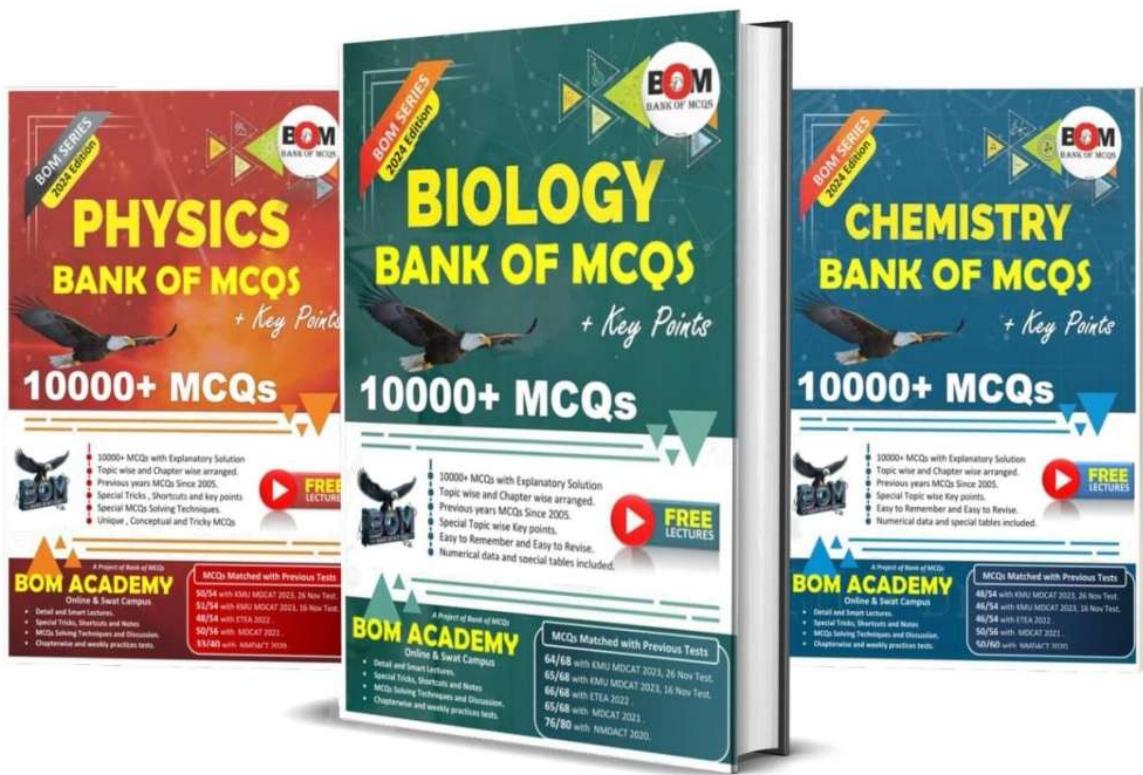


This book provides a complete review of the material covered in two years course in biology. It is in the form of key points that ranges from elementary and basic to advanced and sophisticated level. By using this book, you can prepare yourself for medical collages admission tests and at college level biology examination.

These contents of this book are mainly based on recommended textbook for college level biology course.

We wish you every success and invites positive critisimm and suggestions for the improvement of the information.

Shamsul Amin Khan



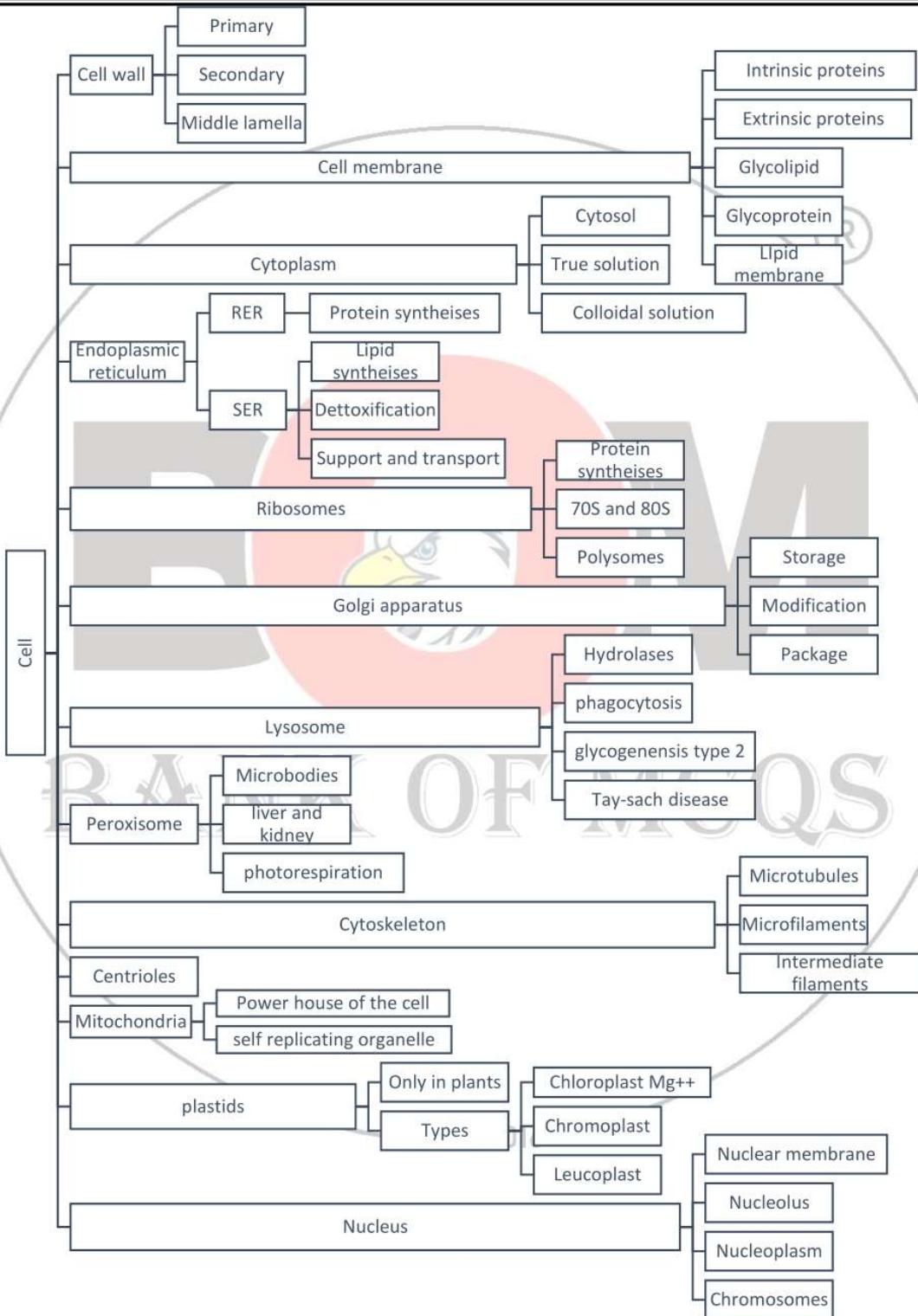
Since 2016

**Table of Contents**

<b>CHAP# 1 THE CELL KEY POINTS</b>	<b>4</b>	<b>ALL BIOLOGY NUMERICAL DATA</b>	<b>128</b>
<b>CHAP# 2 BIOLOGICAL MOLECULES KEY POINTS</b>	<b>11</b>	CELL STRUCTURE AND FUNCTIONS	128
<b>CHAP# 3 ENZYMES KEY POINTS</b>	<b>12</b>	BIOLOGICAL MOLECULES	129
<b>CHAP# 4 BIOENERGETICS KEY POINTS</b>	<b>12</b>	ENZYME	129
<b>CHAP# 5 ACELLULAR LIFE KEY POINTS</b>	<b>17</b>	BIOENERGETICS	130
<b>CHAP# 6 PROKARYOTES KEY POINTS</b>	<b>18</b>	ACELLULAR LIFE	130
<b>CHAP# 7 PROTISTA AND FUNGI KEY POINTS</b>	<b>19</b>	PROKARYOTES	131
<b>CHAP# 8 DIVERSITY AMONG PLANTS KEY POINTS</b>	<b>24</b>	PROTISTA AND FUNGI	131
<b>CHAP# 9 DIVERSITY AMONG ANIMALS KEY POINTS</b>	<b>29</b>	DIVERSITY AMONG PLANTS	131
<b>CHAP# 10 FORMS &amp; FUNCTIONS IN PLANTS KEY POINTS</b>	<b>47</b>	DIVERSITY AMONG ANIMALS	132
<b>CHAP# 11 DIGESTION KEY POINTS</b>	<b>55</b>	FORM AND FUNCTIONS IN PLANTS	132
<b>CHAP# 12 CIRCULATION KEY POINTS</b>	<b>56</b>	DIGESTION	133
<b>CHAP# 13 IMMUNITY KEY POINTS</b>	<b>56</b>	CIRCULATION	133
<b>CHAP# 14 RESPIRATION KEY POINTS</b>	<b>62</b>	IMMUNITY	135
<b>CHAP# 15 HOMEOSTASIS KEY POINTS</b>	<b>66</b>	RESPIRATION	135
<b>CHAP# 16 SUPPORT AND MOVEMENT KEY POINTS</b>	<b>72</b>	HOMEOSTASIS	135
<b>CHAP# 17 NERVOUS COORDINATION KEY POINTS</b>	<b>74</b>	SKELETON AND MUSCLES	136
<b>CHAP# 18 CHEMICAL COORDINATION KEY POINTS</b>	<b>83</b>	NERVOUS COORDINATION	137
<b>CHAP# 19 BEHAVIOR KEY POINTS</b>	<b>84</b>	CHEMICAL COORDINATION	137
<b>CHAPTER NO.: 20 REPRODUCTION</b>	<b>84</b>	BEHAVIOR	138
<b>CHAP# 21 DEVELOPMENT &amp; AGING KEY POINTS</b>	<b>92</b>	REPRODUCTION	138
<b>CHAP# 22 INHERITANCE KEY POINTS</b>	<b>93</b>	DEVELOPMENT AND AGING	140
<b>CHAP# 23 CHROMOSOMES AND DNA KEY POINTS</b>	<b>93</b>	INHERITANCE	141
<b>CHAP# 24 EVOLUTION KEY POINTS</b>	<b>105</b>	CHROMOSOMES AND DNA	143
<b>CHAP# 25 MAN AND HIS ENVIRONMENT KEY POINTS</b>	<b>109</b>	EVOLUTION	144
<b>CHAP# 26 BIOTECHNOLOGY KEY POINTS</b>	<b>114</b>	MAN AND HIS ENVIRONMENT	145
<b>CHAPTER 27 BIOLOGY AND HUMAN WELFARE KEY POINTS</b>	<b>123</b>	BIOTECHNOLOGY	146
		BIOLOGY AND HUMAN WELFARE	147

Since 2016

# CHAP# 1 The cell Key points



S.No | QUESTIONS

ANSWERS

**TECHNIQUE USED IN BIOLOGY**

1.	TEM can magnify an object upto	10 lac times															
2.	SEM produce	3D image <b>ETEA-2017 &amp; 2018</b>															
3.	<table border="1"> <thead> <tr> <th>Objective lens</th> <th>Eye piece lens</th> <th>Magnification</th> </tr> </thead> <tbody> <tr> <td>10 x</td> <td>6x</td> <td>60x</td> </tr> <tr> <td>40x</td> <td>6x</td> <td>240x</td> </tr> <tr> <td>10x</td> <td>10x</td> <td>100x</td> </tr> <tr> <td>40 x</td> <td>10x</td> <td>400x</td> </tr> </tbody> </table>		Objective lens	Eye piece lens	Magnification	10 x	6x	60x	40x	6x	240x	10x	10x	100x	40 x	10x	400x
Objective lens	Eye piece lens	Magnification															
10 x	6x	60x															
40x	6x	240x															
10x	10x	100x															
40 x	10x	400x															
4.	Methylene and neutral red are	Vital stains															
5.	Aniline sulphate, iodine solution and schultz's solution are	Temporary stains															
6.	Chlorine, zinc and iodine are present in	Schultz's solution															
7.	Stain suitable for DNA is	Feulgen's stain															
8.	Stain suitable for nuclei and obelia coloni is	Borax caraime															
9.	Stain suitable for cellulose and cytoplasm is	Eosin															
10.	Stain suitable for blood cells	Leishman's stain															
11.	Aniline sulphate is used for	lignin															
12.	Iodine solution is used for	Starch															
13.	Schultz's solution is used for lignin, starch, cellulose and	cutin															
14.	Hemacytometer, cryostorage container and autoclave are	Tissue culture apparatuses															
15.	Multiplication of explant give rise to	Callus															
16.	Selection, sterilization, callus formation, root formation and shoot formation are main steps of	Tissue culture															

**PLASMA MEMBRANE**

17.	The first wall formed in developing cell is	Primary wall
18.	primary and secondary walls are	Optically active
19.	Nitrocellulose is an	Explosive
20.	Integral proteins which are carriers are also known as	Permeases <b>ETEA-2014</b>
21.	Glycoprotein and glycolipid are also known as	Permeases
22.	Often the outer region of cytosol is more	Gel like
23.	Hormone corticosteroids made in adrenal cortex and sex hormones testosterone, estrogen are initiated by	Endoplasmic reticulum
24.	Plasma membrane are 7nm wide and its structure is	Dynamic
25.	Primary cell wall is mainly made of	Polysaccharides cellulose <b>ETEA-2013</b>
26.	Secondary cell wall mainly contain	Pectin <b>ETEA-2011</b>
27.	The soluble part of cytoplasm which forms ground substances are called	Cytosol
28.	Nucleus was discovered by Robert brown in	1838 <b>ETEA-2013</b>
29.	The attachment of two sub-units of ribosomes along mRNA is controlled by	Magnesium ions
30.	Secondary wall, primary wall and middle lamella	Layers in plant cell from inside to outside <b>ETEA-2009</b>
31.	The ability of an instrument to reveal the minor details of an object is its	Resolving power

**CELL WALL, CELL MEMBRANE,ER AND RIBOSOMES**

32.	Function of rough endoplasmic reticulum	Protein synthesis <b>ETEA-2005</b>
33.	Function of smooth endoplasmic reticulum	Lipid syntheses

		<b>ETEA -2012-23</b>															
34.	Ribosomes are attached to endoplasmic reticulum hence called	Rough endoplasmic reticulum <b>ETEA-2019</b>															
35.	Growth movement of pollen tube towards the egg is	Chemotropism															
36.	Size of ribosome in prokaryotic cell is	70S															
37.	Size of ribosome in eukaryotic cell is	80S															
38.	<table border="1"> <thead> <tr> <th>Ribosomes</th> <th>Smaller unit</th> <th>Larger unit</th> <th>Total size</th> <th></th> </tr> </thead> <tbody> <tr> <td>Prokaryotic</td> <td>30 S</td> <td>50 S</td> <td>70 S</td> <td><b>ETEA-2009</b></td> </tr> <tr> <td>Eukaryotic</td> <td>40 S</td> <td>60 S</td> <td>80 S</td> <td><b>ETEA-2015</b></td> </tr> </tbody> </table>	Ribosomes	Smaller unit	Larger unit	Total size		Prokaryotic	30 S	50 S	70 S	<b>ETEA-2009</b>	Eukaryotic	40 S	60 S	80 S	<b>ETEA-2015</b>	
Ribosomes	Smaller unit	Larger unit	Total size														
Prokaryotic	30 S	50 S	70 S	<b>ETEA-2009</b>													
Eukaryotic	40 S	60 S	80 S	<b>ETEA-2015</b>													
39.	In paper chromatography we use	Water absorbed on papers															
40.	For separation of compounds from mixture use a technique called	Chromatography															
41.	The growth and reproduction of eukaryotic cell is dependent upon its	Nucleus															
42.	Special protein carrier in plasma membrane	Protoplastids															
43.	Cell wall of cells are held together by	Middle lamella															
44.	The membrane is like sea of lipids in which proteins are floating	Fluid mosaic model															
45.	<table border="1"> <thead> <tr> <th>Wall</th> <th>Thickness</th> </tr> </thead> <tbody> <tr> <td>Middle lamella</td> <td>1 <math>\mu</math> m</td> </tr> <tr> <td>Primary wall</td> <td>1 – 3 <math>\mu</math> m</td> </tr> <tr> <td>Secondary wall</td> <td>5 – 10 <math>\mu</math> m</td> </tr> </tbody> </table>	Wall	Thickness	Middle lamella	1 $\mu$ m	Primary wall	1 – 3 $\mu$ m	Secondary wall	5 – 10 $\mu$ m								
Wall	Thickness																
Middle lamella	1 $\mu$ m																
Primary wall	1 – 3 $\mu$ m																
Secondary wall	5 – 10 $\mu$ m																
46.	Chronological developments towards fluid mosaic model of plasma membrane	<table border="1"> <tr> <td>1</td> <td>Gorter &amp; Grendel 1925</td> <td>Two layers of lipids molecule only</td> </tr> <tr> <td>2</td> <td>J f Danielle &amp; Davon 1935</td> <td>Lipid bilayer is covered with protein and protein pores</td> </tr> <tr> <td>3</td> <td>Roberston 1959</td> <td>Unit membrane model</td> </tr> <tr> <td>4</td> <td>S J Singer &amp; G L Nicholson 1972</td> <td>Fluid mosaic model</td> </tr> </table>	1	Gorter & Grendel 1925	Two layers of lipids molecule only	2	J f Danielle & Davon 1935	Lipid bilayer is covered with protein and protein pores	3	Roberston 1959	Unit membrane model	4	S J Singer & G L Nicholson 1972	Fluid mosaic model			
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3	Roberston 1959	Unit membrane model															
4	S J Singer & G L Nicholson 1972	Fluid mosaic model															
<b>LYSOSOMES, GLYOXISOMES, PEROXISOME</b>																	
47.	The cisternae together with vesicles are called	Golgi-complex															
48.	Lysosomes contain variety of enzymes called	Hydrolases															
49.	Protein extending from in double layer of lipids completely are called	Intrinsic protein															
50.	Some protein are on one side of membrane called	Extrinsic protein															
51.	Carbohydrates attached to lipids are called	Glycolipid															
52.	Carbohydrates attached to proteins are called	Glycoprotein															
53.	Channels of endoplasmic reticulum are separated from one another by spherical or tubular membranes one above another called	Cisternae															
54.	Circulation, syntheses, detoxification, mechanical support and communication	ER functions <b>ETEA-2006</b>															
55.	In cytoplasm, small ions and molecules form	True solution															
56.	In cytoplasm, some large molecules form	Colloidal solution															
57.	Active mass movement of cytoplasm is called	Cyclosis															
58.	The unit of Golgi apparatus	Dictyosomes <b>ETEA -2023</b>															
59.	Stacks of flattened, membrane bounded sacs called	Cisternae															
60.	Cisternae associated vesicles are called	Golgi-complex															
61.	Storage of secretory products and packaging and modification	Functions of Golgi apparatus															

	of the secretory products									
62.	The food digestive enzyme of lysosome are called	Hydrolases								
63.	Enzymes are budded off as Golgi vesicles and are called	Primary lysosomes								
64.	Metamorphosis in animals are example of	Lysosomal activity								
PLASTIDS										
65.	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Plastids</th> <th style="text-align: center;">Found in</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">Chloroplast</td><td style="text-align: center;">Green parts</td></tr> <tr> <td style="text-align: center;">Chromoplast</td><td style="text-align: center;">Other than green parts</td></tr> <tr> <td style="text-align: center;">Leucoplast</td><td style="text-align: center;">Colourless parts</td></tr> </tbody> </table>		Plastids	Found in	Chloroplast	Green parts	Chromoplast	Other than green parts	Leucoplast	Colourless parts
Plastids	Found in									
Chloroplast	Green parts									
Chromoplast	Other than green parts									
Leucoplast	Colourless parts									
66.	Primary lysosomes are synthesized in RER are processed in	Golgi apparatus								
MIX										
67.	Ribosomes are synthesized in	Nucleolus of the nucleus								
68.	The two sub units of ribosomes are attached by	Mg <sup>++</sup> <b>ETEA-2009</b>								
69.	In animals peroxisomes are present in	Liver and kidney								
70.	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Organisms</th> <th style="text-align: center;">No of flagella</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">Mammalian spermatozoon</td><td style="text-align: center;">1</td></tr> <tr> <td style="text-align: center;">Chlamydomonas</td><td style="text-align: center;">2</td></tr> <tr> <td style="text-align: center;">Paramecium</td><td style="text-align: center;">Few thousands</td></tr> </tbody> </table>		Organisms	No of flagella	Mammalian spermatozoon	1	Chlamydomonas	2	Paramecium	Few thousands
Organisms	No of flagella									
Mammalian spermatozoon	1									
Chlamydomonas	2									
Paramecium	Few thousands									
71.	In leaves of plants, photorespiration occurs in	Peroxisomes								
72.	Glyoxisomes (only in plants) contains glycolic acid, oxidase and	Catalase								
73.	Conversion of fatty acids to carbohydrates are done by	Glyoxisomes <b>ETEA-2010</b>								
74.	Chloroplast Size	4-6 micrometer								
75.	Length and diameter of centriole	0.3-0.5 μm and 0.2 μm								
76.	Each centriole consist of	9 microtubules (27 tubules)								
77.	In animal cells and lower plants, two centrioles are present at	Right angle to each other <b>ETEA-2017</b>								
78.	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Cytoskeleton</th> <th style="text-align: center;">Subunit</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">Microtubules</td><td style="text-align: center;">Tubulin protein</td></tr> <tr> <td style="text-align: center;">Microfilament</td><td style="text-align: center;">Actin protein</td></tr> <tr> <td style="text-align: center;">Intermediate filaments</td><td style="text-align: center;">Fibrous</td></tr> </tbody> </table>		Cytoskeleton	Subunit	Microtubules	Tubulin protein	Microfilament	Actin protein	Intermediate filaments	Fibrous
Cytoskeleton	Subunit									
Microtubules	Tubulin protein									
Microfilament	Actin protein									
Intermediate filaments	Fibrous									
79.	Small knob structures on inner surface mitochondria is called	Elementary / F1 particles								
80.	The presence of ribosomes and DNA indicate that	Protein is synthesize here in mitochondria								
81.	The average number of thylakoids to form one granum is	50 or more								
82.	Chloroplast and mitochondria are	Self-replicating organelle <b>ETEA -2023</b>								
83.	Glyoxisomes and plastids are unique organelle found in	Plants only								
84.	Mitochondria is absent in	Mature RBCs <b>ETEA -2023</b>								
85.	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Organelle</th> <th style="text-align: center;">Diameter</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">Chloroplasts</td><td style="text-align: center;">4 - 6 μ m <b>ETEA-2015</b></td></tr> <tr> <td style="text-align: center;">Nucleus</td><td style="text-align: center;">10 μ m</td></tr> <tr> <td style="text-align: center;">Ribosomes</td><td style="text-align: center;">20 nm</td></tr> </tbody> </table>		Organelle	Diameter	Chloroplasts	4 - 6 μ m <b>ETEA-2015</b>	Nucleus	10 μ m	Ribosomes	20 nm
Organelle	Diameter									
Chloroplasts	4 - 6 μ m <b>ETEA-2015</b>									
Nucleus	10 μ m									
Ribosomes	20 nm									
86.	The central bundle of microtubules in cilia is called	Axoneme								
87.	Mitosis is missing in	Prokaryotes								

88.	Prokaryotic Cell wall is made of	Murein <b>ETEA -2023</b>															
89.	<b>ETEA-2013</b>																
	<b>Species</b>	<b>No of chromosomes</b>	<b>Species</b>	<b>No of chromosomes</b>													
	Drosophila	8	Man	46													
	Garden pea	14 <b>ETEA-2019</b>	Chimpanzee	48													
	Onion	16	Potato	48													
	Frog	26	pigeon	80													
90.	Eukaryotic Cell wall is made of	Cellulose															
91.	In cell one organelle are involved in function of other except endoplasmic reticulum	And peroxisome															
92.	Glyoxisome is only found in	Plant cell <b>ETEA-2006</b>															
93.	Cell fail to detoxify the waste substances produced in it because it does not posses	Enough Smooth Endoplasmic Reticulum <b>ETEA-2012</b>															
94.	Mitosis occur in nucleus with nuclear membrane intact in	Fungi															
95.	Ascomycota reproduce asexually by means of	Conidia															
96.		<table border="1"> <thead> <tr> <th><b>Drugs</b></th><th><b>used for</b></th><th><b>Obtain from</b></th></tr> </thead> <tbody> <tr> <td>Ergotamine</td><td>Baby delivery</td><td><i>Claviceps purpurea</i></td></tr> <tr> <td>Penicillin</td><td>Antibiotics</td><td><i>Pencillium chrysogenum</i></td></tr> <tr> <td>Cephalosporin</td><td>Antibiotics</td><td><i>Cephalosporin acremonium</i></td></tr> <tr> <td>Griseofulvin</td><td>Antibiotics</td><td><i>Pencilllin</i></td></tr> </tbody> </table>	<b>Drugs</b>	<b>used for</b>	<b>Obtain from</b>	Ergotamine	Baby delivery	<i>Claviceps purpurea</i>	Penicillin	Antibiotics	<i>Pencillium chrysogenum</i>	Cephalosporin	Antibiotics	<i>Cephalosporin acremonium</i>	Griseofulvin	Antibiotics	<i>Pencilllin</i>
<b>Drugs</b>	<b>used for</b>	<b>Obtain from</b>															
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Griseofulvin	Antibiotics	<i>Pencilllin</i>															
97.	Braking down of glucose to produce ethanol and carbon dioxide is done by	<i>Saccharomyces cerevisiae</i>															
98.	Yeast contain	6000 genes															
99.	Peroxisomes are most common in	Liver and kidney cells															
100.	Photorespiration may occur in	Peroxisomes															
101.	Peroxisomes break down hydrogen peroxide to	Hydrogen and oxygen															
102.	Converting of fatty acids to carbohydrates are the primary activity of	Glyoxisomes <b>ETEA-2012</b>															
103.	Cyclosis and amoeboid movements are because of	Microfilaments															
104.	Microtubules (25nm) are made of	Tubulin protein															
105.	Microfilaments (7nm) are made of	Actin protein															
106.	Intermediate filaments (8-12nm) are made of	Fibrous protein															
107.	Cilia and flagella contain	20 Microtubules															
108.	The bundles of microtubules comprising the axoneme are surrounded by	Plasma membrane															
109.	Mitochondria are also called	Power house of the cell <b>ETEA-2013</b>															
110.	The shapes of mitochondria may be	Vesicles, Rods or Filaments															
111.	The presence of ribosome and DNA in mitochondria shows that it is	Self Replicating organelle <b>ETEA -2023</b>															
112.	Small knob present in inside of mitochondrial wall is known as Elementary particles	Or F1 particles															
113.	Two subunits of ribosomes are attached by	Mg <sup>++</sup> <b>ETEA-2012</b>															
114.	Chlorophyll contain	Mg <sup>++</sup>															

115.	Haemoglobin contains	Fe <sup>++</sup> <b>ETEA-2011</b>
116.	Chromoplast helps in pollination and dispersal of	Seeds
117.	The place where spindle fibers are attached is	Centromere
118.	Sedberg is unit of	Ultracentrifugation
119.	Metamorphosis of animals is example of	Lysosomal activity
120.	In glycogenesis type II , the liver and muscles appear filled with	Glycogen <b>ETEA-2012</b>
121.	Tay-Sach's disease is involved in the catabolism of	Lipids
122.	Diameter of peroxisome is	5 micrometer
123.	In animal, peroxisome is also known as	Microbodies
124.	Photorespiration may occur in	Peroxisome
125.	Spindle structure formation is due to	Microtubules
126.	Cyclosis and amoeboid movements are due to	Microfilament
127.	Cell shape is maintained by	Intermediate filament
128.	Centriole is present in	Lower plant
129.	Protein, ribosome and small circular DNA is present in	Chloroplast
130.	Chloroplast is	Self replicating organelle
131.	Nucleopores present in egg	30000
132.	Nucleopores present in erythrocytes are	3-4
133.	Cell wall of bacteria is made of	Murein <b>ETEA -2023</b>
134.	Cell of plant is made of	Cellulose
135.	Polysaccharide bonded with amino acid are called peptidoglycan or	Murein <b>ETEA-2019</b>
136.	Single, circular and double stranded DNA molecule is present in the	Bacteria <b>ETEA-2016</b>
137.	The two prominent structure present in the nucleus are	Chromosome and nucleous
138.	The largest and more conspicuous structure or cell organelle is the double membrane bounded	Nucleus

**THE FOLLOWING TABLE IS EXTRA BUT CONTAIN SIMPLE AND IMPORTANT INFO**

Microscope:

1. Light microscope → 500X
2. TEM → 10 lac times
3. SEM → 3D **ETEA**

Permanent stains

4. Aniline blue → fungal hyphae and spores
5. Borax carmine → nuclei and obelia colony
6. Eosin → cytoplasm and cellulose
7. Feulgen's stain → DNA
8. Leishman's Stain → blood cells
9. Methylene blue → nuclei
10. Safranin → nuclei lignin and plant tissues **ETEA-2019**
11. Aniline sulphate → lignin

Temporary stains

12. Iodine solution → starch
13. Schiltz solution → starch, lignin, protein and cellulose
14. Automated cell counter → hemocytometer
15. Liquid nitrogen freezer or cryostorage container

16. Chromatography depends on solubility and molecular masses

17. Column chromatography for photosynthetic pigment, sugar and amino acids.

18. Many cell have only primary wall

Cell wall components use

19. Itracellular → explosive
20. Rayon → textile fibre
21. Cellophane → partially permeable membrane
22. Plastics including celluloid and cinematography Paper making

23. Microtubule → spindle structure **ETEA**24. Microfilament → cyclosis and amoeboid movement **ETEA**

25. Intermediate structure → cell shape

26. Centriole → low plant and microorganism

27. Cilia and flagella → 20 micro tubule **ETEA**28. Centriole → 27 microtubule **ETEA**

29. Free ribosome → haemoglobin in new RBCs formation

30. S → ultracentrifugation unit  
 31. Spindle fibre attached to centromere  
 32. Bacteria → single, circular and double stranded DNA **ETEA**  
 33. Bacteria = 10 times of body cells  
 34. Prokaryotes → no mitosis  
 35. Prokaryotes → binary fission occurs

## In Bacteria

36. Sexually → conjugation **ETEA**  
 37. Asexually → binary fission or multiple fission(spore formation)  
 70S ribosomes is of **NMDCAT-2020**  
 38. Prokaryotes  
 39. Chloroplast  
 40. Mitochondria

Dimater

41. Peroxisome → 0.5 micro m **ETEA**  
 42. Centriole 0.2 micro m  
 43. Chloroplast → 4-6 micro m **ETEA**  
 44. Nucleus → 10 micro m

- Pore per nucleus  
 45. Undifferentiated cell/egg → 30,000  
 46. Differentiated cell/erythrocytes → 3-4

## Prokaryotes

47. Bacteria  
 48. Blue green algae (cyanobacteria) **ETEA**

## Eukaryotes

49. Protists (amoeba, paramecium and euglena)  
 50. Animals  
 51. Plants  
 52. Fungi

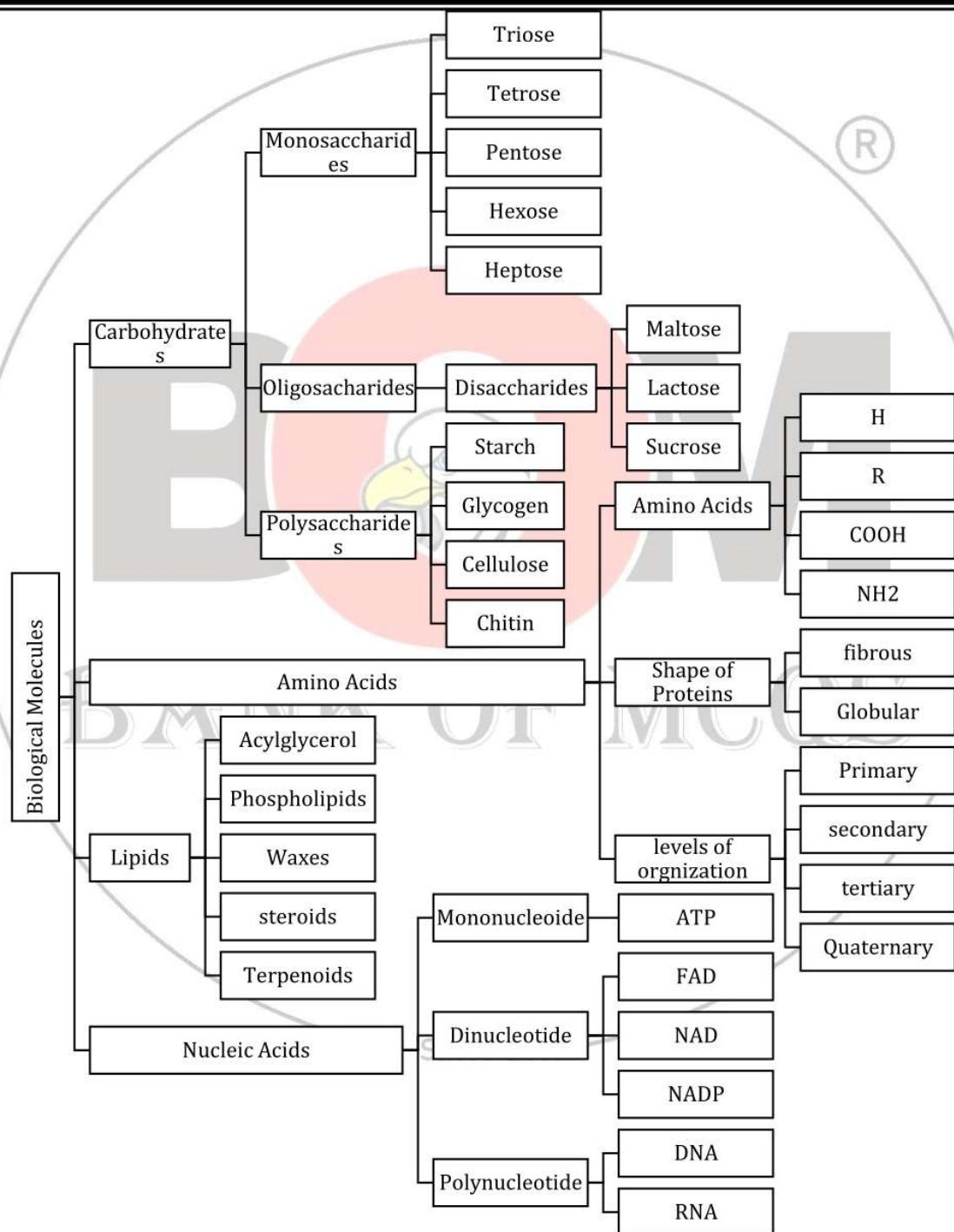


# BANK OF MCQS

Since 2016

# CHAP# 2 Biological Molecules

## Key points



**This chapter is missing because this is book sample.**

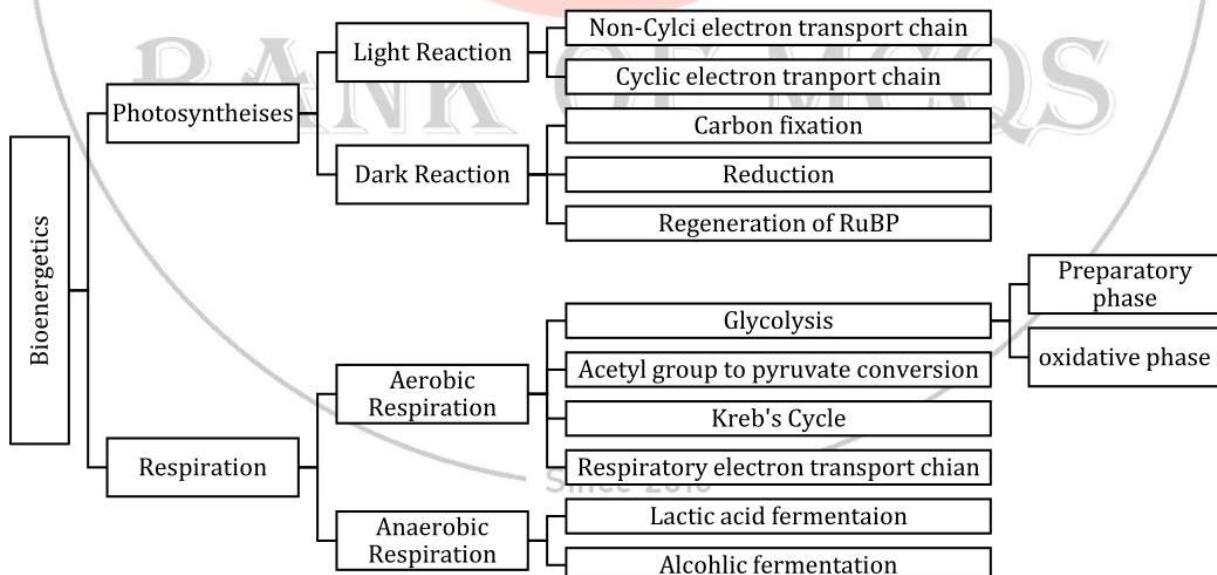
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## **CHAP# 3 Enzymes Key points**

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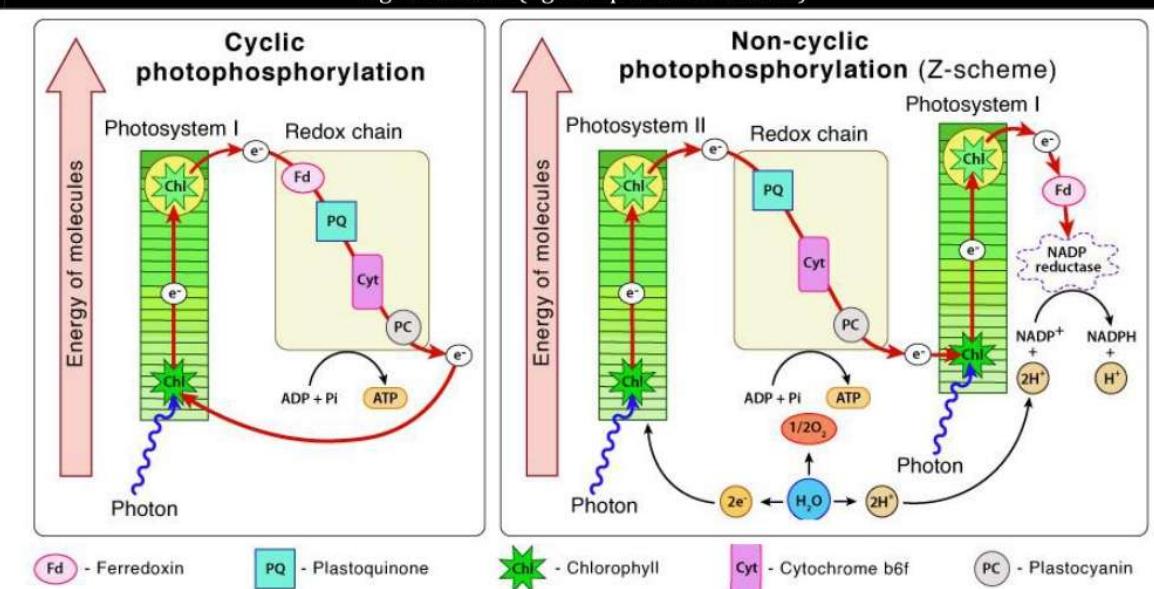
## **CHAP# 4 Bioenergetics Key points**



S.No	Questions	Answers
Role of sunlight in photosynthesises		
1)	Shorts wavelength are more energetic than	Long wavelength
2)	Chlorophyll appear green, because they reflect green colour, so	Less important

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	green colour, for photosynthesis is	ETEA-2005
3)	<b>Visible light ranges from</b>	<b>380 nm - 760 nm</b>
4)	Wavelength shorter than visible light	Ultraviolet
5)	Wavelength longer than visible light	Infrared
6)	Infrared can not affect	Photosynthetic process
7)	Total sunlight that enters to atmosphere and reaches to the earth surface	40 %
8)	Chlorophylls absorb light of violet blue wavelength ( <b>390-460 nm</b> ) and	Red wavelength ( <b>630-700 nm</b> ) ETEA-2019
9)	Carotenoids (accessory pigments) absorbs light of wavelength Photosynthetic pigments	500-600 nm
10)	Photosynthesis takes place in	Chloroplast ETEA -2023
11)	Light reaction takes place in	Thylakoids <b>ETEA -2015- 2023</b>
12)	Dark reaction occurs in	Stroma ETEA-2008
13)	Photosynthetic bacteria lack	Chloroplasts
14)	Chlorophyll in photobacteria is attached to	Cell membrane
15)	Chlorophyll "a" is present in all green plants except	Bacteria
16)	Chlorophyll "b" is present in higher plants and	Algae
17)	Chlorophyll "c", "d" and "e" are present in	Various groups of algae
18)	Chlorophyll contains	Magnesium ETEA-2012
19)	Bacterio-Chlorophyll is only present in	Bacteria
20)	Long hydrocarbon chain attached to pyrrole rings is called	Phytol side chain
21)	The four rings (tetra pyrrole rings) are collectively called	Porphyrin
22)	In chlorophyll a the group attached to porphyrine group is	Methyl group ( $\text{CH}_3$ ) <b>ETEA-2013</b>
23)	In chlorophyll b the group attached to porphyrine group is	carbonyl group (CHO) <b>ETEA-2014</b>
24)	Aerobic respiration is also called	Cellular respiration
25)	Photosystem consists of many hundreds chlorophyll a, chlorophyll b, carotenoids and	Electron acceptor
26)	Photosystem I absorbs light of	700 nm
27)	Photosystem II absorbs light of	680 nm
28)	Reaction centre consists of primary electron acceptor and	Reaction centre chlorophyll
29)	On absorbing light, electron from photosystem is lost from	Chlorophyll
30)	Von Neel hypothesized that plant splits water to release oxygen in	1930 ETEA-2014
31)	In glycolysis phosphate is gained by NADH and is converted to	$\text{NADPH}_2$
32)	Chlorophyll a has methyl group( $\text{CH}_3$ ) and formula of	$\text{C}_{55} \text{H}_{72} \text{O}_5 \text{N}_4 \text{Mg}$
33)	Chlorophyll b has carbonyl group(CHO) and formula of	$\text{C}_{55} \text{H}_{70} \text{O}_6 \text{N}_4 \text{Mg}$ ETEA-2017
34)	Carotenoids include	Carotenes & xanthophylls
35)	Carotenoids are yellow, orange, red or	Brown pigment <b>ETEA-2015 &amp; 2016.</b> <b>Formula: YORB</b>
36)	Carotenoids protect chlorophyll from intense light and	Oxidation by oxygen
37)	Carotenoids absorb light and transfer it to	Chlorophyll a
38)	Instrument that measures amount of light passed	Spectrophotometer
39)	We can measure the rate of photosynthesis by measuring the amount of	Oxygen produced

## Light reaction (light dependent reaction)



40)	Thylakoids contains chlorophyll a, b and	Carotenoids <b>ETEA-2013</b>
41)	Forming ATP from ADP and inorganic phosphate using sunlight energy is called	Photphosphorylation <b>ETEA-2014</b>
42)	The ATP synthesis during Non-cyclic electron transport flow is called	Non-Cyclic Photphosphorylation
43)	The ATP synthesis during Cyclic electron transport flow is called	Cyclic Photphosphorylation
44)	The 1 <sup>st</sup> product of photosynthesis is	PGA
45)	In non cyclic electron transport chain, ATP is produced by energy loss between cytochrome	B and f
46)	Cyclic elctron transport occurs in	Rare conditions
47)	Cyclic electron transport of light reaction involves	Photosystem 1
48)	Product of lght reaction are	NADPH+ATP <b>ETEA-2014</b>
49)	ATPs produced in non-cyclic photophosporylation are	4 <b>ETEA-2015</b>
50)	Non cyclic electron transport chain involves	Photosystem 1 + 2
51)	Cyclic electron transport chain involves	Photosystem 1
52)	When light hits photosystem 2, _____ are removed	2 electrons
53)	Electrons from photosystem 2 are captured by	Plasto quinione
54)	Electrons from plastoquinone are captured by	Cytochrome b and f
55)	In electron transport chain, moecules are	Reduced + oxidized
56)	Electrons from plstoccyanin are accepted by	Photosystem 1
57)	NADP is reduced in light reaction to	NADPH <sub>2</sub>
	Dark reaction	
58)	Dark reaction is also called	Calvin cycle
59)	Dark reaction takes place at	Day and night
60)	Steps of dard reaction	3
61)	In Carbon fixation, RuBP + CO <sub>2</sub>	Unstable 6 carbon compound
62)	Unstable 6 carbon compound splits to 2 molecules of	PGA
63)	In Reduction , PGA gives	PGAL
64)	PGAL gives RuBp and	Glucose

BOM SERIES	Page 15	BOM ACADEMY Online & Swat
65)	The most common protein in nature	Rubisco
66)	Ribulose bisphosphate carboxylase is also called	Rubisco
67)	First product of photosynthesis to be identified is	PGA
68)	In reduction process fixed carbon is reduced to a 3-carbon sugar molecules of	PGAL
69)	Five PGAL are recycled to regenerate 3 molecules of	RuBP ETEA-2015
70)	For sugar molecules, the number of PGAL used are	One
71)	ATP is used in ___ stage of dark reaction	Reduction
<b>Respiration</b>		
72)	Total ATP produced in glycolysis	4
73)	Net gain of ATP in glycolysis	2
74)	The number of ATP formed directly by a single Krebs cycle is	1 ETEA-2012
75)	Total ATP produced in respiration of glucose is	36
76)	Glycolysis occurs in cytosol while Krebs cycle & electron transport chain occur in	Mitochondria ETEA-2013
77)	The non-cyclic electron transport is also called	Zigzag Scheme
78)	Dark reaction is also called	Calvin-Benson cycle
79)	In carbon fixation RuBP combines with CO <sub>2</sub> forming 6-carbon compound which splits to	Two Phosphoglycerate (PGA)
80)	In reduction process carbon is reduced to a 3 - carbon molecules	PGAL
81)	Out of six PGAL, only one molecule is used for making	Glucose
82)	Five PGAL molecules are recycled to generate	3 molecules of RuBP
83)	In preparatory phase of glycolysis, the glucose splits into	PGAL & DAP
84)	End product of glycolysis is	Two pyruvate
85)	In glycolysis electron is gained and form water by	Oxygen ETEA-2012
86)	The generation of ATP in process of glycolysis is called	Substrate level Phosphorylation
87)	The end product of glycolysis is	2 molecules of Pyruvate ETEA-2013 NMDCAT-2020
88)	In Kreb's Cycle or TCA cycle, Acetyl CoA is completely oxidized into	2 molecules of CO <sub>2</sub>
89)	Important points	
90)	Coenzyme A consists of a nucleotide and a portion of one of the	B vitamins
91)	Nine acetyl group generate	108 ATP molecules
92)	Anaerobic respiration yields	2 ATP molecules
93)	The simplest amino acid is	Glycine
94)	Sugar cane and maize are	C <sub>4</sub> plants ETEA-2014
95)	Chlorophyll a absorbs	Blue light
96)	Chlorophyll b absorbs	Red light
97)	Plant cell synthesizes sugar in the	Grana ETEA-2012
98)	Conversion of excess glucose into fat is known as	Lipogenesis
99)	DNA has one oxygen less than	RNA
100)	Redox reactions occur in photosynthesis and	Respiration
101)	Sucrose sugar is considered as	Oligosaccharide
102)	Chlorophyll is protected from intense light by	Carotenoids
103)	Sequence of nucleotide bonded to TATGA is	ATACT
104)	Some hormones are composed of	Lipids
105)	Magnesium is attached to center of porphyrin ring of	Chlorophyll

BOM SERIES	Page 16	BOM ACADEMY Online & Swat										
106) During cellular respiration NADH <sub>2</sub> produces	3 ATP	ETEA-2010										
107) During cellular respiration FADH <sub>2</sub> produces	2 ATP											
108) Fatty acids are converted into carbohydrates by	Glyoxisomes											
109) In chromosomes, the material controlling heredity is;	DNA											
110) The common cytochrome in both photosynthesis and respiration is	Cyt "b"											
111) Anticodon of AUG will be	UAC											
112) Peptide bond is formed between carbonyl group and	Amino group	ETEA-2008										
113) What happen to oxygen in electron transport chain	It reduce to water	ETEA-2005 & 2008										
114) Glycolysis occur in	Cytosol(cytoplasm)											
115) Kreb's cycle or Tricarboxylic Acid Cycle(TCA) occur in	Mitochondria	R										
116) Electron transport chain occur in	Mitochondria											
117) Light reaction occur in	Granum of chloroplast	ETEA -2023										
118) Dark reaction or Calvin cycle occur in	Stroma of chloroplast											
119) The step in glycolysis in which transfer of energy is not involved is	Fructose diphosphate → Dap											
120) Photorespiration occur when inside leaf concentration of	CO <sub>2</sub> is high	ETEA-2006										
121) The process responsible for production of energy is	Respiration											
122) Chemiosmosis takes place in	Mitochondria	ETEA-2014										
123) RuBP + O <sub>2</sub> → Glycolate → glycine → serine + CO <sub>2</sub>	Photorespiration											
123) RuBP + O <sub>2</sub> → Glycolate → glycine → serine + CO <sub>2</sub>		ETEA-2016										
124)	<table border="1"> <thead> <tr> <th>C3 PLANTS</th> <th>C4 PLANTS</th> </tr> </thead> <tbody> <tr> <td>PGA</td> <td>Oxaloacetate</td> </tr> <tr> <td>Rubisco</td> <td>Pepco</td> </tr> <tr> <td>Chloroplast is in mesophyll tissues</td> <td>Chloro last is in mesophyll tissues and bundle sheath cells</td> </tr> <tr> <td>Mesophyll cells carry calvin cycle</td> <td>Mesophyll fix CO<sub>2</sub> Bundle sheet cells produce calvin cycle producing glucose</td> </tr> </tbody> </table>		C3 PLANTS	C4 PLANTS	PGA	Oxaloacetate	Rubisco	Pepco	Chloroplast is in mesophyll tissues	Chloro last is in mesophyll tissues and bundle sheath cells	Mesophyll cells carry calvin cycle	Mesophyll fix CO <sub>2</sub> Bundle sheet cells produce calvin cycle producing glucose
C3 PLANTS	C4 PLANTS											
PGA	Oxaloacetate											
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Chloroplast is in mesophyll tissues	Chloro last is in mesophyll tissues and bundle sheath cells											
Mesophyll cells carry calvin cycle	Mesophyll fix CO <sub>2</sub> Bundle sheet cells produce calvin cycle producing glucose											

### Chlorophyll

- 125) A→ all green plants except bacteria  
 126) B→higher plants and green algae  
 127) C,D,E→ various groups of algae  
 128) Bacteriochlorophyll → bacteria

Photosystem **ETEA-2019**

- 129) Antenna comple → chl b + carotenoids  
**ETEA**  
 130) Reaction centre → chl a + primary electron acceptor + electro carrier

ATP production by

- 131) Light reaction → photophosphorelation  
**NMDCAT-2020**  
 132) Non- cyclic transport → non-cyclic photophosphorelation  
 133) Cyclic electron transport → cyclic photophosphorelation

134) Glycolysis → substrate level phosphorelation

135) Light reaction → thylakoids  
**ETEA**  
**NMDCAT-2020**

- 136) Dark reaction → stroma  
 137) Glycvolysis → cytoplasm  
 138) Kreb's cycle → mitochondria  
**ETEA**  
 139) Electron transport chain → mitochondria

140) Co A = nucleotide + B vitamin  
 141) Glycerol → PGAL → glycolytic pathway  
 142) Fatty acids → acetyl group → kreb cycle  
**ETEA**

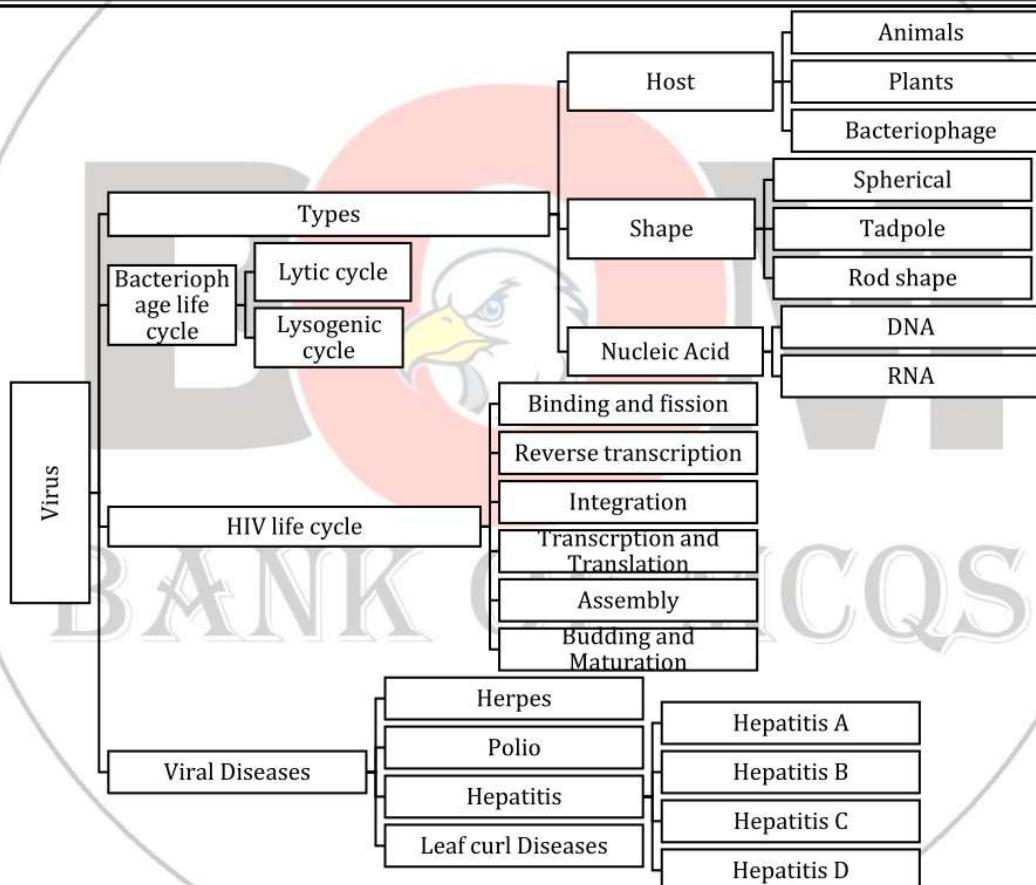
- 143) Oleic acid (18 C) → 9 acetyl group → 108 ATP  
 Anaerobic respirain  
 Lactic acid fermentation  
 144) Muscles of human and many microorganism  
 145) Pyruvic acid → lactic acid  
 Alcoholic fermentaiotn

- 146) Microorganism  
 147) Pyruvic acid → acetaldehyde → ethyl alcohol  
**ETEA**

- Photorespiration  
 148) RuBp + O → glycolate (stoma) **ETEA**  
 149) Glycolate → glycine (peroxisome) **ETEA**  
 150) Glycine → serine + CO<sub>2</sub> (mitochondria)
- C<sub>4</sub> photosyntheses  
 151) RuBP + CO<sub>2</sub> → PEP → malate

- 152) Malate + CO<sub>2</sub> to bundle of sheet where calvin cycle proceeds. **ETEA**
- 153) C<sub>4</sub> plants → sugar cane and maize **ETEA**  
 154) C<sub>4</sub> plants → photosynthesises remains high when stomata closed and temperature is high and the rate of CO<sub>2</sub> fixation is also high as compared to C<sub>3</sub>.  
 155) C<sub>4</sub> plants fix CO<sub>2</sub> and reduce rate of photorespiration **ETEA**

## CHAP# 5 Acellular Life Key points



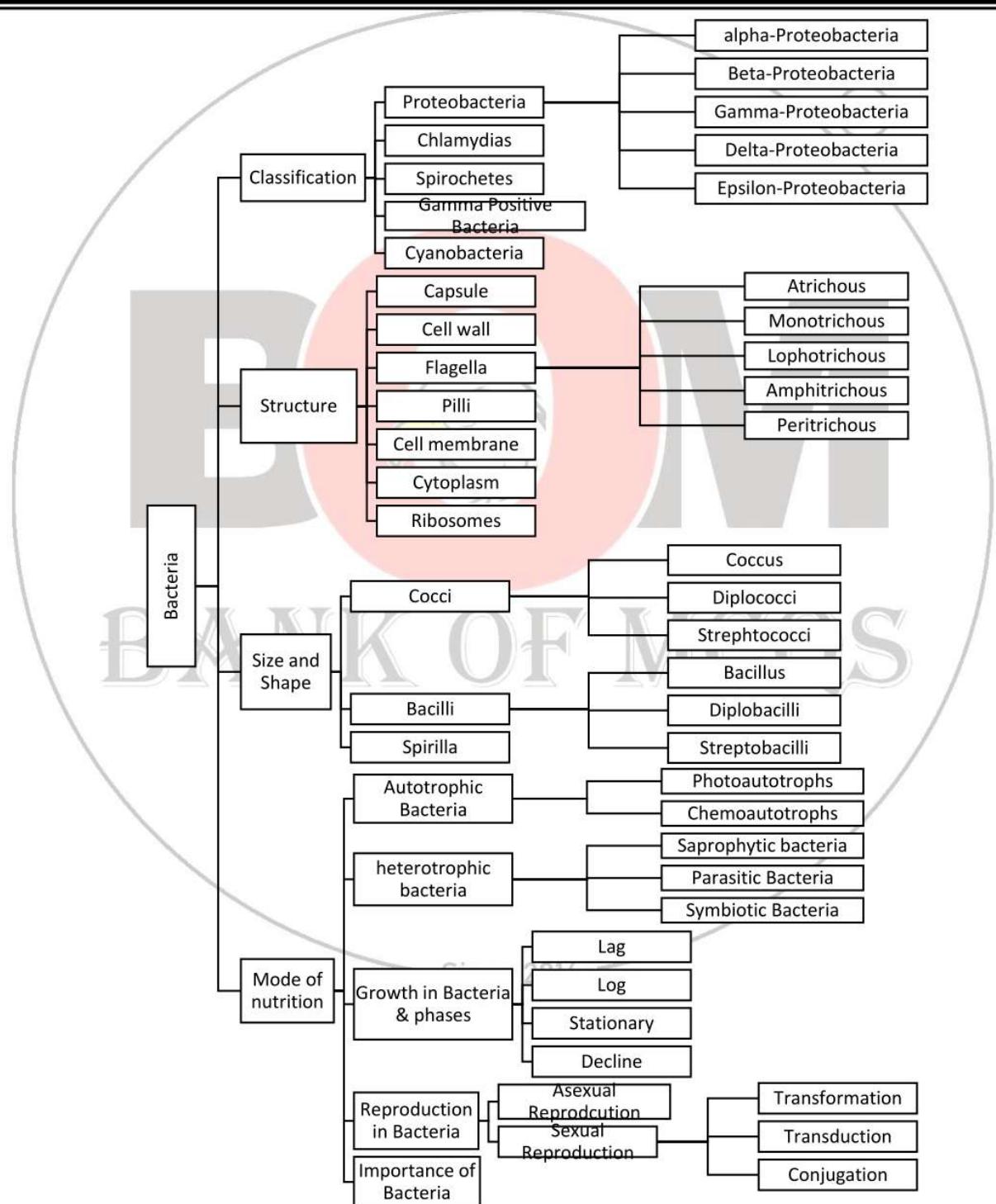
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# CHAP# 6 Prokaryotes Key points

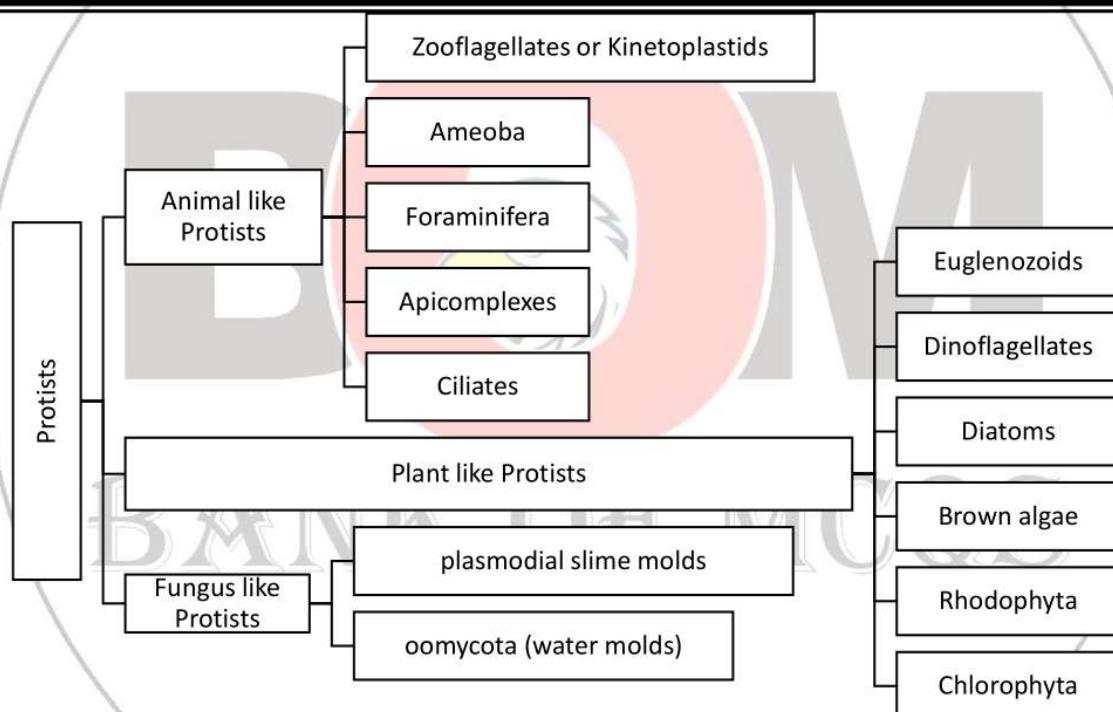


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# CHAP#7 Protista and Fungi Key points



S.No	Questions	Answers
1)	PROTISTA AND TYPES OF PROTISTS	
2)	The oldest eukaryotes are	Protists
3)	Protest kingdom is sometimes called	"Trash can" kingdom
4)	The number of protist species is in between of	60,000 – 200,000
5)	The process of endosymbiosis is present in	Protists
6)	ANIMAL LIKE PROTISTS	
7)	Animal like protists:	
	<b>Protozoa</b>	
	<b>Main groups</b>	<b>Examples &amp; main characteristics</b>
	Zooflagellates or Kinetoplastids	1. Trypanosome which cause African sleeping disease ETEA-2015

		2. Trachonymph in termites digestive track <b>ETEA-2015</b>	
	Ameoba	1. Pseudopodia motion 2. Reproduce by binary fission	
	Foraminifera	1. Resembles like snail 2. Secrete shell of calcium carbonate/limestone	
	Apicomplexes	1. Plasmodium <b>ETEA-2015</b>	
	Ciliates	1. Two nuclei (micro and mega) 2. Paramecium 3. Balantidium coli which infect intestinal tracts of pigs and rats <b>ETEA-2015</b>	
8)	Trachonymph helps in digestion of wood and present in digestive track of	Termites <b>ETEA-2015</b>	(R)
9)	The cell extension or motion of amoeba is called	Seudopodia	
10)	Dysentery is caused by	Amoeba	
11)	Foraminifera helps in determining geological	Age of Strata <b>ETEA-2016</b>	
12)	Sporozoites divide in liver and from	Merozoites <b>ETEA-2005</b>	
13)	The carrier of plasmodium is	Female anopheles Mosquito	
14)	When RBCs burst and Merozoites are released it this time	Diseases symptoms appear <b>ETEA-2013</b>	
15)	Ciliates have outer flexible covering called	Pellicle	
16)	Two types of nuclei ,macro(control physiological functions) and micro(need for sexual reproduction) are present in	Ciliates	

## PLANT LIKE PROTISTS

17)

Type	Characters
Euglenozoids	<ul style="list-style-type: none"> <li>Autotrophs &amp; heterotrophs,</li> <li>two flagella,</li> <li>pellicle membrane beneath plasma membrane (Euglena)</li> </ul>
Dinoflagellates	<ul style="list-style-type: none"> <li>Cellulose wall, two flagella,</li> <li>red tides, change water colour to red <b>ETEA-2017</b></li> <li>, chlorophyll a, c and carotenoids</li> </ul>
Diatoms	<ul style="list-style-type: none"> <li>Two shell made of silica,</li> <li>chlorophyll a, c and carotenoids,</li> <li>diatomaceous earth</li> </ul>
Brown algae	<ul style="list-style-type: none"> <li>Conspicuous seaweeds, <b>ETEA-2015</b></li> <li>air bladder,</li> <li>alternation of generation b/w diploid sporophyte and haploid gametophyte,</li> <li>holdfast (Kelps) <b>ETEA-2015</b></li> </ul>
Rhodophyta	<ul style="list-style-type: none"> <li>Coral reefs, agar and carrageenan production</li> </ul>
Chlorophyta	<ul style="list-style-type: none"> <li>Both uni and multicellular, store food as starch,</li> <li>cellulose wall, chlorophyll a and b, a</li> <li>sexual reproduction is zoospores <b>ETEA-2016</b></li> <li>(volvox + chlamydomonas + spirogyra )</li> </ul>

18)	Two flagella are attached in Euglenozoids in	Reservoir
19)	Some genera of kelps attain height of	100 m
20)	About 40 genera of Euglenozoids contain	Chlorophyll ETEA-2017
21)	Paramecium reproduce asexually by	Transverse fission
22)	Dinoflagellates contain chlorophyll a, c and	Carotenoids
23)	Dinoflagellates produces	Red tides ETEA-2017
24)	Dinoflagellates have two unequal flagella which are	Perpendicular to each other
25)	Diatoms are made up of two shells made of	Silica
26)	The floor made by shells of diatoms are called	Diatomaceous earth
27)	Brown algae float during high tides because it possesses	Air bladders ETEA-2016
28)	Kelps are brown algae possessing large leaf like	Thallus
29)	Brown algae have large root like structure called	Holdfast
30)	The reddish colour of algae is due to accessory pigment called	Phycoerythrin
31)	The green colour of chlorophyll is due to	Phycoerythrin
32)	Chlorophyta are considered as ancestors of	Plants ETEA-2014

## FUNGUS LIKE PROTISTS

33)	<b>Fungus like protists:</b>	
	<b>1. plasmodial slime molds</b>	<b>2. oomycota (water molds)</b>
	Plasmodium is mass form in cycle ETEA-2019	Parasite or parasites
	Back and forth motion of cytoplasm distributes nutrients	Chitin cell wall
	Pseudopodia motion	Male organ: antheridia, female: oogonium
	Phagocytosis of leaf, bacteria & yeast	Sexual reproduction is oogamous
	Meiosis	e.g mycelium
34)	The product of mitotic nuclear division which are not followed by cytokinesis is	Supercell (plasmodium) ETEA-2015
35)	When food exhausts the plasmodium growth stops and meiosis occurs in	Flagellate gametes
36)	The flagellate gametes fuse in pairs and form a new	Plasmodium by mitosis
37)	Oomycota are distinguished from other protists by their	Zoospores
38)	Zoospores have two	unequal flagella
39)	Cell wall of oomycota is made of	Cellulose ETEA-2014
40)	Cell wall of fungi is made of	Chitin
41)	Fungi secrete substances into the food which make the food unpalatable,	Poisonous and carcinogenic
42)	On host body, parasites water molds produce	White fuzz

## KINGDOM FUNGI

43)		<b>Disease</b>	<b>Cause (fungus like protists)</b>
		Dandruff	<i>Miccosporum furfur</i>
		Aspergillosis	<i>Aspergillus sp.</i>
		<b>Disease</b>	<b>Cause (animal like protists)</b>
		Late blight of potatoes	<i>Phytophthora infestans</i>
		Malaria	<i>Plasmodium</i>
44)	Athlete's foot		Fungal diseases ETEA-2015
45)	Red algae are rich in		Vitamins and minerals
46)	<i>Trichophyton</i> (fungi) cause a disease called		Ringworms in dogs and horses

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47)	The cowpox and smallpox virus is very similar in	Structure	ETEA-2012
48)	Out of the total world the photosynthesis performed by protists is	One-quarter	
49)	The planktons play a major role in photosynthesis in	Aquatic life	
50)	The vast majority of planktons in the ocean consists of	Protists	
51)	The world largest organism is fungus called	Armillaria ostoyae	
52)	A single colony of fungus covers 1000 km <sup>2</sup> areas, weight 100 tons and about	1000 years old	
53)	Chitin is more resistant to decomposition than	Cellulose	
CLASSES OF FUNGI AND THEIR DIAGNOSTIC FEATURES			
Classes of fungi:			
Zygomycota	Ascomycota	Basidiomycota	
All terristial	Sac fungi	Club fungi (club shape basidia) ETEA-2015	
Coenocytic hyphae	Parasites produces powdery mildow	Primary, secondary & tertiary mycelium	
Live on decaying organic materials	40 % forms lichen (symbiotic )	Dikaryotic cell has 2 haploid nuclei ETEA-2017	
Both sexual and asexual spores	Sexual spores called ascocarps	Bsidiocarp is Tertiary mycelium ETEA-2015+2016	
Parasites and symbiotic relations	Penicillin drug from pencillium		
Rhizopus stolonifer (common bread mold )	Yeast ETEA-2010	Muchrooms, puffballs, shelf fungi, rusts and smuts ETEA-2014	
54)	Ascus develop	8 ascocarps	ETEA-2014
55)	Spores formed in each sporangiumare in	Thousands	
56)	Asci are produced in ascocarps in	Ascomycota	
57)	Ascomycota reproduce asexually by means of conidia, produced in chain at the end of	Conidiophores	
58)	Yeast is useful for both bakers and	Brewers	
59)	Primary mycelium (haploid nucleus) is also called	Monokaryon (uninucleate)	
60)	Fungi evolved from a	Unicellular flagellated ancestors	
61)	The ability to switch from heterotrophic to autotrophic is used to treat sewage is	Present in euglena	
62)	Cacca means	Cow pus	
63)	Club-shaped basidia are arranged inside a fruit body is called	Basidiocarp	
64)	No reproductive structures such as antheridia or archegonia are formed in	Basidiomycota	
65)	Cup like ascocarp in fungi is	Apothecium	
66)	The cause of dandruff is	Microsporum furfur ETEA-2010-2013	
67)	The cause of infection in corneal tissue of eye is	Neurospora & Fusarium	
68)	Marine alga	Ulva	
PATHOGENIC FUNGI			
69)			
	Fungus	Diseases	
	Rhizopus & mucor species	Lung, brain, gastric tissues infection	

	Microsporum furfur	Dandruff <b>ETEA-2013</b>
	Candida sp.	Nail, genital track, Throat and mouth diseases
	Neurospora & fusarium	Infection of corneal tissue of eye
	Aspergillus sp.	Aspergillosis (symptoms like tuberculosis )
	Athlete's foot	Fungal

**IMPORTANCE OF FUNGI**

70)	In fungi the important adoption for terrestrial mode of life is disappearance of	Flagellated cells
71)	Red tides in ocean are produced by	Dinoflagellate
72)	Plasmodium is found at different stages in man and mosquito. At what stage it can be seen in both hosts	Sporozoite <b>ETEA-2013</b>
73)	Aspergillus sp. Is used to produce	Citric acid for coals
74)	The ascocarps of morchella esculanta(a morel) and tuber melanosporum (a truffle) is used for	Their complex flavor
75)	Yeast contain vitamin B and	50% protein
76)	The carrier of genetic information is	DNA
77)	Lichens are known as Pioneers in	Ecological succession
78)	Lichen protect its algae from	Sun's rays
79)	The protective pigment of lichen as used as	Natural dyes
80)	All vascular plants have mutualistic symbiotic association with fungi, this about	80%
81)	Mycorrhiza transfer nutriens(phosphorus, zinc, copper) to plant and get	Organic carbon from it
82)	Fungi recycles nutrients in nature and are called	Recyclers / scavengers
83)	Most common fungal diseases of cereals are rusts and smuts and are caused by	Puccinia & ustilago
84)	World's food harves caused by fungal attach is	50 %
85)	Red rot of sugarcane, late blight of tomato are caused by	Fungi
86)	Ergotamine is obtained from	Claviceps purpurae
87)	Pencillin is obtained from	Pencillium chrysogenum <b>ETEA-2012</b>
88)	Cephalosporin is obtained from	Cephalosporium acremonium
89)	Griseofulvin is obtained from	Pencillium <b>ETEA-2019</b>
90)	Cyclosporine is obtained from	Fungal product
91)	Yeast is obtained from	Saccharomyces cerevisiae
92)	Ergotamine is used as	Facilitate delivery of baby
93)	Pencillin is used as	Pencillium chrysogenum
94)	Cephalosporin is used as	Antibiotic
95)	Griseofulvin is used	Against fungal infection
96)	Cyclosporine is used as	Immunosuppressant drug in organ transplantation
97)	Yeast is used as	Baking and wine making

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# CHAP# 8 Diversity Among Plants Key points

S.No	Questions	Answers																				
INTRODUCTION, LYPETIC LINKAGE & ALTERNATION OF GENERATION																						
1)	Ferns are dominated in periods of	Permian & Triassic																				
2)	Ammonoids mollusk are dominated in periods of	Triassic & Jurasic																				
3)	Arrangement of species from ancestors to descendants through their evolution is called	Phyetic lineage																				
4)	Today Two million species of animals are present and plants present are	0.5 million																				
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6)	In plants like algae, mosses and liverworts the gametophyte generation is Larger and sporophyte generation is dependent on	Gametophyte																				
7)	Both generation are independent in	Ulva & ectocarpous <b>ETEA-2016 ETEA-2019</b>																				
8)	Vascular tissues are present only in sporophyte and absent in	Gametophyte																				
NON VASCULAR PLANTS																						
9)	Classes of bryophytes <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>S.N</th><th>types</th><th>Also called</th><th>Example</th><th></th></tr> </thead> <tbody> <tr> <td>1</td><td>Musci</td><td>Mosses</td><td>Funaria &amp; polytrichum</td><td>Rootless, leafless, stemless <b>ETEA-2016</b></td></tr> <tr> <td>2</td><td>Hepaticae</td><td>Liverwort</td><td>Marchantia</td><td>● Green branched thallus</td></tr> <tr> <td>3</td><td>Anthocerotae</td><td>Hornworts</td><td>Anthoceros</td><td>● Lack true roots, stem and leaves ● Rhizoids are present</td></tr> </tbody> </table>	S.N	types	Also called	Example		1	Musci	Mosses	Funaria & polytrichum	Rootless, leafless, stemless <b>ETEA-2016</b>	2	Hepaticae	Liverwort	Marchantia	● Green branched thallus	3	Anthocerotae	Hornworts	Anthoceros	● Lack true roots, stem and leaves ● Rhizoids are present	
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10)	Fusion of sperm with egg or oospore to form zygote or oospore is called	Fertilization																				
11)	Bryophytes are also called	Embryophytes																				
12)	Moss(2.7 cm height) is	Gregarious in habit																				
13)	Antheridia and archegonia of mosses are sometime mixes with each other by hair like structures known as	Paraphyses																				
14)	If antheridia and archegonia are present on same or two branch of same plant	Monoecious																				
15)	If antheridia and archegonia are present on branch separate plants	Dioecious																				

BOM SERIES		Page 25	BOM ACADEMY Online & Swat																										
16)	The antheridium is multicellular, short stalked, club shaped body which contain			Antherozoid cells																									
17)	The lower swollen portion of archegonium is called			Venter (belly)																									
TRACHOPHYTA																													
18)	S.N o	Sub- divisions	Living	Fossil																									
	1	Psilopsida	Psilotum & Tmesipetris	Psilophyton(psilopsidom), Rhynia, Cooksonia																									
	2	Lycopsida	Lycopodium, Selaginella, Isoetes, Phylloglossum <b>ETEA-2019</b>	Lepidodendron & sigillaria																									
	3	Sphenopsida	Equisetum (only living genus) <b>ETEA-2010</b>	Clamites (extinct) <span style="font-size: 2em; vertical-align: middle;">R</span>																									
	4	Pteropsida	It contain ferns, angiosperm and gymnosperms: <b>ETEA-2014</b>																										
19)	Except from ovum other cell in archegonium are			Functionless																									
20)	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Plants types</th> <th>Examples</th> </tr> </thead> <tbody> <tr> <td>Filiciniae /ferns</td> <td>Adiantum, Pteris, Dryopteris, &amp; Pteridium <b>ETEA-2010</b></td> </tr> <tr> <td></td> <td><b>Living</b></td> </tr> <tr> <td>Gymnosperm</td> <td>Cycads &amp; conifers</td> </tr> <tr> <td>Angiosperm</td> <td>-----</td> </tr> </tbody> </table>				Plants types	Examples	Filiciniae /ferns	Adiantum, Pteris, Dryopteris, & Pteridium <b>ETEA-2010</b>		<b>Living</b>	Gymnosperm	Cycads & conifers	Angiosperm	-----															
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Angiosperm	-----																												
21)	Waxy waterproof layer called cuticle is present in			Bryophytes																									
22)	Heterogamy of Bryophytes are			It's adaptation of life <b>ETEA-2010</b>																									
23)	The moss which is used as packing material is			Sphagnum																									
24)	Sphagnum is also called			Peat moss <b>ETEA-2017</b>																									
25)	Tracheophytes are also called vascular plants due to presence of			Vascular tissues																									
26)	Tracheophytes are also called Tracheophytes due to presence of cells called			Tracheids																									
27)	Tracheids are water conducting cells of			Xylem																									
28)	In tracheaphytes the sporophyte generation is dominant and the gametophyte is			Small reduced & short lived																									
29)	Rhynia, psilotum, club mosses, horsetails and ferns			Lower vascular plants																									
30)	Gymnosperm & angiosperms are			Higher vascular plants																									
31)	Spore consists of cytoplasm and nucleus, surrounded by			Double layer of cell wall																									
32)	The inner cell wall of spore is called			Intine or endosporium																									
33)	The outer cell wall of spore is called			Exine or exosporium																									
34)	Intine is made of			Cellulose																									
35)	Exine is made of			Chitin																									
36)	Four sub-division of tracheophyta:	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>S.No</th> <th>Sub-divisions</th> <th>Root</th> <th>Leaf</th> <th>Stem</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Psilopsida</td> <td>Rootless</td> <td>Leafless</td> <td>Dichotomous</td> </tr> <tr> <td>2</td> <td>Lycopsida</td> <td>Root</td> <td>Microphyllous leaf</td> <td>Dichotomous</td> </tr> <tr> <td>3</td> <td>Sphenopsida</td> <td>Adventitious roots</td> <td>Microphyllous leaf</td> <td>Rib/joint stem</td> </tr> <tr> <td>4</td> <td>Pteropsida</td> <td></td> <td>Megaphyllous</td> <td></td> </tr> </tbody> </table>			S.No	Sub-divisions	Root	Leaf	Stem	1	Psilopsida	Rootless	Leafless	Dichotomous	2	Lycopsida	Root	Microphyllous leaf	Dichotomous	3	Sphenopsida	Adventitious roots	Microphyllous leaf	Rib/joint stem	4	Pteropsida		Megaphyllous	
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4	Pteropsida		Megaphyllous																										
37)	The stem and petiole of adiantum are covered with numerous			Ramenta																									

	brownish scales called										
38)	<b>Pteropsida basic properties</b> <table border="1"> <tr> <td>a</td> <td>Filicineae</td> <td>Roots from rhizome, Megaphyllous leaf</td> </tr> <tr> <td>b</td> <td>Gymnosperm</td> <td>Seeds ,No fruit , Open carpels , cones ,dimorphic leaves</td> </tr> <tr> <td>c</td> <td>Angiosperm</td> <td>Seed, flower, fruit</td> </tr> </table>	a	Filicineae	Roots from rhizome, Megaphyllous leaf	b	Gymnosperm	Seeds ,No fruit , Open carpels , cones ,dimorphic leaves	c	Angiosperm	Seed, flower, fruit	
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39)	The roots of adiantum are	Fibrous adventitious									
40)	Ferns have prostate plant body that bears numerous sporangia on the leaves called	Fronds									
41)	Microphyllous leaf are present in	Club mosses and horse tails									
42)	Primitive vascular plants lacked	Leaves									
43)	In filicineae sporangia are grouped under the leaves on margin of pinnules called	Sori									
44)	Filicineae have a	Subterranean rhizome									
45)	Filicineae are found in	Moist & shady places									
46)	The immature and young filicineae are	Coiled and short									
47)	In lower vascular plants seeds are not produced they reproduce by	Spores									
48)	Higher vascular plants are	Seed producing									
49)	The leaves of lycopsida are small and simple and are called	Microphyllus									
50)	In lycopsida, sporophyll usually forms	Strobili									
51)	In lycopsida,small outgrowth present at the base is called	Ligule									
52)	In some lycopsida such as lycopodium, the ligule is	Absent									
53)	Sphenopsida are also called	Arthrophytes									
54)	Sphenopsida are commonly called	Horse tail <b>ETEA-2019</b>									
55)	Lycopsida are commonly called	Club Mosses									
56)	Number of species of selaginella are	300									
57)	Selaginella have four rows of leaves, two small on upper surface and two large on	Two sides									
58)	In selaginella, a long slender root like organ give off from stem which is known is	Rhizopore									
59)	Selaginella plant is	Sporophyte									
60)	Sporangia are closely packed to form	Terminal cone or strobilus									
61)	Special lateral appendages called sporangiophores are developed which bear	Sporangia									
62)	The mature gametophyte of sphenopsida or horse tail is called	Prothallus									
63)	Spore germinate in week time and produce haploid gametophyte called	Prothallus									
64)	Prothallus is independent plant because it produce its own food with the help of	Chloroplast									
65)	Sporophyte give rise to gametophyte and gametophyte give rise to sporophyte is	Alternation of generation									
66)	Ripened and fertilized ovule is called	Seed <b>ETEA-2016</b>									
67)	Around the sporangium, in evolution branch like outgrowths fuse and form	Integuments									
68)	The integumented megasporangium in which megaspore is retained is called	Ovule or unripe seed									

BOM SERIES	Page 27	BOM ACADEMY Online & Swat																															
69)	All gymnosperm are invariably branched except	Cycads																															
70)	The leaves of gymnosperm are evergreen and dimorphic i.e.	foliage & scale leaves																															
71)	In gymnosperm secondary growth or increase in thickness occur by activity of	Cambium																															
72)	1/4 <sup>th</sup> of oospore is concerned with development of embryo so fertilization is	Single																															
73)	Seed of angiosperm are enclosed in the	Fruits																															
<b>ANGIOSPERMS</b>																																	
74)	Sub classes of angiosperm:	<table border="1"> <thead> <tr> <th></th> <th>Monocotyledonous</th> <th>Dicotyledonous</th> </tr> </thead> <tbody> <tr> <td>No of cotyledons</td><td>1</td><td>2</td></tr> <tr> <td>Plamule is</td><td>Lateral</td><td>Terminal</td></tr> <tr> <td>Cotyledons are</td><td>Terminal</td><td>Lateral</td></tr> <tr> <td>Root</td><td>Adventitious</td><td>Tap root</td></tr> <tr> <td>Rule venation</td><td>Reticulate</td><td>Parallel</td></tr> <tr> <td>Flower symmetry</td><td>Trimerous</td><td>Pentamerous</td></tr> <tr> <td>Vascular bundles are</td><td>Closed Scattered Oval shape</td><td>Open In ring form Wedge shape</td></tr> <tr> <td>Xylem bundle</td><td>5 – 8</td><td>2 – 6</td></tr> <tr> <td>Secondary growth</td><td>Absent Cambium absent</td><td>Present Cambium present</td></tr> </tbody> </table>		Monocotyledonous	Dicotyledonous	No of cotyledons	1	2	Plamule is	Lateral	Terminal	Cotyledons are	Terminal	Lateral	Root	Adventitious	Tap root	Rule venation	Reticulate	Parallel	Flower symmetry	Trimerous	Pentamerous	Vascular bundles are	Closed Scattered Oval shape	Open In ring form Wedge shape	Xylem bundle	5 – 8	2 – 6	Secondary growth	Absent Cambium absent	Present Cambium present	
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75)	The wall of microspore become thick and is known as	Pollen grain																															
76)	The pollen grain send tube called pollen tube which contain two	Male gametes & tube nucleus																															
77)	The ovary contain ovule, the ovule consist of tissues called	Nucellus cover by integument																															
78)	The fusion of sperm with egg to form zygote and other sperm with endosperm to form fusion nucleus is called	Double fertilization <b>ETEA-2017</b>																															
79)	The fusion nucleus develops into nutritive tissues called	Endosperm																															
80)	The integuments of the ovule form the seed coats called	Testa and tegment																															
81)	After fertilization, ovule matures into	Seed																															
82)	The walls of the ovary develops into	Fruit or ripening																															
83)	The size of angiosperm ranges from	1 mm – 100m																															
84)	Size of wolfia is	1 mm																															
85)	Size of Eucalyptus is	100 m																															
86)	Single flower on pedicle	Solitary flowers																															
87)	Clusters of flowers on floral axis	Inflorescence																															
88)	The Inflorescence may be	Racemose or Cymose																															
89)	Main axis continue to grow, oldest flowers at the base are	Racemose																															
90)	Main axis ends with flower, oldest flowers at the top	Cymose																															
91)	The leaves of English yew( <i>Taxus bacata</i> ) is used in synthesize of compound called	Taxols																															
92)	A bark of fever tree( <i>Cinchona succiruba</i> ) produces quinine which is used to treat	Malaria																															
93)	<b>Spermatophytes means Seed plants. It includes</b> 300 families , 12,500 genera , 3,00,000 species																																
94)	The most important of angiosperm belongs to Gramineae of the	Grass family																															
95)	The number of species of grass family are	7500 species																															
96)	Three billion years old bacteria was discovered by	Barghoon & Schopf																															
97)	Example of C4 plants are	Sugar cane and maize																															

BOM SERIES		Page 28	BOM ACADEMY Online & Swat
98)	Ferns are dominated on earth during period of		Permian and Triassic
99)	All the flowers come to same level due to equal size of their pedicel in	Umbel	ETEA-2009
100)	Crop rotation leads to		Soil fertility
101)	In red ,green ,blue and sunlight, the least important for photosynthesis is		Green light
102)	In bryophytes, sterile hairs are produced between sex organs to keep them		Wet
103)	The amount of energy in food is measured by		Calories
104)	Club-mosses are also called		Lycopsida
105)	Horse tails are also called		Sphenopsida
106)	The process of cell division results in		Two daughter cells
107)	Hydra reproduce asexually by		Budding
108)	Class filicinae, Gymnosperm, and angiosperm belongs to sub-phylum pteropsida and to class		Trachopyta

#### INFLORESCENCE

109)	<b>Inflorescence</b>	<b>Examples</b>	<b>Inflorescence</b>	<b>Examples</b>
	<b>Typical</b>	Amaltas (cassia fistula)	<b>Umbel of umbel</b>	Carrot ETEA-2018
	<b>Spike</b>	Puth kanda (Achyranthus) And Bottle brush	<b>Panicle</b>	Grapes, Mango and Oat ETEA-2014
	<b>Catkin</b>	Mulberry & Willow	<b>Capitulum</b>	Sunflower
	<b>Corymb</b>	Candytuft (Iberis)	<b>Uniparous (Monochasial)</b>	Begonia, Tradescantia
	<b>Umbel</b>	Brahmi booti	<b>Biparous (Dichasial)</b>	Silene & Ipomoea
			<b>Multiparous</b>	Euphorbia
110)	Pollen sacs are		Microsporangium	ETEA-2009
111)	A pollen grain germinates and develops into		Micro-gametophyte	ETEA-2010
112)	Food is renewable sources due to		Continuous photosyntheises	
113)	Alternation of generation in plant is regarded a mechanism for		Promoting survival	
114)	Spongilla is		Fresh water sponge	
<b>BENEFITS OF ANGIOSPERMS FOR HUMANS</b>				
115)	For sleeping disorder, autoimmune diseases and glaucoma, we use		Cannabis (Cannabis sativa)	
116)	For altitude sickness in south africem, we use		Coca (Erythroxylon coca)	
117)	To treat Alzheimer's disease, we use	Since 2016	Daffodil (Narcissus spp.)	
118)	We use taxol for breast cancer and this is obtained from		English yew (taxus baccata)	
119)	Quinine is used for malaria and this is obtained from		Fever tress (Cinchona succiruba)	

# CHAP# 9 Diversity Among Animals Key points

Parazoa					Phylum Porifera
Metazoa or Eumetazoa	Diploblastic	Radiata			Phylum coelenterates
	Triploblastic	Bilateria	Acoelomates		Phylum Platyhelminthes
			Pseudocoelomates		Phylum Aschelminthes
			Coelomates	Protostomes (first mouth )	Phylum Molluska
					Phylum Annelids
					Phylum Arthropoda
				Deuterostomes (anus first)	Phylum Echinodermata
					Phylum Chordata

Phylum Porifera	1. Ostia and Operculum		2. Choanocytes and Pinacocytes	
	3. Except Mycospongida have skeleton		Sycon	Marine sponge
	Spongilla			Fresh water sponge
	leucosenia			Tubular marine sponge
	Wuplectella or venus flower basket			Siliceous sponge
Phylum coelenterates	1. Gastrozoids		2. Nematocytes and mesogloea	
	3. Polymorphism		4. Physalia Phalagica, Portuguese man of war	
	5. Metagenesis / Alternation of Generation			
Phylum Platyhelminthes	1. Flat worms		2. Flame Cells	
	3. Tape worm (Taenia Saginata)		4. hermaphrodite	
	Class	E.G	Form	Digestion
	Tubellaria	Planaria	Free (Cuti)	Fully dev
	Trematoda	Liver Fluke (Larva)	Parasitic	Poorly dev
Phylum Aschelminthes	Cestoda	Tape Worm	Parasitic	Fully absent
	1. Five classes		2. Nematoda → Round worms	
	3. Ascaris lumbricoides		4. Rnterobius vermicularis (Pinworm)	
	4. Shor male with satea		5. 27 million eggs. 2 lak eggs per day.	
Phylum Molluska (Glochidiam Larva)	1. soft bodies, 2 <sup>nd</sup> largest phylum		2. Mantle and Radula	
	3. Single Heart		4. Colourless blood with WBCS	
	5. External fertilizatin in gills		6.Haemocyanin (Cu)	
Phylum Annelids (Trochhopora Larva)	1. Little ring, Ring worms		2. Metamerically segmented	
	3. Pseudo hearts		4. Haemoglobin in blood	
	5. Satea (earthworm), parapedia in Neries			
	6.Hermephrodeite		7. Nephridiopore	
Phylum Arthropoda	1. Jointed legs , Larges (2.mullusk)		2.haemolymph and Haemocoel	
	3. Resp: trachea and gills		4. Malpighian tubules	
	5.Arachinids, spider and scorpion → book lungs		6. Metamorphosis	
	Type	Metamorphosis	Example	
	Ametabola	No	Collembolan & other wingless insects	
Phylum Echinodermata (Bipinnaria Larva)	Hemimetabola	Incomplete	Cockroaches & wasps and other insects	
	Holometabola	compl te	Flies, butterflies, mo hs, beetles e	
	1. spin skin → star fish		Echinoderms	Respiratory Structures
	2. Bil→ larva, Rad → adult		Starfish	Papule
3. Tube Feet		Sea urchins	Peristomial gills	
4.Pyloric cacea, 1 pairs		Sea urchins	Cloacal respiratory tract	
5. few viviparous		Brittle star	Genital bursae	

	6. eye → light receiving organ. 8. no parasitic	7. Regeneration 9. All marine
Sub phylum Hemichordata of Chordata	→ Tornaria Larva of balanglossus is same as bipinnaria → both larva's have same creatine phosphate energy source 1. Acron worm is example 3. 3 regions: protosomes, mesosome, metasome or proboscis, collar, trunk	2. Single glomerulus with blood vessel 2. Dipnoi → lung fishes

Divisions	Sub phylum	Groups	
Proto -chordata or Acrania	Urochordate		Tunicate → tunic → tunicin Larva are free swimmin
	Cephalo- chordate	-----	Long pointed body → sea lancelet Filter feeders
Craniata	Vertebrata	Pisces (fishes)	48 % vertebrates, 29000 living species
		Amphibia [Tadpole larva]	Devonian period → fish move to shallow water hibernation
		Reptilian	4 embryonic membranes. carnivores, Reptiles → Mesozoic period. Dinosaurs → jurassic
		Aves (Birds) [flightless and flighting birds]	(1861). Archaeopteryx → reptiles + birds ETEA -2023 Only left ovary Only uropygial gland at tail Oval nucleated RBCs Sound box → syrinx Third eye lid → nictating membrane Extra embryonic membranes
		Mammalia	

	Cyclo stomata	Chondrichthyes	Osteichthyes
Skeleton	Fibrous cartilage	Cartilage	Bones
Body	Long eel like	Streamlined	
Scales	Lacked paired fins/appendages	covered with placoid scales	Body covered with scales
Mouth	circular	Ventral	Jaw with teeth
Skin	naked without scales	covered with placoid scales	
Gills by operculum	Not Covered	Not Covered	Covered
Swim bladder	Absent	Absent	Present
	Parasitic	Carnivores	
	Marine	Aquatic	

Subclass	Examples		
Prototheria / montremata	Duck billed platypus ( <i>Ornithorhynchus</i> ) Spiny ant eater ( <i>Tachyglossus</i> )		
Metatheria / Marsupials	Kangaroo, opossum & Koala		
Eutheria / placentalia	Insectivore	Moles & shrews	
	Chiroptera	Bats & flying squirrels	Flying mammals
	cetecea	Whale, dolphin, porpoises, sea lion	Aquatic mammals ETEA -2023
	Carnivore	Dog, cat, lion, wolves	Flesh eating
	Rodentia	Rat, mice, squirrel, beavers	Cutting habit
	Edentate	South American anteater, sloths	No or poorly teeth
	Pholidata	Penguin	overlapping large & horny scales
	Proboscidea	Elephant	Long trunk
	Perissodactyla	Horse, zebra	Odd-toed hoofed mammals
	Artiodactyla	Cow, goat, deer	Even-toed hoofed mammals
	Primates	Ape, man, monkey, lemur tarsier	Highest brain development

Prototheria / montremata	Egg laying mammals No placenta, Ovo-viviparous, ETEA -2022	Offspring immature Nocturnal, 20-25°C
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Metatheria / Marsupials	Pouched mammals, marsupium ,No placenta, Arboreal
Eutheria / placentalia	True/Place mammals Sixteen orders

Phylum	Examples	
Phylum porifera	1) Sycon(marine), 2) Spongilla(fresh water),	3) Leucoselenia(marine), 4) euptectella (flower basket)
Phylum Coelenterata	5) Hydra, Obelia, 6) Jelly fish,	7) Sea anemone, 8) Corels Portugese man of war
Phylum Platyhelminthes	9) Planaria(Dugesia), 10) liver flukes(fasciola hepatica),	11) tape worms(taenia solium)
Phylum Aschelminthes / nematode	12) Ascaris lumbricoides	13) Enterobius vermicularis(pin worm)
Phylum Mollusca	14) Garden snail(Helix aspersa), 15) Slug(Limax maximus), 16) freshwater mussel (Anodonta grandis), 17) Marine mussel(Mytilus edulis),	18) Oyster(Ostrea lurida), 19) Squid(Loligo pealii), 20) Cuttle fish(Sepia officinalis), 21) Octopus( Octopus bairdi)
Phylum Annelida	22) Medicinal leech(Hirudinaria medicinalis), 23) Earthworm(Pheritema posthuma	24) Medicinal leech(Hirudinaria medicinalis), 25) Neries
Phylum Echinodermata	26) Brittle star(ophiothrix fragilis), 27) sea urchin(arbacia punctulata),	28) sea cucumber(thyone briareus)
Phylum hemichordate	29) Acorn worm(Saccoglossus kowalevskii)	30) balanoglossus sp.

Organism	Larve	Organisms	Chambered
Echinodermata	Bipinnaria	Pisces (bony fishes)	2 chambered (1A 1V)
some annelids	Trochopora	Mollusca	2-3 chambered (1or2A & 1V)
Hemichordata	Tornaria	Amphibian	3 chambered (2A 1V)
Mollusca(balanoglossus)	Glochidiam larva	Reptiles	4 chambered (2A 2V)
Amphibian	Tadpole	Birds	4 chambered (2A 2V)
		Mammals	4 chambered (2A 2V)

S.No	Questions	Answers												
INTRODUCTION, CLASSIFICATION OF ANIMALS, COMPLEXITY IN ANIMALS														
1)	The world Animalia is derived from Latin word which means	Soul or breath												
2)	Number of species of animals are	15,00,000												
3)	The outer most covering of animal is	Cell membrane												
4)	Animals evolved from single cell organism included in kingdom	Protoctista												
5)	<b>On basis of cell composition animals are divided into three categories:</b>													
	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>S.No</th> <th>Type</th> <th>Cell &amp; tissues</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Protozoa</td> <td>Single celled organism</td> </tr> <tr> <td>2</td> <td>Parazoa</td> <td>Simple multicellular having no tissues and organ</td> </tr> <tr> <td>3</td> <td>Metazoa</td> <td>Multicellular organisms having tissues and organs</td> </tr> </tbody> </table>	S.No	Type	Cell & tissues	1	Protozoa	Single celled organism	2	Parazoa	Simple multicellular having no tissues and organ	3	Metazoa	Multicellular organisms having tissues and organs	
S.No	Type	Cell & tissues												
1	Protozoa	Single celled organism												
2	Parazoa	Simple multicellular having no tissues and organ												
3	Metazoa	Multicellular organisms having tissues and organs												
6)	The gel like non-cellular material present in diploblastic are	Mesogloea												

	called			
7)	The central cavity of diploblastic are called Coelenteron or			Gastro-vascular cavity
8)	There is transport and nervous system in			Diploblastic
9)	Diploblastic have no anus and their digestive system is also called			Sac like digestive system
10)	In triploblastic, layers appear through embryonic life and in adult they are			represented by the organs
11)	<b>Three layers of triploblastic:</b>			
	S.N o	Layer	<b>Organ formed from layer</b>	
	1	Ectoderm	Skin & nervous system	
	2	Endoderm	Digestive system & associated glands	
	3	Mesoderm	Skeletal, excretory, reproductive and all other body organs and systems	
12)	Acoelomates are those animals which do not contain			Coelom or body cavity
13)	Instead of parietal and visceral layer, in Acoelomates the mesoderm forms loose tissues called			Mesenchyma or parenchyma
14)	In Pseudocoelomates the cavity is			Not a true body cavity
15)	The Pseudocoelomates the cavity develops from blastocoel not from			Archenteron
Parazoa	<b>ETEA-2016</b>			Phylum Porifera
Metazoa or Eumetazoa	Diploblastic	Radiata		Phylum coelenterates
	Triploblastic	Bilateria	Acoelomates	Phylum Platyhelminthes <b>ETEA-2019</b>
			Pseudocoelomates	Phylum Aschelminthes
			Coelomates	Phylum Mollusca
			Protostomes (first mouth )	Phylum Annelids
				Phylum Arthropoda
			Deuterostomes (anus first)	Phylum Echinodermata
				Phylum Chodata
16)	Animals of Phylum Echinodermata are bilaterial symmetrical in their larval stage and adults gain			Radial symmetry
17)	Coelomic epithelium is absent in			Pseudocoelomates
18)	pseudocoelom has no relation with Reproductive system and			Excretory system
19)	Coelomates are those animals in which true body cavity or coelom is			Present
20)	Daughter cell lie on the top of previous cell			Radial cleavage
21)	If embryonic cells are separated, each one will develop into a complete organism			fate of cell is indeterminate
22)	Radial cleavage and fate of cell is indeterminate are properties of			Deutrosomes
23)	Phylum ctenopora is also called "minor pyla" which contain Ignored animals or			less in numbers
24)	The categories of Phylum can be sub divided by using prefix sub or super except for			Genus
25)	The smallest and basic unit of classification is			Species
26)	System of naming of animal is called			Binomial nomenclature

**PHYLUM PORIFERA**

27)	The pores of phylum porifera are called	Ostia
28)	Body of porifera is tubular and open anteriorly end called	Osculum
29)	Walls of porifera are made of two layers, the outer Pinacoderm and the inner	Choanoderm
30)	Pinacoderm is made of flattened cells called	Pinacocytes
31)	Choanoderm is made of flagellated collar cells called	Choanocytes
32)	Porifera contain some special mobile cells called amoebocytes which produce	Ova & sperm
33)	The porifera's dependence of dead decaying organic matter is	80%
34)	All sponges have skeleton except class	Mycospongida
35)	Sponging is a form of protein in the form of	Fibers
36)	Sponges are found in warm water of	Mediterranean sea
37)	Sponges are used to absorb	Sound waves
38)	<b>Examples of sponges are:</b>	
	Sycon	Marine sponge
	Spongilla	Fresh water sponge <b>ETEA-2008</b>
	leucosenia	Tubular marine sponge <b>ETEA-2010</b>
	Wuplectella or venus flower basket	Siliceous sponge <b>ETEA-2018</b>
39)	Predatory sponges are found 5000 m beneath the sea and belongs to	Family Cladorhizidae
<b>PHYLUM COELENTERATEA (CNIDARIA)</b>		
40)	Word coelenterate is derived from Greek: Kolios means hollow & enteron means	Intestine
41)	Coelenterates are also called cnidarian due presence of cnidocytes cells which	Rise to nematocyst
42)	Majority of Coelenterates are marine but some also live in	Fresh water as well
43)	The cells of endoderm in Coelenterates are specialized for	Digestion
44)	In coelenterates mouth are surrounded by tentacles which bear organ of offence and defence called	Nematocyst <b>ETEA-2010</b>
45)	In coelenterates the enzymes are produced from	Glandular cells of endoderm
46)	In coelenterates special feeding zooids which are called	Gastrozooids
47)	The function of gastrozooids are to nutrition to	Whole colony
48)	Gastrozooids are found in obelia & animals of order	Siphonophora
49)	Coelenterates are	Carnivorous
50)	In coelenterates the digestion are both	Intra and extracellular <b>ETEA-2010</b>
51)	Portuguese man of war are commonly known as	<i>Physalia pelagica</i> <b>ETEA-2016</b>
52)	The speed of <i>Physalia pelagica</i> is	12.1 cm/sec
53)	The fast moving coelenterate is	Jelly fish (jet-propulsion method)
54)	The very common characteristics of coelenterates are the presence of Polymorphism and alternation of generation or	Metagenesis <b>ETEA-2012</b>
55)	Two major types of zooids are	Polyps(tube) & Medusa (umbrella) <b>ETEA-2012</b>
56)	In obelia, the polyp form, called blastostyle reproduce into a saucer shape	Medusae

<b>57)</b>	<b>Coral reefs are of four types: ETEA -2023</b>		
	<b>S.No</b>	<b>Types</b>	
	1	Fringing reef or shore reef	Simplest
	2	Platform reef or table reef	Without a lagoon
	3	Barrier reef	No connection with land
	4	Great Barrier reef	
<b>58)</b>	Coral reef are characteristic feature of		Coelenteron <b>ETEA -2023</b>
<b>59)</b>	A strip of sea water is always present between barrier reef and main land called		Lagoon
<b>60)</b>	The lagoon may be		180 feet to 3 miles wide
<b>61)</b>	The length of the great Barrier reef of Australia is		1250 miles (2012 km )
<b>PHYLUM PLATYHELMINTHES</b>			
<b>62)</b>	Word Platyhelminthes was coined by Gaugenbaur (1859) which means		Flat worms
<b>63)</b>	The bodies of Platyhelminthes are unsegmented or Superficially segmented &		True segmentation is absent
<b>64)</b>	In Platyhelminthes cilia are present in free form while cuticle is present in		Parasitic form
<b>65)</b>	In Platyhelminthes, organs of attachment are present in the form of		Hooks and suckers
<b>66)</b>	In earth worm, mucin and energy are produced by		Pharyngeal mass
<b>67)</b>	Two chamber heart are present in		Fish <b>ETEA-2008</b>
<b>68)</b>	The term "bivalent" means		2 chromosomes
<b>69)</b>	Kangaroo is		Homeothermic
<b>70)</b>	Polymerization is a process of producing high molecular weight compound		From Monomers
<b>71)</b>	In Platyhelminthes, in free from D.S is well developed while it is poorly developed in Class Trematoda and absent in		Class Cestoda <b>ETEA-2010</b>
<b>72)</b>	Thin elastic wall with nucleus and cavity containing cilia flickering through flame		Flame cell <b>ETEA-2016</b>
<b>73)</b>	In Platyhelminthes flame attached with duct which open with		Excretory pore
<b>74)</b>	In Platyhelminthes, the nervous system consist of pair of anterior cerebral ganglion and ventral ganglion connected by		Nerve ring and 1/3 nerve cords
<b>75)</b>	Platyhelminthes are		Hermaphrodite <b>ETEA-2011</b>
<b>76)</b>	Muscular system is well developed in free form of		Platyhelminthes
<b>77)</b>	In Platyhelminthes, reproductive system is well developed with gonads, ducts		And copulatory organs
<b>78)</b>	Egg are small with yolk and are produced in large numbers in		Platyhelminthes
<b>79)</b>	Fertilization is always internal in <i>Since 2016</i>		Platyhelminthes
<b>80)</b>	In Platyhelminthes, the fertilized egg grow into new individual as in		Planaria and tape worm
<b>81)</b>	In Platyhelminthes different type of larvae are formed in		Liver fluke
<b>82)</b>	In Platyhelminthes regeneration ability is present in class		Tubellaria (planaria)
<b>83)</b>	In Platyhelminthes regeneration ability is absent in class Trematoda(liver flukes)		& Cestoda (tape worms )
<b>84)</b>	All the members of Platyhelminthes are		Solitary
<b>85)</b>	Trematoda(liver flukes ) & Cestoda (tape worms ) are parasite so		Ability is absent

	regeneration					
86)	The total number of species of Platyhelminthes are				15,000	
87)	The length of planaria is				10 mm	
88)	The length of tape worm is				16 feet or 5 meter	
89)	The tape worm found in human is				Taenia saginata	
90)	Class	E.G	Form	Digestive system	Larva	Cuticle
	Tubellaria	Planaria	Free	Fully develop	Absent	Present
	Trematoda	LiverFluke	Parasitic	Poorly develop	Present	Absent
	Cestoda	Tape Worm	Parasitic	Fully absent	Absent	Absent

**PHYLUM ASCHELMINTHES (NEMATODA)**

91)	According to Hegner and Engemann, phylum Aschelminthes consist of Five Classes Gastrotricha, rotifera, kinorhyncha, nematode and	Nematomorpha R
92)	The spiny, marine and microscopic organisms are called	Kinorhyncha
93)	The word nematode is of Greek origin which means	Thread
94)	The body of nematodes are Non segmented and	Tapering at both ends
95)	The fluid contained in the body of the nematodes work as	Blood
96)	Excretory consists of two longitudinal canals on each side which opens on ventral side behind the mouth is about	Nematodes
97)	The nervous system consist of nerve ring which encircles the pharynx and send its branches to body parts	Nematodes nervous system ETEA -2023
98)	In nematodes muscles are arranged in four longitudinal bands while circular muscle are	Absent
99)	male is smaller than female of	Ascaris
100)	Power of regeneration is absent in	Nematodes
101)	Most nematodes are white or cream but ascaris is reddish tinge because of	Dissolved haemoglobin
102)	In male of nematode the testes is long, coiled thread with seminal vesicle and open in rectum by short	Ejaculatory duct
103)	In female nematodes the two uteri unite posteriorly forming vagina which on ventral surface at the female genital aperture situated in the	Middle line
104)	The most common animal of phylum nematode is	<i>Ascaris lumbricoides</i>
105)	The length of female <i>Ascaris lumbricoides</i> is	8 – 16 inches
106)	The length of male <i>Ascaris lumbricoides</i> is	6 – 12 inches
107)	The past of male ascaris is curved with two spine like structures called	Penial setae
108)	Female ascaris may contain 27 million eggs at one time at lay about	2 lac eggs per day
109)	<i>Enterobius vermicularis</i> is human parasite commonly known as	Pinworm
110)	The parts of body where <i>Enterobius vermicularis</i> lives are	cecum, colon & appendix

**PHYLUM MOLLUSKA**

111)	The word mulluscus is been derived from Latin word "molluscus" means	Soft
112)	The largest phylum of invertebrates is	Arthropoda ETEA-2009
113)	The second largest phylum of invertebrates are Phylum mollusks	Phylum mollusks
114)	The number of species of phylum mollusks are	80,000 and fossils are 35,000
115)	Most mollusks are protected by shell of calcium carbonate	Mantle

	secreted by	
116)	In some mollusks the shell may be internal, external are	Completely absent
117)	The body of mollusks can differentiated into head, dorsal visceral hump and	Ventral muscular foot
118)	The space between the body in mollusks are called Mantle cavity in which	Kidney and anus opens
119)	Mollusks respire through gills present in the	Mantle cavity
120)	Mollusks have respiring tongue called	Radula
121)	The blood mollusks are colourless and contain WBCs and have no	Respiratory pigments
122)	Nervous system consist of three pairs of orange colour ganglia connected by	Nerve cords in mollusks
123)	The testes are white and ovaries are reddish and fertilization is external in	Mollusks R

## PHYLUM ANELIDA

124)	The word annelida is of Greek origin annelus means	Little ring
125)	The animals of phylum annelids are called annelids because they have	MetamERICALLY Segmented body
126)	Annelids have	Closed circular system
127)	The colour of annelids blood is red due to	Haemoglobin dissolve in plasma
128)	Excretory system of annelids consist of metamerically arranged	Nephridia
129)	Nephridium opens to the exterior through	Nephridiopore
130)	Locomotary organs are setae in earthworm and parapodia in	Neries(gills under parapodia)
131)	The body of annelids and arthropods are covered with	Cuticle
132)	Mostly annelids are	Hermafrodite ETEA-2015
133)	Locomotory organs in earthworm	Setae
134)	Locomotory organs in Neries	parapodia

## PHYLUM ARTHROPODA

135)	The word arthropoda are derived from two Greek words, Arthros means jointed and Podos means	Limbs or legs
136)	Body of arthropoda are differentiated into head, thorax and	Abdomen
137)	The blood of arthropods are haemolymph because it does not contain oxygen	And carries food only
138)	Respiration in arthropods in aquatic life takes place through gills and in	Terrestrial through trachea
139)	Trachea communicate with exterior in arthropods by	Spiracles
140)	Arachinids(scorpion & spider) are group of arthropods which have	Book lungs ETEA-2014
141)	In arthropods the excretion occur either malpighian tubule in insects and	Green/coxal gland in crustacean ETEA-2015
142)	Sexual dimorphism is generally present in	Arthropodes
143)	A pair of cerebral ganglia(brain) connected to a double nerve cord in	Arthropods
144)	All the changes occurring from the fertilization of an egg to the formation of an adult are collectively called Metamorphosis which occur in	Arthropods
145)	During metamorphosis a larva undergoes a series of changes	Ecdysis or moulting

	called		
146)	The stage between ecdysis are called		Stadia <b>ETEA-2014</b>
147)	The stadia attained by insect larva in any stadium between two ecdysis is		Termed as instar
148)	The final instar is the		Adult or imago
149)	On the basis of metamorphosis the arthropods are divided into three groups		
	<b>S.No</b>	<b>Types</b>	<b>Metamorphosis</b>
1	Ametabola	No metamorphosis	Collembolan & other wingless insects
2	Hemimetabola	Incomplete metamorphosis	Cockroaches & wasps and other insects
3	Holometabola	complete metamorphosis	Flies, butterflies, moths, beetles etc
150)	The connecting link between annelids and arthropods are		Onychophora
151)	Onychophora, a group of arthropods consist of		70 species classifies in 10 genera
<b>PHYLUM ECHINODERMATA</b>			
152)	The name of Phylum echindermata are derived from two Greek words : echinos means spine and		Derm means skin
153)	Echinoderms are		Exclusively marine
154)	Echinoderms are bilaterally symmetrical in larval stage and radial symmetrical		As adults <b>ETEA-2014</b>
155)	In echinoderm the water vascular system including tube feet are used for		Locomotion
156)	A typical circulatory system present in echinoderms also called		Heamal system
157)	Digestive system of echinoderms consist of 10 pairs of pyloric caecae, the		Digestive glands
158)	All the echinoderms including the starfish are		Carnivores
159)	In echinoderms fertilization is external but some are		Viviparous
160)	In echinoderms respiration occurs through a variety of structures e.g		
	<b>Echinoderms</b>	<b>Structures</b>	
	Starfish	Papule <b>ETEA-2008</b>	
	Sea urchins	Peristomial gills	
	Sea urchins	Cloacal respiratory tract	
	Brittle star	Genital bursae	
161)	In echinoderms amoebocytes absorb wastes and remove them by		Rectal caecae
162)	In echinoderms, Nervous system consist of radial ganglia containing nerve cords & sense organs		Are poorly developed
163)	In echinoderms, the radial nerve cords ends in a pigmented mass known as		Eye
164)	A single arm with a part of central disc regenerate into a		New animal
165)	Echinoderms have no parasitic member and all are marine, bilaterally symmetrical in larval stage and radial symmetrical in adult stage which seem as		Secondary phylogenetic origin
166)	Brittle star is brittle because it can break off its		Arm when injured
167)	Energy for muscular activity in echinoderms and chordates are available by		Creatinine phosphate
168)	Pattern of cleavage of fertilization egg, formation of mesoderm,		Echinochordates and

	anus, mouth and coelom are similar in	hemichordates																											
<b>PHYLUM HEMICHORDATA</b>																													
169)	Echinoderms and chordates are evolved from	Common ancestors																											
170)	Hemichordates are worm like animals which are found in	Shallow ocean bottom																											
171)	Hemichordates are closely related to chordates but similarities with	Echinoderms																											
172)	Hemichordates body are divided into three regions, anterior protosome, middle mesosome and Posterior metastome or	Proboscis, collar & trunk																											
173)	Body wall of hemichordate are made of unicellular epidermis and	Mucus secreting cells																											
174)	Digestive system is complete and consist of long straight tube in	Hemichordates																											
175)	Circulatory system is composed of dorsal and ventral vessel	Hemichordates																											
176)	Gills slit are present behind the collar which perform function of respiration, in	Hemichordates																											
177)	A single glomerulus connected to blood vessels constitutes excretory system of	Hemichordates																											
178)	Brain occur in middle mesosome and main nerve tracts are present in	Mid dorsal and mid ventral line																											
179)	Tornaria larva resembles to	Bipinnaria larva																											
<b>PHYLUM CHORDATA</b>																													
180)	The word chordate are derived from Notochord where chord means	Thread or rope																											
181)	<b>Basic characteristics or chordate characteristics are as follow:</b> <ol style="list-style-type: none"> <li>1. A dorsal stiff rod is found in all chordates called Notochord.</li> <li>2. In higher chordates notochord are replaced by Vertebral column.</li> <li>3. All chordates have central, dorsal, hollow nervous systems which lies above the notochord.</li> <li>4. All chordates develop gills slits which sometimes called Perforated Pharynx at least in the embryonic stage.</li> <li>5. Perforated pharynx are functional in fishes and amphibians.</li> </ol>																												
182)	<b>Phylum chordate are classified into two divisions and three sub phylums:</b> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Divisions</th> <th>Sub phylum</th> <th>Groups</th> <th>Classes</th> </tr> </thead> <tbody> <tr> <td rowspan="2">Protochordata or Acrania</td> <td>Urochordate</td> <td>-----</td> <td></td> </tr> <tr> <td>Cephalochordate</td> <td>-----</td> <td></td> </tr> <tr> <td rowspan="7">Craniata</td> <td rowspan="7">Vertebrata</td> <td>Pisces (fishes)</td> <td>Cyclostomata/ Agnatha Condrichthyes/38artilaginous fishes Osteichthyes / bony fishes</td> </tr> <tr> <td>Amphibia</td> <td></td> </tr> <tr> <td>Reptilian</td> <td></td> </tr> <tr> <td>Aves (Birds)</td> <td></td> </tr> <tr> <td>Mammalia</td> <td></td> </tr> <tr> <td></td> <td></td> </tr> <tr> <td></td> <td></td> </tr> </tbody> </table>	Divisions	Sub phylum	Groups	Classes	Protochordata or Acrania	Urochordate	-----		Cephalochordate	-----		Craniata	Vertebrata	Pisces (fishes)	Cyclostomata/ Agnatha Condrichthyes/38artilaginous fishes Osteichthyes / bony fishes	Amphibia		Reptilian		Aves (Birds)		Mammalia						
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183)	In Protochordata or Acrania, skull is	Absent																											
184)	In Craniata, skull is	Present																											
185)	Notochord is present in free swimming larvae and absent in adults in	Urochordata																											
186)	Subphylum Urochordata are also called tunicate because they contains sheath called tunic which is made of	Tunicin (related to cellulose)																											
187)	The body of Cephalochordate are in form of long rod hence called	Sea lancelet																											
188)	Hollow cord runs through out the body in	Cephalochordate																											
189)	Hooves, Hemoglobin and enzymes are	Proteinous																											

190)	Cephalochordate are Filter feeders and it's example is SUB PHYLUM VERTEBRATA	Branchiostoma(amphioxus)																																								
191)	Vertebrates are divided into Five groups /super classes (Pisces, Amphibia, Reptilia, Aves or Birds, Mammalia )	PARAM (formula)																																								
	<b>CLASS PISCES</b>																																									
192)	The largest group of vertebrates are fishes , which constitution is	48%																																								
193)	The number of living fishes are more than	29,000																																								
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195)	Jawless fishes having circular mouth																																									
196)	Long eel like body																																									
197)	Skin is naked without scales																																									
198)	Lacked paired fins or appendages																																									
199)	Seven pair of gills are found which opens to outside separately																																									
200)	Gills not covered with operculum																																									
<b>Class chondrichthyes :</b>																																										
201)	Skeleton is of lower grade means of fibrous cartilage																																									
202)	They are parasitic and have no stomach																																									
203)	Mouth is adopted for sucking																																									
204)	e.g: Petromyzon merinus (lamprey) and Maxile glutenosa (hag fish)																																									
205)	Skeleton made of cartilage																																									
206)	Streamlined bodies																																									
207)	All live in marine environment																																									
208)	Mouth is ventral																																									
209)	Body is covered with placoid scales which are small and numerous and give the skin a touch of sand paper																																									
210)	Circulatory system is with many pairs of aortic arches																																									
211)	Heterocercal tails in which dorsal lobe is longer than ventral lobe																																									
212)	Respiration takes place through 5-7 pairs of gills																																									
213)	Gills are not covered with operculum and open separately																																									
214)	Most are carnivorous																																									
215)	Swim bladder is absent																																									
216)	Sexes are separate and most of them are viviparous																																									
217)	E.g: sharks, rays, skates and chimaeras																																									

<b>Class osteichthyes;</b>		
218)	Skeleton made of bones	
219)	Inhibits all types of aquatic habitats	
220)	Body covered with scales such as (1.Median fins: dorsal fin, anal fin, caudal fin. 2. <b>Paired fins:</b> pectoral and pelvic fins)	
221)	Swim bladder is found which are hydrostatic in function and provide buoyancy	
222)	Respire through gills which are covered with operculum	
223)	Jaws may be with or without teeth	
224)	Brain is developed with ten pair of cranial nerves	
225)	Blood contain haemoglobin and its colour is red	
226)	Sexes are separate but some are external	
227)	Majority of bony fishes are oviparous but some are ooviviparous and viviparous	
228)	Fishes of subclass Dipnoi are called Lung fishes which are only	3 live in this world
229)	Dipnoi fishes when aestivate in holes they respire through extremely	Vascularized swim bladder
230)	In rainy season dipnoi came out of holes and respire through	Gills
<b>CLASS AMMPHIBIA</b>		
231)	The word amphibian is derived from latin word Amphi which means	Both
232)	Amphibian are considered on border line of both	Aquatic & terrestrial
233)	Transition from aquatic life to terrestrial is clearly indicated by	Amphibian
234)	Certain fin fishes of dipnoi came to live in shallow water in period of	Devonian
235)	Amphibia are poikilothermic and fertilization is	External
236)	Tadpole larva respire through gills and swim with the help of	Laterally flattened tail
237)	After developing gills during metamorphosis, amphibian came out	Of water
238)	In some amphibian, gills are retained through out the life such as in	Necturus
239)	Amphibians have tetrapods having two pectoral two pelvic limbs, some are legless like	Caecilians
240)	Amphibian feet are webbed and without	Claws
241)	The skin of amphibian are pigmented, smooth and	glandular
242)	The mixing of oxygenated and deoxygenated takes place in one ventricle in	Amphibian ETEA-2014
243)	In hibernation, amphibian get energy out from fat bodies deposited around the	Kidneys
<b>CLASS REPTILIA</b>		
244)	The true land vertebrates are	Reptiles
245)	The bodies of reptiles can be divided into four region, Head, neck, trunk	and tail
<b>Reptiles are</b>		
246)	Pentadactile means having five fingers	
247)	Lowest amniotes having embryo covered with amnion	
248)	Have protective membranes such as yolk sac, amnion, chorion & allantois	
249)	They are oviparous and lay shelled eggs	
250)	Their skin is thick and acaly and devoid of glands	
251)	Exoskeleton is in the form of nails and epidermal cells and digits are with claws	
252)	Teeth are present in jaws except turtle and tortoise	
253)	Colour of blood is red due to presence of haemoglobin	
254)	Respiration takes place through lungs which have spongy tissues	
255)	Gills never develop in reptile	

- 256) Excretory organs are metanephric kidneys  
 257) Uricotelic means excrete uric acid  
 258) Dominant in age of reptiles  
 259) Flourished in Mesozoic period(225-65 million years back) **ETEA-2016**  
 260) Modern reptiles are the descendants of Dinosaurs of Jurassic period (195-136 million years back) and Cretaceous period(136-65 million years back).

**Class Aves****Birds like characteristic of archaeopteryx:**

- 261) Well developed contour and feathers  
 262) Forlimbs modified into flying wings  
 263) Tail with two rows of feathers  
 264) Large skull with single occipital condyle  
 265) Jaw elongated to form beak

**Reptilian characteristics of archaeopteryx:**

- 266) Presence of scale on legs  
 267) Solid bones without air spaces  
 268) Long tail consist of 20 caudal vertebrae  
 269) 9-10 cervical vertebrae  
 270) No fusion of trunk and sacral vertebrae  
 271) Sternum not keeled free cervical and abdominal ribs are also present  
 272) Simple brain with cylindrical hemisphere and unexpanded cerebellum  
 273) Fore limb with three clot fingers

274)	Archaeopteryx, the lizard tailed bird are found in rocks of Jurassic period in	1861
275)	Archaeopteryx have both the characteristics of	Reptiles & birds <b>ETEA-2010</b>
276)	both bird and mammal are evolved from	reptilian ancestors
277)	The connecting link between reptiles and birds are	Archaeopteryx

**Characteristics of Birds:**

- 278) Fore limb with three clot fingers  
 279) Homoeothermic means cold blooded  
 280) Body covered with epidermal exoskeleton  
 281) Body is fusiform(streamlines)  
 282) Forelimbs are modified to wings  
 283) The aquatic bird posses webbed feet  
 284) Skin without gland except uropygial gland at the base of tail  
 285) Hollow bones  
 286) Sternum is keel  
 287) Jaw without teeth and form beak  
 288) Digestive system has a crop to store and the gizzard to grind it  
 289) Blood is red due to haemoglobin contained in oval, nucleated RBCs  
 290) Vocal cords are not present in larynx but special sound box is present in junction of trachea and bronchi  
 291) Lungs are provided with extra air sacs which extends to viscera  
 292) Eyes are provided with third eyelid, the nictitating membrane  
 293) A rudimentary pinna is present outside the external auditory opening  
 294) Excretory organs are metanephric kidneys, ureter open in the cloaca and nitrogenous wastes are excreted in the form of semisolid urates  
 295) Females have only left ovary and oviduct is well developed **ETEA-2016**  
 296) Females have shell secreting shell

297)	Flightless birds are also called	Running birds
298)	Flightless birds have not hollow bones and not keeled sternum and feathers are	Irregularly arrangement
299)	Flying birds have strong wings for flight and	Keeled sternum
300)	Ostrich, emu, kiwi, cassowary, penguin are examples are	Flightless Birds
301)	Pigeon, sparrow, parrot, eagle, owl are examples of	Flying birds

## CLASS MAMMALIA

302)	The characters which placed mammalian on top of evolutionary tree is due to	Brain & nervous system development
303)	Ancestors of mammals lived with reptiles in Jurassic period and are called	mammal like reptiles
304)	Fossil animal recovered from Texas which has 50% mammalian character is	Varanope R
305)	The ancestors of mammals were of the size of mice and lived on	Trees ETEA-2010
306)	Mammals become dominant in	Cenozoic period
307)	Mammals have two pairs of	Pentadactyle limbs
308)	In mammals brain is well developed with two large cerebral hemisphere and	12 pairs of cranial nerves
309)	Only left aortic arc is present in	mammals
310)	Besides mammals, diaphragm is present in	crocodiles
311)	In mammals, blood is red due to presence of haemoglobin in biconcave	Non nucleated RBCs
312)	In mammals the embryo is kept inside the female body for development and this process is called	gestation
313)	Mammals are also called	Amniotes
314)	<b>Mammals are divided into three subclasses:</b> <ol style="list-style-type: none"> <li>1. Prototheria or monotremata</li> <li>2. Metatheria or marsupials</li> <li>3. Eutheria or placentalia</li> </ol>	
315)	Prototheria or monotremata are most primitive animals and are also called	Egg laying animals ETEA-2008
316)	Class Metatheria / Marsupials are also called	Pouched mammals
317)	There is no connection between body of mother and foetus in	Prototheria / monotremata
318)	The Prototheria or monotremata animals are rightly be called as	Ovo-viviparous
319)	Young birth are in immature form and nourished by teats present on ventral side of the body in females until they enough grow, are about	Prototheria / monotremata
320)	Prototheria are restricted to Australian Tasmania, New Guinea and their	Neighbouring island
321)	In adults teeth are absent and beak are found in	Prototheria / monotremata
322)	The body temperature of Prototheria / monotremata are about	25 – 28 °C
323)	On ventral side of female of Metatheria / Marsupials bear a pouch called	Marsupium
324)	There is no placenta formation but teats of mammary gland are present in pouch in	Metatheria / Marsupials
325)	Marsupials are also restricted to Australian region except	American opossum
326)	Their body is covered with hairs and are terrestrial and	Arboreal (live in trees)
327)	Eutheria or placentalia are also called	Placental animals
328)	In Eutheria or placentalia, cloaca is absent and urino-genital duct	Indefinitely of rectum

	opens	
329)	Eutheria are divided into	Sixteen orders
330)	Subclass	Examples
	Prototheria / montremata	Duck billed platypus ( <i>Ornithorhynchus</i> ) Spiny ant eater ( <i>Tachyglossus</i> )
	Metatheria / Marsupials	Kangroo, opossum & Koala <b>ETEA-2019</b>
	Eutheria / placentalia	Insectivore      Moles & shrews
		Chiroptera      Bats & flying squirrels
		cetecea      Whale, dolphin, porpoises, sea loin
		Carnivore      Dog, cat, loin, wolves
		Rodentia      Rat, mice, squirrel, beavers
		Edentate      South American anteater, sloths
		Pholidata      Penguin
	Proboscidea	Elephant
	Perissodactyla	Horse, zebra
	Artiodactyla	Cow, goat, deer
	Primates	Ape, man, monkey, lemur tarsier
		Highest brain development

## MIX

331)	Tissue organization is missing in	Protozoa
332)	Tissue organization in present in	Metazoan
333)	Round worms, which have body cavities partially lined with mesoderm are classified as	Pseudo coelomates
334)	Daphnia belongs to	Crustacean
335)	Feathers of birds are waterproof due to secretion of	preen gland
336)	In fishes the heart pumps	Impure blood to gills
337)	Nematocysts are found in	Coelenterates
338)	Teeth adopted for cutting are	Incisors
339)	The main excretory organ in cockroach is	Malpighian tubes <b>ETEA-2009</b>
340)	The number of legs in scorpion are	Four pairs
341)	Vertebrate with one occipital condyle is	Pigeon
342)	The existence of an organism in more than one form is known as	Polymorphism
343)	In a pond ecosystem profundal zone is missing because	Pond is shallow
344)	Spiny ant eaters	Lay eggs
345)	Protein is converted to peptone by	Trypsin
346)	Sudden as well as rapid mitosis leads to	Cancer
347)	Organs of locomotion in earth worm are	Setae <b>ETEA-2009</b>
348)	Plantigrad locomotion is found in	Man

349)	Ammonoid mollusks are dominated on earth during period of	Triassic and Jurassic
350)	Prothallus is	Hermaphrodite
351)	Ferns have prostrate plant body that bears various sporangia on leaves called	Fronds
352)	Wings of a bird and fore limbs of man are	Homologous
353)	The association in which an organism get advantage and the other get suffers are	Parasitism
354)	The modern horse is called	Equus
355)	Important characteristic of coelenterates	Polymorphism <b>ETEA-2014</b>
356)	In Platyhelminthes, regeneration ability is present in class	Tubellaria(planaria)
357)	In Platyhelminthes, regeneration ability is absent in class	Trematoda(liver flukes) and Cestoda(tape worms)
358)	Echinoderms have strong power of	Regeneration
359)	In Earth worm 4-5 pairs of heart present called	Pseudo-hearts <b>ETEA-2013</b>
360)	Metamorphosis occur in	Arthropodes
361)	Urochordates are also called tunicate as they have sheath called tunic which is made	Of tunicin

Phylum	Examples
Phylum porifera	Sycon(marine), Spongia(fresh water), <b>ETEA-2014</b> Leucosolenia(marine), eumytila (flower basket)
Phylum Coelenterata	Hydra, Obelia, Jelly fish, Sea anemone, Corells Portuguese man of war <b>ETEA-2015</b>
Phylum Platyhelminthes	Planaria(Dugesia), liver flukes(fasciola hepatica), tape worms(taenia solium)
Phylum Aschelminthes Or nematode	Ascaris lumbricoides Enterobius vermicularis(pin worm)
Phylum Mollusca	Garden snail(Helix aspersa), Slug(Limax maximus), freshwater mussel (Anodonta grandis), Marine mussel(Mytilus edulis), Oyster(Ostrea lurida), Squid(Loligo pealii), Cuttle fish(Sepia officinalis), Octopus(Octopus bairdi) <b>ETEA-2013</b>
Phylum Annelida <b>ETEA-2014</b>	Earthworm(Pheretima posthuma), Medicinal leech(Hirudinaria medicinalis), Neries
Phylum Echinodermata	Brittle star(ophiothrix fragilis), sea urchin(arbacia punctulata), sea cucumber(thyone briareus)
Phylum hemichordate	Acorn worm(Saccoglossus kowalevskii) and balanoglossus sp.

362)	Cephalochordates are also called Since 2016	Sea lancelet
363)	In "Devonian" period certain lobe fin fishes of group "Diploïd" came to live in	Shallow water
364)	Two tubes are present in amphibian which are	Truncus arteriosus & sinus venosus
365)	Frog, toad(tailless), newt, salamander	Class amphibia
366)	In reptiles teeth are present except in	Turtle and tortoise
367)	Special sound box is present in birds in junction of	Trachea and bronchi

368)	Birds are amniotes and have all the four extra embryonic membranes	Amnion, Chorion, Yolk sac, Allantois												
369)	A fossil animal (named varanope) has been recovered from Texas which has 50%	Mammalian character												
370)	Mammals become dominant in	Cenozoic period												
371)	Reptiles flourished in Mesozoic period	225-65 million years back												
372)	Modern reptiles are descendants of the Dinosaurs of Jurassic period 195-136 million years back and Cretaceous period	136-65 million years back												
373)	In arthropods excretion takes place in insects in	Malpighian tubules <b>ETEA-2012</b>												
374)	In arthropods excretion takes place in crustacean in	Green gland or coxal gland <b>ETEA-2023</b>												
375)	Daphnia belongs to class	Crustacean												
376)	<table border="1"> <thead> <tr> <th>Organism</th> <th>Larva</th> </tr> </thead> <tbody> <tr> <td>Echinodermata</td> <td>Bipinnaria</td> </tr> <tr> <td>some annelids</td> <td>Trochopora</td> </tr> <tr> <td>Hemichordata</td> <td>Tornaria</td> </tr> <tr> <td>Mollusca(balanoglossus)</td> <td>Glochidium larva <b>ETEA-2019</b></td> </tr> <tr> <td>Amphibian</td> <td>Tadpole</td> </tr> </tbody> </table>		Organism	Larva	Echinodermata	Bipinnaria	some annelids	Trochopora	Hemichordata	Tornaria	Mollusca(balanoglossus)	Glochidium larva <b>ETEA-2019</b>	Amphibian	Tadpole
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Amphibian	Tadpole													
377)	Circulatory system is of open type in a	phylum Arthropoda												
378)	Grasshopper, spider and scorpion belongs to	phylum Arthropoda												
379)	Of human body leg muscles are not	Vestigial												
380)	In hydra, planaria and earthworm the exchange of gases occur through the	General body surface												
381)	Tape worm has no	Digestive tube												
382)	Liver fluke, planaria and round worm have	Digestive system												
383)	Extra cellular digestion occurs in	Grasshopper & Frog												
384)	The oesophagus of earthworm opens in	Intestine												
385)	Alveoli are absent in	Birds <b>ETEA-2009</b>												
386)	Sperm remain viable for years within female genital tract of	Bat												
387)	Opossum belongs to	Metatheria <b>ETEA-2009</b>												
388)	Metamorphism is found in	Earth worm												
389)	Penguin is swimming	Bird												
390)	Extra embryonic membranes i.e. Amnion, Yolk sac, Chorion, and Allantois are present in	Reptiles <b>ETEA-2016</b>												
391)	Cheatopterus includes in	Protosome												
392)	Book lungs are present in spider and scorpion which are	Arthropods <b>ETEA-2014</b>												
393)	All cell membranes are composed of	Lipo protein												
394)	Crocodile heart is of	Four chambered												
395)	Chest muscles are especially adapted for	Flight												
396)	Muscles, Gonads, blood vessels are derived from	Mesoderm												
397)	Liver is not derived from	Mesoderm												
398)	The number of nitrogenous bases common in both DNA and RNA are	Three												
399)	Influenza, AIDS, Hepatitis, Herpes, Poliomyelitis, leaf curl diseases	Viral diseases												
400)	The only human disease known to be caused by viroid is	Hepatitis D												

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<b>402)</b>	The % of arthropods in animal kingdoms	75%														
<b>403)</b>	Middle ear is not present in fish while internal ear is	Present														
<b>404)</b>	The mesodermal cell which give rise to urinary system in frog is	Nephrotome 														
<b>405)</b>	The digestion in Hydra and Planaria is both	Intra and extra cellular <b>ETEA-2005</b>														
<b>406)</b>	Rabbits, Pabulus, Rats, Grasshoppers and Grasses constitute a	Community														
<b>407)</b>	Size of flower of chrysanthemum may be enlarged by removing	All floral buds except on														
<b>408)</b>	Genome of HIV consist of single strand of	DNA														



# CHAP# 10 Forms & Functions in plants Key points

S.No	Questions	Answers
<b>PLANT NUTRITION</b>		
1)	Soil pH is one of the most important soil properties that affects the	Availability of nutrients
2)	Macronutrients tend to be less available in soil with	Low pH
3)	Micronutrients are tend to be less available in solid with	High pH
4)	The following are a. carbon      b. oxygen      c. hydrogen d. nitrogen      e. potassium      f. calcium g. phosphorus      h. magnesium      i. sulphur	Macronutrients <b>ETEA-2015-2017-2019</b>
5)	The following are a. iron                                  b. copper                                  c. chlorine d. manganese                            e. zinc                                         f. molybdenum g. cobalt                                h. sodium	Micronutrients <b>ETEA-2015-2017</b>
6)	Lime can be added to soil to make it less sour(acidic) and also supplies	Calcium & magnesium
7)	Lime also rises the pH to desire ranges of	6.0 – 6.5
<b>SPECIAL MODE OF NUTRITION IN PLANTS</b>		
8)	A classic passive trap is the “pitfall trap” of pitcher plants,including Darlingtonia, Sarracenia of the sarraceniaceae and	Nepenthes of Nepenthaceae
9)	Other passive trap of the “flypaper” or adhesive traps of sundews(drosera, Droseraceae) and butterworts (pinguicula,Lentibulariaceae), these two have	Gland tripped hairs (Dorcere)
<b>ROLES OF STOMATA IN GASEOS EXCHANGE AND TRANSPIRATION</b>		
10)	Small pores on epidermis of leaves are called	Stomata
11)	In dicot plants, guard cells are of	Kidney/bean shaped
12)	In monocot stomata , guard cells are	Dumb bell shaped <b>ETEA-2016</b>
13)	The inner wall of guard cells are	Thick and non-elastic <b>ETEA-2015</b>
14)	The outer wall of guard cells are	Thin and elastic <b>ETEA-2016</b>
15)	The adjoining cell walls of two guard cells around the pore are	Free, not attached to each other
16)	The epidermal cells surrounding the guard cells are called	Subsidiary cells
17)	The stomata pore, guard cells and the subsidiary cells are called	Stomata apparatus
18)	Each guard cell contain single nucleus and numerous	Chloroplast
19)	Starch are synthesized in guard cells by	Chloroplast
20)	In mesophyll cells, accumulation of starch occur in	Dark or Night
21)	In mesophyll cells, degradation of starch occur in	Light or Day
22)	Mesophyll cells accumulate starch during the day and decrease during the	Day

## TRANSPORT IN PLANTS

23)	Xylem cells are elongated and are connected end to end to form a	Tubular water-transport
24)	Tracheids are elongated cells to cells with secondary,lignified cell wall of	80 m $\mu$ wide
25)	Functional tracheal conduits are surrounded by supports and storage cells including	Parenchyma fibers and Sclereids
26)	Water moves from one vessel element to the next through	Proforations & pits
27)	Vessel elements and companion cells are the characteristic of the	Angiosperms <b>ETEA-2016</b>
28)	Companion cells are present in angiosperm and absent in	Gymnosperm and ferns <b>ETEA-2015</b>
29)	Vessel element are wider, shorter, thinner-walled and less tapered than	Tracheids <span style="font-size: 2em; vertical-align: middle;">R</span>
30)	Vessel element are individual cells linked together end to end to form	Xylem vessels
31)	Phloem cells form the	Inner bark
32)	The cells of the phloem that transport organic solute through the plant are	Sieve tubes
33)	Phloem is present in all	Vascular plants
34)	Sieve tubes are specially adopted for process of	Translocation
35)	The cell wall of sieve tubes are made of	Cellulose
36)	The perforated end of sieve tube is called	Sieve plate
37)	Every cell tube is a thin walled elongated cell called	Companion cell
38)	Companion cell is living cell which contain cytoplasm and	Elongated nucleus
39)	The sieve tube and companion cell are in communication with each other by	Plasmodesmata
40)	The companion cell supply energy to sieve tube and help in its	Translocation

## WATER STATUS I PLANTS

41)	Water potential is directly proportional to the concentration of the	Water-molecules
42)	Greater the concentration of water molecules, greater will be the kinetic energy of water and this is called	Water potential
43)	Pure water has	Maximum water potential
44)	Water potential and solute potential is measured in	Kilopascal
45)	Water potential is affected by	Heat
46)	Solute potential + pressure potential =	Water potential
47)	The change in water potential due to the presence of the solute molecules	Solute / osmotic potential
48)	Osmotic potential is equal to	Osmotic pressure
49)	The turgor pressure produced by endosmosis of cell sap is called	Pressure potential
50)	Pressure potential is just like pumping of water from	One place to another

## MOVEMENT OF WATER THROUGH ROOTS

51)	Water and mineral move in xylem by the way of appoplast, symplast &	Through vacuoles
52)	The water which enters to the epidermal cells of root passes through cortex, endodermis, pericycle and finally to the	Xylem cells
53)	The whole non-living pathway of water is called	Apoplast pathway
54)	The system of interconnected cell walls and inter cellular spaces are	Apoplast pathway
55)	A living transport of water through cortical cells by osmosis is called	Symplast pathway
56)	A system of intercellular protoplast of cytoplasm is called	Symplast pathway
57)	In the cells of the roots both the cell membrane and cytoplasm act as	Partially permeable

	one	membrane
WATER MOEMENT IN XYLEM THROUGH TACT MECHANISM		
58)	Transpiration, adhesion, cohesion and tension are	TACT forces
59)	The attached cells have interconnected	Vacuoles
60)	Cells and vacuoles are interconnected with one another by	Plasmodesmata
61)	When water move from vacuole to vacuole, it is called	Vacuolar pathway
62)	Adhesion is the attractive force between water molecules and	Other substances
63)	Cohesion is the force between molecules of the	Same substances
64)	Water has high cohesive force due to	Hydrogen bonding
65)	A combination of adhesion, cohesion and surface tension allow the water to climb on the wall of small diameter tubes like xylem and this is called	Capillary action
66)	The U shaped surface formed by the water as it climb to the tube is called	Meniscus
67)	A force that pulls water from the place where potential is greater is called	Tension
68)	Tension is	Negative force
MECHANISM OF OPENING AND CLOSING OF STOMATA		
69)	High pH favours the activity of enzyme phosphorylase which convert starch into	Glucose and Phosphate
70)	Guard cells become turgid and swell and thus stomata	Opens
71)	Glucose is converted into starch at	Low pH
72)	When carbondioxide is absorbed for photosynthesis which lowers the H <sup>+</sup> of cell sap and pH of the guard cell	Decreases
73)	In the presence of light starch is converted into	Phosphorylated hexose
74)	Phosphorylated hexose is converted into	Phosphoenol pyruvic acid
75)	Phosphoenol pyruvic acid combines with carbondioxide to produce	Malic acid
76)	Malic acid dissociate into	malate ion and H <sup>+</sup> ions
77)	H <sup>+</sup> cells are transported to epidermal cell and K <sup>+</sup> ion are taken into guard cell in	Exchange of H <sup>+</sup> ions
78)	Increase concentration of H <sup>+</sup> ions and malate ions in the vacuole of the guard cell cause sufficient osmotic pressure to absorb water from surrounding and thus	Stomata opens
TRANSLOCATION OF ORGANIC SOLUTES		
79)	The transports of organic solutes from the source of assimilates to the sinks of assimilates is called	Translocation of organic solutes <b>ETEA-2016</b>
80)	The movement of water, sucrose, hormones and amino acid is called	Translocation <b>ETEA-2016</b>
81)	The accepted mechanism needed for the translocation of sugars from source to sink is called	Pressure flow hypothesis
82)	In the phloem the loading of sugar into source produce a	Hypertonic condition
83)	For translocation, suger is converted into	Sucrose
84)	Water in the adjacent xylem moves into the phloem by	Osmosis
85)	Active transport is needed for the removal of the sucrose out of the	Phloem sap into cells
HOMEOSTASIS IN PLANTS		
86)	Solute dissolved are less than that of cell or another solution	Hypotonic
87)	Dissolved solutes are less outside the cell than inside	Hypertonic
88)	Extensive specialized supporting tissues exist only in	Vascular plants
OSMOREGULATION IN PLANTS		

89)	Halophytes have special type of vegetation called	Mangrove
90)	Halophytes are salt tolerators not salt	Lovers
91)	The stem of halophytes are more developed for storage of	Water

Groups	Main characters	Examples
Hydrophyte s	Root absent, absorb water by whole body, live in water or damp place	Hydrilla, Vallisneria, Potamogeton
Mesophytes	Ordinary plants, live in average condition	Citrus, Brassica, Pea, Peach and Rose
Xerophytes	Long roots, desert plants, stem store water, leaves are spines/thorns, <b>cuticle</b> <b>ETEA-2016</b>	Cactus, Opuntia, Aloe, Ruscus, Acasia, Calotropics and Zizyphus <b>ETEA-2015</b>
Halophytes	In soil which have salts,	Mangrove, Salsola(saltwort), Rhizophora

**SUPPORT IN PLANTS**

92) Vascular plants have the following three main types of supporting tissues:

S.No	Types	Further types
1	Collenchyma	Angular Annular Lamellar(plate) Lacunar
2	Sclerenchyma	Fibers Scleroids
3	Vascular tissues	---

93)	The word Collenchyma is derived from Greek word "kola" which means	Glue
94)	The word Sclerenchyma is derived from Greek word "scleros" which means	Hard
95)	The two groups of Sclerenchyma cells exists are	Fibres & sclereids
96)	The wall of Sclerenchyma consist of	Cellulose or lignin
97)	Sclerenchyma constitute the source material for many fibrils such as	Flax, hemp, jute & ramie
98)	The fibers of xylem are always	Lignified
99)	Fibers that do not belong to the xylem are	Bast (outside ring of cambium )
100)	Fibers are so long, slender, so called	Prosenchymatous cells
101)	Fibers occur in the form of	Strands or bundles
102)	Totality of a stem's bundles are colloquially called	Fibers
103)	The fibers of flax ( <i>Linum usitatissimum</i> ) have known in Europe and Egypt	Since more than 3000 year
104)	The fiber ramie( <i>Boehmeria nivea</i> , a nettle) are extremely	Soft & elastic
105)	Scleroid are short and are variable	In shape
106)	The cells of scleroid may be isodiametric, prosenchymatic, forked or	Branched
107)	Stone cells are present in	Pears & wax plants
108)	Shell of seed like nut and drupes like cherries or plump are made of	Scleroids

**GROWTH AND DEVELOPMENT IN PLANTS**

109)	Increases in size and number of cell is termed as	Growth
110)	Meristems are undifferentiated, perpetually juvenile plant tissues	Divide mitotically

	which	
<b>111)</b> Meristematic tissues are of two types:		
	<b>Types</b>	<b>Primary meristems</b>
	Apical meristem	Protoderm Ground meristem Procambium
	Lateral meristem	<b>Types</b> Vascular cambium Cork cambium
<b>112)</b>	The apical meristem give rise to three primary meristems which are protoderm, ground meristem and	Procambium
<b>113)</b>	The inner most tissue is the pith which is produced by the	Central ground meristem
<b>114)</b>	The function of central ground meristem for a short period as a	Storage tissues
<b>115)</b>	The elongation is called	Primary growth
<b>116)</b>	The increase in thickness of the plant is called or	Lateral growth
<b>117)</b>	All vascular plants whether herbaceous or woody undergoes	Primary growth
<b>118)</b>	Production of lateral branches leaves and flowers are occur by	Primary growth
<b>119)</b>	Primary growth is found in most monocots and some	Herbaceous dicots
<b>120)</b>	Lateral meristem are the cylinders of dividing cells found in	Gymnosperm & dicots
<b>121)</b>	Cork cells protect the stem and the root from water loss, pathogens and	Herbivorous insects
<b>122)</b>	During the life of most dicots the growth present is	Secondary growth
<b>123)</b>	From the procambium in the vascular bundles secondary cambium is formed which produces secondary phloem and	secondary xylem
<b>124)</b>	In some species cork cambium that makes cork tissues develops from Parenchymatous cells in the	Cortex
<b>GROWTH CORRELATION</b>		
<b>125)</b>	The reciprocal relationship for growth among the different organs of plant is called	Growth correlation
<b>126)</b>	The correlation may be Inhibitory or	Compensatory
<b>127)</b>	The inhibition or control of lateral buds to develop by the activity of apical bud is called	Inhibitory correlation or apical dominance
<b>128)</b>	In Complete apical meristem only the main shoot grows and the lateral buds are not allowed to develop as in	Sunflower <b>ETEA-2014</b>
<b>129)</b>	In Incomplete apical meristem the growth of lateral buds are not under controlled which grow out to form a bushy appearance as in	Tomato
<b>ANNUAL RINGS</b>		
<b>130)</b>	When condition are ideal the annual ring is	Thick
<b>131)</b>	In summer or other trouble the annual layer will be	Thin
<b>132)</b>	The layers appear in the stump as a series concentric rings are called	Annual or tree rings
<b>133)</b>	Each tree ring mark a line between the dark late wood and	Pale early wood
<b>134)</b>	In annual ring formation the growth occurs in	Cambium
<b>135)</b>	In spring the cambium divides and increase the diameter of the tree at two places	<b>1</b> Outside the cambium Become part of phloem <b>ETEA-2016</b>

	2	Inside the cambium	Become part of xylem
136)	The tree add extra tissues and produce a thick ring when condition		Encourage growth
137)	The growth is slow and the tree produces a thin ring in a		Discouraging year
GROWTH RESPONCES IN PLANTS			
138)	Hormones of plants are referred as		Phyto Hormones

**Five major growth hormones:**

S.No	Hormones	Controls
1	Auxins	<ul style="list-style-type: none"> <li>Lengthening of shoot, differentiation of vascular tissue,</li> <li>initiate cell division, <b>ETEA-2011</b></li> <li><b>inhibit growth in lateral buds, ETEA-2012</b></li> <li>maintain apical dominance,</li> </ul>
2	Gibberellins	<ul style="list-style-type: none"> <li>Restore normal growth, cause bolting in reset form plant,</li> <li>seed germination in grasses,</li> <li>produce enzyme from aleurone layer of endosperm,</li> <li>break dormancy of seed, cancel effect of inhibitory substances</li> </ul>
3	Cytokinins	<ul style="list-style-type: none"> <li>Promote cell division and bud formation,</li> <li>prevent senescence in leaves <b>ETEA-2013</b></li> </ul>
4	Abscisic acid(ABA)	<ul style="list-style-type: none"> <li>Cause bud dormancy and seed dormancy, <b>ETEA-2010</b></li> <li>inhibit active growth of seedling flowering in long day and promotes abscission,</li> </ul>
5	Ethylene	<ul style="list-style-type: none"> <li>Its gaseous hormone, inhibit root growth and development auxiliary buds when present in high concentration, <b>ETEA-2012</b></li> <li>stimulate fruit ripening, <b>ETEA-2017 - ETEA-2019</b></li> </ul>

139)	Auxin is a Greek word which means	To increases
140)	Auxins are hormone which are produced in the apical meristems of shoots	And tips of coleoptiles
141)	Indole acetic acid with other related compounds are collectively called	Auxins <b>ETEA-2012</b>
142)	The same quantity of auxin that promotes growth in stem inhibits growth in the	Main root system
143)	The Gibberellins was first isolated from a Parasitic fungus, which cause abnormal growth in	Rice seedlings <b>ETEA-2012</b>
144)	In apples and grapes the exogenous application cause more fruit set by	Gibberellins <b>ETEA-2018</b>
145)	Gibberellins promote flowering, helps in growing seedless grapes and improves	Storage life of banana
146)	Gibberellins are chemically related to the certain components of the	Nucleic acid
147)	High concentration of auxin promotes Root formation and High concentration of cytokinins promotes Bud formation in	Tobacco pith culture
148)	Cytokinins promotes the growth of lateral buds in	Intact plant
149)	A substance that promotes abscission of cotton fruit was called	Abscission II
150)	The Abscission II was later named "abscisic acid" due to its abscission and	Acidic nature
151)	Substance which produce bud dormancy is called	Dormain
152)	During stress, the concentration of abscisic acid increases which causes	Stomata to close

153)	The leaf abscission involves decrease auxin and increases Ethylene production
PLANT MOVEMENTS	

154)	<b>Plants movement are classified into two major types:</b>			
	Growth movement	Autonomic movement	Nastic/nutation	e.g zig zag growth of stem of plant
			Epinasty <b>ETEA-2018</b>	e.g opening of buds: upper part of leaf grow more than lower part of leaf
			Hyponasty	e.g closing of buds: upper part of leaf grow less than lower part of leaf
	Paratonic movement (movement by external stimuli)	Tropic movement (in any direction)	Phototropism	Light
			Geotropism	Gravity
			Hydrotropism	Moisture
			Chemotropism <b>ETEA-2009</b>	Chemical
		Nastic movement	Thigmotropism	Touch, contact, friction
			Photonasty	Light e.g oxalis plant
			Thermonasty	Temperatur e.g crocus,tulips
		Tactic movement	Seismonasty	Touch, friction e.g mimosia pudica
			Phototactic	Light e.g chlamadomonas, volvex
			Thermotactic	Temp e.g unicellular algae
			Chemotactic	Chemical e.g spermatozoids
	Turgor movement	Rapid movement e.g touch me not		
		Sleep movement e.g bean plant		

155)	The orientation of stem and roots in response to gravity is called	Geotropism
156)	The root grow towards the gravity and show	Positively geotropic
157)	The stem grows away from the force of gravity and show	Negatively geotropic
158)	the tendrils are found in number of plants such as	<i>Passiflore, Lathyrus, &amp; Smilax</i>
159)	The pollen tube grows towards the egg in angiosperm due to disintegration of the	Synergid cell
160)	Towards protein, salt of ammonia , phosphate tentacles of <i>Drosera</i> show	Positive chemotropism
161)	Towards sugar and peptones the hyphae show	Positive chemotropism
162)	Towards acid and alkali, the hyphae show	Negative chemotropism
163)	the seismonasty movement is caused by the differential loss and support on the two sides of the	Pulvinus

**PHOTOPERIODISM**

164)	The relative length of the day and night to which plant is exposed is called	Photoperiod
165)	The response of plant towards the photoperiod is called	Photoperiodism
166)	The critical day length is	11 hours
167)	Critical day length for flowering for short day plants	15 1/2 <b>ETEA-2015</b>
168)	Critical day length for flowering for long day plants	11 1/2
169)	Short day plant produce flowers in spring when the day length is	shorter than critical value
170)	Long day plant produce flowers in summer when the day length is	longer than critical value
171)	Day neutral plant are independent to the length of the day they	Mature

	produce flowers whenever they													
172)	<table border="1"> <thead> <tr> <th>S.No</th><th>Plants</th><th>Examples</th></tr> </thead> <tbody> <tr> <td>1</td><td>Short day plant</td><td>Tobacco, dahlia, soya bean &amp; chrysanthemum <b>ETEA-2013</b></td></tr> <tr> <td>2</td><td>Long day plant</td><td>Hibiscus, beet, spinach &amp; potato</td></tr> <tr> <td>3</td><td>Day neutral plant</td><td>Maize, tomato, sunflower &amp; cucumber</td></tr> </tbody> </table>	S.No	Plants	Examples	1	Short day plant	Tobacco, dahlia, soya bean & chrysanthemum <b>ETEA-2013</b>	2	Long day plant	Hibiscus, beet, spinach & potato	3	Day neutral plant	Maize, tomato, sunflower & cucumber	
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3	Day neutral plant	Maize, tomato, sunflower & cucumber												
173)	For short day plant, the critical value for flowering is	Maximum												
174)	For long day plant, the critical value for flowering is	Minimum												
<b>PHYTOCHROMES</b>														
175)	Pigment which is sensitive to the transition between light and darkness is	Phytochrome												
176)	The pigment can exist in two forms	$P_r$ & $P_{fr}$												
177)	The $P_r$ forms absorb red light with a wavelength of 660 nm and converted to	$P_{fr}$												
178)	The $P_{fr}$ forms absorb far red light with a wavelength of 730 nm and converted to	$P_r$ <b>ETEA-2015</b>												
179)	The active form of pigment is called	$P_{fr}$												
180)	$P_{fr}$ Promotes flowering in long day plants and inhibits in	Short day plants												
181)	$P_{fr}$ is responsible for changes takes place in seedling, for germination of seeds	& for development of anthocyanins												
182)	A hormone that produced in leaves and travels through the phloem to the floral buds and initiates flower formation is	Florigen <b>ETEA-2013</b>												
183)	A Russian scientist named M.H Chailakhain proved by experiment in 1936 that florigen is produced in the	Leaves												
184)	M.H Chailakhain proved performed his experiment on short day plants name	Chrysanthemum												
<b>VERNALIZATION</b>														
185)	Vernalization is of Latin word meaning	Spring												
186)	The conversion of winter variety plant into the spring variety by low temperature treatment is called	Vernalization <b>ETEA-2016</b>												
187)	The term vernalization was coined by	Lysenko in 1928												
188)	Some plants required low temperature period before producing flowers if this condition is not fulfilled the plant	Will not produce flowers												
189)	If the germination seeds of winter wheat are exposed to low temperature, the plant produce by this seed will flower much	Earlier than other they done before												
190)	The plants which are stimulated by low temperature treatment are the parts of plants which receive stimulus of low temperature	Embryo of seed & apex of the stem												
191)	The temperature which is effective for vernalization is	4° C <b>ETEA-2012</b>												
192)	At 4° C, plant produce hormone a vernalin which induce	Vernalization <b>ETEA-2017</b>												
193)	Vernalization procedure is applied to cereal crops particularly wheat in Northern Europe during	1930 and 1940 <b>ETEA-2015</b>												
194)	In Northern Europe chilled winter varieties are grown as	Spring varieties												
<b>MIX</b>														
195)	Abcissic acid is also called	Stress hormone												
196)	Auxins is Greek word which means	To increase												
197)	Herbaceous plants are often known for the	Attractive flowers / foliage												
198)	Support to the plant is provided by the mechanical tissue which	Sclerenchyma												

	are collenchyma &													
199)	Non woody plants are supported by the turgidity(water pressure) of	Parenchymatous cells												
200)	The pressure of the cell pushing against the wall is called	Turgor pressure												
201)	Auxins controls the	Lengthening of shoot												
202)	Gibberellins cause the aleurone layer of the endosperm to produce alpha-amylase which breakdown starch to sugar present in	Endosperm												
203)	Auxins inhibits the growth of	Lateral buds												
204)	Gibberellin, Auxins, Cytokinins	Growth hormones <b>ETEA-2015</b>												
205)	The hormone that causes bud dormancy in plant is	Abscisic acid(ABA) <b>ETEA-2012</b>												
206)	Cytokinins promotes	Bud formation												
207)	The mechanism of leaf abscission involves decrease auxin and increase	Ethylene production												
208)	In xerophytes leaves are covered with	Cuticle <b>ETEA-2014</b>												
209)	Sunken stomata are present in	Xerophytes												
210)	Attraction of water molecule with another water molecule is called	Cohesion												
211)	Attraction of water molecules to the xylem vessels is called	Adhesion												
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Vessel elements	Companion cells													
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	Phloem fibers													
	Phloem ray cell													
213)	Ripening of fruit can be promoted by	Ethylene gas <b>ETEA-2019</b>												
214)	Opening and closing of stomata is controlled by	Sugar, Potassium and PH												
215)	Primary(N, P, K), secondary(Ca, Mg, S)	Macronutrients <b>ETEA-2019</b>												
216)	B, Cu, Fe, Cl	Micronutrients												
217)	Plants which feed on water mites	Utricularia												
218)	The cell that play vital role in the differentiation of different body parts are called	Mesodermal cells												

## CHAP# 11 Digestion Key points

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# CHAP# 12 Circulation Key points

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# CHAP# 13 Immunity Key points

S.No	Questions	Answers
1)	INTRODUCTION	
2)	Antibodies are produced by the immune system in response to the presence of an	Antigen
3)	large molecules usually proteins on surface of cells, virus, fungi, bacteria and some non-living substances such as toxin, chemicals and foreign particles are known as	Antigens
4)	Study of our protection from macromolecules or invading organism and our response for them	Immunology
5)	Immune response to our own proteins and other molecules are called	Autoimmunity
6)	Immunity response against our own aberrant cells is called	Tumor immunity
7)	FIRT LINE OF DEFENCE	
8)	Skin, mucus membrane, HCl, cilia, mucus	Firt line of defence <b>ETEA-2016</b>
9)	Macrophages, neutrophils, natural killer cells, the complementary system	Second line of defence <b>ETEA-2015</b>
10)	The largest organ of integumentary system	Skin
11)	Providing insulation, temperature regulation and sensation is done by	Skin
12)	Our first line of defense in nonspecific and includes structures, chemicals & Process that prevent	Pathogens from entering
13)	Skin, mucus membrane of respiratory, digestive, urinary and reproductive systems	First line of defense
14)	PHYSICAL AND CHEMICAL COMPONEN OF SKIN DEFENCE	
15)	<b>Skin is comprised of two main layers:</b> <ol style="list-style-type: none"> <li>1. The epidermis <ul style="list-style-type: none"> <li>• Composed of multiple layers of tightly packed cells</li> <li>• Contain epidermal dendritic cells that actively patrol the skin to phagocytize pathogens</li> </ul> </li> </ol>	

	2. The dermis <ul style="list-style-type: none"> <li>Contain protein fibers called collagen</li> <li>Collagen is tough fibrous proteins which give strength and pliability to resist</li> </ul>	
16)	CHEMICAL COMPOSITION OF SKIN DEFENCE	
17)	<b>Chemical components of skin defense:</b> <ol style="list-style-type: none"> <li>Perspiration <ul style="list-style-type: none"> <li>Secreted by the skin's sweat glands</li> <li>It contain salt and enzyme</li> <li>Lysozymes in sweat are enzyme that can destroy cell wall of bacteria</li> </ul> </li> <li>Sebum <ul style="list-style-type: none"> <li>Secreted by skins sebaceous(oil) gland</li> <li>Lower the pH of the skin to more acidic</li> </ul> </li> </ol>	R
18)	The healthy stomach essentially remain	Sterile
19)	Proper acidic level of the stomach prevent	Over growth from occurring
20)	FUNCTIONS OF CILIA AND MUCUS IN NOSE AND NASAL CAVITY:	
21)	<b>Functions of cilia and mucus in nose and nasal cavity:</b> <ul style="list-style-type: none"> <li>Filteration of bacteria, virus, duct, pollen</li> <li>Traping of particles before they enter to body</li> <li>Warming the air</li> <li>Adding moisture to each breath to prevent air ways and lung from becoming dry and damaged</li> </ul>	
22)	Because the nose and nasal cavity are so effective at filtering, warming and moisturizing each breath so it is better to breath through nose rather than	Mouth
23)	Oxygen may be easier for the lungs to extract from air that has entered by	Nose
24)	Basal cell of nose are also called	Stem cell
25)	Goblet cell secrete	Mucus <b>ETEA-2012</b>
26)	To help the breathing process there is a own natural clearance method in	Lungs
27)	Thin mucus is swept up towards the wind pipe by tiny breathing hairs called	Cilia
28)	<b>SECOND LINE OF DEFENCE</b> <b>ROLE OF MACROPHAGES AND NEUTROPHYLLS</b>	
29)	Second line of defense is nonspecific but it contains	Variety of microbes
30)	Monocytes and neutrophils are two types of	WBCs
31)	Monocytes are released by the	Bone marrow
32)	Monocytes flow in the blood steam when enter to tissues it turn into	Macrophages
33)	Of all blood cells, macrophages are	Biggest
34)	Most boundary tissues has its own macrophages for example, Alveolar macrophages live in the	lungs
35)	Macrophages clean up pus as a part of the	Healing process <b>ETEA -2023</b>
36)	<b>ROLE OF NATURAL KILLER CELLS</b>	
37)	The most common form of WBCs in the body are	Neutrophils
38)	Bone marrow produces trillion of WBCs every day but their life span is	Less than a day <b>ETEA-2012</b>
39)	Once in the blood steam neutrophils can move through	Capillary wall into

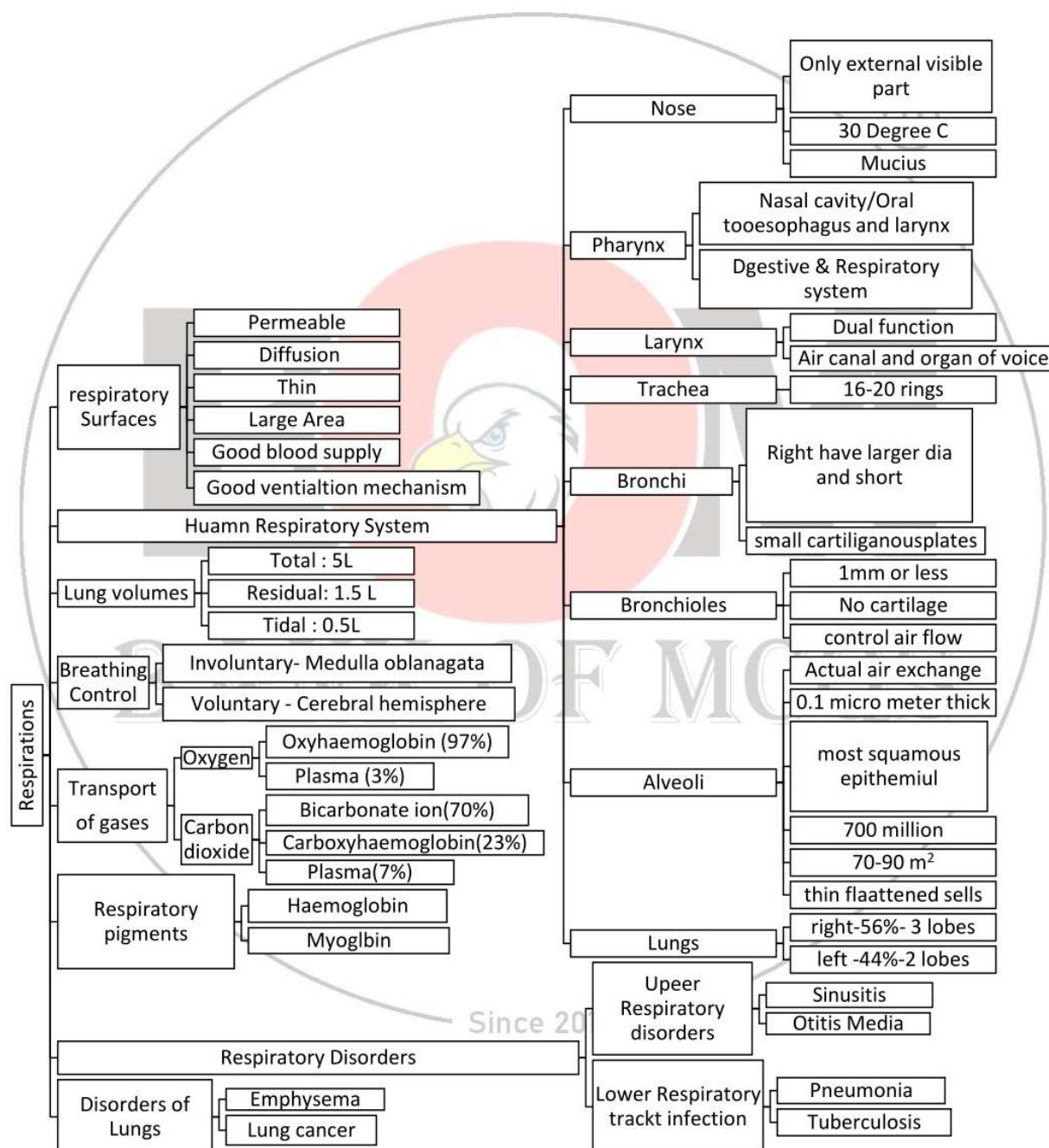
		tissues
40)	If we get a splinter, neutrophils will be attached by a process called	Chemotaxis
41)	Once neutrophil finds foreign particles it engulf it & destroy it by releasing	hydrogen peroxide
42)	Natural killer cell are type of lymphocytes and a component of	Innate immune system
43)	Natural killer(NK) cell play a vital role in host-rejection of both tumours and	Virally infected cells
44)	Nk cells are cytotoxic, small granules in cytoplasm contain special proteins such as perforin and protease known as	Granzymes
45)	In the cell membrane of target cell pores are formed by	Perforin
46)	Granzymes and associated molecules enter through pores and cause	Apoptosis
47)	When virus infected cell burst it releases the virions and is called	Cell lysis
48)	When virus cell burst inside the cell, it is called	Apoptosis
49)	<b>COMPLEMENTARY SYSTEM</b>	
50)	The complement system includes proteins and white blood cells which	Carry antibodies
51)	The white blood cells and proteins work together to coat any invading bacteria with antigen which often make the bacteria incapable of reproducing or bind the bacterium to a toxic chemical	To make it break apart
52)	The cell in the blood that detect the pathogenic bacteria and signal the complement system to get to work are	Macrophages
53)	<b>INTERFERON</b>	
54)	<b>There are three main types of interferon:</b> <ol style="list-style-type: none"> <li>Interferon alpha (produced by WBC and fibroblasts)</li> <li>Interferon beta (produced by WBC and fibroblasts)</li> <li>Interferon gamma (produced primarily by Activated T cells)</li> </ol>	
55)	Interferon are antiviral agent and can fight	Tumors <b>ETEA-2018</b>
56)	Major histocompatibility complex class I and II, which display foreign peptides for	Activation of T cells
57)	<b>INFLAMMATOR RESPOME AS ONE OF THE NNON SPECIFIC DEFENCES</b>	
58)	When tissues are injured by bacteria, trauma, toxin, heat or any other cause	Inflammation occurs
59)	In inflammation the damaged tissue releases chemicals including histamine, bradykinin and	Serotonin
60)	The chemicals from injured tissues cause blood vessels to leak fluid into the tissue causing	Swelling
61)	Pus is formed from a collection of dead tissue, dead bacteria, and live and	Dead phagocytes
62)	<b>The main symptoms of inflammatory response are:</b> <ol style="list-style-type: none"> <li>Heat</li> <li>Pain</li> <li>Redness</li> <li>Inflammation</li> <li>Loss of function</li> </ol>	
63)	The inflammation process continues until the infection that cause it has been	Eradicated
64)	<b>PYREXIA AND PYROGENS</b>	
65)	The elevation of body temperature above the normal range is	Pyrexia (fever)

	called	
66)	Pyrexia may cause by abnormality in the brain or by	Toxins substances
67)	The temperature of body is regulated normally by	Nervous feedback mechanisms
68)	The temperature regulating center is located in the	Hypothalamus at brain
69)	Substance which may cause "set point" of the hypothalamus thermostat to rise is called	Pyrogens
70)	A pyrogens may be break down products of protein, lipopolysaccharides toxins(LPS or endotoxin) secreted by bacteria and can act as	Pyrogens
71)	Pyrogen if injected to animal, it can cause fever if they are as little as	Few nanogram (one-billionth)
72)	Pyrogens are produced by many microorganism including bacteria,	Yeast and moulds
73)	The body's natural way of defending itself is	Fever
74)	The normal temperature of human is	37.8° C (100 °F)
75)	<b>Benefits of fever:</b> 1. More WBCs produced 2. More interferon produced 3. Walling off iron on which bacteria feed on 4. Increase temperature	
76)	<b>THIRD LINE OF DEFENCE</b>	
77)	Monocytes develop from stem cells in the	Bone marrow
78)	In tissues, monocytes further mature into	Macrophages
79)	Lymphocytes are one of the five kinds of	WBCs
80)	The most abundant lymphocytes are	B cells & T cells
81)	B cells are produced in	Bone marrow
82)	T cells are produced in Bone marrow but mature in	Thymus
83)	Each B & T cell is specific for specific	Antigen
84)	<b>BASIC TYPES OF IMMUNITY</b>	
85)	<b>There are two types of immunity:</b> 1. Innate or inborn or natural immunity(skin, hairs, cilia, mucus, HCl, WBCs, macrophages) 2. Acquired or adaptive immunity a. Active or natural immunity → Long lasting immunity b. Passive or artificial immunity → For a short time	
86)	The innate immunity is inherited from mother to offspring through	Placenta <b>ETEA-2019</b>
87)	<b>The acquired immunity may be</b> 1. Temporary such as influenza 2. Permanent such as measles, mumps, polio, small pox for long life	
88)	<b>Active immunity is developed by three ways:</b> 1. By disease (chicken pox, mumps, measles) 2. By subclinical infection ( <b>live</b> "sabin" vaccine against polio) 3. By killed microorganisms ( <b>killed</b> "salk" vaccine against polio)	
89)	Passive immunity is "borrowed" from	Another source
90)	Antibodies in a mother's breast milk provide a baby with temporary immunity which is	Passive immunity <b>ETEA-2015</b>
91)	<b>VACCINATION</b>	
92)	Body is made vaccine or resistant to infection diseases, typically	Immunization

BOM SERIES	Page 60	BOM ACADEMY Online & Swat
	by the administration of a vaccine is called	
93)	The word vaccination or vaccine had been evolved from "vacca" which means cowpus, which contain	Virus for cowpox
94)	The cowpox and small fox virus are very similar	In structure
95)	If human body is exposed to cowpox virus, the body acquired immunization	Against smallpox
96)	Immune-biological substances which produce specific protein against a given disease is definition of	Vaccine
97)	Vaccine may be prepared from live modified organisms, inactivated or killed organisms, extracted cellular fractions toxoids or	Combination of these
98)	<b>SPECIFIC DEFENCE MECHANISM</b>	
99)	<b>Specific defense mechanism are effective against pathogens, there are two main types of specific defense mechanism:</b> <ol style="list-style-type: none"> <li>Cell mediated immune response → consist of T-cells <b>ETEA-2012</b></li> <li>The antibody mediated immune response → consist of B-cells</li> </ol>	
100)	<b>T cell are of three types:</b> <ol style="list-style-type: none"> <li>Cytotoxic T cells which directly kill invaders</li> <li>Helper T cells which aid B and other T cells to do their jobs</li> <li>Suppressor T cells which suppress the activity of B and T cells</li> </ol>	
101)	<b>The cellular immune response occur in two phases:</b> <ol style="list-style-type: none"> <li>Activation phase → repeatedly division occur</li> <li>Effector phase → killing the target cell</li> </ol>	
102)	The humeral immune system consist of	B cells
103)	B cell can produce antibodies but they need exposure to the	antigens to do so <b>NMDCAT-2020</b>
104)	Antigens are cell surface oligosaccharides & proteins which the cell uses as	ID tags
105)	Antibodies are chemically proteins found in the	Blood plasma & lymph
106)	All B daughter cell will able to produce same antibodies as the	Mother cell produced
107)	Antibodies bind to certain parts of an antigen to mark it for destruction by	T cells
108)	Some B cell become memory cell ready to respond to a later invasion by the same pathogens but most become antibody producing factories called	Plasma cells
109)	Antibodies are immune system-regulated proteins called	Immunoglobulins
110)	<b>STRUCTURAL OF MODEL OF ANTIBODIES</b>	
111)	Each antibody consist of four polypeptide chains	2 heavy & 2 light
112)	The amino acid sequence at the tip of "Y" varies greatly among	Different antibodies
113)	The variable region of antibody is composed of	110-130 amino acids
114)	The variable region includes the end of	Light and heavy chain
115)	<b>Classes of antibodies:</b> IgG , IgA , IgM , IgE , IgD (gamed)	
116)	<b>ALLERGIES</b>	
117)	The abnormal reaction to the ordinarily harmless substances is called	Allergies
118)	<b>The chance of allergies if:</b> <ul style="list-style-type: none"> <li>Neither parents are allergic → 15%</li> <li>One parent are allergic → 30%</li> <li>Both parents are allergic → 60%</li> </ul>	

119)	During the sensitization period in allergy,	IgE is overproduced <b>ETEA-2017</b>												
120)	Allergic shock are also called	Anaphylaxis shock or Anaphylactic shock												
121)	<b>Allergens that most frequently cause problems are :</b> Pollens, mold spores, house dust mites, animal danders, foods, insect bites or stings, plant insect spores, latex, virus, bacteria, medications and Environmental conditions such as cold temperature													
122)	<b>AUTOIMMUNE DISORDERS</b>													
123)	When body produce an inappropriate immune response against its own tissues is called	Autoimmune disorder												
124)	<b>Some of the auto immune disorders are:</b> <b>NMDCAT-2020</b> •Lupus                                  •Juvenile rheumatoid arthriti                                  •Juvenile dermatomyositis •Ankylosing spondylitis                •Scleroderma													
125)	<b>MIX</b>													
126)	Of all blood cells, Macrophages are	Biggest												
127)	Macrophages lives in lungs are called	Alveolar macrophages												
128)	Perforin and proteases are known as	Granzymes												
129)	There are three types of interferon are:	<table border="1"> <thead> <tr> <th>S.No</th> <th>Type</th> <th>Produced By</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Alpha (<math>\alpha</math>)</td> <td>White Blood Cells and fibroblast</td> </tr> <tr> <td>2</td> <td>Beta (<math>\beta</math>)</td> <td>White Blood Cells and fibroblasts</td> </tr> <tr> <td>3</td> <td>Gamma (<math>\gamma</math>)</td> <td>Act vated T cells</td> </tr> </tbody> </table>	S.No	Type	Produced By	1	Alpha ( $\alpha$ )	White Blood Cells and fibroblast	2	Beta ( $\beta$ )	White Blood Cells and fibroblasts	3	Gamma ( $\gamma$ )	Act vated T cells
S.No	Type	Produced By												
1	Alpha ( $\alpha$ )	White Blood Cells and fibroblast												
2	Beta ( $\beta$ )	White Blood Cells and fibroblasts												
3	Gamma ( $\gamma$ )	Act vated T cells												
130)	Vaccine used against polio is	Sabin												
131)	Vaccine used against tetanus	Tetanus toxoid												
132)	Helper T-Cells releases enzymes which go into	Rapid Reproduction												
133)	After reproduction B-cell forms two types of cells	Memory cells & Plasma cells												
134)	Irish potato famine was caused by <i>Phytopythora infestans</i> in	1845-1847												
135)	Oomycota (water molds) reproduce sexually as	Oogamous												
136)	The ability of switching from heterotrophic to autotrophic is present in	Euglena												
137)	Fungi cell wall is made of	Chitin												
138)	Fungi are not true multicellular and they are heterotrophic	Eukaryotes												
139)	Antibodies are released by	B cells <b>NMDCAT-2020</b>												
140)	Antibodies are produced by	B-lympocytes												
141)	Blood cells are produced by	Bone Marrow												
142)	Memory cells of the immune system are deried from	B lymphocytes												
143)	B cells can be stimulated and suppressed by	T cells												
144)	Humeral immunity is due to	B lymphocytes												
145)	Hypersensitivity to an allerden is due to	Abberant functioning of immune system												

# CHAP#14 Respiration Key points



S.No	Questions	Answers
1)	Of all blood cells, Macrophages are	Biggest
2)	Human respiratory System	
3)	Diffusion is only effective over distance of	1mm or less
4)	The only externally visible part of respiratory system is	Nose
5)	The structure of human nose is composed of bone, cartilage and	Fibro fatty tissues
6)	The external features of bones depends upon the ethmoid bone and	Cartilage
7)	Hairs are present inside	Nostrils
8)	The mucus membrane secretes a sticky substance called	Mucus
9)	For their removal the cilia move the trapped substance to the	Pharynx
10)	Blood capillaries helps to warm the blood to a temperature of	30° C
11)	Nose, Nasal cavity, Pharynx, larynx, trachea, bronchi, bronchioles and	Alveoli <b>ETEA-2012</b>
12)	The shape of pharynx is	Cone shaped
13)	Pharynx leads from oral and nasal cavities to the	Oesophagus and larynx
14)	The part of both respiratory and digestive system is	Pharynx
15)	Food is allowed to pass to the oesophagus through the	Nasal cavity in pipe
16)	Function of larynx is air canal and	Organ of voice
17)	Two fibrous bands called vocal cords are present in the	Larynx
18)	Vocal cords are composed of mucus membrane stretched horizontally	Across the larynx
19)	The length of trachea is	10 – 12 cm
20)	The width of trachea is	2cm
21)	The wall of trachea is composed of horse shoe shaped rings, their no is	16 – 20
22)	Trachea protects the respiratory system from an accumulation of	Foreign particles
23)	Adults male have larger vocal cords and have	Low pitched voice
24)	Adults woman have smaller vocal cords and have	High pitched voice
25)	the right bronchus has a larger diameter and shorter than the	Left bronchus
26)	The diameter of bronchiole is	1 mm or less
27)	The walls of bronchiole consist of ciliated cuboidal epithelium and a	Layer of smooth muscles
28)	The first airway branch which do not contain cartilage is	Bronchioles <b>ETEA-2016</b>
29)	The air distribution in lungs is controlled by	Bronchioles
30)	The actual exchange of oxygen and carbon dioxide occurs in	Alveoli
31)	The thickness of wall of alveolus is	0.1 cm
32)	Alveoli contain collagen and	Elastic fibres
33)	The volume of right lung by percentage is	56%
34)	The volume of left lung in total lung volume is	44%
35)	The right lung is composed of three lobes	Superior, middle and inferior
36)	The left lung has only	Two lobes (sup-inf)
37)	The two lung rest their bases with diaphragm and their apexes extends	Above the first rib
38)	Special cells in alveolus secrete a detergent like chemical on inside lining of alveolus called	Surfactant
39)	Each lung is encased in a thin membranous sac called	Pleura
40)	<b>Lung volume and capacity</b>	

41)	<b>Volume of lungs:</b>			
	Normal volume	5 L		
	Tidal volume	0.5 L		
	Residual volume	1.5 L		
42)	The average adult human has a lung capacity of approximately	5 liters		
43)	The volume of air exchanged during one breath in and out in quite breathing and this is about	Tidal volume		
44)	The volume of air remaining in the lungs even after a forcible expiration and this is about	Residual volume		
45)	<b>Control of breathing</b>			
46)	Involuntary control of breathing is carried out by a breathing center	In medulla oblongata		
47)	The ventral portion of breathing center act to increase the rate and depth of inspiration and is called	Inspiratory centre		
48)	The dorsal and lateral portion inhibits inspiration and stimulate expiration and form the	Expiratory centre <b>ETEA-2018</b>		
49)	The breathing center communicates with intercostal muscles by	Intercostal nerves		
50)	The breathing center communicates with diaphragm muscles by	Phrenic nerves		
51)	Inpiration is an	Active process		
52)	Expiration is an	Passive process		
53)	The lungs are made to expand and contract by movements of the	Ribs and Diaphragm		
54)	The shape of diaphragm in inspiration is	Flattened		
55)	The shape of diaphragm in expiration is	Dome		
56)	During voluntary control impulses originate from the cerebral hemispheres and pass to the	Breathing center		
57)	<b>Mechanism of transport of gases</b>			
58)	20% decrease in oxygen concentration in the air produce	Doubling in breathing rate		
59)	<b>Transport of oxygen in blood:</b>	<b>ETEA-2015</b>		
	As oxyhaemoglobin	97 %		
	As plasma	3%		
60)	Oxygen binds with haemoglobin in presence of enzyme called	Carbonic anhydrase		
61)	To form oxyhaemoglobin, each haemoglobin binds with	Four oxygen molecules		
62)	<b>Respiratory pigment in invertebrates</b>			
	<b>Pigment</b>	<b>Invertebrates</b>	<b>Oxygenated pigment colour</b>	<b>Deoxygenated pigment colour</b>
	Haemoglobin	Human	Bright red	Dark red
	Haemocyanin	Molluscs	Blue	Colourless
	Haemoerythrin	Some marine animals	Violet to pink	Colourless
	Chlorocruorin	Annelids	Green	colourless
63)	Amount of haemoglobin in blood is	Since 2016	15 gms / 100 ml	
64)	1 gm haemoglobin combines with		1.34 ml of oxygen	
65)	<b>ETEA-2014</b>			
	<b>Oxygen in</b>	<b>Capacity</b>	<b>Pressure of PO<sub>2</sub></b>	<b>Saturation</b>
	Arterial blood (maximum)	20 ml /100 ml	100 mm Hg	100 %
	Arterial blood (normal)	19.4 ml/100 ml	95 mm Hg	97 %
	Venous blood (normal)	14.4 ml/100 ml	40 mm Hg	75 %
66)	The amount of oxygen released to tissues by each 100ml blood is		5ml of oxygen	<b>ETEA-2017</b>

67)	During exercise venous blood that leave an active tissues has 4.4 ml	At 18 mm Hg (20% sat)								
68)	In dissolved form 100 ml of artery blood contain 0.29 ml O <sub>2</sub> (95 mmHg) and increase to	0.3ml/100ml at 100 mmHg								
69)	In plasma in dissolved form 100 ml of venous blood contain 0.12 ml of dissolved oxygen at	40 mmHg								
70)	The oxygen transported to tissues per cycle in dissolved state is	0.17 ml of oxygen								
71)	Haemoglobin is bright red when	Oxygenated								
72)	Haemoglobin is dark red when	Deoxygenated								
73)	Carbon dioxide is carried in the blood <b>ETEA-2016</b>	<table border="1"> <thead> <tr> <th>As</th> <th>%age</th> </tr> </thead> <tbody> <tr> <td>Bicarbonate ions</td> <td>70 %</td> </tr> <tr> <td>Carboxyhaemoglobin</td> <td>23 %</td> </tr> <tr> <td>Plasma</td> <td>7 %</td> </tr> </tbody> </table>	As	%age	Bicarbonate ions	70 %	Carboxyhaemoglobin	23 %	Plasma	7 %
As	%age									
Bicarbonate ions	70 %									
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74)	Otisitis media is of two types otitis externa and	Otisitis media								
75)	Otisitis media is due to formation of	Cholestrenata <b>ETEA-2017</b>								
76)	CO <sub>2</sub> combines with H <sub>2</sub> O to form carbonic acid(H <sub>2</sub> CO <sub>3</sub> ) in presence of	Enzyme Carbonic anhydrase								
77)	From inside erythrocytes diffuses H <sub>2</sub> CO <sub>3</sub> <sup>-</sup> into plasma to form	Sodium bicarbonate								
78)	Diffusion of H <sub>2</sub> CO <sub>3</sub> <sup>-</sup> and Cl <sup>-</sup> is balanced by	Bicarbonate-chloride carrier								
79)	The opposite movement of H <sub>2</sub> CO <sub>3</sub> <sup>-</sup> and Cl <sup>-</sup> is called chloride-shifts or	Hamburger's phenomenon								
80)	<b>Respiratory pigments</b>									
81)	CO <sub>2</sub> combines with globin part of	Haemoglobin <b>ETEA-2012</b>								
82)	Oxygen carrying capacity is increases by	Haemoglobin								
83)	Oxygen is stores in muscles in	Myoglobin								
84)	<b>Respiratory disorders</b>									
85)	Sinusitis is an inflammation of	Nasal Sinusitis								
86)	Otisitis media is an inflammation of	Middle ear <b>ETEA-2017</b>								
87)	Pneumonia is serious disorder of	Lower respiratory track								
88)	Acute symptoms of Sinusitis appear in	2 - 8 weeks								
89)	80% of otitis media clear up within	3 - 4 days								
90)	Sinusitis and Otisitis media are caused by	Bacteria, allergy & infection								
91)	Treatment of Sinusitis is Antibiotics, antiallergic and	Decongestants								
92)	Treatment of otitis media is	Antibiotic and pain killer								
93)	There are four large sinuses 2 maxillary sinuses and	2 frontal sinuses								
94)	The pressure between the middle air cavity and outside mucus to drain out of the middle air cavity is equalized by	Eustachian tube								
95)	Fluid leaking of ear is called	Nausea								
96)	Device which is used to look into the ear is called <b>ETEA-2016</b>	Otoscope or auriscope								
97)	Otoscope consist of light and	Low-power magnifying lens								
98)	There are about 30 different kinds of	Pneumonia								
99)	Usually pneumonia is caused by	Bacteria and virus								
100)	Streptococcus pneumonia, hemophilus influenza, legionella pneumophilia, ataphylococcus aureus and mycoplasma causes	Pneumonia								

101)	<b>Some complications may arise if pneumonia is not treated on time:</b>	
	<b>Complications</b>	<b>Name</b>
	Fluid around the lungs	Pleural effusion
	pus in the pleural cavity	Empyema
	low blood sodium	Hyponatremia
	Accumulation of fluid	Abscess in the lung (rare)
102)	In pneumonia body is unable to get proper amount of oxygen due to	Fluid in the air sacs
103)	Tuberculosis is highly contagious chronic bacterial infection of	Lungs
104)	TB infection begins when mycobacteria reach the alveoli, where they invade and replicate within the Phagosomes of alveolar	Macrophages
105)	TB is caused by	Mycobacterium tuberculosis
106)	TB is transferred from person to person by	Airborne droplets
107)	Most common drugs used for treatment of TB are	Isoniazid and rifampin
108)	In a person with emphysema, the	Alveoli are damaged <b>ETEA-2016</b>
109)	15% of TB patient may develop the disease other than lungs, such as	Lymph nodes, GI track, bones and joints
110)	10% of people having M.Tuberculosis ever develop	Pneumonia
111)	Tubes which are inserted to ear are called	Grommerts / tympanostomy
112)	The surgery in which hole is made in the ear drum is called	Myringotomy
113)	Rapid breathing and rapid pulse rate are symptoms of	Bacterial pneumonia
114)	Breathlessness and slow heart beat are symptoms of	Mycoplasma pneumonia

## Chap# 15 Homeostasis Key points

S.No	Questions	Answers
1)	<b>Mechanism of homeostasis</b>	
2)	The internal environment is formed by circulating organic liquid called	Lymph or Plasma
3)	The tendency to regulate internal conditions are	Homeostasis
4)	Hypothalamus in fore brain is a body	Thermostat <b>ETEA-2019</b>
5)	Hypothalamus stimulates posterior pituitary lobe to release	Antidiuretic hormone (ADH) <b>ETEA -2023</b>
6)	Maintenance of water in body by ADH is an example of	Negative feedback
7)	The part of nephrons which become permeable by secretion of ADH	Collecting tubules and distal convoluted tubule
8)	The negative feedback mechanism results in a reversal of the	Direction of change
9)	Positive feedback brings childbirth to	Completions
10)	If a person breath high concentration of CO <sub>2</sub> the breathing rate of him	increases

<b>11)</b>	<b>Osmoregulations</b>													
<b>12)</b>	Electrolysis is used for both water and	Ions												
<b>13)</b>	The percentage of water in animals is	70%												
<b>14)</b>	Osmoregulators are animals which use energy in controlling	Water gain or loss												
<b>15)</b>	All land animals and some marine vertebrates are	Osmoregulators												
<b>16)</b>	Osmoconformers live in sea and have same amount of solutes equal to	External environment												
<b>17)</b>	The animal body fluids of osmoconformers are kept	Isotonic												
<b>18)</b>	Almost all of the fresh water animals are	Osmoregulators												
<b>19)</b>	The animals of osmoregulator to external environment are	hypertonic												
<b>20)</b>	In fresh water animals there is continual loss of	Body salts to surrounding												
<b>21)</b>	All fresh water has no need of	Drinking water												
<b>22)</b>	All fresh water animals produce large amount of urine and absorbs	Salts												
<b>23)</b>	Salt is obtained from food they eat in	Fresh water animals												
<b>24)</b>	Fresh water animals actively transport salts from external dilute environment through special salt cells called	Ionocytes												
<b>25)</b>	Ionocytes are present in amphibian's skin and	Gills of fishes												
<b>26)</b>	Osmolarity of sea water is	1000 mos m/L												
<b>27)</b>	Osmolarity of blood of marine animals is	200-300 m/L												
<b>28)</b>	Marine animals excrete divalent ions like Mg <sup>++</sup> and Ca <sup>++</sup> through	Kidney <b>ETEA-2017</b>												
<b>29)</b>	Na <sup>+</sup> , Cl <sup>-</sup> and K <sup>+</sup> are removed in marine animals by	Gill's epithelium												
<b>30)</b>	Some fishes have special salt secreting glands in the wall of rectum	Called rectal glands												
<b>31)</b>	The characteristic of special metabolic and behavioral adaptation of desert mammals is called	Anhydrobiosis												
<b>32)</b>	In anhydrobiosis animals 90% of water came from	Cellular oxidation												
<b>33) s</b>	<b>Excretion</b>													
<b>34)</b>	Most troublesome nitrogen containing wastes come from metabolism of protein and	Nucleic acid												
<b>35)</b>	The primary nitrogenous wastes product is	Ammonia ( NH <sub>3</sub> )												
<b>36)</b>	In ammonia, urea and uric acid the more toxic is	Ammonia ( NH <sub>3</sub> )												
<b>37)</b>	In ammonia, urea and uric acid the less toxic is	Uric acid <b>ETEA-2019</b>												
<b>38)</b>	In ammonia, urea and uric acid the more toxic is	Ammonia												
<b>39)</b>	Birds secretes	Uric acid <b>ETEA-2016</b>												
<b>40)</b>	Shark secretes	urea												
<b>41)</b>	<b>Into nontoxic form, amount of water requires to dissolve 1g of:</b>													
	<table border="1"> <thead> <tr> <th>Substance</th> <th>Water amount</th> </tr> </thead> <tbody> <tr> <td>NH<sub>3</sub></td> <td>500 ml</td> </tr> <tr> <td>Urea</td> <td>50 ml</td> </tr> <tr> <td>Uric acid</td> <td>1 ml</td> </tr> </tbody> </table>	Substance	Water amount	NH <sub>3</sub>	500 ml	Urea	50 ml	Uric acid	1 ml					
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Uric acid	1 ml													
<b>42)</b>	Urea is 1 lac time less toxic than	Ammonia ( NH <sub>3</sub> )												
<b>43)</b>		<table border="1"> <thead> <tr> <th>Secretion</th> <th>Called</th> <th>Example</th> </tr> </thead> <tbody> <tr> <td>Ammonia</td> <td>Ammonotelic</td> <td>fishes, protozoa, sponges</td> </tr> <tr> <td>Urea</td> <td>Ureotelic</td> <td>some marine and all terrestrial</td> </tr> <tr> <td>Uric acid</td> <td>Uricotelics</td> <td>terrestrial invertebrates and egg laying vertebrates</td> </tr> </tbody> </table>	Secretion	Called	Example	Ammonia	Ammonotelic	fishes, protozoa, sponges	Urea	Ureotelic	some marine and all terrestrial	Uric acid	Uricotelics	terrestrial invertebrates and egg laying vertebrates
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<b>44)</b>	The vertebrates that lay shelled eggs excrete	Uric acid												
<b>45)</b>	<b>Human excretory system</b>													

46)	Skin, Lungs, Liver and kidney are organs of	Excretory system
47)	The length, width and thickness of kidney is	12cm 6cm 4cm
48)	The weight of stomach is about	150 gms <b>ETEA-2016</b>
49)	Kidney is placed between last thoracic vertebra and	Third lumbar vertebra
50)	The upper part of kidney is protected by	Eleventh and twelfth rib
51)	The right kidney is..... from left kidney	Lower
52)	The deep notch of inner surface of kidney is called	Hilus
53)	The tough double membrane around the kidney is called	Renal peritoneum
54)	The blood received by kidney from heart is	20%
55)	The rate of blood flow through kidney is	1.2 liter per minute
56)	Cortex contain renal corpuscles and	Convoluted tubules
57)	The medulla contain conical structures called	Pyramids
58)	Kidney length	12 cm
59)	Ureter length	28 cm
60)	Urethra (female) length	2-3 cm
61)	Urethra (Male) length	20 cm
62)	The storage of urinary bladder is	0.5 to 1 liter <b>ETEA-2017</b>
63)	Lower part of urinary bladder is guarded by	2 sphincters
64)	The act of emptying the bladder is called	Micturition
65)	Urethra in females carry	Only urine
66)	Urethra in male carry	Urine and spermatic fluid
67)	Urethra in female open externally by	Urethral orifice
68)	Urethra in male open externally by	Urinogenital aperture
69)	Each human kidney contain	<b>1 million nephrons</b> <b>ETEA-2017</b>
70)	2 kidney or human contain	<b>2 million nephrons</b>
71)	Glomerulus receives blood from	Afferent arteriole
72)	Glomerulus sent blood to	Efferent arteriole
73)	Cells of bowman capsule wrap around glomerulus capillary is called	Podocytes
74)	The membrane which stops getting protein is	Basement membrane
75)	Proximal convoluted tubule, loop of Henle, distal convoluted tubule and collecting duct are	Renal tubules
76)	The longest part of nephron is	Proximal convoluted tubule
77)	The loop of Henle is more prominent in	Juxtamedullary nephrons
78)	Loop of Henle descends down to the tips of	Pyramids in medulla
79)	<b>Two general classes of nephron are:</b> <ul style="list-style-type: none"> <li>• Cortical → 70% - 80% <b>ETEA-2016</b></li> <li>• Juxtamedullary → 20% - 30%</li> </ul>	
80)	Cortical nephron have short	Loop of Henle
81)	Under normal condition the cortical nephron deals with control of	Blood volume
82)	Juxtamedullary nephron have long loop of Henle which go deep into	Medulla
83)	In kidney more amount of work is done by	Juxtamedullary
84)	The capillaries of vasa recta runs antiparallel to the loops of Henle and	Collecting duct in medulla
85)	Ultrafiltration, selective reabsorption and tubular secretion are	Process for urine formation
86)	The diameter of efferent to afferent arteriole is	Half

87)	About <b>20%</b> of plasma is filtered into	Bowman's capsule <b>ETEA-2015</b>								
88)	The filtered fluid into bowman's capsule is called	Glomerular filtrate								
89)	The amount of glomerular filtrate per minute is	125ml								
90)	The amount of glomerular filtrate per day is	180 liters								
91)	The amount of reabsorption from nephron out of 125ml is	124 ml								
92)	Over <b>80%</b> of glomerular filtrate is reabsorbed in	Proximal convoluted tubule								
93)	The function of loop of Henle is to	Conserve water								
94)	The ascending limb is impermeable to	Water								
95)	The descending limb is highly permeable to	Water								
96)	The system which result in reabsorption of a lot of water is	Counter current multiplier								
97)	The distal convoluted tubules control blood PH by secreting	Hydrogen ions								
98)	ADH open water channels in collecting duct to allow water to	Move out of the filtrate								
99)	Tubular secretion is the transfer of materials from peritubular capillaries	To renal tubular lumen								
100)	Tubular secretion is mainly caused by	Active transport								
101)	Most important substances secreted by the tubules are	H ions, K ions & organic ions								
102)	Many drugs are eliminated by	Tubular secretion								
103)	Water loss by body in many ways such as evaporation, sweating,	Egestion and urine								
104)	The solute potential is primarily achieved by the effect of	Antidiuretic hormone (ADH)								
105)	ADH is secreted by the posterior lobe of	Pituitary gland								
106)	The hormone which increases the permeability of distal convoluted tubules and collecting duct is	Antidiuretic hormone (ADH)								
107)	When more water is absorbed from urine it make urine	Concentrated								
108)	When less water is absorbed from urine it make urine	Dilute								
109)	The maintenance of sodium level at a steady state is controlled by the	Steroid hormone aldosterone <b>NMDCAT-2020</b>								
110)	Steroid hormone aldosterone is secreted by	Adrenal cortex								
111)	Aldosterone activates sodium potassium pumps in the	Distal convoluted tubule								
112)	<b>URINARY TRACK INFECTION</b>									
113)	All parts of urinary track is infected except	Ureters								
114)	<b>Infection in digestive tube and their names:</b>	<table border="1"> <thead> <tr> <th>Organ</th> <th>Infection</th> </tr> </thead> <tbody> <tr> <td>Kidney</td> <td>Pyelonephritis</td> </tr> <tr> <td>Bladder</td> <td>Cystitis</td> </tr> <tr> <td>Urethra</td> <td>Urethritis</td> </tr> </tbody> </table>	Organ	Infection	Kidney	Pyelonephritis	Bladder	Cystitis	Urethra	Urethritis
Organ	Infection									
Kidney	Pyelonephritis									
Bladder	Cystitis									
Urethra	Urethritis									
115)	<i>Escherichia coli, Staphylococcus saphrophyticus, Klebisella, Entrococci bacteria, and proteus merabilis.Candida albicans (fungus)</i>	Bacteria which causes urinary tract infections(UTIs)								
116)	<i>Candida albicans (fungus) cause infection in mouth,digestive tract and</i>	Vagine and UTIs								
117)	<b>URINARY STONES</b>									
118)	Urinary stones causes pain when enter from kidney to the	Bladder								
119)	Symptoms of urinary stones are pain in side belly/groin and colour of	Urine is penkish/reddish								
120)	Kidney stone forms when there is decrease in	Urine volume								
121)	Kidney stone forms when there is excess of stone forming	In urine								

	substance																
122)	Percentage of types of stones of stone formation:																
	<table border="1"> <thead> <tr> <th>Stone type</th><th>% age</th></tr> </thead> <tbody> <tr> <td>Calcium with oxalate/phosphate</td><td>70 %</td></tr> <tr> <td>Struvite or infection stone</td><td>20 %</td></tr> <tr> <td>uric acid stones</td><td>5-10 % <b>ETEA-2016</b></td></tr> <tr> <td>amino acid cysteine stones</td><td>1-3 %</td></tr> </tbody> </table>	Stone type	% age	Calcium with oxalate/phosphate	70 %	Struvite or infection stone	20 %	uric acid stones	5-10 % <b>ETEA-2016</b>	amino acid cysteine stones	1-3 %						
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123)	Kidney stones also results from Infection in urinary tract; known as	Struvite / infection stone															
124)	Hypercalcemia, Hyperoxaluria and Hyperuricemia are risk factors for	Developing kidney stones															
125)	The over secretion of parathyroid hormone from parathyroid gland	Hyperparathyroidism															
126)	<table border="1"> <thead> <tr> <th>Disease</th><th>Increase level of</th><th>Place or target</th></tr> </thead> <tbody> <tr> <td>Hypercalcemia</td><td>Calcium</td><td>Blood</td></tr> <tr> <td>Hypercalceuria</td><td>Calcium</td><td>Urine</td></tr> <tr> <td>Hyperoxaluria</td><td>Oxalate</td><td>Urine</td></tr> <tr> <td>Hyperuricemia</td><td>Uric Acid</td><td>Blood</td></tr> </tbody> </table>	Disease	Increase level of	Place or target	Hypercalcemia	Calcium	Blood	Hypercalceuria	Calcium	Urine	Hyperoxaluria	Oxalate	Urine	Hyperuricemia	Uric Acid	Blood	
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Hypercalcemia	Calcium	Blood															
Hypercalceuria	Calcium	Urine															
Hyperoxaluria	Oxalate	Urine															
Hyperuricemia	Uric Acid	Blood															
127)	Oxalates are present in tomato and other	Green leafy vegetables															
128)	The level of uric acid may arise from gout (genetic disorder) or due to	High protein intake (meat)															
129)	The stone which can pass from kidney is under	0.5 cm															
130)	The stone which cannot pass from kidney have greater than	1 cm															
131)	Extracorporeal shock waves lithotripsy (ECWL) is used for	Small stones															
132)	Percutaneous nephrolithotripsy (PCNL) is used for	Large stones															
133)	The type of waves of Extracorporeal shock waves lithotripsy (ECWL) are Sound waves while that of PCNL is	Electromagnetic															
134)	Surgery is used for branched stones which are commonly known as	staghorn															
135)	<b>KIDNEY FAILURE</b>																
136)	Acute kidney failure can be	reversible															
137)	Chronic renal failure cannot be	Reversible															
138)	Blood clot or cholesterol deposition of kidney artery, drugs, antibiotics, toxin such as alcohol, heavy metals and cocaine can lead to	Acute kidney failure															
139)	Mostly diabetes and hypertension and anti-inflammatory drugs and analgesic medications (pain relievers) can lead to	Chronic renal failure															
140)	Chronic renal failure can progress to end stage renal disease (ESRD) and	Uremia															
141)	Diabetes modification such as reduced sodium, protein & fluid intake allow people to live for years with	Chronic renal failure															
142)	<b>RENAL DIALYSIS</b>																
143)	Procedure to filter toxins from blood when kidney is unable to perform its function is called	Renal dialysis															
144)	In theory renal dialysis can sustain life	Indefinitely															
145)	The two stages of peritoneal dialysis are the exchange and	The Dwell (time)															
146)	The primary advantage of peritoneal dialysis are	mobility															
147)	<b>KIDNEY TRANSPLANT</b>																
148)	Replacement of diseased, damaged or missing kidney by donor kidney is called	Renal transplant															
149)	First successful kidney transplantation took place between two twins	<b>1954 ETEA-2016</b>															

	in	
150)	The recipient of transplant kidney can expect to live for	5-20 years
151)	The 1983 the risk of kidney rejection was high before the discovery of	Immunosuppressive drug cyclosporine
152)	Transplant surgeon like to see HLAs matching of	3 or more HLAs
153)	Donor-Recipient match of kidney must have same blood group and	Same HLAs
154)	The number of Human Leucocyte Antigens(HLAs) in humans are	6
155)	The antibody response of donor blood with recipient is called	Negative cross match
156)	The risk of transplantation kidney include bleeding and	Postoperative infection
157)	<b>THERMOREGULATIONS</b>	
158)	The maintenance of body temperature by living organism is termed as	Thermoregulation
159)	Temperature affect the geographical distribution of	Animals
160)	On basis of maintaining the body temperature types of animals are	2(poikilotherm+homeotherm)
161)	Animals which unable to maintain internal body temperature are	Poikilotherms (Ectotherms)
162)	Animals which are able to maintain internal body temperature are	Homeotherms (Endotherms)
163)	Invertebrates, fishes, amphibians and reptiles are	Poikilotherms <b>ETEA-2015</b>
164)	Birds, white shark, flying insects, polar bear and mammals are	Homeotherms <b>ETEA-2015</b>
165)	Animals gain heat from two sources the chemical reactions and	Radiant energy from sun
166)	The animals which depends on external source for heat are	Poikilotherms
167)	Animals which rely on heat derived from environment than metabolic heat to raise their temperature are called	Ectotherms
168)	The temperature of structures below the skin and subcutaneous tissue	<b>36.4 – 37.3 °C</b>
169)	The process of heat production in animals are called	Thermogenesis
170)	Thermogenesis is regulated by nervous system and	Hormone
171)	Shivering and non-shivering are two types of	Thermogenesis
172)	Shivering response in muscles can increase heat production by up to	5 times the basal level
173)	The short term metabolic activity is increased by	Adrenaline
174)	The long term metabolic activity is increased by	Thyroxin
175)	Heat is lost from body in process like conduction, convection and	Radiation (50%),
176)	Heat loss occurs by evaporation from skin and from	Lungs
177)	The erected hairs in human produces	Goose-pimples/ goose bumps <b>ETEA-2018</b>
178)	Smooth muscle which erect human hair present at base of hair is called	Follicle
179)	An increase in core temperature is known is	Fever or pyrexia
180)	Antipyretic drug such as aspirin and paracetamol lower the set point and give relief but they slow down the normal	Defence mechanism <b>ETEA-2018</b>

# CHAP# 16 Support and movement Key points

This chapter is missing because this is book sample.

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HUMAN SKELETON				
Axial	Skull	Skull (8)	Unpaired bones	frontal
			ETEA-2019	Occipital
				Sphenoid
				Ethmoid
			Paired bones	Parietal
				Temporal
			Unpaired bones	Mandible
				Vomer
		Facial Bones (14)	paired bones	Maxilla
				Zygomatic
				Nasal
				Lacrimal
				Palatine
				Inferior concha
		Ear bones (6)	Unpaired bones	-
				Malleus
				Incus
				Stapes
		Vertebral Column	Cervical (7) ETEA-2019	
			Thoracic (12)	
			Lumbar (5)	
			Sacral (5)	
			Coccyx (4) ETEA-2008	
		Ribs	True ribs (7)	
			False ribs(3)	
			Floating ribs (2)	
appendicular	Pectoral Girdle + fore limb	Pectoral girdle		Clavicle
				Scapula
				Supra scapula
		Fore limb		Humerous

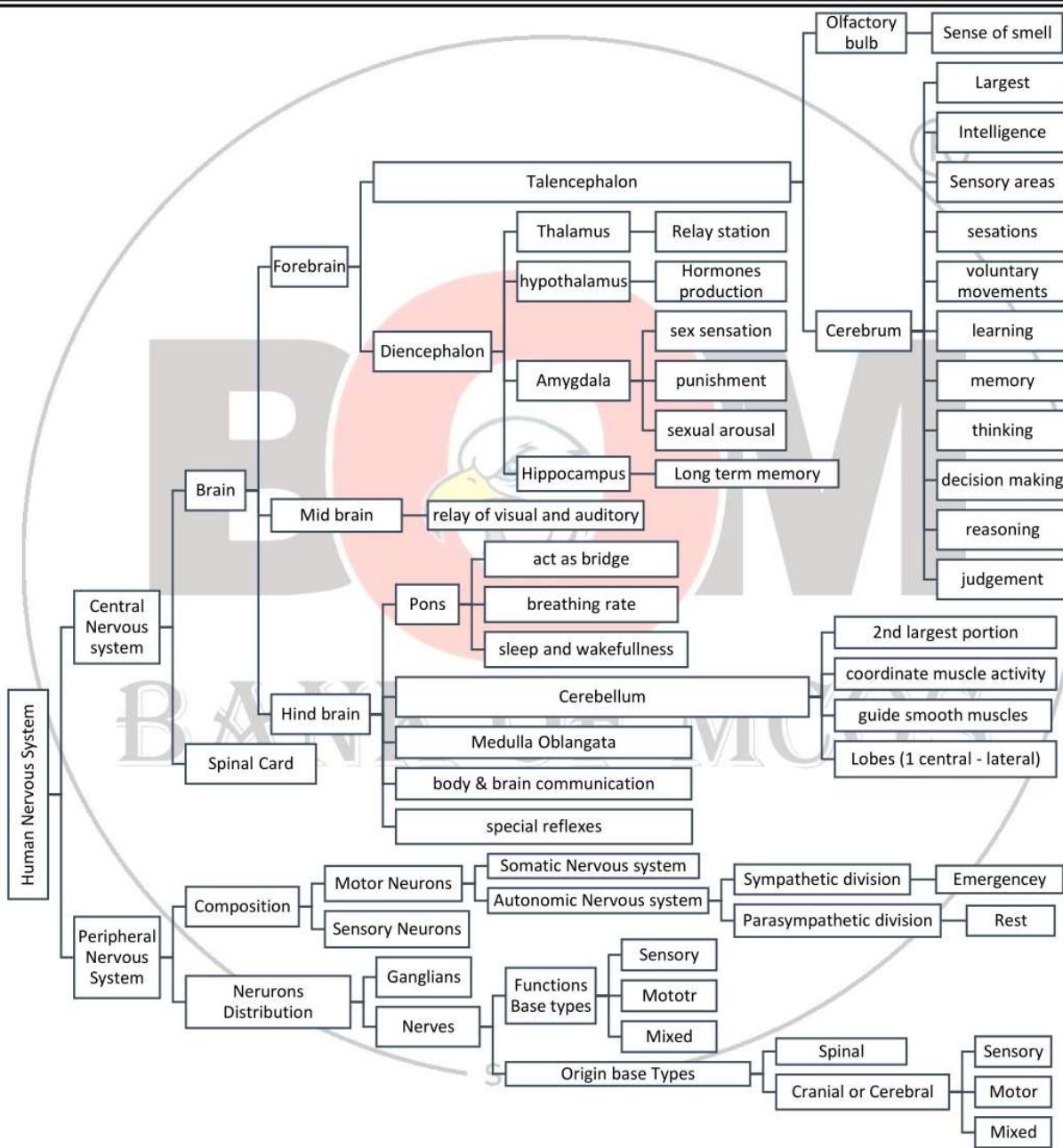
			Radius
			Ulna
			Carpals
			Meta carpals
			Phalanges
Pelvic girdle + hind limb	Pelvic girdle		Ilium
	Hind limb		Ischium
			Pubis
			Femur
			Tibia
			Fibula
			Tarsal
			Metatarsal
			phalanges



Since 2016

# CHAP# 17 Nervous Coordination

## Key points



S.No	Questions	Answers
1)	<b>STEPS INVOLVED IN NERVOUS COORDINATION</b>	
2)	The functional unit of nervous system is	Neuron <b>ETEA-2019</b>
3)	Nervous coordination comprises of units called	Neurons

4)	The function of neuron is detection, integration and	Command																					
5)	Parts that receive stimuli from internal /external of body is called	Receptors or transducers																					
6)	A receptor may be complete organ or cell or just	Neuron endings																					
7)	Photoreceptors (rods & cones) detects	Light stimuli																					
8)	Chemoreceptors (olfaction, gustation & osmoreceptors) detects	Ions or molecules <b>ETEA-2008</b>																					
9)	Receptor that detect change in pressure, position or acceleration, hearing and equilibrium(ear)	Mechanoreceptors <b>ETEA-2013</b>																					
10)	Receptors which detect temperature stimuli are called	Thermoreceptors																					
11)	Receptors:	<table border="1"> <thead> <tr> <th>Detect</th> <th>Present in</th> <th>Receptors</th> </tr> </thead> <tbody> <tr> <td>Pain</td> <td>Skin</td> <td>Nociceptors <b>ETEA-2014</b></td></tr> <tr> <td>Smell</td> <td>Nasal epithelium</td> <td>Olfaction</td></tr> <tr> <td>Taste</td> <td>Tongue</td> <td>Gustation</td></tr> <tr> <td>Osmotic Pressure</td> <td>Hypothalamus</td> <td>Osmoreceptors</td></tr> <tr> <td>Touch</td> <td>Skin</td> <td>Meissner's corpuscles</td></tr> <tr> <td>Stretch or pressure</td> <td></td> <td>Pacinian's corpuscle (skin), Baroreceptors (blood vessels) <b>ETEA-2018</b></td></tr> </tbody> </table>	Detect	Present in	Receptors	Pain	Skin	Nociceptors <b>ETEA-2014</b>	Smell	Nasal epithelium	Olfaction	Taste	Tongue	Gustation	Osmotic Pressure	Hypothalamus	Osmoreceptors	Touch	Skin	Meissner's corpuscles	Stretch or pressure		Pacinian's corpuscle (skin), Baroreceptors (blood vessels) <b>ETEA-2018</b>
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Stretch or pressure		Pacinian's corpuscle (skin), Baroreceptors (blood vessels) <b>ETEA-2018</b>																					
12)	The part of the body which produce appropriate response are called	Effectors (muscles /glands)																					
13)	<b>NEURONS</b>																						
14)	50% of nervous system consist of	Neurological cells <b>ETEA-2017</b>																					
15)	The chief structural and functional unit of nervous system is	Neuron																					
16)	Dendrites of neuron receive information from receptors and increase	Surface area of neuron																					
17)	Dendrites are	Non-myelinated																					
18)	The cell body contains one nucleus, many mitochondria, microtubules,	& Nissl's granules																					
19)	Collection of group of ribosomes associated with RER and golgi apparatus are called	Nissl's granules <b>ETEA-2015</b>																					
20)	Dendrites are	Thin fibres																					
21)	Axons are	Thick fibres																					
22)	The cytoplasm of axon is called	Axoplasm																					
23)	Axons are covered by	Schwann cells (neuroglia)																					
24)	Axons are called myelinated fibers due to fatty substance covering	Myelin sheath																					
25)	A non myelinated part of axon between two shwann cells are called	Node of ranveir																					
26)	Velocity of impulse in axon fibre depends on its diameter, its length and	Myelin sheath																					
27)	When axon is larger and thicker the transmission of information is	Faster <b>ETEA-2016</b>																					
28)	The transmission of information in myelinated than non myelinated is	Faster																					
29)	<b>Radiating form cell body Neuron having</b> <ul style="list-style-type: none"> <li>• One fiber are called Unipolar neuron</li> <li>• Two fiber are called Bipolar neuron</li> </ul>																						

	• Many fiber are called Multipolar neuron	
30)	The neuron which carry impulse from receptors to CNS	Sensory neuron
31)	Neuron involved in processing and interpretation of data from receptors	Associative/intermediate
32)	The neurons which carry impulse from CNS to the effectors are called	Motor neuron
33)	Sensory neuron is mono polar while intermediate and motor neurons	Are multi polar
34)	There is no clear difference b/w dendrites and axons of	Sensory neuron
35)	There is highly numbers of dendrites and give raise to tree like structure	Associative neuron
36)	Short axon and long dendrites	Sensory neurons
37)	Long axon and short dendrites	Motor neuron
38)	<b>REFLEX ARC</b>	
39)	The pathway of nerve impulse during reflex action is called	Reflex arc
40)	Reflex activities have no involvement of	Brain
41)	Peripheral branch of sensory neuron transmits information to the	Dorsal root ganglion
42)	A synapse made on associative neuron to the form to inform of danger	Is send by sensory neuron
43)	<b>NERVE IMPULSE</b>	
44)	A wave of electrochemical change which travels along length of neuron	Is called nerve impulse
45)	In case of neuron the electrical potential is termed as	Membrane potential
46)	More positive outer surface than inner surface is called	Resting membrane potential
47)	The state Resting membrane potential is also called	Polarized state
48)	The potential in rest with inside negative to outside positive is	-70 millivolts
49)	Concentration of K <sup>+</sup> inside to fluid to outside is	30 times
50)	Concentration of Na <sup>+</sup> in outside to inside is	10 times
51)	when 2 K <sup>+</sup> are active transported inward the number of Na <sup>+</sup> transported	Outward is 3 (energy use) <b>ETEA-2014</b> <b>ETEA-2016</b>
52)	Negative organic ions present inside in neuron cytoplasm are proteins,	Amino acids, DNA and RNA
53)	Cell membrane of neuron has many channels proteins called	Gates
54)	K <sup>+</sup> ions moves out of neuron to make more positive inside through	Non-voltage regulated gates
55)	More positive charge on outside than inside of neuron are called	Resting membrane potential
56)	Inside more positive charge than outside(depolarized state) are called	Active membrane potential
57)	Active membrane potential is also called	Action potential
58)	Stimulus capable to bring an electrochemical change Threshold stimulus	Or adequate stimulus
59)	Stimulus not capable to bring an electrochemical change Sub threshold	Or inadequate stimulus
60)	By threshold stimulus,Na <sup>+</sup> diffuse to inside neuron by	Voltage regulated Na gates
61)	Due to diffusion of Na <sup>+</sup> ,electric potential from -70mV towards 0 and then reach to the	50mV

62)	The reversal of polarity across two sides of membranes are called	Depolarization
63)	Until $\text{Na}^+$ gates are closed the depolarized state lasts for	One milli second
64)	After the peak of action potential, called the	Spike potential
65)	$\text{Na}^+$ gates opens, inside neuron become more positive than outside	Depolarization
66)	$\text{Na}^+$ gates closed, inside regain original polarity (inside more negative than outside)	Repolarization
67)	The period of recovery of nerve fiber is called	Refractory period
68)	The types of nerve impulse are continuous impulse and	Salutatory impulse
69)	Type of impulse in which action potential flows as a wave	Continuous impulse
70)	The kind of jumping impulse from node of Ranvier to node of Ranvier	Saltatory impulse
71)	In non-myelinated neuron fibers, the type of nerve impulse is	Continuous impulse <b>ETEA 2023</b>
72)	In myelinated neuron fibers, the type of nerve impulse is	Salutatory impulse
73)	Average speed of nerve impulse is	<b>100-120 m/s</b>
74)	The speed of nerve impulse is 20 times faster in myelinated neuron fiber due to	Saltatory conduction
75)	Myelinated neuron fibers require less energy from	Non-myelinated
76)	Impulse is conducted faster in neuron that is	Thick, from thin
77)	Greater the thickness, lesser the resistance to nerve impulse and so	Impulse moves faster
78)	<b>SYNAPSE</b>	
79)	In electrical synapse the synaptic cleft is of	<b>0.2 nm ETEA -2023</b>
80)	In chemical synapse the synaptic cleft has gap of more than	20nm
81)	In electrical synapse the synaptic cleft is enough to depolarize the	Post synaptic membrane
82)	In electrical synapse the impulse formation is transmitted by means of	Neurotransmitters
83)	The axon terminals of pre synaptic neurons have expanded tips called	Synaptic knobs
84)	Synaptic knobs contain synaptic vesicles which contain 10,000	Neurotransmitter substance
85)	Synaptic vesicles fuse with pre synaptic membrane and release	Neurotransmitters
86)	Neurotransmitters fuse with post synaptic membrane which open	Channels for $\text{Na}^+$ ions
87)	Action potential produced by $\text{Na}^+$ which brings membrane potential towards threshold level, it is called	Excitatory postsynaptic potential (EPSP)
88)	The hyperpolarization of post synaptic membrane by opening channel for $\text{K}^+$ or $\text{Cl}^-$ is called	Inhibitory postsynaptic potential (IPSP)
89)	Enzyme that catalyzes the hydrolysis of acetylcholine neurotransmitter is	Acetylcholinesterase
90)	Enzyme that catalyzes the hydrolysis of adrenalin is	Monoamine oxidase
91)	The chemical messengers of nervous system are	Neurotransmitters
92)	Acetylcholine, biogenic amine, amino acid, neuropeptides, and gases	Classes of Neurotransmitter
93)	Neurotransmitters that produce excitation on postsynaptic neuron receptors are called	Excitatory neurotransmitters e.g Acetylcholine
94)	Neurotransmitters that inhibit the postsynaptic action potential are called	Inhibitory neurotransmitters e.g Serotonin

<b>95)</b>	<b>ORGANIZATION OF HUMAN NERVOUS SYSTEM</b>	
<b>96)</b>	Centralized nervous system is the characteristic of the most animals	From flat worm to chordates
<b>97)</b>	Central nervous system(CNS) act as coordinating system while peripheral nervous system(PNS) providers communication	Among receptors, CNS and effectors
<b>98)</b>	Central nervous system consist of	Brain & spinal cord
<b>99)</b>	Brain is involved more in coordination than	Spinal cord
<b>100)</b>	Spinal cord is the link between	PNS & brain
<b>101)</b>	Brain and spinal cord is protected by	Skeleton, meninges & CSF
<b>102)</b>	The part of skeleton that protect brain and spinal cord are	Cranium & vertebral column
<b>103)</b>	The meninges protects the brain and spinal cord by providing	Cushion like matrix
<b>104)</b>	The dura mater, the arachnoid mater and the pia mater	Three layers of meninges
<b>105)</b>	The cerebrospinal fluid (SCF) is produced from blood vessels of brain and spinal cord by a combined process of	Diffusion, pinocytosis and active transport
<b>106)</b>	The CSF is found <b>between Pia mater and arachnoid mater</b> , around surface of brain and spinal cord, in the ventricles of brain and in central	Hollow of spinal cord <b>ETEA-2015</b>
<b>107)</b>	CSF protects brain and spinal cord from	Mechanical shocks
<b>108)</b>	CFS play a role in metabolism of central nervous system and its	Homeostasis
<b>109)</b>	Human brain is divided into three parts	Forebrain, midbrain & hindbrain
<b>110)</b>	Forebrain is subdivided into	Telencephalon & diencephalon
<b>111)</b>	The telencephalon consists of a pair of	Olfactory bulbs & cerebrum
<b>112)</b>	The olfactory bulbs are connected with the	Sense of smell
<b>113)</b>	The cerebrum has many folds that are related with	Intelligence
<b>114)</b>	The <b>1<sup>st</sup></b> largest part of brain is	Cerebrum
<b>115)</b>	The <b>2<sup>nd</sup></b> largest part of brain is	Cerebellum
<b>116)</b>	The two cerebral hemispheres are connected by	Corpus callosum
<b>117)</b>	Sight, smell, <b>speech</b> , touch, <b>hearing</b> , learning, memory, thinking, decision making reasoning and judgment are controlled by	Cerebrum <b>ETEA-2007-2010-2012</b>
<b>118)</b>	The diencephalon harbours limbic system, collectively representing parts of Thalamus, hypothalamus,	amygdala & hippo campus <b>ETEA-2014</b>
<b>119)</b>	Thalamus is a relay station between	Body & cerebrum
<b>120)</b>	Hormone production, regulation of temperature, <b>hunger</b> , thirst, sexual response, the fight or flight response and biorhythms are functions of	Hypothalamus <b>ETEA-2018</b> <b>NMDCAT-2020</b>
<b>121)</b>	Formation of long term memory and learning are function of	Hippocampus <b>ETEA-2014</b>
<b>122)</b>	The midbrain function is the coordination and relay of	Visual & auditory information
<b>123)</b>	A network of neuron running through the medulla in hind brain, through the midbrain and up into the thalamus of the forebrain	Reticular formation
<b>124)</b>	Filtering the sensory information, midbrain receive input from sense	& send output to higher brain center
<b>125)</b>	The hindbrain consist of pons, cerebellum and	Medulla oblongata

126)	Pons act as impulse conducting bridge between	Cerebellum, medulla oblongata and cerebellum												
127)	Pons are concerned with rate of	Sleep, breathing & wakefulness												
128)	Cerebellum consist of a central lobe and	Two lateral lobes												
129)	Muscle activity and guide smooth and accurate motion are function of	Cerebellum <b>ETEA-2015</b>												
130)	The posterior most portion of the brain is	Medulla oblongata												
131)	Medulla oblongata is the connection between	Body & brain												
132)	Special reflexes such as heart beat, <b>respiratory movements</b> , salivary secretions, <b>swallowing, vomiting</b> , coughing and sneezing are located in	Medulla oblongata <b>ETEA-2010-2015-2016-2017</b>												
133)	The central cable of nervous system is	Spinal cord												
134)	The length of spinal cord	<b>18 inch</b>												
135)	The width of spinal cord	<b>0.5 inch</b>												
136)	The gray matter of spinal cord consist of	Cell bodies												
137)	The white matter of spinal cord consist of	Nerve fibres												
138)	The spinal cord is covered with thin pigment membrane called	The pia mater												
139)	The neural canal is lined with thick tough membrane called	The dura mater												
140)	The space between two membranes of spinal cord are filled with	Lymphatic fluid												
141)	The lymphatic protect the spinal cord from	Shocks												
142)	Below the neck region the reflex actions are controlled by	Spinal cord												
143)	Sensory impulse from the skin and muscles are conducted by	Spinal cord												
144)	Peripheral nervous system consist of	Sensory and motor neurons												
145)	In peripheral nervous system the neuron are distributed in the form of	Ganglia and nerves												
146)	The collection of the neuron cell bodies are called	Ganglia												
147)	Ganglia interconnect with other ganglia to form complex system called	Plexus												
148)	The bundle of neuron fibers covered by connective tissues are called	Nerves												
149)	With respect to function the types of the nerves are	Sensory, motor and mixed												
150)	With respect to origin the types of nerves are	Spinal & cranial nerves												
151)	Nerves which carry impulse from receptors to CNS	Sensory nerves												
152)	Nerves which carry impulse from CNS to effectors	Motor nerves												
153)	Nerves which are group of sensory and motor nerves are called	Mixed nerves												
154)	Nerves which originate form and lead to the spinal cord are called	Spinal nerves												
155)	Nerves which originate form and lead to the brain are called	Cranial or cerebral nerves												
156)	<b>The total number of spinal nerves airs are 31 (31 pair, 62 nerves). Which are grouped as:</b> <b>ETEA-2019</b>													
	<table border="1"> <thead> <tr> <th>Nerves</th> <th>No</th> </tr> </thead> <tbody> <tr> <td>Cervical</td> <td>8</td> </tr> <tr> <td>Thoracic</td> <td>12</td> </tr> <tr> <td>Lumbar</td> <td>5</td> </tr> <tr> <td>Sacral</td> <td>5</td> </tr> <tr> <td>Coccygeal</td> <td>1</td> </tr> </tbody> </table>	Nerves	No	Cervical	8	Thoracic	12	Lumbar	5	Sacral	5	Coccygeal	1	
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Sacral	5													
Coccygeal	1													
157)	Vagus nerve extends up to the	Abdomen												

158)	<b>The total number of pairs of cranial nerves are 12 pairs, Functionality:</b>																						
	Sensory nerves (3)	1, 2, 8																					
	Motors nerves (5)	3, 5, 6, 11, 12																					
	Mixed nerves (4)	4, 7, 9, 10																					
Sen;mix;motore= 3;4;5 <b>ETEA-2019</b>																							
159)	Somatic nervous system (SNS) carry information between		CNS & voluntary body parts																				
160)	Somatic nervous system (SNS) controls skeletal muscles as well as		External sensory organs (skin)																				
161)	Autonomic nervous system (ANS) runs between the Nervous system especially hypothalamus		& internal organs (heart, lungs, viscera, glands)																				
162)	The contraction of smooth and cardiac muscles are controlled by		Motor neurons of ANS																				
163)	The actions of autonomic nervous system are largely		Involuntary																				
164)	The Parasympathetic division controls autonomic functions during		State of rest																				
165)	The Sympathetic division controls autonomic functions during		State of emergency <b>ETEA-2017</b>																				
166)	<b>The autonomic nervous system are further divided into Parasympathetic and Sympathetic</b>																						
	<table border="1"> <thead> <tr> <th>PARASYMPATHETIC</th> <th>SYMPATHETIC</th> </tr> </thead> <tbody> <tr> <td>Constrict pupil</td> <td>Dilate pupil</td> </tr> <tr> <td>Stimulate flow of saliva</td> <td>Inhibits flow of saliva</td> </tr> <tr> <td>Slow heartbeat</td> <td>Fast heartbeat</td> </tr> <tr> <td>Constrict bronchi</td> <td>Dilate bronchi</td> </tr> <tr> <td>Stimulates peristalsis</td> <td>Inhibit peristalsis</td> </tr> <tr> <td>Stimulate secretions</td> <td>Inhibit secretions</td> </tr> <tr> <td>Stimulate release of bile</td> <td>Conversion of glycogen to glucose</td> </tr> <tr> <td>Inhibit adrenaline and non-adrenaline secretion</td> <td>Secretion of adrenaline and non-adrenaline</td> </tr> <tr> <td>Contract bladder</td> <td>Inhibit bladder contraction</td> </tr> </tbody> </table>			PARASYMPATHETIC	SYMPATHETIC	Constrict pupil	Dilate pupil	Stimulate flow of saliva	Inhibits flow of saliva	Slow heartbeat	Fast heartbeat	Constrict bronchi	Dilate bronchi	Stimulates peristalsis	Inhibit peristalsis	Stimulate secretions	Inhibit secretions	Stimulate release of bile	Conversion of glycogen to glucose	Inhibit adrenaline and non-adrenaline secretion	Secretion of adrenaline and non-adrenaline	Contract bladder	Inhibit bladder contraction
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167)	Sympathetic system prepare the body for violent activity in		Danger																				
168)	When danger is over, the body becomes normal by		Parasympathetic																				
169)	<b>STRUCTURE AND FUNCTION OF SPECIAL RECEPTORS</b>																						
170)	The tongue contain many ridges and valleys called		Papillae																				
171)	<b>There are four types of papillae</b>																						
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172)	The circumvallate papillae are surrounded by		Trench																				
173)	All papillae contain taste buds except		Filiform papillae																				
174)	The center of the tongue is called		Taste-blind																				
175)	Taste bud contain number of taste cells that have tips that protrude		Into the taste pore																				
176)	The site of olfactory transduction, located in nasal cavity is		Olfactory mucosa																				
177)	Olfactory mucosa contain olfactory receptor neuron, olfactory receptor neuron have cilia which contain		olfactory receptor proteins																				

<b>178)</b>	The total types of olfactory receptor proteins are about	<b>1000</b>												
<b>179)</b>	Smell also called	Olfaction												
<b>180)</b>	Touch, also called	Tactition or mechanoreception												
<b>181)</b>	Pain receptors are also called	Nociception												
<b>182)</b>	Hair follicle are touch receptors, so removal of hair	Decrease touch sensitivity												
<b>183)</b>	Touch receptors are found in	Tongue, throat & mucosa												
<b>184)</b>	The fingertips and tongue have as touch receptors as	<b>100 per cm<sup>2</sup></b>												
<b>185)</b>	The back of hand have as touch receptors as	<b>10 per cm<sup>2</sup></b>												
<b>186)</b>	Loss or impairment of the ability to feel anything touched is called	Tactile anesthesia												
<b>187)</b>	Sensation of tingling, pricking, numbness of skin result from nerve damage are called	Paresthesia												
<b>188)</b>	Paresthesia may be	Temporary or permanent												
<b>189)</b>	When sensory nerve fibers are exposed to extremes, the	Signal pain												
<b>190)</b>	The main function of pain is to	Warm us about danger												
<b>191)</b>	There are three types of pain receptors	<table border="1"> <thead> <tr> <th>S.no</th> <th>Name</th> <th>Found in</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Cutaneous</td> <td>Skin</td> </tr> <tr> <td>2</td> <td>Somatic</td> <td>Joints and bones</td> </tr> <tr> <td>3</td> <td>visceral</td> <td>Body organs</td> </tr> </tbody> </table>	S.no	Name	Found in	1	Cutaneous	Skin	2	Somatic	Joints and bones	3	visceral	Body organs
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<b>192)</b>	<b>EFFECTS OF DRUGS ON NERVOUS SYSTEM</b>													
<b>193)</b>	Heroin is processed from morphine which is extracted from	Poppy plants <b>ETEA-2014</b>												
<b>194)</b>	The chemical name of morphine are	Diamorphine & diacetylmorphine												
<b>195)</b>	The heroine is gives as subcutaneous, intramuscular and	Intravenous route												
<b>196)</b>	In pain such as trauma, myocardial infarction, post-surgical pain and chronic pain, we use	Heroine												
<b>197)</b>	Long term uses of heroine addiction disease are	HIV,AIDs & hepatitis B & C												
<b>198)</b>	Cannabis (cannabis sativa) are also known as	Marijuana												
<b>199)</b>	Hashish are commonly known as	Chars <b>ETEA-2012</b>												
<b>200)</b>	Hashish (form of cannabis) is produced from the flowers of the	Female cannabis plant												
<b>201)</b>	For amelioration of nausea and vomiting, stimulation of hunger in chemotherapy and AIDs patients, lower intraocular eye pressure(glaucoma) we uses	Hashish												
<b>202)</b>	Restlessness, feel loss control, panic, fear of impending death, depression, suicidal thoughts and psychosis	Common adverse effects of abuse cannabis												
<b>203)</b>	Nicotine is an alkaloid found in tobacco leaves and plants of family	Solanaceae												
<b>204)</b>	Acetylcholine, norepinephrine, epinephrine, serotonin, vasopressin, dopamine, and beta-endorphin	Chemical messengers release by Nicotine												
<b>205)</b>	Nicotine act as Nerve stimulant and	Sedative/pain killer												
<b>206)</b>	Higher dose of nicotine enhance effect of serotonin and beta-endorphin and produce	Calming, pain-killing effect												
<b>207)</b>	Nicotine is sold commercially in the form of	Pesticide												
<b>208)</b>	An adult can be killed by nicotine by an amount of	<b>60 mg</b>												
<b>209)</b>	In cigarette if nicotine is 60mg then number of cigarette is	<b>4</b>												
<b>210)</b>	Vomiting, nausea, headaches, breathing difficulty and stomach pain	Caused by nicotine poisoning												
<b>211)</b>	In smoker mother nicotine damages the	Placenta												

212)	Cigarette to mother leads to miscarriages, pre mature birth and	Damage to the fetus																		
213)	The drug which is absorbed quickly into blood among other drugs	Alcohol																		
214)	Alcohol when used in low amount	Improve health conditions																		
215)	Alcohol is used to wash wounds due to its	Antiseptic nature																		
216)	Alcohol reduces level of the serotine and dopamine and act as a	Depressant																		
217)	People who drink too much lose control of	Speech and movement																		
218)	Hallucinations cause by alcohol drinking (patient imagines that they are in magical world). This disease are also called	Paranoia																		
219)	Inhalants are chemical vapours or gases that produce	Psychoactive																		
220)	<b>NERVOUS DISORDERS AND DIAGNOSTIC TESTS</b>																			
221)	Diseases of nervous system are also called	Neurological disorders																		
222)	<b>Neurological disorders are classified into following categories</b>																			
	<table border="1"> <thead> <tr> <th>S.no</th> <th>Name</th> <th>Type</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Stroke</td> <td>Vascular <b>ETEA-2013</b></td> </tr> <tr> <td>2</td> <td>Meningitis</td> <td>Infectious</td> </tr> <tr> <td>3</td> <td>Brain tumor</td> <td>Structural</td> </tr> <tr> <td>4</td> <td>Headache</td> <td>Functional</td> </tr> <tr> <td>5</td> <td>Alzheimer's disease</td> <td>Degenerative <b>ETEA-2017</b></td> </tr> </tbody> </table>	S.no	Name	Type	1	Stroke	Vascular <b>ETEA-2013</b>	2	Meningitis	Infectious	3	Brain tumor	Structural	4	Headache	Functional	5	Alzheimer's disease	Degenerative <b>ETEA-2017</b>	
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3	Brain tumor	Structural																		
4	Headache	Functional																		
5	Alzheimer's disease	Degenerative <b>ETEA-2017</b>																		
223)	Stroke is also known as	Cerebrovascular accident(CVA)																		
224)	In stroke the blood supply to brain is disrupted, causing brain cells to	Die																		
225)	<b>There are two kinds of stroke</b>																			
	<table border="1"> <thead> <tr> <th>S.no</th> <th>Name</th> <th>Cause</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Isochemic stroke</td> <td>Blood clot</td> </tr> <tr> <td>2</td> <td>hemorrhagic</td> <td>Blood vessel</td> </tr> </tbody> </table>	S.no	Name	Cause	1	Isochemic stroke	Blood clot	2	hemorrhagic	Blood vessel										
S.no	Name	Cause																		
1	Isochemic stroke	Blood clot																		
2	hemorrhagic	Blood vessel																		
	Mini-strokes or transient ischemic attacks (TIAc), occur when blood supply to brain is briefly interrupted																			
226)	One side numbness, trouble speaking, balance/coordination loss	Stroke symptoms																		
227)	Treatment of strokes are Clot bursting drugs , Blood thinners and	Thrombolytic therapy Such as heparin																		
228)	Inflammation of membrane of brain and spinal cord	Meningitis																		
229)	Meningitis can caused by infection with drugs,	Virus, bacteria, microorganism																		
230)	Head and neck arched backward, agitation, rapid breathing, sensitivity to light, stiff neck, unusual posture	Symptoms of meningitis																		
231)	Antibiotics and corticosteroids are used as general treatment for	Meningitis																		
232)	A brain tumor is the mass or growth of abnormal cells due to	Uncontrolled cell division																		
233)	A brain tumor may be	Benign(noncancerous) or malignant (cancerous)																		
234)	A tumor that originate in the brain are called	Primary brain tumor																		
235)	A tumor that originate in the parts of brain and spread to the brain are Called	Secondary brain tumor or metastatic brain tumor																		
236)	Treatment and Sign and symptoms of brain tumor depends upon	Tumor size & location & growth rate																		
237)	Surgery, radiotherapy and chemotherapy are general treatment for	Brain tumors																		
238)	Headache or cephalgia is pain anywhere in the region of	Head and neck																		

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239)	The brain tissue is not sensitive to pain because it lacks		Pain receptors
240)	Muscle tension in the face, neck and shoulders may cause		Tension headache
241)	Alzheimer's disease is impairment of memory and disturbance in		Reasoning, planning, language and perception
242)	Alzheimer's disease increase substantially after the age of	70	
243)	Alzheimer's disease may effect around 50% of persons over the age of	85	
244)	Alzheimer's disease result from increase of proteins called	Beta-amyloid protein <b>ETEA-2015</b>	

# CHAP# 18 Chemical Coordination Key points

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Gland	Hormone	Function
Anterior lobe of Pituitary	<ul style="list-style-type: none"> <li>Growth hormone</li> <li>Adrenocorticotrophic hormone</li> <li>Thyroid stimulating hormone</li> <li>Luteinising hormone</li> </ul>	<ul style="list-style-type: none"> <li>regulates development of muscles and bones, stimulates secretion of cortisol and aldosterone by the adrenal cortex</li> <li>stimulates the thyroid gland to produce its hormone</li> <li>stimulates the thyroid gland to produce its hormone</li> <li>stimulates the testes to produce testosterone</li> </ul>
Intermediate lobe of pituitary	<ul style="list-style-type: none"> <li>melanocyte</li> </ul>	<ul style="list-style-type: none"> <li>skin colut</li> </ul>
Posterior lobe of Pituitary hormone	<ul style="list-style-type: none"> <li>Antidiuretic hormone</li> <li><b>ETEA -2023</b></li> <li>Oxytocin</li> </ul>	<ul style="list-style-type: none"> <li>increases the reabsorption of water from nephrons</li> <li>initiates uterine contractions during childbirth</li> <li>stimulates the flow of milk from the breasts during lactation</li> </ul>
Thyroid gland	<ul style="list-style-type: none"> <li>Thyroxine</li> <li>Calcitonin</li> </ul>	<ul style="list-style-type: none"> <li>stimulates enzymes of cellular metabolism</li> <li>decreases blood calcium concentration</li> </ul>
Adrenal medulla	<ul style="list-style-type: none"> <li>Epinephrine</li> <li>Norepinephrine</li> </ul>	<ul style="list-style-type: none"> <li>initiate body's response to stress and the "fightor flight" response to danger</li> </ul>
Adrenal cortex	<ul style="list-style-type: none"> <li>Cortisol</li> <li>Aldosterone</li> </ul>	<ul style="list-style-type: none"> <li>promotes production of glucose from proteins</li> <li>promotes salt and water retention by the kidneys</li> </ul>
Pancreas	<ul style="list-style-type: none"> <li>Insulin</li> <li>Glucagon</li> <li>Somatostatin</li> <li>Pancreatic polypeptide</li> </ul>	<ul style="list-style-type: none"> <li>lowers the blood glucose level by stimulating body cells to store glucose or use it</li> <li>stimulates release of glucose from the liver into the blood</li> </ul>
Ovaries	<ul style="list-style-type: none"> <li>Estrogen</li> <li>Progesterone</li> </ul>	<ul style="list-style-type: none"> <li>cause the release of an egg from the ovary and</li> <li>regulates female secondary sex characteristics</li> </ul>
Testes	<ul style="list-style-type: none"> <li>Androgens</li> </ul>	<ul style="list-style-type: none"> <li>regulate male secondary sex characteristics</li> </ul>

	<b>Nervous coordination</b>	<b>Chemical coordination</b>
Modes of coordination	Electrical	Hormonal
Receptors	Sense organs (eyes, ears, nose, tongue, skin)	Many body organs (kidney, liver etc)
Coordinator	Brain and spinal cord	Endocrine glands
Effectors	Muscle and glands	Many body organs (kidney, liver, stomach)
Nature of message	Electrical (nerve impulse)	Chemical (hormones)
Carrier of message	Neurons	Blood
Nature of response	Contraction of muscles Secretin from glands	Various types (e.g. Growth, reabsorption of water by kidneys)

## CHAP#19 Behavior Key points

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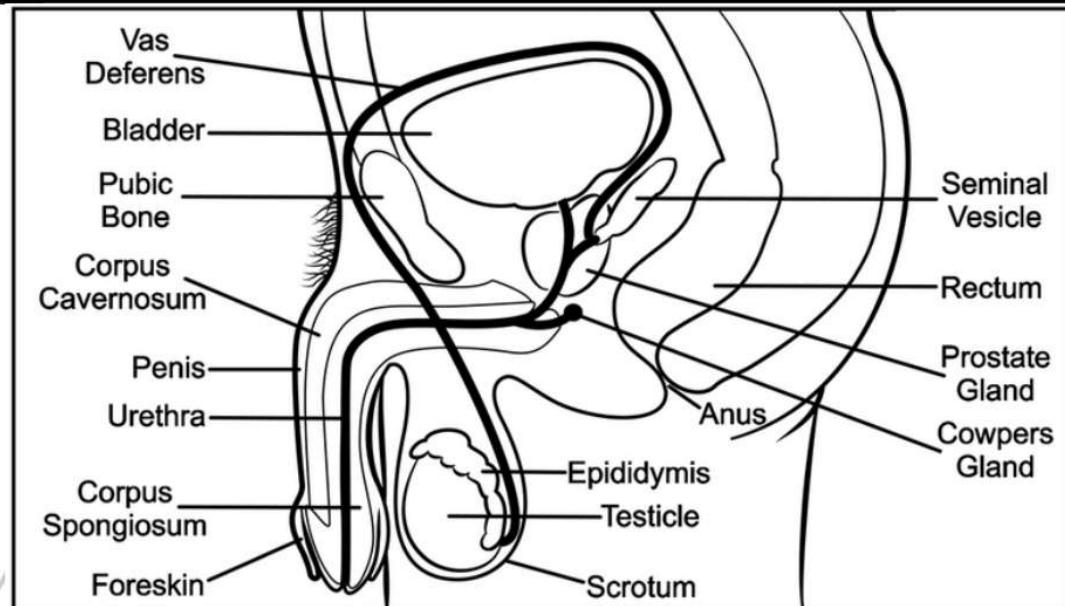
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## Chapter No.: 20 Reproduction

S.No	Questions	Answers
	<b>REPRODUCTION</b>	
1)	The most advanced mammals are	Human being
	<b>MALE REPRODUCTIVE SYSTEM</b>	

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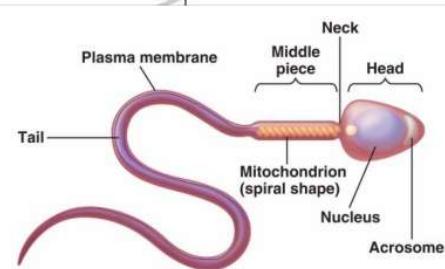
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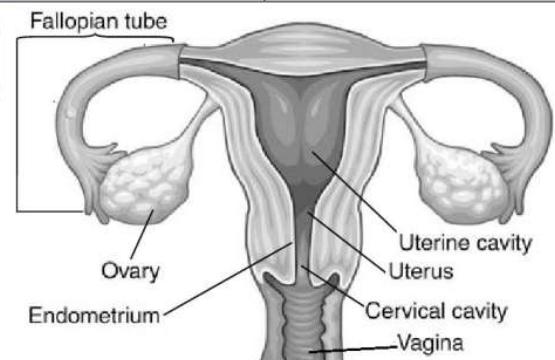


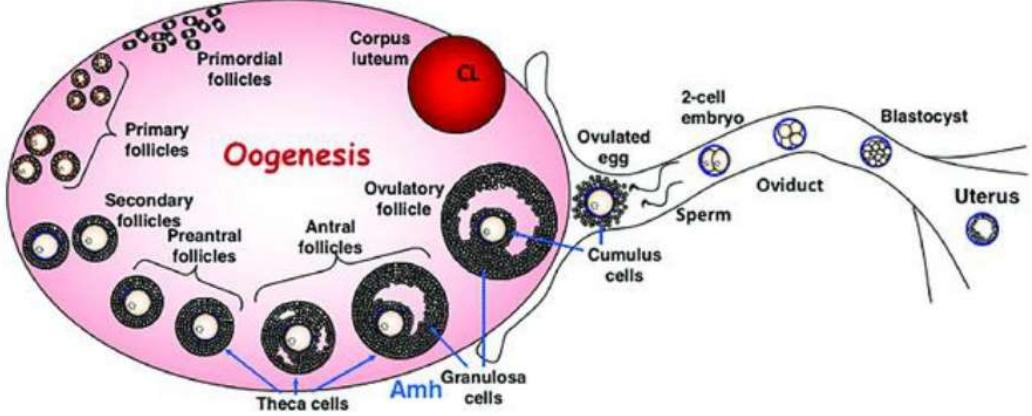
Male reproductive system consist of :

- Pair of testes
- Ducts
- Gland
- External genitalia

3)	Testes are male gonads which are outside body and covered by	Scrotum <b>ETEA -2023</b>
4)	Each testes are divided into lobules which are about	250 to 300
5)	Each lobule contains one to four tightly coiled	Seminiferous tubule
6)	<b>Lyeden cells</b> are present between the seminiferous tubules which produce male sex hormone	Testosterone <b>ETEA-2015</b>
7)	<b>The accessory duct include:</b>	
	• Vasa efferentia      • The epididymis      • The ductus deferene	
	• The ejaculatory duct      • The urethra	
8)	About <b>10 to 20</b> vasa efferentia collect sperm from inside the testes and transfer them to the	Epididymis
9)	The length of uncoiled epididymis is about	<b>6 m or 20 feet</b>
10)	The function of epididymis is transport and storage of sperms, here sperms are stored temporary, nourished and gain	The ability to swim
11)	Vas deferens start from epididymis move back into pelvic cavity and then join with the duct of the seminal vesicle to form the short	Ejaculatory duct
12)	Each ejaculatory duct enters the prostate, there it empties into the	Urethra
13)	The terminal portion of the male duct system is	Urethra
14)	Urethra open to the outside through external urethral orifice and conveys both	Urine and semen
15)	The seminal vesicles provide an alkaline fluid containing fructose sugar, ascorbic acid and a coagulating enzyme called	Vesiculase
16)	The optimum temperature for sperm development is about	<b>35 °C</b>
17)	The prostate encircle the urethra just below the	Bladder
18)	Prostate secrete milky, <b>slightly acidic</b> fluid that contains citrate as nutrient source and several enzymes especially	Hyaluronidase <b>ETEA-2017</b>
19)	Cowpers' gland secretes mucus and an alkaline fluid into the	Urethra
20)	The alkaline fluid neutralize the acidity of urine in	Urethra
21)	White, sticky mixture of sperm and secretion of accessory glands	Is called Semen
22)	The viscosity of mucus guarding the entry(cervix) is decrease by	Prostaglandins
23)	Prostaglandins stimulate reverse peristalsis in the Uterus, facilitating	Female reproductive tract

	sperm movement through the	
24)	<b>Spermatogenesis and Oogenesis diagram</b>	
	<b>Spermatogenesis</b>	
25)	The process of sperm formation in males are called	Spermatogenesis
26)	Spermatogenesis takes place in	Seminiferous tubules
27)	Spermatogonia are the outer most cells which make the epithelial wall of the	Seminiferous tubules
28)	Spermatogonia cells are just below the	Basal lamina
29)	The spermatogonia continuously divide by the mitosis which results in two distinctive daughter cells types	A and B
30)	The type A daughter cells remains at the basement membrane to	Maintain the germ cell line
31)	The type B cell get pushed toward the lumen, where it become primary spermatocyte destined to produce	Four sperms
32)	Each primary spermatocyte undergoes meiosis I, forming two smaller haploid cells called	Secondary spermatocytes
33)	The secondary spermatocytes goes rapidly on meiosis II, and Produce	spermatids <b>ETEA-2016</b>
34)	Each spermatid is round, nonmotile and	Haploid cell
35)	Process in which spermatids change into motile and active sperms	Spermogenesis
36)	During spermatogenesis a spermatids elongate, sheds its excess cytoplasm and	Forms a tail
37)	<b>The sperm or spermatozoon( animal seed ) is small and has:</b> <ul style="list-style-type: none"> <li>• A head (have nucleus containing haploid chromosomes)</li> <li>• A neck (short and contain pair of centrioles)</li> <li>• A mid piece (contains mitochondria arranged spirally around the axial filament )</li> <li>• A tail</li> </ul>	
38)	Adhering to the top of the head is	Acrosome

39)	The lysosome-like acrosome are produced by the	Golgi apparatus						
40)	Acrosome contain an enzyme that enables the sperm to penetrate and enter an egg is called	Hyaluronidase						
41)	In sperm microtubule of centriole of neck elongates and run entire	Length of the tail						
42)	The process of the spermatogenesis starts at the age of	14 years						
43)	Every day, a healthy adult male makes about	400 million sperm <b>ETEA-2017</b>						
44)	<b>Process of spermatogenesis is controlled by hormonal secretion from</b> 1. Hypothalamus : It releases gonadotrophin-releasing hormone(GnRH) which controls release of anterior pituitary <ul style="list-style-type: none"><li>• gonadotrophin follicle-stimulating hormone(FSH) : FSH stimulates spermatogenesis by stimulating <b>Sertoli Cells</b> to complete the development of sperm from spermatids <b>ETEA - 2023</b></li><li>• Lutenizing hormone(LH): LH stimulates Leydig cells to release testosterone</li></ul> 2. Pituitary gland							
45)	Cells of testes that are part of seminiferous tubules	Sertoli cells						
46)	Cells that are found adjacent to the seminiferous tubules in testicle	Leydig cells						
47)	Testosterone cause the growth and development of germinal epithelium to	Form sperm						
48)	Hormone that is produced by the sertoli cells and serves to control the spermatogenesis at normal rate is	Inhibin <b>ETEA-2016</b>						
49)	When the sperm count is high, inhibin	Releases						
50)	When sperm count falls, inhibin secretion secretion	Declines steeply						
51)	Inhibin inhibits anterior pituitary releases of FSH and hypothalmic release of	GnRH						
52)	<b>FEMALE REPRODUCTIVE SYSTEM</b>							
53)	The female body prepare to nurture a developing embryo for a period of approximately	<b>Nine months</b>						
54)	<b>Female reproductive system consists of:</b> <ul style="list-style-type: none"><li>• Pair of ovaries</li><li>• Oviducts</li><li>• Uterus cervix</li><li>• Vagina</li></ul> <b>Some key points about ovary:</b> <table border="1"><tr><td>Shape</td><td>Almond shape</td></tr><tr><td>Length</td><td>3 – 5 cm</td></tr><tr><td>Width</td><td>2 – 3 cm</td></tr></table>	Shape	Almond shape	Length	3 – 5 cm	Width	2 – 3 cm	 <p>The diagram illustrates the female reproductive system. It shows the uterus, which has a central uterine cavity and a lower cervical cavity. Two fallopian tubes extend from the uterus to the ovaries. The ovaries are almond-shaped organs located on either side of the uterus. The endometrium is the lining of the uterine cavity. Labels point to each of these components: Fallopian tube, Ovary, Endometrium, Uterine cavity, Uterus, Cervical cavity, and Vagina.</p>
Shape	Almond shape							
Length	3 – 5 cm							
Width	2 – 3 cm							
55)	Ovaries are female gonads which produce ova and release	Hormone						
56)	The paired ovaries flank the uterus on each side and each ovary is held in place within the peritoneal cavity by	Several ligaments						
57)	Within the ovary are sac like structures called	Ovarian follicles						
58)	Each ovarian follicle consist of an immature egg called an	Oocyte						
59)	Each month in adult woman , one of the ripening follicle eject its oocyte from the ovary, this process is called	Ovulation						
60)	After ovulation, the ruptured follicle is transformed into a glandular structures called the	Corpus luteum						
61)	Fallopian tubes or oviducts form the initial part of the female	Duct system <b>ETEA -2023</b>						

62)	Fallopian tubes receive the ovulated oocyte and is the site when	Fertilizations occur
63)	The length of the oviduct is about	10 cm long
64)	The uterine tubes contain sheets of smooth muscles and contains both	Ciliated and non-ciliated cells
65)	The oocyte is carried towards the uterus by the combination of the muscular peristalsis and the	Beating of the cilia
66)	Non-ciliated cells produce secretion that keeps the oocyte and the sperm if present	Moist and nourished
67)	The uterus is located in the pelvis, anterior to the rectum and posterior to the	Bladder
68)	The size and shape of uterus is about of	Inverted pear
69)	The uterus is hollow, thick-walled, muscular organ that function to receive, retain and nourished the	Fertilized ovum
70)	<b>The wall of uterus is composed of three layers:</b> 1. Perimetrium → outermost <b>thin</b> covering layer of uterus 2. Myometrium → middle <b>thick</b> muscular layer of smooth muscles 3. Endometrium → inner spongy lining of uterine cavity	
71)	To the layer which contract rhythmically to expel the baby out of the mother body is	Myometrium
72)	If fertilization occur, the young embryo takes root into the endometrium(implants) and reside there for the rest of the	Development
73)	The narrow entrance to the uterus from the vagina is	Cervix
74)	Cervix is normally blocked by a plug of the	Mucus
75)	The vagina is thin-walled 8 – 10 cm long tube which extends from the cervix to	Body exterior
76)	The vagina provides a passageway for delivery of an infant and for menstrual flow, so it is also called	Birth canal
77)	In vagina, the urethra is embedded in its	Anterior wall
78)	Oogenesis	
79)		
80)	The process of egg formation in females is called	Oogenesis
81)	The required for the completion of oogenesis is	Years
82)	First, in the fetal period of oogonia, the diploid stem cells of the ovary, multiply rapidly by mitosis and then enter a growth phase and lay in	<b>nutrient reserves.</b>
83)	Gradually, oogonia are transformed into primary oocytes and become surrounded by a	single layer of follicle cells
84)	The primary oocyte divide the first mitotic division, but become "stalled" late in _____ and do not complete it	<b>prophase I</b>

85)	They remain in state of suspension all through childhood, the wait is a long is _____ at least .	1 to 10- 14																								
86)	Only one oocyte is selected each time to continue meiosis , ultimately producing two haploid cells that are dissimilar in size,	one large and one small																								
87)	The large cell, that contain nearly <b>all the cytoplasm</b> of the primary oocyte, is the	secondary oocytes																								
88)	In humans the secondary oocytes arrests in metaphase II and it is this cell <b>that is</b>	<b>ovulated</b>																								
89)	If an ovulated secondary oocyte is not penetrated by a sperm, it is	simply deteriorates																								
90)	The unequal cytoplasmic divisions that occur during oogenesis ensures that a fertilized egg has ample nutrients for its _____ to the uterus	<b>6 – 7 day</b>																								
91)	Without nutrients containing cytoplasm the polar bodies	degenerate and die.																								
92)	Spermatogenesis and oogenesis	<table border="1"> <thead> <tr> <th></th> <th><b>Spermatogenesis</b></th> <th><b>Oogenesis</b></th> </tr> </thead> <tbody> <tr> <td>Location</td> <td>Testes</td> <td>Ovary</td> </tr> <tr> <td>gammates</td> <td>4</td> <td>1</td> </tr> <tr> <td>Beginning</td> <td>Puberty</td> <td>Fetal development</td> </tr> <tr> <td>End of process</td> <td>Long life</td> <td>Stops at menopause</td> </tr> <tr> <td>Meiotic deviation</td> <td>Equal deviations of cells</td> <td>Unequal deviations of cells</td> </tr> <tr> <td>Durations</td> <td>Uninterrupted process</td> <td>In arrested stages</td> </tr> <tr> <td>Release</td> <td>Cibitinous</td> <td>Monthly from puberty</td> </tr> </tbody> </table>		<b>Spermatogenesis</b>	<b>Oogenesis</b>	Location	Testes	Ovary	gammates	4	1	Beginning	Puberty	Fetal development	End of process	Long life	Stops at menopause	Meiotic deviation	Equal deviations of cells	Unequal deviations of cells	Durations	Uninterrupted process	In arrested stages	Release	Cibitinous	Monthly from puberty
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93)	<b>MENSTRUAL CYCLE</b>																									
94)	<p>The diagram illustrates the menstrual cycle phases and follicular development:</p> <ul style="list-style-type: none"> <li><b>Menstruation:</b> Days 0-5, shown as a pink area with a downward arrow.</li> <li><b>Follicular phase:</b> Days 6-14, shown as a light pink area. It shows the progression of follicles from Primary to Ruptured (Mature) to Developing corpus luteum.</li> <li><b>Ovulation:</b> Day 14, indicated by a red arrow pointing down to the ruptured follicle.</li> <li><b>Luteal phase:</b> Days 15-28, shown as a green area. It shows the transition from Developing corpus luteum to Corpus luteum and finally to Degrading corpus luteum.</li> </ul> <p>Below the timeline, a cross-section of the uterine lining shows the endometrium with blood vessels and glands, thickening during the follicular phase and shedding during menstruation.</p>																									
95)	The reproductive cycle in humans and other primates are called	Menstrual cycle																								
96)	The first menstrual cycle starts at	Puberty																								
97)	The uterine or menstrual cycle is a series of cyclic changes that the uterine endometrium goes through each month as it responds to the	Waxing and waning of ovarian hormone in blood																								
98)	The changes in ovarian cycle are controlled by the	Gonadotropins																								
99)	<b>phases of menstrual cycle are</b>	3																								
100)	Shortest phase	<b>Menstrual phase</b>																								
101)	Longest phase	<b>Secretory/ postovulatory phase</b>																								
102)	In this menstruation phase, the uterus sheds all but the deepest part of it is.	endometrium																								
103)	The thick hormone-dependent functional layer of the endometrium	3-5 days																								

	detaches from the uterine wall, a process that is accompanied by bleeding for	
104)	The detached tissue and blood pass out through the vagina as the	Menstrual flow.
105)	At the beginning of this stage, the ovarian hormone are at their lowest normal level and gonadotropins are beginning to rise, then FSH levels	Begin to rise. <b>Etea-2014</b> <b>nmdcat-2020</b>
106)	Under the influence of rising blood levels of estrogen, the basal layer of endometrium generates a	New functional layer.
107)	In <b>Proliferative/preovulatory phase</b> The endometrium again become	Velvety, thick and well vascularized.
108)	Normally, cervical mucus is thick and sticky but rising estrogen level cause it to _____, forming channels that facilitates the passage of sperm into the uterus.	thin and become crystalline
109)	Ovulation which takes	less than five minutes,
110)	Ovulation occurs in the ovary at the end of the	proliferative stage
111)	_____ converts the ruptured follicle to a corpus luteum	LH
112)	During secretory phase, endometrium prepares for the	Implantation of an embryo.
113)	Rising level of progesterone from the corpus luteum act on the estrogen-primed endometrium, causing the arteries to elaborate and converting the functional layer to a	Glandular secretory layer
114)	If fertilization does not occur, the corpus luteum begins to degenerate toward the end of the secretory phase as LH levels	Begins towards decline.
115)	Progesterone level low downs depriving the endometrium of hormonal support and endometrial cells die setting the stage for the menstruation to begin on day	28
116)	In female menstruation cycle ceases around at the age of 50 and is termed as	Menopause.
117)	_____ is an indicator of normal reproductive life of the females.	Cyclic menstruation
118)	Time span during which woman extends only from puberty to menopause, about at the age of	50
119)	The 1-2% of all ovulations, more than one oocyte is	Ovulated <b>ETEA-2014</b>
120)	Identical twins are the result from the fertilization of single oocyte by	Single sperm <b>ETEA-2017</b>
121)	Infertility means not being able to get	Pregnant
122)	Woman who get pregnant but are unable to stay pregnant may be	Infertile
123)	<b>Pregnancy is the result of a process that has many steps, to get pregnant:</b> <ul style="list-style-type: none"> <li>• Woman should release an egg (ovulation).</li> <li>• Egg must flow to uterus</li> <li>• Man's sperm must join with fertilized egg.</li> <li>• Fertilized egg must attach to inside uterus (implantation).</li> </ul>	
124)	Without ovulation, there are no eggs to be	Fertilized
125)	Some signs that a woman is not ovulating normally include irregular	Or absent menstrual cycle
126)	<b>DISORDERS OF REPRODUCTIVE SYSTEM</b>	
127)	<b>Less common cause of fertility problems in woman include:</b> <ul style="list-style-type: none"> <li>• Blocked fallopian tube due to pelvic inflammatory diseases, endometriosis.</li> <li>• Physical uterus with the uterus.</li> <li>• Uterine fibroids, which are non-cancerous clumps of tissue and muscle on the walls of the uterus.</li> </ul>	
128)	Infertility in men is most often caused by a problem called	Varicocele
129)	Varicocele happens when veins of man's testes are too large this	Heats the testes

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130)	The shape and number of sperms can be affected by the	Heat
131)	Movement of the sperm is another cause of the	Infertility
132)	Sometimes injuries or other damage to the reproductive system	Block the sperm
133)	Infertility is sometimes causes by the	Infertility in men
134)	In vitro fertilization (IVF) means fertilization	Outside the body
135)	When woman's follapian tubes are blocked or when a man produce too much sperm it cause	In vitro fertilization (IVF)
136)	Doctors treat IVF woman with hormones that causes the ovaries to	Produce multiple eggs
137)	Of IVF one mature egg are removed in putted in dish for	Fertilization <b>ETEA-2015</b>
138)	After 3- 5 days of outside the body, healthy embryo are implanted to	Woman's uterus
139)	A continuous loss of foetus before the 20 <sup>th</sup> week of pregnancy	Called Miscarriage
140)	Pregnancy loss after 20 <sup>th</sup> week is called	Preterm deliveries
141)	A miscarriage may be also called a	Spontaneous abortion
142)	Miscarriage are not related to the mother or	Father's genes
143)	The spontaneous abortion is used for occurring events which are	Natural not artificial
144)	<b>Some causes of miscarriage includes:</b> <ul style="list-style-type: none"> <li>• Drug and alcohol abuse</li> <li>• Exposure to environmental toxins and hormone problems</li> <li>• Infection, obesity and physical problems with the mother reproductive organs</li> <li>• Problem with the body's immune response</li> <li>• Serious body-wide diseases in the mother such as uncontrolled diabetes and smoking.</li> </ul>	
145)	The quantity of fertilized egg which die and lost spontaneously usually before woman know that she is pregnant is	Half or 50 %
146)	Woman who know they are pregnant, the miscarriage are about	<b>15 – 20 %</b>
147)	Most miscarriage occurs during	<b>1<sup>st</sup> 7 week of pregnancy</b>
148)	The termination of pregnancy by the removal or expulsion of a foetus or embryo from the uterus before it is viable	Abortion
149)	An abortion can occur spontaneously, in this case it is called	Miscarriage
150)	The term abortion most commonly refers to the induced abortion of	Human pregnancy
151)	<b>SEXUALLY TRANSMITTED DISEASES</b>	
152)	The causing agent of a gonorrhea is	<i>Neisseria gonorrhoeae</i> <b>ETEA-2015</b>
153)	<i>Neisseria gonorrhoeae</i> Invades the mucosa of the reproductive and	Urinary tract
154)	The most common symptom of gonorrhea in males is	Urtethritis
155)	Most common symptom of gonorrhea is	Painful urination <b>ETEA -2023</b>
156)	In gonorrhea, Urtethritis accompanied by <b>painful urination</b> and	Discharge of pus from penis <b>ETEA -2023</b>
157)	In females symptoms of gonorrhea are ranging from	None (20%)
158)	<b>The 80 % symptoms of gonorrhea in females are:</b> <ul style="list-style-type: none"> <li>• Abdominal discomfort, vaginal discharge and abnormal uterine bleeding.</li> <li>• Urethral symptoms to same those seen in males.</li> </ul>	
159)	In woman, Gonorrhea causes pelvic inflammatory disease and	Sterility
160)	Gonorrhea are treated by pencillin, tetracycline and other	Antibiotics
161)	Syphilis is caused by a bacteria called	<i>Treponema pallidum</i> <b>ETEA -2016-23</b>
162)	Syphilis can transmitted through	Sexually

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163)	Fetuses infected with syphilis are usually stillborn or	Die shortly after birth
164)	The bacteria of syphilis can easily penetrates intact mucosa and	Abraded skin
165)	The incubation period of syphilis are	2 – 3 weeks <b>ETEA-2013</b>
166)	After the incubation period the symptoms of syphilis are, a red painless primary lesion called chancre (shang'ker) appear	At the site of bacterial invasion
167)	In syphilis the symptoms in male appear on penis while in female it goes undetected within the vagina or on the	Cervix
168)	If syphilis is untreated, its secondary signs appear several	Weeks later
169)	A pink skin rash all over the body is one of the first symptom of	Syphilis
170)	The common symptoms of Syphilis are	Fever and joint pain
171)	In Syphilis symptoms like fever and joint pain disappears after	3 – 12 weeks <b>ETEA-2012</b>
172)	The Syphilis enters to latent period and can only be detected by	Blood test
173)	Latent stage of Syphilis may last a person's life or bacteria may by or Killed by immune system or it may be followed by signs of	Tertiary syphilis
174)	Tertiary syphilis is characterized by <b>gummas</b> , destructive lesions of the CNS, blood vessels	Bones and skin
175)	Treatment for all stages of syphilis is	Pencillin
176)	The first cause of AIDS was discovered in san Francisco and New york about	20 years ago
177)	The number of people estimated with HIV and AIDS are about	42 million
178)	The quantity of people which die every year are	3 million <b>ETEA-2016</b>
179)	HIV destroys a type of defense cell in the body called	CD4 helper lymphocytes <b>ETEA-2018 ETEA-2019</b>
180)	Still there is no cure for	HIV and AIDS
181)	HIV can be transmitted from person to person through blood, Semen vaginal fluid and	Breast milk
182)	Syphilis, genital herpes, gonorrhea or bacterial vaginosis are at greater risk for developing	AIDS
183)	If mother is infected by HIV, her child can get the virus before the birth or after birth through	Breast feeding
184)	Needles used in tattoo art can be an agent for	HIV infection

## CHAP#21 Development & Aging

### Key points

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# CHAP# 22 Inheritance Key points

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# CHAP# 23 Chromosomes and DNA Key points

S.No	Questions	Answers								
1)	<b>CHROMOSOMES</b>									
2)	Gregor Mendel's "heredity factors" were purely an abstract concept when he proposed their existence in	1865								
3)	Mendel's factor are located along the	Chromosomes								
4)	The location of particular gene by tagging chromosomes with a fluorescent that	Highlight the gene								
5)	Chromosomes are thick thread like structures that appear in nucleus	During cell division								
6)	In an interphase cell chromosomes become uncondensed and look like very fine network called	Chromatin network								
7)	Chromosomes are first observed in 1882 by German embryologist	Walther Fleming								
8)	Chromosomes was first seen in	Salamander larvae								
9)	The term chromosomes was proposed by Waldeyer and literally means	Coloured bodies								
10)	In prokaryotes the single DNA molecule is referred as	Chromosomes								
11)	Number of chromosomes exactly half than the somatic number of chromosomes are referred is	Haploid								
12)	Many species has two sets of chromosomes hence called	Diploid								
13)	Many species have more than two sets of chromosomes which are	Polypliods								
14)	<b>Polypliods may be</b>	Tetraploid or Hexaploid								
15)	Gametes and spores are usually	Haploid cells								
16)	<b>A haploid cell may be:</b> Monoploid → one set , Diploid → two sets , Triploid → three sets									
17)	<table border="1"> <thead> <tr> <th>Species</th> <th>Somatic number</th> <th>Haploid</th> <th>Monoploid (n)</th> </tr> </thead> <tbody> <tr> <td>Human</td> <td>46 (2n)</td> <td>23 (n)</td> <td>23</td> </tr> </tbody> </table>	Species	Somatic number	Haploid	Monoploid (n)	Human	46 (2n)	23 (n)	23	
Species	Somatic number	Haploid	Monoploid (n)							
Human	46 (2n)	23 (n)	23							

	Wheat	42 (6n)	21 (n)	7																			
18)	A typical chromosomes consists of two sets of chromosomes called		Chromatids																				
19)	Each chromatid is made of a long DNA molecule which is highly coiled with		Histone Proteins																				
20)	Both chromatids are attached with each other at a point known as		Centromere/ Primary constriction																				
21)	Some chromosomes have another point of union along the length of chromatids, called		Secondary constriction/ Nucleolar organizer																				
22)	Beside secondary constriction the end become the knob like structure called		Satellite	ETEA-2012																			
23)	Satellite region has useless sequences of DNA called		Junk DNA																				
24)	The terminal end of chromosomes are called		Telomeres																				
25)	The two chromosomes are prevented from attaching with each other by		Telomeres																				
26)	<b>On the basis of position of centromere along the length, a chromosomes may be called:</b>																						
	<ul style="list-style-type: none"> <li>• Metacentric → centromere at center</li> <li>• Submetacentric → centromere slightly away from center</li> <li>• Acrocentric → centromere located near end</li> <li>• Tolecentric → centromere located at an end</li> </ul> <p>*center → away from center → near end → at end*</p>																						
27)	<b>Generally chromosomes are made of DNA (40%) and Proteins (60%)</b>																						
28)	Each chromatid has		One DNA molecule																				
29)	An average size of human chromosomes are		5 cm long																				
30)	The number of nucleotides in DNA are about		140 million																				
31)	DNA has negatively charge due to		Phosphate group																				
32)	Histone proteins are positively charge due to some amino acids like		Arginine and lysine																				
33)	<b>There are five types of Histone Proteins:</b>																						
	• H <sub>1</sub> • H <sub>2</sub> A • H <sub>2</sub> B • H <sub>3</sub> • H <sub>4</sub>																						
34)	During S phase of cell cycle DNA and histone are completely		Disorganized																				
35)	The organization of chromosomes occur in four levels;																						
	<table border="1"> <thead> <tr> <th>S.No</th> <th>Level</th> <th>Thickness and diameter</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>DNA</td> <td>2 nm thick</td> </tr> <tr> <td>2</td> <td>Nucleosome string</td> <td>10 nm thick ETEA-2005</td> </tr> <tr> <td>3</td> <td>Chromatin fiber/ solenoid</td> <td>30 nm thick</td> </tr> <tr> <td>4</td> <td>Super coil</td> <td>200 nm diameter</td> </tr> <tr> <td>5</td> <td>Chromatid</td> <td>700 nm diameter</td> </tr> </tbody> </table>	S.No	Level	Thickness and diameter	1	DNA	2 nm thick	2	Nucleosome string	10 nm thick ETEA-2005	3	Chromatin fiber/ solenoid	30 nm thick	4	Super coil	200 nm diameter	5	Chromatid	700 nm diameter				
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36)	200 nucleotides wrap twice around the core of histone proteins forming		Nucleosome																				
37)	Two of each H <sub>2</sub> A, H <sub>2</sub> B, H <sub>3</sub> and H <sub>4</sub> are eight proteins from which		DNA wrap twice																				
38)	A small segment of DNA(linker DNA) between two every nucleosome		H <sub>1</sub>																				
39)	The whole DNA is converted into bread like appearance by		Linker histone protein																				
40)	During G <sub>1</sub> and G <sub>2</sub> phase chromosomes are found in the form of		Chromatin fiber/Solenoid																				
41)	<b>CONCEPT OF GENE</b>																						
42)	<b>The chromatin fiber show two regions:</b>																						
	<ul style="list-style-type: none"> <li>• Heterochromatin →highly condensed → unexpressed region</li> <li>• Euchromatin →non- condensed → expressed region</li> </ul>		ETEA-2015																				
43)	<b>Historical background of genes:</b>																						

	<ul style="list-style-type: none"> <li>Charles Darwin first conceived idea of heredity units when he published his theory of pangenesis in 1868. In this model the circulating unit was <b>Gemmules</b>.</li> <li>In the 1890s Hugo De Vries took the term "pangenesis" and transmitted it to "<b>pangene</b>" for the units of inheritance.</li> <li>William Johansson introduced the term "<b>gene</b>" to replace several contending and misleading terms for the basis unit of heredity in 1909. <b>ETEA-2012</b></li> <li>The term "<b>genetics</b>" came earlier, when William Betson coined the word in 1906 to represent the new field that studied heredity, variation and evolution.</li> </ul>	
44)	The theory of Darwin was experimentally discredited by	Francis Galton
45)	Modern concept of gene was given by Mendel on his experiment on	Pea plant
46)	According to Mendel, each trait in the pea plant is controlled by the discrete units, what he referred as elements or factors	Modern concept of gene
47)	In modern terminology the Mendel factors are called	Gene
48)	A gene is composed of nucleotide sequence of a short segment of DNA which encodes the sequence of amino acids of a	Particular polypeptide
49)	The position of gene where gene is located are called	Locus
50)	Most gene exists in more than one form called	Alleles
51)	The alleles are due to difference at one or more nucleotide	Position on DNA
52)	The alleles related to same trait are present on the	Same locus
53)	The gene of ABO blood group is " <i>I</i> " and it has three allele which are	<i>I<sup>A</sup></i> , <i>I<sup>B</sup></i> and <i>i</i>
54)	The three alleles of Blood group gene are present on the	Chromosome 9
55)	<b>Regions of genes:</b> <ul style="list-style-type: none"> <li>Regulatory region           <ol style="list-style-type: none"> <li>Promoter → 5' ends</li> <li>Terminator → 3' ends</li> </ol> </li> <li>Structural region           <ol style="list-style-type: none"> <li>Introns → non-functional <b>ETEA-2016</b></li> <li>Exons → functional</li> </ol> </li> </ul>	
56)	The regulatory region located at the end 5' end of coding strand of a gene is called	Promoter
57)	Promoter controls the binding RNA polymerases during	Transcription
58)	Terminator region is located to the 3' end of	Coding strand of gene
59)	The terminator region causes RNA polymerases to	Stop transcription
60)	The region between promoter and terminator region is called	Structural region
61)	Structural region comprises information(genetic code) for a particular polypeptide or	Functional RNA
62)	In eukaryotic gene the information of structural region is interrupted by a non-functional sequence called	Introns
63)	The functional sequence of terminator is called	Exons
64)	There is no such pattern of introns and exons is called	Prokaryotic DNA <b>ETEA-2012</b>
65)	In prokaryotes many adjacent structural region produce different polypeptides by some promoter and terminator region and are	Called Operon
66)	<b>CHROMOSOME THEORY OF INHERITANCE</b>	
67)	Chromosomes are unit of heredity, this was first forwarded by	Karl Correns in 1900
68)	Behavior of Mendel's factors(gene) are parallel to behavior of chromosomes at meiosis, this idea was recognized in 1902 by; <ul style="list-style-type: none"> <li>Walter Sutton → An American graduate student</li> </ul>	

	<ul style="list-style-type: none"> <li>Theodor Boveri → A German biologist</li> </ul>																
69)	Objection on Sutton's theory was cleared by discovery of T.H Morgan in 1910 on	<i>Drosophila</i>															
70)	Parallel behavior of gene and chromosomes in meiosis;																
	<table border="1"> <thead> <tr> <th>S.No</th> <th>Chromosomes behavior</th> <th>Gene behavior</th> </tr> </thead> <tbody> <tr> <td>1</td><td>Diploid cells have two copies of each chromosomes</td><td>Diploid cells have two copies of each genes</td></tr> <tr> <td>2</td><td>Gametes have half number of chromosomes</td><td>Gametes have half number of genes</td></tr> <tr> <td>3</td><td>Homologous pair of chromosomes separate during meiosis</td><td>Pair of genes are separated from each other during meiosis</td></tr> <tr> <td>4</td><td>Each pair assort independently</td><td>Independent assortment in genes pair</td></tr> </tbody> </table>	S.No	Chromosomes behavior	Gene behavior	1	Diploid cells have two copies of each chromosomes	Diploid cells have two copies of each genes	2	Gametes have half number of chromosomes	Gametes have half number of genes	3	Homologous pair of chromosomes separate during meiosis	Pair of genes are separated from each other during meiosis	4	Each pair assort independently	Independent assortment in genes pair	
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71)	The work with respect to gene linkage and inheritance of eye colour in <i>Drosophila</i> was done by	Morgan's															
72)	The chromosomes theory of inheritance was confirmed in	1910															
73)	<b>DNA AS HEREDITY MATERIAL</b>																
74)	<b>Griffith's Experiment (1928) :</b>																
	<p>S-type → polysaccharide membrane → smooth and shiny colony  R-type → no polysaccharide membrane → rough colony</p>																
*live.R																	
75)	The transfer of genetic material from one organism to another by which genetic make-up of recipient is called	Transformation															
76)	The agent responsible for transforming R-type to S-type went undiscovered until	1944															
77)	<b>Avery's Experiment (1944): ETEA-2014</b> In the classic series of experiments Oswald Avery along with Colin Macleod and Maclyn McCarty																

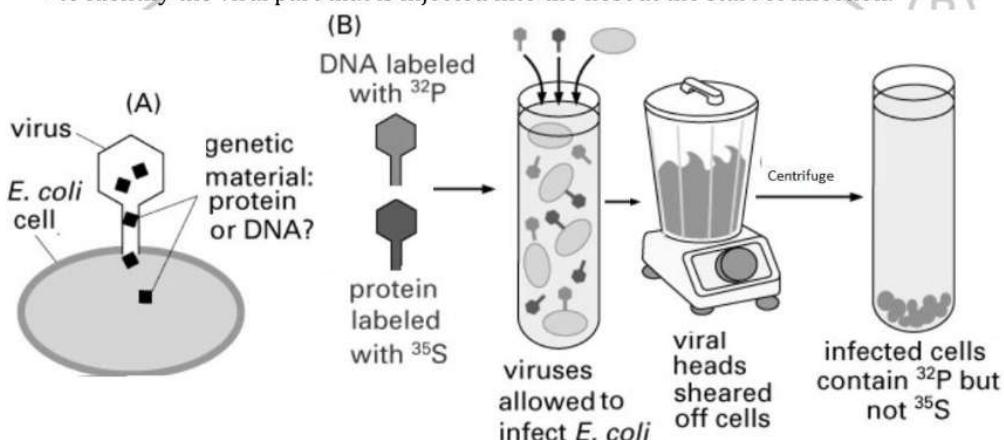
characterized what they referred as "transforming principle", they took dead S-type and live R-type mixture

Removed particle from S-type	Transfer	Result to mouse
Proteins	Occur	Die
Lipids	Occur	Die
Carbohydrates	Occur	Die
RNA	Occur	Die
DNA	Did not occur	Live

→ It is confirmed that transforming agent in Griffith's experiment is called DNA.

**78) Hershey and Chase Experiment:**

→ to identify the viral part that is injected into the host at the start of infection.



→  $\text{P}^{32}$  labeled DNA of bacteriophage was injected into the Bacterial cell while its  $\text{S}^{35}$  labeled protein remain constant. So virus DNA, not the virus protein, was responsible for directing the direction of new viruses. [ETEA-2017]

79)

Experiment	Year
Griffith's	1928
Avery's [ETEA-2014]	1944
Hershey and Chase	1952

80) It was not known that either DNA or protein possesses heredity information for bacteriophage till

1952

**81) DNA REPLICATION**

82) The process of self-synthesis of DNA molecule is called

DNA replication

83) The process of DNA replication in the life cycle of cells occurs

Once in S-phase

84) The molecule of DNA which is replicated is called

Parent DNA

85) The molecule which is produced in DNA replication process is called

Daughter DNA

86) A parent DNA after replication give rise to

2 daughter DNA molecules

**87) Three different models to explain the replication process:**

- Semi conservative model      • Conservative model      • Dispersive model

88) The structure of DNA was proposed by Watson and crick and also proposed

Semi conservative model

89) Parent DNA molecules becomes unwind and lost its base pairs and Both strands act as template produce two daughter DNA molecules

One old and one new (hybrid DNA)

90) Parental strands are partially conserved in both daughter DNA

Semi-conservative

	molecules	model																																			
91)	Parental DNA remains in its duplex state, while a daughter DNA molecule is with both new strands is established	Conservative model																																			
92)	Parental DNA become completely dispersed into fragments , which will mixed with new nucleotide fragments	Dispersive model																																			
93)	Overall three models to explain the replication process in DNA:																																				
	<table border="1"> <thead> <tr> <th>S.No</th><th>Model</th><th>Parental DNA is</th></tr> </thead> <tbody> <tr> <td>1</td><td>Semi conservative model</td><td>Partially conserved into daughter DNA</td></tr> <tr> <td>2</td><td>Conservative model</td><td>Fully conserved into daughter DNA</td></tr> <tr> <td>3</td><td>Dispersive model</td><td>Dispersed into fragments</td></tr> </tbody> </table>		S.No	Model	Parental DNA is	1	Semi conservative model	Partially conserved into daughter DNA	2	Conservative model	Fully conserved into daughter DNA	3	Dispersive model	Dispersed into fragments																							
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	→ The three models of DNA replication were evaluated by Mathew Meselson and Franklin Stahl of the California Institute of technology on 1958.																																				
94)	<p><b>Meselson-Stahl experiment:</b></p> <ul style="list-style-type: none"> <li><b>Culturing of bacteria</b> <ul style="list-style-type: none"> <li>→ Bacteria are grown in <math>N^{15}</math> heavy medium.</li> <li>→ Transfer some bacteria to three separate plates contained <math>^{14}N</math> light medium.</li> </ul> </li> <li><b>Sampling of DNA</b> <ol style="list-style-type: none"> <li>Sample at 0 min</li> <li>Sample at 20 min</li> <li>Sample at 40 min</li> <li>Sample from pure <math>^{14}N</math> medium</li> </ol> </li> <li><b>Centrifugation of DNA molecules</b> <ul style="list-style-type: none"> <li>→ All DNA samples are mixed with cesium chloride (CsCl) and then centrifugate it.</li> <li>→ Cesium and chloride ions are pushed towards the bottom</li> </ul> </li> <li><b>Results of Centrifugation</b> <table border="1"> <thead> <tr> <th>S.no</th><th>Sample</th><th>Position</th></tr> </thead> <tbody> <tr> <td>1</td><td>Sample of <math>N^{14}</math> medium</td><td>Top</td></tr> <tr> <td>2</td><td>Sample at 0 min</td><td>Bottom</td></tr> <tr> <td>3</td><td>Sample at 20 min</td><td>Intermediate or center</td></tr> <tr> <td>4</td><td>Sample at 40 min</td><td>Intermediate + top</td></tr> </tbody> </table> </li> <li><b>Interpretation of results</b> <table border="1"> <thead> <tr> <th>S.no</th><th>Sample and its position</th><th>Reason</th><th>No of DNA</th></tr> </thead> <tbody> <tr> <td>1</td><td>Sample of <math>^{14}N</math> medium → Top</td><td>Lightest → both strands was <math>^{14}N</math>.</td><td>1</td></tr> <tr> <td>2</td><td>Sample at 0 min → Bottom</td><td>Heaviest → both strands was <math>^{15}N</math>.</td><td>1</td></tr> <tr> <td>3</td><td>Sample at 20 min → Intermediate or center</td><td>Intermediate → one strand of <math>^{15}N</math> and one of <math>^{14}N</math>.</td><td>2</td></tr> <tr> <td>4</td><td>Sample at 40 min → Intermediate + top</td><td>Two sediments → <math>^{15}N</math> strand form <math>^{14}N</math> and other <math>^{14}N</math> form also <math>^{14}N</math>.</td><td>4</td></tr> </tbody> </table> </li> </ul>		S.no	Sample	Position	1	Sample of $N^{14}$ medium	Top	2	Sample at 0 min	Bottom	3	Sample at 20 min	Intermediate or center	4	Sample at 40 min	Intermediate + top	S.no	Sample and its position	Reason	No of DNA	1	Sample of $^{14}N$ medium → Top	Lightest → both strands was $^{14}N$ .	1	2	Sample at 0 min → Bottom	Heaviest → both strands was $^{15}N$ .	1	3	Sample at 20 min → Intermediate or center	Intermediate → one strand of $^{15}N$ and one of $^{14}N$ .	2	4	Sample at 40 min → Intermediate + top	Two sediments → $^{15}N$ strand form $^{14}N$ and other $^{14}N$ form also $^{14}N$ .	4
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	*The result was it that the replication of DNA is semi-conservative.																																				
95)	<p><b>Phases of DNA replication:</b></p> <ul style="list-style-type: none"> <li>Initiation phase</li> <li>Extension / polymerization phase</li> <li>Termination phase</li> </ul>																																				
96)	The initiation phase is characterized by the formation of replication bubble replication fork , which are formed at particular site called	Origin of replication site																																			
97)	<p><b>The number of origin of replication in</b></p> <ul style="list-style-type: none"> <li>Eukaryotic are more than one</li> </ul>																																				

	<ul style="list-style-type: none"> <li>• Prokaryotic are only one</li> </ul>	
98)	Origin of replication is specific site of nucleotide in DNA from which	Replication starts
99) 1	When DNA gyrase (tropoisomerases) and DNA helicase work together on DNA,	Replication bubble is formed
100)	DNA duplex is converted from spider ladder like form to straight ladder like form by	DNA gyrase
101)	The base pairs of DNA are break down by	DNA helicase
102)	When the base pairs are broken down it give rise to bubble like Appearance to	origin of replication
103)	When the base pairs are broken down, The single strand of DNA are prevented to pair up again by	Single Stranded binding(SSB) proteins
104)	Each side of replication bubble is termed as	Replication fork
105)	The formation of daughter strands(leading or lagging) along the temple strands are called	Extension or polymerization
106)	The daughter strands are actually synthesized by	DNA polymerase enzyme
107)	The enzyme DNA polymerase cannot work unless some nucleotide	Are arranged on template
108)	To arrange some nucleotides on template strand the enzyme involved is	Primase enzyme
109)	The short fragments of nucleotide are called	Primers
110)	Primer is short oligonucleotide strand of RNA, act as start site for	DNA polymerase
111)	<b>There are three types of DNA polymerases:</b> <ul style="list-style-type: none"> <li>• DNA polymerases – I           <ul style="list-style-type: none"> <li>→ role in termination phase of replication</li> <li>→ provide support to the DNA polymerase III.</li> </ul> </li> <li>• DNA polymerases – II           <ul style="list-style-type: none"> <li>→ help in DNA repairing during cell life time</li> </ul> </li> <li>• DNA polymerases – III <b>ETEA-2019</b> <ul style="list-style-type: none"> <li>→ proof reading</li> <li>→ main enzyme that produce both daughter strands along template during replication process.</li> </ul> </li> </ul>	
112)	The DNA polymerase-III is a huge dimer molecule and consist of	Two subunits
113)	DNA polymerase-III cannot initiate replication process it only add	Nucleotide on 3'-OH group
114)	To perform its activity DNA polymerase-III need a	Primer
115)	The direction of replication of DNA is from	5' to 3' <b>ETEA-2017</b> <b>ETEA-2019</b>
116)	The process of DNA polymerase-III to remove wrong nucleotide is called	Proofreading
117)	Both units of DNA polymerase-III are linked together by a small	Polypeptide chain
118)	The continuously daughter strand towards replication fork is	Leading strand
119)	The discontinuously growing daughter strand away from fork is	Lagging strand
120)	The small fragment of lagging strand are called	Okazaki' fragments
121)	The second unit of DNA polymerase-III are allowed to polymerize daughter strand up to a specific length such as <ul style="list-style-type: none"> <li>• 100 – 200 nucleotides in prokaryotes</li> <li>• 1000 – 2000 nucleotide in eukaryotes</li> </ul>	
122)	The replacement of primer by DNA nucleotide is called	DNA polymerase-I

<b>123)</b>	<b>DNA polymerase-I has dual function:</b> 1. Polymerase 2. Exonuclease	
<b>124)</b>	The joining of Okazaki's fragment is carried out by	DNA ligase
<b>125)</b>	To form continuous strand the bond formed b/w Okazaki's fragment	Is Phosphodiester bond
<b>126)</b>	The process in which mRNA copy the sequence of DNA with the help of RNA polymerase is called	Transcription <b>NMDCAT-2020</b>

**DNA REPLICATION**

- 127)** Replication begins with double stranded DNA being separated.
- 128)** Each original strand, called a parent strand, is used as a template for the complementary base pairing of nucleotide to make two new molecules.
- 129)** DNA replication occurs in the 5' to 3' direction adding new nucleotide to the 3' end of the newly forming strand.
- 130)** DNA replication will begin at a specific area of molecule called the origin of the replication.
- 131)** The origin of replication denotes the area of active replication called the replication fork
- 132)** A number of enzymes are needed for replication process;
- 133)** Helicase: separate the strands of the double helix
- 134)** Single stranded binding proteins: stabilize the newly single stranded regions
- 135)** DNA Gyrase: used to make sure the double stranded areas outside the replication fork do not supercoil.
- 136)** DNA polymerase: catalyze the addition of new nucleotide to the growing daughter strand.
- 137)** Other proteins: such as beta clamps and clamp leader, help hold the DNA polymerase in place on the DNA
- 138)** Short sequence of RNA, called primer, have to be paired to the template strands by the enzyme primase, because DNA polymerase cannot begin to add nucleotide without a primer.
- 139)** Replication of both stands occur at the same time, once using continuous synthesis and the other discontinuous.
- 140)** New nucleotide are added to the 3' end moving continuously towards the expanding replication fork.
- 141)** Discontinuous synthesis occur on the parent strand that is oriented 5' – 3', called the lagging strand and is completed in segment called Okazaki's fragments
- 142)** Replication on this primer uses primase to add primer ahead of the 5' end to the lagging strand.
- 143)** DNA polymerase-III then add short sequence of nucleotide, the Okazaki's fragments, to the primer filling in the gap.
- 144)** As the helix is opened further, this process repeats until the entire strand is replicated
- 145)** DNA polymerase-I replaces the RNA primer with DNA nucleotide
- 146)** DNA ligase is used to ensure bonding between the fragments and the replaced nucleotides.
- 147)** Once both the leading and lagging strands have completed their replications, two identical copies of DNA result.

**GENE EXPRESSION**

<b>149)</b>	<b>Process of transcription is completed in three phases:</b> 1. Initiation phase 2. Elongation phase 3. Termination phase	
<b>150)</b>	Transcription begins with the binding of RNA polymerase at	Promoter region
<b>151)</b>	Promoter is regulatory region of gene which provides binding site	For RNA polymerase
<b>152)</b>	<b>Binding sites in prokaryotes:</b> 1. TATAAT → -10 sequence 2. TTGACA → -35 sequence	

	<b>Binding sites in eukaryotes:</b> 1. TATA (TATA box) → -25 sequence <b>ETEA-2017</b> 2. CAAT (CAAT box) → -70 sequence													
153)	Subunits of RNA polymerase are	Four												
154)	The three subunits are also called	Core enzyme												
155)	The factor which is required for RNA polymerase to bind to the promoter are	Sigma factor												
156)	In prokaryotes, the number type of RNA polymerase is only	One type												
157)	In eukaryotes, the type of RNA polymerase are three: <b>ETEA-2014</b>	<table border="1"> <thead> <tr> <th>S.No</th> <th>Type</th> <th>Synthesize</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>RNA polymerase - I</td> <td>rRNA</td> </tr> <tr> <td>2</td> <td>RNA polymerase - II</td> <td>mRNA</td> </tr> <tr> <td>3</td> <td>RNA polymerase - III</td> <td>tRNA</td> </tr> </tbody> </table>	S.No	Type	Synthesize	1	RNA polymerase - I	rRNA	2	RNA polymerase - II	mRNA	3	RNA polymerase - III	tRNA
S.No	Type	Synthesize												
1	RNA polymerase - I	rRNA												
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3	RNA polymerase - III	tRNA												
158)	The template strand is also called	Antisense												
159)	The other strand is also called	Coding or sense strand												
160)	In elongation phase, towards the terminal region the RNA polymerase keep on moving towards the	5' to 3' direction												
161)	The terminator region consist of GC pairs followed by series of	AT base pairs												
162)	The loop like structure formed by mRNA in termination phase is called	GC hairpin followed by AU nucleotide												
163)	The GC hairpin causes the RNA polymerase to stop the synthesize of	RNA												
164)	A process by which primary mRNA is converted into mature RNA or functional RNA is called	Post transcriptional modification <b>ETEA-2015</b>												
165)	The post transcriptional modification process is only associated with	Eukaryotic transcription												
166)	The post transcription modification process is not occur in prokaryotes due to Absence of a	True or definite nucleus												
167)	The enzymes which can degrade mRNA before its translation are	Phosphatases and nucleases												
168)	Exon → protein coding sequences Introns → non - protein coding sequences													
169)	To remain stable the cap and tail are added to the both ends of	Primary mRNA												
170)	A cap(attached to 5' end) is in the form of	7-methyl GTP												
171)	A tail or poly-A tail(attached to 3' end) is small chain of	30-500 adenine nucleotides												
172)	The removal of introns and maturation of primary mRNA to secondary or functional mRNA is called	RNA splicing												
173)	The sequence of genetic nucleotides in DNA or RNA that determines the specific amino acids sequences of the proteins is called	Genetic code												
174)	The total number of codes of codons are	64												
175)	<b>Start codon</b> → AUG <b>Stop codons</b> → UGA, UAG and UAA <b>ETEA-2017</b>													
176)	The three stop codons are also called	Non sense codon <b>ETEA-2017</b>												
177)	All amino acids that encode specific amino acids except stop codons are also called	Sense codon												

178)	Amino acids leucine and serine are encoded by	Six codons <b>ETEA-2018</b>																
179)	An amino acids can be encoded by	More than one codon																
180)	GAA and GAG both specify an atomic acid called	Glutamic acid																
181)	The genetic code is universal, it is common in	All the organism																
182)	AGA specifies arginine in bacteria, in human and	All organism																
183)	The study of genetic codon of mitochondrial DNA however , showed that genetic code is not that universal. e.g:	<table border="1"> <thead> <tr> <th>Codon</th> <th>Nuclear DNA</th> <th>Mitochondrial DNA</th> <th><b>ETEA-2015-2017</b></th> </tr> </thead> <tbody> <tr> <td>UGA</td> <td>Stop codon</td> <td>Tryptophan</td> <td></td> </tr> <tr> <td>AUA</td> <td>Iso leucine</td> <td>Methionine</td> <td></td> </tr> <tr> <td>AGA &amp; AGG</td> <td>Arginine</td> <td>Stop codon</td> <td></td> </tr> </tbody> </table>	Codon	Nuclear DNA	Mitochondrial DNA	<b>ETEA-2015-2017</b>	UGA	Stop codon	Tryptophan		AUA	Iso leucine	Methionine		AGA & AGG	Arginine	Stop codon	
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184)	In bacteria, translations occur in the	Cell's cytoplasm																
185)	In eukaryotic, the translation occur in the membrane of the	Endoplasmic reticulum																
186)	The region of smaller ribosomal subunit where first aminocyl tRNA complex is attached is called	P site (peptidyl side ) <b>ETEA-2017</b>																
<b>REGULATION OF GENE EXPRESSION</b>																		
187)	When expression of gene is quantitatively increased by the presence of specific regulatory protein (the activator) is called	Positive gene regulation																
188)	When the expression of gene is diminished by the presence of specific regulatory protein (the repressor) is called	Negative gene regulation																
189)	Catabolism of a substrate obtained from outside called	Lac operan																
190)	Biosynthesis of a given amino acid is called	Try operan																
191)	Lac operan consist of: <ol style="list-style-type: none"> <li>One regulatory region → i gene → codes for the represse of the lac operan.</li> <li>Three structural regions:</li> </ol>	<table border="1"> <thead> <tr> <th>Regions</th> <th>Codes for</th> </tr> </thead> <tbody> <tr> <td>z</td> <td>β-galactosidase</td> <td>Responsible for hydrolysis of disaccharides</td> </tr> <tr> <td>y</td> <td>Permeases</td> <td>Increase permeability of the cell to β-galactosidase</td> </tr> <tr> <td>a</td> <td>Transacetylase</td> <td>An enzyme that transfer an acetyl group from acetyl-CoA to β-galactosidase</td> </tr> </tbody> </table>	Regions	Codes for	z	β-galactosidase	Responsible for hydrolysis of disaccharides	y	Permeases	Increase permeability of the cell to β-galactosidase	a	Transacetylase	An enzyme that transfer an acetyl group from acetyl-CoA to β-galactosidase					
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<b>MUTATION</b>																		
192)	A gene mutation is permanent change in	DNA sequences																
193)	<b>A mutation may occur in:</b> <ol style="list-style-type: none"> <li>Single DNA nucleotide</li> <li>Segment of chromosomes or whole chromosomes</li> <li>Change in number of chromosomes</li> </ol>																	
194)	<b>Causes of mutations:</b> <ul style="list-style-type: none"> <li>Radiation</li> <li>Viruses</li> <li>Transposons</li> <li>Mutagenic chemicals as well as errors</li> </ul>	Since 2016																
195)	The agent that cause mutation is called	Mutagens																
196)	The organism in mutation occur is called	Mutant																
197)	Mutation that occur in more than one percent of the population are called	Polymorphisms																

198)	Mutation that transfer from parent to child are called		Heredity mutation or germ line mutations																		
199)	Mutation that occur only in egg or sperm cell, or those that occur just after fertilization are called		New (de novo) mutations																		
200)	Onto next generation, Acquired mutation in somatic cell		Cannot be transfer																		
201)	Mutations that occur due to internal factor are called		Spontaneous mutations																		
202)	Mutations that are produces by external factors are called		Induced mutations																		
203)	A mutation that cause change of single or few nucleotide are called Point mutation																				
	Deletion	Removal of one or few nucleotide from particular segment of DNA.																			
	Insertion	Addition of one or few nucleotide in particular segment of DNA																			
	Base substitution	Replacement of one or few nucleotide in a particular segment of DNA																			
204)	Mutation that cause change in the structure or number of chromosomes are called Chromosomal mutation or aberration. Structural changes are of following types:																				
	Deletion	Removal of segment of chromosomes comprising single of few genes																			
	Inversion	Chromosomes breaks off, turns around and join so that sequence become inversed																			
	Translocation	Shifting of a segment of one chromosomes to another non homologous chromosomes																			
	Duplication	Repetition of one or few genes in the same chromosomes																			
205)	Change in number of chromosomes due to addition or loss of one or more chromosomes are called		Aneuploidy																		
206)	Aneuploidy are of following types:																				
	S.No	Types	As a result of																		
1		Monosomy ( $2n-1$ )	Loss of single chromosomes from diploid set .																		
2		Nullisomy ( $2n-2$ )	Loss of pair of homologous chromosomes from diploid set .																		
3		Trisomy ( $2n+1$ )	Addition of single chromosomes in diploid set (down syndrome and Klinfelter's syndrome).																		
4		Tertrasomy( $2n+2$ )	Addition of pair of homologous chromosomes in diploid set.																		
207)	Change in number of chromosomes due to addition or loss of one or more complete set of chromosomes are called		Euploidy																		
208)	Euploidy is the state of cell or organism having an integral multiple of the monoploid (single set) number of chromosomes. It is also called		Polyploidy																		
209)	Various forms of euploidy are: <ul style="list-style-type: none"> <li>• Triploidy → three sets</li> <li>• Tertaploidy → four sets</li> <li>• Pentaploidy → five sets</li> <li>• Hexaoploidy → six sets and so on.</li> </ul>																				
210)	Major types of mutagens:																				
	<table border="1"> <thead> <tr> <th>Physical mutagens</th> <th>Chemical mutagens</th> </tr> </thead> <tbody> <tr> <td>X-rays</td> <td>Nitrous acid</td> <td>Acridines</td> <td>Pesticides</td> </tr> <tr> <td>Gamma rays</td> <td>Formaldehyde</td> <td>Colchicine</td> <td>Food preservatives</td> </tr> <tr> <td>U.V rays</td> <td>Mustard gas</td> <td>Caffeine</td> <td></td> </tr> <tr> <td>Cosmic rays (background radiation)</td> <td>5-bromouracil</td> <td>Nicotine</td> <td></td> </tr> </tbody> </table>		Physical mutagens	Chemical mutagens	X-rays	Nitrous acid	Acridines	Pesticides	Gamma rays	Formaldehyde	Colchicine	Food preservatives	U.V rays	Mustard gas	Caffeine		Cosmic rays (background radiation)	5-bromouracil	Nicotine		
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	→H.J Muller was the first to induce mutation by physical method using X-rays in Drosophila. →The first chemical mutagens was mustard gas that was used as a chemical weapon during 1 <sup>st</sup> world war.									
211)	<b>DISEASE INDUCED BY MUTATION</b>									
212)	<b>Disease induced by mutation:</b> 1. Sickle cell anemia 2. Phenyl ketonuria (PKU) 3. Down syndrome 4. Turner' syndrome 5. Klinefelter's syndrome									
213)	The low number of red blood cells are called	Anemia R								
214)	The rapid breakdown of red blood cell cause yellowing of eyes and skin which are symptoms of	Jaundice								
215)	Almost all patients with sickle cell anemia have painful episodes	Called crises								
216)	Sickle cell anemia is caused by recessive allele HbS which encodes defective allele for $\beta$ globin as a result of abnormal haemoglobin called	Haemoglobin S								
217)	HbS is originated from HBA(normal haemoglobin) due to	Point mutation								
218)	Sickle cell anemia is much common in people of african and	Mediterranean descent								
219)	Folic acid is needed to make	Red blood cells								
220)	<b>The crises can affect the bones of:</b> 1.The back      2. The long bone      3. The chest									
221)	<b>Treatment of sickle cell anemia crises:</b> • Blood transfusions      • Pain medicines      • Plenty of fluids									
222)	In Phenyl ketonuria (PKU), the baby is born without the ability of proper break down of the an amino acid called	Phenylalanine								
223)	Both parents must pass the defective gene to have Phenyl ketonuria (PKU). This condition is called	Autosomal recessive trait								
224)	Babies with PKU are missing an enzyme called	Phenylalanine hydroxylase								
225)	Phenyalanine have major role in production of the	Melanin								
226)	Melanin is responsible for the production of the	Hair and skin colour								
227)	A special infant formula that is for infant with PKU are	Lofenalac								
228)	Smaller skin folds at the inner corner are called	Epicanthic field								
229)	White spots on coloured part of the eye are called	Brushfield spots								
230)	The genetic origin of down syndrome was discovered by the	Jerome Legeunu								
231)	<b>Down syndrome: ETEA-2016</b>  <table border="1"> <thead> <tr> <th>Age</th> <th>Birth</th> </tr> </thead> <tbody> <tr> <td>Before 30</td> <td>1 per 800</td> </tr> <tr> <td>35</td> <td>1 per 350</td> </tr> <tr> <td>40</td> <td>1 per 100</td> </tr> </tbody> </table> <b>Klinefelter's syndrome:</b> • 1 in 5000 to 1000      • 1 in 50,000 <b>Turner's syndrome:</b> • 1 in 2500	Age	Birth	Before 30	1 per 800	35	1 per 350	40	1 per 100	
Age	Birth									
Before 30	1 per 800									
35	1 per 350									
40	1 per 100									
232)	Klinefelter's syndrome was named after Dr klinefelter who	Symptoms on men								
233)	In 1938, Henery Turner first describe	Turner syndrome								
234)	When mother produce an egg lacking X chromosomes are called	Nullo gametes								

ETEA-2014-16-17

	<b>Down syndrome</b>	<b>Turner syndrome</b>	<b>Klinefelter's syndrome</b>	
	2n+1	2n-1	2n+1	
Also called	Trisomy 21		XXY syndrome	
		Missing 1 X chromosomes	Male have extra X chromosomes	
		Only in females	Only in males	
			Does not occur in females	
Sign and symptoms	<ul style="list-style-type: none"> <li>• Flattened face and nose</li> <li>• Short neck</li> <li>• Small mouth</li> <li>• Protruding tongue</li> <li>• Small ears</li> <li>• Epicanthic fold</li> <li>• Brushfield spots</li> <li>• Short hand</li> <li>• Short fingers</li> <li>• Poor muscle tone</li> <li>• Not average height</li> </ul>	<ul style="list-style-type: none"> <li>• 95% adult are short stature</li> <li>• Non-functional ovaries</li> <li>• Infertile</li> <li>• Pregnancy with donor embryo are possible</li> <li>• Middle ear infections hearing loss</li> <li>• Good verbal skill</li> <li>• Good reading skill</li> <li>• Problem with mathematics</li> </ul>	As baby Puberty Teens Adults Else	Weak muscles Not much testosterone Larger breast Weaker bone Trouble in "fitting in" No/little sperm 95-99% are infertile Language trouble
Cause and risk factors	Autosomal no-disjunction Half IQ to normal	Non disjunction Nullo gamete	Non disjunction during oogenesis in mother	
Treatment	No specific treatment Corrective surgery Regular health checkups Fully included in family	Growth hormone injection Estrogen and progesterone replacement therapy	Testosterone replacement therapy (TRT)	

## CHAP# 24 Evolution Key points

S.No	Questions	Answers												
<b>THE EVOLUTION OF THE CONCEPT OF THE EVOLUTION</b>														
235)	<b>The evolution of the concept of evolution:</b> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="padding: 2px;"><b>Scientist</b></td><td style="padding: 2px;"><b>Theory</b></td></tr> <tr> <td style="padding: 2px;">Aristotle</td><td style="padding: 2px;">The scala naturae</td></tr> <tr> <td style="padding: 2px;">George Cuver</td><td style="padding: 2px;">Theory of catastrophism</td></tr> <tr> <td style="padding: 2px;">James hutton and Charles lyell</td><td style="padding: 2px;">Uniformitarianism <b>ETEA-2014</b></td></tr> <tr> <td style="padding: 2px;">Lamark</td><td style="padding: 2px;">Organism evolved through inheritance of acquired characteristic</td></tr> <tr> <td style="padding: 2px;">Charles Darwin</td><td style="padding: 2px;">Natural selection</td></tr> </table>	<b>Scientist</b>	<b>Theory</b>	Aristotle	The scala naturae	George Cuver	Theory of catastrophism	James hutton and Charles lyell	Uniformitarianism <b>ETEA-2014</b>	Lamark	Organism evolved through inheritance of acquired characteristic	Charles Darwin	Natural selection	
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Lamark	Organism evolved through inheritance of acquired characteristic													
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<b>EVOLUTION OF EUKARYOTIC FROM PROKARYOTIC</b>														
236)	<b>The process involved in the evolution of eukaryotic are:</b> <ol style="list-style-type: none"> <li>1. Endosymbiosis</li> <li>2. Membrane infolding</li> </ol>													
237)	Fossils records indicate that eukaryote evolved from prokaryote somewhere between	1.5 to 2 billion years age												

BOM SERIES	Page 106	BOM ACADEMY Online & Swat
238)	The eukaryotic organelles which are formed from prokaryote are	Mitochondria & chloroplast
239)	Both the mitochondria and chloroplast have their own genes, circular DNA and RNA, and reproduce by binary fission independent to the host's cell cycle, this is evidence for	Endosymbiosis
240)	Inner membrane of both mitochondria and chloroplast are more similar to	Prokaryotes rather than eukaryotes
241)	The outer membrane of mitochondria and chloroplast resembles to	Eukaryotes
242)	It can be said that first eukaryotic was formed from prokaryotic, symbiotic and	Multicellular interaction
<b>LAMARKISM</b>		
243)	Lamark was first soldier then botanist and finally	Professor of zoology
244)	Lamark gives an explanation of evolution based on the	Inheritance of acquired character
245)	Structural change in the body of an organism involving a deviation from normal, induced in the life time of an individual due to certain changes in the environment i.e use or disuse of an organ	An acquired characters
246)	<b>The examples given by Lamark to prove his theory:</b> <ul style="list-style-type: none"> <li>The legs and neck of giraffe become long and this habit passes from generation to generation in order to reach high leaves of trees.</li> <li>Due to crawling of snakes the feet of snakes reduces.</li> </ul>	
247)	Lamarckism is the inheritance of acquired character, which is wrong in terms of	Principle of genetics
<b>DARWANISM</b>		
248)	The types of Finches found at Galapagos islands are	13 types <b>ETEA-2018</b>
249)	<b>Silent features of Darwin-Wallace theory are:</b> <ul style="list-style-type: none"> <li>Over production</li> <li>Struggle for existence</li> <li>Variation</li> <li>Natural selection of survival of the fittest</li> <li>Speciation or origin of new species</li> </ul>	
250)	<b>Struggle for existence may be three fold in nature:</b> <ol style="list-style-type: none"> <li>Intra specific struggle or rivals → competition between member of the same species <b>ETEA -2023</b></li> <li>Inter specific struggle or pray or predation → competition between members of the different species</li> <li>Extra specific struggle or environmental struggle → struggle against force of nature</li> </ol>	
251)	<b>Variation are of two types :</b> <ol style="list-style-type: none"> <li>Harmful variation → results an extermination</li> <li>Useful variation →increases chances of survival</li> </ol>	
252)	The term "natural selection" was used by the	Darwin
253)	The term "survival of the fittest" was used by the	Herbert selection
<b>NEO-DARWANISM</b>		
254)	<b>The modern accepts five major causes of evolution:</b> <ol style="list-style-type: none"> <li>Gene and chromosomal mutation</li> <li>Genetic recombination</li> <li>Natural selection</li> <li>Genetic drift</li> </ol>	

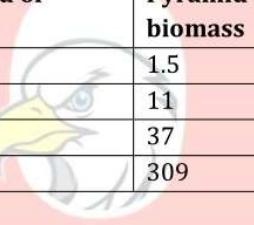
	5. Reproductive isolation							
255)	The genetic drift determines	Evolution						
256)	Structural that have same arrangement of parts and similar mode of development but different functions are called	Homologous structures						
257)	<b>Evidence of evolution from comparative anatomy:</b> The following bones consists of same number of bones, muscles, nerves and blood vessels arrangement in the same pattern with similar mode of development: <b>ETEA -2014 -2023</b> <ul style="list-style-type: none"> <li>• Human hand              • Bat's wing              • Cat's paw</li> <li>• Horse front leg           • Front flipper of whale</li> </ul>							
258)	Structures that have the same function and are specially alike, such as wings of birds, wings of butterfly and that of a flying lizard, such structures are called	Analogous						
259)	<i>Archaeopteryx</i> , the fossil bird, discovered from rocks in	East Germany						
260)	The bird which possessed both reptilian as well as avian characters	<i>Archaeopteryx</i>						
261)	Modern horse is called	<i>Equus</i>						
262)	A progression of fossils can be tracked back over 60 million years ago to the "drawn hose called"	<i>Eohippus</i>						
263)	The birds are	Glorified reptiles						
264)	<b>Evidence of evolution from vestigial organs:</b> 1. Vestigial organs in human beings: <b>ETEA-2012-16</b> <ul style="list-style-type: none"> <li>• Nictatings membranes of eye</li> <li>• Appendix</li> <li>• Coccyx or tail bones</li> <li>• Mammary glands of male</li> </ul> 2. Vestigial organs in Whales: <ul style="list-style-type: none"> <li>• Hind limbs buried in flesh</li> </ul> 3. Vestigial organs in Python: <ul style="list-style-type: none"> <li>• Hind limb</li> </ul>							
265)	<b>Evidence of evolution from biochemistry:</b> The aspect of common origin are: <ul style="list-style-type: none"> <li>• DNA and RNA              • Protein synthesis process              • Occurrence of ATP</li> </ul>							
266)	<b>Evidence of evolution from Molecular biology:</b> <ul style="list-style-type: none"> <li>• DNA and RNA are mechanism of inheritance</li> <li>• Gene activity</li> <li>• Similar structures of genes</li> <li>• Same mechanism of trapping and transforming energy</li> </ul>							
267)	<b>Evidence of evolution from embryology:</b> <ul style="list-style-type: none"> <li>• The embryo of adult vertebrates resemble one another</li> <li>• Recapitulation theory of Von bear or biogenetic law of Haeckel state that in development each individual tends to climb to its own family tree.</li> <li>• Zygote can be supposed to be the unicellular ancestor and the gastrula a diploblastic ancestor in many organisms.</li> </ul>							
268)	The process of two or more related species becoming more and more dissimilar is called	Divergent evolution						
269)	Similarity due to share developmental pathways	Homology						
270)	The kit fox and the red fox provide an example of two species that have undergone divergent evolution. <b>ETEA-2018</b>							
	<table border="1"> <thead> <tr> <th></th> <th>Kit fox</th> <th>Red fox</th> </tr> </thead> <tbody> <tr> <td>Live in</td> <td>Deserts</td> <td>Farmland and forests</td> </tr> </tbody> </table>		Kit fox	Red fox	Live in	Deserts	Farmland and forests	
	Kit fox	Red fox						
Live in	Deserts	Farmland and forests						

	Colour Ears	Sandy colour Large(help to excess body heat)	Red colour Small	
271)	The process whereby organisms not closely related(not monophyletic), independently evolve similar trait as a result having to adopt to similar environments or ecological niches		Convergent evolution	
272)	Some animals have organs which perform same function and yet they are different in their origin and structure, they are called		Analogous organs <b>NMDCAT-2020</b>	
273)	The cactus, which grows in the American desert resembles to the Euphorbia, which grows in the African desert resembles in their		Fleshy stem armed with spines	
274)	Similar nature of the flight/wings of insects, birds, pterosaurs and bats are example of		Convergent evolution	
275)	<b>Hardy-weinberg:</b> The Hardy-weinberg principle states that in a large randomly breeding population, allelic frequencies will remain in the same generation to generation in the absence of the following conditions: <ul style="list-style-type: none"><li>• Mutation</li><li>• Natural selection</li><li>• Infinite large population</li><li>• All mating is totally random</li><li>• All members of the population breed</li><li>• There is no migration in or out of the population</li><li>• Everyone produces the same number of offspring</li></ul>		R	
276)	<b>Hardy-Weinberg equilibrium equation</b> → $p^2 + 2pq + q^2 = 1$ <ul style="list-style-type: none"><li>• p is frequency of dominant allele</li><li>• q is frequency of recessive allele</li><li>• Here <math>p^2</math> is frequency of dominant allele(AA),</li><li>• <math>2pq</math> is the frequency of the heterozygous(Aa)</li><li>• <math>q^2</math> is the frequency of homozygous (aa) ones.</li></ul>			
277)	When the population size is limited and by chance some alleles increase or decrease in frequency, this is called		Genetic drift	
278)	Unlike natural selection, mutation is randomly and Rarely produce to environment			
279)	Evolution in its modern form was first explored by Charles Darwin in		1859	
280)	Descent in modification means		Evolution	
281)	The evolutionary process by which new biological species arises		Speciation	
282)	The time from which life is originated is some		3.5 billion years ago	
283)	<b>Types of speciation:</b> <b>ETEA-2015</b> <ol style="list-style-type: none"><li>1. Sympatric speciation → rare</li><li>2. Allopatric speciation → most common form</li><li>3. Parapatric speciation → extremely rare</li></ol>			
284)	The speciation phenomenon which occurs through polyploidy, in which an offspring or group of offspring will be produced with twice the		Number of normal chromosomes	
285)	A tetraploid plants can fertilize		Itself and create offspring	
286)	A tetraploid animal to reproduce, it Must find another		Animal of same species	
287)	The speciation which occur which population of species becomes		Geographically isolated	
288)	When the population are separated not by geographical barrier but an extremely change in habitat is called		Parapatric speciation	

# Chap# 25 Man And His Environment Key points

S.No	Questions	Answers
289)	<b>BIOGEOCHEMICAL CYCLES</b>	
290)	The surrounding in which organism live is called	Environment
291)	The thing which man required for his survival and comfort are called	Sources
292)	Maintaining the natural resources of the environment and their careful use is called	Conservation
293)	The flow of chemical elements and compounds between the living organism and the physical environment is called	Biogeochemical cycle
294)	<b>The six elements out of 92 which are critical for the life of living organism are:</b>	
	1. Hydrogen 2. Carbon 3. Nitrogen	4. Oxygen 5. Phosphorus 6. Sulfur
	→ These six constitute 95% mass of all living organisms.	
295)	The substance that cover three-fourths of the earth surface is	Water
296)	The salt water present on earth is	97%
297)	The percentage of fresh water is	3% <b>ETEA-2019</b>
298)	The fresh water present in the form of ice is	66% of total
299)	The water present in solid form is	2%
300)	All the world water which is useful for humans and land animals are	1%
301)	The water present in the form of vapors is	Fresh water
302)	<b>Once the water reaches the ground, one of the two process may occur:</b>	
	1. Some water evaporate back to atmosphere 2. The water may penetrate and may become surface water	
303)	The balance of water that remain on the earth surface is	Runoff
304)	The earth atmosphere almost	80% nitrogen gas
305)	The green plant convert atmospheric nitrogen into	Proteins
306)	Microorganisms break down the proteins and releases	Ammonium ions
307)	The nitrogen cycle is movement of nitrogen between the earth and	Atmosphere
308)	<b>The nitrogen cycle can be broken down into four types of reactions:</b>	
	1. Nitrogen fixation 2. Biological fixation 3. Nitrification 4. Denitrification	
309)	<b>Nitrogen fixation:</b> Nitrogen gas can be fixed by three ways:	
	1. Atmospheric fixation → 5-8% 2. Industrial fixation → 32-35% 3. Biological fixation → 60%	
310)	The process which is used for making nitrogen containing fertilizers	Haber process
311)	The reduction of nitrogen gas to ammonia requires ( $N_2 + 3H_2 \rightarrow 2NH_3$ )	16 molecules of ATP
312)	<b>Types of nitrogen fixing bacteria:</b> <b>ETEA-2013</b>	
	1. Free living	

	<ul style="list-style-type: none"> <li>• <i>Azotobacter</i> → aerobic</li> <li>• <i>Clostridium</i> → anaerobic</li> </ul> <p>2. Symbiotic association</p> <ul style="list-style-type: none"> <li>• <i>Rhizobium</i></li> </ul>	
313)	Rhizobium form symbiotic association with roots of leguminous plants and appear in the form of swelling called	Nodules
314)	Free living rhizome invade the legume through an	Infection thread
315)	Infection thread is formed in the	Root hair of plant
316)	Each root nodule is packed with thousands of living	Rhizobium bacteria
317)	The infection thread is constructed by root cells and not by bacteria and is formed only in response of	Infection
318)	Root nodulated non-legume is a diverse group of woody species such as elder with e.g Frankia. These filamentous bacteria infects the roots of plants forming	Actinorhizal root nodules
319)	<i>Anabaena azollae</i> is a cyanobacteria that infect new leaves of	<i>Azolla</i>
320)	Nitrogen fixing bacteria contain an enzyme called	Nitrogenase
321)	An enzyme that catalyses of nitrogen gas to ammonia	Nitrogenase
322)	Nitrogenase supplies energy from ATP and also provide	Hydrogen
323)	The nitrogenase complex become inactivated when exposed to	Oxygen <b>ETEA-2018</b>
324)	Nitrogenase complex become inactivated when exposes to oxygen while this problem is not present free living bacteria such as	<i>Clostridium</i>
325)	Free living bacteria have a variety of different mechanisms for protecting the nitrogenous complexes such as	High rate of metabolism and physical barriers
326)	Bacteria having highest rate of respiration of any organism, thus maintaining a low level of oxygen in their cells	<i>Azotobacter</i>
327)	Rhizobium contains leghaemoglobin, it work similar to	Haemoglobin
328)	Frankia and Anabaena are able to exclude oxygen by carrying out the fixation in specialized structures respectively as a	Vasicles and a heterocyst
329)	The thick walls of vasicles and heterocyst form an	Oxygen carrying barrier
330)	The oxidation of ammonium compounds to nitrites and then to nitrates by the nitrifying bacteria. This process is called	Nitrification
331)	<b>Nitrification is a two-steps process:</b> <b>ETEA-2014</b> <ul style="list-style-type: none"> <li>• Ammonium → nitrites(<math>\text{NO}_2^-</math>) (by Nitrosomonas bacteria )</li> <li>• Nitrites → nitrates(<math>\text{NO}_3^-</math>) (by Nitrobacter) <b>ETEA-2012</b></li> </ul> → Nitrite is toxic to plant and present in animals while nitrates can be taken by plants.	
332)	The conversion of nitrates into primarily nitrogen gas and nitrous oxide gas by denitrifying bacteria e.g. <i>Pseudomonas</i> . This process is	Denitrification
333)	The conversion of organic form of nitrogen into organic nitrogen	Ammonification
334)	<b>ENERGY FLOW THROUGH AN ECOSYSTEM</b>	
335)	Ammonification process is carried out by	Decomposers
336)	The net energy production at one trophic level is passed on to next level is	10%
337)	The total amount of organic matter that is produced through photosynthesis is called	An ecosystem's gross productivity (GPP)
338)	The amount of energy that remains available from plant growth after	Net primary

BOM SERIES	Page 111	BOM ACADEMY Online & Swat																				
	subtracting the friction that plants uses for respiration is called	production (NPP)																				
339)	Productivity in land ecosystems generally rises with temperature up to about	30°C																				
340)	Due to warm, the land primary productivity is	Highest																				
341)	In contrast, desert scrub ecosystems have the lowest productivity because their climates are	Extremely hot and dry																				
342)	In oceans light penetrate only into the uppermost level of oceans, so photosynthesis occurs in	Surface and near surface water																				
343)	Among aquatic systems, the highest net primary production is that of	Algal buds and coral reefs																				
344)	In contrast to land, the most primary production is carried out by	Vascular plants																				
345)	Most primary production in the oceans is done by	Microscopic algae																				
346)	A graphical representation designed to show the number of organisms, energy relationships and biomass of an ecosystem	Eltonian pyramids or Ecological pyramid																				
347)	<b>There are three types of pyramids:</b> 1. Pyramid of energy → g/m² or C/m² 2. Pyramid of biomass 3. Pyramid of numbers																					
	<table border="1"><thead><tr><th>Levels of organisms</th><th>Pyramid of energy</th><th>Pyramid of biomass</th><th>Pyramid of numbers</th></tr></thead><tbody><tr><td>Third level consumers</td><td>0.1%</td><td>1.5</td><td></td></tr><tr><td>Secondary consumers</td><td>1%</td><td>11</td><td>90,000</td></tr><tr><td>Primary consumers</td><td>10%</td><td>37</td><td>200,000</td></tr><tr><td>Primary producers</td><td>100%</td><td>309</td><td>1,500,000</td></tr></tbody></table>	Levels of organisms	Pyramid of energy	Pyramid of biomass	Pyramid of numbers	Third level consumers	0.1%	1.5		Secondary consumers	1%	11	90,000	Primary consumers	10%	37	200,000	Primary producers	100%	309	1,500,000	
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348)	<b>ECOLOGICAL SUCCESSION</b>																					
349)	A directional, non-seasonal cumulative change in the type of plant species that occupy a given area through time is called	Succession																				
350)	When species composition changes no longer occur with time and this community is said to be	Climax community																				
351)	<b>On the basis of origin, ecological succession may be of following types:</b> <ul style="list-style-type: none"><li>• Primary succession</li><li>• secondary succession</li><li>• Xerach succession</li><li>• Hydrash</li></ul>																					
352)	The lichen colonies on these boulders on the first step in	Xerach succession <b>ETEA-2014-18</b>																				
353)	The term xerose refers to changes in community structure during	Xerach succession																				
354)	<b>A xerosere may include:</b> <ul style="list-style-type: none"><li>• Lithoseres on rocks</li><li>• Psammoseres on sand</li></ul>																					
355)	<b>Stages of lithoseres:</b> <ol style="list-style-type: none"><li>1. Crustose lichen stage</li><li>2. Foliose and fructiose lichen stage</li><li>3. Moss stage</li><li>4. Herb stage</li><li>5. Shrub stage</li><li>6. Tree stage</li></ol>	Since 2016																				

	7. Forest or climax stage	
356)	<b>POPULATION DYNAMICS</b>	
357)	<b>Properties of population include:</b> <ul style="list-style-type: none"> <li>• Population size</li> <li>• Population density</li> <li>• Patterns of dispersion</li> <li>• Demographics</li> <li>• Population growth limits on population growth</li> </ul>	
358)	<b>Three common patterns of population:</b> <ol style="list-style-type: none"> <li>1. Clumped distribution (attraction)</li> <li>2. Uniform distribution (repulsion)</li> <li>3. Random distribution (minimal interaction/influence)</li> </ol>	
359)	The maximum stable population size that a particular environment can support over a relatively long period of time	Carrying capacity
360)	Random spacing occurs in the absence of strong attraction or repulsion among	Individuals of population
361)	The malnourished in all over the world are about	1 to 2 billion
362)	The people that are now hungry and malnourished in china are	80 million
363)	Most of the 99% food supply of the world comes from the	Land
364)	The 1% food supply to world comes from	Ocean and aquatic habits
365)	To form 25 mm of soil under agricultural conditions need	500 years
366)	During one growing season, a hectare of corn will transpire	5 million liters water
367)	The amount of water needed to reach to 1 hectare is	8 million liters
368)	The fresh water which is used by agricultural is	87 %
369)	The disease occur due to lack of clean water in developing countries are about	90 %
370)	The cases of diseases that are contracted from water are	4 billion
371)	The death occurs due to water-borne disease are about	6 million per year
372)	The number of people living in urban areas is doubling every	10 to 20 years
373)	Human and environment are	Inseparable
374)	Nuclear energy is the energy stored in the	Nucleus of atom
375)	The nuclear accident at Chernobyl was the worst nuclear accident to date, spewing about	100 million curies radioactive materials
376)	<b>HUMAN IMPACTS ON ENVIRONMENT</b>	
377)	<b>Sources of carbon dioxide:</b> <ul style="list-style-type: none"> <li>• Fossil fuel combustion</li> <li>• Electricity generation (41 %)</li> <li>• Industry</li> <li>• Residential and commercial</li> <li>• Transportation (2<sup>nd</sup> largest source)</li> <li>• Deforestation</li> <li>• Geological sequestration</li> </ul>	
378)	Permanent removal of standing forest is called	
379)	The rise in average global temperature at the end of next century is	
380)	Acid rain have PH	
381)	<b>Serious environmental sequences causes by acid rain:</b> <ul style="list-style-type: none"> <li>• Increase in the soil acidity</li> <li>• Effects the fertility of soil</li> <li>• Destroys vegetation</li> <li>• Kills the aquatic life</li> <li>• Cause stone cancer, which has corrosive effect on marble structure</li> </ul>	
382)	The ozone layer or stratospheric ozone is a high concentration of ozone molecule on the height from	30-50 kilometers the maximum

383)	Ozone molecules are about 12,000 in	1 Arab of total molecules																				
384)	The oxygen molecule is broken down to oxygen atom, which on combination with oxygen molecule form ozone. This breakdown is	Done by Ultra violet rays of sun																				
385)	The measurement unit defining ozone layer "thickness" is the	Dobson (DU)																				
386)	100 Dobson unit indicate that the ozone layer is	1mm thick																				
387)	3 lac non-melanoma and 4500 melanoma skin cancers worldwide annually caused due to	10 % decrease in ozone																				
388)	16 million people in the world every year suffer from blindness due to	Loss of transparency of lens																				
389)	20% of cataracts may be caused by over exposure to the	UV radiation																				
390)	<b>ENVIRONMENTAL RESOURCES &amp; THEIR DEPLETION</b>																					
391)	<b>Natural resources:</b> ETEA-2010-2011	<table border="1"> <thead> <tr> <th>Renewable sources</th> <th>Non-renewable sources</th> </tr> </thead> <tbody> <tr> <td>Animals</td> <td>Fossil fuels</td> </tr> <tr> <td>Insects</td> <td>Oil</td> </tr> <tr> <td>Reptiles</td> <td>Coal</td> </tr> <tr> <td>Water</td> <td>Copper</td> </tr> <tr> <td>Gross</td> <td>Diamonds</td> </tr> <tr> <td>Solar</td> <td>Natural gas</td> </tr> <tr> <td>Wind energy</td> <td>Iron ore</td> </tr> <tr> <td></td> <td>Minerals</td> </tr> <tr> <td></td> <td>Gold</td> </tr> </tbody> </table>	Renewable sources	Non-renewable sources	Animals	Fossil fuels	Insects	Oil	Reptiles	Coal	Water	Copper	Gross	Diamonds	Solar	Natural gas	Wind energy	Iron ore		Minerals		Gold
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392)	The main cause of source depletion is	Man																				
393)	<b>Causes of source depletion:</b>	<ul style="list-style-type: none"> <li>• Over-consumption</li> <li>• Non-equitable distribution of resources</li> <li>• Over population</li> <li>• Burn agricultural practices</li> <li>• Technological and industrial practices</li> <li>• Erosion</li> <li>• Irrigation</li> <li>• Mining of oil and minerals</li> <li>• Aquifer depilation</li> <li>• Forestry</li> <li>• Pollution or contamination of resources</li> </ul>																				
394)	Tidal power is also called	Lunar energy																				
395)	When the gravitational forces due to the sun and the moon add together, tides of maximum range, called	Spring tides																				
396)	When the two forces opposes each other, tides of minimum range is called	Neap tides																				
397)	Approximately tidal cycles in one year are about	705																				
398)	The outer crust of earth has an average thickness of 32km and below that is	Magma																				
399)	The average increase in temperature with depth of earth is $1^{\circ}\text{C}$ for every	30 to 40 meter depth																				
400)	At depth of 3-4 km in earth	Water boils																				
401)	At depth of 15kms the temperature is in range of	$1000^{\circ}\text{C}$ to $12000^{\circ}\text{C}$																				
402)	<b>Non-conventional energy sources:</b>	<ul style="list-style-type: none"> <li>• Tidal power</li> <li>• Wind power</li> <li>• Geothermal power</li> <li>• Wave power</li> <li>• Solar energy</li> <li>• Magneto Hydro Dynamic(Mhd) generation</li> </ul>																				

# CHAP# 26 Biotechnology Key points

S.No	Questions	Answers
403)	<b>CLONING GENES</b>	
404)	The history of biology is as old as history of	Man
405)	The use of living organism or their processes and products for the welfare of mankind is called	Biotechnology
406)	The act of making copies, or clones, of a single gene is called	Gene cloning
407)	<b>The two possible ways of cloning of genes are</b> <ul style="list-style-type: none"> <li>• Recombinant DNA technology</li> <li>• Polymerase chain reaction (PCR)</li> </ul>	
408)	<b>Components or tools required for Recombinant DNA technology are:</b> NMDCAT-2020 <ul style="list-style-type: none"> <li>• Gene of interest</li> <li>• Molecular scissors</li> <li>• Molecular carrier or vectors</li> <li>• Molecular glue</li> <li>• Expression system</li> </ul>	
409)	<b>The desired gene or gene of interest can be obtained by following three possible ways:</b> <ol style="list-style-type: none"> <li>1. Artificial gene synthesis</li> <li>2. Synthesis from mRNA</li> <li>3. Cleavage from chromosomal DNA</li> </ol>	
410)	Complementary DNA is formed from	mRNA ETEA-2012
411)	Gene of interest is cleaved from chromosomal DNA by	Restriction endonuclease ETEA-2008
412)	<b>Some restriction enzymes are:</b> <ul style="list-style-type: none"> <li>• EcoRI isolated from <i>Escherichia coli</i></li> <li>• Hind II and Hind III from <i>Haemophilus influenza</i></li> <li>• Xhol from <i>Xanthomonas holicola</i></li> </ul>	
413)	The substrates for restriction enzyme are specific sequences of double stranded DNA called	Recognition sites or restriction sites
414)	<b>Restriction enzyme produces one of the three different types of ends:</b> <ul style="list-style-type: none"> <li>• 5' overhangs → Bam H1 cuts in this manner</li> <li>• 3' overhangs → Kpn 1 cuts in this method</li> <li>• Blunts → Sma1 cuts in this way</li> </ul>	
415)	<b>A DNA molecule should possess the following essential characteristics to act as cloning vector:</b> <ul style="list-style-type: none"> <li>• Origin of replication</li> <li>• Selectable markers</li> <li>• Multiple cloning sites (MCS) or polylinker</li> <li>• Small size</li> </ul>	
416)	The most common markers used for the selection are the	Antibiotic resistant genes
417)	If gene is present in bacteria it will show	Resistant to antibiotic
418)	Ampicilline resistant gene is resistant to	Ampicilline antibiotic

BOM SERIES	Page 115	BOM ACADEMY Online & Swat														
419)	All the unique restriction sites are grouped together in small region of a vector known as the	Multiple cloning sites (MCS) or polylinker														
420)	Relatively small vectors are more desirable because they increase the	Transformation efficiency and easy to manipulate <b>ETEA-2017</b>														
421)	<b>Types of cloning vectors are six:</b> <table border="1"> <thead> <tr> <th>Types of vector</th> <th>Insert DNA size in kb</th> </tr> </thead> <tbody> <tr> <td>Plasmid cloning vectors</td> <td>0.5 – 8</td> </tr> <tr> <td>Bacteriophage cloning vectors</td> <td>2.5 – 9</td> </tr> <tr> <td>Cosmid-cloning vectors(combination of plasmid and phage DNA)</td> <td>30 – 45</td> </tr> <tr> <td>Yeast artificial chromosomes</td> <td>250 – 1000</td> </tr> <tr> <td>Bacterial artificial chromosomes</td> <td>50 – 300</td> </tr> <tr> <td>Animal and plant vector (shuttle vector)</td> <td>&gt;1000</td> </tr> </tbody> </table>	Types of vector	Insert DNA size in kb	Plasmid cloning vectors	0.5 – 8	Bacteriophage cloning vectors	2.5 – 9	Cosmid-cloning vectors(combination of plasmid and phage DNA)	30 – 45	Yeast artificial chromosomes	250 – 1000	Bacterial artificial chromosomes	50 – 300	Animal and plant vector (shuttle vector)	>1000	
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422)	The natural bacterial plasmid could be modified to produce new plasmid like	pBR322 <b>ETEA-2016</b>														
423)	The first widely used purpose built plasmid vector is	pBR322														
424)	<b>Useful features of pBR322:</b> <ul style="list-style-type: none"> <li>Origin of replication → pMBI fragment which is origin of replication</li> <li>Size → 4,363bp</li> <li>Copy number → 15 copies per cell</li> <li>Selectable marker → two antibiotic resistant genes(ampicillin and tetracycline)</li> <li>Cloning sites</li> </ul>															
425)	There is room in pBR322 for an insert of at least	6 kbp														
426)	On pBR322, sites for Pse I, Pvu I and Sac I are found on	Ampicillin <b>ETEA-2010</b>														
427)	On pBR322, sites for Bam HI and Bam HIII are found on	tetracycline														
428)	Cloning in one of the cloning sites inactivate the gene allowing recombinants to be differentiated from non-recombinants known as	Insertional inactivation														
429)	DNA ligase is responsible for the phosphodiester linkage between two adjacent nucleotides and thus join two double stranded DNA fragment, therefore it is also called	Molecular glue <b>NMDCAT-2020</b>														
430)	A suitable organism that can act as host for the recombinant vector to express is called	Expression system														
431)	The ideal expression system is	Bacteria														
432)	<b>PROCEDURE OF RECOMBINANT DNA TECHNOLOGY</b>															
433)	<b>Procedure of recombinant DNA technology:</b> <ul style="list-style-type: none"> <li>Formation of Recombinant DNA <ul style="list-style-type: none"> <li>➢ Digest vector to make it linear by endonuclease enzyme</li> <li>➢ Isolate the DNA fragment by endonuclease enzyme</li> <li>➢ Both DNA are bonded by DNA ligase. <b>NMDCAT-2020</b> This results recombinant DNA molecule of vector and gene of interest.</li> </ul> </li> <li>Transformation of expression system <ul style="list-style-type: none"> <li>➢ Put bacterial cells and recombinant plasmids into the same medium</li> <li>• Identification of transformed clone <ul style="list-style-type: none"> <li>➢ If resistant is shown to antibiotic it means that gene is inserted and live.</li> </ul> </li> </ul> </li> </ul>															
434)	Bacterial cells take up the recombinant plasmid, if they are treated with the	Calcium chloride														
435)	If resistant is not shown to antibiotic by recombinant DNA, then it	Gene is not cloned														

	means that	
436)	<b>POLYMERASE CHAIN REACTION (PCR)</b>	
437)	A technique by which we can generate thousand to millions of copies from single or few copies of piece of DNA is called	Polymerase chain reaction (PCR) <b>NMDCAT-2020</b>
438)	Polymerase chain reaction was invented by Kary Mullis in 1983 and he was awarded by noble prize in	1993
439)	Polymerase chain reaction (PCR) is based upon <i>in vitro</i> replication process by which it is carried out by	DNA polymerase enzyme
440)	<b>Components of Polymerase chain reaction (PCR): NMDCAT-2020</b> <ul style="list-style-type: none"> <li>• Template DNA</li> <li>• Deoxyribo-nucleoside tri-phosphates (dNTPs)</li> <li>• Primers</li> <li>• <i>Taq</i> polymerase</li> </ul>	R
441)	The piece of DNA to be amplified or to be cloned is called	Template DNA
442)	Deoxyribo-nucleoside tri-phosphates (dNTPs): these are free nucleosides that act as raw material for synthesis of new DNA fragments. <b>There are four different type of DNTPs:</b> • dATP      • dGTP      • dCTP      • dTTP	
443)	Temperature-tolerant enzyme isolated from <i>thermos aquaticus</i> is called	<i>Taq</i> polymerase
444)	The PCR mixture is placed in an instrument called	Thermal cycler/reaction mixture
445)	<b>Mechanism of PCR reaction: ETEA-2017-18</b> <ul style="list-style-type: none"> <li>• Denaturation (94°C for 1-5 min)</li> <li>• Primer annealing (54°C for 2 min)</li> <li>• Extension or polymerization (72°C for 1 min)</li> </ul>	
446)	Technique used for detection of specific infectious agents e.g. HBC, HIV,HCV is	Polymerize chain reaction
447)	There is PCR-based cDNA synthesis know as	RT-PCR (reverse transcriptase PCR)
448)	PCR has also shown its impact in	Criminology
449)	<b>GENOMIC LIBRARY</b>	
450)	A collection of bacterial or bacteriophages clones, each contains at least one copy of every DNA sequence in a genome of an organism is called	Genomic library
451)	<b>To construct a genomic library, the genomic DNA of the organism is extracted and is cut into fragments of suitable sizes by any of the following three methods:</b> <ul style="list-style-type: none"> <li>• Restriction enzymes.</li> <li>• Un-enzymatically by means of mechanical shearing such as sonication</li> <li>• Partial enzymatic digestion with a restriction enzyme.</li> </ul>	ETEA-2012
452)	A small, fluorescently or radioactively labeled DNA molecule that is used to locate similar or complementary sequences among a long stretch of DNA molecule or bacterial colonies such as genomic or cDNA or in a genome is called	A DNA probe <b>ETEA-2010-2017</b>
453)	<b>DNA SEQUENCE</b>	
454)	<b>The main principle of any DNA sequencing method is:</b> <ul style="list-style-type: none"> <li>• To generate piece of DNA of different sizes all starting from the same point and ending at different points.</li> <li>• Separation of these different sizes pieces of DNA by gel electrophoresis</li> <li>• Reading of the sequences from the gel</li> </ul>	

455)	For generation of different size DNA fragments, the two different sequencing methods are: 1. Sanger method 2. Maxam-Gilbert method	
456)	The widely used method and similar to the natural process of DNA replication is	Sanger method
457)	Fredrich Sanger along with Andrew Coulson was awarded in 1977 by	Noble Prize
458)	Sanger method is now become standard method because of its	Practicality
459)	The key of sanger method is that all the reactions start from same nucleotide and end with	Specific base
460)	In sanger method, bands of all different lengths are	Produced
461)	The contents of each of the four tubes are run in separate plates on a polyacrylamide in order to separate	Different size bands from one another
462)	<p><b>Prepare four reaction mixtures</b></p> <p>5' C T G A C T T C G A C T T A 3'</p> <p>Single-stranded DNA with unknown sequence (blue) serves as a template</p> <p>+ DNA polymerase</p> <p>+ dATP, dCTP, dTTP, and dGTP</p> <p>+ Radioactively labeled primer</p> <p>DNA synthesis</p> <p>Gel electrophoresis followed by autoradiography</p> <p>ddATP ddCTP ddTTP ddGTP</p> <p>Read sequence of new strand and deduce sequence of template</p> <p>Longer fragments</p> <p>Reaction products</p> <p>Shorter fragments</p>	
463)	A technique used in molecular biology to separate charge bearing polymers under influence of magnetic field is called	Gel electrophoresis
464)	DNA electrophoresis is used to separate DNA fragments primarily by	Size
465)	The types of gel most commonly used to separate electrophoresis are; : ETEA-2014	
	<ul style="list-style-type: none"> <li>• Agarose → for relatively large DNA molecules</li> <li>• Polyacrylamide → for high resolution of short DNA fragments</li> </ul>	
466)	At one end of the gel some partial holes are made which are called	Wells
467)	In Gel electrophoresis, the DNA fragments migrate relative to its	Size
468)	Distance a DNA travelled is inversely proportional to its	Length

469)	Smaller fragments move faster through the gel matrix than	Larger matrix
470)	<b>Although the movement of fragments also depends upon:</b> <ul style="list-style-type: none"> <li>• Charges</li> <li>• Number of strands (single or double)</li> <li>• Shape of molecules (linear or circular)</li> <li>• Concentration of the gel (pore size)</li> </ul>	
471)	Bands cannot be viewed until they are labeled with	Florescent dyes or radioactive probes
472)	There is no need for radiolabeling and auto radiography in	Automated DNA sequencing
473)	In 1975-1977, Allan Maxam and Walter Gilbert developed a DNA sequencing method which is also called as	Chemical cleavage method
474)	The DNA to be sequenced is end labeled by kinase treatment with	32P ATP
475)	Dimethylsulphoxide (DMSO) is then added and the labeled DNA samples are heated with	90°C
476)	The two strand of DNA are separated from one another by	Gel electrophoresis
477)	One strand is purified and divided into four samples which are treated with Cleavage reagent and	Modifying chemical reagent
478)	<b>The four samples taken from one strand are: G, A+G, T+C , C</b>	
479)	<b>DNA ANALYSIS</b>	
480)	DNA analysis and DNA fingerprinting is an examination method that emerged in the 1980s and is credited to	Alec Jeffrey
481)	Each species has a unique	Genetic sequences
482)	A process by which we can identify any type of organism by analyzing its genetic sequences is	DNA analysis
483)	<b>The first method used in DNA analysis is Restriction fragment length polymorphism (RELP). Key steps to make DNA by this process are:</b> <ul style="list-style-type: none"> <li>• Collection of DNA samples</li> <li>• Placement of RELP</li> <li>• Separation of RELPs</li> <li>• Southern blotting</li> <li>• Autoradiography</li> </ul>	
484)	RELP refers to the different size fragments of DNA produced by a	Restriction enzymes
485)	Every person has a unique set of	RELPs
486)	Restriction site of particular enzyme is always different in Numbers and distribution in all humans except the	Monozygotic (identical) twins
487)	In nucleotide sequences of genome, entire human have	99% similarity
488)	1% difference in genome sequences that establishes the individuality	Of every person <b>ETEA-2017</b>
489)	A method which routinely used in molecular biology for the detection of a specific DNA sequences in DNA samples is called	Southern Blot
490)	Subsequent fragment detection is done by	Probe hybridization
491)	The banding pattern, which was originally obtained in the gel due to the separation of the RELPs, is now developed on the	X-ray film
<b>Application of DNA analysis to:</b>		
492)	Identify crime	
493)	Identify relations	
494)	Identify bacteria	
495)	Match organ donor	

496)	Identify potential suspects	
497)	Determine pedigree for seed or livestock breeds	
498)	Identify endangered and protected species	
499)	<b>GENOME MAPS</b>	
500)	The collection of all genes present in one complete set of chromosomes is called	Genome
501)	<b>In his marvelous book, Genome, Matt Ridley wrote that (→ means "is like a"):</b> <b>ETEA-2012</b>	
	<ul style="list-style-type: none"> <li>• Human → Book</li> <li>• Chromosomes → Chapters(23)</li> <li>• Genes → Several thousand stories</li> <li>• Exons → Paragraphs</li> <li>• Introns → Advertisement</li> <li>• Codons → Words</li> <li>• Bases → Letters (A,G,C,T)</li> </ul>	
502)	<b>Commonly used DNA markers:</b>	
	<ul style="list-style-type: none"> <li>• RELPs → Restriction fragment length polymorphisms</li> <li>• VNTRs → variable number of tandem repeat polymorphism</li> <li>• SNPs → single nucleotide polymorphism</li> <li>• Microsatellite polymorphism</li> </ul>	
503)	The branch which deals with the exploration and analysis of complete DNA sequence of an organism's genome is called	Genomic
504)	The first director of Human Genome Project(HGP) was	James D. Watson
505)	The time of completion of project, the director of HGP was	Dr. Francis Collin
506)	<b>Major goals of Human Genome Project(HGP) was:</b>	
	<ul style="list-style-type: none"> <li>• To identify 20,000 to 25000 genes of humans</li> <li>• To identify 3 billion chemical bases pairs of human DNA</li> <li>• Improve tools of data analysis</li> <li>• Address the Ethical, legal, and social issues (ELSI) that may arise from the project.</li> </ul>	
507)	<b>Benefits of Human Genome Project (HGP):</b>	
	<ol style="list-style-type: none"> <li>1. <b>In molecular medicine</b> <ul style="list-style-type: none"> <li>• Improve diagnosis of disease</li> <li>• Earlier detection of genetic predisposition to disease</li> <li>• Rational drug design</li> <li>• Gene therapy</li> <li>• Control system for drugs</li> <li>• Custom drugs</li> </ul> </li> <li>2. <b>In Bioarchaeology, Anthropology, Evolution and human migration</b> <ul style="list-style-type: none"> <li>• Study evolution through germ line mutations in lineages</li> <li>• Study migration of different population groups based on female genetic inheritance</li> <li>• Study mutations on the Y chromosomes to trace lineage and migration of males</li> <li>• Compare breakpoints in the evolution of mutations with ages of populations and historical events.</li> </ul> </li> </ol>	
508)	<b>TISSUE CULTURE</b>	
509)	The propagation of plant part or single cell or group of cells in a test tube under very controlled and hygienic conditions is called	Tissue culture
510)	The generic term used for both organ culture and cell culture is	Tissue culture
511)	The initial plant part which is used to develop tissue culture is called	Explant
512)	<b>On the basis of explant tissue culture is variously called as Cell culture and Organ culture</b>	

513)	<b>Procedure of tissue culture:</b> <b>ETEA-2016</b>	<ul style="list-style-type: none"> <li>• Sterilization</li> <li>• Media preparation</li> <li>• Inoculation</li> <li>• Development of callus</li> <li>• Development of plantlets</li> </ul>	
514)	Tissue culture is performed under	Aseptic conditions	
515)	The placement of explant onto the surface of solid culture medium	Inoculation	
516)	Explant is allowed to grow into and unorganized mass of cells called	Callus	
517)	A callus is formed when auxin and cytokinin are in	Balance <b>ETEA-2017</b>	
518)	<b>Types of tissue culture:</b>	<ul style="list-style-type: none"> <li>• Callus culture              • Cell suspension culture              • Protoplast culture</li> <li>• Meristem culture            • Anther culture</li> </ul>	
519)	Any plant tissue can be used as an explant in	Callus culture	
520)	The cell suspension culture produce the same chemicals as the	Entire plant	
521)	<b>Cell suspension culture of:</b> <b>ETEA-2014</b>	<ul style="list-style-type: none"> <li>• Cinchona ledgeriana produce Quinone              • Digitalis lanata produce digitoxin</li> </ul>	
522)	Protoplast are plant cells with the	Cell wall removed	
523)	Protoplast are most commonly isolated from either leaf mesophyll or	Cell suspensions	
524)	The synthesis of embryo that are developed from somatic cells	Somatic embryogenesis	
525)	Protoplast culture can be used to develop whole plants by organogenesis or	Somatic embryogenesis	
526)	The variation which are induced in somatic embryos by exposing it to chemical or physical mutagens	Somaclonal variations	
527)	The rapid dividing and growing tissues, especially found at the apices of roots and shoots in other part of some plants is called	Meristems tissues	
528)	A tissue culture in which meristems are used as explants is called	Meristem culture	
529)	For micropropagation and to obtain virus or bacteria free plant we use	Meristem culture	
530)	If plant is infected, the meristem are not affected because it	Lake vascular tissues <b>ETEA-2012</b>	
531)	Anther culture is also called as microspore culture or	Pollen culture	
532)	A technique in which anther or microspores are cultured in a suitable medium to give rise to haploid callus by division and grown finally into haploid plant	Anther culture	
533)	A diploid plant can also be obtained if chromosomal doubling is induced by the	Colchicine treatment	
534)	A cell culture which is initiated by the cells removed from an animal's organ is called as	Primary cell culture	
535)	Primary culture is subcultured in fresh media to establish	Secondary cultures	
536)	The culture of native tissues that retains most of the in vivo histological features is regarded as	Organ culture	
537)	The culturing of the cells for their reaggregation to form tissue like structure represents	Histotypic culture	
538)	Culture technique that involves the recombination of different cell types to form a more defined tissue or an organ is known as	Organotypic culture	
539)	<b>In animal cell culture the incubators are used to maintain:</b>	<ul style="list-style-type: none"> <li>• Oxygen              • Carbon dioxide              • Temperature              • Humidity</li> <li>• Media with vitamins, amino acids and fetal calf serum</li> </ul>	

540)	<b>Synthetic media are of two types</b> Serum containing media <b>and</b> Serum-free media	
541)	<b>Applications of animal cell culture:</b> <ul style="list-style-type: none"> <li>● Production of antiviral vaccine</li> <li>● Chromosomes analysis</li> <li>● Use of artificial skin</li> <li>● Production of monoclonal antibodies required cell lines in culture</li> <li>● Production of pharmaceutical drugs using cell lines</li> <li>● Study of effect of toxin and pollutant using cell line</li> <li>● Study the function of the nerve cell</li> </ul>	
542)	<b>TRANSGENIC ORGANISM</b>	
543)	Combining genes from different organisms is known as	Recombinant DNA technology <b>NMDCAT-2020</b>
544)	<b>The resulting organism of recombinant DNA technology is termed as:</b> <b>ETEA-2011-2013</b>	<ul style="list-style-type: none"> <li>● Genetically modified (GM)</li> <li>● Genetically engineered (GE)</li> <li>● Transgenic</li> </ul>
545)	Free living organism in the environment that have had a foreign gene inserted into them are called	Transgenic organism <b>NMDCAT-2020</b> <b>ETEA-2014</b>
546)	The first transgenic organism is	Bacteria (1973) <b>ETEA-2010</b>
547)	Herbert Boyer(1978) inserted human insulin gene to <i>E.coli</i> to produce	Synthetic human insulin
548)	<b>Genetically modified bacteria are used to produce:</b> <ul style="list-style-type: none"> <li>● The protein insulin to treat diabetes</li> <li>● Clotting factors to produce haemophilia</li> <li>● Growth hormone to treat dwarfism</li> <li>● Tissue plasminogen activator (tPA) to treat thrombotic disorders</li> <li>● Interferon for treating viral infections</li> </ul>	
549)	Modifying <i>P. syringae</i> may have unexpected consequences for	Climate
550)	Ice nucleating proteins may play an important part in causing	Ice crystal to form in cloud
551)	The main issue regarding genetically engineered bacteria is that	New pathogen may created
552)	The first field trials of genetically engineered plants occurred in	France and USA in 1986 <b>ETEA-2016</b>
553)	→ as per estimates recorded in 2002, transgenic crop was cultivated world-wide on about 148 million acres 587 million hectares land by about 5.5 million farmers.	
554)	→ the first gene available for genetic engineering of crop plants for pest resistance were Cry genes (popularly known as Bt genes) from a bacterium <i>Bacillus Thuringiensis</i> .	
555)	<b>Some of the commercially transgenic plants in developed countries are:</b> <ul style="list-style-type: none"> <li>● Roundup ready → soyabean</li> <li>● Freedon II squash</li> <li>● High-lauric → represeed (canola)</li> <li>● Flavr Savr</li> <li>● Endless summer → tomatoes</li> </ul>	
556)	The Dolly sheep was produced in	July 2002 <b>ETEA-2011</b>
557)	Animal which carries a foreign gene that has been deliberately inserted into its gene is called	Transgenic animals
558)	<b>Transgenic animals have the potential to improve human welfare in:</b> <b>NMDCAT-2020</b> Agricultural , Medicine, Industry	
559)	The model animal used in the field of transgenic is	Mice <b>ETEA-2006</b>
560)	<b>The three principal methods used for the creation of transgenic animals are:</b> <ul style="list-style-type: none"> <li>● DNA microinjection</li> </ul>	

	<ul style="list-style-type: none"> <li>• Embryonic stem cell-mediated gene transfer</li> <li>• Retrovirus mediated gene transfer</li> </ul>	
561)	<b>BIOTECHNOLOGY AND HUMAN WELFARE</b>	
562)	<b>Biotechnology is used in three different ways in the development of vaccine:</b>	
	<ul style="list-style-type: none"> <li>• Separation of a pure antigen using a specific monoclonal antibody</li> <li>• Synthesis of an antigen with the help of a cloned gene</li> <li>• Synthesis of peptides to be used as vaccines.</li> </ul>	
563)	The response of immune system to any antigen, even the simplest is	Polyclonal
564)	Monoclonal antibodies (mAB) are a group of identical antibodies because they are made by	Identical immune cells
565)	Monoclonal antibodies are typically made by fusing myeloma cells (cancerous B-lymphocytes) with the spleen cells from a mouse that has been immunized with the desired antigen. This technique is	Called somatic cell hybridization
566)	The disease caused by protozoa and helminthes are diagnosed by	Monoclonal antibodies and DNA probes
567)	A technique for correcting defective genes responsible for disease development is called	Gene therapy

**Researches may use one of several approaches for correcting faulty genes:**

568)	Normal gene insertion for replacement of abnormal gene	
569)	Abnormal gene can be swapped by homologous recombination.	
570)	Repair the abnormal gene by selective reverse mutation	
571)	Regulation of particular gene could be altered	
572)	The most common vector for gene therapy is	Virus
573)	The generation of a functional protein product from the therapeutic gene restores the target cell to	Normal state
574)	An inherited disease that affect mucus and sweat glands is	Cystic fibrosis (CF)
575)	The cause of Cystic fibrosis (CF) is Cystic fibrosis transmembrane conductance regulator (CFTR) gene that encodes a protein which	Controlled water and salt movement of cells
576)	The cure of Cystic fibrosis (CF) is Gene therapy of	Cystic fibrosis
577)	The science of applied biological processes is	Biotechnology
578)	The result of marriage of biological science with technology is	Biotechnology
579)	<b>SCOPE AND IMPORTANCE OF BIOTECHNOLOGY</b>	
580)	The result of marriage of microchips business technology is	Biochip
581)	The size of microchip is about size of uncooked grain of	Rice
582)	The symbiotic association between fungi and roots of higher plants is	Mycorrhiza
583)	Biologically fixed nitrogen consumes about 25-30% less energy than normally by chemical process, and this is called	Biofertilizers
584)	The study and manipulation of material between 1-100 nanometers is called	Nanotechnology

**Students of biotechnology after completing their studies can have scope in following fields:**

<ul style="list-style-type: none"> <li>• Communication/media</li> <li>• Computer science</li> <li>• Pharmaceutical companies</li> <li>• Engineering</li> <li>• Research</li> </ul>	<ul style="list-style-type: none"> <li>• Diagnostic laboratories</li> <li>• Waste management</li> <li>• Medicine</li> <li>• Bio power plants</li> </ul>	<ul style="list-style-type: none"> <li>• Bio-processing industry</li> <li>• Agricultural and animal husbandry</li> <li>• Legal field</li> <li>• Military</li> <li>• Crime and law</li> </ul>
585)	Never to produce microbial or other biological agents or toxins, whatever may be their method of production, for use in wars	Biological weapon conventions of 1972
586)	<b>Intellectual property includes:</b>	

	<ul style="list-style-type: none"> <li>• Patents</li> <li>• Trade secrets</li> <li>• Copyrights</li> <li>• Trademarks</li> </ul>
587)	The collective term applied to a number of different types of legal rights granted by each country Intellectual property rights (IPR)

# Chapter 27 Biology And Human Welfare Key points

S.No	Questions	Answers
588)	<b>INTEGRATED DISEASE MANAGEMENT</b>	
589)	The people living on the planet earth are	7 billion
590)	<b>In integrated disease management, every available method of disease control is used like</b>	<ul style="list-style-type: none"> <li>• Preventive measures</li> <li>• Drug treatment</li> <li>• Vaccination</li> <li>• therapies</li> </ul>
591)	<b>VACCINATION</b>	
592)	The administration of vaccine to stimulate the immune system of an individual to develop artificially induced active immunity against an infectious diseases is called	Vaccination
593)	The first scientist who developed vaccine against small pox in 1796	Edward Jenner <b>ETEA-2016</b>
594)	Edward Jenner inserted liquid of cowpox and inserted it to the boy of age 8 years and named James Philip, the boy	Did not suffer from disease
595)	The bacteria which inserted by Louis Pasteur to chicken which develop immunity against the disease instead of causing the disease was	Fowl cholera
596)	The word vaccine is derived from Latin word "vacca" which means	Cow
597)	<b>Vaccine</b>	<b>Characteristics</b>
598)	Live, attenuated vaccine	Good "teachers" of immunity system
599)	Inactivated or killed vaccine	More stable and safe but weaker than live vaccines.
600)	Subunit vaccine	Lower adverse reactions <b>ETEA-2017</b>
601)	Toxoid vaccine	Used for disease which is mainly caused by bacterial toxin.

**Types of vaccines:** **ETEA-2011**

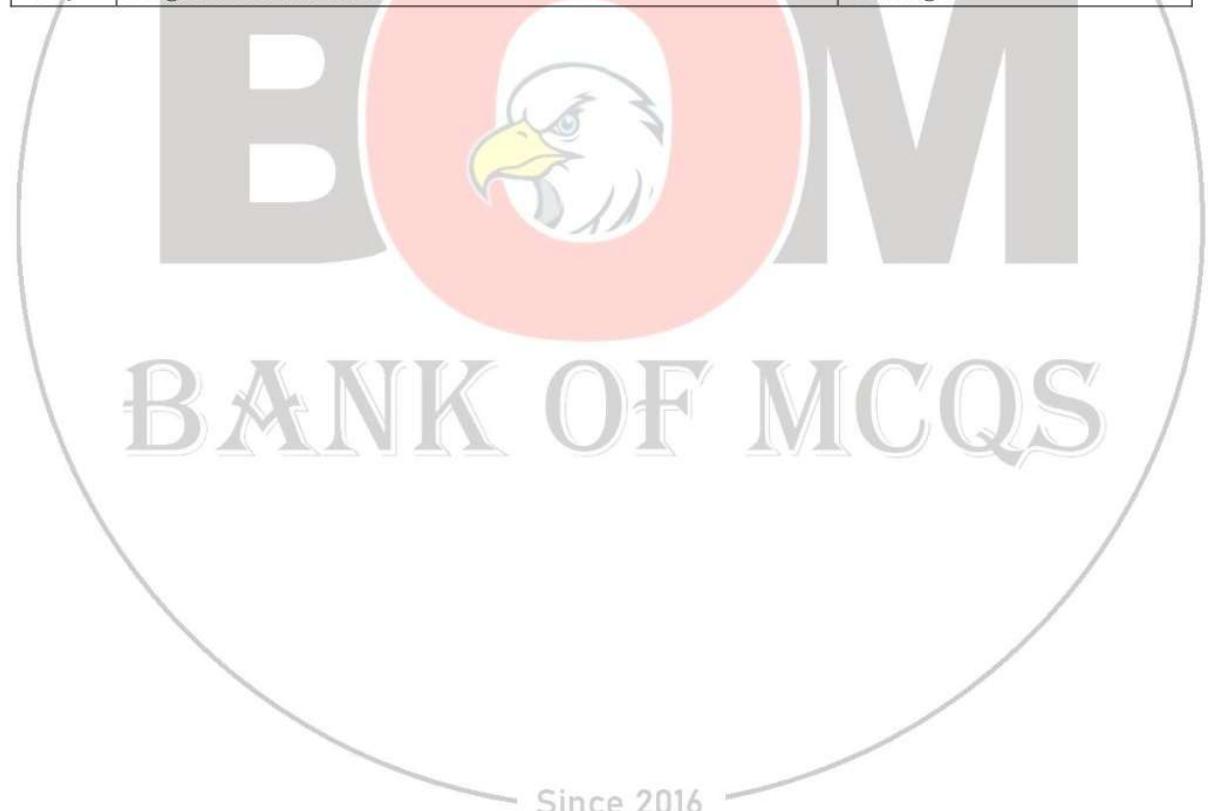
602)	Vaccine	Examples of vaccines used for
603)	Live, attenuated vaccine	Yellow fever, measles, rubella, mumps, bacterial disease typhoid
604)	Inactivated or killed vaccine	Influenza, cholera, bubonic plague, polio, hepatitis A, Rabies
605)	Subunit vaccine	Hepatitis B
606)	Toxoid vaccine	Diphtheria and tetanus <b>ETEA-2019</b>
607)	A vaccine that contains a version of the living microbe that has been weakened in the lab so it can't cause disease	Live, attenuated vaccine
608)	By killing the disease causing microbe with heat, chemicals or	Inactivated or killed

	radiation, such vaccines are more stable and safer and are called	vaccines		
609)	Instead of entire microbe, subunit vaccines include only the antigens that best stimulates the immune system, this vaccines are called	Subunit vaccines		
610)	For bacteria that produces toxins or harmful chemicals, the vaccine use for it is	Toxoid vaccines		
611)	A detoxified toxins are called	Toxoids		
612)	Toxins can be inactivated by treating them with	Formalin		
613)	A solution of formaldehyde and sterilized water is called	Formalin		
614)	<b>SCHEDULE OF VACCINES AGAINST COMMON DISEASE:</b>			
615)	<b>Schedule of vaccines against common disease: ETEA-2011-2016</b>			
	<b>Disease</b>	<b>Vaccine</b>	<b>Type</b>	<b>Age group</b>
	Polio	OPV (Oral Polio Vaccine)	Live	Birth- 5 years
	Tuberculosis	BCG (Bacillus Calmette Geurin)	Live	At birth
	Typhoid	Typhoid vaccine TAB vaccine (Typhoid Paratyphoid A and Partyphoid B)	Kill	2 years of age
	Hepatitis	Hepatitis B vaccine	Subunit	Any age
	Diphtheria & tetanus	Diphtheria toxoid vaccine Tetanus toxoid vaccine	Toxoid	childhood
616)	<b>ANIMAL HUSBANDRY</b>			
617)	The branch of science which deals with the study of various breeds of domesticated animals and their management for obtaining better product and services is known as	Animal husbandry		
618)	The term husbandry is derived from the word "husband" which means	One who take care		
619)	The study of proper utilization of economically important domestic animals, it is called	Livestock management		
620)	The people of Pakistan who are engaged in livestock are	30-35 million		
621)	<b>Different categories of animals or livestock:</b>			
	<b>Type</b>	<b>Characters</b>	<b>Examples</b>	
	Wild	Breed better when free No common use for humans	Lion, tiger	
	Tamed	Caught from wild and are trained to useful for humans	Elephant, chimpanzee, gorilla, Yak	
	Domesticated	Use at home and are easily look after by humans	Dog, horse, cow, sheep, buffalo, fowl	
622)	<b>Importance of domestic animals :</b>			
	<b>Type</b>	<b>Example</b>		
	Milk yielding animals	Cattle, buffalo, goat, sheep		
	Draught animal s	Horse, donkey, mule, camel , yak, buffalo		
	Fibre, hide and skin yielding animals	Sheep, goat, buffalo, camel		
	Meat and egg yielding animals	Fowl, duck, goat, buffalo		
623)	The first animal domesticated by man for agricultural use are	Cattle <b>ETEA-2010</b>		
624)	<b>Milk and meat yielding animals :</b>			
	<ul style="list-style-type: none"> <li>• Male → labour, meat and hide</li> <li>• Females→ milk(ghee, curd, butter and cheese)</li> </ul>			

625)	Milk drawn from animals are known as	Full cream milk
626)	When cream is separated from the milk, the remaining milk is called	Toned milk
627)	The milk containing no fat is called	Skimmed milk
628)	<b>On the basis of fat contents the various milk products are as follow:</b> <ul style="list-style-type: none"> <li>• Cream → 10-70% fat content</li> <li>• Curd → made from milk by bacterial activities</li> <li>• Butter milk → left over milk after removal of butter</li> <li>• Ghee → produced by heating butter (100% fat content)</li> <li>• Condensed milk → produced by removing water from milk(31% milk and 9% fat)</li> <li>• Powdered milk → powder form of milk</li> <li>• Cheese → coagulated milk protein-casein with fat and water</li> <li>• Khoya → by water evaporation and by reducing bulk to 70-75%</li> </ul>	
629)	Draught animals are animals need for	Carrying load
630)	Rearing and keeping of birds such as fowl, duck and hen for egg and meat is called	Poultry farming
631)	In the era of animal husbandry, the silver revolution is brought by	Increase in production of eggs
632)	The collection of semen from a healthy bull of desired breed, its storage at low temperature and introduction to the females of cattle of other breeds for bringing about fertilization is called	Artificial insemination
633)	<b>Advantages of artificial insemination are:</b> <ul style="list-style-type: none"> <li>• 3000 females can be fertilized from semen of one bull</li> <li>• Semen can be stored</li> <li>• High success rate of fertilization</li> </ul>	
634)	The method of embryo transplant are quite successful in	Sheep and goat
635)	Out of artificial insemination and embryo transplant, the most successful is	Artificial insemination
636)	<b>LATEST TECHNIQUES USED FOR PLANTS</b>	
637)	<b>Techniques is used for plants to get:</b> <ul style="list-style-type: none"> <li>• Increased quality of crop</li> <li>• Increased quantity of crop</li> <li>• Increase tolerance of plant to environmental pressures</li> <li>• Increase resistivity to viruses, fungi and bacteria</li> <li>• Increase tolerance to pests</li> <li>• Increases tolerance to herbicides</li> </ul>	
638)	<b>The classical techniques for plants:</b> <ul style="list-style-type: none"> <li>• Protoplast fusion</li> <li>• Embryo rescue</li> <li>• Mutagenesis</li> </ul> <b>Some of the modern techniques for plants are:</b> <ul style="list-style-type: none"> <li>• Acclimatization</li> <li>• Selective breeding</li> <li>• Hybridization</li> <li>• Genetic engineering</li> </ul>	
639)	The process of an individual organism adjusting to a gradual change in its environment allowing it to maintain performance across a range of environmental conditions are called	Acclimatization
640)	Acclimatization occurs in small period of time	From days to weeks

641)	In response to change in temperature, organisms can change the biochemistry of cell membrane making them <ul style="list-style-type: none"> <li>• More fluid in cold temperature</li> <li>• Less fluid in warm temperature</li> </ul> By using number of membrane proteins.	
642)	Protein that assists non-covalent folding are called	Chaperons
643)	The specific proteins which help the cell to maintain function under periods of extreme stress are called	Heat shock proteins
644)	Many plants such as maple trees, tomato plants and irises can survive if temperature gradually drops low and low an if drop occur suddenly	It may kill the plants
645)	The art and science of changing the genetics of plants in order to produce desired characteristics, this process is called	Selective breeding
646)	Classical plant breeding uses deliberate interbreeding (crossing) of closely or distantly related individuals to produce new crop varieties or lines with desirable properties, this process is called	Hybridization and backcrossing
647)	By hybridization, by crossing mildew-resistant pea may be crosses with high-yielding to get	Mildew with high resistant pea
648)	Insect resistance is achieved through incorporation of a gene from	<i>Bacillus thuringiensis</i>
649)	The enzyme that the herbicide inhibits are known as the	Herbicides target sites
650)	<b>ROLES OF MICROBES IN HUMAN WELFARE</b>	
651)	Lactose are present in milk which are converted into lactic acid by: <ul style="list-style-type: none"> <li>• <i>Streptococcus salivarius</i></li> <li>• <i>S. thermophiles</i></li> <li>• <i>Lactobacillus bulgaricus</i></li> </ul> These bacteria are collectively known as lactic acid bacteria or LAB	
652)	The solid part of milk produced by coagulation is known as curd and the liquid is known as	Whey
653)	Coagulation can be controlled by using	Rennet tablets
654)	The rennet tablets contain an enzyme called	Renin
655)	The conversion of sugar to ethanol and carbon dioxide is known as	Alcoholic fermentation
656)	<b>Depending on the type of sugar, different types of alcohol can be made:</b> <ul style="list-style-type: none"> <li>• Beer is prepared by fermentation of maltose by yeast</li> <li>• Wine is made from the fermentation of grape sugar by yeast</li> </ul>	
657)	Beer is brewed from barely grain, which is partially germinated to convert starch into maltose, this process is called	Malting
658)	To speed up the process of germination and to increase the germination and to increase the amount of sugar to produce more alcohol, we use	Gibberellins and amylase
659)	The liquid obtained from crushing of grain and by adding water to it	Wort
660)	Next to wort is fermented by the yeast to produce	Alcohol
661)	Insulin is commercially produced by	Transgenic <i>E.coli</i>
662)	The two main <b>advantages of preparing insulin</b> by recombinant DNA technology as:	

	1. It is chemical identical to human insulin 2. We can get it in unlimited quantities	
663)	Penicillin is obtained from	<i>Penicillium</i> fungi
664)	Cyclosporine is produced from	<i>Trichoderman polysporum</i> fungus
665)	Lovastatin is produced by the yeast	<i>Monascus purpureas</i>
666)	Penicillin is not produced during	Active growth
667)	The blood cholesterol lowering agent is	Lovastatin
668)	An immune suppressive agent used in organ transplant patients is	Cyclosporine
669)	Biogas is 50-75% methane and the rest are	Carbon dioxide + other gases <b>ETEA-2018</b> R
670)	The bacteria used for the production of methane from carbon and hydrogen is	Methanogens
671)	The solid waste that is taken out from the settling tanks at various stage in sewage treatment plants is called	Activated sludge
672)	The bacteria which help in the breakdown of cellulose is	Methanobacteria
673)	Biogas is also known as	Gobar gas



# BANK OF MCQS

Since 2016

# All Biology Numerical Data

## Cell Structure and Functions

1) Resolution of light microscope	250 nm
2) Resolution of eye	500X
3) Human eye can differentiate	1.0 mm
4) Light microscope magnification	10,000 times
5) TEM magnification	1 million
6) SCM	3D image
7) Centrifugation	G→800,20k,100k,150 T→10,15,60,3hour
8) Freezer	-20 degree
9) Thickness of middle, primary and secondary	1,1-3,5-10 (micrometer)
10) Robert hook discover cell wall in	1665
11) Plasma membrane lipid	20-40%
12) Plasma membrane proteins	60-80%
13) Gorter and Grendel → two layers of lipids	1925
14) Dinelle and devon → lipid bilayer covered with proteins and pores	1935
15) Reoberston → unit membrane model	1959
16) Singer and nicholson→ fluid mosaic model	1972
17) Plasma membrane wideness	7 nm
18) Water in cytoplasm	90%
19) Ribosome diameter	20nm
20) Palade discovered ribosomes in	1955
21) Prokaryotic ribosomes	70S
22) Eukaryotic ribosome	80Sv
23) 70S ribosome made of	30 and 50
24) 80S ribosomes is made of	40 and 60
25) Golgi apparatus	1898
26) De Duve → lysosome	1949
27) Peroxisome diameter	0.5 micro meter
28) Kirchoff → cytoskeleton	1928
29) Cohen → confirmation cytoskeleton	1977
30) Centriole width	0.2 micrometer
31) Centriole length	0.3-0.5 micrometer
32) Microtubule in centriole	9
33) Tubules in centriole	9×3=27
34) Mitochondria discovery	1850
35) ATP production by cellular respiration Since 2016	38
36) Robert Brown → Nucleus	1838
37) Thylakoids forming granum	50 or more
38) Number of chromosomes	
Drosophila	8
Garden pea	14
Onion	16
Frog	26
Man	46

Chimpanzee	48
Potato	48
pigeon	80

**Biological Molecules**

39) C,H,O in human body are	95%
40) Water-enzymes hormones-inorganic ions in bacterial cell and in mammalian cell	70-2-1 %
41) Carbohydrate in bacteria and mammalian cell	3,4
42) lipids in bacteria and mammalian cell	2,3
43) DNA in bacteria and mammalian cell	1, 0.25%
44) RNA in bacteria and mammalian cell	6, 1.1 %
45) Living organ body contain water	70-90 %
46) Water boils without H-bond	-80 degree C
47) Water freezes without H-bond at	-100 degree C
48) Water is heavy at	4 degree C
49) Carbon in monosaccharides	3-7
50) Glucose in 100 ml blood	100 mg
51) Glucose in grapes	27%
52) Amino acid types	20
53) Polypeptide chains in haemoglobin	4
54) Polypeptide chains in insulin	2
55) Sanger → insulin molecule structure	1951
56) Carbon in fatty acids	16-18
57) Triglyceroids energy	2 x carbohydrate energy
58) Carbon in steroids	17
59) Energy given by one ATP	-7 Kcal
60) Structure of DNA → Watson - Crick - Wilkison	1953
61) DNA diameter	2nm
62) Pair distance in DNA	0.34 nm
63) Griffith experiment	1928
64) Avery, Mcleod and McCarty experiment	1844
65) Genetic codes	64

**Enzymes**

66) Fischer → lock and key model	1890
67) Activation energy without catalyst → $H_2O \rightarrow O+OH$	86 KJ
68) Activation energy in catalyst → $H_2O \rightarrow O+OH$	1 KJ
69) Optimum temperature for mammalian enzyme	40 degree C
70) Optimum temperature for arctic snow flea	-10 degree C
71) Optimum temperature for thermophilic bacteria	90 Degree C
72) Protease pH	1
73) Pepsin pH	1.5-1.6
74) Invertase pH	4.5
75) Catalase, Urease pH	7.0
76) Trypsin pH	7.8-8.7
77) Lipase → castor oil, pancreas, stomach	4.0 - 5.0 , 4.7, 8.0 (40 50 47 80)
78) Maltase pH	6.1-6.8

79) Amylase → malt and pancreas

4.6-5.2 and 6.7-7.0

**Bioenergetics**

80) Eyes are sensitive to	390-760 nm light
81) Light enters to atmosphere	40 %
82) Chlorophylls absorb violet blue light of wavelength	390-430 nm
83) chlorophyll absorb also red light of wavelength	670-700 nm
84) carotenoid absorb light of wavelength	600-700 nm
85) Chlorophyll a → methyl	C55 H72 O5 N4 Mg
86) Chlorophyll b → carbonyl	C55 H70 O6 N4 Mg
87) Vane Neil → water gives oxygen	1930
88) Van Neil supported by Hill	1937
89) Photosystem 1 absorb light of	700 nm
90) Photosystem 2 absorb light of	680 nm
91) ATP produced in light reaction	1
92) NADPH produced in light reaction	1
93) Melvin Calvin → Dark reaction	1950
94) Net gain of ATP in glycolysis	2
95) ATP produced in glycolysis	4
96) NADH produced in glycolysis	2
97) NADH <sub>2</sub> produced in single linked reaction	1
98) NADH <sub>2</sub> produced in linked reaction	2
99) NADH <sub>2</sub> produced in single Kreb's cycle are	3
100) FADH <sub>2</sub> produced in single Kreb's cycle are	1
101) ATP produced in single Kreb's cycle	1
102) Overall production in Kreb's cycle	8 NADH <sub>2</sub> , 2 FADH <sub>2</sub> and 2 ATP
103) 9 acetyl group generates	108 ATP
104) 1 acetyl group generate	12 ATP
105) ATP produced in Anaerobic respiration	2

**Acellular Life**

106) Virus replication time	70 sec
107) Bacteria replication time	20 min
108) Virus discovery → Iwanosky	1892
109) Virus form blisters	1898
110) Virus nature determined	1935
111) Size of virus	24-200 nm
112) Head of virus sides	20 sides
113) HIV size : 100-150 billionth of metre. 0.1Micron , 4 millionth of inch, One twentieth of E.coli , One seventeenth of diameter of human CD4 cell	
114) spikes on HIV	72
115) spike made of	Gp 141 and g120
116) matrix made of	p17
117) core made of	p24
118) RNA in HIV	2 identical
119) HIV genes	9
120) Human genes	20,00 -25,000
121) Bacterium genes	500
122) Anti HIV medicines combines in HAART	3 or more

123)	Incubation period of Leaf curl disease Hepatitis A Hepatitis B Hepatitis C	2-3 weeks 2-6 weeks 4-20 weeks 2-26 weeks
124)	Medicine for Hepatitis C for children	1
125)	Two drugs for Hepatitis C for adults work upto	50 %
126)	Incubation period for polio	5-35 days (average 7-14 days)
127)	Immunization for polio effective upto	90 %

**Prokaryotes**

1)	Scientific names of prokaryotes	6300 species
2)	Dr. Carl → Bacteria and archeae domains	1970
3)	Extremophile bacteria	90 degree C
4)	Bacteria by Leeuwenhoek	1618
5)	Oxygen level raised from	1 % to 21 %
6)	Hans Chrisitan Gram → experiment	1884
7)	Length of bacteria	2-10 micrometer
8)	Diameter of bacteria or width	0.2-2 micrometer
9)	E.coli generation time	20 min
10)	Time of bacteria to cover earth surface	36 hours
11)	Conjugation → Lederberg and Tatum	1946
12)	Transduction → Lederberg and Zinder	1952
13)	Incubation period → bacterial wilt	2-3 days
14)	Temperature (In degree C)and time High Temperature Short Time(HTST) pesturization Ultra High Temperature Heating Incineration	72 →15 sec 140 →3 sec 100 →10 min 170 → 2 hours
15)	Refrigeration temperature	0-7 degree C
16)	Ethylene oxide kill microbes in	4-18 hours

**Protista and Fungi**

128)	Protest species	60,000 – 2 Lac
129)	Autotrophic genera of euglenozoids	40
130)	Height of some kelps	100 m
131)	Irish Potato Famine	1845-1847
132)	People die in Irish potato famine	4 Lac
133)	Potato Famine in Ireland	1840s
134)	Armillaria Ostoyae area	8.9 km <sup>-2</sup>
135)	Armillaria Ostoyae weight	100 tons
136)	Armillaria Ostoyae old	1000 years
137)	Ascomycota forming lichen	More than 40%
138)	Protein in yeast	50 %
139)	Genes of yeast	6000
140)	Mycorrhizae relations	80 %
141)	Fruit harvest cause by fungal diseases	50 %

**Diversity Among Plants**

142)	Dicotyledons	2 Lac
143)	Monocotyledon	50 thousand
144)	Gymnosperm	700

145)	Algae	18 thousand
146)	Fungi	80 thousand
147)	Height of moss plant	2.7 cm
148)	Selaginella species	300
149)	Filicinae species	10 thousand
150)	Seed cotyledons	1 to many
151)	Xylem in dicotyledon	2-6
152)	Monocotyledon xylem	5-8
153)	Size of wolfia	1 mm
154)	Size of eucalyptus	100 m
155)	Spermatocytes has	300 families , 12500 genera 3 Lac species

**Diversity Among Animals**

156)	Food of porifera as decaying organic matter	80 %
157)	Predatory sponges depth of	5000 m
158)	Physalia pelagica speed	12.1 cm
159)	Barrier reef widness	180 feet to 3 mile wide
160)	Term Platyhelminthes by Gaugenbaur	1859
161)	Great Barri cer Reef length	1250 miles (2012 km)
162)	Planaria length	10 mm
163)	Tape worm length	16 feet or 5 meter
164)	Platyhelminthes species from mm to many feet	15 thousands
165)	Male Ascaris length	6-12 inch
166)	Female Ascaris length	8-12 inches
167)	Eggs at one time in Ascaris	27 million
168)	Ascaris lay egg per day	2 Lac
169)	Mollusks living species	80,000
170)	Mollusks fossils species	35,000
171)	Total mollusks species	115,000
172)	Members of Onychophora	70 species → 10 genera
173)	% of fishes in vertebrate	48%
174)	Number of living fish	29000
175)	Pair of gills in class chondrichthyes	5-7
176)	Fish sub class Dipnoi	3 species
177)	Mesozoic period	225-65 million year back
178)	Jurassic period	195-136 million year back
179)	Cretaceous period	136-65 million year back
180)	Prototheria or monotremata temperature	25-28 Degree C

**Form and Functions in Plants**

181)	Lime raise soil pH	6.0 to 6.5
182)	Water loss by transpiration	90 %
183)	Tracheids widness	80 micro meter
184)	Long day→ critical day length	11 hours
185)	Short day→ critical day length	15 ½ hours
186)	P <sub>r</sub> absorb red light	660 nm
187)	P <sub>fr</sub> absorb far red light	730 nm
188)	Florigen produced in leaves →M.H.Chaikhain	1936
189)	Vernalization effective temperature	4 Degree C

<b>190)</b>	Vernalization applied to wheat in Northern Europe  digestion	1930-1940
<b>191)</b>	Mouth to stomach food time	4-8 seconds
<b>192)</b>	Stomach volume Empty Capacity Maximum capacity	50 ml 1 L 4 L
<b>193)</b>	Gastric juice produced at each meal	400-800 ml
<b>194)</b>	H <sup>+</sup> concentration in stomach	0.15 M
<b>195)</b>	Stomach pH	Less than 1
<b>196)</b>	Gastric juice pH	1-3
<b>197)</b>	When food not reached to stomach, Gastric juice secreted	1/4 th
<b>198)</b>	Small intestine length	17 feet
<b>199)</b>	Large intestine length	5 feet
<b>200)</b>	Duodenum length	10 inch
<b>201)</b>	Jejunum length	4-5 feet
<b>202)</b>	Ileum length	5-7 feet
<b>203)</b>	Time takes by food from stomach to duodenum	4-5 hours
<b>204)</b>	Small intestine diameter	9-12 cm
<b>205)</b>	Large intestine diameter	3-4 cm
<b>206)</b>	Gastrocolic reflex	2-3 times a day
<b>207)</b>	Anal canal length	1.5 inch
<b>208)</b>	Acinar cells and ducts pancreatic mass by	80-90 %
<b>209)</b>	Acinar cells acinus	20-40
<b>210)</b>	Islets of Langerhans	2 %
<b>211)</b>	Amylase pH	7
<b>212)</b>	Lipase pH	7-9
<b>213)</b>	Wait gain after pregnancy	4-6 pound
<b>214)</b>	BMI Normal Overweight Obese Morbidly obese	18.5-24.9 25.0-29.9 30 or greater 40 or greater
<b>215)</b>	In BMA weigh in pound is multiplied by	705
<b>216)</b>	Heightx705 is divides by	Height in inches 2 times
<b>217)</b>	Exercise time for obesity treatment	30 min
<b>Circulation</b>		
<b>218)</b>	Cardiac cycle time	0.8 sec
<b>219)</b>	Systole time	0.1 sec
<b>220)</b>	Diastole time	0.4 sec
<b>221)</b>	Normal heart rate	72 per min
<b>222)</b>	Increased beats	120 per minute
<b>223)</b>	Time for stimulus spreading through arterial surface	50 m sec
<b>224)</b>	Delay at AV node	100 m sec
<b>225)</b>	Arterial contraction begins and delay at AV node	150 m sec
<b>226)</b>	Stimulus reached from AV to right ventricle	175 m sec
<b>227)</b>	Impulse spreading throughout ventricular myocardium	225 m sec
<b>228)</b>	Blood speed in aorta	425 cm/sec
<b>229)</b>	Blood speed in capillary	Less than 1 mm/min

230)	Rate of ECG paper	25 mm per second																																
231)	For ECG	Imm = 0.1 mV																																
232)	Diameter of arterioles	3mm – 10 micrometer																																
233)	Capillary diameter is more than RBCs which is	7.5 micro meter																																
234)	Pressure in arteries	100 mm Hg																																
235)	Pressure in Veins	2 mm Hg																																
236)	Venules diameter	8-100 micrometer																																
237)	Capillary length	60,000 miles																																
238)	1 mile =	1.602 Km																																
239)	Capillaries volume	5 Liters																																
240)	Capillary surface area	800-1000 m <sup>-2</sup>																																
241)	Showing blood flow in mm/min																																	
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243)	B.P inn capillaries	40 mm																																
244)	B.P when blood leaves arteries	20 mm																																
245)	Term embolus coined by Rudolph Carl Virchow	1848																																
246)	Hypertension, smoking increase risk of arteriosclerosis by	7 times																																
247)	Normal B.P	120/70																																
248)	For normal adult, hypertensive is	130/90																																
249)	Above 45 years, hypertensive man B.P Hypertensive woman B.P	146/95 140/95																																
250)	5-6 mmHg can decrease the risk of~ Since 2016 stroke by heart disease by	40 % 15-20 %																																
251)	Water pressure of balloon catheter	75 to 500 times																																
252)	Normal pressure	6-20 atmosphere																																
253)	First coronary artery bypass	May, 2 1960																																
254)	Replacement of blocked coronary artery	1867																																
255)	First successful heart surgery → Dr. Ludwig	September 7 , 1896																																

256)	First successful intracardiac correction	September 2, 1952
257)	Successful graft typically lasts for	10-15 years
258)	Firstly lymphatic ducts described in liver	1630-1702

**Immunity**

259)	Amino acids in Variable region of antibiotics	110-130
260)	Chance of allergy; If neither parents are affected If one parent is affected If both parent are affected	15 % 30 % 45 %

**Respiration**

261)	Respiratory surface thickness	1mm or less
262)	Trachea length	10-12 cm
263)	Trachea widness	2 cm
264)	Trachea rings	16-20
265)	Bronchioles diameter	1 mm or less
266)	Alveoli thickness	0.1 micrometer
267)	Alveoli in lungs	700 million
268)	Area of alveoli	70-90 m
269)	Right lung volume	56 %
270)	Left lung volume	44 %
271)	Lung capacity	5 liters
272)	Tidal volume	500 ml
273)	Residual volume	1.5 liter
274)	Decrease in oxygen that doubles breathing rate	20 %
275)	Oxygen transport as oxyhaemoglobin	97 %
276)	Oxygen transport in plasma state	3 %
277)	Hb combines with	4 O <sub>2</sub>

Oxygen in	Capacity	Pressure of PO <sub>2</sub>	Saturation
Arterial blood (maximum)	20 ml /100 ml	100 mm Hg	100 %
Arterial blood (normal)	19.4 ml/100 ml	95 mm Hg	97 %
Venous blood (normal)	14.4 ml/100 ml	40 mm Hg	75 %

278)	The amount of oxygen released to tissues by each 100ml blood is	5ml of oxygen
279)	During exercise venous blood that leave an active tissues has 4.4 ml	At 18 mm Hg (20% sat)
280)	In dissolved form 100 ml of artery blood contain 0.29 ml O <sub>2</sub> (95 mmHg) and increase to	0.3ml/100ml at 100 mmHg
281)	In plasma in dissolved form 100 ml of venous blood contain 0.12 ml of dissolved oxygen at	40 mmHg
282)	The oxygen transported to tissues per cycle in dissolved state is	0.17 ml of oxygen

283)	Carbon dioxide is carried in the blood	Since 2016
	As	%age
	Bicarbonate ions	70 %
	Carboxyhaemoglobin	23 %
	Plasma	7 %

284)	Acute symptoms of Sinusitis appear in	2 - 8 weeks
285)	80% of otitis media clear up within	3 - 4 days

**Homeostasis**

286)	The percentage of water in animals is	70%
------	---------------------------------------	-----

287) Osmolarity of sea water is	1000 mos m/L
288) Osmolarity of blood of marine animals is	200-300 m/L
<b>289) Into nontoxic form, amount of water requires to dissolve 1g of:</b>	
<b>Substance</b>	<b>Water amount</b>
NH <sub>3</sub>	500 ml
Urea	50 ml
Uric acid	1 ml
290) Urea is 1 lac time less toxic than	Ammonia ( NH <sub>3</sub> )
291) The length, width and thickness of kidney is	12cm 6cm 4cm
292) The weight of stomach is about	150 gms
293) The blood received by kidney from heart is	20%
294) The rate of blood flow through kidney is	1.2 liter per minute
295) Kidney 12 cm long	
296) Ureter 28 cm long	
297) Urethra (female) 2-3 cm long	
298) Urethra (Male) 20 cm long	
299) The storage of urinary bladder is	0.5 to 1 liter
300) Lower part of urinary bladder is guarded by	2 sphincters
301) Each human kidney contain	1 million nephrons
<b>302) Two general classes of nephron are:</b>	
303) Cortical → 70% - 80%	
304) Juxtamedullary → 20% -30%	
305) Percentage of types of stones of stone formation:	
<b>Stone type</b>	<b>% age</b>
Calcium with oxalate/phosphate	70 %
Struvite or infection stone	20 %
uric acid stones	5-10 %
amino acid cysteine stones	1-3 %
306) The stone which can passes from kidney is under	0.5 cm
307) The stone which cannot pass from kidney have greater than	1 cm
308) First successful kidney transplantation took place between two twins in	1954
309) The recipient of transplant kidney can expect to live for	5-20 years
310) Transplant surgeon like to see HLAs matching of	3 or more HLAs
311) The number of Human Leucocyte Antigens(HLAs) in humans are	6
312) The temperature of structures below the skin and subcutaneous tissue	36.4 – 37.3 °C
313) Heat is lost from body in process like conduction, convection and	Radiation (50%),

**SKELETON AND MUSCLES**

314) Osteoblast produce a matrix which is mainly composed of	Type I collagen
315) The composition of <b>organic material</b> in matrix in bone cells	30%
316) The composition of <b>inorganic material</b> in matrix in bone cells	70%
317) Matrix is composed of collagen fibers (90%) and	Glycoproteins (10%)
318) Bone matrix contain	Type I collagen
319) Cartilages mostly contain	Type II collagen
320) The number of bones in babies are	350
321) The number of bones in adult stage are	206
322) The number of bones in skull	22

323) The number of vertebrae in human	33
324) Arthritis is leading cause over the age of	65
325) For simple fracture the healing time is	6-8 weeks
326) Bony callus formation continues until a firm union is formed The total no of muscles in human are	About 2 months later 650
327) The muscles fibres are cylindrical, unbranched and with diameter	Of 10-100 $\mu$ m
328) The diameter of muscle fibre is	10-100 $\mu$ m
329) The diameter of myofibrils is	1-2 $\mu$ m
330) The energy utilized for muscular contraction is	35%
331) In the spore form clostridium tetani can remain infectious for	40 years

**NERVOUS COORDINATION**

332) The potential in rest with inside negative to outside positive is	-70 millivolts
333) Concentration of K <sup>+</sup> inside to fluid to outside is	30 times
334) Concentration of Na <sup>+</sup> in outside to inside is	10 times
335) when 2 K <sup>+</sup> are active transported inward the number of Na <sup>+</sup> transported	Outward is 3 (energy use)
336) Due to diffusion of Na <sup>+</sup> , electric potential from -70mV towards 0 and then reach to the	50mV
337) Average speed of nerve impulse is	100-120 m/s
338) The speed of nerve impulse is 20 time faster in myelinated neuron fiber due to	Salutatory conduction
339) In electrical synapse the synaptic cleft is of	0.2 nm
340) In chemical synapse the synaptic cleft has gap of more than	20nm
341) Synaptic knobs contain synaptic vesicles which contain 10,000	Neurotransmitter substance
342) The length of spinal cord	18 inch
343) The width of spinal cord	0.5 inch

344) The total number of spinal nerves are 31. Which are grouped as:

Nerves	No
Cervical	8
Thoracic	12
Lumbar	5
Sacral	5
Coccygeal	1

345) The total number of pairs of cranial nerves are 12, Functionality:

Sensory nerves	1, 2, 8
Motors nerves	3, 5, 6, 11, 12
Mixed nerves	4, 7, 9, 10

346) The total types of olfactory receptor proteins are about	347) 1000
348) The fingertips and tongue have as touch receptors as	349) 100 per cm <sup>2</sup>
350) The back of hand have as touch receptors as	351) 10 per cm <sup>2</sup>
352) An adult can be killed by nicotine by an amount of	353) 60 mg
354) In cigarette if nicotine is 60mg then number of cigarette is	355) 4
356) Alzheimer's disease increase substantially after the age of	357) 70
358) Alzheimer's disease may effect around 50% of persons over the age of	359) 85

**CHEMICAL COORDINATION**

360) Pituitary gland is pea shaped and gray colour and its weight is	0.5g
--	------

361) The number of glands in endocrine system are

20

**BEHAVIOR**

362) Some organism do not function at constant rate over the entire	24 hours of the body
363) Spider monkeys form loose group of	15 – 20 Animals
364) Spider group divide into small group of about	2 – 8 Animals
365) In altruism, female baboon protects and cares for its offspring	For 6 years

**REPRODUCTION**

366) The science of genetics originated in the year 1900 with the rediscovery of an article originally published in 1866 by an	Augustinian monk named Gregor John Mendel															
367) Mendel was born on July 22, 1822 in	Czech Republic															
368) Between 1856 and 1863 Mendel carefully analyzing the seven pairs of seed and plant characteristic and cultivated and tested about	28,000 pea plants															
369) Mendel first delivered his lecture on pea plants in the year of	1865															
370) Mendel published his paper "Experiments on plants hybridization" in	1866															
371) The Darwin's theory of evolution was appeared in the year of	1859															
372) Mendel observed that the recessive character appeared in the F <sub>2</sub> offspring in an average ratio of	3 : 1															
373) <b>Mendel crossed RrYy x RrYy and the result was</b>																
<table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <th>Round yellow</th> <th>Round green</th> <th>Wrinkled yellow</th> <th>Wrinkled green</th> </tr> <tr> <td>9</td> <td>3</td> <td>3</td> <td>1</td> </tr> </table>	Round yellow	Round green	Wrinkled yellow	Wrinkled green	9	3	3	1								
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374) Independent assortment of gene was studied by Mendel in	1865															
375) If male plant is Pp and female plant is Pp, the probability of heterozygous plant are																
376) product rule → ¼																
377) Sum rule → ½																
378) <b>When Corren crossed two pink flowers the result was:</b>																
<table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <th>Red flower</th> <th>Pink flower</th> <th>White flower</th> </tr> <tr> <td>1</td> <td>2</td> <td></td> </tr> </table>	Red flower	Pink flower	White flower	1	2											
Red flower	Pink flower	White flower														
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379) Blood group system was discovered at the university of the Karl Landsteiner in	1901															
380) ABO blood group system is encoded by the single polymorphic gene "I" on	Chromosomes 9															
381)	<table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>ABO blood type</td> <td>Genotype</td> </tr> <tr> <td>A</td> <td>I<sup>A</sup> I<sup>A</sup>, I<sup>A</sup> i</td> </tr> <tr> <td>B</td> <td>I<sup>B</sup> I<sup>B</sup>, I<sup>B</sup> i</td> </tr> <tr> <td>AB</td> <td>I<sup>A</sup> I<sup>B</sup></td> </tr> <tr> <td>O</td> <td>ii</td> </tr> </table>	ABO blood type	Genotype	A	I <sup>A</sup> I <sup>A</sup> , I <sup>A</sup> i	B	I <sup>B</sup> I <sup>B</sup> , I <sup>B</sup> i	AB	I <sup>A</sup> I <sup>B</sup>	O	ii					
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AB	I <sup>A</sup> I <sup>B</sup>															
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382) The major types of blood group systems are	30															
383) The minor blood group systems(rare blood types) are	More than 200															
384)	<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Rh blood type</th> <th>Rh factor or antigen</th> <th>Anti Rh antibodies</th> <th>Donors</th> <th>Genotypes</th> </tr> </thead> <tbody> <tr> <td>Rh+</td> <td>Present</td> <td>Absent</td> <td>Rh+ / Rh-</td> <td>DD / Dd</td> </tr> <tr> <td>Rh-</td> <td>Absent</td> <td>Present</td> <td>Only Rh-</td> <td>dd</td> </tr> </tbody> </table>	Rh blood type	Rh factor or antigen	Anti Rh antibodies	Donors	Genotypes	Rh+	Present	Absent	Rh+ / Rh-	DD / Dd	Rh-	Absent	Present	Only Rh-	dd
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Rh-	Absent	Present	Only Rh-	dd												
385) The antigen of Rh was discovered in the Rhesus monkey by	Landsteiner in 1930s															
386) The Rh blood group system currently consist of	50 defined blood groups															
387) The more common of Rhesus blood groups are	D, C, c, E & e															
388) The commonly-used terms Rh factor, Rh positive and Rh negative	D antigen only															

refer to the			
389) ABO blood group system are controlled by a dominant secretor gene	"Se" on chromosomes 19		
390) Rh blood group system is encode by three genes C, D & E which occupy	2 tightly linked loci		
391) When individual are phenotypically O but genotypically they may be like A, B or AB, this is	Bombay Phenotype		
392) The Bombay phenotype was first discovered in 1952 by	Dr. Y.M Bhende		
393) Bombay phenotype is present about	0.0004% (4 per million)		
394) The maximum possibility of Bombay phenotype is	0.01% (1 in 10,000)		
<b>395) Qualitative traits:</b>			
<b>S.No</b>	<b>Organism/Part</b>	<b>No of phenotypes</b>	<b>Phenotypes</b>
1	Pea seed shape	2	Round & wrinkled
2	4' O clock flower	3	Red, Pink & Water
3	ABO blood group system	4	A, B, AB & O
396) Number of population of all phenotypes of wheat population are	7		
397)			
<b>Colour</b>	<b>F<sub>2</sub> generation</b>		<b>No of red pigment</b>
Dark red	1	AABBCC	6
Moderately dark red	6	AaBBCC, AABbCC, AABCcC	5
Red	15	AABBcc, AAbbCC, AAAbCC	4
Light red	20	AaBbCc, AABbcc, aaBbCC	3
Pink	15	AaBbcc, AabbCc, aaBbCc	2
Light pink	6	Aabbcc, aaBbcc, aabbCc	1
White	1	aabbcc	0
398) Alleles A,B and c codes for an equal amount (dose) of	Red pigment		
399) <b>Different shades of skin colour:</b>			
<b>Alleles colour shades</b>		<b>Pigment</b>	<b>Ratio</b>
Dark brown		6	1
Moderate dark brown		5	6
Brown		4	15
Light brown		3	20
Pinkish brown		2	15
White brown		1	6
Pure white		0	1
400) *Total combinations: 64			
401) In humans, the sickle cell anemia, leukemia and albinism are found on	Chromosomes 11		
402) <b>T.H Morgan experiment:</b>			
403) → Normal is dominant over vestigial and gray is dominant over black.			
<b>Body</b>	<b>Wings</b>	<b>Type 2016</b>	<b>Numbers</b>
Gray	Normal	Parental	65
Black	Vestigial	Parental	944
Gray	Vestigial	Recombinant	216
Black	Normal	Recombinant	185
So it is incomplete or partial linkage.			
404) <b>Recombinant frequency % = sum of recombinants / sum of combination(parental + Maternal) x 100</b>			

b-----cn-----vg

405) Distance between: b and vg → 17%, b and cn → 9%, cn and vg → 9.5%

406) One map unit is supposed to equal to 1% recombination frequency

407) A chance that a man will inherit the colour blind trait from a carrier mother is 50%

### DEVELOPMENT AND AGING

408)	The first two identical cells are produced called blastomeres after	First cleavage division
409)	The first cleavage takes place after	36 hours of fertilization
410)	The no of cells which are berry-shaped in morula are	16 or more cells
411)	After 3-4 days The embryo consist of	100 or more cells
412)	When embryo become of 100 cells there is a process of compaction in neighboring calls are called	Compaction
413)	The inner cell mass in trophoblast consist of	20-30 rounded cells
414)	The two layer embryonic disk transforms into a three layer embryo	During week 3
415)	The first axial support of the embryo is	Notochord
416)	When notochord is formed the length of the embryo is	2 mm long
417)	The first major event in organogenesis is	Neutralization
418)	The superior margins of the neural folds fuse forming a neural tube	At day 22
419)	The three primary brain vesicles (fore-mid-hind) are formed at the	End of first month
420)	All brain flexures are evident; the cerebral hemisphere cover the top of the brain at the	End of the 2nd month
421)	<i>Acetabularia</i> are found in European seawater and its length is	2 - 3 inches
422)	The German zoologists Hans Spemann and Halide Mangold discovered in an early gastrula an extremely important morphogenetic field with amazing properties in	1920s
423)	Through technically difficult because the gastrulas were only about	2 nm

### Each three month period of pregnancy is called Trimester.

1. Fetal development: The first trimester: week 1 – 12.
2. Foetal development: The second trimester: week 13 – 24
3. Foetal development: The third trimester: week 24-36

424)	During each trimesters the fetus	Grows and develop
425)	In pregnancy the implantation takes place at	Fourth weak
426)	The baby's brain, spinal cord, heart and other organs begin to form	At 5 <sup>th</sup> week of pregnancy
427)	The beginning of embryonic period is marked by	5 <sup>th</sup> week of pregnancy
428)	In second trimester the foetal ear begins to stand out at the side of head and allow the foetus	To hear the sound
429)	The head is about half of the overall size of foetus in	Second trimester
430)	The foetus grown rapidly at 5 month and internal organs continue	To mature
431)	In 2nd trimester, hairs starts to appear and	Finger prints developed
432)	In third trimester the weight gain is	28 g per day
433)	The foetus begins to move rapidly and woman can felt it, this is	Third trimester
434)	The fetal head descend into pelvic cavity by	Third trimester
435)	38 or 40 weeks into pregnancy, baby weight might by <b>18-20 inches</b>	And weight is <b>6-9 pound</b>
436)	Usually, the baby is fed on the maternal milk for upto	Two years
437)	In first trimester the miscarriages are due to a chromosome abnormality in the foetus and this is about	50 %

438) The adult height accumulated by the leg length is	Half
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**INHERITANCE**

439) The science of genetics originated in the year 1900 with the rediscovery of an article originally published in 1866 by an	Augustinian monk named Gregor John Mendel
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440) Mendel was born on July 22, 1822 in	Czech Republic
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442) Mendel first delivered his lecture on pea plants in the year of	1865
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443) Mendel published his paper "Experiments on plants hybridization" in	1866
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444) Later on in 1900, Mendel's work was recognized by three investigators:	
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A Dutch botanist Hugo de Vries, De Correns of Germany, Tschmarchek of Austria

445) The Darwin's theory of evolution was appeared in the year of	1859
---	------

446) Mendel observed that the recessive character appeared in the F <sub>2</sub> offspring in an average ratio of	3 : 1
---	-------

447) Mendel crossed RrYy x RrYy and the result was	
--	--

Round yellow	Round green	Wrinkled yellow	Wrinkled green
9	3	3	1

448) Independent assortment of gene was studied by Mendel in	1865
--	------

449) If male plant is Pp and female plant is Pp, the probability of heterozygous plant are product rule → $\frac{1}{4}$ and by Sum rule → $\frac{1}{2}$	
---	--

450) When Corren crossed two pink flowers the result was:	
---	--

Red flower	Pink flower	White flower
1	2	1

451) Blood group system was discovered at the university of the Karl Landsteiner in	1901
---	------

452) ABO blood group system is encoded by the single polymorphic gene "I" on	Chromosomes 9
--	---------------

453) The major types of blood group systems are	30
---	----

454) The minor blood group systems(rare blood types) are	More than 200
--	---------------

455)

Rh blood type	Rh factor or antigen	Anti Rh antibodies	Donors	Genotypes
Rh+	Present	Absent	Rh+ / Rh-	DD / Dd
Rh-	Absent	Present	Only Rh -	dd

456) The antigen of Rh was discovered in the Rhesus monkey by	Landsteiner in 1930s
---	----------------------

457) The Rh blood group system currently consists of	50 defined blood groups
--	-------------------------

458) The more common of Rhesus blood groups are	D, C, c, E & e
---	----------------

459) The commonly-used terms Rh factor, Rh positive and Rh negative refer to the	D antigen only
--	----------------

460) ABO blood group system are controlled by a dominant secretor gene	"Se" on chromosomes 19
--	------------------------

461) Rh blood group system is encoded by three genes C, D & E which occupy	2 tightly linked loci
--	-----------------------

462) When individual are phenotypically O but genotypically they may be like A, B or AB, this is	Bombay Phenotype
--	------------------

463) The Bombay phenotype was first discovered in 1952 by	Dr. Y.M. Bhende
---	-----------------

464) Bombay phenotype is present about	0.0004% (4 per million)
--	-------------------------

465) The maximum possibility of Bombay phenotype is	0.01% (1 in 10,000)
---	---------------------

**466) Qualitative traits:**

S.No	Organism/Part	No of phenotypes	Phenotypes
1	Pea seed shape	2	Round & wrinkled
2	4' O clock flower	3	Red, Pink & Water
3	ABO blood group system	4	A, B, AB & O

**467) Quantitative traits (polygenic traits/multiple gene):**

Height , Weight, Intelligence, Skin colour , Wheat grain colour

**468) Number of population of all phenotypes of wheat population  
are**

7

Colour	F <sub>2</sub> generation		No of red pigment
Dark red	1	<b>AABBCC</b>	6
Moderately dark red	6	<b>AaBBCC, AABbCC, AABCcC</b>	5
Red	15	<b>AABBcc, AAbbCC, AAAbCC</b>	4
Light red	20	<b>AaBbCc, AABbcc, aaBbCC</b>	3
Pink	15	<b>AaBbcc, AabbCc, aaBbCc</b>	2
Light pink	6	<b>Aabbcc, aaBbcc, aabbCc</b>	1
White	1	<b>aabbcc</b>	0

**469) Alleles A,B and c codes for an equal amount (dose) of**

Red pigment

**470) Different shades of skin colour:**

Alleles colour shades	Pigment	Ratio
Dark brown	6	1
Moderate dark brown	5	6
Brown	4	15
Light brown	3	20
Pinkish brown	2	15
White brown	1	6
Pure white	0	1

471) \*Total combinations: 64

**472) The number of gene is greater than number of**

Chromosomes

**473) In humans, the sickle cell anemia, leukemia and albinism are found on**

Chromosomes 11

**474) Detection of gene linkage:**475) Heterozygous individual(F<sub>1</sub>) is crossed with recessive parent(P<sub>1</sub>), then if

476) If all phenotype are produced in equal (1:1:1:1) then there is no linkage between genes.

477) If more parental and less recombinant are produced then it is incomplete or partial linkage.

478) If only parental types are produced then tight or complete linkage is believed.

**479) T.H Morgan experiment:**

480) → Normal is dominant over vestigial and gray is dominant over black.

Body	Wings	Type 2016	Numbers
Gray	Normal	Parental	965
Black	Vestigial	Parental	944
Gray	Vestigial	Recombinant	216
Black	Normal	Recombinant	185

So it is incomplete or partial linkage.

**481) Recombinant frequency % = sum of recombinants / sum of combination(parental + Maternal) x 100**

b-----cn-----vg

Distance between: b and vg → 17%, b and cn → 9%, cn and vg → 9.5%

482) One map unit is supposed to equal to 1% recombination frequency

483) A chance that a man will inherit the colour blind trait from a carrier mother is 50%

### CHROMOSOMES AND DNA

484) Gregor Mendel's "heredity factors" were purely an abstract concept when he proposed their existence in 1865

485)

Species	Pairs of chromosomes
Penicillium	1
Ferns	500

486) A haploid cell may be: Monoploid → one set , Diploid → two sets , Triploid → three sets

Species	Somatic number	Haploid	Monoploid (n)
Human	46 (2n)	23 (n)	23
wheat	42 (6n)	23 (n)	7

487) Generally chromosomes are made of: DNA (40%) Proteins (60%)

488) Each chromatid has One DNA molecule

489) An average size of human chromosomes are 5 cm long

490) The number of nucleotides in DNA are about 140 million

491) During S phase of cell cycle DNA and histone are completely Disorganized

492) The organization of chromosomes occur in four levels;

S.No	Level	Thickness and diameter
1	DNA	2 nm thick
2	Nucleosome string	10 nm thick
3	Chromatin fiber/ solenoid	30 nm thick
4	Super coil	200 nm diameter
5	Chromatid	700 nm diameter

493) 200 nucleotides wrap twice around the core of histone proteins forming Nucleosome

494) Historical background of genes:

495) Charles Darwin first conceived idea of heredity units when he published his theory of pangenesis in 1868. In this model the circulating unit was **Gemmules**.

496) In the 1890s Hugo De Vries took the term "pangenesis" and transmitted it to "**pangene**" for the units of inheritance.

497) Wilhelm Johansson introduced the term "**gene**" to replace several contending and misleading terms for the basis unit of heredity in 1909.

498) The term :"**genetics**" came earlier, when William Betson coined the word in 1906 to represent the new field that studied heredity, variation and evolution.

499) Regions of genes:

500) Regulatory region : Promoter → 5' ends , Terminator → 3' ends

501) Structural region : Introns → non-functional , Exons → functional

502) The chromosomes theory of inheritance was confirmed in 1910

503) Griffith's Experiment (1928) :

504) The agent responsible for transforming R-type to S-type went undiscovered until 1944

Experiment	Year
Gr ffith's	1928
Avery's	1944
Hershey and Chase	1952

505) It was not known that either DNA or protein possesses heredity information for bacteriophage till

1952

506) Overall three models to explain the replication process in DNA:

S.No	Model	Parental DNA is
1	Semi conservative model	Partially conserved into daughter DNA
2	Conservative model	Fully conserved into daughter DNA
3	Dispersive model	Dispersed into fragments

507) → The three models of DNA replication were evaluated by Mathew Meselson and Franklin Stahl of the California Institute of technology on 1958.

508) The direction of replication of DNA is from R 5' to 3'

509) The second unit of DNA polymerase-III are allowed to polymerize daughter strand up to a specific length such as

510) 100 – 200 nucleotides in prokaryotes

511) 1000 – 2000 nucleotide in eukaryotes

512) **Binding sites in prokaryotes:**

TATAAT → -10 sequence      TTGACA → -35 sequence

513) **Binding sites in eukaryotes:**

TATA (TATA box) → -25sequence      CAAT (CAAT box) → -70 sequence

514) Subunits of RNA polymerase are

Four

515) In eukaryotes, the number type of RNA polymerase is only

One type

516) In elongation phase, towards the terminal region the RNA polymerase keep on moving towards the

5' to 3' direction

517) A cap(attached to 5' end) is in the form of

7-methyl GTP

518) A tail or poly-A tail(attached to 3' end) is small chain of

30-500 adenine nucleotides

519) The total number of codes of codons are

64

520) Amino acids leucine and serine are encoded by

Six codons

521) The study of genetic codon of mitochondrial DNA however, showed that genetic code is not that universal. e.g:

Codon	Nuclear DNA	Mitochondrial DNA
UGA	Stop codon	Tryptophan
AUA	Iso leucine	Methionine
AGA & AGG	Arginine	Stop codon

522) Various forms of euploidy are:

Triploidy → three sets , Tertaploid → four sets, Pentaploid → five sets, Hexaoploid → six sets and so on.

523) **Down syndrome:**

Age	Birth
Before 30	1 per 800
35	1 per 350
40	1 per 100

524) **Klinefelter's syndrome:** 1 in 5000 to 1000, 1 in 50,000

525) **Turner's syndrome:** 1 in 2500

## EVOLUTION

526)	Fossils records indicate that eukaryote evolved from prokaryote somewhere between	1.5 to 2 billion years ago
527)	<b>Hardy-Winberg equilibrium equation</b> → $p^2 + 2pq + q^2 = 1$	
528)	Evolution in its modern form was first explored by Charles Darwin in	1859
529)	The time from which life is originated is some	3.5 billion years ago

## MAN AND HIS ENVIRONMENT

530)	The salt water present on earth is	97%	
531)	The percentage of fresh water is	3%	
532)	The fresh water present in the form of ice is	66% of total	
533)	The water present in solid form is	2%	
534)	All the world water which is useful for humans and land animals are	1%	
535)	The earth atmosphere almost	80% nitrogen gas	
536)	<b>Nitrogen fixation:</b> Nitrogen gas can be fixed by three ways: Atmospheric fixation → 5-8%, Industrial fixation → 32-35%, Biological fixation → 60%		
537)	The process which is used for making nitrogen containing fertilizers	Haber process	
538)	The reduction of nitrogen gas to ammonia requires ( $N_2 + 3H_2 \rightarrow 2NH_3$ )	16 molecules of ATP	
539)	The net energy production at one trophic level is passed on to next level is	10% 	
540)	Productivity in land ecosystems generally rises with temperature up to about	30°C	
541)	<b>There are three types of pyramids:</b>		
	<ul style="list-style-type: none"> <li>• Pyramid of energy → g/m<sup>2</sup> or C/m<sup>2</sup></li> <li>• Pyramid of biomass</li> <li>• Pyramid of numbers</li> </ul>		
Levels of organisms	Pyramid of energy	Pyramid of biomass	Pyramid of numbers
Third level consumers	0.1%	1.5	
Secondary consumers	1%	11	90,000
Primary consumers	10%	37	200,000
Primary producers	100%	309	1,500,000
542)	The malnourished in all over the world are about	1 to 2 billion	
543)	The people that are now hungry and malnourished in china are	80 million	
544)	Most of the 99% food supply of the world comes from the	Land	
545)	The 1% food supply to world comes from	Ocean and aquatic habits	
546)	To form 25 mm of soil under agricultural conditions need	500 years	
547)	During one growing season, a hectare of corn will transpire	5 million liters water	
548)	The amount of water needed to reach to 1 hectare is	8 million liters	
549)	The fresh water which is used by agricultural is	87 %	
550)	The disease occur due to lack of clean water in developing countries are about	90 %	
551)	The cases of diseases that are contracted from water are	4 billion	
552)	The death occurs due to water-borne disease are about	6 million per year	
553)	The number of people living in urban areas is doubling every	10 to 20 years	
554)	The nuclear accident at Chernobyl was the worst nuclear accident to date, spewing about	100 million curies radioactive materials	
555)	<b>Sources of carbon dioxide:</b> Electricity generation (41 %), Transportation (2 <sup>nd</sup> largest source)		
556)	Permanent removal of standing forest is called	Deforestation	
557)	The rise in average global temperature at the end of next century is	1.5°C to 4.5°C	
558)	Acid rain have PH	Less than 5.6	
559)	The ozone layer or stratospheric ozone is a high concentration of ozone molecule on the height from	30-50 km the maximum	
560)	Ozone molecules are about 12,000 in	1 Arab of total molecules	
561)	3 lac non-melanoma and 4500 melanoma skin cancers worldwide annually caused due to	10 % decrease in ozone	
562)	16 million people in the world every year suffer from blindness due	Loss of transparency of lens	

to	
563) 20% of cataracts may be caused by over exposure to the	UV radiation
564) Approximately tidal cycles in one year are about	705
565) The average increase in temperature with depth of earth is 1°C for every	30 to 40 meter depth
566) At depth of 3-4 km in earth	Water boils
567) At depth of 15kms the temperature is in range of	1000°C to 12000°C

**BIOTECHNOLOGY**

568) Types of cloning vectors are six:

Types of vector	Insert DNA size in kb
Plasmid cloning vectors	0.5 – 8
Bacteriophage cloning vectors	9 – 2.5
Cosmid-cloning vectors(combination of plasmid and phage DNA)	30 – 45
Yeast artificial chromosomes	250 – 1000
Bacterial artificial chromosomes	50 – 300
Animal and plant vector (shuttle vector)	>1000

569)

570) The natural bacterial plasmid could be modified to produce new plasmid like	pBR322
571) The first widely used purpose built plasmid vector is	pBR322
<b>572) Useful features of pBR322:</b>	
573) Origin of replication → pMBI fragment which is origin of replication	
574) Size → 4,363bp	
575) Copy number → 15 copies per cell	
576) Selectable marker → two antibiotic resistant genes(ampicillin and tetracycline)	
577) Cloning sites	
578) There is room in pBR322 for an insert of at least	6 kbp
579) On pBR322, sites for Pse I, Pvu I and Sac I are found on	Ampicillin
580) On pBR322, sites for Bam HI and Bam HIII are found on	tetracycline
581) Polymerase chain reaction was invented by Kary Mullis in 1983 and he was awarded by noble prize in	1993

582) Mechanism of PCR reaction:

583) Denaturation (94°C for 1-5 min)	
584) Primer annealing (54°C for 2 min)	
585) Extension or polymerization (72°C for 1 min)	
586) *54-72-94 → 1-5→2→1	

587) In 1975-1977, Allan Maxam and Walter Gilbert developed a DNA sequencing method which is also called as	Chemical cleavage method
588) The DNA to be sequenced is end labeled by kinase treatment with	32P ATP
589) Dimethylsulphoxide (DMSO) is then added and the labeled DNA samples are heated with	90°C
590) In nucleotide sequences of genome, entire human have	99% similarity
591) 1% difference in genome sequences that establishes the individuality	Of every person
<b>592) Major goals of Human Genome Project(HGP) was:</b>	
593) To identify 20,00 to 25000 genes of humans	
594) To identify 3 billion chemical bases pairs of human DNA .	
595) The first transgenic organism is	Bacteria (1973)
596) Herbert Boyer(1978) inserted human insulin gene to <i>E.coli</i> to	Synthetic human insulin

produce	
597) The first field trials of genetically engineered plants occurred in	France and USA in 1986
598) The Dolly sheep was produced in	July 2002
599) Never to produce microbial or other biological agents or toxins, whatever may be their method of production, for use in wars	Biological weapon conventions of 1972

**BIOLOGY AND HUMAN WELFARE**

600) The people living on the planet earth are	7 billion
--	-----------

**601) Schedule of vaccines against common disease:**

Disease	Vaccine	Type	Age group
Polio	OPV (Oral Polio Vaccine)	Live	Birth- % years
Tuberculosis	BCG (Bacillus Calmette Guerin)	Live	At birth
Typhoid	Typhoid vaccine TAB vaccine (Typhoid Paratyphoid A and Paratyphoid B)	Kill	2 years of age
Hepatitis	Hepatitis B vaccine	Subunit	Any age
Diphtheria & tetanus	Diphtheria toxoid vaccine Tetanus toxoid vaccine	Toxoid	childhood

602) The people of Pakistan who are engaged in livestock are	30-35 million
--	---------------

**On the basis of fat contents the various milk products are as follow:**

603) Cream → 10-70% fat content

604) Khoya → by water evaporation and by reducing bulk to 70-75%

**From artificial insemination** 3000 females can be fertilized from semen of one bull**BANK OF MCQS**

Since 2016

**TABLE OF CONTENTS**

<b>Chapter-1: CELL STRUCTURES &amp; FUNCTIONS .....</b>	<b>199</b>	MODE OF NUTRITION IN BACTERIA ..... <b>ERROR!</b>
TECHNIQUES.....	199	<b>BOOKMARK NOT DEFINED.</b>
CELL WALL.....	199	GROWTH IN BACTERIA ..... <b>ERROR! BOOKMARK NOT DEFINED.</b>
CELL MEMBRANE .....	200	REPRODUCTION IN BACTERIA , UES OF BACTERIA ..... <b>ERROR! BOOKMARK NOT DEFINED.</b>
CYTOPLASM .....	201	BACTERIAL DISEASES..... <b>ERROR! BOOKMARK NOT DEFINED.</b>
RIBOSOMES.....	202	BACTERIAL FLORA AND CONTROL OF BACTERIA <b>ERROR!</b>
ENDOPLASMIC RETICULUM .....	203	<b>BOOKMARK NOT DEFINED.</b>
GOLGI APPARATUS.....	204	<b>Chapter 07 Protista &amp; Fungi..</b> Error! Bookmark not defined.
LYSOSOME.....	204	PAST PAPERS..... <b>ERROR! BOOKMARK NOT DEFINED.</b>
PEROXISOME.....	205	PROTISTS AND TYPES OF PROTISTS ..... <b>ERROR!</b>
CYTOSKELETON.....	205	<b>BOOKMARK NOT DEFINED.</b>
CENTRIOLES.....	205	ANIMALS LIKE PROTISTS ..... <b>ERROR! BOOKMARK NOT DEFINED.</b>
MITOCHONDRIA .....	205	PLANT LIKE PROTISTS ..... <b>ERROR! BOOKMARK NOT DEFINED.</b>
PLASTIDS.....	206	FUNGUS LIKE PROTISTS ..... <b>ERROR! BOOKMARK NOT DEFINED.</b>
NUCLEUS .....	207	KINGDOM FUNGI... <b>ERROR! BOOKMARK NOT DEFINED.</b>
VACUOLE.....	207	CLASSES OF FUNGI <b>ERROR! BOOKMARK NOT DEFINED.</b>
PROKARYOTIC AND EUKARYOTIC CELL.....	208	PATHOGENIC FUNGI..... <b>ERROR! BOOKMARK NOT DEFINED.</b>
<b>Chapter 02 Biological Molecules .....</b>	<b>208</b>	IMPORTANCE OF FUNGI ..... <b>ERROR! BOOKMARK NOT DEFINED.</b>
INTRODUCATIN AND WATER.....	208	<b>Chapter 08 Diversity among Plants.....</b> <b>233</b>
CARBOHYDRATES.....	209	INTRODUCTION, ALTERNATION OF GENERATION ... 235
PROTEINS.....	211	NON VASCULAR PLANTS .....
LIPIDS .....	214	236
NUCLEIC ACIDS.....	215	TRACHOPHYTA .....
GENETIC CODE.....	216	236
CONJUGATED MOLECULES .....	217	ANGIOSPERM.....
<b>Chapter 03 Enzymes.....</b> Error! Bookmark not defined.		238
INTRODUCION + HYPOTHEISES..... <b>ERROR! BOOKMARK NOT DEFINED.</b>		INFLORESCNCE .....
FACTORS AFFECTING RATE OF ENZYME .....	<b>ERROR!</b>	239
<b>BOOKMARK NOT DEFINED.</b>		<b>Chapter 09 Diversity Among Animals</b> <b>240</b>
<b>Chapter 04 Bioenergetics.....</b>	<b>217</b>	CLASSIFICATION AND COMPLEXITY OF ANIMALS ,
PHOTOSYNTHESIS INTRODUCTION (ROLE OF SUNLIGHT,PIGMENTS, SPECTRUM,FACTORS ).....	217	DIPLOBLASTIC AND TRIPLOBLASTIC.....
MECHANISM OF PHOTOSYNTHESIS (LIGHT AND DARK REACTION).....	221	240
CELLULAR RESPIRATION (GLYCOLYSIS. KREB CYCLE.ELECTRON TRANSPORT CHAIN).....	225	PHYLUM PORTIFERA.....
ANAEROBIC RESPIRATION .....	226	242
PHOTORESPIRATION .....	226	PHYLUM COELENTERATAT OR CNIDARIAN.....
C3 AND C4 PLANTS.....	226	242
<b>Chapter 05 ACellular Life .....</b>	<b>227</b>	PHYLUM PLAYHELMINTHES .....
STATUS, DISCOVERY ABD CLASSIFICATION OF VIRUS	227	243
STRUCTURE OF SOME VIRUS.....	227	PHYLUM ASCHELMEMTHIS OR NEMATODE .....
VIRUS LIFE CYCLE .....	229	245
HIV .....	229	PHYLUM MULLUSKA.....
SOME VIRAL DISEASES(HEPATITIS, HERPES, POLIO, PRIONS) .....	230	246
VIROIDS .....	232	PHYLUM ANNELIDA.....
<b>Chapter 06 Prokaryotes ..</b> Error! Bookmark not defined.		246
TAXONOMY,PYLOGENY, CLASIFICATION, STRUCTURE AND SHAPE OF BACTERIA..... <b>ERROR! BOOKMARK NOT DEFINED.</b>		PHYLUM ARTHROPODA .....
ENDOSPORES .....	<b>ERROR! BOOKMARK NOT DEFINED.</b>	247
		PHYLUM ECHINDERMATA .....
		248
		PHYLUM HEMICHORDATA .....
		249
		PHYLUM CHORDATE.....
		249
		<b>Chapter 10 Forms &amp; Functions in Plants</b> Error!
		Bookmark not defined.
		PAST PAPERS..... <b>ERROR! BOOKMARK NOT DEFINED.</b>
		PLANT NUTRITION..... <b>ERROR! BOOKMARK NOT DEFINED.</b>
		SPECIAL MODE OF NUTRITION IN PLANTS .....
		<b>ERROR! BOOKMARK NOT DEFINED.</b>
		ROLE OF GASEOUS EXCHANGE AND TRANSPIRATION .....
		<b>ERROR! BOOKMARK NOT DEFINED.</b>
		TRANSPORT IN PLANTS .....
		<b>ERROR! BOOKMARK NOT DEFINED.</b>

WATER STATUS IN PLANTS .**ERROR! BOOKMARK NOT DEFINED.**  
MOVEMENT OF WATER THROUGH ROOTS.....**ERROR! BOOKMARK NOT DEFINED.**  
MECHANISM OF OPENING AND CLOSING OF STOMATA .....**ERROR! BOOKMARK NOT DEFINED.**  
TRANSLOCATION OF ORGANIC SOLUTES .....**ERROR! BOOKMARK NOT DEFINED.**  
HOMEOSTASIS IN PLANTS ....**ERROR! BOOKMARK NOT DEFINED.**  
SUPPORT IN PLANTS .....**ERROR! BOOKMARK NOT DEFINED.**  
GROWTH AND DEVELOPMENT IN PLANTS .....**ERROR! BOOKMARK NOT DEFINED.**  
GROWTH CORRELATION .....**ERROR! BOOKMARK NOT DEFINED.**  
ANNULAR RINGS.. **ERROR! BOOKMARK NOT DEFINED.**  
GROWTH RESPONCES IN PLANTS .**ERROR! BOOKMARK NOT DEFINED.**  
PLANTS MOVEMENTS .....**ERROR! BOOKMARK NOT DEFINED.**  
PHOTOPERIODISM **ERROR! BOOKMARK NOT DEFINED.**  
PHYTOCHROMES .. **ERROR! BOOKMARK NOT DEFINED.**  
VERNALIZATION... **ERROR! BOOKMARK NOT DEFINED.**  
MIX.....**ERROR! BOOKMARK NOT DEFINED.**  
**Chapter 11 Digestion** ..... Error! Bookmark not defined.  
INTRODUCTION, MECHANISM AND CHEMICAL DIGESTION IN THE ORAL CAVITY.**ERROR! BOOKMARK NOT DEFINED.**  
PHARYNGEAL STAGE , OESOPHAGUS STAE AND FOOD IN STOMACH.....**ERROR! BOOKMARK NOT DEFINED.**  
DIGESTIVE ORGANS LENGTHS.....**ERROR! BOOKMARK NOT DEFINED.**  
SMALL INTESTINE **ERROR! BOOKMARK NOT DEFINED.**  
LARGE INTENSTINE .....**ERROR! BOOKMARK NOT DEFINED.**  
LIVER .....**ERROR! BOOKMARK NOT DEFINED.**  
PANCREASE.....**ERROR! BOOKMARK NOT DEFINED.**  
DISORDERS .....**ERROR! BOOKMARK NOT DEFINED.**  
ULCER.....**ERROR! BOOKMARK NOT DEFINED.**  
OBESITY.....**ERROR! BOOKMARK NOT DEFINED.**  
BULIMIA NERVOSA .....**ERROR! BOOKMARK NOT DEFINED.**  
ANOREXIA NERVOSA.....**ERROR! BOOKMARK NOT DEFINED.**  
FOOD POISING .... **ERROR! BOOKMARK NOT DEFINED.**  
DISEASE CHART ... **ERROR! BOOKMARK NOT DEFINED.**  
DYSPEPSIA .....**ERROR! BOOKMARK NOT DEFINED.**  
**Chapter 12 Circulation** ..... Error! Bookmark not defined.  
HUMAN BLOOD CIRCULATORY SYSTEM AND HUMAN HEART.....**ERROR! BOOKMARK NOT DEFINED.**  
ECG.....**ERROR! BOOKMARK NOT DEFINED.**  
BLOOD VESSELS.... **ERROR! BOOKMARK NOT DEFINED.**  
BLOOD PRESSURE **ERROR! BOOKMARK NOT DEFINED.**  
CARDIOVASCULAR DISEASES.**ERROR! BOOKMARK NOT DEFINED.**

BLOOD PRESSURE **ERROR! BOOKMARK NOT DEFINED.**  
THROMBOSIS AND EMBOLISM..... **ERROR! BOOKMARK NOT DEFINED.**  
ATHEROSCLEROSIS.....**ERROR! BOOKMARK NOT DEFINED.**  
CONGENITAL HEART DEFECT .....**ERROR! BOOKMARK NOT DEFINED.**  
BLUE BABY OR CYANOSIS.....**ERROR! BOOKMARK NOT DEFINED.**  
HYPERTENSTION..**ERROR! BOOKMARK NOT DEFINED.**  
ANGINA PECTORIS (HEART ATTACK) AND HEART FAILURE .....**ERROR! BOOKMARK NOT DEFINED.**  
TREATMENT OF CARDIOVASCULAR DISORDERS**ERROR! BOOKMARK NOT DEFINED.**  
LYMPHATIC SYSTEM.....**ERROR! BOOKMARK NOT DEFINED.**  
**Chapter 13 Immunity** ..... Error! Bookmark not defined.  
1<sup>ST</sup> - 2<sup>ND</sup> – 3<sup>RD</sup> LINE OF DEFENSE ...**ERROR! BOOKMARK NOT DEFINED.**  
FIRST LINE OF DEFENCE .....**ERROR! BOOKMARK NOT DEFINED.**  
PHYSICAL AND CHEMICAL COMPONENTS OF SKIN DEFENCE .....**ERROR! BOOKMARK NOT DEFINED.**  
FUNCTIONS OF CILIA AND MUCUS IN NOSE AND NASAL CAVITY.....**ERROR! BOOKMARK NOT DEFINED.**  
SECOND LINE OF DEFENSE – ROLE OF MACHROPHAGES AND NEUTROPHILLS.....**ERROR! BOOKMARK NOT DEFINED.**  
ROLE OF NATURAL KILLER CELLS**ERROR! BOOKMARK NOT DEFINED.**  
COMPLEMENTARY SYSTEM ...**ERROR! BOOKMARK NOT DEFINED.**  
INTERFERON .....**ERROR! BOOKMARK NOT DEFINED.**  
INFLMMATION RESPONSE AS ONE OF THE NON SPECIFIC DEFENCES .....**ERROR! BOOKMARK NOT DEFINED.**  
PYREXIA AND PYROGENS .....**ERROR! BOOKMARK NOT DEFINED.**  
THIRD LINE OF DEFENCE .....**ERROR! BOOKMARK NOT DEFINED.**  
BASIC TYPES OF IMMUNITY (INNATE, ACUTE, VACCINATION) .....**ERROR! BOOKMARK NOT DEFINED.**  
SPECIFIC DEFENSE MECHANISMS (B,T,ANTIBODY) .....**ERROR! BOOKMARK NOT DEFINED.**  
ANTIBODIES .....**ERROR! BOOKMARK NOT DEFINED.**  
ALLERGY .....**ERROR! BOOKMARK NOT DEFINED.**  
**Chapter 14 Respiration**.....**256**  
INTRODUCTION AND PROPERTIES OF RESPIRATORY SURFACES.....**256**  
HUMAN RESPIRATORY SYSTEM .....**256**  
LUNGS VOLUME AND CAPACITY.....**257**  
CONTROL OF BREATHING (INSPIRATION, EXPIRATION) .....**258**  
MECHANISM OF TRANSPORT OF GASES.....**258**  
RESPIRATORY PIGMENTS .....**260**  
RESPIRATORY DISORDERS .....**260**  
**Chapter 15 Homeostastisis**..... Error! Bookmark not defined.

BOM SERIES	Page 198	BOM ACADEMY Online & Swat
MECHANISM OF HOMEOSTASIS , POSITIVE NEGATIVE FEEDBACK, THERMOREGULATION. <b>ERROR! BOOKMARK NOT DEFINED.</b>		FEEDBACK MECHANISM..... <b>ERROR! BOOKMARK NOT DEFINED.</b>
OSMOREGULATION & OSMOREGULATION IN ANIMALS OF DIFFERENT ENVIRONMENTS..... <b>ERROR! BOOKMARK NOT DEFINED.</b>		<b>Chapter 20 Behavior</b> ..... Error! Bookmark not defined.
EXCRETION ..... <b>ERROR! BOOKMARK NOT DEFINED.</b>		NATURE OF BEHAVIOR..... <b>ERROR! BOOKMARK NOT DEFINED.</b>
HUMAN EXCRETORY SYSTEM <b>ERROR! BOOKMARK NOT DEFINED.</b>		INNATE BEHAVIORS..... <b>ERROR! BOOKMARK NOT DEFINED.</b>
NEPHRON AND URINARY SYSTEM OF MAN ..... <b>ERROR! BOOKMARK NOT DEFINED.</b>		REFLEXES ..... <b>ERROR! BOOKMARK NOT DEFINED.</b>
URINARY TRACT INFECTIONS, URINARY STONES, RENAL FAILURE/ KIDNEY FAILURE , RENAL DIALYSIS, KIDNEY TRANSPLANTATION ..... <b>ERROR! BOOKMARK NOT DEFINED.</b>		LEARNING BEHAVIOURS ..... <b>ERROR! BOOKMARK NOT DEFINED.</b>
URINARY TRACK INFECTION. <b>ERROR! BOOKMARK NOT DEFINED.</b>		SOCIAL BEHAVIOURS ..... <b>ERROR! BOOKMARK NOT DEFINED.</b>
URINARY STONES. <b>ERROR! BOOKMARK NOT DEFINED.</b>		<b>Chapter 20 Reproduction</b> ..... <b>276</b>
KIDNEY FAILURE.. <b>ERROR! BOOKMARK NOT DEFINED.</b>		INTRODUCTION TO REPRODUCTION ..... 276
RENAL DIALYSIS .. <b>ERROR! BOOKMARK NOT DEFINED.</b>		MALE REPRODUCTIVE SYSTEM..... 276
KIDNEY TRANSPLANT..... <b>ERROR! BOOKMARK NOT DEFINED.</b>		SPERMATOGENESIS ..... 277
THERMOREGULATION ..... <b>ERROR! BOOKMARK NOT DEFINED.</b>		FEMALE REPRODUCTIVE SYSTEM ..... 278
LIVER ..... <b>ERROR! BOOKMARK NOT DEFINED.</b>		OOGENESIS ..... 279
<b>Chapter 16 Support &amp; Movement</b> .....Error! Bookmark not defined.		MENSTRUAL CYCLE ..... 280
HUMAN SKELETON ..... <b>ERROR! BOOKMARK NOT DEFINED.</b>		DISORDERS..... 281
JOINTS ..... <b>ERROR! BOOKMARK NOT DEFINED.</b>		SEXUALLY TRANSMITTED DISEASES..... 282
DISORDER OF SKELETON ..... <b>ERROR! BOOKMARK NOT DEFINED.</b>		<b>Chapter 21 Development &amp; Aging</b> ..... <b>283</b>
BONE FRACTURE.. <b>ERROR! BOOKMARK NOT DEFINED.</b>		PAST PAPERS..... 283
MUSCLES ..... <b>ERROR! BOOKMARK NOT DEFINED.</b>		EMBRYONIC DEVELOPMENT ..... 285
MUSCLE PROBLEMS..... <b>ERROR! BOOKMARK NOT DEFINED.</b>		CONTROL OF DEVELOPMENT ..... 287
<b>Chapter 17 Nervous coordination</b> ..... <b>262</b>		HUMAN EMBRYONIC DEVELOPMENT ..... 288
STEPS INVOLVED IN NERVOUS COORDINATION..... 262		DISORDERS DURING EMBRYONIC DEVELOPMENT .. 289
NEURONS ..... 262		POSTNATAL DEVELOPMENT..... 290
REFLEX ARC ..... 264		AGING ..... 290
NERVE IMPULSE AND ITS TYPES ..... 264		<b>Chapter 22 Inheritance</b> ..... <b>291</b>
SYNAPSE ..... 266		MENDELS LAW OF INHERITANCE..... 291
BRAIN - BASIC ORGANIZATION OF HUMAN NERVOUS SYSTEM ..... 267		EXCEPTION TO MENDELIAN BEHAVIOR ..... 295
SPINAL CORD - BASIC ORGANIZATION OF HUMAN NERVOUS SYSTEM ..... 270		ABO AND RH BLOOD GROUP SYSTEM ..... 296
STRUCTURE AND FUNCTION OF SPECIAL RECEPTORS ..... 272		GENE INTERACTIONS..... 299
EFFECTS OF DRUGS ON NERVOUS SYSTEM..... 273		GENE LINKAGE, SEX LINKAGE AND CROSSING OVER 301
DISORDERS OF NERVOUS SYSTEM AND DIAGNOSTIC TESTS ..... 274		SEX DETERMINATION ..... 302
<b>Chapter 18 Chemical Coordination</b> .....Error! Bookmark not defined.		SEX LINKAGE (RECESSIVE & DOMINANT INHERITANCE) ..... 302
HORMONES – THE CHEMICAL MESSENGERS ..... <b>ERROR! BOOKMARK NOT DEFINED.</b>		<b>Chapter 23 Chromosome &amp; DNA</b> .....Error! Bookmark not defined.
ENDOCRINE SYSTEM OF MAN <b>ERROR! BOOKMARK NOT DEFINED.</b>		PAST PAPERS ..... <b>ERROR! BOOKMARK NOT DEFINED.</b>

<b>Chapter 24 Evolution</b> .....	Error! Bookmark not defined.
CONCEPT OF EVOLUTION .....	<b>ERROR! BOOKMARK NOT DEFINED.</b>
DARWINISM.....	<b>ERROR! BOOKMARK NOT DEFINED.</b>
NEO DARWINISM	<b>ERROR! BOOKMARK NOT DEFINED.</b>
<b>Chapter 25 Man and his Environment</b> .....	Error! Bookmark not defined.
PAST PAPERS .....	<b>ERROR! BOOKMARK NOT DEFINED.</b>
BIOGEOCHEMICAL CYCLES ....	<b>ERROR! BOOKMARK NOT DEFINED.</b>
ENERGY FLOW THROUGH AN ECOSYSTEM .....	<b>ERROR! BOOKMARK NOT DEFINED.</b>
ECOLOGICAL SUCCESSION .....	<b>ERROR! BOOKMARK NOT DEFINED.</b>
POPULATION DYNAMICS .....	<b>ERROR! BOOKMARK NOT DEFINED.</b>
HUMAN IMPACTS ON ENVIRONMENT.....	<b>ERROR! BOOKMARK NOT DEFINED.</b>
c) REFORESTATION .....	d) ALL OF THESE <b>ERROR! BOOKMARK NOT DEFINED.</b>
ENVIRONMENTAL RESOURCES & THEIR DEPLETION .....	<b>ERROR! BOOKMARK NOT DEFINED.</b>
<b>Chapter 26 Biotechnology</b> Error! Bookmark not defined.	
PAST PAPERS.....	<b>ERROR! BOOKMARK NOT DEFINED.</b>
CLONING OF GENES .....	<b>ERROR! BOOKMARK NOT DEFINED.</b>
PROCEDURE OF RECOMBINANT DNA TECHNOLOGY .....	<b>ERROR! BOOKMARK NOT DEFINED.</b>
POLYMERASE CHAIN REACTION (PCR) .....	<b>ERROR! BOOKMARK NOT DEFINED.</b>
GENOMIC LIBRARY .....	<b>ERROR! BOOKMARK NOT DEFINED.</b>
DNA SEQUENCE... .....	<b>ERROR! BOOKMARK NOT DEFINED.</b>
DNA ANALYSIS ....	<b>ERROR! BOOKMARK NOT DEFINED.</b>
GENOME MAPS.... .....	<b>ERROR! BOOKMARK NOT DEFINED.</b>
TISSURE CULTURE	<b>ERROR! BOOKMARK NOT DEFINED.</b>
TRANSENIC ORGANISM.....	<b>ERROR! BOOKMARK NOT DEFINED.</b>
BIOTECHNOLOGY AND HUMAN WELFARE.....	<b>ERROR! BOOKMARK NOT DEFINED.</b>
SCOPE AND IMPORTANCE OF BIOTECHNOLOGY.	<b>ERROR! BOOKMARK NOT DEFINED.</b>

<b>Chapter 27 Biology and Human Welfare</b> Error!	
Bookmark not defined.	
PAST PAPERS .....	<b>ERROR! BOOKMARK NOT DEFINED.</b>
INTEGRATED DISEASE MANAGEMENT .....	<b>ERROR! BOOKMARK NOT DEFINED.</b>
VACCINATION.....	<b>ERROR! BOOKMARK NOT DEFINED.</b>
SCHEDULE OF VACCINES AGAINST COMMON DISEASES .....	<b>ERROR! BOOKMARK NOT DEFINED.</b>
ANIMAL HUSBANDRY .....	<b>ERROR! BOOKMARK NOT DEFINED.</b>
LATEST TECHNIQUES USED FOR PLANTS.....	<b>ERROR! BOOKMARK NOT DEFINED.</b>
ROLES OF MICROBES IN HUMAN WELFARE .....	<b>ERROR! BOOKMARK NOT DEFINED.</b>
<b>MCQs Solution</b> .....	<b>306</b>
CHAPTER-1: CELL STRUCTURES & FUNCTIONS KEY.....	306
CHAPTER 02 BIOLOGICAL MOLECULES KEY.....	310
CHAPTER 03 ENZYMES KEY .....	316
CHAPTER 04 BIOENERGETICS KEY.....	318
CHAPTER 05 ACELLULAR LIFE KEY.....	322
CHAPTER 06 PROKARYOTES KEY .....	322
CHAPTER 07 PROTISTA & FUNGI KEY .....	328
CHAPTER 08 DIVERSITY AMONG PLANTS KEY.....	332
CHAPTER 09 DIVERSITY AMONG ANIMALS KEY ....	332
CHAPTER 10 FORMS & FUNCTIONS IN PLANTS KEY	332
CHAPTER 11 DIGESTION KEY.....	336
CHAPTER 12 CIRCULATION KEY.....	338
CHAPTER 13 IMMUNITY KEY.....	342
CHAPTER 14 RESPIRATION KEY .....	344
CHAPTER 15 HOMEOSTASIS KEY .....	344
CHAPTER 16 SUPPORT & MOVEMENT KEY .....	350
CHAPTER 17 NERVOUS COORDINATION KEY.....	350
CHAPTER 18 CHEMICAL COORDINATION KEY.....	359
CHAPTER 20 BEHAVIOR KEY.....	360
CHAPTER 20 REPRODUCTION KEY.....	363
CHAPTER 21 DEVELOPMENT & AGING KEY .....	363
CHAPTER 22 INHERITANCE KEY.....	363
CHAPTER 23 CHROMOSOME & DNA KEY.....	363
CHAPTER 24 EVOLUTION KEY .....	367
CHAPTER 25 MAN AND HIS ENVIRONMENT KEY....	369
CHAPTER 26 BIOTECHNOLOGY KEY.....	371
CHAPTER 27 BIOLOGY AND HUMAN WELFARE KEY	373

1)

# CHAPTER-1:

## CELL

## STRUCTURES &

## FUNCTIONS

### Techniques

- 2) In tissue culture cells are held together by **NUMS 2016**
- Callus
  - Adhesive
  - Both
  - None
- 3) Gel electrophoresis is a technique: **ETEA 2020**
- Employed by forensic scientists to assist in the identification of the individuals by their respective type of DNA
  - Collect all the genes found in one complete set of chromosome.
  - Is a technique to separate different size fragment of charge bearing polymers (Proteins, RNA or DNA)
  - Grows single cells of a group of cells in a glass ware on artificial medium under aseptic conditions,
- 4) If  $15\mu\text{m}$  size object is observed under light microscope using 5x eyepieces and 10x objective, its magnified image size will be: **MDCAT 2019**
- $50\mu\text{m}$
  - $50 \mu\text{m}$
  - $750 \mu\text{m}$
  - $500 \mu\text{m}$
- 5) A botanist who proposed the cell-theory was: **[ETEA 2012]**
- Schleiden
  - Schwann
  - Robert Hook
  - Robert Brown
- 6) The process by which various components of cells including its organelle can be isolated is called **NUMS 2018**
- Homogenization
  - Cell fractionation
  - Cell fixation
  - Cell electrophoresis
  - Ultracentrifuge
- 7) Which of the following is not a basic unit of cell? **NUMS 2016**
- Cell wall

- b. Cell membrane  
c. Nucleus  
d. Ribosome
- 8) Group of cells performing same function **NUMS 2016**
- Organelles
  - Tissue
  - System
  - Both a and b
- 9) In paper chromatography we use
- Water removed from paper
  - Water absorbed on papers
  - Data from barometer
  - Manometer
- 10) For separation of compounds from mixture use a technique called
- Micrometer
  - Microscope
  - Auriscope
  - Chromatography
- 11) **Cell wall**  
The prokaryotic cell wall composed of: **ETEA 2023**
- Cellulose
  - Chitin
  - Murein
  - Pectin
- 12) In which type of cell, Cell wall is not Present?: **ETEA 2020**
- Plant cells
  - fungal cells
  - Bacterial cells
  - Liver cells
- 13) Which of the following organelles are involved in the synthesis of plant cell Wall?: **ETEA 2020**
- Endoplasmic reticulum
  - Golgi complex
  - Lysosomes
  - Peroxisomes
- 14) Which of the following is correct for the cell wall **NUMS 2022**
- Semi-permeable
  - Differentially permeable
  - Permeable
  - Not permeable
- 15) Proper arrangement of layers in plant cell from inside to outwards is: **[ETEA 2009]**
- Primary wall - Secondary wall - middle lamella
  - Secondary wall - Primary wall - middle lamella
  - Primary wall - Middle lamella - Secondary wall
  - Secondary wall - Middle lamella - Primary wall
- 16) Polysaccharide cellulose is the building material of: **[ETEA 2013]**

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Page 201

**BOM ACADEMY Online & Swat**

- A) Primary cell-wall  
B) Secondary cell-wall  
C) Middle lamella  
D) Plasma membrane

17) The middle lamella of cell-wall is composed of:  
**[ETEA 2011]**  
(a) Cellulose  
(b) pectin  
(c) Lignin  
(d) Murein

18) In which type of cell. Cell wall is not Present?  
**MDCAT 2020**  
A) Plant cells      b) fungal cells  
c) Bacterial cells      d) Liver cells

19) Which of the following organelles are involved in the synthesis of plant cell Wall? **MDCAT 2020**  
a) Endoplasmic reticulum  
b) Golgi complex  
c) Lysosomes  
d) Peroxisomes

20) \_\_\_\_\_ organelles involve in the synthesis of plant cell wall. **NUMS 2020**  
a) Endoplasmic reticulum  
b) Golgi complex  
c) lysosomes  
d) peroxisomes

21) The outermost boundary in most of the leaf cell is: **NUMS 2018**  
a) Cell wall  
b) Cell membrane  
c) Tonoplast  
d) Unit membrane  
e) Polar substances

22) Cell wall is synthesized by **NUMS 2016**  
a. Cellulose  
b. Cell  
c. Ribosomes  
d. Penicillin binding protein

23) Secondary wall, primary wall and middle lamella are layers of plant cell  
a) From inside to outside  
b) From outside to inside  
c) These are not layers of plant  
d) Present only in gymnosperm

24) Cell wall of cells are held together by  
a) Priomary wall      b) Secondary wall  
c) Middle lamella      d) Non of these

25) The thickness of primary wall  
a) 1  $\mu$  m      b) 1 – 3  $\mu$  m  
c) 5 – 10  $\mu$  m      d) 1 mm

26) The thickness of secondary wall  
a) 1  $\mu$  m      b) 1 – 3  $\mu$  m  
c) 5 – 10  $\mu$  m      d) 1 mm

27) The thickness of middle lamella

- a) 1  $\mu$  m      b) 1 – 3  $\mu$  m  
c) 5 – 10  $\mu$  m      d) 1 mm

28) **Cell Membrane**

Where do phospholipids arrange themselves in a cell? **ETEA 2023**

- A. Inside the nucleus  
B. Inside the cytoplasm  
C. In the plasma membrane  
D. Inside the mitochondrial matrix

29) The statement "the membrane is like a sea Of lipids in which proteins are floating" represents: **ETEA 2022**

- A. Gorter & Grendel  
B. J F Dartieue & Davison Model  
C. Robertson Model  
D. S J Singer and Nicholson Model

30) According to the fluid mosaic model of cell membrane, which zone is embedded Inside?: **ETEA 2020**

- a) Hydrophobic  
b) Globular  
c) Hydrophilic  
d) Filamentous

31) Which property of water helps to maintain The integrity of cell membranes?: **ETEA 2020**  
A) Specific heat capacity  
b) hydrogen bonding  
c) Cohesion and adhesion  
d) Hydrophobic exclusion

32) lipid bilayer makes the membrane differently permeable barrier that allows the transport of: **ETEA 2019**

- a) ionic materials      b) polar materials  
c) non-polar materials      d) Glycoproteins

33) Why it is said that plasma membrane is asymmetrical **NUMS 2022**  
a. Proteins are not fixed at their position  
b. Hydrophobic tail facing inward and hydrophilic head facing outward  
c. The two surfaces and halves are not identical  
d. Cholesterol molecules are only present inside

34) Cell membrane also contain \_\_\_\_\_ through which movement of materials take place by active and passive transport **NUMS 2022**

- a. Lipid  
b. Corner  
c. Charge pores  
d. Carbohydrates

35) The \_\_\_\_\_ part of plasma membrane controls the fluidity of the membrane **NUMS 2022**

- a. Glycoprotein  
b. Carrier protein  
c. Lipid  
d. Carbohydrate

36) \_\_\_\_\_ regulates the selective permeability of the

	plasma membrane, allowing movement of molecules according to the needs of the cells. <b>ETEA 2023</b> a) Membrane proteins b) Membrane carbohydrate c) Membrane glycolipids d) Membrane cholesterol	in plasma membrane. <b>NUMS 2020</b> a) Phospholipids b) carbohydrates c) glycolipids d) proteins
37)	A special protein carrier in plasma membrane is: <b>[ETEA 2014]</b> (a) Catalase (b) Lipase (c) Permease (d) Arginase	45) Plasma membrane is named so because it surrounds <b>NUMS 2016</b> a. Semifluid cell contents b. Protoplasm c. Cell wall d. None
38)	Its membranes are the sites where sunlight energy is trapped and where all is formed refers to; <b>[2005]</b> (a) Chloroplast (b) Leucoplast (c) Chromoplast (d) Cytosol	46) Some protein are on one side of membrane called A) Intrinsic                              B) Extrinsic C) Permeases                              D) Non of these
39)	According to the fluid mosaic model of cell membrane, which zone is embedded Inside? <b>MDCAT 2020</b> a) Hydrophobic b) Globular c) Hydrophilic d) Filamentous	47) Carbohydrates attached to lipids are called a) Glycolipid                              b) Glycoprotein c) Permease                                d) lipoprotein
40)	Which property of water helps to maintain The integrity of cell membranes? <b>MDCAT 2020</b> A) Specific heat capacity b) hydrogen bonding c) Cohesion and adhesion d) Hydrophobic exclusion	48) Carbohydrates attached to proteins are called a) Glycolipid                              b) Glycoprotein c) Permease                                d) lipoprotein
41)	Fluid mosaic model of plasma membrane states that proteins molecules float in a fluid layer. <b>MDCAT 2015</b> a. Galactose b. Phospholipids c. Glucose d. Carbohydrate	49) Lipid bilayer is covered with protein and protein pores, this model was presented by a) Gorter & Grendel 1925 b) J f Danielle & Davon 1935 c) Roberston 1959 d) S J Singer & G L Nicholson 1972
42)	The basic structure of plasma membrane is provided by <b>MDCAT 2016</b> a. Proteins b. Chloesterols c. Cytoskeleton d. Phospholipids	50) Two layers of lipid molecules only, this model was presented by a) Gorter & Grendel 1925 b) J f Danielle & Davon 1935 c) Roberston 1959 d) S J Singer & G L Nicholson 1972
43)	Cholesterol molecules in plasma membrane are present in _____ <b>NUMS 2020</b> a) Outer membrane of phospholipid b) Inner membrane of phospholipid c) Both layers of phospholipid d) Between bilayers of phospholipid	51) Unit membrane model was suggested by a) Gorter & Grendel 1925 b) J f Danielle & Davon 1935 c) Roberston 1959 d) S J Singer & G L Nicholson 1972
44)	Fibers of extracellular matrix are attached to _____	52) The membrane is like sea of lipids in which proteins are floating a) Unit membrane model b) Fluid mosaic model c) Roberston model    d) Non of these
		53) Protein extending in double layer of lipids completely are called A) Intrinsic                              B) Extrinsic C) Permeases                            D) Non of these
		54) <b>Cytoplasm</b> The cytoplasm contain(s). <b>ETEA 2023</b> A. Cell organelle only B. Insoluble waste only C. Storage products only D. Cell organelle, insoluble waste and storage products
		55) In cytoplasm, small ions and molecules form

	a) True solution      b) Colloidal solution c) Neutral solution    d) suspension	b) 70S and 10S c) 50S and 30S d) 60S and 40S
56)	In cytoplasm, some large molecules form a) True solution      b) Colloidal solution c) Neutral solution    d) Suspension	66) 70S size ribosomes are found in the cells of <b>MDCAT 2020</b> a) Algae                b) Protozoans c) Fungi                d) bacteria
57)	Active mass movement of cytoplasm is called a) Cyclosis b) Amoeboid movement c) Locomotion          d) Non of these	67) Ribosomes are tiny organisms, which are involved in the synthesis of <b>MDCAT 2015</b> a. Protein b. RNA c. Nucleus d. Nucleosome
58)	<b>Ribosomes</b> Which is the factory for synthesis of sugar in autotrophic eukaryotes? <b>ETEA 2023</b> a) Mitochondria b) Chloroplast c) Ribosome d) Amyloplasts	68) Which one of the following organelle is found in both prokaryotic and eukaryotic cells? <b>MDCAT 2016</b> a. Centriole b. Endoplasmic reticulum c. Nucleus d. Ribosome
59)	70S size ribosomes are found in the cells of: <b>ETEA 2020</b> a) Algae b) Protozoans c) Fungi d) bacteria	69) _____ involved in the production of lipids and steroids. <b>MDCAT 2018</b> a. Rough E.R b. Lysosomes c. Ribosomes d. Smooth E.R
60)	The ribosomes responsible for protein synthesis are present in the cell: <b>ETEA 2019</b> a) Floating in the cytosol b) Localized in the nucleus c) Bound to rough endoplasmic reticulum d) Both a and	70) Site of protein synthesis is <b>MDCAT 2019</b> a. Ribosomes b. Lysosomes c. Golgi body d. Cisternae
61)	A group of ribosomes attached to mRNA is known as a polysome and the attachment is controlled by <b>NUMS 2022</b> a. Na <sup>+</sup> ions b. Mg <sup>++</sup> ions c. Ca <sup>++</sup> ion d. K <sup>+</sup> ions	71) The prokaryotes possess small ribosome of size: <b>MDCAT 2019</b> a. 40S b. 70S c. 65S d. 60S
62)	The attachment of two sub units of ribosomes on a single mRNA is controlled by: <b>[ETEA 2009,2010]</b> a. Mg <sup>+</sup> ions b. Na <sup>-</sup> ions c. Proteins d. Ribosomal RNA	72) The attachment of two sub-units of ribosomes along mRNA is controlled by a) Iron ion                b) Hemeoglobin c) Copper ion            d) Magnesium ion
63)	The attachment of two sub-units of ribosome along mRNA is controlled? <b>[ETEA 2009]</b> (a) Sodium ions (b) Calcium ions (c) Potassium ions (d) Magnesium ions	73) Size of ribosome in prokaryotic cell is a) 70S                    b) 80S c) Both                    d) Non of these
64)	The size of ribosome in prokaryotic cell is: <b>[ETEA 2009]</b> a. 40s                    b. 60 s c. 70s                    d. 80 s	74) Size of ribosome in eukaryotic cell is a) 70S                    b) 80S c) Both                    d) Non of these
65)	80-S" ribosome is formed by the combination of: <b>[ETEA 2015]</b> a) 30S and 40S	75) Ribosomes are synthesized in a) Peroxisome b) Endoplasmic reticulum c) Nucleus d) Nucleolus of nucleus
		76) The two sub units of ribosomes are attached by a) Mg <sup>++</sup> b) Ca <sup>++</sup>

BOM SERIES		Page 204	BOM ACADEMY Online & Swat
77)	c) Fe <sup>++</sup> Diameter of ribosome a) 4 -6 $\mu$ m c) 20 nm	d) Non of these b) 10 $\mu$ m d) Non of these	Ribosome Rough endoplasmic reticulum smooth endoplasmic reticulum
78)	Function of rough endoplasmic reticulum a) Lipid synthesises c) Detoxification	b) Protein synthesises d) circulation	87) The rough endoplasmic reticulum is involved in the synthesis of; <b>2005]</b> (a) Proteins (b) Carbohydrates (c) Phospholipids (d) Terpenoids
79)	<b>Endoplasmic reticulum</b>		88) The organelle involved in detoxification of drugs and poisons in the liver cells is <b>MDCAT 2016</b> a. Smooth endoplasmic reticulum b. Rough endoplasmic reticulum c. Golgi apparatus d. Lysosomes
80)	Detoxification drug is the main role Of; <b>ETEA 2022</b>	A. Ribosome B. Golgi bodies C. Mitochondria D. Endoplasmic reticulum	89) Smooth endoplasmic reticulum is responsible for the metabolism of <b>MDCAT 2019</b> a. Carbohydrates b. Proteins c. Nucleic acids d. Lipids
81)	Select the one which is not a function of Smooth Endoplasmic Reticulum (SER)? : <b>ETEA 2020</b>	a) Metabolism of lipids b) Transmission of impulses c) Transport of materials d) Processing of glycoproteins	90) _____ is involved in lipids synthesis / metabolism <b>NUMS 2019</b> a) Smooth endoplasmic reticulum b) Rough endoplasmic reticulum c) Mitochondria d) Vacuoles
82)	Select the one which is not a function of Smooth Endoplasmic Reticulum (SER)? <b>MDCAT 2020</b>	a) Metabolism of lipids b) Transmission of impulses c) Transport of materials d) Processing of glycoproteins	91) _____ is involved in lipids synthesis / metabolism <b>NUMS 2019</b> a) Smooth endoplasmic reticulum b) Rough endoplasmic reticulum c) Mitochondria d) Vacuoles
83)	The enzymes of lysosomes are synthesized on <b>NUMS 2019</b>	a) PER b) SER c) Chloroplast d) Golgi apparatus	92) The difference between the rough Endoplasmic reticulum and smooth endoplasmic reticulum is due to the presence of <b>FMDC 2012</b> a. mesosomes b. Ribosomes c. Golgi bodies d. mitochondria
84)	Smooth endoplasmic reticulum makes: <b>ETEA 2012]</b>	(a) Enzymes (b) Protein (c) Sugar (d) Lipids	93) Channels of endoplasmic reticulum are separated from one another by spherical or tubular membranes one above another called a) Vesicle                                  b) Crista c) Cisternae                                d) Non of these
85)	Detoxification of the drugs is a function of ----- in a cell. <b>NUMS 2016</b>	a. R.E.R b. S.E.R c. Liver cells d. Lysosome	94) Circulation, syntheses, detoxification, mechanical support and communication a) Peroxisome b) Endoplasmic reticulum c) Nucleus                                    d) cytoplasm
86)	A cell fails to detoxify the waste substances produced in it because it does not possess enough: <b>ETEA 2006]</b> Lysosomes		95) RER synthesizes a) Protein

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- b) Primary lysosome  
c) Protein and primary lysosome  
d) Lipids

**96) Golgi apparatus**

consists of units called dictyosomes: **ETEA 2023**

- A. Ribosomes  
B. Lysosomes  
C. Glyoximes  
D. Golgi Complex

**97) Which organelle would be more abundant in the secretory cell than the non-secretory cell:**

**NUMS 2022**

- a. Lysosome  
b. Golgi complex  
c. Vacuole  
d. Centrioles

**98) Which one of the following cell structure is involved in the synthesis of lipids?**

**MDCAT 2015**

- a. Endoplasmic reticulum  
b. Golgi complex  
c. Centriole  
d. Mitochondria

**99) Which cell organelle is responsible for cell secretion?**

**MDCAT 2019**

- a. Mitochondrion  
b. Chloroplast  
c. Ribosome  
d. Golgi body

**100) Inner concave surface of golgi complex is called \_\_\_\_ face**

**NUMS 2019**

- a) Ending  
b) Forming  
c) Starting  
d) Maturing

**101) In human, cell \_\_\_\_ is responsible for producing hydrogen peroxides**

**NUMS 2018**

- a) Lysosomes  
b) Mitochondria  
c) Peroxisomes  
d) Glyoxisomes

**102) Fatty acids are converted into carbohydrates by;**

**ETEA 2010]**

- a. Glyoxosome  
b. Bile juice  
c. Pancreatic juice  
d. Lysosomes

**103) The cisternae together with vesicles are called**

- a) Multi cisternae      b) Golgi complex  
c) Cirovasicle      d) Non of these

**104) Primary lysosomes are synthesized in RER and processed in**

- a) Peroxisome

Page 205

**BOM ACADEMY Online & Swat**

- b) Endoplasmic reticulum  
c) Nucleus      d) Golgi apparatus

**105) The unit of Golgi apparatus**

- a) Dictyosomes      b) Permease  
c) Cisternae      d) Vesicle

**106) Stacks of flattened, membrane bounded sacs called**

- a) Vesicle      b) Crista  
c) Cisternae      d) Non of these

**107) Glyoxisomes contains**

- a) Glycolic acid      b) Catalase  
c) Urease      d) All of these

**108) Enzymes are budded off as Golgi vesicles and are called**

- a) Lysosome      b) Primary lysosome  
c) Secondary lysosome      d) All of these

**109) Cell fail to detoxify the waste substances produced in it because it does not posses enough**

- a) SER      b) RER  
c) Mitochondria      d) peroxisomes

**110) Lysosome**

Storage diseases are caused by the excessive accumulation of substances within the cell, due to defects (mutations) in one of the enzymes. **ETEA 2023**

- a) Amylase  
b) Lysosomal  
c) Lyase  
d) Lipase

**111) Tay-sach's disease particularly results from the malfunctioning of:** **ETEA 2023**

- A. Cell membrane  
B. Nucleus  
C. Lysosomes  
D. Vacuole

**112) ..... are spherical sacs surrounded by a single membrane and containing hydrolytic enzymes**

**NUMS 2022**

- a. Mitochondria  
b. Golgi bodies  
c. Lysosome  
d. Chloroplast

**113) The enzyme present in the lysosome are synthesized in the**

**MDCAT 2018**

- a. Golgi apparatus  
b. Cytoplasm  
c. Rough endoplasmic reticulum  
d. Nucleus

**114) Role of lysosomes are:**

**NUMS 2017**

- a) Hydrolytic enzymes  
b) Autophagy  
c) Destruction of cell  
d) All of above

**115) Role of lysosomes are:** **FMDC 2015**

- a) Hydrolytic enzymes  
 b) Autophagy  
 c) Destruction of cell  
 d) All of above

**116) Peroxisome**

Which one of the following is found in plant cells only? **ETEA 2006]**

- a. Peroxisome      b. Lysosome  
 c. Glyoxisome      d. Ribosome

**117) Peroxisomes **NUMS 2019****

- a) Protect cell from toxic materials  
 b) Digest cell  
 c) Break down fatty acids  
 d) Both A and C

118) In cell one organelle are involved in function of other except endoplasmic reticulum and  
 a) Peroxisome  
 b) Endoplasmic reticulum  
 c) Nucleus  
 d) Golgi apparatus

119) In animals peroxisomes are present in  
 a) Liver      b) Kidney  
 c) Both a and b      d) Only in heart

**120) Cytoskeleton**

Which one of the following is most cylindrical in structure? **MDCAT 2018**

- a. Microtubules  
 b. Intermediate filaments  
 c. Micro filaments  
 d. Both A & B

**121) Centrioles**

Select the organelle which is only present in animal cells: **MDCAT 2017**

- a. Centrioles  
 b. P.E.R  
 c. Microtubules  
 d. Ribsosomes

122) W.O.F structures is present in both plant and animal cells but is absent in prokaryotic cells **MDCAT 2017**

- a. centrioles  
 b. microtubules  
 c. plastids  
 d. sieve-tubes

123) The number of flagella in mammalian spermatozoon

- a) 1      b) 2      c) 500      d) Few thousands

124) The number of flagella in chlamydomonas

- a) 1      b) 2      c) 500      d) Few thousands

125) The number of flagella in paramecium

- a) 1      b) 2      c) 500      d) Few thousands

126) Each centriole consist of ..... microtubules

- a) 3      b) 6      c) 9      d) 27

127) In cells two centrioles are present at

- a) Parallel to each other  
 b) Right angle to each other  
 c) At opposite poles  
 d) Centre of nucleus

128) The subunit of microtubules

- a) Tubulin protein      b) Actin protein  
 c) Fibrous      d) Non of these

129) The subunit of micro filament

- a) Tubulin protein      b) Actin protein  
 c) Fibrous      d) Non of these

130) The subunit of intermediate filaments

- a) Tubulin protein      b) Actin protein  
 c) Fibrous      d) Non of these

131) The central bundle of microtubules in cilia is called

- a) Centroid      b) Nucleoid  
 c) Axoneme      d) Non of these

132) The bundles of microtubules comprising the axoneme are surrounded by

- a) Plasma membrane  
 b) Nuclear membrane  
 c) Triple membrane  
 d) Single membrane

133) The place where spindle fibers are attached is

- a) Centromere      b) Chloroplast  
 c) Chromosomes      d) All of these

134) Length and diameter of centriole

- a) 0.3-0.5  $\mu$ m and 0.5  $\mu$ m  
 b) 0.5  $\mu$ m and 0.2  $\mu$ m  
 c) 0.3-0.5  $\mu$ m and 0.2  $\mu$ m  
 d) 0.3-0.5  $\mu$ m and 2  $\mu$ m

135) Diameter of chloroplast

- a) 4 -6  $\mu$ m      b) 10  $\mu$ m  
 c) 20 n m      d) Non of these

**136) Mitochondria**

Which of the following organelle is regarded as self-replicating organelle: **ETEA 2023**

- A) Endoplasmic reticulum  
 B) Golgi Bodies  
 C) Mitochondria  
 D) Vacuole

137) Mitochondria is usually absent in: **ETEA 2023**

- A. Muscle cells  
 B. Cardiac cells  
 C. Mature RBC's  
 D. WBC's

138) Mitochondria was first seen as granules in: **ETEA 2022**

- A. White Blood cells  
 B. Red blood cells  
 C. Muscle cells  
 D. Liver cells

139) The enzyme ATP synthase is located on the membrane of the organelle **NUMS 2022**

- a. Nucleus  
 b. Mitochondria

c. Lysosome d. Vacuole	a) Protein is synthesized here b) Lipid and Protein is synthesized here c) carbohydrates and Protein is synthesized here d) all of these																								
140) Which organelle is bounded by two membranes? <b>MDCAT 2015</b> a. Ribosome b. Mitochondria c. Lysosome d. Nucleolus	148) Mitochondria is absent in a) Mature WBCs      b) Mature RBCs c) Mature platelets    d) Immature RBCs																								
141) The inner membrane of mitochondria form extensive infoldings called: : <b>MDCAT 2016</b> a. cristae b. cisternae c. lamella d. bifidae	149) Mitochondria are also called a) Power house of the cell b) Power room of the cell c) Power car of the cell d) Generator of the cell																								
142) The finger like infoldings which are formed by inner membrane of mitochondria are called: <b>MDCAT 2019</b> a. Matrix b. Porin c. Cristae d. Ribosomes	150) The shapes of mitochondria may be a) Vesicles      b) Rods c) Filaments      d) All of these																								
143) Select the pair of organs which contain a large number of mitochondria. <b>NUMS 2020</b> a) Stomach and liver b) muscle and stomach c) heart and liver d) liver and muscle	151) <b>Plastids</b> The chloroplasts contain: <b>ETEA 2022</b> A. proteins only B. Ribosomes only C. Small circular DNA only D. proteins and small circular DNA																								
144) Which of the following correctly shows structures which are found in a eukaryotic cell? (yes present; No = absent) <b>NUMS 2018</b> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th></th> <th>Nuclear membrane</th> <th>Mitochondria</th> <th>Ribosomes</th> </tr> </thead> <tbody> <tr> <td>a</td> <td>No</td> <td>No</td> <td>No</td> </tr> <tr> <td>b</td> <td>No</td> <td>Yes</td> <td>No</td> </tr> <tr> <td>c</td> <td>Yes</td> <td>No</td> <td>No</td> </tr> <tr> <td>d</td> <td>Yes</td> <td>No</td> <td>Yes</td> </tr> <tr> <td>e</td> <td>Yes</td> <td>Yes</td> <td>yes</td> </tr> </tbody> </table> a) No      no      no b) No      yes      no c) Yes      no      no d) Yes      no      yes e) Yes      yes      yes		Nuclear membrane	Mitochondria	Ribosomes	a	No	No	No	b	No	Yes	No	c	Yes	No	No	d	Yes	No	Yes	e	Yes	Yes	yes	152) Magnesium is an important nutrient in plants for the formation of <b>NUMS 2022</b> a. Proteins b. Lipids c. Chlorophylls d. Enzymes
	Nuclear membrane	Mitochondria	Ribosomes																						
a	No	No	No																						
b	No	Yes	No																						
c	Yes	No	No																						
d	Yes	No	Yes																						
e	Yes	Yes	yes																						
145) DNA is found in which of the following? <b>NUMS 2016</b> a. Golgi complex b. Lysosomes c. Mitochondria d. Ribosomes	153) All types of plastids are produced from: <b>ETEA 2010]</b> (a) Chloroplasts (b) Proplastids (c) Chromoplasts (d) Leucoplasts																								
146) Small knob structures on inner surface mitochondria is called a) Elementary particle b) F1 particle c) Both a and b      d) Non of these	154) Potatoe plastids, which store starch, are known as: <b>ETEA 2013]</b> (a) Paramylum (b) Amyloplasts (c) Leucoplasts (d) glycoplasts																								
147) The presence of ribosomes and DNA indicate that	Anthocyanins are various types of colourful pigments present in the: <b>ETEA 2011]</b> (a) chloroplasts (b) chromoplasts (c) leucoplasts (d) vacuoles																								
	155) The chloroplast size is about. <b>ETEA 2015]</b> A) 1-2 $\mu\text{M}$ B) 2-4 $\mu\text{M}$ C) 4-6 $\mu\text{M}$ D) 6-8 $\mu\text{M}$																								
	156) _____ organelle is bounded by single membrane <b>MDCAT 2018</b> a. Nucleus b. Vacuole c. Chloroplast d. Mitochondria																								

- 157) Among followings which cellular organelle contains circular DNA similar to those found in bacteria? **MDCAT 2019**
- Ribosome
  - Lysosome
  - Chloroplast
  - Nucleus
- 
- 158) Plant cells synthesize sugar in the: **ETEA 2011**
- Thylakoid
  - grana
  - stroma
  - crista
- 
- 159) Which of these single membrane bound organelles does not contain enzymes? **NUMS 2019**
- Glyoxisome
  - Peroxisomes
  - Lysosomes
  - None
- 
- 160) Chloroplast is present in
- Green parts of plants
  - Other than green parts
  - Colourless parts
  - All of these
- 
- 161) Chromoplast is present in
- Green parts of plants
  - Other than green parts
  - Colourless parts
  - All of these
- 
- 162) Leucoplast are present in
- Green parts of plants
  - Other than green parts
  - Colourless parts
  - All of these
- 
- 163) The average number of thylakoids to form one granum is
- 30
  - 40 or more
  - 50
  - 50 or more
- 
- 164) Chloroplast and mitochondria are
- Same organelle
  - Self replicating organelle
  - Separate organism
  - Separate tissues
- 
- 165) Glyoxisomes and plastids are unique organelle found in
- Plants
  - Animals
  - Both
  - bacteria
- 
- 166) **Nucleus**  
Function of the nucleolus is to form: **ETEA 2023**
- Nuclear envelope
  - Chromosome
  - rRNA
  - cytoplasm
- 
- 167) The colloidal mixture of ions, organic and inorganic salts present in the nucleus is called: **ETEA 2022**
- Nuclear membrane
  - Nucleolus
  - Nucleoplasm
  - Chromosome
- 
- 168) Within the nucleus, \_\_\_\_\_ are made by the
- nucleus **NUMS 2022**
- Ribosome
  - mRNA
  - protein
  - enzymes
- 
- 169) Nucleus was discovered by: **[ETEA 2013]**
- Waldyar
  - T.H. Margan
  - Robert Brown
  - Kohler
- 
- 170) The growth and reproduction of eukaryotic cell is dependent upon its; **ETEA 2005**
- Cytoplasm
  - Nucleus
  - Vacuoles
  - Nuclear pores
- 
- 171) The structure present in a eukaryotic cell but absent in prokaryotic cells is **MDCAT 2019**
- Nucleus
  - DNA
  - Ribosomes
  - Cell surface membrane
- 
- 172) Which of the following cells does not have nucleus? **NUMS 2020**
- Muscle cell
  - nerve cell
  - white blood cell
  - red blood cell
- 
- 173) Which type of RNA is most abundant in the cell? **NUMS 2019**
- mRNA
  - tRNA
  - rRNA
  - sRNA
- 
- 174) Diameter of nucleus
- 4 - 6  $\mu$  m
  - 10  $\mu$  m
  - 20 nm
  - Non of these
- 
- 175) The number of chromosomes is 8 in
- Drosophila
  - Garden pea
  - Onion
  - Frog
- 
- 176) The number of chromosomes in chimpanzee is
- 46
  - 48
  - 48
  - 80
- 
- 177) The number of chromosomes in man is
- 46
  - 48
  - 48
  - 80
- 
- 178) The number of chromosomes in potato is
- 46
  - 48
  - 48
  - 80
- 
- 179) The number of chromosomes in pigeon is
- 46
  - 48
  - 48
  - 80
- 
- 180) The number of chromosomes in frog
- 46
  - 48
  - 48
  - 80
- 
- 181) Cilia and flagella contain ..... microtubules
- 10
  - 20
  - 30
  - 40
- 
- 182) **Vacuole**  
The membrane separating the vacuole From

<p>cytoplasm is called : <b>ETEA 2020</b></p> <p>a) Cristae b) Cisternae c) Tonoplast d) vacuolar membrane</p>	<p>d. Single, circular, double stranded, membrane bound</p>				
<p>183) Which of the following terms is used to describe the membrane of central vacuole? <b>NUMS 2018</b></p> <p>a) Tonopisat b) Myoplast c) Periplast d) Epitonoplast</p>	<p>186) <b>Prokaryotic and Eukaryotic cell</b> Central large vacuole is the characteristic of _____. <b>MDCAT 2018</b></p> <p>a. Bacteria b. Animal &amp; plant cell c. Plant cell d. Animal cell</p>				
<p>184) The membrane separating the vacuole From cytoplasm is called <b>MDCAT 2020</b></p> <p>a) Cristae b) Cisternae c) Tonoplast d) vacuolar membrane</p>	<p>187) Prokaryotic Cell wall is made of</p> <table border="0" style="width: 100%;"> <tr> <td style="width: 50%;">a) Cellulose</td> <td style="width: 50%;">b) Chitin</td> </tr> <tr> <td>c) Glycogen</td> <td>d) Murein</td> </tr> </table>	a) Cellulose	b) Chitin	c) Glycogen	d) Murein
a) Cellulose	b) Chitin				
c) Glycogen	d) Murein				
<p>185) DNA molecule in prokaryotes is <b>MDCAT 2017</b></p> <p>a. Single, circular, double stranded molecule not bound by membrane b. Double , circular molecule c. Linear double stranded molecule</p>	<p>188) Eukaryotic Cell wall is made of</p> <table border="0" style="width: 100%;"> <tr> <td style="width: 50%;">a) Cellulose</td> <td style="width: 50%;">b) Chitin</td> </tr> <tr> <td>c) Glycogen</td> <td>d) Murein</td> </tr> </table>	a) Cellulose	b) Chitin	c) Glycogen	d) Murein
a) Cellulose	b) Chitin				
c) Glycogen	d) Murein				
 <p><b>CHAPTER 02</b> <b>BIOLOGICAL MOLECULES</b></p>	<p>A) Cohesion B) Adhesion C) Tension D) Transpiration</p> <p>4) Water act as universal solvent because of : <b>ETEA 2020</b></p> <p>a) Heat of vaporization b) hydrogen bonding c) high polarity d) Cohesion and adhesion</p> <p>5) Due to its high heat of vaporization water plays important role in living organism as <b>NUMS 2022</b></p> <p>a. Being an excelleng solvent b. Cooling agent c. Membrane stabilizer d. Thermal shock resistor</p> <p>6) Amount of DNA in bacterial cell is: <b>ETEA 2013]</b></p> <p>(a) 1% (b) 2% (c) 3% (d) 4%</p> <p>7) What is %age of carbohydrates in the mammalian Cell per total cell weight; <b>ETEA 2015]</b></p> <p>(a) 2 (b) 4 (c) 8 (d) 18</p> <p>8) Second most abundant bio element in human</p>				

body is	hexose
a) Oxygen      b) carbon	a) Erythrolose      b) Ribulose
c) hydrogen    d) Nitrogen	c) Fructose      d) sceloheptose
9) The most abundant element present in human body is. <b>ETEA 2022</b> A) sulphur      B) nitrogen C) carbon      D) manganese	23) Which one of the following is example of keto heptose a) Erythrolose      b) Ribulose c) Fructose      d) sceloheptose
10) The four types of fundamental biological molecules present in protoplasm are carbohydrates, proteins, lipids and ____ <b>ETEA 2022</b> A) Enzymes      B) Hormones C) Nucleic acids    D) Alkaloids	24) Fats composed of fatty acid and glycerol are converted to fats for storage by process called a) Lipogenesis      b) Lipolysis c) Glucogenesis      d) Gluconeogenesis
11) Hydrolysis is the breakdown of polymer into its monomers by the addition of <b>NUMS 2022</b> a.      Hydroxyl group b.      Hydrogen c.      Water d.      Nitrogen	25) If glucose energy levels are low, stored are converted to glycerol and fatty acid by a process called a) Lipogenesis      b) Lipolysis c) Glucogenesis      d) Gluconeogenesis
12) Most abundant component of protoplasm are a) Water      b) Protein c) Carbohydrate    d) Lipids	26) Surplus amino acid in the body are broken down to form urea in a) Stomach      b) Liver c) Kidney      d) Heart
13) Which one of th following is type of carotenoids a) Carotenes      b) Xanthophylls c) Carotene and xanthophyll d) Isoprenoid units	27) <b>Carbohydrates</b> Glucose is classified as a ____ ? <b>ETEA 2023</b> a) Monosaccharide b) Disaccharide c) Oligosaccharide d) Polysaccharide
14) In aldehydes the double bond is present at a) Ist carbon atom b) Second carbon atom c) Third carbon atom d) At any place	28) Which of the following is the opposite of condensation reaction? <b>ETEA 2023</b> a) Decarboxylation b) Hydration c) Dehydration d) Hydrolysis
15) In sickle cell haemoglobin, glutamic acid is replaced by a) Valine      b) Alinine c) Cytocine      d) Non of these	29) Sucrose is hydrolyzed into: <b>ETEA 2023</b> a) Lactose and glucose b) Lactose and fructose c) Glucose and fructose d) Glucose and galactose
16) Carotenoids are of ..... Types a) 2      b) 3      c) 4      d) 5	30) _____ is found in the exoskeleton of crabs: <b>ETEA 2023</b> A) Cellulose B) Chitin C) Murein D) Hemi-cellulose
17) In DNA spiral stair case wound around a a) Central axis      b) End c) Lipids      d) carbohydrates	31) . Lactose is composed of: <b>ETEA 2023</b> A) Glucose + Fructose B) Glucose + galactose C) Glucose + Glucose D) Fructose + Galactose
18) Diameter of DNA a) 2 nm      b) 10nm c) 30 nm      d) 200 nm	32) The glycerol is a ____ carbon compound <b>ETEA 2022</b> A) Three      b) Four C) Five      d) Six
19) Maltose ,lactose and sucrose are a) Monosaccharides      b) Disaccharides c) Trisaccharides      d) oligosaccharides	33) Monosaccharides have a general formula Represented by : <b>ETEA 2020</b>
20) Monosaccharides are named which end with a) ase      b) ose c) ese      d) ate	
21) Which one of the following is example of keto pentose a) Erythrolose      b) Ribulose c) Fructose      d) sceloheptose	
22) Which one of the following is example of keto	

a) $C_n(H_2O)_n$	b) $C(H_2O)_n$
c) $C_2(H_2O)_n$	d) $C^2(H_2O)_n$
34) _____ is stored in animal cells: <b>ETEA 2019</b>	
a) Starch	b) cellulose
c) sucrose	d) glycogen
35) The bond that is formed between two monosaccharide units is called	
a) ionic bond	b) hydrogen bond
c) peptide bond	d) Glycosidic bond
36) Which of the following is not a carbohydrate <b>NUMS 2022</b>	
a. Glucose ( $C_2H_{12}O_6$ )	
b. Sucrose ( $C_2H_2O$ )	
c. Rhamnose ( $C_5H_{12}O_5$ )	
d. Lactic acid ( $C_2H_6O_3$ )	
37) Which of the following molecules would yield glucose and fructose on hydrolysis? <b>NUMS 2022</b>	
a. Starch	
b. Maltose	
c. Sucrose	
d. Lactose	
38) The covalent bond or bridge between two monosaccharides to form a disaccharide is called a <b>MDCAT 2019</b>	
a. Carboxyl bond	
b. Hydroxyl bond	
c. Hydrogen bond	
d. Glycosidic bond	
39) Starch is present in tuber, fruits and grains but absent in animal cells, instead animals have a substance stored in liver and muscles known as <b>MDCAT 2019</b>	
a. Glucose	
b. Glycogen	
c. Galactose	
d. Glucagon	
40) Oligosaccharides class of carbohydrates contain monosaccharide's of about: <b>ETEA 2015]</b>	
A) 2 to 8 units	
B) 2 to 9 units	
C) 2 to 10 units	
D) 2 to 11 units	
41) Sucrose on hydrolysis yield: <b>ETEA 2015]</b>	
a) Glucose	
B) Glucose and fructose	
C) Glucose and maltose	
D) Maltose and fructose	
42) Lactose, maltose and sucrose are the important; <b>ETEA 2005]</b>	
(a) Polysaccharides	
(b) Disaccharides	
(c) Monosaccharides	
(d) Oligosaccharides	
43) Sucrose is considered as: <b>[ETEA</b>	
<b>2012- 2014]</b>	
a) Monosaccharide	
b) Disaccharides	
c) Polysaccharides	
d) None of these	
44) Conversion of excess glucose into fat is known as: <b>ETEA 2012]</b>	
(a) Glycolysis	
(b) Lipogenesis	
(c) Ketogenesis	
(d) Glycogenesis	
45) Sucrose sugar is considered as: <b>ETEA 2012]</b>	
Monosaccharide	
(b) Oligosaccharides	
(c) Polysaccharides	
(d) All of the above	
46) All of the following are polysaccharides except: <b>ETEA 2012]</b>	
(a) Lactose	(b) Cellulose
(c) Starch	(d) Glucose
47) All of the following are polysaccharides EXCEPT: <b>ETEA 2010]</b>	
(a) Cellulose	
(b) Glycogen	
(c) Starch	
(d) Lactose	
48) All of the following are carbohydrate EXCEPT: <b>ETEA 2009]</b>	
(a) Glycogen	(b) Collagen
(c) Starch	(d) Cellulose
49) Monosaccharides have a general formula Represented by <b>MDCAT 2020</b>	
a) $C_n(H_2O)_n$	
b) $C(H_2O)_n$	
c) $C_2(H_2O)_n$	
d) $C^2(H_2O)_n$	
50) The compounds which on hydrolysis yield polyhydroxy aldehyde or ketone subunits are <b>MDCAT 2016</b>	
a. Lipids	
b. Proteins	
c. Polynucleotides	
d. Carbohydrates	
51) _____ are the specific structures related to monosaccharides: <b>MDCAT 2017</b>	
a. Glycosidic bond	
b. Keto group	
c. Maltose	
d. Fructose	
52) _____ are the major site for storage of glycogen in animal's body <b>MDCAT 2017</b>	
a. Muscle and liver	
b. Around things and belly	
c. Around belly and hips	
d. Liver and kidneys	

- 53) A giant molecule made from many similar repeating subunit is **MDCAT 2018**  
 a. Macromolecule  
 b. Polymer  
 c. Dimer  
 d. Monomer
- 54) Which carbohydrate is the main structural component of cell wall in plants? **MDCAT 2018**  
 a. Cellulose  
 b. Sucrose  
 c. Glycogen  
 d. Starch
- 55) Which of the following has 40 chromosomes?  
**MDCAT 2018**  
 a. Corn  
 b. Sugarcane  
 c. Frog  
 d. Mouse
- 56) Which is an example of a Disaccharide?  
**MDCAT 2019**  
 a. Lactose  
 b. Glycogen  
 c. Starch  
 d. Fructose
- 57) Glucose and fructose join together through \_\_\_\_\_ to form sucrose **NUMS 2019**  
 a) 1,4 glycosidic linkage  
 b) 1,6 glycosidic linkage  
 c) 1,2 glycosidic linkage  
 d) 1,3 glycosidic linkage
- 58) The most abundant organic molecule on the planet earth is **NUMS 2016**  
 a. Starch  
 b. Glycogen  
 c. Glucose  
 d. Cellulose
- 59) Monosaccharides have carbon that may contain ..... Carbon atoms  
 a) 3-4    b) 3-5  
 c) 3-6    d) 3-7
- 60) Maltose are present in  
 a) Fruits    b) Milk  
 c) Sugarcane                                        d) All of these
- 61) Lactose are found in  
 a) Fruits    b) Milk  
 c) Sugarcane                                        d) All of these
- 62) Sucrose are mostly present in  
 a) Fruits    b) Milk  
 c) Sugarcane                                        d) All of these
- 63) The components of maltose is  
 a) Glucose + Glucose                            b) Glucose + Galactose  
 c) Glucose + Fructose                            d) Fructose + fructose
- 64) The components of lactose is
- 65) The components of sucrose is  
 a) Glucose + Glucose                            b) Glucose + Galactose  
 c) Glucose + Fructose                            d) Fructose + fructose
- 66) Cellulose and Chitin are  
 a) Digestible                                        b) Not digestible  
 c) Only cellulose are not digestible  
 d) Only chitin are not digestible
- 67) The amount of glucose present in per 100 ml of blood is  
 a) 100 mg    b) 10 mg  
 c) 50 mg     d) 130 mg
- 68) Types of amino acids  
 a) 5    b) 10    c) 15    d) 20
- 69) No of carbons in oligosaccharides  
 a) 24    b) 2-6    c) 2-8    d) 2-10
- 70) Grapes contain .....% glucose  
 a) 11    b) 13    c) 17    d) 27
- 71) Haemoglobin consists of ..... polypeptide chain  
 a) 2    b) 4    c) 6    d) 8
- 72) Insulin consists of ..... polypeptide chain  
 a) 2    b) 4    c) 6    d) 8
- 73) In DNA the bond between Adenine(A) and Thiamine(T) is  
 a) Single    b) Double  
 c) Triple    d) Ionic
- 74) In DNA the bond between Cytosine(C) and Guanine(G) is  
 a) Single    b) Double  
 c) Triple    d) Ionic
- 75) Anticodon of UAG will be  
 a) AUC    b) AUA  
 c) AUG    d) It has no anticodons
- 76) The number of carbon atoms present in fatty acids in per molecule  
 a) 12-14    b) 14-16  
 c) 16-18    d) 18-20
- 77) **Proteins**  
 In sickle cell, haemoglobin molecule, glutamic acid, is replaced by: **ETEA 2023**  
 A) Proline –  
 B) Glutamine  
 C) Valine  
 D) Glycine
- 78) Amino acids mainly differ from each other by the difference in their: **ETEA 2023**  
 A. Rgroup  
 B. Amino group  
 C. Carboxyl group  
 D. Hydrogen of alpha carbon
- 79) Proteins are macromolecules formed of units known as amino acids. The amino acids in which

the variable group (R) is represented by an H atom is. <b>ETEA 2022</b> A) Lysin B) Phenylalanine C) Glycine D) Alanine	a. 20 b. 170 c. 25 d. 200 <b>89)</b> Most proteins are made up of <b>MDCAT 2019</b> a. 16 types of amino acids b. 10 types of amino acids c. 170 types of amino acids d. 20 types of amino acids
<b>80)</b> A haemoglobin molecule consists of Amino acids: <b>ETEA 2022</b> A) 874      B) 474 C) 674      D) 574	<b>90)</b> Most simple amino acid is: <b>NUMS 2019</b> a) Alanine b) Valine c) Glycine d) Lycine
<b>81)</b> The most common protein in nature is <b>ETEA 2022</b> A) collagen b) rubisco C) DNAase D) keratin	<b>91)</b> Which of the following is not the function of proteins? <b>NUMS 2019</b> a) Protection b) Transport c) Catalysis d) Information storage
<b>82)</b> Which of the following molecule contains amino acid? <b>NUMS 2022</b> a. Cellulose b. Collagen c. Sucrose d. Ascorbic acid	<b>92)</b> The helical structure of a protein is kept by formation of hydrogen bond between amino acid molecules which are <b>NUMS 2015</b> a) Adjacent to each other b) In successive turns of spiral c) Between two different polypeptide chains d) None of given
<b>83)</b> Haemoglobin exhibits <b>NUMS 2016</b> a. Secondary structure b. Primary structure c. Quarternary structure d. Tertiary structure	<b>93)</b> reactive parts of an amino acid are <b>NUMS 2015</b> a) alpha carbon & amino group b) amino group & carboxyl group c) carboxyl group & R group d) R group & alpha carbon
<b>84)</b> In glycine R is _____: <b>MDCAT 2019</b> a. fatty acid b. ethane c. hydrogen d. methane	<b>94)</b> <b>HIV-1 protease is an enzyme produced by the HIV virus. Two identical chains of 99 amino acids form the enzyme. In each chain, amino acids 25, 25 and 27 in the sequence form part of the active site. Which orders of protein structure control the shape of the active site?</b> <b>FMDC 2017</b> a) Primary, secondary, tertiary and quaternary b) Primary, secondary and tertiary only c) Primary and quaternary only d) Quaternary only
<b>85)</b> Peptide bond is formed between: <b>ETEA 2009</b> (a) Hydrogen groups of adjacent amino acids (b) Functional group of the amino acids (c) Carboxyl group and Amino group. (d) Functional group & hydrogen group of adjacent amino acid..	<b>95)</b> <b>Amino Acids are linked together by:</b> <b>FMDC 2017</b> a) Hydrogen Bonds b) Ionic bonds c) Peptide bonds d) Glycosidic bonds
<b>86)</b> The enormous diversity of protein molecules is mostly due to the diversity of ; <b>ETEA 2005</b> (a) Amino groups on the amino acids (b) R groups on the amino acids (c) Peptide bonds (d) Amino acids sequences within protein molecules	<b>96)</b> Albumin is an example of: <b>KMU-CAT 2021</b>
<b>87)</b> The number of amino acids that have been found to occur in cells and tissues are <b>MDCAT 2017</b> a. 170 b. 20 c. 25 d. 40	
<b>88)</b> Most proteins are made up of _____ type of amino acids: <b>MDCAT 2017</b>	

A) Conjugated proteins B) Simple proteins C) Both (A) & (B) D) None of the above	<b>2021</b> A) Primary structure b) Secondary structure C) Tertiary structure D) Quaternary structure
97) High molecular mass compound was hydrolyzed the product was analyzed and found to be amino acid. The compound is: <b>ETEA 2014]</b> (a) Protein (b) Carbohydrate (c) Lipid (d) Vitamins	106) The enormous diversity of protein is mostly due to the diversity of a) COOH b) R group c) NH <sub>2</sub> d) Non of these
98) Keratinized Epithelium is found in the: <b>ETEA 2013]</b> (a) Hair (b) Skin (c) Bone (d) Muscle	107) Which one of the following is fibrous protein? a) Keratin b) Myosin c) Collage d) All of these
99) A single molecule of haemoglobin is composed of: <b>ETEA 2013]</b> (a) Three polypeptide chains (b) Four polypeptide chains (c) Five polypeptide chains (d) Six polypeptide chains	108) Which one of the following is globular protein? a) Haemoglobin b) Enzyme and antibodies c) Egg albumin d) All of these
100) A coiled hemoglobin is called: <b>ETEA 2009]</b> (a) Haemocyanine (b) Haemoprotein (c) Myoglobin (d) Haemorrhoids	109) Types of proteins a) 2 b) 3 c) 4 d) 5
101) Secondary structure of protein is found in <b>MDCAT 2016</b> a. Trypsin b. Keratin c. Insulin d. Glucagon	110) The structure of haemoglobin is a) Primary b) Secondary c) Tertiary d) Quaternary
102) _____ is the structure of a protein molecule resulting from the regular coiling or folding of the chains of <b>MDCAT 2018</b> a. Secondary structure b. Tertiary structure c. Quaternary structure d. Primary structure	111) Which one of the following is both branched and unbranched structure? a) Starch b) Glycogen c) Cellulose d) Chitin
103) The structure of a fibrous protein comprises of polypeptide chain in the form of <b>MDCAT 2019</b> a. Cluster b. Flat uncoiled chains c. Spherical or curled up ball d. Long strands of fibrils	112) Which one of the following have branched structure? a) Starch b) Glycogen c) Cellulose d) Chitin
104) Most abundant organic compounds in mammalian cell are <b>NUMS 2020</b> a) Water b) lipids c) carbohydrates d) proteins	113) Which one of the following has unbranched structure? a) Starch b) Glycogen c) Cellulose d) Chitin
105) Enzymes have a 3D shape due to which type of protein structure <b>KMU-CAT</b>	114) Which one of the following contains amide group? a) Starch b) Glycogen c) Cellulose d) Chitin
	115) Which one of the following is present only in plants? a) Starch b) Cellulose c) Starch and cellulose d) Glycogen and chitin
	116) Which one of the following is present only in animals? a) Starch b) Cellulose c) Starch and cellulose d) Glycogen and chitin
	117) Acylglycerol with saturated fatty acids such as Palmitic Acid are fats present in a) Plants b) Animals c) Bacteria d) Algae
	118) Unsaturated fatty acids such as Oleic Acid are oils stored in a) Plants b) Animals c) Bacteria d) Algae
	119) The cell wall of bacteria is one exception, they

**BOM SERIES**

Page 215

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contain	a) Right handed sugar b) Left handed sugar c) Both right and left handed sugar d) Bacteria have no sugar molecules	a) 81 b) 98 c) 101 d) 108
120)	Each steroid is formed of four fused carbon rings containing ..... carbo atoms a) 13 b) 15 c) 17 d) 19	130) Carotenoids are related to <b>NUMS 2015</b> a) Vitamin A b) Vitamin B c) Vitamin C d) Vitamin D
121)	Waxes contain a) Monohydroxy alcohol b) Dihydroxy alcohol c) Trihydroxy alcohol d) Polyhydroxy alcohol	131) Which of the following is composed of lipids? <b>ETEA 2011</b> a) Some hormones b) Enzymes c) Skin tendons d) Insulin
122)	The unit of Terpenoids are a) Isoprenoid units b) Isoterpenene c) Isopropyne d) Non of these	132) In saturated fatty acids more hydrogen are not accommodated because of <b>ETEA 2017</b> a) presence of single bonds between carbon atoms b) presence of double bonds between two carbon atoms c) presence of double bonds between carbon atoms d) absence of bond between carbon atoms
123)	The human body break beta-carotene to form two molecules of a) Vitamin A b) Vitamin B c) Vitamin C d) Vitamin D	133) Which of the following is an unsaturated Fatty acid? <b>MDCAT 2020</b> a) Oleic acid b) palmitic acid c) butyric acid d) acetic acid
124)	<b>Lipids</b> Choose the unsaturated fatty acid among the Following: <b>ETEA 2023</b> A) Palmitic acid B) Arachidic acid C) Steric acid D) Oleic acid	134) Lipids store double amount of energy as compared to carbohydrates because of <b>MDCAT 2020</b> a) High proportion of oxygen b) High C-O ratio c) Low proportion of carbon d) High proportion of C-H
125)	The type of lipids which do not contain fatty acids are <b>ETEA 2022</b> A) Phospholipids B) Waxes C) Steroids D) Acylglycerol	135) If in lipids there is an higher proportion of unsaturated fatty acids then it will be: <b>MDCAT 2017</b> a. Oils b. Waxes c. Phenols d. Fats
126)	Steroid is formed by backbone of four fused carbon rings containing: <b>ETEA 2022</b> A) 14 carbon atoms B) 16 carbon atoms C) 17 carbon atoms D) 18 carbon atoms	136) Lipids contain double amount of energy as compared to the same amount of carbohydrates due to the presence of <b>MDCAT 2019</b> a. lower proportion of C-H bonds b. higher proportion of C-H bonds c. higher proportion of C-O bonds d. higher proportion of oxygen
127)	Lipids store double amount of energy as compared to carbohydrates because of: <b>ETEA 2020</b> a) High proportion of oxygen b) High C-O ratio c) Low proportion of carbon d) High proportion of C-H	137) Which statement about a triglyceride molecule are correct? <b>FMDC 2017</b> 1) It always contains unsaturated hydrocarbon tails 2) It is formed using ester bonds 3) It does not form hydrogen bonds
128)	Which of the following is an unsaturated Fatty acid? : <b>ETEA 2020</b> a) Oleic acid b) palmitic acid c) butyric acid d) acetic acid	
129)	Oleic acid is a fatty acid with 18 carbon atoms. It breaks down into 9 acetyl groups. It is estimated that these nine acetyl groups would generate _____ ATP molecules: <b>ETEA 2019</b>	

4) It contains a hydrophilic glycerol head a) 1,2 and 3      b) 2,1 and 4 c) 1 and 4 only    d) 2 and 3 only	b) Single ringed c) Double bond d) Single bond
138) Which one of the following is an example of unsaturated fatty acid? <b>MDCAT 2015</b> a. Butyric acid b. Oleic acid c. Acetic acid	148) What is 'Flavin adenine dinucleotide'? <b>ETEA 2023</b> a) Catalyst b) Coenzyme c) Cofactor d) Enzyme
139) Saturated fatty acid contains <b>MDCAT 2018</b> a. Up to six double bonds b. Only two double bonds c. No double bonds d. Many double bonds	149) NAD is an example of: <b>ETEA 2020</b> a) Mononucleotide b) Dinucleotide c) Tri nucleotide d) Tetra nucleotide
140) Lecithin is formed by combining phosphatidic acid with ____ <b>NUMS 2020</b> a) Serine b) choline c) Inositol d) ethanolamine	150) Single ringed pyrimidines are <b>MDCAT 2018</b> a. Cytocines, adenine & thymine b. Cytocine, guanine & uracil c. Adenine & guanine d. Uracil, cytocine & thymine
141) Phosphodiester bond is <b>MDCAT 2016</b> a. P - O - C - P - O - C b. C - O - P c. C - O - P - O - C d. C - C - O - P	151) If sequence in DNA is CCCTAGAG, then what would be the sequence in messenger RNA after transcription? <b>MDCAT 2019</b> a. GGGAUUCUC b. GGGATCTC c. GGGGTCTC d. GGAAUCUC
142) Waxes are the esters of fatty acids with high molecular weight. <b>ETEA 2015</b> a) Monohydroxy alcohols b) Dihydroxy alcohol c) Trihydroxy alcohol d) All of the abovea	152) Which bond is present between the nucleotides of DNA: <b>NUMS 2017</b> a) Peptide bond b) Phosphodiester bond c) Glycosidic bond d) Ester bond
143) Waxes are formed by combination of fatty acids with <b>MDCAT 2016</b> a. Alcohol b. Glycerol c. Serine d. Cysteine	153) What will be the approximate length of DNA strand having 500 nucleotides? <b>NUMS 2015</b> a) 100 nm b) 130 nm c) 170 nm d) 150 nm
144) All of the following structures are proteinous in nature except: <b>ETEA 2009</b> (a) Hooves      (b) Hemoglobin (c) Enzymes      (d) Steroids	154) Sequence of stop codon in DNA is <b>NUMS 2018</b> a) TAG b) AUG c) UAG d) AAA e) AGT
145) <b>Nucleic acids</b> The co enzyme NAD is made up of <b>ETEA 2023</b> a) Vitamins b) Amino acids c) Nucleotides d) Sugar	155) Monosaccharides are major components of <b>MDCAT 2015</b> a. DNA, ATP, Ribulose bisphosphate and cysteine b. DNA, NAD and insulin c. DNA, NADP, ATP and ribulose bisphosphate d. DNA, RNA and Myosin
146) Muscle fatigue results due to deficiency of _____ and excess accumulation of _____. <b>ETEA 2023</b> a) Adenosine triphosphate, lactic acid b) Adenosine triphosphate, ionic imbalance c) Glucose, lactic acid d) Glucose, ionic imbalance	156) When x-rays are passed through crystalline
147) Purines are _____ nitrogenous bases. <b>ETEA 2023</b> a) Double ringed	

DNA, it shows helix making one twist every:

**MDCAT 2017**

- a. 2nm
- b. 3.4 nm
- c. 34 nm
- d. 4 nm

157) The nitrogen containing bases in nucleotide are of two types; purines and pyrimidines; the purines bases are **MDCAT 2019**

- a. Guanine and cytosine
- b. Adenine, guanine and cytosine
- c. Adenine and guanine
- d. Adenine and thymine

158) NAD is an example of **NUMS 2020**

- a) Monosaccharide
- b) dinucleotide
- c) tri nucleotide
- d) tetra nucleotide

159) What would be the number of nucleotides for a protein molecule about 142 amino acids?

**NUMS 2020**

- a) 430
- b) 142
- c) 426
- d) 460

160) Hypoxanthine is the nucleobase of **NUMS 2019**

- a) cytosine
- b) inosine
- c) trypsin
- d) valine

161) Nucleic acids are formed of units called:

**FMDC 2017**

- a) Amino acids
- b) Nucleotides
- c) Citric acids
- d) Isoprenoid units

162) All of the following are mono nucleotides

EXCEPT: **[ETEA 2009]**

- (a) A.M.P      (b) A.T.P
- (c) A.D.P.      (d) F.A.D.

**Answer.** F.A.D

163) NAD is an example of **MDCAT 2020**

- a) Mononucleotide
- b) Dinucleotide
- c) Tri nucleotide
- d) Tetra nucleotide

164) Which one among the following is double ring structure? **KMU-CAT 2021**

- A) Cytosine
- B) Thymine
- C) Guanine
- D) Uracil

165) Which of the following base is not present in

RNA; **[2005]**

- (a) Thymine      (b) Adenine
- (c) Guanine      (d) Cytosine

166) Which one of the following is purine

- a) Adenine      b) Thymine
- c) Cytocine      d) Uracil

167) Which one of the following is double ring compound

- a) Adenine      b) Thymine
- c) Cytocine      d) Uracil

168) Which one of the following is single ring compound

- a) Adenine      b) Thymine
- c) Cytocine      d) All of these

169) Adenine are linked with pentose sugar forming a structure called

- a) Adenosine
- b) Adenosine monophosphate
- c) Adenosine diphosphate
- d) Adenosine triphosphate

170)  $\text{ATP} + \text{H}_2\text{O} \rightarrow \text{ADP} + \text{P}$  gives ..... energy

- a) 7.0 cal      b) 7.0 K cal
- c) 0.7 cal      d) - 7 K cal

171) Riboflavin is also called

- a) Vitamin B12      b) Vitamin B 10
- c) Vitamin B 20      d) Vitamin K

172) When two nucleotide are joint together, they form structure called

- a) Adenine      b) Adenosine
- c) Dinucleotide      d) All of these

173) Adenine dinucleotide in combination with vitamins form

- a) Vitamins      b) Antibiotic
- c) Antiallergic      d) Co-enzymes

174) Nicotinamide is vitamin called

- a) Co-enzymes
- b) Nicotinic acid (niacin)
- c) Riboflavin (Vitamin B12)
- d) Non of these

175) Flavin is vitamin called

- a) Co-enzymes
- b) Nicotinic acid (niacin)
- c) Riboflavin (Vitamin B12)
- d) Non of these

176) A code is a sequence of three nitrogenous bases along with

- a) Suger      b) Phosphate
- c) Suger and phosphate
- d) Non of these

177) **Genetic code**

If there are 3 nucleotides in a genetic code, how many different genetic codes are possible to be formed? **NUMS 2019**

a) 16	c) Conjugated molecules
b) 64	d) Coagulated molecules
c) 32	
d) 48	
178) <b>Conjugated molecules</b>	
All cell membranes are composed of:	<b>ETEA 2010]</b>
(a) Proteins	(b) Lipids
(c) Lipo protein	(d) Cellulose
179) The basic structural framework of all types of membrane are	<b>NUMS 2020</b>
a) Glycolipids	
b) Glycoproteins	
c) lipoproteins	
d) nucleoproteins	
180) The conjugated molecule that is primarily present in egg albumin is:	<b>ETEA 2023</b>
A) Lipoprotein	
B) Nucleoprotein	
C) Glycolipid	
D) Glycoprotein	
181) Which molecules do not contribute to the formation of biological membranes?	<b>NUMS 2022</b>
a. Glycoproteins	
b. Lipids	
c. Phospholipids	
d. Nucleoproteins	
182) Molecule formed from two different molecules belonging to different categories	
a) Homogenous molecules	
b) Heterogenous molecules	

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## **CHAPTER 04**

## **BIOENERGETICS**

**Photosynthesis Introduction**

**(role of sunlight,pigments, spectrum,factors )**

- 1) The carotenoids absorbs light in the visible spectrum between \_\_\_\_ and \_\_\_\_ wavelengths.  
**ETEA 2023**  
a) 400-600nm      b) 630-700nm  
c) 620-700nm      d) 500-600nm
- 2) The range of visible light is from **ETEA 2022**

BOM SERIES		Page 219	BOM ACADEMY Online & Swat
A) 300-650nm C) 380-750nm	B) 350-700nm D) 430-790nm		(a) Respiration      (b) Photosynthesis (c) Growth      (d) Both A and B
3) Which scientist among the following hypothesized that plant splits water to release oxygen as byproduct: <b>ETEA 2022</b> A) Van Neil      B) Lysenko C) Calvin      D) Kreb	14) Chlorophyll a and b chiefly absorb: <b>[ETEA 2012]</b> (a) Violet & blue light (b) Orange light (c) Blue —red light (d) Red, orange light		
4) Organization of photosynthetic pigment into clusters is : : <b>ETEA 2019</b> a) photosyntheises b) photosystem c) photosynthetic cluster arrangements d) calvin system	15) In chlorophyll "a" The group attached to porphyrine ring is: <b>[ETEA 2011]</b> (a) hydroxyl group (b) methyl group (c) carboxyl group (d) aldehyde group		
5) Which wavelengths are mainly absorbed by chlorophyll? : <b>ETEA 2019</b> a) Violet, blue and red b) green and blue c) Violet and orange d) red and indigo	16) Chlorophyll is protected from intense light by: <b>[ETEA 2011]</b> (a) plant hormones (b) carotenoids (c) plant-enzymes (d) water present in mesophyll tissue		
6) Which statement about chlorophyll is not true? : <b>ETEA 2019</b> a) It contains terminal carbonyl group b) It contains phyto tail c) It contain porphyrin ring d) It contains magnesium	17) The center of porphyrine in the head region of hemoglobin is occupied by: <b>[ETEA 2010]</b> (a) Iron (b) Magnesium (c) Sodium (d) Potassium		
7) Carotenoids pigments are: <b>[ETEA 2015]</b> a) Yellow, Red, Green, Blue b) Orange, Yellow, Red, Brown c) Green, Yellow, Blue, Brown d) Blue, Red, Green, Yellow	18) Which of the following is present in the centre of Porphyrine ring of chlorophyll? <b>[ETEA 2010]</b> (a) Iron (b) Sodium (c) Potassium (d) Magnesium		
8) Accessory pigments are: <b>[ETEA 2014]</b> (a) Red-Yellow-Green (b) Red-Orange-Blue (c) Orange-Blue-Green (d) Red-Orange-Yellow,brown	19) Which of the following is a copper containing protein in electron transport chain? <b>MDCAT 2020</b> (a) Plastoquinone (b) Cytochrome-C (c) Plastocyanin (d) Ferredoxin		
9) In chlorophyll-b, the porphyrine ring is attached to the: <b>[ETEA 2013- 2011]</b> (a) Methyl group (b) Carboxyl group (c) Aldehyde group (d) Hydroxyl group	20) Photosystem I has chlorophyll a molecules which absorb maximum light of <b>MDCAT 2016</b> a. 680 nm b. 780 nm c. 700 nm d. 580 nm		
10) The centre of porphyrine ring of haemoglobin is occupied by: <b>[ETEA 2013- 2010]</b> (a) Magnesium      (b) Sodium (c) Iron      (d) Potassium	21) Functional group of chlorophyll a is <b>2016</b> a. -CH <sub>3</sub> b. -CHO c. -COOH d. -OH		
11) The pigments of chlorophyll a,b, and carotenoids are present in: <b>[ETEA 2013]</b> (a) Stroma (b) Grana (c) Thalakoid membrane (d) Crista	22) Chlorophyll molecule contains <b>MDCAT 2017</b> a. Mg <sup>++</sup>		
12) Carotenoid contains: <b>[ETEA 2012]</b> (a) Carotenes      (b) Xanthophylls (c)Chlorophyll -C      (d)Both A and B)			
13) Redox action takes place during the process of: <b>[ETEA 2012]</b>			

BOM SERIES	Page 220	BOM ACADEMY Online & Swat
b. Ca++ c. K+ d. Na+	31)	Shorts wavelength are ..... energetic than long wavelength a) More b) Less c) Equal d) Very less
23) The tail of chlorophyll molecule is embedded in <b>MDCAT 2017</b>	32)	Visible light ranges from a) 100-200 nm b) 390 – 760 nm c) 360-750 nm d) 350-850 nm
a. Membrane of mitochondria b. Thylakoid membrane c. Membrane of S.E.R d. Membrane of R.E.R	33)	Wavelength shorter than visible light a) Infrared b) Microwaves c) Radio waves d) Ultraviolet
24) Carotenoids absorb light of <b>MDCAT 2017</b>	34)	Infrared ..... Photosynthetic process a) Can effect b) Can't effect c) Is need of d) Is base for
a. Yellow-orange range b. Yellow-red range c. Orange-red range d. Blue-violet range	35)	Total sunlight that enters to atmosphere and reaches to the earth surface a) 10% b) 20% c) 30% d) 40%
25) Chlorophyll 'a' and chlorophyll 'b' differ in one of the functional groups ..... chlorophyll 'a' has <b>MDCAT 2017</b>	36)	Chlorophylls absorb light of a) Blue and white b) Blue and green c) Blue and red d) Red and green
a. - CHO b. - OH c. - CH <sub>3</sub> d. - NH <sub>2</sub>	37)	Chlorophyll "a" is present in all green plants except a) Algae b) Bacteria c) Cycas d) Angiosperm
26) The photosynthetic pigments of plants are arranged as clusters in thylakoid membrane. The reaction centers of these clusters consist of molecules: <b>MDCAT 2019</b>	38)	Chlorophyll "b" is present in higher plants and a) Algae b) Bacteria c) Cycas d) Angiosperm
a. ATP b. Chlorophyll c. Glucose d. Carotenoids	39)	Chlorophyll "c" , "d" and "e" are present in Various groups of: a) Algae b) Bacteria c) Cycas d) Angiosperm
27) Carotenoids are related to <b>NUMS 2015</b>	40)	Bacterio- Chlorophyll is only present in a) Algae b) Bacteria c) Cycas d) Angiosperm
a) Vitamin A b) Vitamin B c) Vitamin C d) Vitamin D	41)	Long hydrocarbon chain attached to pyrole rings is called a) Phytol centre b) Phytol side chain c) Phytol d) Porphyrin
28) 1 NADH in respiratory chain produces <b>NUMS 2015</b>	42)	The four rings (tetra pyrrole rings) are collectively called a) Phytol centre b) Phytol side chain c) Phytol d) Porphyrin
a) 1 ATP b) 2 ATP c) 3 ATP d) 4 ATP	43)	Carotenoids include a) Carotenes b) Xanthophylls c) Carotenes and xanthophylls d) Terpenoids
29) NADH produces how many ATP? <b>NUMS 2016</b>	44)	Carotenoids protect chlorophyll from a) Bright light b) Intense light c) Weak light d) Red light
a. 2 ATP b. 3 ATP c. 4 ATP d. 6 ATP	45)	Forming ATP from ADP and inorganic phosphate using sunlight energy is called a) Respiration b) Cellular respiration
30) Which of following is a chemical link between catabolism and anabolism? <b>FMDC 2017</b>		
a) AMP b) ADP c) ATP d) All of these		

**BOM SERIES**

Page 221

**BOM ACADEMY Online & Swat**

c) Photorespiration d) Photphosphorylation	59) Redox reaction occurs in a) Photosyntheises b) Respiration c) Photosyntheises and respiration d) Non of these
46) The ATP synthesis during Non-cyclic electron transport flow is called a) Non-Cyclic Photphosphorylation b) Cyclic Photphosphorylation c) Cellular respiration d) Non of these	60) Sucrose in sugar is considered as a) Monosaccharides b) Oligosaccharides c) Polysaccharides d) Non of these
47) The ATP synthesis during Cyclic electron transport flow is called a) Non-Cyclic Photphosphorylation b) Cyclic Photphosphorylation c) Cellular respiration d) Non of these	61) In chlorophyll a the group attached to porphyrine group is a) Methyl group (CH3) b) Carbonyl group (CHO) c) Formyl d) Ethyl
48) The 1 <sup>st</sup> product of photosynthesis is a) ATP b) PGA c) PGAL d) Rubisco	62) In chlorophyll b the group attached to porphyrine group is a) Methyl group (CH3) b) Carbonyl group (CHO) c) Formyl d) Ethyl
49) Aerobic respiration is also called a) Non-Cyclic Photphosphorylation b) Cyclic Photphosphorylation c) Cellular respiration d) Non of these	63) Chlorophyll is protected from intense light by a) Nucleus b) Carotenes c) Carotenoids d) Lipids
50) Chlorophyll a has methyl group(CH3) and formula of a) C <sub>55</sub> H <sub>72</sub> O <sub>5</sub> N <sub>4</sub> Mg b) C <sub>55</sub> H <sub>70</sub> O <sub>6</sub> N <sub>4</sub> Mg c) C <sub>55</sub> H <sub>72</sub> O <sub>6</sub> N <sub>4</sub> Mg d) C <sub>55</sub> H <sub>70</sub> O <sub>5</sub> N <sub>4</sub> Mg	64) Sequence of nucleotide bonded to TATGA is a) ATACT b) TATAT c) TATAG d) Non of these
51) Chlorophyll b has carbonyl group(CHO) and formula of a) C <sub>55</sub> H <sub>72</sub> O <sub>5</sub> N <sub>4</sub> Mg b) C <sub>55</sub> H <sub>70</sub> O <sub>6</sub> N <sub>4</sub> Mg c) C <sub>55</sub> H <sub>72</sub> O <sub>6</sub> N <sub>4</sub> Mg d) C <sub>55</sub> H <sub>70</sub> O <sub>5</sub> N <sub>4</sub> Mg	65) Some hormones are composed of a) Lipids b) Proteins c) Carbohydrates d) Nucleic acids
52) Van Neil hypothesized that plant split water to release oxygen in a) 1900 b) 1910 c) 1920 d) 1930	66) Magnesium is attached to center of porphyrine ring of a) Chlorophyll b) Haemoglobin c) Porphyrin d) All of these
53) C <sub>3</sub> plants are a) Sugar cane and maize b) Sugar cane and wheat c) wheat and maize d) only suger cane	67) During cellular respiration NADH <sub>2</sub> produces a) 2 ATP b) 3 ATP c) 4 ATP d) 6 ATP
54) Chlorophyll a absorbs a) Blue light b) Red light c) Green light d) yellow light	68) During cellular respiration FADH <sub>2</sub> produces a) 2 ATP b) 3 ATP c) 4 ATP d) 6 ATP
55) Chlorophyll b absorbs a) Blue light b) Red light c) Green light d) yellow light	69) Fatty acids are converted into carbohydrates by a) Peroxisome b) Glyoxosome c) Centriole d) Nucleus
56) Plant cell synthesize sugar in the a) Grana b) Cytoplasm c) Nucleus d) Mitochondria	70) In chromosomes, the material controlling heredity is; a) DNA b) RNA c) Proteins d) All of these
57) Conversion of excess glucose into fat is know is a) Lipogenesis b) Liopolysis c) Gluconeogenesis d) Non of these	71) The common cytochrome in both photosynthesis and respiration is a) Cyt a b) Cyt b c) Cyt a <sub>3</sub> d) All of these
58) DNA have ..... than RNA a) one oxygen less b) one oxygen more	72) Anticodon of AUG will be a) UAC b) ACU c) TAT d) Non of these
	73) Peptide bond is formed between carbonyl group

and a) Other carbonyl group b) Amino group c) R group d) C	C) Nucleus D) Golgi bodies
74) What happen to oxygen in electron transport chain a) It forms CO <sub>2</sub> b) It reduce to water c) It reduce to CO d) It reduce to oxygen	85) Light reaction occurs in the chloroplast: of ETEA 2023 A. Outer membrane B. Inner membrane C. Granum D. Stroma
75) Glycolysis occur in a) Cytoplasm b) Peroxisome c) Mitochondria d) Nucleus	86) The ATP formed in the preparatory phase of glycolysis is (are): ETEA 2023 D. 0 (Answer)
76) Kreb's cycle or Tricarboxylic Acid Cycle(TCA) occur in a) Cytoplasm b) Peroxisome c) Mitochondria d) Nucleus	87) In aerobic respiration glucose molecule is completely broken down into carbon dioxide (CO <sub>2</sub> ), water (H <sub>2</sub> O) and energy. $C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O + ?$ ETEA 2022 A) 2atp B) 4atp C) 34 tp D) 36 atp
77) Electron transport chain occur in a) Granum of chloroplast b) Stroma of chloroplast c) Mitochondria d) Nucleus	88) Ribose is a pentose sugar (5-carbon) that contains: ETEA 2022 A) Aldehyde group B) Ketone group C) Carboxyl group D) Easter group
78) Light reaction occur in a) Granum of chloroplast b) Stroma of chloroplast c) Mitochondria d) Nucleus	89) In which part of the chloroplast the fixation of carbon dioxide results in the formation of sugars? ETEA 2022 A) Grana B) Stroma C) Intergranum D) Outer memberane of chloroplast
79) Dark reaction or Calvin cycle occur in a) Granum of chloroplast b) Stroma of chloroplast c) Mitochondria d) Nucleus	90) The Calvin cycle is completed in ____ stages ETEA 2022 a) Two b) Three c) Four d) Five
80) The step in glycolysis in which transfer of energy is not involved is a) Fructose diphosphate → DAP b) Glucose diphosphate → Fructose diphosphate c) DGP → DAP d) Non of these	91) First stable compound during Calvin cycle Is: ETEA 2020 a) 3-phosphoglycerate b) Glyceraldehyde 3-phosphatase c) 1,3 bisphosphoglycerate d) Ribulose biphosphate
81) Photorespiration occur when inside leaf concentration of a) CO <sub>2</sub> is high b) CO <sub>2</sub> is low c) O <sub>2</sub> is low d) O <sub>2</sub> is high	92) What is the function of Ribulose?: ETEA 2020 a) Intermediate in photosynthesis b) Respiratory fuel c) Intermediate in cellular respiration d) Component of DNA and RNA
82) The process responsible for production of energy is a) Photosyntheise b) Respiration c) Both photorespiration and respiration d) Non of these	93) Which of the following process does not need pyruvic acid as a substrate?: ETEA 2020 a) Alcohol fermentation b) Calvin cycle c) Aerobic respiration d) Lactic acid fermentation
83) <b>Mechanism of photosynthesis (light and dark reaction)</b> In the non-cyclic electron transport of light reaction', the deficit of ____ electrons occur in the chlorophyll, as it absorbs energy. ETEA 2023 a) 1    b) 2    c) 3    d) 4	94) Which of the following is a copper containing protein in electron transport chain?: ETEA 2020 a) Plastoquinone b) Cytochrome-C c) Plastocyanin d) Ferredoxin
84) The process of photophosphorylation takes place in: ETEA 2023 A) Nucleolus B) Chloroplast	95) Photophosphorylation takes place in the ____ of the chloroplasts.: ETEA 2020

a) Stroma b) Granum c) Inner membrane d) Outer membrane	a) PGA b) PGAL c) RUBP d) RUBISCO
96) What are the products of light dependent reactions of photosynthesis? <b>NUMS 2022</b> a. ATP, RuBP and reduced NAD b. GP, oxygen and reduced NAD c. ATP, oxygen and reduced NADP d. GP reduced NADP and RuBP	106) Which is least important in photosynthesis; <b>[2005]</b> (a) Red light (b) Blue light (c) Sunlight (d) Green light
97) In the process of photosynthesis water act as <b>NUMS 2022</b> a. Proton accepter b. Electron donor c. CO <sub>2</sub> reducer d. CO <sub>2</sub> accepter	107) The product of light dependent reactions are: <b>[ETEA 2014]</b> (a) RUBP + ATP (b) RUBP + PGAL (c) NADPH + ATP (d) PGAL + ATP
98) During photosynthesis, CO <sub>2</sub> works as <b>NUMS 2022</b> a. Proton donor b. Electron donor c. Proton acceptor d. Source of O <sub>2</sub>	108) Light absorbing pigments in photosystem first is: <b>[ETEA 2014]</b> (a) P 600 (b) P 680 (c) P 700 (d) P 760
99) End product of Calvin cycle is <b>NUMS 2022</b> a. 3-phosphoglycerate b. 1,3-biphosphoglycerate c. Glyceraldehyde-3-phosphate d. Glucose	109) "Photo-phosphorylation" is: <b>[ETEA 2014]</b> (a) ATP synthesis by food energy (b) ATP synthesis by solar energy. (c) ATP synthesis by source of water. (d) ATP synthesis by source of NADH <sub>2</sub>
100) Excited electrons from photo system-II are captured by: <b>[ETEA 2015]</b> a) PC                            b) PQ c) Cytochrome-b              d) Pentamerous	110) Stroma of chloroplasts carries the fixation of: <b>[ETEA 2013]</b> (a) N <sub>2</sub> (b) O <sub>2</sub> (c) CO <sub>2</sub> (d) NH <sub>3</sub>
101) What is the function of Ribulose? <b>MDCAT 2020</b> a) Intermediate in photosynthesis b) Respiratory fuel c) Intermediate in cellular respiration d) Component of DNA and RNA	111) Stream of chloroplast carries the fixation of: <b>[ETEA 2011]</b> (a) Nitrogen (b) Oxygen (c) Carbon monoxide (d) carbon dioxide
102) Which carbohydrate is required for the synthesis of ATP <b>MDCAT 2018</b> a. Glucose b. Ribulose c. Fructose d. Ribose	112) During cellular respiration NADH <sub>2</sub> produces ; <b>[ETEA 2010]</b> (a) 2 ATP                      (b) 3 ATP (c) 4 ATP                      (d) 5 ATP
103) 6-NADH can yield: <b>[ETEA 2015]</b> a) 12-ATP b) 38-ATP c) 18-ATP d) 36-ATP	113) Each molecule of NADH <sub>2</sub> entering the electron transport chain produces: <b>[ETEA 2009]</b> (a) Four ATPs                (b) Two ATPs (c) One ATPs                (d) Three ATPs
104) The product of light reaction travel from: <b>[ETEA 2015]</b> a) Cristae to stroma b) Stroma to grana c) Grana to cristae d) Grana to stroma	114) Calvin cycle takes place within: <b>[ETEA 2008]</b> (a) stroma of chloroplasts (b) granum of the chloroplast (c) cytoplasm of the cell (d) Mitochondria
105) Dark reaction gets completed by the regeneration of: <b>[ETEA 2015]</b>	115) In electron transport chain, ATP synthesis takes place when electron moves from

- a) Primary Electron Acceptor (PEA) to Plastoquinone  
 b) Plastoquinone (Pq) to cytochromes  
 c) Cytochromes to Plastocyanin  
 d) Plastocyanin (Pc) to Photosystem 1 (PS-I)
- 116) Which of the following process does not need pyruvic acid as a substrate? **MDCAT 2020**  
 a) Alcohol fermentation  
 b) Calvin cycle  
 c) Aerobic respiration  
 d) Lactic acid fermentation
- 117) First stable compound during Calvin cycle Is **MDCAT 2020**  
 a) 3-phosphoglycerate  
 b) Glyceraldehyde 3-phosphate  
 c) 1,3 bisphosphoglycerate  
 d) Ribulose biphosphate
- 118) Photophosphorylation takes place in the \_\_\_\_\_ Of the chloroplasts. **MDCAT 2020**  
 a) Stroma  
 b) Granum  
 c) Inner membrane  
 d) Outer membrane
- 119) In light independent stage of photosynthesis, the CO<sub>2</sub> combines with \_\_\_\_\_ to form an unstable 6-carbon intermediate. **MDCAT 2015**  
 a. Ribulose bisphosphate  
 b. Hexose sugar  
 c. Glycerate-3-phosphate  
 d. Glyceraldehyde-9-phosphate
- 120) Immediate product formed after CO<sub>2</sub> fixation in Calvin cycle is **MDCAT 2016**  
 a. Unstable 6 carbon compound  
 b. Unstable 5-carbon compound  
 c. Unstable 4-carbon compound  
 d. Unstable 3-carbon compound
- 121) Glycerate-3 phosphate in the presence of ATP and reduced NADP from light dependent stage is reduced to: **MDCAT 2017**  
 a. 3-carbon compound  
 b. Ribulose bisphosphate  
 c. 5-carbon compound  
 d. 6-carbon compound
- 122) Calvin cycle occurs in **MDCAT 2017**  
 a. Grana of chloroplast  
 b. Stroma of chloroplast  
 c. Chlorophyll (reaction centre)  
 d. Roots of plants
- 123) Photosynthesis is a redox process in which CO<sub>2</sub> is reduced to: **MDCAT 2018**  
 a. C<sub>6</sub>H<sub>12</sub>O<sub>6</sub>  
 b. NADPH

- c. O<sub>2</sub>  
 d. H<sub>2</sub>O
- 124) During light independent reaction which one of the following process occurs? **MDCAT 2018**  
 a. Water molecules are formed  
 b. CO<sub>2</sub> breaks down to C&O  
 c. Fixation of CO<sub>2</sub> take place  
 d. Water molecules split
- 125) The following flowchart depicts the steps of the Calvin Cycle. Which option according to you fits in as the correct answer of the missing steps? **MDCAT 2019**  
 a. Hydrogenase  
 b. Oxaloacetate  
 c. Ribulose bisphosphate  
 d. Pyruvate
- 126) Which of the following photosystem is involved in cyclic photophosphorylation? **MDCAT 2019**  
 a. PS I and PS II  
 b. PS II  
 c. PS III  
 d. PS I
- 127) Dark reaction of photosynthesis takes place in \_\_\_\_\_ of chloroplast. **NUMS 2020**  
 a) Thylakoids  
 b) Grana  
 c) Intergrana  
 d) Stomata
- 128) Dark reaction of photosynthesis takes place: **NUMS 2017**  
 a) Grana  
 b) Stroma  
 c) Thylakoid  
 d) Both a & b
- 129) Which one of the following is the correct outline of the main events in photosynthesis? **FMDC 2012**  
 a. Oxygen reacts with a carbohydrate to produce water and carbon dioxide in the presence of light  
 b. Light joins carbon dioxide to an acceptor compound which is then reduced by hydrogen obtained from water  
 c. Light splits water and the resulting hydroxyl group combines with a compound which has incorporated carbon dioxide  
 d. Light splits carbon dioxide and the resulting carbon then combines with oxygen and hydrogen obtained from water  
 e. Carbon dioxide combines with an acceptor compound and this is reduced by hydrogen split from water by light
- 130) In the course of glycolysis **FMDC 2013**

**BOM SERIES**

Page 225

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A) NADH is reduced to $NNN+$ B) $NNN+$ is oxidized to NADH C) Glucose is degraded into two molecules D) Both A & B	144) Total ATP produced in respiration of glucose is a) 2    b) 4    c) 36    d) 40
131) <b>Dark reaction of photosynthesis takes place:</b> <b>FMDC 2015</b>  a) Grana b) Stroma c) Thylakoid d) Both a & b	145) Glycolysis occur in cytosol while Krebs cycle & electron transport chain occur in a) Cytosol                          b) Mitochondria c) Peroxisome                      d) Nucleus
132) <b>The word glycogenesis means, the conversion of:</b> <b>FMDC 2015</b>  a) Glucose to glycogen b) Lactic acid to glycogen c) Glycogen to glucose d) Amino acid to glycogen	146) The non-cyclic electron transport is also called a) Calvin cycle                    b) Balvin cycle c) Calvin benson cycle            d) Zigzag scheme
133) <b>The primary electron acceptor in cyclic photophosphorylation is:</b> <b>FMDC 2017</b>  a) Carbon dioxide b) A protein that contains iron and Sulphur c) NADP d) FAD	147) In carbon fixation RuBP combine with $CO_2$ forming 6-carbon compound which splits to a) 2 ATP                            b) 2 PGA c) 2 PGAL                         d) 2 Rubisco
134) In glycolysis phosphate is gain by a) NAD                              b) NADH c) $NADH_2$ d) NADP	148) In reduction process carbon is reduced to a 3 – carbon molecule a) ATP                              b) PGA c) PGAL                            d) Rubisco s
135) In light reaction electrons are gained by ..... and make NADPH a) NAD                              b) NADH c) $NADH_2$ d) NADP	149) Out of six PGAL, only one molecule is used for making a) Maltose                         b) Lactose c) Glucose                         d) ATP
136) End product of glycolysis is a) Two ATP                         b) Two pyruvate c) Two PGA                         d) Two PGAL	150) Five PGAL molecules are recycled to generate a) 3 molecules of RuBP b) 2 molecules of RuBP c) 2 molecules of ATP d) 3 molecules of ATP
137) In glycolysis electron is gain by ..... to form water a) Hydrogen                        b) Oxygen c) PGA                              d) Rubisco	151) In preparatory phase of glycolysis, the glucose splits into a) PGAL                            b) ATP c) PGAL & ATP                    d) PGAL & DAP
138) Photosystem I absorb light of a) 700 nm                         b) 690 nm c) 680 nm                         d) 670 nm	152) The generation of ATP in process of glycolysis is called a) Non-Cyclic Photphosphorylation b) Cyclic Photphosphorylation c) Cellular respiration d) Substrate level phosphorelation
139) Photosystem II absorb light of a) 700 nm                         b) 690 nm c) 680 nm                         d) 670 nm	153) The end product of glycolysis is a) 2 molecules of ATP b) 2 molecules of Pyruvate c) 2 molecules of $CO_2$ d) 2 molecules of DAP
140) First product of photosynthesis to be identified is a) ATP                              b) PGA c) PGAL                            d) Rubisco	154) In Kreb's Cycle or TCA cycle, Acetyl CoA is completely oxidized into a) 2 molecules of ATP b) 2 molecules of Pyruvate c) 2 molecules of $CO_2$ d) 2 molecules of DAP
141) ATPs produced in non-cyclic photophosporylation are a) 2    b) 4    c) 6    d) 8	155) Coenzyme A consist of a nucleotide and a portion of one of the a) Vitamins A                      b) Vitamins B c) Vitamins C                      d) Vitamins D
142) Net gain of ATP in glycolysis a) 2    b) 4    c) 6    d) 8	156) Nine acetyl group generate ..... ATP
143) The number of ATP formed directly by a single Krebs cycle is a) 2    b) 4    c) 6    d) 8	

molecules a) 100 b) 102 c) 104 d) 108	respiration is <b>MDCAT 2020</b> a) ethanol and carbon dioxide b) lactate c) pyruvate d) acetyl CoA
157) Anaerobic respiration yields ..... ATP molecules a) 2 b) 4 c) 36 d) 40	168) In glycolysis, glycerate-1,3-bisphosphate is converted into glycerate-3-phosphate by losing _____ phosphate molecules. <b>MDCAT 2015</b> a. 3 b. 2 c. 1 d. 4
158) The simplest amino acid is a) Alanine b) Glycine c) Serine d) Lysine	169) Malate is oxidized by _____ to oxaloacetate in Krebs's Cycle. <b>MDCAT 2015</b> a. ATP b. NADP c. NAD d. FAD
159) <b>Cellular respiration (glycolysis. Kreb cycle.electron transport chain)</b> Chemiosmosis occurs in the: <b>[ETEA 2014]</b> (a) Grana (b) Stroma (c) Thylakoids (d) InterGrana	170) In electron transport chain, the electrons from NADH and FADH <sub>2</sub> are passed to; <b>MDCAT 2015</b> a. Cytochrome a b. Cytochrome a <sub>3</sub> c. Co-enzyme c d. Co-enzyme Q
160) What is the number of carbon atoms in Pyruvic acids? <b>ETEA 2023</b> a) 2 b) 3 c) 4 d) 5	171) Carriers of the respiratory chain are located on <b>MDCAT 2015</b> a. Matrix of mitochondria b. Outer membrane of mitochondria c. Inner membrane of mitochondria d. Cytoplasmic matrix
161) ..... of mitochondria are the sites of: <b>[ETEA 2013]</b> (a) Electron transport chains (b) Photophosphorylation (c) Krebs cycle (d) Glycolysis	172) Another name given to Krebs cycle is <b>MDCAT 2018</b> a. Glutamate cycle b. Isocitrate cycle c. Succinate cycle d. Citric acid cycle
162) Glycolysis completes with the net gain of: <b>[ETEA 2012]</b> (a) 2 ATP (b) 3 ATP (c) 4 ATP (d) 32 ATP	173) In chemiosmosis the proton (H <sup>+</sup> ) pumps moves from ____: <b>MDCAT 2019</b> a. Stroma to Lumen b. Stroma to cytoplasm c. Lumen to stroma d. Cytoplasm to stroma
163) The number of ATP formed directly by a single krebs cycle is: <b>[ETEA 2012]</b> (a) One ATP (b) Two ATP (c) 32 ATP (d) 36 ATP	174) Glycolysis takes place in the ____ of cell: <b>MDCAT 2019</b> a. golgi complex b. nucleus c. cytoplasm d. mitochondria
164) Which one of the following bond is broken first in glycolysis to release the energy? <b>[ETEA 2008]</b> (a) glycosidic (b) Peptide (c) ester (d) none of the above	175) How many molecules of ATP would be utilized for phosphorylation of one glucose molecule during glycolysis? <b>MDCAT 2019</b> a. One b. Four
165) What happens to oxygen in the electron transfer chain in respiration? <b>[ETEA 2008],[2005]</b> (a) It is released as gas (b) it is reduced to water (c) CO <sub>2</sub> (d) It is used as an electron carrier	
166) The step in glycolysis in which energy transfer is not involved is: <b>[ETEA 2006]</b> (a) Glucose phosphate → fructose diphosphate (b) Fructose diphosphate → DAP (c) PGAL → PGAP (d) PGAP → PGA	
167) The end product of glycolysis in aerobic	

<p>c. Two d. Three</p> <p>176) End product of glycolysis in yeast is <b>NUMS 2020</b> a) Ethanol and carbon dioxide b) Lactate c) Pyruvate d) Acetyl Co. A</p> <p>177) Site of glycolysis <b>NUMS 2019</b> a) Ribosome b) Mitochondria c) Cytosol d) Nucleus</p> <p>178) Which component enters into mitochondria after glycolysis? <b>NUMS 2015</b> a) Pyruvate b) Acetate c) Oxaloacetate d) Acetyl-CoA</p> <p>179) <b>In aerobic respiration most of the ATP is synthesized during FMDC 2017</b> a) Oxidation of pyruvic acid b) Electron transport chain c) Krebs cycle d) Glycolysis</p> <p>180) <b>Aerobic respiration is a pathway involving a series of reactions. What is the final reaction in the pathway?</b> <b>FMDC 2017</b> a) The formation of carbon dioxide b) The oxidation of cytochrome c) The reduction of oxygen to water d) The synthesis of ATP</p> <p>181) The end product of glycolysis in aerobic respiration is: <b>ETEA 2020</b> a) ethanol and carbon dioxide b) lactate c) pyruvate d) acetyl CoA</p> <p>182) If oxygen is available, the complete breakdown of glucose produces _____ ATP molecules in prokaryotes, <b>NUMS 2022</b> a. 201 b. 36 c. 38 d. 40</p> <p>183) <b>Anaerobic respiration</b> Aerobic respiration results in how many ATP? <b>NUMS 2016</b> a. 2 b. 36 c. 18 d. 32</p>	<p>184) Which of the following pathways outlines the order of events during aerobic cellular respiration? <b>FMDC 2013</b> Trac from first to last: A) Glucose → triose phosphate → Pyruvate Kreb cycle → <math>N_2 + N_2O + ATP</math> B) Glucose → triose phosphate → Pyruvate Kerbs cycle → <math>N_2 + N_2O + ADP + Pi</math> C) Glucose hexose phosphate → Pyruvate Kerbs cycle → <math>N_2 + N_2O + ADP + Pi</math> D) Glucose hexose phosphate → Pyruvate Kerbs cycle → Ethanol <math>N_2 + ATP</math></p> <p>185) Which metabolic pathway is common to both fermentation and cellular respiration <b>KMU-CAT 2021</b> a) glycolysis b) kreb's cycle c) synthesizes of acetyl Co-A d) Electron transport chain</p> <p>186) In alcoholic fermentation ATP molecules are produced from 1 glucose molecule: <b>ETEA 2023</b> A. 2 B. 18 C. 32 D. 36</p> <p>187) <b>Photorespiration</b> Photo-respiration can generate: <b>[ETEA 2015]</b> a) 4-ATP b) 36-ATP c) 32-ATP d) No-ATP</p> <p>188) <b>C3 and c4 plants</b> Cyclic flow or C4 photosynthesis produces: <b>MDCAT 2016</b> a. ATP and <math>CO_2</math> b. ATP c. Only <math>CO_2</math> d. Only oxygen</p>
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# CHAPTER 05

## ACELLULAR LIFE

### Status, discovery abd classification of virus

- 1) Which of the following is a rod shape virus? **ETEA 2023**
- Bacteriophage
  - Herpes virus
  - Hepatitis virus
  - Tobacco mosaic virus
- 2) Viruses are NOT classified based on **ETEA 2023**
- Morphology
  - Host specificity
  - Cell membrane
  - Envelop
- 3) The most common symptom of gonorrhea in males is:- **ETEA 2023**
- Skin rash on neck
  - Joint pain
  - Painful urination
  - Chancre
- 4) in 1935 WM. Stanley prepared an extract of: **ETEA 2022**
- Tobacco mosaic (WV)
  - Human immunodeficiency Virus (HIV)
  - Flu virus
  - polio virus
- 5) Which one of the following is not the characteristic Of viruses? **ETEA 2022**
- They do not respire.
  - They do not excrete.
  - They do not have the ability to reproduce.
  - They can be crystallized.
- 6) Which of the following is not related enveloped virus?: **ETEA 2020**
- They survive for a short time
  - Their envelop is sensitive to sunlight
  - They are tolerant to antidotes
  - Envelop is derived from host
- 7) Which one can be considered as living characteristic of a virus **NUMS 2022**
- Can be crystalized
  - No cellular respiration
  - Mutuate their genetic amterial
  - Lack biosynthetic machinery
- 8) The shape of polio virus is: **[ETEA 2010]**
- (a) Polyhedral shape  
 (b) Bad shape  
 (c) Tadpole shape  
 (d) Golf ball shape
- 9) All viruses can reproduce within living organisms only, so they are known as:
- Ectoparasites
  - Endoparasites
  - Obligative intracellular parasites
  - Facultative intracellular parasites
- 10) The genome of the most animals and higher plants is: **[ETEA 2014],[2005]**
- DNA
  - RNA
  - Both DNA and RNA
  - Either DNA or RNA
- 11) First infectious disease against which effective method of prevention developed was a **NUMS 2020**
- Bacterial disease
  - viral disease
  - protozoan disease
  - viroid disease
- 12) Choose the cell which lack endoplasmic reticulum **MDCAT 2018**
- Muscle cell
  - Bacteria
  - Virus
  - Neuron
- 13) Shape of tobacco mosaic virus is **NUMS 2016**
- Spring shape
  - Rod shape
  - Comma shape
  - Spherical shape
- 14) Which of the following is derived from Latin word VENOME which means poisonous? **NUMS 2018**
- Bacteria
  - Fungi
  - Virus
  - Malaria
- 15) **Structure of some virus**  
 The protein that form the matrix of HIV virus is **KMU-CAT 2021**
- gp120
  - gp41
  - p17

d) both A and B		d) Envelop is derived from host	
16)	How many pieces of ribonucleic acid (RNA) make up the genome of influenza virus? <b>ETEA 2023</b> A. 4 B. 6 C. 8 D. 10	25)	Cilia and flagella are absent in <b>MDCAT 2017</b> a. Viruses b. Bacteria c. Higher plants d. Lower animals
17)	The genome of the human immunodeficiency virus (HIV) is made up of <b>ETEA 2023</b> a) cDNA b) DNA c) RNA d) rRNA	26)	The minimum size of virus is _____ <b>MDCAT 2018</b> a. 20 nm b. 200 nm c. 250nm d. 100 nm
18)	HIV belongs to a special class of virus known as: <b>ETEA 2023</b> A) Retrovirus B) Flavivirus- C) Novavirus D) Tetravirus	27)	The genome of influenza virus is made up of : <b>ETEA 2019-Med</b> a) single stranded RNA b) double stranded RNA c)single strand DNA d) double stranded RNA
19)	Human immunodeficiency virus (HIV) particles surround with a coat known as the viral envelop or membrane made up of; <b>ETEA 2022</b> A. Glycoprotein B. Glycolipid C. Lipoprotein D. Sulpholipid	28)	Capsid, the protective coat of a virus is made up of subunits known as capsomeres: <b>MDCAT 2019</b> a. Lipid b. Protein c. RNA d. DNA
20)	Phages viruses are usually abundant in the intestine of man and animals because: <b>[ETEA 2008]</b> (a) Abundant bacteria are present (b) Abundant water is present (c) Abundant nutrients are present (d) They can only live at human bodytemperature	29)	The head of some phages are icosahedral, which means that the head possess: <b>ETEA 2023</b> A) 6 sides B) 10 sides. C) 15 sides D) 20 sides
21)	Genome of which of the following consists of single molecule of DNA? <b>[ETEA 2006]</b> (a) HAV (b) HBV (c) HCV (d) HIV	30)	The genome of influenza virus is made up of : <b>ETEA 2019</b> a) single stranded RNA b) double stranded RNA c)single strand DNA d) double stranded RNA
22)	The genetic material of plant viruses mostly is; <b>[2005]</b> (a) DNA (b) RNA (c) Both DNA and RNA (d) Proteins	31)	The protein coat surrounding the genome of virus is called <b>ETEA 2023</b> a) Capsid b) DNA sheath c) Phage d) Viroid
23)	Identify in which one of the following the genetic information is catalyzed using reverse transcription <b>[ETEA 2017]</b> a. protein → DNA b. RNA → DNA c. DNA → RNA d. RNA proteins	32)	<b>Retroviruses cause diseases in:</b> <b>FMDC 2017</b> a) Rodents b) Fowls c) Cats d) All of these
24)	Which of the following is not related enveloped virus? <b>MDCAT 2020</b> a) They survive for a short time b) Their envelop is sensitive to sunlight c) They are tolerant to antidotes	33)	In HIV the proteins ..... makes the spikes a) gp120 and gp40 b) gp120 and gp41 c) gp121 and gp41 d) gp121 and gp41
		34)	In HIV the proteins ..... make the Matrix and ..... together makes the core a) P17 and p 24 b) P 24 and p 17 c) P 17 and p p 27 d) P 24 and p 14
		35)	HIV belongs to special class of virus called Retrovirus, within this class it is in a) Superclass lentivirus b) Subclass lentivirus c) Superclass Pox virus d) Non of these
		36)	Three HIV genes gag, pol, and env code for Protein

BOM SERIES	Page 230	BOM ACADEMY Online & Swat
		synthesises for new
		a) HIV particle                          b) Infectious particles
		c) RNA particles                           d) RNA particles
37)	Six HIV genes tat,rev,nef, vif,vpr, and vpu code for protein that control the ability of	
	a) Infection                              b) DNA syntheis	a. Without invading any cell
	c) Proteins syntheisess                d) Lipid syntheise	b. In bacterial cell
		c. By mitosis
		d. By meiosis
50)	The complete, mature and infection virus particle is known as: [ETEA 2020]	
	a) Venome                                b) genome	
	c) virion                                 d) capsid	
51)	Lytic cycle is also called	
	a) Master-slave relation              b) Guest -host relation	
	c) Both a and b                        d) Non of these	
52)	Lysogenic cycle is also called	
	a) Master-slave relation              b) Guest -host relation	
	c) Both a and b                        d) Non of these	
53)	When a virus securely attach to host cell in good conditions	
	a) infections begins                b) infections stops	
	c) virus dies                            d) virus become crystalline	
54)	The type of life cycle in which bacterium cell burst are called	
	a) Master-slave relation              b) Guest -host relation	
	c) Both a and b                        d) Non of these	
55)	Phages can be used as	
	a) Cloning vectors                    b) Infectious agent	
	c) Food                                d) All of these	
56)	Cloning vectors are capable of replicating inside	
	a) Nucleus                              b) Mitochondria	
	c) Living cell                        d) Non living cell	
57)	HIV	
	Which of the following can be effective in preventing viral infection in humans? [ETEA 2023]	
	a) Taking antihistamines	
	b) Getting vaccinated	
	c) Applying antiseptics	
	d) Taking antibiotics	
58)	Which of the following is not TRUE about Human Immunodeficiency Virus (HIV)? : [ETEA 2020]	
	a) It is retrovirus	
	b) It is surrounded by an envelop	
	c) It does not cause AIDS	
	d) It causes the deficiency of the human immune system	
59)	HIV is also known as: [ETEA 2010]	
	(a) AIDS                              (b) HAV	
	(c) HTLV                            (d) HBV	
60)	Numerous opportunistic diseases might attack a person suffering from which of the following diseases? : [ETEA 2020]	
	a) Measles	
	b) influenza	
	c) Hepatitis A	
	d) AIDS	
61)	Numerous opportunistic diseases might attack a person suffering from which of the following	
46)	Virus life cycle	
	The life cycle in which the phage kills the bacteria is known as [MDCAT 2017]	
	a.Transduction	
	b.Temperate phage cycle	
	c.Lytic cycle	
	d.Lysogenic phage cycle	
47)	Phage-virus secretes an enzyme "lysozyme" form its: [ETEA 2011]	
	(a) tail region	
	(b) head region	
	(c) neck region	
	(d) capsule region	
48)	The complete, mature and infection virus particle is known as [MDCAT 2020]	
	a) Venome	
	b) genome	
	c) virion	
	d) capsid	
49)	The viruses can reproduce [MDCAT 2017]	

diseases? <b>MDCAT 2020</b>	(b) a single R.N.A (c) D.N.A and R.N.A. (d) D.N.A
a) Measles b) influenza c) Hepatitis A d) AIDS	
62) Numerous opportunistic diseases might attack a person suffering from which of the following disease? <b>NUMS 2020</b>	71) AIDS is caused by a) HIV virus b) AIDS virus c) Both a and b d) Bactetria
a) Measles b) influenza c) Hepatitis A d) AIDS	72) There are ..... types of lymphocytes a) 2 b) 3 c) 4 d) 5
63) Which of the following is not TRUE about Human Immunodeficiency Virus (HIV)? <b>MDCAT 2020</b>	73) B cells release a) Antigens b) Antibodies c) Bacteria d) Virus
a) It is retrovirus b) It is surrounded by an envelop c) It does not cause AIDS d) It causes the deficiency of the human immune system	74) The genome of is Hepatitis A a) RNA b) DNA c) Both a and b d) Non of these
64) HIV is classified as <b>MDCAT 2015</b>	75) The genome of is Hepatitis B a) RNA b) DNA c) Both a and b d) Non of these
a. Bacteriophage b. Oncovirus c. Retrovirus d. Icosahederal virus	76) The genome of is Hepatitis C a) RNA b) DNA c) Both a and b d) Non of these
65) Among followings, _____ enzyme is naturally found in human immunodeficiency virus (HIV): <b>MDCAT 2019</b>	77) There are ..... types of T cells a) 2 b) 3 c) 4 d) 5
a. DNA polymerase b. RNA polymerase c. Reverse transcriptase d. Ligase	78) Helper T cell a) Recognize antigen b) Recognize antibody c) Help T cell d) Kill T cell
66) HIV destroys a type of defense cell in the body called a helper lymphocyte.: <b>ETEA 2019</b>	79) Killer T cell kill the a) Recognize antigen b) Recognize antibody c) Help T cell d) Kill T cell
a) TD <sub>4</sub> b) T <sub>4</sub> c) C <sub>4</sub> d) CD <sub>4</sub>	80) HIV can only replicate inside a) Bacteria b) Virus c) Human d) Tiger
67) Most favorite host cell of HIV – Virus is: <b>[ETEA 2009]</b>	81) HIV have special carriers on its surface called a) CDA b) CD1 c) CD3 d) CD4
(a) Lymphocytes (b) RBC (c) T - Cell (d) B - Cells	82) Viral DNA integrated into human DNA by HIV enzyme called a) Lyases b) Integrase c) Lysosome d) Protease
68) The enzyme "Reverse transcriptase" present in HIV – virus is: <b>[ETEA 2009]</b>	83) The enzyme present in phage which digest cell wall of bacteria is called a) Lyases b) Endonuclease c) Lysosome d) Protease
(a) 50 molecules per virion (b) 40 molecules per virion (c) 30 molecules per virion (d) 20 molecules per virion	84) Enzyme that convert the viral RNA into DNA is a) Lyases b) Endonuclease c) Lysosome d) Reverse transcriptase
69) which one is not opportunistic disease related to HIV infection <b>[ETEA 2017]</b>	85) The combine DNA formed from human and viral DNA is called a) Proivirus b) Cock tail c) Antiretroviral d) Prions
a) destruction of body immune system b) recurrent pneumonia c) pulmonary tuberculosis d) toxoplasmosis	86) Anti-HIV are also called a) Proivirus b) Cock tail c) Antiretroviral d) Prions
70) H.I.V contains: <b>[ETEA 2011]</b>	87) 3 or more anti-HIV medications(HAART) are known as a) Proivirus b) Cock tail c) Antiretroviral d) Prions
(a) two R.N.As	88) Some viral diseases(hepatitis, herpes, polio, prions)

Which of the following diseases is NOT caused by bacteria? **[ETEA 2011]**

- (a) tetanus
- (b) small pox
- (c) tuberculosis
- (d) diphtheria

89) \_\_\_\_\_ is a non-cellular infectious entity: **MDCAT 2017**

- a. Mycoplasma
- b. Escherichia coli
- c. Herpes virus
- d. Diplococcus

90) **Herpes is a virus that enters the human body and remains dormant in the nervous system until it produces an outbreak, without any particular reason. Which of the following statements correctly describes herpes?** **FMDC 2013**

- A) While it remains dormant in the nervous system, the virus is in its lysogenic cycle
- B) During an outbreak the virus is in the lytic cycle
- C) Herpes integrates itself into the DNA of the cell
- D) All of the above

91) 38) Which of the following pairs of disease is caused by virus? **ETEA 2022**

- A) Syphilis and TB
- B) AIDS and Typhoid
- C) Measles and Mumps
- D) Tetanus and Cholera

92) For hepatitis B the incubation period is between: **ETEA 2019**

- a) 4 and 20 weeks
- b) 6 and 20 weeks
- c) 2-26 weeks
- d) 2-6 weeks

93) A combination of alpha interferon and ribavirin is used for the treatment of hepatitis **NUMS 2020**

- a) B
- b) A
- c) D
- d) C

94) second major form of hepatitis is **NUMS 2015**

- a) hepatitis A
- b) hepatitis B
- c) hepatitis C
- d) hepatitis D

95) All of the following statements are true regarding hepatitis a virus except **KMU-CAT 2021**

- a) it is concerned with children
- b) cause chronic liver disease
- c) can cause prolonged illness upto 4 months
- d) lives in feces

96) The word hepatitis means inflammation of the; **ETEA 2022**

- A. pancreas
- B. Liver
- C. spleen
- D. Gall bladder

97) All of the following are bacterial diseases except; **[2005]**

- Cholera
- (b) Tuberculosis
- (c) Typhoid
- (d) Poliomyelitis

98) Hepatitis means inflammation to

- a) heart
- b) liver
- c) stomach
- d) kidney

99) Hepatitis A is also called

- a) Infectious hepatitis
- b) Serum hepatitis
- c) Simlex hepatitis
- d) No of these

100) Hepatitis B is also called

- a) Infectious hepatitis
- b) Serum hepatitis
- c) Simlex hepatitis
- d) No of these

101) Herpes is caused by

- a) Herpes simplex virus type 1
- b) Herpes simplex virus type 2
- c) Herpes simplex virus type 1,2
- d) Complex of begomo virus

102) poliomyelitis is caused by

- a) Herpes simplex virus type 1
- b) Complex of begomo virus
- c) Herpes simplex virus type 1,2
- d) Polio virus

103) Leaf curl diseases of cotton is caused by

- a) Herpes simplex virus type 1
- b) Complex of begomo virus
- c) Herpes simplex virus type 1,2
- d) Polio virus

104) Transmissible neurodegenerative diseases is caused by

- a) Proviruses
- b) Cock tail
- c) Antiretroviral
- d) Prions

105) Hepatitis D is caused by

- a) Proviruses
- b) Cock tail
- c) Viroids
- d) Prions

106) The incubation for hepatitis A

- a) 2 – 6 weeks
- b) 4 – 20 weeks
- c) 2 – 26 weeks
- d) 5 – 35 days

107) The incubation for hepatitis B

- a) 2 – 6 weeks
- b) 4 – 20 weeks
- c) 2 – 26 weeks
- d) 5 – 35 days

108) The incubation for hepatitis C

- a) 2 – 6 weeks
- b) 4 – 20 weeks
- c) 2 – 26 weeks
- d) 5 – 35 days

109) The incubation period for polio

- a) 4 – 20 weeks
- b) 2 – 26 weeks
- c) 5 – 35 days
- d) 2 – 3 weeks

110) The incubation period for leaf curl disease

- a) 4 – 20 weeks
- b) 2 – 26 weeks
- c) 5 – 35 days
- d) 2 – 3 weeks

**BOM SERIES**

- 111) The incubation period for syphilis  
 a) 4 – 20 weeks b) 2 – 26 weeks  
 c) 5 – 35 days d) 2 – 3 weeks
- 112) There is no medications used to treat  
 a) Hepatitis A b) Hepatitis B  
 c) Hepatitis C d) Hepatitis D
- 113) Polio cause  
 a) Stroke b) Arteriosclerosis  
 c) Muscle paralysis d) AIDS
- 114) Leaf curl disease of cotton are transmitted by  
 a) Begomo virus b) Whitefly Bemisia tabaci  
 c) Longest virus d) Mycoplasma
- 115) Pox virus is the  
 a) Begomo virus b) Bemisia tabaci  
 c) Longest virus d) Mycoplasma
- 116) Antibiotics can be used for  
 a) Urinary tract infection  
 b) Urinary retention  
 c) Dehydration d) All of these
- 117) Bethanechol can be used for  
 a) Urinary tract infection  
 b) Urinary retention  
 c) Dehydration d) All of these
- 118) Polio immunization vaccine is effective up to  
 a) 50 % b) 80 %  
 c) 90 % d) 100 %
- 119) Most animal viruses are

Page 233

**BOM ACADEMY Online & Swat**

- |                     |         |
|---------------------|---------|
| A) RNA              | B) DNA  |
| C) Both RNA and DNA | D) mRNA |
- 120) The only genus of bacteria which lack Cell walls is  
 a) Begomo virus b) Bemisia tabaci  
 c) Longest virus d) Mycoplasma
- 121) HIV is ..... virus  
 A) RNA B) DNA  
 C) Both RNA and DNA D) mRNA
- 122) **Viroids**  
 \_\_\_\_\_ infection is caused by a viroid. **NUMS**

**2020**

- a) Hepatitis A  
 b) Hepatitis B  
 c) mad cow disease  
 d) mysterious brain infection

- 123) The only human disease caused by VIROID is:  
**[ETEA 2015]**  
 a) Hepatitis A  
 b) Hepatitis B  
 c) Hepatitis C  
 d) Hepatitis D



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## CHAPTER 08

### DIVERSITY AMONG PLANTS

- 1) Galantamine hydrobromide is a compound derived from **[ETEA 2019-Med]**  
 (a) cannabis  
 (b) Coca  
 (c) English yew  
 (d) daffodil
- 2) Dicotyledonous flowers are usually:  
**[ETEA 2015]**  
 (a) Clmerous  
 (b) Trimerous  
 (c) Tetra,erpis  
 (d) Pentamerous
- 3) Smallest gametophyte is present in:  
**[ETEA 2015]**  
 (a) Adiantum  
 (b) Funaria  
 (c) Marchantia  
 (d) Angiosperms
- 4) Heterospory occurs in: **[ETEA 2015]**  
 (a) Selaginella  
 (b) Equisetum  
 (c) Lycopodium  
 (d) Lepidodendron
- 5) All of the following are dioecious except:  
**[ETEA 2014]**  
 (a) Ulva  
 (b) Funaria  
 (c) Marchantia  
 (d) Polytricum
- 6) All of the following are gametophytes except:  
**[ETEA 2014]**  
 (a) Club Mosses  
 (b) Funaria  
 (c) Liver-Worts  
 (d) Horn-Worts
- 7) A spore of Fern plant develops into:  
**[ETEA 2014]**  
 (a) Zygote  
 (b) Sporophyte  
 (c) Gametophyte

- (d) Prothalus
- 8) In angiosperms the megasporangium develops into:  
**[ETEA 2014]**  
 (a) Embryo-Sac  
 (b) Embryo  
 (c) Seed  
 (d) Male gametophyte
- 9) A spore of Fern plant develops into:  
**[ETEA 2014]**  
 (a) Zygote  
 (b) Sporophyte  
 (c) Gametophyte  
 (d) Prothalus
- 10) Seaginella is the living member of:  
**[ETEA 2013]**  
 (a) Psilosida  
 (b) Lycopsida  
 (c) Sphenopsida  
 (d) Pteropsida
- 11) A sporophyte that depends on gametophytes is: **[ETEA 2013]**  
 (a) Adiantum  
 (b) Pinus  
 (c) Marchantia  
 (d) Mustard-plant
- 12) Club-mosses are also called; **[ETEA 2011]**  
 (a) psilosida                         (b) sphenopsida  
 (c) lycopsida                           (d) pteropsida
- 13) Equisetum is the living member of:  
**[ETEA 2010]**  
 (a) Sphenopsida                       (b) Psilosida  
 (c) Pteropsida                        (d) Lycopsida
- 14) All of the following are gametophyte plants EXCEPT: **[ETEA 2010]**  
 (a) Liver wort   (b) Equisetum  
 (c) Funaria       (d) Polytrichum
- 15) All of the following plants possess actinomorphic flowers EXCEPT:  
**[ETEA 2010]**  
 (a) Rose                               (b) Potato  
 (c) Apple                              (d) Pea
- 16) A pollen-grain germinates and develops into: **[ETEA 2009]**  
 (a) Prothalus  
 (b) Sporophyte  
 (c) Micro-gametophyte  
 (d) Mega-gametophyte
- 17) All of the following belong to mosses Except:  
**[ETEA 2009]**  
 (a) Funaria                           (b) Polytrichum

<p>(c) Sphagnum      (d) Club-mosses</p> <p>18) Alternation of generations in plants is regarded a mechanism for: <b>[ETEA 2008]</b>          (a) Achieving haploidy          (b) Promoting survival          (c) Producing diploidy          (d) Having no significance</p> <p>19) Class filicinae belongs to "phylum" <b>[ETEA 2008]</b>          (a) Tracheophyta      (b) Bryophyte          (c) Thallophyta      (d) Embryophyta</p> <p>20) In bryophytes sterile hair are produced between sex organs to keep them: <b>[ETEA 2008]</b>          (a) Dry      (b) Wet          (c) Worm      (d) Covered</p> <p>21) Which one of the following is necessary for evolution of seeds? <b>[2005]</b>          (a) Introduction of heterospory          (b) Retention of the megasporangium          (c) Fertilization of the egg prior to discharge          (d) All of the above</p> <p>22) All of the following are angiosperms except; <b>[2005]</b>          (a) Cactus          (b) Amaryllis          (c) Spurge          (d) Firs</p> <p>23) Size of the flower of chrysanthemum may be enlarged by removing: <b>[ETEA 2006]</b>          (a) All leaves          (b) A few leaves          (c) All branches except one          (d) All floral bud except one.</p> <p>24) Consider the following names of some plants; <b>[2005]</b>          I. Grapes      II. Mango          III. Oats      IV. Willow          Which of them is the most appropriate for panicle inflorescence?          (a) I, II and III only      (b) I and II only          (c) II and IV only      (d) I and IV only</p> <p>25) In grapes and mangoes, the inflorescence is: <b>[ETEA 2011]</b>          (a) panicle      (b) multiparous cyme          (c) capitulum      (d) umbel</p> <p>26) Kelps are: <b>[ETEA 2016]</b>          a) Diatoms      b) Red-algae          c) Green-algae      d) <b>Brown-algae</b></p> <p>27) independent gametophyte and sporophyte are found in: <b>[ETEA 2016]</b>          a) Liverworts          b) Tracheophytes</p>	<p>c) <b>Ectocarpus</b>          d) Mosses</p> <p>28) The flowers come at the same level due to equal size of their pedicels in; <b>[ETEA 2007]</b>          (a) Corymb          (b) Umbel          (c) Catkin          (d) Panicle</p> <p>29) It looks like a single flower but it is in fact an inflorescence called; <b>[ETEA 2007]</b>          (a) Panicle          (b) Typical raceme          (c) Compound umbel          (d) Capitulum</p> <p>30) Name the class that contains seedless plants <b>MDCAT 2018</b>          a. Angiospermae          b. Paraphyses          c. Gymnospermae          d. Filicinae</p> <p>31) Which of the following have rootless sporophytes <b>MDCAT 2018</b>          a. Psilopsida          b. Glycopsida          c. Tracheophyta          d. Sphenopsida</p> <p>32) The cell suspension culture of _____ produces quinine? <b>MDCAT 2018</b>          a. Soybean          b. Luciferin          c. Cinchonaled geriava          d. Digitalis lanata</p> <p>33) Xerophytes have small thick leaves to <b>MDCAT 2019</b>          a. Help them float on water          b. Help them survive in salty environment          c. Limit water loss by reducing the surface area          d. Limit water loss by increasing the surface area</p> <p>34) Plants of this group are called ferns: <b>NUMS 2017</b>          a) Filicinae          b) Angiospermae          c) Gymnospermae          d) All of them</p> <p>35) Brassica and rose plant belong to the group of plants: <b>NUMS 2017</b>          a) Hydrophytes          b) Mesophytes          c) Xerophytes          d) Succulent</p> <p>36) Wood is not formed in <b>NUMS 2015</b>          a) Monocots</p>
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<p>b) Dicots c) Gymnosperms d) All of given</p>	<p>C) oosphere D) Both (B) &amp; (C)</p>
<p>37) Which of the following feature is not related to vexillum in pea family? <b>NUMS 2015</b>            a) Large b) Single c) Outermost d) Anterior</p>	<p>45) potamogeton is an example of _____.: ETEA 2019            a) xerophytes      b) mesophytes c) hydrophytes      d) halophytes</p>
<p>38) Leaves of ..... are used to cure cough and cold in horses <b>NUMS 2015</b>            a) Glycyrrhizaglabra b) Cassia alata c) Bamboo d) Both bomboo and glycyrrhizaglabra</p>	<p>46) Horsetails are included in class: ETEA 2019            a) Pteropsida      b) Lycopsida c) Psilopsida      d) Sphenopsida</p>
<p>39) Bryophytes and ferns both require water for fertilization but ferns are not placed in bryophyte because they have <b>NUMS 2015</b>            a) Ciliated spermatozoa instead of flagellated spermatozoa b) Sporophyte as main generation instead of gametophyte generation c) Vascular tissue d) None of given</p>	<p>47) Galantamine hydrobromide is a compound derived from: ETEA 2019            a) cannabis b) Coca c) english yew d) daffodil</p>
<p>40) Apple trees, oaks and palm trees are...? <b>FMDC 2012</b>            A. Angiosperms B. Gymnosperms C. Chordates D. Bryophytes</p>	<p>48) The gametophyte of Lycopsida is mainly: ETEA 2019            a) Aerial b) partial aerial and partially underground c) underground d) Photosynthetic</p>
<p>41) "Hordeum vulgare" is the botanical name of: <b>FMDC 2013</b>            A) Wheat B) Oats C) Rice D) Barley E) Bajra</p>	<p>49) Independent gametophyte and sporophyte are found in: ETEA 2019            a) Selaginella      b) Polytrichum c) Ectocarpus      d) liverworts</p>
<p>42) Plants of this group are called ferns: <b>FMDC 2015</b>            a) Filicinae b) Angiospermae c) Gymnospermae d) All of them</p>	<p>50) Tmesipteris is an example of: ETEA 2019            a) Horsetail      b) club mosses c) psilopsida      d) Pteropsida</p>
<p>43) Brassica and rose plant belong to the group of plants: <b>FMDC 2015</b>            a) Hydrophytes b) Mesophytes c) Xerophytes d) Succulent</p>	<p>51) <b>Introduction, alternation of generation</b>            Ferns are dominated in periods of            a) Permian &amp; Triassic      b) Triassic &amp; Jurasic c) Permian      d) Triassic</p>
<p>44) The female reproductive cells in bryophytes Is called: <b>KMU-CAT 2021</b>            A) Archegonium B) Egg</p>	<p>52) Ammonoids mollusk are dominated in periods of            a) Permian &amp; Triassic      b) Triassic &amp; Jurasic c) Permian      d) Triassic</p>
	<p>53) Arrangement of species from ancestors to descendants through their            a) Growth      b) Evolution c) Revolution      d) Decantation</p>
	<p>54) Today Two million species of animals are present and plants present are            a) 0.5 million      b) 1 million c) 1.5 million      d) 2 million</p>
	<p>55) The number of dicotyledons            a) 2,00,000      b) 50,000 c) 700      d) 18,000</p>
	<p>56) The number of monocotyledons            a) 2,00,000      b) 50,000 c) 700      d) 18,000</p>
	<p>57) The number of gymnosperms            a) 2,00,000      b) 50,000 c) 700      d) 18,000</p>
	<p>58) The number of algae            a) 50,000      b) 700 c) 18,000      d) 80,000</p>
	<p>59) The number of fungi</p>

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- a) 50,000      b) 700  
c) 18,000      d) 80,000
- 60) In plants like algae, mosses and liverworts the independent and larger generations is  
a) Gametophyte    b) Sporophyte  
c) Both a and b    d) Non of these
- 61) The generation of Ulva & ectocarpous is Gametophyte  
a) Gametophyte    b) Sporophyte  
c) Both a and b    d) Non of these
- 62) Vascular tissues are present only in sporophyte and absent in  
a) Gametophyte    b) Sporophyte  
c) Both a and b    d) Non of these
- 63) **Non Vascular Plants**  
Musci is also called  
a) Mosses                  b) Liverworts  
c) Hornworts                d) Non of these
- 64) Hepaticae is also called  
a) Mosses                  b) Liverworts  
c) Hornworts                d) Non of these
- 65) Anthrocerota is also called  
a) Mosses                  b) Liverworts  
c) Hornworts                d) Non of these
- 66) Examples of mosses  
a) Funaria & polytrichum  
b) Marchantia  
c) Anthoceros                d) All of these
- 67) Examples of liverworts  
a) Funaria & polytrichum  
b) Marchantia  
c) Anthoceros                d) All of these
- 68) Examples of hornworts  
a) Funaria & polytrichum  
b) Marchantia  
c) Anthoceros                d) All of these
- 69) The main characters of bryophytes are  
a) Green branched thallus  
b) Lack true roots, stem and leaves  
c) Rhizoids                  d) All of these
- 70) Fusion of sperm with egg or oospore to form zygote or oospore is called  
a) Fertilization            b) Reproduction  
c) Double fertilization    d) Non of these
- 71) Bryophytes are also called  
a) Arthropophytes    b) Embryophytes  
c) Sporophyte              d) All of these
- 72) Moss (2.7 cm height) is  
a) Gregarious in habit  
b) Non gregarious in habit  
c) Vascular in habit  
d) Non cellular in habit
- 73) Antheridia and archegonia of mosses are sometimes mixed with each other by hair-like structures known as  
a) Rhizoids                b) Paraphyses  
c) Antherozoids            d) Hairs
- 74) If antheridia and archegonia are present on same or

Page 237

**BOM ACADEMY Online & Swat**

- two branch of same plant  
a) Paraphyses              b) Monoecious  
c) Dioecious                d) Antherozoid cells
- 75) If antheridia and archegonia are present on branch separate plants  
a) Paraphyses              b) Monoecious  
c) Dioecious                d) Antherozoid cells
- 76) The antheridium is multicellular, short stalked, club shaped body which contain  
a) Paraphyses              b) Monoecious  
c) Dioecious                d) Antherozoid cells
- 77) The lower swollen portion of archegonium is called  
a) Venter                  b) Neck  
c) Tail                      d) Head
- 78) Which one of the following is land adaptation by bryophytes  
a) absorption of CO<sub>2</sub>    b) Absorption of water  
c) Heterogamy              d) All of these
- 79) **Trachophyta**  
The living genera of Psilopsida  
a) Psilotum & Tmesipteris  
b) Lycopodium, Selaginella, Isoetes, Phylloglossum  
c) Equisetum                d) Clamite
- 80) The living genera of Lycopida  
a) Psilotum & Tmesipteris  
b) Lycopodium, Selaginella, Isoetes, Phylloglossum  
c) Equisetum                d) Clamite
- 81) The living genera of Sphenopsida  
a) Psilotum & Tmesipteris  
b) Lycopodium, Selaginella, Isoetes, Phylloglossum  
c) Equisetum                d) Clamite
- 82) Pteropsida includes  
a) Ferns                    b) Angiosperm  
c) Gymnosperms            d) All of these
- 83) The fossil genera of psilopsida are  
a) Psilophyton (psilopsidom), Rhynia, Cooksonia  
b) Lepidodendron & sigillaria  
c) Clamites                d) Equisetum
- 84) The fossil genera of lycopsida are  
a) Psilophyton (psilopsidom), Rhynia, Cooksonia  
b) Lepidodendron & sigillaria  
c) Clamites                d) Equisetum
- 85) The fossil genera of sphenopsida  
a) Psilotum & Tmesipteris  
b) Lycopodium, Selaginella, Isoetes, Phylloglossum  
c) Equisetum                d) Clamite
- 86) Except from ovum other cell in archegonium are  
a) Fully functional    b) Functionless  
c) Diploid in nature    d) Triploid in nature
- 87) Examples of ferns  
a) Adiantum                b) Pteris  
c) Dryopteris and pteridium  
d) All of these
- 88) Examples of gymnosperm  
a) Cycads                  b) Conifers  
c) Both cycads and conifers  
d) Adiantum
- 89) Waxy waterproof layer called cuticle is not present in

**BOM SERIES**

Page 238

**BOM ACADEMY Online & Swat**

a) Psilosidae c) Sphenopsida	b) Lycopsida d) Ferns	104) Fruits are present in a) Gymnosperm b) Angiosperm c) Psilosidae d) Lycopsida
90) Heterogamy of Bryophytes are a) Its adaptation of life b) Its adaptation of water plants c) Its adaptation of being living d) Its adaptation of being cellular	105) Fruits are absent in a) Gymnosperm b) Psilosidae c) Lycopsida d) All of these	
91) Which is used as packing material from the following a) Sphagnum b) Equisetum c) Climates d) Ferns	106) Megaphyllous leaf is present in a) Psilosidae b) Lycopsida c) Sphenopsida d) Filicinea	
92) Tracheophytes are also called vascular plants due to presence of a) Xylem b) Vessels c) Both xylem and phloem d) Cell wall	107) The roots of adiantum are a) Fibrous adventitious b) Adventitious c) Fibrous long singular d) Non of these	
93) Tracheophytes are also called Tracheophytes due to presence of cells called a) Xylem b) Phloem c) Tracheids d) Cell membrane	108) Ferns have prostate plant body that bears numerous sporangia on the leaves called a) Sori b) fronds c) Rhizoids d) Strobili	
94) Tracheids are water conducting cells of a) Xylem b) Phloem c) Tracheids d) Cell membrane	109) Microphyllous leaf are present in a) Club mosses b) Horse tails c) Clubmosses and horse tails d) Non of these	
95) In tracheophytes the sporophyte generation is dominant and the gametophyte is a) Small reduced b) Short lived c) Small reduced and short lived d) Small reduced and long lived	110) In filicineae sporangia are grouped under the leaves on margin of pinnules called a) Sori b) Spunds c) Rhizoids d) Strobili	
96) Rhynia, psilotum, club mosses, horsetails and ferns a) Small reduced & short lived b) Lower vascular plants c) Higher vascular plants d) Small reduced and long lived	111) The immature and young filicineae are a) Uncoiled b) Coiled c) Round d) Tubular	
97) Gymnosperm & angiosperm a) Small reduced & short lived b) Lower vascular plants c) Higher vascular plants d) Small reduced and long lived	112) In lower vascular plants seeds are not produced they reproduce by a) Seeds b) Conjugation c) Asexual reproduction d) Spores	
98) Spore consists of cytoplasm and nucleus, surrounded by a) Single layer of cell wall b) Single layer of cell membrane c) Double layer of cell wall d) Double layer of cell membranes	113) Higher vascular plants are a) Seed producing b) Seedless c) Lack roots d) Lact leaves	
99) The inner cell wall of spore is called a) Intina b) Intina or endosporium c) Exine d) Exine or exosporium	114) The leaves of lycopsida are small and simple and are called a) Microphyllus b) Megaphyllous c) Both of these d) No of these	
100) The outer cell wall of spore is called a) Intina b) Intina or endosporium c) Exine d) Exine or exosporium	115) In lycopsida, sporophyll usually forms a) Sori b) Spunds c) Rhizoids d) Strobili	
101) Leaves are absent in a) Psilosidae b) Lycopsida c) Sphenopsida d) Pteropsida	116) In lycopsida, small outgrowth present at the base is called a) Sporangia b) Spunds c) Rhizoids d) Ligule	
102) Roots are absent in a) Psilosidae b) Lycopsida c) Sphenopsida d) Pteropsida	117) In some lycopsida such as lycopodium, the ligule is a) Small b) Large c) Normal size d) Absent	
103) The stem and petiole of adiantum are covered with numerous brownish scales called A) stolen B) runner C) rementa D) non of these	118) Sphenopsida are also called a) Arthropophytes b) Horse tail c) Club mosses d) Angiosperm	
	119) Sphenopsida are commonly called a) Arthropophytes b) Horse tail c) Club mosses d) Angiosperm	
	120) Lycopsida are commonly called a) Arthropophytes b) Horse tail c) Club mosses d) Angiosperm	

**BOM SERIES**

Page 239

**BOM ACADEMY Online & Swat**

121) No of species of selaginella are a) 300 b) 150 c) 600 d) 1200	a) Monocotyledon c) Both a and b d) Non of these
122) Selaginella have four rows of leaves, two small on upper surface and two large on a) One side b) Two sides c) Three sides d) Four sides	138) Root is adventitious in a) Monocotyledon c) Both a and b d) Non of these
123) In selaginella, a long slender root like organ give off from stem which is known is a) Rhizopore b) Srons c) Rhizoids d) Ligule	139) Reticulate rule venation is present in a) Monocotyledon b) Dicotyledons c) Both a and b d) Non of these
124) Selaginella plant is a) Sporophyte b) Gametophytes c) Both a and b d) Non of these	140) Tap root is present in a) Monocotyledon b) Dicotyledons c) Both a and b d) Non of these
125) Sporangia are closely packed to form a) Rhizopore b) Spronds c) Rhizoids d) Strobilus	141) Pentamerous flower symmetry is present in a) Monocotyledon b) Dicotyledons c) Both a and b d) Non of these
126) Special lateral appendages called sporangiophores are developed which bear a) Sporangia b) Spronds c) Rhizoids d) Ligule	142) Wedge shape vascular bundles in ring form are present in a) Monocotyledon b) Dicotyledons c) Both a and b d) Non of these
127) The mature gametophyte of sphenopsida or horse tail is called a) Sporangia b) Prothallus c) Rhizoids d) Ligule	143) 5-8 xylem bundles ar present in a) Monocotyledon b) Dicotyledons c) Both a and b d) Non of these
128) Spore germinate in week time and produce haploid gametophyte called a) Sporangia b) Prothallus c) Rhizoids d) Ligule	144) Secondary growth is present in a) Monocotyledon b) Dicotyledons c) Both a and b d) Non of these
129) Prothallus is independent plant because it produce its own food with the help of a) Chloroplast b) Chromoplast c) Leucoplast d) Non of these	145) 2-6 xylem bundles are present in a) Monocotyledon b) Dicotyledons c) Both a and b d) Non of these
130) Ripened and fertilized ovule is called a) Seeds b) Integuments c) Ovule / unripe fruit d) Fruits	146) Secondary growth is absent in a) Monocotyledon b) Dicotyledons c) Both a and b d) Non of these
131) Around the sporangium, in evolution branch like outgrowths fuse and form a) Seeds b) Integuments c) Ovule / unripe fruit d) Fruits	147) Monocotyledona dn dicotyledons are types of a) Ferns b) Angiosperm c) Gymnosperm d) Non of these
132) The integumented megasporangium in which megaspore is retained is called . Seeds A) Integuments B) Ovule / unripe fruit C) Fruits D) non of these	148) The pollen grain send tube called pollen tube which contain two a) Male gametophyte b) Tube cell c) Both a and b d) Non of these
133) All gymnosperm are invariably branched except a) Conifers b) Cycades c) Both a and b d) Non of these	149) The ovary contain ovule, the ovule consist of tissues called _____ cover by integumets a) Nucleous b) Nucleolous c) Nucellus d) Nucleoid
134) The leaves of gymnosperm are evergreen and a) Dimorphic b) Foliage c) Scale leaves d) All of these	150) The fusion of sperm with egg to form zygote and other sperm with endosperm to form fusion nucleus is called a) Fertilization b) Single fertilization c) Double fertilization d) Endosperm fertilization
135) In gymnosperm secondary growth or increase in thickness occur by activity of a) cambium b) Procambium c) Pith d) All of these	151) The fusion nucleus develops into nutritive tissues called a) Endosperm b) Testa and tegment c) Fruit or ripening d) Integuments
136) Seed of angiosperm are enclosed in the a) Cell wall b) Integuments c) Ovule / unripe fruit d) Fruits	152) The integuments of the ovule form the seed coats called a) Endosperm b) Testa and tegment c) Fruit or ripening d) Integuments
137) <b>Angiosperm</b> Plamule is lateral in	153) The walls of the ovary develops into a) Endosperm b) Testa and tegment c) Fruit or ripening d) Integuments
	154) The size of angiosperm ranges from

BOM SERIES	Page 240	BOM ACADEMY Online & Swat
a) 1 – 100m c) 1-1000 m	b) 1-10 mm d) Non of these	168) Which one of the following is example of catkin racemose a) Amaltas (cassia fistula) b) Puth kanda (Achyranthus) And Bottle brush c) Mulberry & Willow d) Candytuft (Iberis)
155) Size of wolfia is a) 1 mm c) 50 m	b) 50 mm d) 100 m	169) Which one of the following is example of corymb racemose a) Amaltas (cassia fistula) b) Puth kanda (Achyranthus) And Bottle brush c) Mulberry & Willow d) Candytuft (Iberis)
156) Size of Eucalyptus is a) 1 mm c) 50 m	b) 50 mm d) 100 m	170) Which one of the following is example of umbel racemose a) Amaltas (cassia fistula) b) Puth kanda (Achyranthus) And Bottle brush c) Mulberry & Willow d) Brahmi booti & Carrot
157) A bark of fever tree( <i>Cinchona succiruba</i> ) produces quinine which is used to treat a) Malaria c) Muscular pain	b) Alzheimer's disease d) Breast cancer	171) Which one of the following is example of panicle racemose a) Grapes, Mango and Oat b) Sunflower c) Begonia, Tradescantia d) Silene & Ipomoea
158) Spermatophytes means Seed plants. It includes a) 300 families c) 3,00,000 species	b) 12,500 genera d) All of these	172) Which one of the following is example of capitulum racemose a) Grapes, Mango and Oat b) Sunflower c) Begonia, Tradescantia d) Silene & Ipomoea
159) The most important of angiosperm belongs to Gramineae of the a) Grass family b) Fruit bearing plants family c) Rootless plants d) Cycads		173) Which one of the following is example of uniparous racemose a) Grapes, Mango and Oat b) Sunflower c) Begonia, Tradescantia d) Silene & Ipomoea
160) The number of species of grass family are a) 1500 c) 7500	b) 3500 d) 9000	174) Which one of the following is example of biparous racemose a) Grapes, Mango and Oat b) Sunflower c) Begonia, Tradescantia d) Silene & Ipomoea
161) Inflorescence	Which one of the following is example of typical racemose a) Amaltas (cassia fistula) b) Puth kanda (Achyranthus) And Bottle brush c) Mulberry & Willow d) Candytuft (Iberis)	175) Which one of the following is example of multiparous racemose a) Grapes, Mango and Oat b) Sunflower c) Begonia, Tradescantia d) Euphorbia
162) Single flower on pedicel a) Solitary flowers c) Racemose or Cymose	b) Inflorescence d) Non of these	
163) Clusters of flowers on floral axis a) Solitary flowers c) Both a and b	b) Inflorescence d) Non of these	
164) The Inflorescence may be a) Racemose c) Racemose and cymose	b) Cymose d) Non of these	
165) Main axis continue to grow, oldest flowers at the base are a) Racemose c) Racemose and cymose	b) Cymose d) Non of these	
166) Main axis ends with flower, oldest flowers at the top a) Racemose c) Racemose and cymose	b) Cymose d) Non of these	
167) Which one of the following is example of spike racemose a) Amaltas (cassia fistula) b) Puth kanda (Achyranthus) And Bottle brush c) Mulberry & Willow d) Candytuft (Iberis)		

# CHAPTER 09

## DIVERSITY AMONG ANIMALS

- 1) Classification and complexity of animals , diploblastic and triploblastic
- Parazoa are simple multicellular animals which are believed to have evolved from? [ETEA 2023]
- a) Bacteria  
b) Protists  
c) Fungi  
d) Plants
- 2) Which of the following is include in deuterostome? [ETEA 2014]
- (a) Brittlestar  
(b) Scorpion  
(c) Chaelopterus  
(d) Unio
- 3) Which of the following animal is included in protostom? [ETEA 2014]
- (a) Sea horse  
(b) Sea mouse  
(c) Seacucumber  
(d) Sea lion
- 4) Tissue organization is missing in protozoa and found in: [ETEA 2009]
- (a) Parazoa  
(b) Metazoa  
(c) Sporozoa  
(d) Monera
- 5) The group of animals having a single celled body which performs all the vital activities of life are called [ETEA 2022]
- A) Protozoa  
B) Parazoa  
C) metazoa  
D) nanozoa
- 6) In radial symmetry all body parts are arranged around the central axis. radial symmetry represents \_\_\_\_\_ mode of life.

## MDCAT 2016

- a. Sessile
  - b. Streamlined
  - c. Active
  - d. Parasitic
- 7) The world Animalia is derived from Latin word which means
- a) Soul b) Breath  
c) Both a and b d) Non of these
- 8) Number of species of animals are
- a) 1.5 million b) 0.5 million  
c) 2 million d) Non of these
- 9) The outer most covering of animal is
- a) Cell wall b) Cell membrane  
c) Secondary wall d) Primary wall
- 10) Animals evolved from single cell organism included in kingdom
- a) Protista b) Protoctista  
c) Amoeba d) Arthropoda
- 11) Single celled organism are included in
- a) Protozoa b) Parazoa  
c) Metazoa d) Non of these
- 12) Simple multicellular having no tissues and organ are included in
- a) Protozoa b) Parazoa  
c) Metazoa d) Non of these
- 13) Multicellular organisms having tissues and organs are included in
- a) Protozoa b) Parazoa  
c) Metazoa d) Non of these
- 14) The gel like non-cellular material present in diploblastic are called
- a) Mesogloea  
b) Coelenteron or Gastrovascular cavity  
c) Mesenchyme or parenchyma  
d) Coelom or body cavity
- 15) The central cavity of diploblastic are called
- a) Mesogloea  
b) Coelenteron or Gastrovascular cavity  
c) Mesenchyme or parenchyma  
d) Coelom or body cavity
- 16) There is transport and nervous system in
- a) Diplobastic b) Triploblastic  
c) Both a and b d) Non of these
- 17) Diploblastic have no anus and their digestive system is also called
- a) Sac like digestion  
b) Intracellular digestion  
c) Extracellular digestion  
d) Non of these
- 18) In triploblastic, layers appear through embryonic life and in adult they are

**BOM SERIES**

Page 242

**BOM ACADEMY Online & Swat**

a) Represented by organs b) Represented by cells c) Muscle layers d) Tissues	32) Mouth is formed first in a) Phylum coelenterates b) Phylum Platyhelminthes c) Phylum Aschelminthes d) Phylum Annelids
19) Skin and nervous system are formed from a) Ectoderm                    b) Endoderm c) Mesoderm                    d) Epiblast	33) Triploblastic animals include a) Radial                      b) Bilateral c) Both a and b              d) Non of these
20) Digestive systems and associated glands are formed by a) Ectoderm                    b) Endoderm c) Mesoderm                    d) Epiblast	34) Diploblastic animals include a) Radial                      b) Bilateral c) Both a and b              d) Non of these
21) Skeletal, excretory, reproductive and all other body organs and systems are formed by a) Ectoderm                    b) Endoderm c) Mesoderm                    d) Epiblast	35) Diploblastic animals are included in a) Phylum Porifera b) Phylum coelenterates c) Phylum Platyhelminthes d) Phylum Aschelminthes
22) Acoelomates are those animals which do not contain a) Mesogloea b) Coelenteron or Gastrovascular cavity c) Mesenchyme or parenchyma d) Coelom or body cavity	36) Parazoa are included in a) Phylum Porifera b) Phylum coelenterates c) Phylum Platyhelminthes d) Phylum Aschelminthes
23) Instead of parietal and visceral layer, in Acoelomates the mesoderm forms loose tissues called a) Mesogloea b) Coelenteron or Gastrovascular cavity c) Mesenchyme or parenchyma d) Coelom or body cavity	37) Animals of Phylum Echinodermata are are bilateral symmetrical in their larval stage and adults gain a) Bilateral symmetry b) Radial symmetry c) No symmetry    d) Poly symmetry
24) In Pseudocoelomates the cavity is a) True cavity b) Not true cavity c) Semi fluid d) Not cellular	38) Coelomic epithelium is absent in a) Aceolomates    b) Pseudocoelomates c) Celomates        d) Non of these
25) The Pseudocoelomates the cavity develops from a) Blastocoel                b) Archenteron c) Both a and b              d) Non of these	39) pseudocoelom has no relation with Reproductive system and a) Digestive systm            b) Extretory system c) Nervous system            d) Circulatory system
26) Acoelomates are included in a) Phylum coelenterates b) Phylum Platyhelminthes c) Phylum Aschelminthes d) Phylum Annelids	40) Coelomates are those animals in which true body cavity or coelom is a) Absent                      b) Present c) Poorly developed          d) Rarely developed
27) Pseudocoelomates are included in a) Phylum coelenterates b) Phylum Platyhelminthes c) Phylum Aschelminthes d) Phylum Annelids	41) Radial cleavage and fate of cell is indeterminate are properties of a) Protostomes                b) Deutrosomes c) Non of these                d) Both a and b
28) Coelomates are included in a) Phylum coelenterates b) Phylum Platyhelminthes c) Phylum Aschelminthes d) Phylum Annelids	42) Phylum ctenopora is also called "minor pyla" which contain a) Ignored animals b) Highlighted animals c) High number of animals d) Some large size anials
29) Ceolomates are a) Protostomes                b) Deutrosomes c) Both a and b              d) Non of these	43) The categories of Phylum Phylum can be sub divided by using prefix sub or super except for a) Kingdom                    b) Species c) Genus                      d) Phylum
30) Protostomes contains a) Phylum Annelids            b) Phylum Molluska c) Phylum Arthropoda        d) All of these	44) The smallest and basic unit of classification is a) Kingdom                    b) Species c) Genes                      d) phylum
31) Which one of the following is deutrosomes a) Phylum Annelids            b) Phylum Molluska c) Phylum Arthropoda        d) Phylum Echinodermata	45) System of naming of animal is called a) Naming nomenclature b) Binomial nomenclature c) Bionamial naming d) Non of these

46) Which of these is a fresh water sponge? [ETEA 2008] (a) Sycon (b) Leucosolenia (c) Spongilla (d) Euplectella	c) Sound waves d) Ultraviolet waves 60) Sycon is a) Marine sponge b) Fresh water sponge c) Tubular marine sponge d) Siliceous sponge
47) Which of the following is a fresh water sponge? NUMS 2016 a. Sycon b. Leucosolenia c. Euplectella d. Spongilla	61) Spongilla is a) Marine sponge b) Fresh water sponge c) Tubular marine sponge d) Siliceous sponge 62) leucosolenia is a) Marine sponge b) Fresh water sponge c) Tubular marine sponge d) Siliceous sponge
48) Hydra reproduces asexually by; [ETEA 2010] (a) Binary fission (b) Multiple fission (c) Budding (d) Regeneration	63) Wuplectella or venus flower basket is a) Marine sponge b) Fresh water sponge c) Tubular marine sponge d) Siliceous sponge
49) The pores of phylum porifera are called a) Ostia b) Osculum c) Choanoderm d) Pinacocytes	64) Predatory sponges are found 5000 m beneath the sea and belongs to a) Genus Cladorhizidae b) Class Cladorhizidae c) Order Cladorhizidae d) Family Cladorhizidae
50) Body of porifera is tubular and open anteriorly end called a) Ostia b) Osculum c) Choanoderm d) Pinacocytes	65) <b>Phylum coelenterata or cnidarian</b> The cells of the endoderm of coelentrerates are specialised for [ETEA 2023]
51) Walls of porifera are made of two layers, the outer Pinacoderm and the inner a) Ostia b) Osculum c) Choanoderm d) Pinacocytes	a) Excretion b) Digestion c) Defence d) Respiration
52) Pinacoderm is made of flattened cells called a) Ostia b) Osculum c) Choanoderm d) Pinacocytes	66) Nematocysts are found in: [ETEA 2009] a) Nematodes b) Coelenterates c) Annelids d) Sponges
53) Choanoderm is made of flagellated collar cells called a) Ostia b) Osculum c) Choanoderm d) Choanocytes	67) Alternation of generation is the character of _____ phylum? [ETEA 2023] a) Annelida b) Arthropoda c) Coelenterate d) Echinodermata
54) Porifera contain some special mobile cells called amoebocytes which produce a) Ova b) Sperm c) Both d) Non of these	68) Coral reefs are the characteristic feature of phylum: [ETEA 2023] A) Porifera B) Coelenterate C) Arthropoda D) Platyhelminthes
55) The poriferas dependence of dead decaying organic matter is a) 10% b) 40% c) 80% d) 100%	69) Nematocysts are characteristics of: [FMDC 2013] A) Porifera B) Protozoa C) Cnidarians D) Annelida E) Echinodermata
56) All sponges have skeleton except class a) Spongilla b) leucosenia c) Wuplectella or venus flower basket d) Mycosporigida	70) _____ is a good example of polymorphism.
57) Sponging is a form of protein in the form of a) Fibres b) Scleroids c) Threads d) Balls	
58) Sponges are found in warm water of a) Mediterranean sea b) Mediterranean springs c) Mediterranean river d) All of these	
59) Sponges are used to absorbs a) Light waves b) Water waves	

<p>a. Hydra b. Starfish c. Obelia d. Equiplectella</p>	<p>84) The speed of <i>Physalia pelagica</i> is a) 12.1 cm/sec      b) 12.1 m/sec c) 1.21 cm/sec      d) 1.21 m/sec</p>
<p>71) All of the following are triploblastic animals except: [ETEA 2015] a) Amphibian b) Mollusca c) Coelentrata d) Echinodermata</p>	<p>85) The very common characteristics of coelenterates are the presence of a) Polymorphism b) Alternation of generation c) Metagenesis d) All of these</p>
<p>72) Word coelenterate is derived from Greek: Kolios means hollow &amp; enteron means a) Mouth      b) Stomach c) Intestine      d) Circulatory system</p>	<p>86) Two major types of zooids are a) Polyps and medusa      b) Tube and umbrella c) Both a and b      d) Non of these</p>
<p>73) Coelenterates are also called cnidarian due presence of cnidocytes cells which give rise to a) Nematocyst      b) Gastrozoids c) Gemates      d) Glandular cells</p>	<p>87) The simplest coral reef is a) Fringing reef or shore reef b) Platform reef or table reef c) Barrier reef      d) Great Barri cer reef</p>
<p>74) Majority of Coelenterates are marine but some also live in a) Springs      b) Lands c) Mountains      d) Fresh water as well</p>	<p>88) coral reef wthout a lagoon a) Fringing reef or shore reef b) Platform reef or table reef c) Barrier reef      d) Great Barri cer reef</p>
<p>75) The cells of endoderm in Coelenterates are specialized for a) Crawling      b) Swimming c) Digestion      d) Infection</p>	<p>89) The coral ref having no connection with land a) Fringing reef or shore reef b) Platform reef or table reef c) Barrier reef      d) Great Barri cer reef</p>
<p>76) In coelenterates mouth are surrounded by tentacles which bear organ of effence and defence called a) Nematocyst      b) Gastrozoids c) Gemates      d) Glandular cells</p>	<p>90) A strip of sea water is always present between ..... and main land called lagoon. a) Fringing reef or shore reef b) Platform reef or table reef c) Barrier reef      d) Great Barri cer reef</p>
<p>77) In coelenterates the enzymes are produced from _____ of endoderm. a) Nematocyst      b) Gastrozoids c) Gemates      d) Glandular cells</p>	<p>91) The lagoon may be _____ wide a) 180 feet to 3 miles b) 18 feet to 3 miles c) 180 feet to 30 miles d) 180 feet to 300 miles</p>
<p>78) In oelenterates special feeding zooids which are called a) Nematocyst      b) Gastrozoids c) Gemates      d) Glandular cells</p>	<p>92) The length of the great Barri cer reef of Australia is a) 2000 km      b) 2009 km c) 2012 km      d) 2020 km</p>
<p>79) The function of gastrozoids are nutrition to a) Itself      b) Whole colony c) Whole marine organisms d) Itself and one other gstrozoids</p>	<p>93) <b>Phylum playhelminthese</b> Platyhelminthes are: ETEA 2019 a) Bilaterally symmetrical and diploblastic b) Bilaterally symmetrical and triploblastic c) radially symmetrical and triploblastic d) radially symmetrical and diploblastic</p>
<p>80) Gastrozoids are found in obelia &amp; animals of a) Order Siphonophora b) Class Siphonophora c) Phylum Siphonophora d) Genus Siphonophora</p>	<p>94) Taenia is an endoparasite of human, pig and cattle which belongs to phylum. a. Cnidaria b. Aschelminthes c. Annelida d. Platyhelminthes</p>
<p>81) Coelenterates are a) Carnivorus      b) Herbivorous c) Omnivorous      d) Pathogenics</p>	<p>95) Excretory system consisting of protonephridal tubes are present in phylum NUMS 2020 a) Poridera b) annelida c) Platyhelminthes d) Cnidaria</p>
<p>82) In coelenterates the digestion are a) Intracellular      b) Extracellular c) Intra and extracellular d) No digestion in coelenterates</p>	<p>96) In which of the following pharynx opens directly into intestine? [ETEA 2014] (a) Planaria</p>
<p>83) Portuguese man of war are commonly known as a) <i>Physalia pelangica</i>      b) <i>Physalia pelagica</i> c) <i>Phylia pelagica</i> d) Non of these</p>	

(b) Earthworm (c) Cockroach (d) Snail	in the form of a) Hooks and hinkers b) Suacers and hinkers c) Hooks and suckers d) Only hooks
97) Which one of the following has no digestive tube; [2005] (a) Tape worm (b.) Liver fluke (c) Planaria (d) Round worm	107) In earth worm, mucin and energy are produced by a) Chloroplast b) ATP c) Light d) Pharyngeal mass
98) _____ is also called liver fluke <b>MDCAT 2015</b>  a. Dugesia b. Taenia c. Fasciola d. Coral	108) Two chamber heart are present in a) Fishes b) Amphibian c) Reptiles d) Mammals
99) Complete removal of _____ is necessary because they if only head remains inside the intestine, it can grow again <b>NUMS 2019</b> a) Tape worm b) Liver fluke c) Ascaris d) Pin worm	109) The term "bivalent" means a) 2 chromosomes b) 2 genes c) 2 pair cromosomes d) 2 air genese
100) It is an endoparasite of humans cattle and pig that completes its life cycle in two hosts <b>NUMS 2016</b> a. Tape worm b. Aurelia c. Liver fluke d. Planaria	110) Kangaroo is a) Homeothermic b) Hetrotheric c) Exothermic d) Non of these
101) Which one of the following animals has no alimentary canal? <b>[ETEA 2010],[2005]</b> (a) Ascaris (b) Pin worm (c) Planaria (d) Tape worm	111) Polymerization is a process of producing high molecular weight compound a) By photosyntheises b) By respiration c) From monomers d) From base pairs
102) Body of _____ consists of segments called proglottis which contains mainly sex organs. <b>MDCAT 2016</b> a. Planaria b. Ascaris c. Fasciola d. Tapeworm	112) Digestive system is well developed in a) Tubellaria b) Tematoda c) Cestoda d) Non of these
103) Word Platyhelminthes was coined by Gaugenbaur (1859) which means a) Hollow wars b) Falt worms c) Flow wrms d) Ringworms	113) Digestive system is poorly developed in a) Tubellaria b) Tematoda c) Cestoda d) Non of these
104) The bodies of Platyhelminthes are a) unsegmented b) Superficially segmented c) True segmentation is absent d) All of these	114) Digestive system is absent in a) Tubellaria b) Tematoda c) Cestoda d) Non of these
105) In Platyhelminthes cilia are present in free form while cuticle is present in a) Parasitic form b) Larval for c) Adult form d) Immature form	115) Thin elastic wall with nucleus and cavity containing cilia flickering through a) Flame sellcs b) Nephridia cells c) Nematocyst d) Non of these
106) In Platyhelminthes, organs of attachment are present	116) In Platyhelminthes flame attached with duct which open with a) Small intestine b) Mentle c) Extretory phore d) Nephridia
	117) In Platyhelminthes, the nervous system consist of pair of anterior cerebral ganglion and ventral ganglion connected by a) Nerve rings b) Nerve cords c) Long circular neurons d) Non of these
	118) Muscular system is well developed in free form of a) Porifera b) Coelenterates c) Platyhelmenthis d) aschelminthes
	119) In Platyhelminthes, reproductive system is well developed with a) Gonads b) ducts c) copulatory organs d) all of these
	120) Egg are small with yolk and are produced in large numbers in a) Porifera b) Coelenterates c) Platyhelmenthis d) aschelminthes
	121) Fertilization is always internal in a) Porifera b) Coelenterates c) Platyhelmenthis d) Aschelminthes

- 122) In Platyhelminthes, the fertilized egg grows into new individual as in  
 a) Planaria                        b) Tape worm  
 c) Planaria and tape worm  
 d) liver fluke
- 123) In Platyhelminthes different type of larvae are formed in  
 a) Planaria                        b) Tape worm  
 c) Planaria and tape worm  
 d) liver fluke
- 124) In Platyhelminthes regeneration ability is present in class  
 a) Trematoda                    b) Cestoda  
 c) Cestoda                        d) Non of these
- 125) In Platyhelminthes regeneration ability is absent in class  
 a) Trematoda                    b) Cestoda  
 c) Trematoda and cestoda  
 d) Trematoda and tubellaria
- 126) All the members of Platyhelminthes are  
 a) Solitary                      b) Colony  
 c) Unicellular                  d) Non of these
- 127) Regeneration ability is present in the  
 a) Trematoda                    b) Cestoda  
 c) Cestoda                        d) All of these
- 128) The total number of species of Platyhelminthes are  
 a) 6000                         b) 15000  
 c) 500                            d) 300
- 129) The length of planaria is  
 a) 10 m                         b) 10 mm  
 c) 100m                         d) 100mm
- 130) The length of tape worm is  
 a) 18 feet                      b) 16 feet  
 c) 15 meter                     d) 4 meter
- 131) The tape worm found in ..... is called taenia aginata  
 a) Humans                      b) Apes  
 c) Chimpanzees                 d) Snake
- 132) **Phylum aschelminthis or nematode**  
 In phylum Aschelminths (Nematoda). nervous system consists of a nerve ring which encircles the body and sends its branches to different parts of the body. [ETEA 2023]  
 A. Lips                         B. Teeth  
 C. Stomach                     D. Pharynx
- 133) All of the following are nematodes except:  
 [ETEA 2008]  
 a) Ascaris  
 b) Neries  
 c) Trichinella  
 d) Guinea worm
- 134) \_\_\_\_\_ is a common parasite of the intestine of human and pig which belongs to phylum nematode. [MDCAT 2016]  
 a. Taenia solanum  
 b. Schistosoma  
 c. Ascaris lumbricoides
- 135) \_\_\_\_\_ is an intestinal parasite of man belonging to phylum nematode: [MDCAT 2017]  
 a. Taenia solium  
 b. Wuchereria bancrofti  
 c. Ascaris lumbricoides  
 d. Schistoma
- 136) Name common gut roundworm parasite of human and pigs. [MDCAT 2015]  
 a. Aascaris lumberocoides  
 b. Lumbericus terresaris  
 c. Pheretima posthuma  
 d. Hirudo medicinaly
- 137) Pseudo-coelomates have a body cavity but it is not true coelom. Which one of the following is included in the group. [MDCAT 2016]  
 a. Planaria  
 b. Tapeworm  
 c. Earthworm  
 d. Ascaris
- 138) Ascaris belongs to the phylum...? [FMDC 2012]  
 a. Annelida  
 b. Arthropoda  
 c. Nematodes  
 d. Echinodermata  
 e. Platyhelminthes
- 139) According to Hegner and Engemann, phylum Aschelminthes consist of .... classes  
 a) 3    b) 4    c) 5    d) 6
- 140) The spiny, marine and microscopic organisms are called  
 a) Gastrotricha    b) Rotifer  
 c) Kinorhyncha    d) nematode and nematomorpha
- 141) The word nematode is of Greek origin which means  
 a) Thread                      b) Soul  
 c) Little rings                 d) Intestine
- 142) The body of nematodes are Non segmented and  
 a) Tapering at one end  
 b) Tapering at both ends  
 c) Not tapering at any end  
 d) Contains brain
- 143) The fluid contained in the body of the nematodes work as  
 a) Blood                        b) Lymph  
 c) Nervous system  
 d) Digestive enzymes
- 144) Excretory consists of two longitudinal canals on each side which opens on ventral side behind the mouth is about  
 a) Mollusks                    b) Nematodes  
 c) Arthropods                 d) Chordate
- 145) The nervous system consist of nerve ring which encircles the pharynx and send its branches to body parts

a) Mollusks c) Arthropods	b) Nematodes d) Chordate	"molluscus" means a) Hard c) Thread	b) Soft d) soul
146) In nematodes muscles are arranged in four longitudinal bands while circular muscle are a) Present c) Arranged linearly d) Arranged in 2 longitudinal bands	b) Absent	160) The largest phylum of invertebrates is a) Mollusks c) Chordate	b) Arthropoda d) Platyhelmenthis
147) In male of nematode the testes is long, coiled thread with seminal vesicle and open in rectum by short a) Pouch c) Ejaculatory duct	b) Intestine d) Flame cells	161) The second largest phylum of invertebrates are phylum a) Mollusks c) Chordate	b) Arthropoda d) Platyhelmenthis
148) In female nematodes the two uteri unite posteriorly forming vagina which on ventral surface at the female genital aperture situated in the a) Upper line c) Lower line	b) Middle line d) All of these	162) The number of species of phylum mollusks are a) 8000 living and fossils are 35,000 b) 80,000 living and fossils are 3500 c) 80,000 living and fossils are 35,000 d) 4000 living and fossils are 3000	
149) The most common animal of phylum nematode is a) Ascaris lumbricide c) Red worm	b) Pin worm d) Tape worm	163) Most mollusks are protected by shell of calcium carbonate secreted by a) Mantle c) Immune system cells d) Non of these	
150) The length of female <i>Ascaris lumbricoides</i> is a) 8 – 16 inches c) 10 – 12 inches	b) 6 – 12 inches d) 10 – 12 inches	164) In some mollusks the shell may be a) Internal c) Completely absent	b) External d) All of these
151) The length of male <i>Ascaris lumbricoides</i> is a) 8 – 16 inches c) 10 – 12 inches	b) 6 – 12 inches d) 10 – 12 inches	165) The body of mollusks can differentiated into a) Head and Ventral muscular foot b) dorsal visceral hump and Ventral muscular foot	c) head and dorsal visceral hump d) head, dorsal visceral hump and Ventral muscular foot
152) The past of male ascaris is curved with two spine like structures called a) Panial end c) Satea	b) Panial satea d) Non of these	166) The space between the body in mollusks are called Mantle cavity in which a) Kidney opens c) Kidney and anus opens	b) Anus opens d) Intestine opens
153) Female ascaris may contain 27 million eggs at one time at lay about a) 2 lac per day c) 2 lac per month	b) 1 lac per day d) 1 lac per month	167) Mollusks respire through gills present in the a) Mantle c) Upper surface on skin	b) Mantle cavity d) neck
154) <i>Enterobius vermicularis</i> is human parasite commonly known as a) Ascaris lumbricide c) Red worm	b) Pin worm d) Tape worm	168) Mollusks have respiration tongue called a) Tongue c) Radicular tongue	b) Radula d) Raps
155) The parts of body where <i>Enterobius vermicularis</i> lives are a) Vaecum c) Rectum	b) Colon d) All of these	169) The blood mollusks are a) Colourless c) No respiratory pigments	b) WBCs containing d) All of these
156) <b>Phylum mulluska</b> In octopus, the foot is modified into: <b>[ETEA 2014]</b> (a) Disc (c) Foot	(b) Arm (d) Siphon	170) Nervous system consist of ..... pairs of orange colour ganglia connected by nerve cords in mllusks A) 3    B) 4    C) 5    D) 6	
157) Snails are the intermediate hosts in <b>MDCAT 2017</b> a. <i>Fasciola hepatica</i> b. <i>Taenia solium</i> c. <i>Schistoma</i> d. <i>Ancylosoma doudenale</i>		171) The testse are white and ovaries are reddish and fertilization is external in A) Mollusks C) Chordate	B) Arthropoda D) Platyhelmenthis
158) the scientific name of fresh water mussel is: <b>ETEA 2019</b> a) mytilus edulis c) anodonta grandis	b) loligo pealei d) anodanta bairdi	172) <b>Phylum annelida</b> Hermaphrodite phylum is: <b>[ETEA 2015]</b> a) Annelida b) Arthropoda c) Echinodermata d) Mollusca	
159) The word mulluscs is been derived from Latin word			

- 173) In the annelids, body wall is separated from the gut by **MDCAT 2018**
- False body cavity
  - Bones
  - Coelom
  - Mesenchyma**
- 174) The word "Annelida" is of Green origin; "annelus" means: **ETEA 2022**
- Little ring
  - Segmented body
  - Thread
  - Hollow
- 175) The larva formed during the life cycle of Annelida is: **ETEA 2019**
- Glochidium larva
  - Bipinnaria larva
  - trochophore larva
  - tornaria larva
- 176) Metamerism is found in: **[ETEA 2009]**
- Earth worm
  - Sponges
  - Snakes
  - Grass hopper
- 177) The word annelida is of Greek origin annelus means
- Thread
  - Soul
  - Little rings
  - Intestine
- 178) The animals of phylum annelids are called annelids because they have
- Metamerically unsegmented body
  - Metamerically Segmented body
  - Metamerically superSegmented body
  - Non of these
- 179) Annelids have
- Closed circular system
  - Open circular system
  - Some time open sometimes close
  - No circulatory system
- 180) The colour of annelids blood is
- Red
  - Blue
  - Green
  - Colourless
- 181) Excretory system of annelids consist of metamerically arranged
- Flame cells
  - Nephridia
  - Both a and b
  - Non of these
- 182) Nephridium opens to the exterior through
- Nephridiophore
  - Pores
  - Perpotaions
  - Non of these
- 183) Locomotory organs in earth worm are
- Parapodia
  - Parpodia
  - Both a and b
  - Non of these
- 184) Locomotory organs in neries are
- Parapodia
  - Parpodia
  - Both a and b
  - Non of these
- 185) The body of annelids and arthropods are covered with
- Skin
  - Hairs
  - Cuticle
  - Non of these
- 186) **Phylum arthropoda**
- Which structure is responsible for the excretion in arthropods? **ETEA 2023**
- Nephron
  - Pronephridia
  - Metanephridia
  - Malpighian tubules
- 187) The green glands found in arthropods are concerned with: **ETEA 2023**
- Excretion
  - Respiration
  - Digestion
  - Circulation.
- 188) Crustaceans are the only arthropods that have: **[ETEA 2011]**
- Chitin in their exoskeleton.
  - chelicetae
  - 3 pairs of legs
  - d 2 pairs of antennae
- 189) In arthropods, the body cavity is in the form of **MDCAT 2015**
- Coelem
  - Haemocoel
  - Psedocoelerm
  - Enteron
- 190) which one is not a respiratory organ of arthropods? **FMDC 2012**
- Gills
  - Book lung
  - Trachea
  - antenna**
- 191) **Arthropods can be characterized by all of the following EXCEPT:** **[FMDC 2013]**
- A hard exoskeleton
  - A water vascular system
  - Joined appendages
  - Molting
  - Segmented body
- 192) The largest phylum of animals is: **KMU-CAT 2021**
- Annelida
  - Arthropoda
  - Chordata
  - Coelenterata
- 193) Book lungs may be found in which of the following: **[ETEA 2010],[ETEA 2009]**
- Clam worm
  - Spider
  - Silver fish
  - Leech
- 194) How many waling legs are present in arachnids? **[ETEA 2014]**
- 4
  - 6
  - 8
  - 10
- 195) Spiders belong to class: **[ETEA 2013]**
- Crustacean
  - Myriapoda
  - Arychnida
  - Hexapoda

- 196) In spiders, the organs that contain the silk glands are called: [ETEA 2011]  
 (a) Spinnerets  
 (b) Carapaces  
 (c) Medriporite  
 (d) Tube feet
- 197) The leg of cockroach which acts as 'prop' during walking? **NUMS 2015**  
 (A) Anterior leg  
 (b) Posterior leg  
 (c) Middle leg  
 (d) All given
- 198) The word arthropoda are derived from two Greek words ; Arthros means jointed and Podos means  
 (A) Limbs (B) Legs  
 (C) Both a and b (D) Non of these
- 199) Body of arthropoda are differentiated into  
 (A) head, thorax and abdomen  
 (B) heat and abdomen  
 (D) heat and thorax  
 (D) non of these
- 200) The blood of arthropos are haemolymph because it carry  
 (A) Blood (B) Food  
 (C) Both a and b (D) Non of these
- 201) Respiration in arthropods takes place in  
 (A) Gills (B) Trachea  
 (C) Both a and b (C) Non of these
- 202) Trachea communicate with exterior in arthropods by  
 (A) Flame cells (B) Satea  
 (C) Spiracles (D) Non of these
- 203) Arachinids(scorpion & spider) are group of arthropods which have  
 (A) Book lungs (B) Note book lungs  
 (C) Net lungs (D) Non of these
- 204) In arthropods the excretion occur in  
 (A) malpighian tubule (B) green gland  
 (C) coxal gland (D) all of these
- 205) Sexual dimorphism is generally present in  
 (A) nematode (B) mulluks  
 (C) annelids (D) athropodes
- 206) A pair of cerebral ganglia(brain) connected to a double nerve cord in  
 (A) nematode (B) mulluks  
 (C) annelids (D) athropodes
- 207) All the changes occurring from the fertilization of an egg to the formation of an adult are collectively called Metamorphosis which occur in  
 (A) nematode (B) mulluks  
 (C) annelids (D) athropodes
- 208) During metamorphosis a larva undergoes a series of changes called  
 (A) Ecdysis (B) Moulting  
 (C) Both a and b (D) Non of these
- 209) The stage between ecdysis are called  
 (A) Moulting (B) Stadia  
 (C) Satea (D) Non of these
- 210) The stadia attained by insect larva in any stadium between two ecdysis is termed as  
 (A) Star (B) Mega star  
 (C) Instar (D) Onstar
- 211) The final instar is the  
 (A) Adult (B) Imago  
 (C) Both a and b (D) Non of these
- 212) Arthropods having No metamorphosis aare called  
 (A) Ametabola (B) Hemimetabola  
 (C) Holometabola (D) Non of these
- 213) Arthropods having Incomplete metamorphosis are called  
 (A) Ametabola (B) Hemimetabola  
 (C) Holometabola (D) Non of these
- 214) Arthropods having complete metamorphosis are called  
 (A) Ametabola (B) Hemimetabola  
 (C) Holometabola (D) Non of these
- 215) Which one of the following is Ametabola  
 (A) Collembolan (B) Cockroaches  
 (C) Flies and moths (D) Non of these
- 216) Which one of the following is Hemimetabola  
 (A) Collembolan (B) Cockroaches  
 (C) Flies and moths (D) Non of these
- 217) Which one of the following is Holometabola  
 (A) Collembolan (B) Cockroaches  
 (C) Flies and moths (D) Non of these
- 218) Which one of the following is Ametabola  
 (A) Wingless insects (B) Wasps  
 (C) Butterflies and beetles (D) Non of these
- 219) Which one of the following is Hemimetabola  
 (A) Wingless insects (B) Wasps  
 (C) Butterflies and beetles (D) Non of these
- 220) Which one of the following is Holometabola  
 (A) Wingless insects (B) Wasps  
 (C) Butterflies and beetles (D) Non of these
- 221) The connecting link between .....are  
 (A) Onychophora  
 (B) Mullus and annelids  
 (C) annelids and arthropods  
 (D) nematodes and arthropods
- 222) Onychophora, a group of arthropods consist of ..... species classifies in..... genera  
 (A) 10,10 (B) 10,70  
 (C) 70,10 (D) 35, 5
- 223) **Phylum echindermata**  
 The name of Phylum echindermata are derived from two Greek words : echinos means spine and derm means  
 (A) Skin (B) Digestive system  
 (C) Legs and arms (D) Non of these
- 224) Echinoderms are  
 (A) Terresitil (B) Aquatic  
 (C) Fresh water (D) Exclusively marine
- 225) A typical circulatory system present in echinoderms also called

**BOM SERIES**

Page 250

**BOM ACADEMY Online & Swat**

A) Haemal system	B) Leghaemel system	239) D) all of these
C) Both a and b	D) Non of these	
226) Digestive system of echinoderms consist of....., the digestive glands		Echinoderms and chordates are evolved from
A) 5 pyloric caecae		A) Different ancestors B) Common ancestors
B) 5 pairs of pyloric caecae		C) Mollusks D) Non of these
C) 10 pyloric caecae		240) The larva of balanoglossus (Hemichordate) is called:
D) 10 pairs of pyloric caecae		[ETEA 2015]
227) All the echinoderms including the starfish are		a) Bipinnaria
A) Carnivorous B) Herbivorous		b) Radiolaria
C) Omnivorous D) Non of these		c) Tornaria
228) In Starfish respiration occurs through		d) Trochophore
A) Papule B) Peristomial gills		241) Hemichordates are worm like animals which are
C) Genital bursae		found in
D) Cloacal respiratory tract		A) Soil B) Water
229) In Sea urchins respiration occurs through		C) Shallow ocean bottom D) Rivers and springs
A) Papule B) Peristomial gills		242) Hemichordates body are divided into
C) Genital bursae		A) anterior protosome, middle mesosome and Posterior metastome
D) Cloacal respiratory tract		B) Proboscis, collar & trunk
230) In Sea urchins respiration occurs through		C) Both a and b
A) Papule B) Peristomial gills		D) Non of these
C) Genital bursae		243) Body wall of hemichordate are made of
D) Cloacal respiratory tract		A) unicellular epidermis and Mucus secreting cells
231) In Brittle star respiration occurs through		B) multicellular epidermis and Mucus secreting cells
A) Papule B) Peristomial gills		C) unicellular epidermis and glucose secreting cells
C) Genital bursae		D) non of these
D) Cloacal respiratory tract		244) Circulatory system is composed of dorsal and ventral vessel in
232) In ..... amoebocytes absorb wastes waste and remove them by rectal caecae		A) Chordates B) Hemichordates
A) Echinoderms B) Chordates		C) Arthropoda D) Annelida
C) Mollusks D) Non of these		245) Gills slit are present behind the collar which perform function of respiration, in
233) In echinoderms, Nervous system consist of radial ganglia containing nerve cords & sense organs		A) Chordates B) Hemichordates
A) Are absent		C) Arthropoda D) Annelida
B) Are poorly developed		246) A single glomerulus connected to blood vessels constitutes excretory system of
C) Are infinite in numbers		A) Chordates B) Hemichordates
D) Non of these		C) Arthropoda D) Annelida
234) In echinoderms, the radial nerve cords ends in a pigmented mass known as		247) brain occur in middle mesosome and main nerve tracts are present in
A) Redusa B) Eye		A) Mid dorsal line B) Mid ventral line
C) Ear D) Non of these		C) Both a and b D) Non of these
235) Echinoderms have		248) Tornaria larva resembles to
A) no parasitic member		A) Trochopora B) Lochidium
B) all are marine		C) Bipinnaria D) Tadpole
C) bilaterally symmetrical in larval stage and radial symmetrical in adult		249) [Phylum chordate]
D) all of these		Aquatic mammals belong to the order [ETEA 2023]
236) Brittle star is brittle because it can		A) Cetacea B) Pholidota
A) Break its arm when injured		C) Chiropters D) Proboscidea
B) Be break easily		250) The Archaeopteryx is a fossil bird which possesses the characters of both: [ETEA 2022]
C) break the arm of animal which attack it		A) Fishes and Amphibians
D) non of these		B) Amphibians and Reptiles
237) Energy for muscular activity in echinoderms and chordates are available by		C) Reptiles and birds
A) ATP B) Creatine		D) Birds and mammals
C) Creatine phosphate D) Glucose		251) Opossum and koala bear belong to sub class:
238) ..... are similar in Echinochordates and hemichordates		
A) Pattern of cleavage of fertilization egg		
B) formation of mesoderm		
C) formation of anus, mouth and coelom		

BOM SERIES	Page	BOM ACADEMY Online & Swat
ETEA 2019	251	261) Which of the following is a swimming bird? [ETEA 2010]
a) Prototheria c) metatheria	b) cutheria d) monotremata	(a) Penguin (b) Ostrich (c) Hawk (d) Kiwi
252) Egg laying mammals are called		262) The mammals terming connecting link between reptilian and mammals. [ETEA 2009]
a. Prototheria b. Protozoa c. Chordata d. Monotremes		(a) Marsupials (b) Eutherians (c) Monotremes (d) Metatherians
253) Leptocardii is group of	NUMS 2015	263) Which of the following is not present in the fish; [2005]
a) Urochordata b) Cephalochordate c) Vertebrata d) Mollusca		(a) Middle ear (b) Internal ear (c) Gills (d) Fins
254) Organs of voice in birds:	NUMS 2016	264) Negative feedback mechanism is the characteristic of which class? [NUMS 2020]
a. Larynx b. Pharynx c. Spinx d. Both a and c		(a) Class fish (b) class amphibia (c) Class reptilia (d) class Mammalia
255) Hag fish belongs To:	KMU-CAT 2021	265) scales are present in [NUMS 2015]
A) Cartilaginous fishes B) Bony fishes C) Cyclostomes D) Both (A) & (8)		a) fishes b) amphibians c) birds d) reptiles
256) Which of the following animal is included in deuterostome?	[ETEA 2015]	266) Pick the mismatched pair for birds. [NUMS 2015]
a) Mytelus b) Chaetopterus c) Penguin d) Jelly fish		a) Air spaces – lighter body b) Pectoral muscles – strong pull of wings c) Urinary bladder, producing semisolid urine d) Keel – attachment of muscles
257) Which of the following fish have 14 pairs of gill slits?	[ETEA 2014]	267) Pick the correct option about Drosophila? [NUMS 2015]
(a) Dog fish (b) Lamprey (c) Cat fish (d) Ray fish		a) Male is larger with pointed abdomen b) Female has sex combs on front legs c) It has generation time of just eight weeks d) Salivary gland cells have giant chromosomes in their nuclei
258) The gills are covered by operculum in;	[ETEA 2013]	268) Pectoral fins are enlarged in [NUMS 2015]
(a) Bony fishes (b) Cartllaginous fishes (c) Lung fishes (d) Jawless fishes		a) Whale b) Shark c) Skates d) Plaice
259) Besides mammalian diaphragm is present in;	[ETEA 2010]	269) Maxmimum mammalian character is are [NUMS 2015] present in these
(a) Birds (b) Crocodiles (c) Fishes (d) Toads		a) Metatheria b) Prototheria c) Eutherian
260) Extra embryonic membranes like amnion and chorion appeared for the first time in.	[ETEA 2010]	
(a) Fish (b) Amphibian (c) Reptiles (d) None		

<p>270) Amphibian heat has ----- chambers  <b>NUMS 2016</b></p> <ul style="list-style-type: none"> <li>a. Two</li> <li>b. Three</li> <li>c. Four</li> <li>d. Five</li> </ul>	<p>secretion of: <b>[ETEA 2009]</b></p> <ul style="list-style-type: none"> <li>(a) Sodoreferous glands</li> <li>(b) Endocrine gland</li> <li>(c) Preen gland</li> <li>(d) thymus glands</li> </ul>				
<p>271) Amphibians live on <b>NUMS 2016</b></p> <ul style="list-style-type: none"> <li>a. Water</li> <li>b. Water and land</li> <li>c. Land</li> <li>d. Air</li> </ul>	<p>280) Which of the following are called placental mammals?</p> <ul style="list-style-type: none"> <li>a. Prototheria</li> <li>b. Metatheria</li> <li>c. Eutherian</li> <li>d. All of these</li> </ul>				
<p>272) The egg laying birds are called <b>NUMS 2016</b></p> <ul style="list-style-type: none"> <li>a. Oviparous</li> <li>b. Viviparous</li> <li>c. Monotremes</li> <li>d. All of these</li> </ul>	<p>281) Which of the following expel imperfectly developed embryo out of the body? <b>[ETEA 2008]</b></p> <ul style="list-style-type: none"> <li>(a) prototherions</li> <li>(b) eutherians</li> <li>(c) metatherian</li> <li>(d) all of the above</li> </ul>				
<p>273) Mammals Become dominant in: <b>ETEA 2022</b></p> <ul style="list-style-type: none"> <li>A) Cenozoic Period</li> <li>B) Jurassic Period</li> <li>C) Mesozoic Period</li> <li>D) Paleozoic period</li> </ul>	<p>282) Which one of the following animals lays eggs? <b>[ETEA 2007]</b></p> <ul style="list-style-type: none"> <li>(a) Scally ant eater</li> <li>(b) Spiny ant eater</li> <li>(c) Bat</li> <li>(d) Whale</li> </ul>				
<p>274) Select an anamniote from the following : <b>ETEA 2020</b></p> <ul style="list-style-type: none"> <li>a) Snake</li> <li>b) Frog</li> <li>c) Parrot</li> <li>d) Crocodile</li> </ul>	<p>283) Regarding structure of human heart. Chordae tendinea are present in <b>MDCAT 2020</b></p> <ul style="list-style-type: none"> <li>a) Atria</li> <li>b) Pulmonary valve</li> <li>c) Ventricles</li> <li>d) Aortic valve</li> </ul>				
<p>275) Tail can be regenerated in <b>NUMS 2015</b></p> <ul style="list-style-type: none"> <li>a) Larvae of amphibian</li> <li>b) Lizard</li> <li>c) Both lizard and larvae of amphibian</li> <li>d) None of given</li> </ul>	<p>284) Which of the following animals is not endothermic? <b>[ETEA 2015]</b></p> <ul style="list-style-type: none"> <li>a) Salamander</li> <li>b) Great white shark</li> <li>c) Polar bear</li> <li>d) Butterfly</li> </ul>				
<p>276) Which of the following bird structures are especially adapted to support flight? <b>[ETEA 2011]</b></p> <ul style="list-style-type: none"> <li>(a) Cloacas</li> <li>(b) Bills</li> <li>(c) Gizzard</li> <li>(d) chest muscles</li> </ul>	<p>285) Which of the following animal can survive without drinking water? <b>NUMS 2017</b></p> <ul style="list-style-type: none"> <li>a) Kangaroo rat</li> <li>b) Pig</li> <li>c) Kangaroo</li> <li>d) Camel</li> </ul>				
<p>277) Daphnia belongs to: <b>2009][ETEA 2008]</b></p> <ul style="list-style-type: none"> <li>(a) Insecta</li> <li>(b) Annelida</li> <li>(c) Crustacean</li> <li>(d) Arachnida</li> </ul>	<p>286) The organs of excretion in crustacean are : <b>[ETEA 2015]</b></p> <ul style="list-style-type: none"> <li>a) Coxal glands</li> <li>b) Flame cells</li> <li>c) Malpighian tubules</li> <li>d) Nephridia</li> </ul>				
<p>278) Opossum belongs to: <b>2009]</b></p> <ul style="list-style-type: none"> <li>(a) Metatheria</li> <li>(b) Eutheria</li> <li>(c) Theria</li> <li>(d) Prototheria</li> </ul>	<p>287) The word chordate are derived from Notochord where chord means</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;">A) Thread</td> <td style="width: 50%;">B) Rope</td> </tr> <tr> <td>C) Both a and b</td> <td>D) Spinal cord</td> </tr> </table>	A) Thread	B) Rope	C) Both a and b	D) Spinal cord
A) Thread	B) Rope				
C) Both a and b	D) Spinal cord				
<p>279) Feathers of birds are water proof due to the</p>	<p>288) Phylum chordate does not contain</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;">A) Protochordata</td> <td style="width: 50%;">B) Acrania</td> </tr> <tr> <td>C) Craniata</td> <td>D) All of these</td> </tr> </table>	A) Protochordata	B) Acrania	C) Craniata	D) All of these
A) Protochordata	B) Acrania				
C) Craniata	D) All of these				
	<p>289) Class pisces doen not contain</p>				

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Page 253

**BOM ACADEMY Online & Swat**

A) Cycostomata    B) Condritchtes C) Osteichties    D) All of these	A) Cycostomata    B) Osteichties C) Condritchties    D) Non of these
290) In Protochordata or Acrania, skull is A) Absent                      B) Present C) Some time present and sometime absent D) Non of theses	307) Which one of the following skeleton is made of bones A) Cycostomata    B) Osteichties C) Condritchties    D) Non of these
291) In Urochordata, skull is A) Absent                      B) Present C) Some time present and sometime absent D) Non of theses	308) Majority of bony fishes are A) Oviparous                      B) Ovoviviparous C) Viviparous                      D) All of these
292) Notochord is present in free swimming larvae and absent in adults in A) Cycostomata    B) Condritchties C) Osteichties    D) Urochordata	309) Brain is developed in osteichties with ..... A) five cranial nerves B) five pair of cranial nerves C) ten cranial nerves D) ten pair of cranial nerves
293) Which one of the following are proteinous A) Hooves                      B) Hemoglobin C) Enzymes                      D) All of these	310) Class Reptilia In hibernation, amphibian get energy out from fat bodies deposited around the A) Kidney                      B) Lungs C) Stomach                      D) Non of these
294) Sub phylum vertebrata- Class Pisces The largest group of vertebrates are fishes , which constitution is A) 20%                              B) 48% C) 90%                              D) 66%	311) Archaeopteryx, the lizard tailed bird are found in rocks of Jurassic period in A) 1831                              B) 1841 C) 1861                              D) 1871
295) The number of living fishes are more than A) 19,000                              B) 29,000 C) 39,000                              D) Non of these	312) Archaeopteryx have both the characteristics of A) Reptiles and amphibian B) Reptiles and birds C) Birds and amphibian D) Amphibian and mammals
296) Which one of the following is long eel like body A) Cycostomata    B) Osteichties C) Condritchties    D) Non of these	313) Flightless birds are also called A) Swimming birds                      B) Walking birds C) Running birds                      D) Non of these
297) Which one of the following is lacked paired fins A) Cycostomata    B) Osteichties C) Condritchties    D) Non of these	314) Ostritch, emu, kiwi, cassowary, penguin are examples are A) Swimming birds                      B) flightless birds C) Running birds                      D) Non of these
298) Which one of the following has jaw with teeths A) Cycostomata    B) Osteichties C) Condritchties    D) Non of these	315) Pigeon, sparrow, parrot, eagle, owl are examples of Swi A) Swimming birds                      B) Walking birds C) flying birds                              D) Non of these
299) Which one of the following have gills covered with operculum A) Cycostomata    B) Osteichties C) Condritchties    D) Non of these	316) Class Mammalia The ancestors of mammals were of the size of mice and lived on A) Holes                              B) Soil C) Water                              D) Trees
300) Which one of the following have swim bladder A) Cycostomata    B) Osteichties C) Condritchties    D) Non of these	317) Mammals become dominant in A) Cenozoic                              B) Mesozoic C) Both of these                              D) Non of these
301) Which one of the following is carnivorous A) Cycostomata    B) Osteichties C) Condritchties    D) Non of these	318) In mammals brain is well developed with two large cerebral hemisphere and .....of cranial nerves A) 6 cranial nerves                      B) 12 cranial nerves C) 18 cranial nerves                      D) 24 cranial nerves
302) Which one of the following contain circular mouth A) Cycostomata    B) Osteichties C) Condritchties    D) Non of these	319) Only left aortic arc is present in A) Aves                              B) Reptiles C) Amphibian                              D) Mammals
303) Which one of the following have no stomach A) Cycostomata    B) Osteichties C) Condritchties    D) Non of these	320) Besides mammals, diaphragm is present in A) Sparrow                              B) Snack C) Cockroach                              D) Crocodiles
304) Petromyzon merinus (lamprey) and Maxile glutinosa (hag fish) are A) Cycostomata    B) Osteichties C) Condritchties    D) Non of these	321) In mammals, blood is red due to presence of haemoglobin in biconcave
305) sharks, rays, skates and chimaeras are A) Cycostomata    B) Osteichties C) Condritchties    D) Non of these	
306) Respiration takes place through 5-7 pairs of gills in	

A) Nucleated RBCs C) Both of these	B) Non nucleated RBCs D) Non of these	A) Prototheria C) Eutheria	B) Metatheria D) Non of these
322) In mammals the embryo is kept inside the female body for development and this process is called A) Embryo formation C) Child birth	B) Fermentation D) Gestation	338) Kangroo, opossum & Koala are A) Prototheria C) Eutheria	B) Metatheria D) Non of these
323) .....are most primitive animals and are also called Egg laying animals A) Prototheria C) Eutheria	B) Metatheria D) Non of these	339) Moles & shrews are A) Prototheria C) Eutheria	B) Metatheria D) Non of these
324) Calass .....are also called Pouched mammals A) Prototheria C) Eutheria	B) Metatheria D) Non of these	340) Moles & shrews are A) Insectivore C) Cetecea	B) Chiroptera D) Carnivore
325) There is no connection between body of mother and foetus in A) Prototheria C) Eutheria	B) Metatheria D) Non of these	341) Bats & flying squirrels are A) Insectivore C) Cetecea	B) Chiroptera D) Carnivore
326) The .....animals are rightly be called as Ovo-viviparous A) Prototheria C) Eutheria	B) Metatheria D) Non of these	342) Whale, dolphin, porpoises, sea loin are A) Insectivore C) Cetecea	B) Chiroptera D) Carnivore
327) Young birth are in immature form and nourished by treats present on ventral side of the body in females until they enough grow, are about A) Prototheria C) Eutheria	B) Metatheria D) Non of these	343) Dog, cat, loin, wolves are A) Insectivore C) Cetecea	B) Chiroptera D) Carnivore
328) .....are restricted to Australian Tasmania, New Guinea and their Neighbouring island A) Prototheria C) Eutheria	B) Metatheria D) Non of these	344) Rate, mice, squirrel, beavers are A) Rodentia C) Pholidata	B) Edentate D) Proboscidea
329) In adults teeth are absent and beak are found in A) Prototheria C) Eutheria	B) Metatheria D) Non of these	345) South American anteater, sloths are A) Rodentia C) Pholidata	B) Edentate D) Proboscidea
330) The body temperature of Prototheria / montremata are about A) 25 – 28 °C C) 20 – 28 °C	B) 35 – 38 °C D) 25 – 38 °C	346) Penguin are A) Rodentia C) Pholidata	B) Edentate D) Proboscidea
331) On ventral side of female of .....bear a pouch called marsupium A) Prototheria C) Eutheria	B) Metatheria D) Non of these	347) Elephant are A) Rodentia C) Pholidata	B) Edentate D) Proboscidea
332) There is no placenta formation but teats of mammary gland are present in pouch in A) Prototheria C) Eutheria	B) Metatheria D) Non of these	348) Horse, zebra are A) Proboscidea C) Artiodactyla	B) Perissodactyla D) Primates
333) .....are also called placental animals A) Prototheria C) Eutheria	B) Metatheria D) Non of these	349) Cow, goat, deer are A) Proboscidea C) Artiodactyla	B) Perissodactyla D) Primates
334) In....., cloaca is absent and urino-genital duct opens Indefinitely of rectum A) Prototheria C) Eutheria	B) Metatheria D) Non of these	350) Ape, man, monkey, lemur tarsier are A) Proboscidea C) Artiodactyla	B) Perissodactyla D) Primates
335) Eutheria are divided into ..... orders A) 10    B) 16    C) 26    d.30		351) Flying mammals are included in A) Chiroptera C) Carnivore	B) Cetecea D) Rodentia
336) <i>Ornithorhynchus</i> is A) Prototheria C) Eutheria	B) Metatheria D) Non of these	352) Aquatic mammals are included in A) Chiroptera C) Carnivore	B) Cetecea D) Rodentia
337) <i>Tachyglossus</i> is		353) Flesh eating is nature of A) Chiroptera C) Carnivore	B) Cetecea D) Rodentia
		354) Cutting habit are is nature of A) Chiroptera C) Carnivore	B) Cetecea D) Rodentia
		355) No or poorly teeth are developed in A) Chiroptera C) Carnivore	B) Cetecea D) Edentate
		356) Body with overlapping large & horny scales of A) Pholidata	B) Proboscidea

C) Perissodactyla D) Artiodactyla	C) Phylum Echinodermata D) Phylum hemichordate
357) Long trunk is present in A) Pholidata B) Proboscidea C) Perissodactyla D) Artiodactyla	369) Acron worm(Saccoglossus kowalevskii) and balanoglossus sp. Are A) Phylum Mullusca B) Phylum Annelida C) Phylum Echinodermata D) Phylum hemichordate
358) Odd-toed hoofed mammals are called A) Pholidata B) Proboscidea C) Perissodactyla D) Artiodactyla	370) Mammals become dominant in A) Cenozoic period B) Mesozoic period C) Jurasic period D) non of these
359) Even-toed hoofed mammals are called A) Pholidata B) Proboscidea C) Perissodactyla D) Artiodactyla	371) Reptiles flourished in .....225-65 million years back A) Cenozoic period B) Mesozoic period C) Jurasic period D) non of these
360) Highest brain development is property of A) Pholidata B) Proboscidea C) Perissodactyla D) Primates	372) Modern reptiles are descendants of the Dinosaurs of .....195-136 million years back and Creraceous period 136-65 million years back A) Cenozoic period B) Mesozoic period C) Jurasic period D) non of these
361) Urochordates are also called tunicate as they have sheeth called tunic which is made of A) Pectin B) Tunicin C) Chitin D) Non of these	373) Echinodermata larva is A) Bipinnaria B) Trochopora C) Lochidium D) Tornaria
362) Sycon(marine), Spongilla(fresh water), Leucoselenia(marine), euplectella (flower basket) are A) Phylum porifera B) Phylum Coelenterata C) Phylum Platyhelminthes D) Phylum Aschelminthes	374) some annelids have larval form called A) Bipinnaria B) Trochopora C) Lochidium D) Tornaria
363) Hydra, Obelia, Jelly fish, Sea anemone, Corels are A) Phylum porifera B) Phylum Coelenterata C) Phylum Platyhelminthes D) Phylum Aschelminthes	375) Hemichordata have larval form called A) Bipinnaria B) Trochopora C) Lochidium D) Tornaria
364) Planaria(Dugesia), liver flukes(fasciola hepatica), tape worms(taenia solium) are A) Phylum porifera B) Phylum Coelenterata C) Phylum Platyhelminthes D) Phylum Aschelminthes	376) Mullusca(balanoglossus) have larval form called A) Bipinnaria B) Trochopora C) Lochidium D) Tornaria
365) Ascaris lumbricoides and Enterobius vermicularis(pin worm) are A) Phylum porifera B) Phylum Coelenterata C) Phylum Platyhelminthes D) Phylum Aschelminthes	377) Amphibian have larval form called A) Bipinnaria B) Trochopora C) Lochidium D) Tadpole
366) Garden snail(Helix aspersa), Slug (Limax maximus), freshwater mussel (Anodonta grandis), Marine mussel (Mytilus edulis), Oyster(Ostrea lurida), Squid(Loligo pealii), Cuttle fish(Sepia officinalis), Octopus( Octopus bairdi) are A) Phylum Mullusca B) Phylum Annelida C) Phylum Echinodermata D) Phylum hemichordate	378) Circulatory system is of open type in a A) Phylum mullusks B) Arthrodies C) Nemotodes D) Non of these
367) Earthworm(Pheritema postuma), Medicinal leech(Hirudinaria medicinalis), Neries are A) Phylum Mullusca B) Phylum Annelida C) Phylum Echinodermata D) Phylum hemichordate	379) Grasshopper, spider and scorpion belongs to A) Phylum mullusks B) Arthrodies C) Nemotodes D) Non of these
368) Brittle star(ophiothrix fragilis), sea urchin(arbacia punctulata), sea cucumber(thyone briareus) are A) Phylum Mullusca B) Phylum Annelida	380) Extra cellular digestion occurs in A) Grasshopper & Frog B) Earth worm C) Reptiles D) Birds
	381) Alveoli are absent in A) Grasshopper & Frog B) Earth worm C) Reptiles D) Birds
	382) Sperm remain viable for years within female genital track of A) Grasshopper & Frog B) Earth worm C) Reptiles D) Bat
	383) Metamamerism is found in A) Grasshopper & Frog B) Earth worm C) Reptiles D) Birds
	384) Penguin is swimming A) Grasshopper & Frog B) Earth worm C) Reptiles D) Birds
	385) Extra embryonic membranes i.e. Amnion, Yolk sac,

Chorion, and Allantois are present in A) Grasshopper & Frog      B) Earth worm C) Reptiles                      D) Birds	D) two auricle and two ventricle
386) Book lungs are present in spider and scorpion which are A) Phylum mullusks            B) Arthrodies C) Nemotodes                    D) Non of these	391) The heart of Mammals are made of A) One auricle and one ventricle B) One or two auricle and two ventricle C) One auricle and one or two ventricle D) two auricle and two ventrile
387) The heart of Pisces (bony fishes) are made of A) One auricle and one ventricle B) One or two auricle and two ventricle C) One auricle and one or two ventricle D) two auricle and two ventrile	392) The heart of Mollusk heart is made of A) One auricle and one ventricle B) One or two auricle and two ventricle C) One auricle and one or two ventricle D) two auricle and two ventrile
388) The heart of Amphibian are made of A) One auricle and one ventricle B) One or two auricle and two ventricle C) One auricle and one or two ventricle D) two auricle and two ventrile	393) The % of arthropods in animal kingdoms A) 50%                        B) 70% C) 90%                        D) 30%
389) The heart of Reptiles are made of A) One auricle and one ventricle B) One or two auricle and two ventricle C) One auricle and one or two ventricle D) two auricle and two ventrile	394) In fishers A) Internal ear is present while middle ear is absent B) Internal ear is absent while middle ear is present C) Both internal and middle ear is present D) Both internal and middle ear are absent
390) The heart of Birds are made of A) One auricle and one ventricle B) One or two auricle and two ventricle C) One auricle and one or two ventricle	

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# CHAPTER 14

## RESPIRATION

- 1) Introduction and Properties of respiratory surfaces  
The process responsible for energy production in animals is: [2005]
- (a) Photosynthesis
  - (b) Digestion
  - (c) Respiration
  - (d) Circulation
- 2) Gaseous exchange in plants takes place through the **NUMS 2020**
- |             |              |
|-------------|--------------|
| a) Stomata  | b) mesophyll |
| c) endoderm | d) Xylem     |
- 3) Human respiratory system  
Which one of the following part of human respiratory system forms the gas exchange surface? **ETEA 2022**
- |            |            |
|------------|------------|
| A) Trachea | B) Larynx  |
| C) Bronchi | D) Alveoli |
- 4) Which of the following statements is not correct about alveoli: **ETEA 2023**
- A. Alveoli form the gas exchange surface
  - B. The wall of each alveolus 0.1 cm thick
  - C. Alveoli has a dense network of capillaries
  - D. Collagen and elastin present in alveoli allow it to expand and recall easily during breathing
- 5) The alveoli is lined by **KMU-CAT 2021**
- A) Cuboidal epithelium
  - B) Squamous epithelium
  - C) Columnar epithelium
  - D) Transitional epithelium
- 6) Lungs are \_\_\_\_ in origin. **[ETEA 2014]**
- (a) Ectodermal
  - (b) Endodermal
  - (c) Mesodermal
  - (d) Preformed
- 7) Following nasal passages are composed of cartilage except: **[ETEA 2012]**
- (a) Trachea
  - (b) Bronchus
  - (c) Bronchioles
  - (d) Tracheoles
- 8) Smaller the animal; **[ETEA 2010]**
- a) More the rate of respiration
  - (b) Less the rate of respiration
  - (c) Rate of respiration has nothing to do with size of animal
  - (d) None of these
- 9) Air sac of the lungs are also called? **MDCAT 2018**
- a. Bronchioles
  - b. Para bronchi

- c. Alveoli  
d. Bronchi
- 10) The correct order of the structures through which air passes is **FMDC 2013**
- I. Nasal cavity
  - II. Bronchi
  - III. Larynx
  - IV. Air sacs
  - V. Trachea
- |                      |                      |
|----------------------|----------------------|
| A) I, V, III, II, IV | B) I, V, III, IV, II |
| C) I, III, IV, V, II | D) I, III, V, IV, II |
| E) I, III, V, II, IV |                      |
- 11) The alveoli represent total surface area of : **ETEA 2019**
- |                         |                          |
|-------------------------|--------------------------|
| A) 10-30 m <sup>2</sup> | b) 30-60 m <sup>2</sup>  |
| c) 70-90 m <sup>2</sup> | d) 90-110 m <sup>2</sup> |
- 12) Diffusion is only effective over distance of
- |                  |                 |
|------------------|-----------------|
| a) 1 mm or less  | b) 1 mm or more |
| c) 10 mm or less | d) Non of these |
- 13) The only externally visible part of respiratory system is
- |           |            |
|-----------|------------|
| a) nose   | b) pharynx |
| c) larynx | d) lungs   |
- 14) The structure of human nose is composed of
- |                        |                 |
|------------------------|-----------------|
| a) Bone                | b) Cartilage    |
| c) Fibro fatty tissues | d) All of these |
- 15) The external features of bones depends upon the
- |                               |                 |
|-------------------------------|-----------------|
| a) ethmoid bone               | b) cartilage    |
| c) ethmoid bone and cartilage | d) non of these |
- 16) Hairs are present inside
- |             |                 |
|-------------|-----------------|
| A) Nostrils | B) Lungs        |
| C) Pharynx  | D) Non of these |
- 17) The mucus membrane secretes a sticky substance called
- |             |                   |
|-------------|-------------------|
| a) Mucus    | b) Ciliatic fluid |
| c) Secretin | d) Non of these   |
- 18) For their removal the cilia move the trapped substance to the
- |            |           |
|------------|-----------|
| a) Pharynx | b) Larynx |
| c) Trachea | d) Lungs  |
- 19) Blood capillaries helps to warm the blood to a temperature of
- |          |          |          |          |
|----------|----------|----------|----------|
| a) 20° C | b) 30° C | c) 40° C | d) 37° C |
|----------|----------|----------|----------|
- 20) The shape of pharynx is
- |                 |                 |
|-----------------|-----------------|
| a) Cone shaped  | b) Round shaped |
| c) Linear shape | d) Non of these |
- 21) Pharynx leads from oral and nasal cavities to the
- |                  |                 |
|------------------|-----------------|
| a) Oesophagus    | b) Larynx       |
| c) Both of these | d) Non of these |
- 22) The part of both respiratory and digestive system is
- |               |                 |
|---------------|-----------------|
| a) Oesophagus | b) Larynx       |
| c) PHARYNX    | d) Non of these |
- 23) Food is allowed to pass to the oesophagus through the .... In pipe
- |                 |            |
|-----------------|------------|
| a) Nasal cavity | b) Pharynx |
| c) Larynx       | d) Lungs   |
- 24) Function of larynx is

BOM SERIES	Page 258	BOM ACADEMY Online & Swat
a) air canal b) organ of voice c) both of these d) non of these		a) 2 b) 3 c) 4 d) 5
25) ..... fibrous bands called vocal cords are present in the larynx a) 1 b) 2 c) 3 d) 4		43) The left lung has only ..... Lobes a) 2 b) 3 c) 4 d) 5
26) Vocal cords are composed of mucus membrane stretched a) horizontally Across the larynx b) ventrally Across the larynx c) crossly across the larynx d) non of these		44) The two lung rest their bases with diaphragm and their apexes extends above the .... rib a) First b) Second c) Third d) Non of these
27) The length of trachea is a) 10 cm b) 10-11 cm c) 10-12 cm d) 16-20 cm		45) Special cells in alveolus secrete a detergent like chemical on inside lining of alveolus called a) Macrophages b) Surfactant c) Secretin d) All of these
28) The width of trachea is a) 2 cm b) 3 cm c) 4 cm d) 8 cm		46) <b>Lungs volume and capacity</b> The average adult human has a lung capacity of approximately <b>ETEA 2022</b> A) 2 liters B) 5 liters C) 9 liters D) 12 liters
29) The wall of trachea is composed of horse shoe shaped rings, their no is a) 10-14 b) 12-16 c) 16-20 d) Non of these		47) The residual volume of lungs during rest or sleep is <b>NUMS 2019</b> a) 1.5 liters b) 2.5 liters c) 3.5 liters d) 4.5 liters
30) Trachea protects the respiratory system from an accumulation of a) Foreign particles b) Blood particles c) Macrophages d) Non of these		48) <b>Which of the following best describes the residual volume of the lungs?</b> <b>FMDC 2013</b> A) The amount of air normally inhaled and exhaled with each breath. B) The maximum amount of air that can be forcibly inhaled and exhaled from the lungs. C) The volume of air that can still be forcibly exhaled following a normal exhalation. D) The volume of air that always remains in the lungs.
31) Adults male have larger vocal cords and have a) Low pitched voice b) Normal pitched voice c) High pitched voice d) Non of these		49) _____ is the important structure which surrounds or protect the lungs. <b>MDCAT 2018</b> a. Trachea b. Pericardium c. Pleural membrane d. Keel
32) Adults woman have smaller vocal cords and have a) Low pitched voice b) Normal pitched voice c) High pitched voice d) Non of these		50) Normal volume of lung is a) 5 L b) 0.5 L c) 1.5 L d) Non of these
33) the right bronchus has a larger diameter and .....than the left bronchus a) Shorter b) Longer c) Very longer d) Non of these		51) Tidal volume of lung is a) 5 L b) 0.5 L c) 1.5 L d) Non of these
34) The walls of bronchiole consist of a) ciliated cuboidal epithelium b) layer of smooth muscles c) both of these d) non of these		52) Residual volume of lungs is a) 5 L b) 0.5 L c) 1.5 L d) Non of these
35) The first airway branch which do not contain cartilage is a) Larynx b) Bronchi c) Bronchioles d) Alveoli		53) _____ is the amount of air that can be forcibly inhaled after a normal tidal volume. a) Normal volume b) Tidal volume c) Expiratory Residual volume d) Inspiratory Reserve Volume Volume
36) The air distribution in lungs is controlled by a) Larynx b) Bronchi c) Bronchioles d) Alveoli		54) _____ is the volume of air that can be exhaled forcibly after exhalation of normal tidal volume. a) Normal volume b) Tidal volume c) Expiratory Residual volume d) Inspiratory Reserve Volume Volume
37) The actual exchange of oxygen and carbon dioxide occurs in a) Larynx b) Bronchi c) Bronchioles d) Alveoli		55) The volume of air exchanged during one breath in and out in quite breathing and this is about a) Normal volume b) Tidal volume c) Residual volume d) Volume
38) The thickness of wall of alveolus is a) $0.1 \mu m$ b) $0.2 \mu m$ c) $10 \mu m$ d) $1 \mu m$		
39) Alveoli contain a) Collagen b) Elastic fibers c) Both of these d) Non of these		
40) The volume of right lung by percentage is a) 56% b) 44% c) 60% d) 40%		
41) The volume of left lung in total lung volume is a) 56% b) 44% c) 60% d) 40%		
42) The right lung is composed of .....lobes		

- 56) The volume of air remaining in the lungs even after a forcible expiration and this is about  
 a) Normal volume      b) Tidal volume  
 c) Residual volume      d) Volume
- 57) **Control of breathing (inspiration, expiration)**  
 Diaphragm is a sheet of **NUMS 2019**  
 a) Smooth muscles  
 b) Cardiac muscles  
 c) Skeletal muscles  
 d) All of the above
- 58) The rate of breathing of a child of 5 years is about: **[ETEA 2011]**  
 (a) 44 times / minute  
 (b) 40 times / minute  
 (c) 25 times / minute  
 (d) 20 times / minute
- 59) During inspiration the space inside the chesty cavity is increased due to **MDCAT 2019**  
 a. Increased pressure  
 b. The relaxation of the muscles of the diaphragm  
 c. Relaxation of the external intercostals muscles  
 d. The contraction of the muscles of the diaphragm
- 60) Breathing consists of **MDCAT 2016**  
 a. Four phases  
 b. Three phases  
 c. One phase  
 d. Two phases
- 61) Involuntary control of breathing is carried out by a breathing center in  
 a) Cerebrum      b) Cerebellum  
 c) Medulla oblongata      d) All of these
- 62) The ventral portion of breathing center act to increase the rate and depth of inspiration and is called  
 a) Inspiratory centre      b) Expiratory centre  
 c) Increasing centre      d) Decreasing centre
- 63) The dorsal and lateral portion inhibits inspiration and stimulate expiration and form the  
 a) Inspiratory centre      b) Expiratory centre  
 c) Increasing centre      d) Decreasing centre
- 64) The breathing center communicates with intercostal muscles by  
 a) Intercostal nerves      b) Phrenic nerves  
 c) Humeral nerves      d) Non of these
- 65) The breathing center communicates with diaphragm muscles by  
 a) Intercostal nerves      b) Phrenic nerves  
 c) Humeral nerves      d) Non of these
- 66) Inspiration is in  
 a) Active process      b) Passive process  
 c) Normal process      d) Non of these
- 67) Expiration is an  
 a) Active process      b) Passive process
- 68) The lungs are made to expand and contract by movements of the  
 a) Ribs      b) Diaphragm  
 c) Both of these      d) Non of these
- 69) The shape of diaphragm in inspiration is  
 a) Flattened      b) Dome  
 c) Cone      d) Non of these
- 70) The shape of diaphragm in expiration is  
 a) Flattened      b) Dome  
 c) Cone      d) Non of these
- 71) **Mechanism of transport of gases**  
 The percentage of carbon dioxide carried as carboxyhaemoglobin is: **ETEA 2022**  
 A) 70% B) 23% C) 15% D) 7%
- 72) The oxygen carrying capacity of haemoglobin in humans when the blood is 100% oxygenated is: **[ETEA 2014]**  
 a) 19.4 ml      b) 19.6 ml  
 c) 20 ml      d) 21 ml
- 73) About 70-85% CO<sub>2</sub> in blood is carried: **MDCAT 2015**  
 a. As carboxylase myoglobin  
 b. With proteins in plasma  
 c. Freely as CO<sub>2</sub>  
 d. As bicarbonate
- 74) Percentage of CO<sub>2</sub> carried by plasma is:  
**[ETEA 2016]**  
 a) 5% b) 6%      c) 7% d) 8%
- 75) Carboxyhaemoglobin (10-20%) is formed when CO<sub>2</sub> combines with **MDCAT 2016**  
 a. Amino group of haemoglobin  
 b. Iron part of haemoglobin  
 c. Haem portion of haemoglobin  
 d. Plasma proteins
- 76) Low partial pressure of oxygen in tissues favour \_\_\_\_\_ of oxyhaemoglobin.  
**MDCAT 2017**  
 a. Dissociation  
 b. Formation  
 c. Stability  
 d. Transformation
- 77) Amount of O<sub>2</sub> carried by red blood cells is:  
**[ETEA 2015]**  
 a) 77% b) 90%      c) 87% d) 97%
- 78) How much carbon dioxide is transported through blood proteins? **NUMS 2015**  
 a) 5% b) 20%      c) 25% d) 70%
- 79) Blood containing CO<sub>2</sub> is **NUMS 2018**  
 a) Red color      b) Blue color  
 c) Reddish purple color  
 d) Reddish blue color
- 80) Which of the following ions play important role in the transport of carbon dioxide?  
**[ETEA 2014]**

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Page 260

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a) Sodium c) Bicarbonate	b) Potassium d) Chloride	100) 1 gm haemoglobin combines with..... ml of oxygen a) 1.34 c) 1.99 d) 4.00
81) During voluntary control impulses originate from the cerebral hemispheres and pass to the a) Nose c) Pons	b) Breathing center d) Non of these	101) The maximum oxygen capacity in arterial blood is a) 20 ml /100 ml c) 14.4 ml/100 ml d) Non of these
82) 20% decrease in oxygen concentration in the air produce ..... the breathing rate a) Double c) Qudruples	b) Triple d) Non of these	102) The arterial blood capacity of oxygen is a) 20 ml /100 ml c) 14.4 ml/100 ml d) Non of these
83) Transport of oxygen in blood as oxyhaemoglobin a) 97 % b) 3 % c) 70 % d) 23 %		103) The capacity of oxygen in venous blood is a) 20 ml /100 ml c) 14.4 ml/100 ml d) Non of these
84) Transport of oxygen in blood as plasma a) 97 % b) 3 % c) 70 % d) 23 %		104) Saturation of oxygen of maximum arterial blood is a) 100 % c) 75 % d) Non of these
85) Oxygen binds with haemoglobin in presence of enzyme called a) Carbonic acid c) Carbonase	b) Carbonc anhydrase d) Non of these	105) Saturation of oxygen of normal arterial blood is a) 100 % c) 75 % d) Non of these
86) To form oxyhaemoglobin, each haemoglobin binds with .... Oxygen of molecules a) 2 b) 3 c) 4 d) 5		106) Saturation of oxygen of normal venous blood is a) 100 % c) 75 % d) Non of these
87) The color of oxygenated pigment of Human a) Bright red c) Violet to pink	b) Blue d) Green	107) The amount of oxygen released to tissues by each 100ml blood is a) 3 ml c) 50 ml b) 5ml d) 25 ml
88) The color of oxygenated pigment of Mulluskus a) Bright red c) Violet to pink	b) Blue d) Green	108) During exercise venous blood that leave an active tissues has 4.4 ml at 18 m Hg and a) 10 % saturation c) 50 % saturation b) 20 % saturation d) Non of these
89) The color of oxygenated pigment of Some marine animals a) Bright red c) Violet to pink	b) Blue d) Green	109) In dissolved form 100 ml of artery blood contain 0.29 ml O <sub>2</sub> (95 mmHg) and increase to ..... ml/100ml at 100 mmHg a) 0.1 b) 0.3 c) 0.5 d) 10
90) The color of oxygenated pigment of Annelids a) Bright red c) Violet to pink	b) Blue d) Green	110) In plasma in dissolved form 100 ml of venous blood contain 0.12 ml of dissolved oxygen at a) 40 mm Hg c) 20 mm Hg b) 80 mmHg d) Non of these
91) The respiratory pigment in Human a) Haemoglobin c) Haemoerythrinein	b) Haemocyanin d) Chlorocruorin	111) The oxygen transported to tissues per cycle in dissolved state is ..... ml of oxygen a) 0.10 c) 0.27 b) 0.17 d) 0.57
92) The respiratory pigment in Mulluskus a) Haemoglobin c) Haemoerythrinein	b) Haemocyanin d) Chlorocruorin	112) Carbon dioxide is carried in the blood as bicarbonate ions a) 70 % b) 23 % c) 7 % d) Non of these
93) The respiratory pigment in Some marine animals a) Haemoglobin c) Haemoerythrinein	b) Haemocyanin d) Chlorocruorin	113) Carbon dioxide is carried in the blood as carboxyhaemoglobin a) 70 % b) 23 % c) 7 % d) Non of these
94) The respiratory pigment in Annelids a) Haemoglobin c) Haemoerythrinein	b) Haemocyanin d) Chlorocruorin	114) Carbon dioxide is carried in the blood as plasma a) 70 % b) 23 % c) 7 % d) Non of these
95) Deoxygenated Haemoglobin colour is a) Haemoglobin c) Haemoerythrinein	b) Haemocyanin d) Chlorocruorin	115) CO <sub>2</sub> combines with H <sub>2</sub> O to form carbonic acid(H <sub>2</sub> CO <sub>3</sub> ) in presence of enzyme a) Carbolic anhydrase b) Carbinc acid c) Oxidase d) Carbonase
96) Deoxygenated Haemocyanin colour is a) Haemoglobin c) Haemoerythrinein	b) Haemocyanin d) Chlorocruorin	116) From inside erythrocytes diffuses H <sub>2</sub> CO <sub>3</sub> <sup>-</sup> into plasma to form a) Sodium carbonate b) Sodium bicarbonate c) Codium actated) Non of these
97) Deoxygenated Haemoerythrinein colour is a) Haemoglobin c) Haemoerythrinein	b) Haemocyanin d) Chlorocruorin	117) Diffusion of H <sub>2</sub> CO <sub>3</sub> <sup>-</sup> and Cl <sup>-</sup> is balanced by a) Bicarbonate-chloride carrier b) carbonate-chloride carrier c) Bicarbonate carries
98) Deoxygenated Chlorocruorin colour is a) Dark red c) Colourless	b) Bright red d) Blue	
99) Amount of haemoglobin in blood is .... gms/100 ml a) 10 b) 15	c) 20 d) 25	

- 118) The opposite movement of  $H_2CO_3^-$  and  $Cl^-$  is called  
 a) chloride-shifts  
 b) Hamburger's phenomenon  
 c) Both of these d) Non of these

**Respiratory pigments**

Myoglobin is found in: [ETEA 2013]

- (a) Bone  
 (b) Connective tissue  
 (c) Muscles  
 (d) Cartilage
- 120) Myoglobin combines with:  
 [ETEA 2012]  
 (a) Four oxygen molecules  
 (b) Three oxygen molecules  
 (c) Two oxygen molecules  
 (d) One oxygen molecule

- 121) The respiratory pigment, which has much higher affinity to combine with oxygen is  
**NUMS 2016**

- a. Myoglobin
  - b. Globin
  - c. Haemoglobin
  - d. Hemocyanin
- 122)  $CO_2$  combines with globin part of  
 a) Haemoglobin b) Leg haemoglobin  
 c) Plasma d) myoglobin
- 123) Oxygen carrying capacity is increases by  
 a) Haemoglobin b) Leg haemoglobin  
 c) Plasma d) Myoglobin
- 124) Oxygen is stores in muscles in  
 a) Haemoglobin b) Leg haemoglobin  
 c) Plasma d) Myoglobin

**Respiratory disorders**

W.O.F is a respiratory disorder related to malnutrition: [MDCAT 2017]

- a. cancer
  - b. asthma
  - c. emphysema
  - d. tuberculosis
- 126) Which of the following is a genetic disorder in which abnormally thick mucus is produced in the lungs and other parts of the body?  
**NUMS 2020**
- a) Lung cancer  
 b) chronic bronchitis  
 c) cystic fibrosis  
 d) emphysema
- 127) A disease caused by gradual breakdown of the thin wall of alveoli is \_\_\_\_: [MDCAT 2019]
- a. Tuberculosis
  - b. Asthma
  - c. Emphysema
  - d. Bronchitis
- 128) Otitis media is an inflammation of which part of the body? [ETEA 2017]

- A) Brain  
 B) Middle ear  
 C) Lungs  
 D) Urinary tract

- 129) Nicotine in tobacco: [ETEA 2011]

- (a) decreases the heart rate  
 (b) decreases blood pressure  
 (c) block the transport of oxygen  
 (d) paralyzes cilia

- 130) Sinusitis is an inflammation of  
 a) Nasal Sinusitis b) Middle ear  
 c) Lower respiratory track  
 d) All of these

- 131) Otitis media is an inflammation of  
 a) Nasal Sinusitis b) Middle ear  
 c) Lower respiratory track  
 d) All of these

- 132) Pneumonia is serious disorder of  
 a) Nasal Sinusitis b) Middle ear  
 c) Lower respiratory track  
 d) All of these

- 133) Acute symptoms of Sinusitis appear in  
 a) 2 - 8 weeks b) 3 - 4 days  
 c) 8-10 weeks d) 5-9 days

- 134) 80% of otitis media clear up within  
 a) 2 - 8 weeks b) 3 - 4 days  
 c) 8-10 weeks d) 5-9 days

- 135) Sinusitis and Otitis media are caused by  
 a) Bacteria b) Allergy  
 c) Infection d) All of these

- 136) Treatment of Sinusitis is  
 a) Antibiotics b) Antiallergic  
 c) Decongestants d) All of these

- 137) Treatment of otitis media is  
 A) Antibiotic B) Pain killer  
 C) Both of these D) Non of these

- 138) There are four large sinuses .....maxillary sinuses and ....frontal sinuses  
 a) 2,3 b) 2,2 c) 2,4 d) 4,3

- 139) The pressure between the middle air cavity and outside mucus to drain out of the middle air cavity is equalized by  
 a) Eustachian tube  
 b) Air drum  
 c) Malleus, incus and stapes  
 d) Non of these

- 140) Fluid leaking of ear is called  
 a) Nausea b) Vomiting  
 c) Pneumonia d) Non of these

- 141) Device which is used to look into the ear is called  
 a) Otoscope b) Auriscope  
 c) Both of these d) Non of these

- 142) Otoscope consist of light and  
 a) Low-power magnifying lens  
 b) high-power magnifying lens  
 c) very Low-power magnifying lens  
 d) very high-power magnifying lens

- 143) There are about ..... different kinds of Pneumonia  
 a) 10 b) 20 c) 30 d) 40

- 144) Usually pneumonia is caused by

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Page 262

**BOM ACADEMY Online & Swat**

- |  |                          |  |   |
|--|--------------------------|--|---|
| a) Bacteria  | b) Virus                 |  | 154) TB is transferred from person to person by |
| c) Bacteria and virus                                    | d) Non of these          |  | a) Food   |
| 145) Causes pneumonia                                    |                          | b) Airbonrne droplets                                  |   |
| a) Streptococcus pneumonia, hemophilus influenza         |                          | c) Infections  |   |
| b) legionella pneumophilia, ataphylococcus aureus        |                          | d) Non of these  |   |
| c) mycoplasma  | d) all of these          | 155) Most common drugs used for treatment of TB are    |   |
| 146) Pleural effusion is                                 |                          | a) Isoniazid   | b) Rifampin                                     |
| a) Fluid around the lungs                                |                          | c) Both of these                                       | d) Non of these                                 |
| b) pus in the pleural cavity                             |                          | 156) In a person with emphysema, the ..... are damages |   |
| c) low blood sodium                                      |                          | a) Lugs  | b) Alveoli                                      |
| d) Accumulation of fluid                                 |                          | c) Laryx   | d) All of these                                 |
| 147) Empyema is  |                          | 157) 15% of TB of patient may develop the disease      |   |
| a) Fluid around the lungs                                |                          | other than lungs, such as                              |   |
| b) pus in the pleural cavity                             |                          | a) Lymph nodes   | b) GI track,bones                               |
| c) low blood sodium                                      |                          | c) Joints  | d) All of these                                 |
| d) Accumulation of fluid                                 |                          | 158) 10% of people having M.Tuberculosis ever develop  |   |
| 148) Hyponatremia is                                     |                          | Pneumonia  |   |
| a) Fluid around the lungs                                |                          | a) 10% b) 20% c) 30% d) Non of these                   |   |
| b) pus in the pleural cavity                             |                          | 159) Tubes which are inserted to ear are called        |   |
| c) low blood sodium                                      |                          | a) Grommerts   | b) Tympanostomy                                 |
| d) Accumulation of fluid                                 |                          | c) Gromerts and typanostomy                            |   |
| 149) Abscess in the lung is                              |                          | d) Myringotomy   |   |
| a) Fluid around the lungs                                |                          | 160) The surgery in which hole is made in the ear drum |   |
| b) pus in the pleural cavity                             |                          | is called  |   |
| c) low blood sodium                                      |                          | a) Grommerts   | b) Tympanostomy                                 |
| d) Accumulation of fluid                                 |                          | c) Gromerts and typanostomy                            |   |
| 150) Which one of the following is rare case             |                          | d) Myringotomy   |   |
| a) Fluid around the lungs                                |                          | 161) Rapid breathing and rapid pulse rate are          |   |
| b) pus in the pleural cavity                             |                          | symptoms of  |   |
| c) low blood sodium                                      |                          | a) Bacterial pneumonia                                 |   |
| d) Accumulation of fluid                                 |                          | b) Mycoplasma pneumonia                                |   |
| 151) In pneumonia body is unable to get proper amount    |                          | c) Both of these                                       | d) Non of these                                 |
| of oxygen due to   |                          | 162) Breathlessness and slow heart beat are symptoms   |   |
| a) Bacteria  | b) Fluid in the air sacs | of   |   |
| c) Virus   | d) Non of these          | a) Bacterial pneumonia                                 |   |
| 152) Tuberculosis is highly contagious chronic bacterial |                          | b) Mycoplasma pneumonia                                |   |
| infection of   |                          | c) Both of these                                       | d) Non of these                                 |
| a) Lugs  | b) Alveoli               |  |   |
| c) Laryx   | d) All of these          |  |   |
| 153) TB is caused by                                     |                          |  |   |
| a) Streptococcus pneumonia, hemophilus influenza         |                          |  |   |
| b) legionella pneumophilia, ataphylococcus aureus        |                          |  |   |
| c) Mycobacterium tuberculosis                            |                          |  |   |
| d) all of these  |                          |  |   |

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## CHAPTER 17

### NERVOUS COORDINATION

#### Steps involved in nervous coordination

- 1) Touch receptors are **NUMS 2022**
  - a. Pacinian's corpuscles
  - b. Miessner's corpuscles
  - c. Olfactory receptors
  - d. Nociceptors
- 2) Nervous coordination comprises of units called
  - a) Neurons
  - b) Nephrons
  - c) Both of these
  - d) Non of these
- 3) The function of neuron is
  - a) Detection
  - b) Integration
  - c) Command
  - d) All of these
- 4) Parts that receive stimuli from internal /external of body is called
  - a) Receptors
  - b) Transducers
  - c) Both of these
  - d) Non of these
- 5) A receptor may be
  - a) complete organ
  - b) cell
  - c) neuron endings
  - d) all of these
- 6) Photoreceptors (rods & cones) detects
  - a) Light stimuli
  - b) Ions or molecules
  - c) Pressure
  - d) position
- 7) Chemoreceptors (olfaction, gustation & osmoreceptors) detects
  - a) Light stimuli
  - b) Ions or molecules
  - c) Pressure
  - d) Position
- 8) Receptor that detect change in pressure, position

or acceleration, hearing and equilibrium(ear)  
 a) Mechanoreceptors      b) Thermoreceptors  
 c) Nociceptor              d) Non of these

- 9) Receptors which detect temperature stimuli are called
  - a) Mechanoreceptors
  - b) Thermoreceptors
  - c) Nociceptor
  - d) Non of these
- 10) Which one of the following detect pain
  - a) Nociceptors
  - b) Olfaction
  - c) Gustation
  - d) Osmoreceptors
- 11) Which one of the following detect smell
  - a) Nociceptors
  - b) Olfaction
  - c) Gustation
  - d) Osmoreceptors
- 12) Which one of the following detect taste
  - a) Nociceptors
  - b) Olfaction
  - c) Gustation
  - d) Osmoreceptors
- 13) Which one of the following detect osmotic pressure
  - a) Nociceptors
  - b) Olfaction
  - c) Gustation
  - d) Osmoreceptors
- 14) Which one of the following detect touch
  - a) Osmoreceptors
  - b) Meissner's corpuscles
  - c) Pacinian's corpuscle (skin)
  - d) Baroreceptors(blood vessels)
- 15) Which one of the following detect touch
  - a) Gustation
  - b) Osmoreceptors
  - c) Meissner's corpuscles
  - d) Pacinian's corpuscle (skin) and Baroreceptors(blood vessels)
- 16) The part of the body which produce appropriate response are called
  - a) Effector
  - b) Integrator
  - c) Receptor
  - d) All of these
- 17) **Neurons**  
 The type of neuron that carries nerve Impulse from tissue and organ to the spinal Cord and brain is: **ETEA 2022**
  - a) Sensory neuron
  - b) Motor neuron
  - C) Intermediate neuron
  - d) Associative neuron
- 18) Which of the following is common to all neurons ? : **ETEA 2020**

a) A cell which contains a nucleus. b) A thick myelin sheath c) Presence of node of Ranvier d) Presence of Schwann cells	a) one nucleus b) many mitochondria c) microtubules, & Nissl's granules d) Non of these
19) Neurons are cells adopted for the rapid transmission of electrical impulses. To do this, they have long thin process called: <b>ETEA 2020</b> a) Axons    b) Dendrites c) myelin sheath                                d) Schwann cells	32) Collection of group of _____ and golgi apparatus is called nissl's granules a) ribosomes associated with ER b) ribosomes associated with RER c) ribosomes associated with SER d) all of these
20) A long extension of a nerve cell is called <b>NUMS 2022</b> a. Axon    b. Auxin c. Schwann cell                                 d. Dendrites	33) Dendrites are a) Thin fibres                                    b) Thick fibres c) Very narrow                                    d) Non of these
21) Neuron that carries messages from sense organ to the central nervous system is: <b>[ETEA 2006]</b> (a) Afferent                                      (b) Efferent (c) Associative                                    (d) Interneuron	34) Axons are a) Thin fibres                                    b) Thick fibres c) Very narrow                                    d) Non of these
22) Which of the following is common to all neurons ? <b>MDCAT 2020</b> a) A cell which contains a nucleus. b) A thick myelin sheath c) Presence of node of Ranvier d) Presence of Schwann cells	35) The cytoplasm of axon is called a) Axoplasm                                      b) Cytoplasm c) Both of these                                    d) Non of these
23) Neurons are cells adopted for the rapid transmission of electrical impulses. To do this, they have long thin process called <b>MDCAT 2020</b> a) Axons    b) Dendrites c) myelin sheath                                d) Schwann cells	36) Axons are covered by a) Schwann cells                                b) Neuroglia c) Both of these                                    d) Non of these
24) Neurons CANNOT undergo division, because they do not have <b>NUMS 2018</b> a) Centrosomes                                    b) Nucleus c) Mitochondria                                d) Golgi apparatus	37) A non myelinated part of axon between two shwann cells are called a) Radial nodes                                    b) Nodes c) Node of ranvier                                d) All of these
25) <b>Type of neurons found exclusively in CNS are:</b> <b>FMDC 2017</b> a) Sensory neurons                              b) Motor neurons c) Associative neurons                            d) None of these	38) Velocity of impulse in axon fibre depends on its a) diameter                                        b) length c) myelin sheath                                    d) all of these
26) _____ is considered as chief structural and functional unit of nervous system. : <b>ETEA 2019</b> a) Cell    b) neuron c) nephron                                        d) brain	39) When axon is larger and thicker the transmission of information is a) Faster    b) Slower c) Same speed                                      d) Depends on cell body also
27) <b>50%</b> of nervous system consist of a) Neurological cells                            b) Neuron c) Both of these                                    d) Non of these	40) The transmission of information in myelinated than non myelinated is a) Faster    b) Slower c) Same speed                                      d) Depends on cell body also
28) The chief structural and functional unit of nervous system is a) Neurological cells                            b) Neuron c) Both of these                                    d) Non of these	41) Radiating form cell body Neuron having two fiber are called a) Unipolar                                        b) Bipolar c) Multipolar                                      d) Non of these
29) Dendrites of neuron receive information from receptors and _____ surface area of neuron a) increase                                        b) Decrease c) both of these                                    d) non of these	42) Radiating form cell body Neuron having three fiber are called a) Unipolar                                        b) Bipolar c) Multipolar                                      d) Non of these
30) Dendrites are a) Myelinated                                      b) Non-myelinated c) Both of these                                    d) Non of these	43) Radiating form cell body Neuron having many fiber are called a) Unipolar                                        b) Bipolar c) Multipolar                                      d) Non of these
31) The cell body does not contains	44) The neuron which carry impulse from receptors to CNS a) Sensory neuron                                b) Associative neuron c) Motor neuron                                    d) Non of these
	45) Neuron involved in processing and interpretation of data from receptors a) Sensory neuron                                b) Associative neuron c) Motor neuron                                    d) Non of these
	46) The neurons which carry impulse from CNS to the effectors are called

- 47) a) Sensory neuron  
b) Associative/intermediate  
c) Motor neuron d) Non of these
- 48) Sensory neurons area  
a) Unipolar b) Bipolar  
c) Multipolar d) Non of these
- 49) Intermediate neurons are  
a) Unipolar b) Bipolar  
c) Multipolar d) Non of these
- 50) Motor neurons are  
a) Unipolar b) Bipolar  
c) Multipolar d) Non of these
- 51) There is no clear difference b/w dendrites and axons of  
a) Sensory neuron b) Associative neuron  
c) Motor neuron d) Non of these
- 52) There are highly numbers of dendrites and give raise to tree like structure  
a) Sensory neuron b) Associative neuron  
c) Motor neuron d) Non of these
- 53) Short axon and long dendrites  
a) Sensory neuron b) Associative neuron  
c) Motor neuron d) Non of these
- 54) Long axon and short dendrites  
a) Sensory neuron b) Associative neuron  
c) Motor neuron d) Non of these
- Reflex arc**  
The reflex action is the phenomena which only involves **MDCAT 2019**
- Brain, receptors, spinal cord
  - Receptors, effectors and spinal cord
  - Receptors, neuron, brain
  - Receptor and effectors
- 55) **The reflex arc, which is made of two neurons is known as:** **FMDC 2017**
- Monosynaptic reflex arc
  - Disynaptic reflex arc
  - Polysynaptic reflex arc
  - Asynaptic reflex arc
- 56) The pathway of nerve impulse during reflex action is called  
a) Neural path way b) Reflex arc  
c) Automatic arc d) All of these
- 57) Reflex activities have no involvement of  
a) Brain b) Spinal cord  
c) Both of these d) Non of these
- 58) Peripheral branch of sensory neuron transmits information to the  
a) Dorsal root of ganglion  
b) Brain  
c) Spinal card d) Receptors
- 59) A synapse made on associative neuron to the form to inform of danger is send by  
a) Sensory neuron b) Motor neuron  
c) Intermixed neuron d) All of these
- Nerve impulse and its types**  
The neuron is said to be polarized when the **ETEA 2023**
- 61) which brings membrane potential to threshold? **ETEA 2023**
- Influx of sodium ions across the post synaptic membrane
  - Outflow of sodium ions across the post synaptic membrane
  - Outflow of calcium ions across the post synaptic membrane
  - Influx of potassium ions across the post synaptic membrane
- 62) Which type of nerve impulse occurs in nonmyelinated neuron fibers? **ETEA 2023**
- Saltatory impulse
  - Continuous impulse
  - Rapid impulses
  - Jumping impulse
- 63) The resting membrane potential Of neuron is measured about; **ETEA 2022**
- 40 millivolts
  - 50 millivolts
  - 70 millivolts
  - 100 millivolts
- 64) In the following diagram of action potential in a neuron, 'x' depicts: **MDCAT 2015**
- 
- Depolarization
  - Polarization
  - Repolarization
  - Hyperpolarization
- 65) The nerve impulse which jumps from node to node in myelinated neurons is called as: **MDCAT 2017**
- Resting membrane potential
  - Salutatory nerve impulse
  - Threshold stimulus
  - Initial nerve impulse
- 66) In an action potential, the permeability of sodium ions in the neurons increases due to **MDCAT 2019**
- Re polarization
  - The opening of sodium channels/gates
  - The action of the acetylcholinesterase enzyme
  - Sodium ions forming an ionic bonding
- 67) Which of the following is correct about speed

of nerve impulse: [ETEA 2016]	a) Thicker the nerve fiber-less resistance to flow of current-faster the nerve impulse. b) Thicker the nerve fiber-more resistance to flow of current-slower the nerve impulse c) Thinner the nerve fiber-less resistance to flow of current-slower the nerve impulse d) None of the above Answer: Thicker the nerve fiber-less resistance to flow of current-faster the nerve impulse.	a) Gates b) Pump c) Both of these d) Non of these
68)	The cell transmits impulses from the A. effector organ to the spinal cord B. receptor cells to the effector organ C. receptor cells to the spinal cord <b>D. spinal cord to the effector organ</b> E. spinal cord to the receptor cells	79) K+ ions moves out of neuron to make more positive inside through a) Voltage regulated gates b) Non voltage regulated gates c) Both of these d) Non of these
69)	A wave of electrochemical change which travels along length of neuron is called a) Reflex arc b) Nerve impulse c) Pulse action d) Messegng	80) More positive charge on outside than inside of neuron are called a) Membrane potential b) Resting membrane potential c) Action potential d) Active membrane potential
70)	In case of neuron the electrical potential is termed as a) Membrane potential b) Resting membrane potential c) Action potential d) Active membrane potential	81) Inside more positive charge than outside(depolarized state) are called a) Membrane potential b) Resting membrane potential c) Action potential d) Active membrane potential
71)	More positive outer surface than inner surface is called a) Membrane potential b) Resting membrane potential c) Action potential d) Active membrane potential	82) Active membrane potential is also called a) Membrane potential b) Resting membrane potential c) Action potential d) Active membrane potential
72)	The state Resting membrane potential is also called a) Membrane potential b) Resting membrane potential c) Action potential d) Polarized state	83) Stimulus capable to bring an electrochemical change Threshold stimulus is called a) adequate stimulus b) inadequate stimulus c) improper stimulus d) all of these
73)	The potential in rest with inside negative to outside positive is a) -70mV b) 70 mV c) 50 mV d) -50 mV	84) Stimulus not capable to bring an electrochemical change Sub threshold is called a) adequate stimulus b) inadequate stimulus c) improper stimulus d) all of these
74)	Concentration of K+ inside to fluid to outside is a) 10 times b) 20 times c) 30 times d) 40 times	85) By threshold stimulus, Na+ diffuse to inside neuron by a) Voltage regulated Na gates b) Non-voltage regulated gates c) Pumps d) Non of these
75)	Concentration of Na+ outside to inside is a) 10 times b) 20 times c) 30 times d) 40 times	86) Due to diffusion of Na+, electric potential from -70mV towards 0 and then reach to the a) -70mV b) 70 mV c) 50 mV d) -50 mV
76)	when 2 K+ are active transported inward the number of Na+ transported outward is a) 1 b) 2 c) 3 d) 4	87) The reversal of polarity across two sides of membranes are called a) Membrane potential b) Resting membrane potential c) Action potential d) Depolarized
77)	Negative organic ions present inside in neuron cytoplasm are a) Proteins b) Amino acids c) DNA and RNA d) All of these	88) Until Na+ gates are closed the depolarized state lasts for a) 1 milli second b) 10 milli second c) 100 milli second d) 0.1 milli second
78)	Cell membrane of neuron has many channels proteins called	89) After the peak of action potential, called the a) Spike potential b) Depolarization c) Repolarization d) Refractory period
		90) Na+ gates opens, inside neuron become more positive than outside a) Spike potential b) Depolarization

- c) Repolarization      d) Refractory period
- 91)  $\text{Na}^+$  gates closed, inside regain original polarity (inside more negative than outside)  
 a. Spike potential      b. Depolarization  
 c. Repolarization      d. Refractory period
- 92) The period of recovery of nerve fiber is called  
 a. Spike potential      b. Depolarization  
 c. Repolarization      d. Refractory period
- 93) The types of nerve impulse are continuous impulse and  
 a. Spike potential      b. Depolarization  
 c. Repolarization      d. Refractory period
- 94) Type of impulse in which action potential flows as a wave  
 a. Spike potential      b. Depolarization  
 c. Repolarization      d. Refractory period
- 95) The kind of jumping impulse from node of Ranvier to node of  
 a. Spike potential      b. Depolarization  
 c. Repolarization      d. Refractory period
- 96) In non-myelinated neuron fibers, the type of nerve impulse is  
 a. Spike potential      b. Depolarization  
 c. Repolarization      d. Refractory period
- 97) In myelinated neuron fibers, the type of nerve impulse is  
 a. Spike potential      b. Depolarization  
 c. Repolarization      d. Refractory period
- 98) Average speed of nerve impulse is  
 a) **10-12 m/s**      b) **100-120 m/s**  
 c) **100-140 m/s**      d) **120-140 m/s**
- 99) The speed of nerve impulse is 20 time faster in myelinated neuron fiber due to  
 a. Spike potential      b. Depolarization  
 c. Repolarization      d. Refractory period
- 100) Myelinated neuron fibers require .... energy from non-myelinated  
 a) Less      b) More  
 c) Same      d) Non of these
- 101) Impulse is conducted faster in neuron that is  
 a) Thick from thin      b) Thin from thick  
 c) Same as for thick and thin      d) Non of these
- 102) Greater the thickness, lesser the resistance to nerve impulse and so impulse more  
 a) Slow      b) Fast  
 c) Same      d) Very slow
- 103) **Synapse**  
 The size of synaptic cleft (the gap separating nerve cells) in electrical synapse is: **ETEA 2023**  
 A. 0.2 nm      B. 2 nm  
 C. 20 nm      D. 200 nm
- 104) \_\_\_ is a junction between two neurons or between a motor neuron and a muscle cell  
**MDCAT 2020**  
 a) Impulse      b) synapse  
 c) axon      d) cleft
- 105) Neurotransmitter secreted at synapse outside the central nervous system is **MDCAT 2015**

- a. Dopamine  
 b. Polypeptide  
 c. Androgen  
 d. Acetylcholine

106) The main neurotransmitter for synapses is \_\_\_\_\_ which lie outside the central nervous system:

**MDCAT 2019**

- a. Choline  
 b. Acetylcholine  
 c. Acetaldehyde  
 d. Phosphatidylcholine

107) Acetylcholine and Noradrenaline are two types of \_\_\_\_\_ used in our nervous system:

**MDCAT 2019**

- a. Hormones  
 b. Channel and carrier proteins in the cell membrane of a neurone  
 c. Enzymes  
 d. Neurotransmitters

108) \_\_\_ is a junction between two neurons or between a motor neuron and a muscle cell :

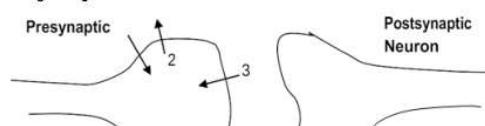
**ETEA 2020**

- a) Impulse  
 b) synapse  
 c) axon  
 d) cleft

109) The gap between neurons at a synapse is **NUMS 2022**

- a. Synaptic knob  
 b. Synaptic cleft  
 c. Synaptic delay  
 d. Synaptic vesicle

110) **The diagram shows the sequence of events occurring as an action potential arrives at a synapse.**



**The numbered arrows represent movement of substances across the membranes.**

**What are the substances moving across the membranes? **FMDC 2013****

	1	2	3	4	5
A	$\text{K}^+$	$\text{N}^{a+}$	Acetylcholine	$\text{Ca}^{2+}$	$\text{K}^+$
B	$\text{K}^+$	$\text{N}^{a+}$	$\text{K}^+$	$\text{Ca}^{2+}$	Acetylcholine
C	$\text{Na}^+$	$\text{K}^+$	$\text{Ca}^{2+}$	Acetylcholine	$\text{Na}^+$
D	$\text{Na}^+$	$\text{K}^+$	$\text{Na}^+$	Acetylcholine	$\text{Ca}^{2+}$

A  $\text{K}^+$   $\text{Na}^+$  Acetylcholine  $\text{Ca}^{2+}$   $\text{K}^+$

B  $\text{K}^+$   $\text{Na}^+$   $\text{K}^+$   $\text{Ca}^{2+}$  Acetylcholine

C  $\text{Na}^+$   $\text{K}^+$   $\text{Ca}^{2+}$  Acetylcholine  $\text{Na}^+$

D Na+ K+ Na+ Acetylcholine Ca2+	
111) In electrical synapse the synaptic cleft is of a) 0.2 nm                          b) 10 nm c) 20 nm                            d) 40 nm	a) Excitatory neurotransmitters b) Inhibitory neurotransmitters c) Both of these d) Non of these
112) In chemical synapse the synaptic cleft has gap of more than a) 0.2 nm                            b) 10 nm c) 20 nm                            d) 40 nm	126) Neurotransmitters that inhibits the postsynaptic action potential are called a) Excitatory neurotransmitters b) Inhibitory neurotransmitters c) Both of these d) Non of these
113) In electrical synapse the synaptic cleft is enough to depolarize the a) Pre synaptic membrane b) Post synaptic membrane c) Both of these d) Non of these	127) Acetylcholine is a) Excitatory neurotransmitters b) Inhibitory neurotransmitters c) Both of these d) Non of these
114) In chemical synapse the impulse formation is transmitted by means of a) Signals                            b) Neurotransmitters c) Lipids                            d) All of these	128) Serotonin is a) Excitatory neurotransmitters b) Inhibitory neurotransmitters c) Both of these d) Non of these
115) The axon terminals of pre synaptic neurons have expanded tips called a) Synaptic knob b) Synoptic bag c) Synoptic vesicles d) All of these	129) <b>Brain - Basic organization of human nervous system</b> Which part of the brain plays a key role in long term memory? <b>ETEA 2023</b> a) Thalamus b) Hippocampus c) Hypothalamus d) Amygdala
116) Synaptic knobs contain synaptic vesicles which contain .... neurotransmitter substances a) 10                                b) 100 c) 1000                            d) 10,000	130) The cerebellum is primarily concerned with <b>ETEA 2023</b> a) Thinking and reasoning b) Balancing during active movement c) Temperature regulation d) Initiation of muscular contraction
117) Synaptic vesicles are fuse with pre synaptic membrane and release a) Signals b) Neurotransmitters c) Lipids                            d) All of these	131) The activities like sleeping, walking and dreaming are controlled by which part of brain: <b>ETEA 2023</b> A. Pons B. Cerebellum C. Olfactory bulb D. Hippocampus
118) Neurotransmitters fuse with post synaptic membrane which open channels for a) Na+ ions                        b) K+ ions c) Cl- ions                        d) All of these	132) a shallow groove in cerebrum is called _____ and deep groove is called _____ <b>ETEA 2023</b> a) sulcus, fissure b) fissure, sulcus c) gyrus, fissure d) fissure, gyrus
119) Action potential produced by Na+ which brings membrane potential towards threshold level, it is called a) Excitatory postsynaptic potential (EPSP) b) Inhibitory postsynaptic potential (IPSP) c) Both of these d) Non of these	133) Which of the following hormones is released by the posterior lobe of pituitary gland? <b>ETEA 2023</b> A) Antidiuretic hormone B) Growth hormone C) Estrogen D) Prolactin
120) The hyperpolarization of post synaptic membrane by opening channel for K+ or Cl- is called a) Excitatory postsynaptic potential (EPSP) b) Inhibitory postsynaptic potential (IPSP) c) Both of these d) Non of these	134) Hunger centers are located in; <b>ETEA 2010</b> (a) Hypothalamus (b) Cerebellum (c) Medulla (d) Mid brain
121) Enzyme that catalyze the hydrolysis of acetylcholine neurotransmitter is a) Acetylcholinesterase            b) Monoamine oxidase c) Both of these d) Non of these	135) Limbic system in forebrain consists of: <b>ETEA 2010</b>
122) Enzyme that catalyze the hydrolysis of adrenalin is a) Acetylcholinesterase            b) Monoamine oxidase c) Both of these d) Non of these	
123) The chemical messengers of nervous system are a) Neurons                        b) Nephrons c) Neurotransmitters              d) All of these	
124) Acetylcholine, biogenic amine, amino acid, neuropeptides, and gases are classes of a) Neurons                        b) Nephrons c) Neurotransmitters              d) All of these	
125) Neurotransmitters that produce excitation on postsynaptic neuron receptors are called	

(a) Hypothalamus (b) Hippocampus (c) Amygdala (d) All of the above	<b>b) Mid brain</b> <b>c) Hypo campus</b> <b>d) Hind brain</b>
136) Control centre of speech is; <b>2007]</b> (a) Medulla oblongata (b) Diencephalons (c) Cerebrum (d) Cerebellum	145) Functions of the brainstem include all of the following EXCEPT: <b>NUMS 2018</b> a) Integration of righting reflexes b) Autonomic control for respiration c) Equilibrium and posture regulation d) Initiation of voluntary movements e) Fixation of the eyes
137) In humans, the temperature regulation control center is located in <b>MDCAT 2020</b> a) Kidneys b) brain c) lungs d) liver	146) Cerebellum causes...? <b>FMDC 2012</b> <b>A. Muscle contraction</b> <b>B. Blinking of eyes</b> <b>C. Dilation and constriction of pupil</b> <b>D. Knee jerking</b>
138) Part of hind brain responsible for the balance and equilibrium of body is called <b>MDCAT 2016</b> a. Medulla b. Cerebellum c. Pons d. Thalamus	147) <b>Sensation of pleasure, punishment or sexual arousal when stimulated by the parts of brain:</b> <b>FMDC 2015</b> a) Hippocampus b) Hypothalamus c) Amygdala d) Thalamus
139) Brain is protected and enclosed in <b>MDCAT 2016</b> a. Lumbar vertebrae b. Coccyx c. Vertebral column d. Caranum	148) 66) The hind brain is comprised of all of the following except: <b>ETEA 2022</b> A) Pons B) Cerebellum C) Cerebrum D) Medulla oblongata
140) Part of the Forebrain working as a coordinating centre between Nervous system and Endocrine system is: <b>MDCAT 2018</b> a. Madilla b. Amyglada c. Hippocampus d. Hypothalamus	149) When the temperature of the surrounding rises, baby responds by: <b>ETEA 2020</b> a) vasoconstriction b) vasodilation c) shivering d) raising body hairs
141) The right and left cerebral hemispheres are connected to each other by <b>MDCAT 2018</b> a. Cerebellum b. Corpus collasum c. Corpus allice d. Pons	150) In humans, the temperature regulation control center is located in: <b>ETEA 2020</b> a) Kidneys b) brain c) lungs d) liver
142) In which part of the brain cerebellum is located? <b>MDCAT 2018</b> a. Hind brain b. Mid brain c. Thalamus d. Fore brain	151) Which of the following hormones of the pituitary gland regulate the menstrual cycle? : <b>ETEA 2020</b> a) Follicle stimulating hormone and estrogen b) Luteinizing hormone and estrogen c) Follicle stimulating hormone and luteinizing hormone d) Estrogen and progesterone
143) Sensation of pleasure, punishment or sexual arousal when stimulated by the parts of brain: <b>NUMS 2017</b> a) Hippocampus b) Hypothalamus c) Amygdala d) Thalamus	152) Hypothalamus connected to pituitary gland via; : <b>ETEA 2019</b> a) nerves b) infundibulum c) blood d) no connection
144) Auditory relay center is present in <b>NUMS 2019</b> a) Left cerebral hemisphere	153) The part of the brain which controls the body temperature in human beings is called <b>NUMS 2022</b>

BOM SERIES	Page 270	BOM ACADEMY Online & Swat
a. Thalamus b. Hypothalamus c. Pones d. Cerebellum		a) Skeleton b) Meninges c) CSF d) All of these
154) Human body thermostat is: [ETEA 2015] a) Medulla b) Medulla oblongata c) Body fluid d) Hypothalamus	165)	The part of skeleton that protect brain and spinal cord are a) Cranium b) Vertebral column c) Both of these d) Non of these
155) The sense of hearing is concerned with: [ETEA 2012] (a) Cerebrum (b) Cerebellum (c) Medulla (d) Hypothalamus	166)	The meninges protects the ..... by providing cushion like matrix a) Brain b) Spinal cord c) Both of these d) Non of these
156) Rhythmicity of respiration is maintained by: [ETEA 2010] (a) The cardiac center (b) Ventillation center (c) Pons (d) Carotid sinus	167)	Which one of the following is not layer of meninges a) Dura matter b) Arachnoid matter c) Pia matter d) Non of these
157) If medulla oblongata of a person brain is damaged which of the following process will be disturbed? [ETEA 2017] a) Thinking b) Sleep c) Thirst d) Swallowing	168)	The cerebrospinal fluid (CSF) is produced from blood vessels of brain and spinal cord by a combined process of a) Diffusion b) Pinocytosis c) Active transport d) All of these
158) All the hormones released by anterior pituitary are tropic hormones excepts: [MDCAT 2017] a. TSH b. STH c. ACTH d. Gonadotrophin hormone	169)	The CSF is found a) between Pia mater and arachnoid mater b) around surface of brain and spinal cord c) in the ventricles of brain and in central hollow of spinal cord d) all of these
159) Centralized nervous system is the characteristic of the most animals from a) Flat worms to chordates b) Mosses to chordates c) Platyhelminthes to chordates d) Non of these	170)	CSF protects brain and spinal cord from a) Mechanical shocks b) Strong force c) Receiving messages d) All of these
160) Central nervous system(CNS) act as coordinating system while peripheral nervous system(PNS) providers communication among a) Receptors b) CNS c) Effectors d) All of these	171)	CSF play a role in a) metabolism of central nervous system b) homeostasis c) both of these d) non of these
161) Central nervous system consist of a) Brain b) Spinal cord c) Both of these d) Non of these	172)	Forebrain is subdivided into a) Telencephalon & diencephalon b) Olfactory bulbs & cerebrum c) Telencephalon & cerebrum d) Olfactory bulbs & diencephalon
162) Brain is involved .....in coordination than spinal cord a) More b) Less c) Same d) Non of these	173)	The telencephalon consists of a pair of a) Telencephalon & diencephalon b) Olfactory bulbs & cerebrum c) Telencephalon & cerebrum d) Olfactory bulbs & diencephalon
163) Spinal cord is the link between a) SNS and brain b) PNS and brain c) Brain and spinal cord d) SNS and PNS	174)	The olfactory bulbs are connected with the a) Sense of smell b) Intelligence c) Reasoning d) All of these
164) Brain and spinal cord is protected by	175)	The cerebrum has many folds that are related with a) Sense of smell b) Intelligence c) Reasoning d) All of these
	176)	The 1 <sup>st</sup> largest part of brain is a) Cerebellum b) cerebrum c) medulla oblongata d) hypothalamus
	177)	The 2 <sup>nd</sup> largest part of brain is a) Cerebellum b) cerebrum c) medulla oblongata d) hypothalamus
	178)	The two cerebral hemispheres are connected by a) Cells b) Tissues c) Ligaments d) Corpus callosum
	179)	Sight, smell, speech, touch, hearing, learning, memory, thinking, decision making reasoning and judgment are controlled by a) Cerebellum b) cerebrum c) medulla oblongata d) hypothalamus
	180)	The diencephalon harbours limbic system,

collectively representing parts of a) Thalamus, hypothalamus b) Amygdala c) Hippocampus      d) All of these	(a) Pia matter and dura mater <b>(b) Pia mater and arachnoid mater</b> (c) Pia mater and neural canal (d) Dura mater and arachnoid mater
181) Thalamus is a relay station between a) Body and brain b) Body and spinal cord c) Spinal cord and brain d) Body and cerebrum	195) The CNS is protected by <b>MDCAT 2017</b> a. There layers of meninges b. One layer of monix c. 4 layer of meninges d. 2 layers of meninges
182) Hormone production, regulation of temperature, hunger, thirst, sexual response, the fight or flight response and biorhythms are functions of a) Cerebellum                  b) cerebrum c) medulla oblongata        d) hypothalamus	196) White matter of spinal cord is made up of <b>MDCAT 2017</b> a. Sensory nerve fibres b. Myelinated nerve fibres c. Motor never fibres d. Mixed nerve fibres
183) Formation of long term memory and learning are function of a) Cerebellum                  b) cerebrum c) medulla oblongata        d) hippocampus	197) The spinal nerves are functionally <b>NUMS 2016</b> a. Sensory never b. Motor nerves c. Mixed nerves d. Unknown
184) The midbrain function is the coordination and relay of a) Visual information        b) Auditory information c) Both of these              d) Non of these	198) Those nerves that originate from or lead to the brain are called cerebral nerves. There are ___ pairs of cerebral nerves in human. <b>ETEA 2022</b> A) 6    B) 12    C) 14    D) 31
185) The hindbrain consist of pons, cerebellum and a) Cerebellum                  b) Cerebrum c) medulla oblongata        d) hypothalamus	199) Functionally ___ pairs of cranial nerves are sensory in nature and ___ pairs are mixed in nature and ___ are motor in nature. : <b>ETEA 2019</b> a) 3,4 and 5                  b) 4,5 and 3 c) 3,5 and 4                  d) 4,3 and 5
186) Pons act as impulse conducting bridge between a) Cerebellum                  b) cerebrum c) medulla oblongata        d) all of these	200) The central cable of nervous system is a) Brain                      b) Spinal cord c) Both of these              d) Non of these
187) Pons are concerned with rate of a) Sleep                      b) Breathing c) Wakefulness              d) All of these	201) The length of spinal cord a) 18 inch                   b) 9 inch c) 0.5 inch                 d) 1 inch
188) Cerebellum consist of a central lobe and a. one lateral lobe           b. one dorsal lobe c. two dorsal lobes        d. two lateral lobes	202) The width of spinal cord a) 18 inch                   b) 9 inch c) 0.5 inch                 d) 1 inch
189) Muscle activity and guide smooth and accurate motion are function of a) Cerebellum                  b) cerebrum c) medulla oblongata        d) hypothalamus	203) The gray matter of spinal cord consist of a) Nerve fibre                b) Dandrites c) Axons                      d) Cell bodies
190) The posterior most portion of the brain is a) Cerebellum                  b) cerebrum c) medulla oblongata        d) hypothalamus	204) The white matter of spinal cord consist of a) Nerve fibre                b) Dandrites c) Axons                      d) Cell bodies
191) Medulla oblongata is the connection between a) Body and brain b) Body and spinal cord c) Spinal cord and brain d) Non of these	205) The spinal cord is covered with thin pigment membrane called a) The pia mater b) The dura mater c) Archanoid matter        d) All of these
192) Special reflexes such as heart beat, respiratory movements, salivary secretions, swallowing, vomiting, coughing and sneezing are located in a) Cerebellum                  b) cerebrum c) medulla oblongata        d) hypothalamus	206) The neural canal is lined with thick tough membrane called a) The pia mater b) The dura mater c) Archanoid matter        d) All of these
193) <b>Spinal cord - Basic organization of human nervous system</b> CSF Is found in between: <b>[ETEA 2015]</b> a) Pia mater and dura mater b) Pia mater and arachnoid mater c) Grey mater and pia mater d) Dura mater and grey mater	207) The space between two membranes of spinal cord are filled with a) Blood                      b) Lymphatic fluid c) spinal fluid              d) All of these
194) C.S.F" is found in between. <b>[ETEA 2016]</b>	208) The lymphatic protect the spinal cord from

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Page 272

**BOM ACADEMY Online & Swat**

a) Damage c) Shocks	b) Broken d) Non of these	a) 8      b) 12      c) 5      d) 1
209) Below the neck region the reflex actions are controlled by	a) Brain      b) Spinal cord c) Both of these      d) Non of these	225) Lumbar spinal nerves in number are a) 8      b) 12      c) 5      d) 1
210) Sensory impulse from the skin and muscles are conducted by	a) Brain      b) Spinal cord c) Both of these      d) Non of these	226) Sacral spinal nerves in number are a) 8      b) 12      c) 5      d) 1
211) Peripheral nervous system consist of	a) Sensory neurons      b) Motor neurons c) Sensory and motor neurons d) Sensory, motor and mixed neurons	227) Coccygeal spinal nerves in number are a) 8      b) 12      c) 5      d) 1
212) In peripheral nervous system the neuron are distributed in the form of	a) Ganglia      b) Nerves c) Both of these      d) Non of these	228) Spinal nerves are a) 10      b) 12      c) 24      d) 62
213) The collection of the neuron cell bodies are called	a) Ganglia      b) Flux c) Plexus      d) Non of these	229) Vagus nerve extends up to the a) Neck      b) Hands c) arms      d) Abdomen
214) Ganglia interconnect with other ganglia to form complex system called	a) Plexus      b) Flux c) Both of these      d) Non of these	230) Which one of the following are Sensory cranial nerves a) 1, 2, 8      b) 3, 5, 6, 11, 12 c) 4, 7, 9, 10      d) 1,5,8
215) The bundle of neuron fibers covered by connective tissues are called	a) Spinal & cranial nerves b) Sensory nerves c) Neuron groups      d) nerves	231) Which one of the following is Sensory cranial nerves are Motors cranial nerves a) 1, 2, 8      b) 3, 5, 6, 11, 12 c) 4, 7, 9, 10      d) 1,5,8
216) With respect to function the types of the nerves are	a) 2      b) 3      c) 4      d) 5	232) Which one of the following is Sensory cranial nerves are Mixed cranial nerves a) 1, 2, 8      b) 3, 5, 6, 11, 12 c) 4, 7, 9, 10      d) 1,5,8
217) With respect to origin the types of nerves are	a) Spinal & cranial nerves b) Sensory nerves c) Motor nerves      d) Mixed nerves	233) The total number of pairs of cranial nerves a) 12      b) 24      c) 10      d) 20
218) Nerves which carry impulse from receptors to CNS	a) Spinal & cranial nerves b) Sensory nerves c) Motor nerves      d) Mixed nerves	234) The total number of cranial nerves a) 10      b) 12      c) 20      d) 24
219) Nerves which carry impulse from CNS to effectors	a) Spinal & cranial nerves b) Sensory nerves c) Motor nerves      d) Mixed nerves	235) Somatic nervous system (SNS) carry information between a) Nervous system especially hypothalamus and internal organs b) CNS and voluntary body parts c) Both of these      d) Non of these
220) Nerves which are group of sensory and motor nerves are called	a) Spinal & cranial nerves b) Sensory nerves c) Motor nerves      d) Mixed nerves	236) Somatic nervous system (SNS) controls skeletal muscles as well as a) Internal sensory organs b) External sensory organs c) All body parts      d) Non of these
221) Nerves which originate form and lead to the spinal cord are called	a) Spinal nerves      b) Cranial nerves c) cerebral nerves      d) non of these	237) The contraction of smooth and cardiac muscles are controlled by a) Sensory neurons of ANS b) Motor neurons of ANS c) Senosory neurons of SNS d) Motor neurons of SNS
222) Nerves which originate form and lead to the brain are called	a) Spinal nerves b) Cranial or cerebral nerves c) Both of these      d) Non of these	238) The actions of autonomic nervous system are largely a) Voluntary      b) Involuntary c) Both of these      d) Non of these
223) Cervical spinal nerves in number are	a) 8      b) 12      c) 5      d) 1	239) The Parasympathetic division controls autonomic functions during a) State of rest      b) State of emergency c) Both of these      d) Non of these
224) Thoracic spinal nerves in number are		240) The Sympathetic division controls autonomic functions during a) State of rest      b) State of emergency c) Both of these      d) Non of these
		241) Which of the following is not signs of parasympathetic a) Constrict pupil b) Stimulate flow of saliva

- c) Slow heartbeat      d) dilate bronchi
- 242) Which of the following is not signs of parasympathetic  
 a) Constrict bronchi      b) Stimulates peristalsis  
 c) Stimulate secretions      d) Dilate pupil
- 243) Which of the following is not signs of parasympathetic  
 a) Stimulate release of bile  
 b) Inhibit adrenaline and non-adrenaline secretion  
 c) Contract bladder      d) Inhibit peristalses
- 244) Which of the following is not signs of sympathetic  
 a) Dilate pupil      b) Inhibits flow of saliva  
 c) Fast heartbeat      d) stimulate secretions
- 245) Which of the following is not signs of sympathetic  
 a) Dilate bronchi      b) Inhibit peristalsis  
 c) Inhibit secretions      d) Stimulate heartbeat
- 246) Which of the following is not signs of sympathetic  
 a) Conversion of glycogen to glucose  
 b) Secretion of adrenaline and non-adrenaline  
 c) Inhibit bladder contraction  
 d) Constrict pupil
- 247) Sympathetic system prepare the body for violent activity in  
 a) Normal mode      b) Danger  
 c) Both of these      d) Non of these
- 248) When danger is over, the body becomes normal by  
 a) parasympathetic      b) sympathetic  
 c) both of these      d) non of these
- 249) The number of human spinal nerves is: **ETEA 2019**  
 a) 60      b) 62      c) 64      d) 66
- 250) **Structure and function of special receptors**
- Messer's capsules are the receptors for:  
**[ETEA 2013]**  
 (a) Temperature      (b) Pain  
 (c) Pressure      (d) Touch
- 251) Tactician receptors are abundant in human:  
**KMU-CAT 2021**  
 A) Sole      B) Lips  
 C) Back of the hand      D) Palm
- 252) The tongue contain many ridges and valleys called  
 a) Filiform papillae      b) fungiform papillae  
 c) foliate papillae      d) papillae
- 253) Which one of the following is cone shaped  
 a) Filiform papillae      b) fungiform papillae  
 c) foliate papillae      d) circumvallate papillae
- 254) Which one of the following is mushroom shaped  
 a) Filiform papillae      b) fungiform papillae  
 c) foliate papillae      d) circumvallate papillae
- 255) Which one of the following contain series of folds  
 a) Filiform papillae      b) fungiform papillae  
 c) foliate papillae      d) circumvallate papillae
- 256) Which one of the following contains flat mounds  
 a) Filiform papillae      b) fungiform papillae  
 c) foliate papillae      d) circumvallate papillae
- 257) Filiform papillae is present  
 a) All over the tongue      b) Sides of tongue  
 c) Tip of the tongue      d) Back of tongue
- 258) fungiform papillae is present  
 a) All over the tongue      b) Sides of tongue  
 c) Tip of the tongue      d) Back of tongue
- 259) foliate papillae is present in  
 a) All over the tongue      b) Sides of tongue  
 c) Tip of the tongue      d) Back of tongue
- 260) circumvallate papillae is present in  
 a) All over the tongue      b) Sides of tongue  
 c) Tip of the tongue      d) Back of tongue
- 261) The .....papillae are surrounded by trench  
 a) Filiform papillae      b) fungiform papillae  
 c) foliate papillae      d) circumvallate papillae
- 262) All papillae contain taste buds except  
 a) Filiform papillae      b) fungiform papillae  
 c) foliate papillae      d) circumvallate papillae
- 263) The center of the tongue is called  
 a) Taste-full      b) Taste blind  
 c) Feel taste sometimes      d) Non of these
- 264) Taste bud contain number of taste cells that have tips that protrude into the  
 a) Tongue      b) Taste cell  
 c) Taste pore      d) Non of these
- 265) The site of olfactory transduction, located in nasal cavity is  
 a) olfactory receptor proteins  
 b) olfactory receptor neurons  
 c) olfactory mucose      d) cilia
- 266) Olfactory mucosa contain olfactory receptor neuron, olfactory receptor neuron have cilia which contain  
 a) olfactory receptor neurons  
 b) olfactory receptor proteins  
 c) olfactory receptor cells  
 d) olfactory receptor tissues
- 267) The total types of olfactory receptor proteins are about  
 a) 10      b) 100      c) 1000      d) 10,000
- 268) Smell also called  
 a) Olfaction  
 b) Tactition or mechanoreception  
 c) Nociception      d) Non of these
- 269) Touch, also called  
 a) Olfaction  
 b) Tactition or mechanoreception  
 c) Nociception      d) Non of these
- 270) Pain receptors are also called  
 a) Olfaction  
 b) Tactition or mechanoreception  
 c) Nociception      d) Non of these
- 271) Hair follicle are touch receptors, so removal of hair  
 a) Increase touch sensitivity  
 b) Decrease touch sensitivity  
 c) Increase pain sensitivity  
 d) Decrease pain sensitivity
- 272) Touch receptors are found in  
 a) Tongue      b) Throat  
 c) Mucosa      d) All of these
- 273) The fingertips and tongue have as touch receptors as  
 a) 100 per cm<sup>2</sup>      b) 10 per cm<sup>2</sup>  
 c) 1000 per cm<sup>2</sup>      d) 1 per cm<sup>2</sup>

274) The back of hand have as touch receptors as a) 100 per cm <sup>2</sup> b) 10 per cm <sup>2</sup> c) 1000 per cm <sup>2</sup> d) 1 per cm <sup>2</sup>	291) a) Male cannabis plant b) Female cannabis plant c) Both of these    d) Non of these
275) Loss or impairment of the ability to feel anything touched is called a) Brain tumor      b) Headache c) Paresthesia      d) Tactile anesthesia	291) For amelioration of nausea and vomiting, stimulation of hunger in chemotherapy and AIDS patients, lower intraocular eye pressure(glaucoma) we uses a) Nicotine      b) solanaceae c) Hashish      d) Chars
276) Sensation of tingling, pricking, numbness of skin result from nerve damage are called a) Meningitis      b) Brain tumor c) Headache      d) paresthesia	292) Restlessness, feel loss control, panic, fear of impending death, depression, suicidal thoughts and psychosis are common adverse effects of a) Abuse cannabis b) Hashish      c) Nicotine d) Beta amyloid protein
277) Paresthesia is a) Temporary      b) Permanent c) Both of these      d) Non of these	293) Nicotine is an alkaloid found in tobacco leaves and plants of family a) Nicotine      b) solanaceae c) Hashish      d) Chars
278) When sensory nerve fibers are exposed to extremes, the a) Signal warmth      b) Signal cold c) Signal pain      d) Signal touch	294) Acetylcholine, norepinephrine, epinephrine, serotonin, vasopressin, dopamine, and beta-endorphin are chemical messengers released by a) Nicotine      b) solanaceae c) Hashish      d) Chars
279) The main function of pain is a) To harm us b) To warn us about danger c) To keep us unknown from danger d) All of these	295) Nicotine act as a) Nerve stimulant      b) Sedative c) Pain killer      d) All of these
280) Pain receptors which are present in skin a) Cutaneous      b) Somatic c) Visceral      d) Non of these	296) Higher dose of nicotine enhance effect of a) Serotonin      b) beta-endorphin c) both of these    d) non of these
281) Pain receptors which are present in joints and bones a) Cutaneous      b) Somatic c) Visceral      d) Non of these	297) Nicotine is sold commercially in the form of a) Urea      b) Ammonia c) Cigarette      d) Pesticides
282) Pain receptors which are present in body organs a) Cutaneous      b) Somatic c) Visceral      d) Non of these	298) An adult can be killed by nicotine by an amount of a) 30 mg      b) 60 gm c) 500 gm      d) 1 gm
283) <b>Effects of drugs on nervous System</b>  Heroin is processed from morphine which is extracted from a) Male cannabis plant      b) Female cannabis plant c) Both of these      d) Poppy plants	299) In cigarette if nicotine is 60mg then number of cigarette is a. 2    b. 4    c. 6    d. 8
284) The chemical name of morphine are a) Diamorphine      b) Diacetylmorphine c) Both of these      d) Non of these	300) Vomiting, nausea, headaches, breathing difficulty and stomach pain caused by a) Nicotine poisoning      b) Alcohol c) Food poisoning      d) All of these
285) The heroine is gives as a) Subcutaneous      b) Intramuscular c) Intravenous route      d) All of these	301) In smoker mother nicotine damages the a) Miscarriages      b) pre mature birth c) damage to the foetus    d) placenta
286) In pain such as trauma, myocardial infarction, post-surgical pain and chronic pain, we use a) Nicotine      b) Colanaceae c) Hashish      d) Heroine	302) Cigarette to mother leads to a) Miscarriages      b) pre mature birth c) damage to the foetus    d) all of these
287) Long term uses of heroine addiction disease are a) HIV      b) AIDS c) Hepatitis B and C      d) All of these	303) The drug which is absorbed quickly into blood among other drugs a) Alcohol      b) Phenol c) Panadol      d) All of these
288) Cannabis (cannabis sativa) are also known as a) Nicotine      b) solanaceae c) Hashish      d) Marijuana	304) Alcohol when used in low amount a) Improve health conditions b) Deteriorate health c) Cause cell death in body d) Cause cell to die
289) Hashish are commonly known as a) Nicotine      b) solanaceae c) Hashish      d) Chars	305) Alcohol is used to wash wounds due to its a) Antiseptic nature      b) Antioxidant nature c) Antifungal      d) Antiviral agent
290) Hashish (form of cannabis) is produced from the flowers of the	

306) People who drink too much alcohol lose control of a) Speech                          b) Movement c) Both of these    d) Non of these	Neurological disorders a) Stroke                          b) Meningitis c) Brain tumor                    d) Headache
307) Hallucinations cause by alcohol drinking (patient imagines that they are in magical world). This disease are also called a) Paranoia                        b) Meningitis c) Brain tumor                    d) Neurological disorders	317) Which one of the following is Infectious Neurological disorders a) Stroke                          b) Meningitis c) Brain tumor                    d) Headache
308) Inhalants are chemical vapours or gases that produce a) Enzyme                         b) Psychoactive c) Blood thickening cells    d) Aylase enzyme	318) Which one of the following is Structural Neurological disorders a) Stroke                          b) Meningitis c) Brain tumor                    d) Headache
309) <b>Disorders of nervous system and diagnostic tests</b>  A neurological disorder characterized by the decline in brain function is _____. Its symptoms are similar to those disease that cause dementia. <b>MDCAT 2016</b> a. Parkinson's disease b. Epilepsy c. Alzheimer's disease d. Diabetes	319) Which one of the following is Functional Neurological disorders a) Stroke                          b) Meningitis c) Brain tumor                    d) Headache
310) A discharge by brain which cause chaotic activity in motor and sensory areas is <b>MDCAT 2016</b> a. Meningitis b. Alzheimer's disease c. Epilepsy d. Parkinson's disease	320) Which one of the following is Degenerative Neurological disorders a) Stroke                          b) Meningitis c) Brain tumor                    d) Headache
311) Tetanus is infection of : <b>ETEA 2019</b> a)respiratory system b)nervous system c) circulatory system d)bones and muscles	321) Stroke is also known as a) Meningitis b) Primary brain tumor c) Secondary brain tumor d) Cerebrovascular accident(CVA)
312) A slowly progressive disease of the brain that is characterized by the impairment of memory and eventually by disturbance in reasoning, planning, language and perception is one of the following? <b>[ETEA 2016]</b> <b>(a) Alzheimer's disease</b> (b) Meningitis (c) Cerebrovascular accident (d) Malignant	322) In stroke the blood supply to brain is disrupted, causing brain cells to a) Grow fast                      b) Enlarge c) Die                              d) Reduce in size
313) In which of the following disorders the structure and function of normal spinal cord is damaged? <b>[ETEA 2017]</b> A)Arthritis                        B)Sciatica <b>C) Spondylosis</b> D) Disc slip	323) ..... occur when blood supply to brain is briefly interrupted a) Isochemic stroke              b) Hemorrhagic c) Mini-strokes                   d) All of these
314) There are evidence that high levels of aluminum can lead to the onset of <b>MDCAT 2017</b> a. Parkinson's disease b. Alzheimer's disease c. Lesch-Nyhan syndrome d. Fragile x-syndrome	324) One side numbness, trouble speaking, balance/coordination loss are symptoms of a) Meningitis                      b) Primary brain tumor c) Secondary brain tumor        d) Stroke
315) Diseases of nervous system are also called a) Stroke                         b) Meningitis c) Brain tumor                    d)Neurological disorders	325) Treatment of strokes are a) Clot bursting drugs            b) Blood thinners c) Thrombolytic therapy        d) All of these
316) Which one of the following is Vascular	326) Inflammation of membrane of brain and spinal cord a) Meningitis                      b) Primary brain tumor c) Secondary brain tumor        d) Non of these
	327) Meningitis can caused by a) infection with drugs b) virus c) virus, bacteria, microorganism d) all of these
	328) Head and neck arched backward, agitation, rapid breathing, sensitivity to light, stiff neck, unusual posture are symptoms of a) Meningitis b) Primary brain tumor c) Secondary brain tumor d) Non of these
	329) Antibiotics and corticosteroids are used as general treatment for a) Meningitis                      b) Primary brain tumor c) Secondary brain tumor

330) A brain tumor is	d) Non of these a) Mass of abnormal cells b) Growth of abnormal cells c) Uncontrolled cell division d) All of these	a) It lacks pain receptors b) No one can touch it c) It lacks blood flow d) It lacks neurons
331) A brain tumor is always	a) Benign                    b) Malignant c) Both of these d) Non of these	338) Muscle tension in the face, neck and shoulders may cause a) Meningitis                b) Primary brain tumor c) Secondary brain tumor d) tension headache
332) A tumor that originate in the brain are called	a) Primary brain tumor b) Secondary brain tumor c) metastatic brain tumor d) non of these	339) Alzheimer's disease is impairment of memory and disturbance in a) Reasoning                b) Planning c) Language and perception d) All of these
333) A tumor that originate in the parts of brain and spread to the brain are Called	a) Secondary brain tumor b) metastatic brain tumor c) both of these d) non of these	340) Alzheimer's disease increase substantially after the age of a) 65    b) 70    c) 75    d) 80s
334) Treatment and Sign and symptoms of brain tumor depends upon	a) Tumor size                b) Tumor location c) Tumor growth rate        d) All of these	341) Alzheimer's disease may effect around 50% of persons over the age of a) 65    b) 70    c) 75    d) 80
335) ..... are general treatment for brain tumors.	a) Surgery                    b) Radiotherapy c) Chemotherapy              d) All of these	342) Alzheimer's disease result from increase of proteins called a) Beta amyloid protein b) Alpha amyloid protein c) Beta amyloid lipase        d) Non of these
336) Headache or cephalgia is pain anywhere in the region of	a) Head                      b) Neck c) Both of these d) Non of these	
337) The brain tissue is not sensitive to pain because		

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# CHAPTER 20

## REPRODUCTION

### Introduction to reproduction

- 1) All animals begin life as a \_\_\_\_\_. [ETEA 2023]
- Multicellular fertilized egg
  - Single fertilized egg
  - Hollow blastula
  - Gastrula
- 2) Only one ovary is functional at a time in [NUMS 2015]
- Human
  - Eagle
  - Pigeon
  - Pigeon and human
- 3) Vitrofertilization takes place in zoo: [ETEA 2007]
- River
  - Sea
  - Land
  - Laboratory hardware
- 4) Man reproduction is; [ETEA 2007]
- Mono estrous
  - Diestrous
  - Triestrous
  - Poly estrous
- 5) The most advanced mammals are
- Human being
  - Bat
  - Whale
  - Monkey
- 6) **Male reproductive system**  
The testes are male gonads which are situated outside the abdomen within a skin pouch called: [ETEA 2023]
- Vas deferens
  - Epididymis:
  - Scrotum
  - Vasa efferentia
- 7) 39) The terminal portion of the male reproductive system is a: [ETEA 2022]
- Vasa efferentia
  - Vasa deferens
  - Urethra
  - Epididymis
- 8) The bulbourethral glands produce: [ETEA 2019]
- Acidic fluid
  - alkaline fluid
  - semen
  - mucus
- 9) The enlarged lining epithelium cells connected with groups of developing spermatozoa in testes is: [ETEA 2014]
- (a) Somatic cells  
 (b) Sertoli cells  
 (c) Stem cells  
 (d) Totipotent cells
- 10) In human testis, which structure is responsible for carrying sperm from inside the testicle? [MDCAT 2015]
- Seminiferous tubules
  - Urinogenital duct
  - Seminal vesicles
  - Vasa efferentia
- 11) During spermatogenesis, the \_\_\_\_\_, which are haploid cells eventually mature into spermatozoa/mature sperms? [MDCAT 2019]
- Secondary spermatocytes
  - Primary spermatocytes
  - Spermatogonia
  - Spermatids
- 12) Which of the following is correct in humans? [NUMS 2015]
- Both sperm and egg contain Yolk
  - All genetic information comes from sperm
  - Sperm contains little cytoplasm
  - Fertilization commonly occurs in uterus
- 13) Sperms of which animal can remain viable for years within the female genital tract? [ETEA 2010, 2009]
- Bat
  - Whale
  - Camel
  - Giraffe
- 14) When the sperm count is high, inhibin hormone release increases which: [ETEA 2017]
- Inhibits anterior pituitary release follicle stimulating g hormone
  - Increase anterior
  - pituitary release of follicle stimulating hormone
  - Inhibit release of luteinizing hormone
  - Increase release of luteinizing hormone
- 15) Which of the following directly develops into sperms: [MDCAT 2017]
- Primary spermatocytes
  - Spermatids
  - Secondary spermatocytes
  - Spermatogonia
- 16) hormone inhibin is produced by [ETEA 2016]
- hypothalamus
  - pituitary gland
  - prostate
  - sertoli cells
- 17) Testes are male gonads which are outside body

BOM SERIES	Page 278	BOM ACADEMY Online & Swat
and covered by a) Thin layer b) Double cell layer c) Scrotum d) Non of these		a) Epididymus b) Ejaculatory duct c) Bladder d) urethra
18) Each testes are divided into lobules which are about a) 200-250 b) 250-300 c) 300-350 d) 200-300	33)	The alkaline fluid neutralize the acidity of urine in a) Epididymus b) Ejaculatory duct c) Bladder d) Urethra
19) Each lobule contains .... tightly coiled seminiferous tubule a) 1-3 b) 1-4 c) 1-5 d) 1-6	34)	White, sticky mixture of sperm and secretion of accessory glands is called a) Vasiculase b) Hyaluronidase c) Prostaglandin d) Semen
20) Testosterone is produced by a) Leyden cells b) Seminiferous tubule c) Urethra d) Non of these	35)	The viscosity of mucus guarding the entry(cervix) is decrease by a) Vasiculase b) Hyaluronidase c) Prostaglandin d) Semen
21) About ..... vasa efferentia collect sperm from inside the testes and transfer them to the epididymis a) 5-10 b) 10-20 c) 20-30 d) 10-30	36)	Which one of the following stimulate reverse peristalsis in the Uterus, facilitating sperm movement through the females reproductive tract a) Vasiculase b) Hyaluronidase c) Prostaglandin d) Semen
22) The length of uncoiled epididymis is about a) 6 m or 20 feet b) 12 m or 40 feet c) 10 m d) 8 m	37)	<b>Spermatogenesis</b> Which among the following is not the role of sertoli cells? ETEA 2023 a) Protects sperms b) Provides liquid medium to sperms c) Provides nourishment to sperms d) Secrete testosterone
23) The function of epididymis is a) transport and storage of sperms, b) here sperms are stored temporary, c) sperms get nourished and gain ability to swim d) all of these	38)	FSH (Follicle Stimulating Hormone) stimulates spermatogenesis by stimulating complete the development of sperms. Cells to ETEA 2023 A) Leydig B) Inhibin C) Sertoli D) TSH
24) Vas deferens start from epididymis move back into pelvic cavity and then join with the duct of the seminal vesicle to form the short a) Duct b) Ejaculatory duct c) Urethra d) Non of these	39)	The cells in our body are all genetically identical apart from the: ETEA 2020 a) Somatic cells b) Reproductive cells c) Muscle fibers d) White blood cells
25) Each ejaculatory duct enters the prostate: there it empties into the a) Duct b) Ejaculatory duct c) Urethra d) Non of these	40)	Which one of the following cell eventually converts to mature sperm? MDCAT 2018 a. Spermatids b. Secondary spermatocyte c. Spermatogonia d. Primary spermatocytes
26) The terminal portion of the male duct system is a) Duct b) Ejaculatory duct c) Urethra d) Non of these	41)	The process of spermatogenesis (formation of sperm) takes place in which part of male reproductive system? ETEA 2022 A) Urethra B) Epididymis C) Oviduct D) Seminiferous tubules
27) Urethra open to the outside through external urethral orifice and conveys a) Urine b) Sperm c) Both of these d) Non of these	42)	In the male reproductive system, the hormone involved in the regulation of the rate of spermatogenesis is called NUMS 2022 a. Luteinizing hormone b. Follicle-stimulating hormone c. Testosterone d. Inhibin
28) The seminal vesicles provide an alkaline fluid containing fructose sugar, ascorbic acid and a coagulating enzyme called a) Vasiculase b) Hyaluronidase c) Prostaglandin d) semen	43)	The process of sperm formation in males are called a) Spermatogenesis b) Spermiogenesis c) Both of these d) Non of these
29) The optimum temperature for sperm development is about a) 35°C b) 37°C c) 98°C d) Non of these	44)	Spermatogenesis takes place in
30) The prostate encircle the urethra just below the a) Epididymus b) Ejaculatory duct c) Bladder d) Belly		
31) Prostate secrete milky, slightly acidic fluid that contains citrate as nutrient source and several enzymes especially a) Vasiculase b) Hyaluronidase c) Prostaglandin d) semen		
32) Cowpers' gland secretes mucus and an alkaline fluid into the		

BOM SERIES	Page 279	BOM ACADEMY Online & Swat
a) Epididymus c) Seminiferous tubules d) Basal lamina	b) Ejaculatory duct	d) non of these
45) Spermatogonia are the outer most cells which make the epithelial wall of the	a) Epididymus c) Seminiferous tubules d) Basal lamina	57) Sperm is also called a) Spermatozoon                                  b) animal seed c) both of these                                      d) non of these
46) Spermatogonia cells are just below the	a) Epididymus c) Seminiferous tubules d) Basal lamina	58) Adhering to the top of the head is a) Acrosome    b) Golgi apparatus c) Both of these                                        d) Non of these
47) The spermatogonia continuously divide by the mitosis which results in two distinctive daughter cells-types	a) A and B    b) 1 and 2 c) A and C    d) Non of these	59) The lysosome-like acrosome are produced by the a) Acrosome    b) Golgi apparatus c) Both of these                                        d) Non of these
48) The type B cell get pushed toward the lumen, where it become primary spermatocyte destined to produce	a) 1 sperm    b) 2 sperms c) 3 sperms    d) 4 sperms	60) Acrosome contain an enzyme that enables the sperm to penetrate and enter an egg is called a) Vasiculase    b) Hyaluronidase c) Prostaglandin                                        d) Semen
49) Each primary spermatocyte undergoes....., forming two smaller haploid cells called Secondary spermatocytes	a) meiosis I    b) meiosis II c) mitosis    d) non of these	61) The process of the spermatogenesis starts at the age of ... years a) 10    b) 14    c) 18    d) 16
50) The secondary spermatocytes goes rapidly on ....., and produce spermatids	a) meiosis I    b) meiosis II c) mitosis    d) non of these	62) Every day, a healthy adult male makes about a) 40 million sperms                                    b) 400 million sperms c) 20 billion sperms                                    d) 400 billion sperms
51) Each spermatid is	a) round, motile and Haploid cell b) round, nonmotile and diploid cell c) round, nonmotile and Haploid cell d) non of these	63) ..... stimulates spermatogenesis by stimulating sertoli cells to complete the development of sperm from spermatids a) FSH    b) LH c) GnRH    d) All of these
52) Process in which spermatids change into motile and active sperms	a) Spermatogenesis                                    b) Sermiogenesis c) Both of these                                        d) Non of these	64) ..... stimulates lyedig cells to release testosterone a) FSH    b) LH c) GnRH    d) All of these
53) During spermatogenesis a spermatids	a) elongate b) sheds its excess cytoplasm c) forms a tail    d) all of these	65) Process of spermatogenesis is controlled by hormonal secretion from a) Hypothalamus                                        b) Pituitary gland c) LH    d) All of these
54) Head of the sperm contain	a) nucleus containing haploid chromosomes b) pair of centrioles c) mitochondria arranged spirally around the axial filament d) non of these	66) Cells that are found adjacent to the seminiferous tubules in testes a) Epididymus    b) Ejaculatory duct c) Bladder    d) Lyedig cells
55) Neck of the sperm contains	a) nucleus containing haploid chromosomes b) pair of centrioles c) mitochondria arranged spirally around the axial filament d) non of these	67) Testosterone cause the growth and development of germinal epithelium to a) 1 sperm    b) 2 sperms c) 3 sperms    d) 4 sperms
56) Mid piece of the mid piece contain	a) nucleus containing haploid chromosomes b) pair of centrioles c) mitochondria arranged spirally around the axial filament	68) Hormone that is produced by the sertoli cells and serves to control the spermatogenesis at a) Higher rate    b) Normal rate c) Slow rate    d) Non of there
		69) When the sperm count is high, inhibin a) Release    b) Does not release c) Both of these    d) Non of these
		70) When sperm count falls, inhibin secretion secretion a) Increase steeply                                    b) Declines steeply c) Both of these    d) Non og these
		71) Inhibin inhibits anterior pituitary releases of FSH and hypothalmic release of a) LH    b) GnRH c) Both of these    d) Non of these
		72) <b>Female reproductive system</b> Fallopian tube is also known as: ETEA 2023 A. Oviduct    B. Ovaries C. Uterus    D. Cervix
		73) Cervix is the part of NUMS 2022

BOM SERIES		Page 280	BOM ACADEMY Online & Swat
	a. Vagina c. Uterus	b. Oviduct d. Ovary	
74)	_____ is the structure in female reproductive system in which fertilization takes place.	MDCAT 2017	89) The oocyte is carried towards the uterus by a) muscular peristalsis b) beating of the cilia c) both of these d) non of these
	a.Ovaries c. Cervix	b. Uterus d. Oviduct	90) Non-ciliated cells produce secretion that keeps the oocyte and the sperm if present a) moist b) Nourished c) Both of these d) Non of these
75)	A single ovum of human being contains:	[ETEA 2012]	91) The uterus is located in the pelvis a) anterior to the rectum and posterior to the bladder b) posterior to the rectum and posterior to the bladder c) anterior to the rectum and anterior to the bladder d) non of these
	(a) X — chromosomes (b)XX — chromosomes (c) YY— chromosomes (d)XY — chromosomes		92) The size and shape of uterus is about of a) Almond shapeb) Inverted pear c) Both of these d) Non of these
76)	The female body prepare to nurture a developing embryo for a period of approximately ..... months		93) The uterus is hollow, thick-walled, muscular organ that function to a) Receive ovum b) retain ovum c) nourished the fertilized ovum d) all of these
	a) 6 b) 9 c) 12 d) 20		94) Outermost <b>thin</b> covering layer of uterus A) perimetrium b) myometrium C) endometrium d) non of these
77)	Ovaries are female gonads which produce		95) Middle <b>thick</b> muscular layer of smooth muscles of uterus A) perimetrium b) myometrium C) endometrium d) non of these
	a) Ove b) Hormone c) Both of these d) Non of these		96) Inner spongy lining of uterine cavity A) perimetrium b) myometrium C) endometrium d) non of these
78)	The paired ovaries plank the uterus on each side and each ovary is held in place within the peritoneal cavity by		97) To the layer which contract rhythmically to expel the baby out of the mother body is a) Perimetrium b) Myometrium c) Endometrium d) Non of these
	a) Muscles b) Several ligaments c) Both of these d) Non of these		98) If fertilization occur, the young embryo takes root into the a) Perimetrium b) Myometrium c) Endometrium d) Non of these
79)	Shape of ovary is like		99) The narrow entrance to the uterus a) Vagina b) Cervix c) Uretus d) Non of these
	a) Apricot shape b) Date shape c) Almond shaped) Non of these		100) Cervix is normally blocked by a plug of the a) Ova b) Mucin c) Mucus d) Sperm
80)	Length of ovary is		101) The vagina is thin-walled ..... long tube a) 3 - 5 cm b) 2 - 3 cm c) 10 cm d) 8-10 cm
	a) 3 - 5 cm b) 2 - 3 cm c) 10 cm d) Non of these		102) The vagina provides a passageway for delivery of an infant and for menstrual flow, so it is also called a) Child canal b) Death canal c) Last canal d) Birth canal
81)	Width of ovary is		103) In vagina, the urethra is embedded in it's a) 3 - 5 cm b) 2 - 3 cm c) 10 cm d) Non of these
	a) 3 - 5 cm b) 2 - 3 cm c) 10 cm d) Non of these		104) <b>Oogenesis</b> FSH (Follicle Stimulating Hormone) stimulates spermatogenesis by stimulating complete the
82)	Within the ovary are sac like structures called		
	a) Ovarian follicles b) Oocyte c) Ovulation d) Corpus luteum		
83)	Each ovarian follicle consist of an immature egg called an		
	a) Ovarian follicles b) Oocyte c) Ovulation d) Corpus luteum		
84)	Each month in adult woman, one of the ripening follicle eject its oocyte from the ovary, this process is called		
	a) Ovarian follicles b) Oocyte c) Ovulation d) Corpus luteum		
85)	After ovulation, the ruptured follicle is transformed into a glandular structures called the		
	a) Ovarian follicles b) Oocyte c) Ovulation d) Corpus luteum		
86)	Fallopian tubes receive the ovulated oocyte and is the site when		
	a) Fertilization occur b) Implantation occur c) Both of these d) Non of these		
87)	The length of the oviduct is about		
	a) 3 - 5 cm b) 2 - 3 cm c) 10 cm d) Non of these		
88)	The uterine tubes contain sheets of smooth muscles and contains		
	a) Ciliated cells b) Non-ciliated cells c) Both of these d) Non of these		

	development of sperms. Cells to <b>ETEA 2023</b> A) Leydig B) Inhibin C) Sertoli D) TSH	during oogenesis ensures that a fertilized egg has ample nutrients for its .....to the uterus a) 6 - 7 days                      b) 5-9 days c) 9-10 days                      d) Non of these
105)	Which one of the following represents the changes that occur in the ovary and the uterus approximately every 28 days involving evolution with the breakdown and loss of the lining of the uterus. : <b>ETEA 2020</b> a) Ovulation b) menstrual cycle c) uterine cycle d) embryo formation	115) <b>Menstrual cycle</b> The fertile time in the menstrual cycle From: <b>KMU-CAT 2021</b> A) 6-8 days                      B) 9-15 days C) 16-22 days                      D) 22-28 days
106)	2 <sup>nd</sup> meiotic division in oocyte is completed; : <b>ETEA 2019</b> a) when oocyte is fertilized by sperm b) when ovum is discharged from ovary c) just before fertilization d) before the onset of menstrurization	116) The reproductive cycle in humans and other primates are called a) Menstrual phase                      b) Menstrual cycle c) Menstrual way                      d) Non of these
107)	The follicle stimulating hormone secreted by the pituitary glands stimulates the growth of; <b>[2005]</b> (a) Uterus                      (b) Ovaries (c) Graffian follicles                      (d) Urinarybladder	117) The first menstrual cycle starts at a) Childhood                      b) Puberty c) Age of 30                      d) Non of these
108)	FSH stimulates the production of oestrogen hormone which has two targets _____ and _____. <b>MDCAT 2017</b> a. Uterus, posterior pituitary b. Ovaries, uterus c. Uterus, anterior pituitary d. Ovaries, hypothalamus	118) The changes in ovarian cycle are controlled by the a) Gonadotrophin                      b) FSH c) LH                              d) Non of these
109)	Inside ovary, primary oocyte divides through first meiotic division forming two haploids cells, secondary oocyte and <b>MDCAT 2019</b> a. Polar body                      b. Oogonium c. Follicle cell                      d. Ovum	119) The uterus sheds all but the deepest part of it is endometrium. It occurs in a) Menstrual phase b) Proliferative/preovulatory c) Secretory/ potovulatory phase d) Non of these
110)	<b>Which of the following is the stage of meiosis during which pairs of homologous chromosomes align at the center of the cell? FMDC 2013</b> A) Anaphase II                      B) Metaphase I C) Prophase II                      D) Anaphase I E) Prophase I	120) The thick hormone-dependent functional layer of the endometrium detaches from the uterine wall, a process that is accompanied by bleeding for 3-5 days, it occurs in a) Menstrual phase b) Proliferative/preovulatory c) Secretory/ potovulatory phase d) Non of these
111)	The process of egg formation if females is called a) Spermatogenesis                      b) Organogenesis c) Oogenesis                              d) Non o these	121) At the beginning of this stage, the ovarian hormone are at their <b>lowest normal level</b> and gonadotropins are beginning to rise, then FSH levels begin <b>to rise</b> . a) Menstrual phase b) Proliferative/preovulatory c) Secretory/ potovulatory phase d) Non of these
112)	The required for the completion of oogenesis is a) Hours                              b) Days c) Months                              d) Years	122) Under the influence of rising blood levels of estrogen, the basal layer of endometrium generates a new functional layer. a) Menstrual phase b) Proliferative/preovulatory c) Secretory/ potovulatory phase d) Non of these
113)	Gradually, oogonai are transformed into primary oocytes and become surrounded by a single layer of follicle cells The primary oocyte divide the first mitotic division, but become " <b>stalled</b> " <b>late in</b> .....and do not complete it a) prophase II                              b) prophase I c) menopause                              d) telpause	123) The endometrium again become velvety, thick and well vascularized. a) Menstrual phase b) Proliferative/preovulatory c) Secretory/ potovulatory phase d) Non of these
114)	The unequal cytoplasmic divisions that occur	124) Normally, cervical mucus is thick and sticky but rising estrogen level cause it to thin and become crystalline, forming channels that facilitates the passage of <b>sperm into the uterus</b> . a) Menstrual phase

BOM SERIES		Page 282	BOM ACADEMY Online & Swat
b) Proliferative/preovulatory	a. Spirochete		
c) Secretory/ potovulatory phase	b. Nostoc		
d) Non of these	c. Water blooms		
125) Ovulation which takes place <b>less than five minutes</b> , occurs in the ovary at the end of the proliferative stage ( <b>day 14</b> ) in response to the sudden release of LH from the anterior pituitary.	d. Cyanobacteria		
a) Menstrual phase	135) AIDS is caused by	<b>MDCAT 2016</b>	
b) Proliferative/preovulatory	a. Bacteria		
c) Secretory/ potovulatory phase	b. Virus		
d) Non of these	c. Fungi		
126) In which phase endometrium prepares for the implantation of an embryo.	d. Alga		
a) Menstrual phase	136) Which of the following diseases Is sexually transmitted?:	<b>ETEA 2020</b>	
b) Proliferative/preovulatory	a) Tuberculosis		
c) Secretory/ potovulatory phase	b) AIDS		
d) Non of these	c) dengue fever		
127) Rising level of progesterone from the corpus luteum act on the estrogen-primed endometrium, causing the arteries to elaborate and converting the functional layer to a <b>glandular secretory layer</b> . These occurs in	d) Cholera		
a) Menstrual phase	137) Which of the following diseases Is sexually transmitted?	<b>MDCAT 2020</b>	
b) Proliferative/preovulatory	a) Tuberculosis		
c) Secretory/ potovulatory phase	b) AIDS		
d) Non of these	c) dengue fever		
128) Time span during which woman extends only from puberty to menopause, about at the age of	d) Cholera		
a) 40      b) 50      c) 60      d) 70	138) Which one is not an STD??	<b>FMDC 2012</b>	
129) The .....of all ovulations, more than one oocyte is ovulated	a. Gonorhea		
a) 1-2%      b) 2-4%	b. syphilis		
c) 4-8 %      d) 10-20%	c. AIDS		
130) Identical twins are the result from the fertilization of single oocyte by	<b>d. meningitis</b>		
a) Single sperm    b) Double sperm	e. herpes simplex		
c) More than two sperms	139) World-wide, mortality rate per annum due to AIDS is more than:	<b>[ETEA 2016]</b>	
d) Non of these	(a) One million		
131) <b>Disorders</b> Gonorrhea is a sex disease caused by: <b>[ETEA 2006]</b>	<b>(b) Two-million</b>		
(a) Bacteria	(c) Three million		
(b) Virus	(d) five-million		
(c) Parasite	140) Syphilis is a sexually transmitted disease and can also damage	<b>MDCAT 2017</b>	
(d) None of the above	a. Hair		
132) Syphilis, sexually transmitted disease in caused by <b>MDCAT 2015</b>	b. Heart		
a. HIV	c. P.N.S		
b. Treponema pallidum	d. Birth canal		
c. Neisseria gonorrhoeae	141) Less common cause of fertility problems in woman include:		
d. Type '2' virus	a) Blocked fallopian tube due to pelvic inflammatory diseases, endometriosis.		
133) Transmission of Neisseria gonorrhoea is best described by which one of the following? <b>MDCAT 2016</b>	b) Physical uterus with the uterus.		
a. Oro-feal route	c) Uterine fibroids, which are non-cancerous clumps of tissue and muscle on the walls of the uterus.		
b. Unsafe sex	d) All of these		
c. Vector brone	142) Infertility in men is most often caused by a problem called		
d. Droplet infection	a) Drugs	<b>b) Cigarette</b>	
134) Syphilis is caused by <b>MDCAT 2016</b>	c) Alcohol	<b>d) varicocele</b>	
a) Heat	143) Varicocele happens when veins of man's testes are too large this		
b) Light	a) Cool the testes	<b>b) Heats the testes</b>	
c) Both of these	c) Both of these	<b>d) Non of these</b>	
d) Non of these	144) The shape and number of sperms can be affected by the		
	a) Heat		
	b) Light		

c) Cigarette	d) alcohol	c) 1st 9 week of pregnancy
145) Movement of the sperm is another cause of the	a) Infertility      b) Waste of sperm	d) 1st 7 week of pregnancy
c) Non marriage	d) Non of these	159) The termination of pregnancy by .... is called
146) In vitro fertilization (IVF) means fertilization	a) Inside the body      b) Outside the body	abortion a) the removal of a foetus
c) Both of these	d) Non of these	b) expulsion of a foetus
147) Doctors treat IVF woman with hormones that	a) One egg      b) Two eggs	c) embryo from the uterus before it is viable
causes the ovaries to produce	c) Multiple eggs      d) No egg	d) all of these
148) Of IVF one mature egg are removed and putted in	a) Fertilization      b) Nutrients source	160) An abortion can occur spontaneously, in this case it
dish for	c) Both of these      d) Non of these	is called a) Miscarriage      b) Preterm deliveries
149) After 3- 5 days of outside the body, healthy embryo	a) Women's uterus      b) Women's vagina	c) Both of these      d) Non of these
are implanted to	c) Women's fallopian tube	161) The term ..... most commonly refers to the
d) Non of these	d) Non of these	induced abortion of human pregnancy a) Miscarriage      b) Preterm deliveries
150) A continuous loss of foetus before the 20 <sup>th</sup> week of	a) Miscarriage      b) Preterm deliveries	c) Abortion      d) Non of these
pregnancy called	c) Both of these      d) Non of these	162) <b>Sexually Transmitted Diseases</b>
151) Pregnancy loss after 20 <sup>th</sup> week is called	a) Miscarriage      b) Preterm deliveries	The causing agent of a gonorrhea is
c) Both of these	d) Non of these	a) Neisseria gonorrhoeae      b) E.Coli
152) A miscarriage may be also called a	a) Spontaneous abortion	c) Both of these      d) Non of these
b) Preterm deliveries	c) Both of these      d) Non of these	163) The most common symptom of gonorrhea in males is
153) Miscarriage are not related to the	a) Mother's genes      b) Father's genes	a) Pain      b) Redness
c) Both of these	d) Non of these	c) Urethritis      d) Vericocele
154) The spontaneous abortion is used for occurring	a) Natural      b) Artificial	164) In gonorrhea, Urtethritis accompanied by
events which are	c) Both of these      d) Non of these	a) painful urination
a) Drug and alcohol abuse	a) pelvic inflammatory disease	
b) Exposure to environmental toxins and hormone	b) Discharge of pus from penis	
problems	c) both of these      d) non of these	
c) Infection, obesity and physical problems with	165) In females symptoms of gonorrhea are ranging	
the mother reproductive organs	a) 10%      b) 20%	
d) Problem with the body's immune response	c) 40%      d) 70%	
e) Serious body-wide diseases in the mother such	166) The 80 % symptoms of gonorrhea in females are:	
as uncontrolled diabetes and smoking.	a) Abdominal discomfort, vaginal discharge and	
f) Non of these	b) abnormal uterine bleeding.	
156) The quantity of fertilized egg which die and lost	c) Urethral symptoms to same those seen in males.	
spontaneously usually before woman know that	d) All of these	
she is pregnant is	167) In woman, Gonorrhea causes	
a) Half or 50 %	a) pelvic inflammatory disease	
b) 15 - 20 %	b) sterility	
c) 70%	c) both of these      d) non of these	
157) Woman who know they are pregnant, the	168) Gonorrhea are treated by	
miscarriage are about	a) pencillin      b) tetracycline	
a) Half or 50 %	c) antibiotics      d) all of these	
b) 15 - 20 %	169) Syphilis is caused by	
c) 70%	a) <i>Neisseria gonorrhoeae</i>	
d) 5%	b) <i>E.Coli</i>	
158) Most miscarriage occurs during	c) <i>Treponema pallidum</i>	
a) 1st 2 week of pregnancy	d) Non of these	
b) 1st 3 week of pregnancy	170) Syphilis can transmitted through	
	a) Air      b) Water	
	c) Sexually      d) Non of these	
	171) Fetuses infected with syphilis are usually	
	a) Stillborn      b) Die shortly after death	
	c) Both of these      d) Non of these	
	172) The bacteria of syphilis can easily penetrates	
	a) intact mucosa      b) abraded skin	
	c) both of these      d) non of these	
	173) The incubation period of syphilis are	
	a) 2 - 4 weeks      b) 3-12 weeks	

c) 3-6 weeks	d) 12-20 weeks	c) antibiotics	d) all of these
174) After the incubation period the symptoms of syphilis are, a red painless .....called chancre (shang'ker) appear at the site of bacterial invasion a) primary lesion      b) secondary lesion c) tertiary lesion      d) non of these	184) The first cause of AIDS was discovered in san Francisco and New Word about a) 5 years ago      b) 10 years ago c) 20 years ago      d) 25 years ago		
175) In syphilis the symptoms in male appear on penis while in female it goes undetected within a) the vagina      b) on the cervix c) both of these      d) non of these	185) The number of people estimated with HIV and AIDS are about a) 42 million      b) 3 million c) 1 million      d) 30 million		
176) If syphilis is untreated, its secondary signs appear several a) Days later      b) Weeks later c) Month later      d) Non of these	186) The quantity of people which die every year are a) 42 million      b) 3 million c) 1 million      d) 30 million		
177) A pink skin rash all over the body is one of the ..... symptom of syphilis a) First      b) Second c) Third      d) Non of these	187) HIV destroys a type of defense cell in the body called a) B cells      b) CD4 helper lymphocytes c) Both of these      d) Non of these		
178) The common symptoms of Syphilis are a) Fever      b) Joint pain c) Both of these      d) Non of these	188) Still there is no cure for a) Fever      b) Joint pain c) HIV and AIDS      d) Non of these		
179) In Syphilis symptoms like fever and joint pain disappears after a) 2 - 3 weeks      b) 3-12 weeks c) 3-6 weeks      d) 12-20 weeks	189) HIV can be transmitted from person to person through a) blood, Semen      b) vaginal fluid c) breast milk      d) all of these		
180) The Syphilis enters to latent period and can only be detected by a) Signs      b) Symptoms c) Blood test      d) Urine test	190) Syphilis, genital herpes, gonorrhea or bacterial vaginosis are at greater risk for developing a) Fever      b) Joint pain c) HIV and AIDS      d) Non of these		
181) Latent stage of Syphilis may last a person's life or bacteria may by or Killed by immune system or it may be followed by signs of a) primary syphilis      b) secondary syphilis c) tertiary syphilis      d) non of these	191) If mother is infected by HIV, her child can get the virus a) before the birth      b) after birth through c) both of these      d) non of these		
182) Tertiary syphilis is characterized by a) Gummas b) destructive lesions of the CNS, blood vessels c) bones and skin      d) all of these	192) Needles used in tattoo art can be an agent for a) Fever      b) Joint pain c) HIV and AIDS      d) Non of these		
183) Treatment for all stages of syphilis is a) pencillin      b) tetracycline			



## CHAPTER 21

# DEVELOPMENT & AGING

### 1) Pasts Papers.

In chick development gives rise to:

[ETEA 2013]

- (a) Ectoderm & Endoderm
- (b) Ectoderm & Mesoderm
- (c) Mesoderm & Endoderm
- (d) Mesoderm only

2) Muscles develop from: [ETEA 2013]

- (a) Ectoderm      (b) Mesoderm
- (c) Endoderm      (d) all of the above

3) The organisms developed with two heads and one trunk is called; [ETEA 2011]

- (a) Identical twins      (b) Siamese twins

- (c) dizygotic twins      (d) fraternal twins
- 4) All of the following are derived from mesoderm except: **[ETEA 2011]**  
 (a) Muscles      (b) Liver  
 (c) Gonads      (d) Blood vessels
- 5) During the development of chick peripheral part of the blastoderm lies unseparated from the yolk and froms: **[ETEA 2010]**  
 (a) Area pellucida      (b) Area opaca  
 (c) Notochord      (d) Primitive streak
- 6) Which germinal layer develops in digestive system? **[ETEA 2010]**  
 (a) Ectoderm      (b) Mesoderm  
 (c) Epidermis      (d) Endoderm
- 7) Cleavage differs from mitosis in that:  
**[ETEA 2009]**  
 (a) It occurs only in zygote  
 (b) It occurs in all body cells  
 (c) It results into haploid cells only  
 (d) It results into identical cells
- 8) The developing embryo is protected against the physical trauma by: **[ETEA 2008]**  
 (a) Pericardial fluid      (b) Allontoic fluid  
 (c) Amniotic fluid      (d) All of the above
- 9) Two individuals formed when two eggs are fertilized at the same time results in twins that are genetically different are: **[ETEA 2008]**  
 (a) Identical twins      (b) Siamese twins  
 (c) Fraternal twins      (d) Double twins
- 10) The mesodermal cell which give rise to urinary system in frog are called; **[2005]**  
 (a) Pincer cells      (b) Blastomers  
 (c) Nephrotome      (d) Parietal
- 11) The transitory stagein between cleavage and gastrulation is; **[2005]**  
 (a) Organogeneses      (b) Blastula  
 (c) Gastrula      (d) Development
- 12) Implantation of zygote takes place in the: **[ETEA 2015-ETEA 2017]**  
 a) 2<sup>nd</sup> week      b) 3<sup>rd</sup> week  
 c) 4<sup>th</sup> week      d) 5<sup>th</sup> week
- 13) Mature ovum in human beings is surrounded by: **[ETEA 2015]**  
 a) Plasma membrane  
 b) Vitelline membrane  
 c) Corona radiate  
 d) All of the above
- 14) acetabularia meditteranea is **[ETEA 2017]**  
 a) fungus      b) an algae  
 c) c. a protozo      d) a prokaryotic
- 15) the common name of rubella is **[ETEA 2018]**  
 a) whooping cough  
 b) german measles
- c) African seeping disease  
 d) Tay sach's disease
- 16) The organism developed with two heads and one truck is called **[ETEA 2018]**  
 a) Identical twins  
 b) Dizyomatic twins  
 c) Fraternal twins  
 d) Siamiese twins
- 17) Which one of the following represents the changes that occur in the ovary and the uterus approximately every 28 days involving evolution with the breakdown and loss of the lining of the uterus. **MDCAT 2020**  
 a) Ovulation  
 b) menstrual cycle  
 c) uterine cycle  
 d) embryo formation
- 18) Which of the following hormones of the pituitary gland regulate the menstrual cycle?  
**MDCAT 2020**  
 a) Follicle stimulating hormone and estrogen  
 b) Luteinizing hormone and estrogen  
 c) Follicle stimulating hormone and luteinizing hormone  
 d) Estrogen and progesterone
- 19) In which part of female reproductive system fertilization takes place? **MDCAT 2015**  
 a. Proximal part of oviduct  
 b. Uterus  
 c. Placenta  
 d. Vagina
- 20) In females, FSH stimulates the ovary to produce:  
**MDCAT 2015**  
 a. Progesterone  
 b. Lactin  
 c. Oestrogen  
 d. Oxytocin
- 21) In which phase of human female menstrual cycle, endometrium prepares for the implanaton of embryo? **MDCAT 2015**  
 a. Proliferative phase  
 b. Menstrual phase  
 c. Secretory phase  
 d. Ovulation phase
- 22) Complete stop age of menstrual cycle in human female is called **MDCAT 2018**  
 a. cession of menses  
 b. menopause  
 c. menstrual stop  
 d. osteoporosis
- 23) Which of the following hormone stimulates the ovulation from the follicle into oviduct? **MDCAT 2019**  
 a. Luteinizing hormone  
 b. Follicle stimulating hormone  
 c. Estrogen

d. Progesterone	a) Follicle-stimulating horomone b) Ganodotropins c) Ovarian hormones d) None of these
24) Which hormonal pair would maintain the endometrium and make it receptive for implantation of embryo? <b>MDCAT 2019</b> a. Luteinizing hormone and progesterone b. Estrogen and follicle stimulating hormone c. Luteinizing hormone and follicle stimulating hormone d. Estrogen and progesterone	33) The longest phase of the menstrual cycle is <b>ETEA 2022</b> A) preovulatory phase B) secretary phase c) ovulatory phase D) menstrual phase
25) Menstrual cycle can be divided into <b>NUMS 2015</b> Single phase Two phase Three phase Four phase	34) To the end of first trimesters the embryo can now technically describe as a: <b>ETEA 2019</b> a) Zygote                              b) infant c) toddler                              d) fetus
26) <b>The usual duration of luteal phase in the menstrual cycle of human female is:</b> <b>FMDC 2013</b> A) 4-6 days B) 8-10 days C) 12-14 days D) 10-12 days	35) In male luteinizing hormone also known as: <b>ETEA 2019</b> a) ACTH                                b) CSH c) TRF                                    d) MSH
27) <b>At which two points of the menstrual cycle are the level estrogen heights?</b> <b>FMDC 2013</b> A) Immediately before and after ovulation B) At ovulation and during the menstrual flow C) During the menstrual flow and pregnancy D) Pregnancy and after menopause	36) Acetabularia crenulata has _____ shaped cap: <b>ETEA 2019</b> a) Irregular                            b) umbrella c) regular                             d) disc
28) <b>A structure established between the uterine and foetal tissues for the exchange of oxygen, carbon dioxide, waste, nutrients and other materials is:</b> <b>FMDC 2017</b> a) Amnion b) Placenta c) Endometrium d) Uterus	37) Normal gestation period in humans is about ____ days. <b>NUMS 2022</b> a. 300 – 320 b. 320 – 350 c. 270 – 280 d. 240 – 250
29) During menstrual cycle, after the female gamets is release from the ovary at gyulation, the remains of the follicle secretes: <b>NUMS 2022</b> a. Progesterone b. FSH c. LH d. Testosterone	38) Except during nuclear division, the nucleus has the chromosome in a loosely coiled state known as <b>NUMS 2022</b> a. Genes b. Ribosomes c. DNA d. Chromatin
30) In male reproductive system, the hormones involved in regulation of rate of spermatogenesis is called <b>NUMS 2022</b> a. Luteinizing hormone b. Folticle – stimulating hormone c. Testosterone d. Inhibin	39) Normal gestation period in humans is about ____ days <b>NUMS 2022</b> a. 300-320 b. 322-350 c. 270-280 d. 240-250
31) Corvix is the part of <b>NUMS 2022</b> a. Vagina b. Oviduct c. Uter d. Ovary	40) During the menstrual cycle, after the female gamete is released from the ovary is ovulation, the remains of the follicle secrets: <b>NUMS 2022</b> a. Progesterone b. FSH c. LH d. Testosterone
32) At the beginning of the menstrual phase the _____ are at the lowest level. <b>ETEA 2023</b>	41) Progesterone is secreted by: <b>ETEA 2019</b> a) Corpus Luteum                    b) Ripening follicles c) Uterine epithelium                d) fertilized egg
	42) Nuclear mitosis occurs in a) Plants                              b) animals c) fungi                                d) Monera
	43) <b>Embryonic Development</b> In the course of life an organism changes from a) fertilized egg to an adult

	b) child to adult c) young to adult d) all of these		c) 20-30 rounded cells d) 180 or more cells
44)	The process of conversion from simpler to more complex form is called a) Growth b) Aging c) Development d) Non of these	59)	Trophoblast cells begins to display L-selection (adhesion) molecules on their surface soon after the a) Inner cell mass b) Blastocyst hatching c) Embryo formation d) Non of these
45)	Negative development at some stages in the life cycle, which are termed as a) Growth b) Development c) Aging d) Non of these	60)	L-selection molecules takes part in a) Inner cell mass formation b) Blastocyst formation c) Embryo formation d) Placenta formation
46)	One of the positive development is a) Growth b) Development c) Aging d) Non of these	61)	L-selection secrete and display several factors with immunosuppressive effects that protect the trophoblast from a) Mother's cells b) Father cells c) Daughter's cell d) Son cell
47)	The early divisions of zygote are called a) Growth b) Development c) Aging d) Cleavage	62)	The inner cell mass become the embryonic disk. Which forms the embryonic proper and the extra embryonic membranes except a) Zona pellucid b) Trophoblast c) Transparent membranous sacs d) The chriion
48)	A period of fairly rapid mitotic divisions of the zygote following are a) Growth b) Development c) Aging d) Cleavage	63)	The derivative of trophoblast is a) Zona pellucid b) Trophoblast c) Transparent membranous sacs d) Chorion
49)	The first two identical cells are produced called blastomeres after a) First cleavage division b) Second cleavage division c) Third cleavage division d) Non of these	64)	The amnion develops when cells of the epiblast fashion themselves into a a) Zona pellucid b) Trophoblast c) Transparent membranous sacs d) Amniotic fluid
50)	The first cleavage takes place after .....hours of fertilization a) 12 b) 24 c) 36 d) 48	65)	The transparent membranous sac are filled with a) Zona pellucid b) Trophoblast c) Transparent membranous sacs d) Amniotic fluid
51)	The divisions in cleavage after many division produce loose collection of cells that are called a) Embryo b) Morula c) Inner cell mass d) Non of these	66)	Embryonic disk curves to form tubular body, the amnion curves to it, eventually, the sac extends all the way around the embryo,broken only by the a) Umbilical cord b) Primitive streak c) Notochord d) Non of these
52)	The no of cells which are berry-shaped in morula are a) 16 or more cells b) 100 or more cells c) 160 or more cells d) 180 or more cells	67)	The two layer embryonic disk transforms into a three layer embryo during week a) 2 b) 3 c) 4 d) 5
53)	After 3-4 days The embryo consist of a) 16 or more cells b) 100 or more cells c) 20-30 rounded cells d) 180 or more cells	68)	The conversion of two layer embryo to three layer embryo is called a) Organogenesis b) Neutralization c) Gastrulation d) Non of these
54)	When embryo become of 100 cells there is a process of compaction in neighboring calls are called a) Compaction b) Placenta formation c) Secretion d) Non of these	69)	Which one of the following is produced by ectoderm a) Nervous system and Skin epidermis b) Epithelial lining of the digestive c) respiratory and urogenital systems and associated glands d) Everything else above
55)	The external membrane of embryo is called a) Zona pellucid b) Trophoblast c) Transparent membranous sacs d) Amniotic fluid	70)	Which one of the following is produced by endoderm a) Nervous system and Skin epidermis b) Epithelial lining of the digestive c) respiratory and urogenital systems and associated glands d) both b and c
56)	The zona pellucid starts to break down and the inner structure now called a a) Inner cell mass b) Blastocyst c) Embryo d) Non of these		
57)	The blastocyst is a fluid filled hollow sphere composed of single layer of large, flattened cells called a) Zona pellucid b) Trophoblast c) Transparent membranous sacs d) Amniotic fluid		
58)	The inner cell mass in trophoblast consist of a) 16 or more cells b) 100 or more cells		

- 71) Which one of the following is produced by the mesoderm  
 a) Nervous system and Skin epidermis  
 b) Epithelial lining of the digestive  
 c) respiratory and urogenital systems and associated glands  
 d) Everything else above
- 72) Gastrulation begins when a groove with raised edges called the  
 a) Umbilical cord      b) Primitive streak  
 c) Notochord      d) Non of these
- 73) The first cells to enter the groove displace the hypoblast cells of the yolk sac and form the most inferior germ layer,  
 a) Mesoderm      b) Endoderm  
 c) Ectoderm      d) Non of these
- 74) Those that follow push laterally between the cells at the upper and lower surfaces, forming the  
 a) Mesoderm      b) Endoderm  
 c) Ectoderm      d) Non of these
- 75) The cells that remain on the embryo's dorsal surface are the  
 a) Mesoderm      b) Endoderm  
 c) Ectoderm      d) Non of these
- 76) The mesodermal cells immediately beneath primitive streak aggregate, forming a rod of mesodermal cells called  
 a) Umbilical cord      b) Primitive streak  
 c) Notochord      d) Non of these
- 77) The first axial support of the embryo is  
 a) Umbilical cord      b) Primitive streak  
 c) Notochord      d) Non of these
- 78) When notochord is formed the length of the embryo is ..... long  
 a) 2mm      b) 2cm  
 c) 4 mm      d) 4 cm
- 79) The formation of organs and systems during the embryonic development are called  
 a) Organogenesis      b) Neutralization  
 c) Gastrulation      d) Non of these
- 80) The first major event in organogenesis is  
 a) Organogenesis      b) Neutralization  
 c) Gastrulation      d) Non of these
- 81) The differentiation of ectoderm that produces the brain and spinal cord is called  
 a) Organogenesis      b) Neutralization  
 c) Gastrulation      d) Non of these
- 82) The process of neutralization is induced by chemical signals from  
 a) Umbilical cord      b) Primitive streak  
 c) Notochord      d) Non of these
- 83) The superior margins of the neural folds fuse forming a neural tube at day  
 a) 12      b) 22      c) 24      d) 32
- 84) The anterior end of the neural tube becomes the brain and the rest becomes  
 a) Whole body      b) Kidney  
 c) Spinal cord      d) Digestive system
- 85) The cells which migrate widely and give rise to the cranial, spinal, and sympathetic ganglia and associated nerves, to the medulla of the adrenal glands and to pigment cells and contribute to some connective tissues are  
 a) Mesoderm cells  
 b) Associated neural crest cells  
 c) Both of these      d) Non of these
- 86) The three primary brain vesicles (fore-mid-hind) are formed at the end of  
 a) First month      b) Second month  
 c) Third month      d) Fourth month
- 87) All brain flexures are evident; the cerebral hemisphere cover the top of the brain at the end of  
 a) First month      b) Second month  
 c) Third month      d) Fourth month
- 88) The remaining ectoderm forming the embryonic body differentiates into ..... Of the skin  
 a) Epidermis      b) Endoderm  
 c) Medoderm      d) Non of these
- 89) **Control of Development**  
 In normal development an important role is played by  
 a) Nucleus      b) Cytoplasm  
 c) Both of these      d) Non of these
- 90) The characteristics of individual are determined by the  
 a) Nucleus      b) Cytoplasm  
 c) Both of these      d) Non of these
- 91) Selective genes are "turn on" and some are "switch off" by the  
 a) Nucleus      b) Cytoplasm  
 c) Both of these      d) Non of these
- 92) Importance of nucleus in development was expressed in unicellular ..... , the acetabularia  
 a) Algae      b) Fungi  
 c) Bacteria      d) Non of these
- 93) Acetabularia are found in European seawater and its length is  
 a) 2-3 inches      b) 2-3 cm  
 c) 3-6 cm      d) 3-6 inches
- 94) The shape of *Acetabularia mediterranea* is  
 a) Umbrella      b) Irregular  
 c) Both of these      d) Non of these
- 95) The shape of *Acetabularia crenulata* is  
 a) Umbrella      b) Irregular  
 c) Both of these      d) Non of these
- 96) When the stacks of *Acetabularia* fungi are interchanged the new head structure will according to the type of ....  
 a) Nucleus      b) Cytoplasm  
 c) Both of these      d) Non of these
- 97) The nucleus exerts a strong influence on the development of cap through  
 a) DNA      b) RNA  
 c) mRNA      d) rRNA
- 98) Different cytoplasmic components certain different morphogenetic determinant that are responsible for  
 a) Cell similarities      b) Cell differentiation  
 c) Cell growth      d) Non of these
- 99) The cytoplasmic director of cell destiny is the  
 a) Nucleus      b) Cytoplasm

c) Both of these d) Gray crescent	secondary notochord and neural tube were composed in large part of a) Host cells only b) Some pigmented cells c) Host cell with some pigmented cells d) Non of these
100) Clear cytoplasm type of fertilized egg of ascidian give rise to a) Larval epidermis b) Muscle cells c) Gut d) Notochord and neural tube	113) The transplanted tissue are named as a) Organizer b) Morphogens c) Optioner d) Secretor
101) Yellow cytoplasm type of fertilized egg of ascidian give rise to a) Larval epidermis b) Muscle cells c) Gut d) Notochord and neural tube	114) The organizer secretes a) Organizer b) Morphogens c) Optioner d) Secretor
102) Gray vegetal cytoplasm type of fertilized egg of ascidian give rise to a) Larval epidermis b) Muscle cells c) Gut d) Notochord and neural tube	115) <b>Human Embryonic Development</b> During each trimesters the fetus a) Grows b) Develop c) Both of these d) Non of these
103) Gray equatorial cytoplasm type of fertilized egg of ascidian give rise to a) Larval epidermis b) Muscle cells c) Gut d) Notochord and neural tube	116) When zygote divide to clusters of cell, the inner cell becomes the embryo and the outer cell becomes the a) Inner cells mass b) Outer cell mass c) Membrane that nourish the embryo d) All of these
104) Mechanism of cell determination is due to a) Asymmetric segregation of unicellular determinants b) Inductive signaling between cells c) Both of these d) Non of these	117) In pregnancy the implantation takes place at a) Second week b) Third week c) Fourth week d) Fifth week
105) Signals can be transferred between two cells by means of a) A signal is sent to extracellular fluid and is received by cell receptor of other cell which are further transmits by second messengers. b) Cell directly contact each other through transmembrane proteins located on their surfaces. c) Signals are passed by the gap junction between of two cytoplasm cells d) All of these	118) The baby's brain, spinal cord, heart and other organs begin to form at ..... of pregnancy a) Second week b) Third week c) Fourth week d) Fifth week
106) The German zoologists Hans Spemann and Halide Mangold discovered in an early gastrula an extremely important morphogenetic field with amazing properties in a) 1920s b) 1910s c) 1930s d) 1940s	119) The beginning of embryonic period is marked by .... Of pregnancy a) Second week b) Third week c) Fourth week d) Fifth week
107) Through technically difficult because the gastrulas were only about a) 2 inches b) 2 mm c) 2 nm d) 2 cm	120) To the end of first trimester the embryo can now be called a a) Feotus b) Baby c) Baby body d) Non of these
108) Which one of the following is pigmented a) Triton taeniatus b) Triton cristatus c) Both of these d) Non of these	121) A developing fingernails and face has a human profile in a a) Feotus b) Baby c) Baby body d) Non of these
109) Which one of the following is tissue donor a) Triton taeniatus b) Triton cristatus c) Both of these d) Non of these	122) A pregnancy in which embryo implants in any other side than the uterus, most often in the uterine tube is called a) Ectopic pregnancy b) Endopic pregnancy c) Both of these d) Non of these
110) Which one of the following is non pigmented a) Triton taeniatus b) Triton cristatus c) Both of these d) Non of these	123) During the second trimester, the foetal sex becomes apparent and possibly identified during an a) X-rays b) Ultrasound c) ECG d) EEG
111) Which one of the following is host embryo a) Triton taeniatus b) Triton cristatus c) Both of these d) Non of these	124) In second trimester the foetal ear begins to stand out at the side of head and allow the foetus a) To see thing b) To hear the sound c) To drink milk d) Non of these
112) By transplanting pigmented tissue from donor to host embryo, Spemann and Mangold get result that	125) The head is about half of the overall size of foetus in a) First trimester b) Second trimester c) Third trimester d) All of these
	126) The foetus grown rapidly at fifth month and

internal organs continue	c) Hard pain	d) Non of these
a) Deassembling	b) To die	
c) To mature	d) Non of these	
127) In ..... hairs starts to appear and finger prints developed	a) First trimester	b) Second trimester
	c) Third trimester	d) All of these
128) In ..... the weight gain is 28g per day	a) First trimester	b) Second trimester
	c) Third trimester	d) All of these
129) The foetus begins to move rapidly and woman can felt it, this is	a) Feotus	b) Baby
	c) Baby body	d) Non of these
130) The fetal head descend into pelvic cavity by	a) First trimester	b) Second trimester
	c) Third trimester	d) All of these
131) 38 or 40 weeks into pregnancy, baby	a) might by 18-20 inches	
	b) weight is 6-9 pound	
	c) both of these	d) non of these
132) A pregnancy of two or more fetuses is called a	a) Fraternal feuses	b) Identical fetuses
	c) Multiple fetuses	d) Non of these
133) Multiple fetuses are same called identicle and or different called	a) Fraternal fetuses	b) Multiple fetuses
	c) Both of these	d) Non of these
134) Identical twins or triplets come from a	a) Single egg fertilization	
	b) Double egg fertilization	
	c) Triple egg fertilization	
	d) Multiple fertilized eggs	
135) Fraternal multiples come from	a) Single egg fertilization	
	b) Double egg fertilization	
	c) Triple egg fertilization	
	d) Multiple fertilized eggs	
136) Some cells of the embryo grow into disk like structures called	a) Placenta	b) Unbilical cord
	c) Both of these	d) Non of these
137) The placenta attached to the embryo by a tube called	a) Nerves	b) New baby arteries
	c) Blood viscera	d) Umbilical cord
138) The blood vessels of the placenta are close to those of	a) Vagina	b) Uterus
	c) Fallopian tubed	d) Non of these
139) A few weeks before the birth, the head of the fetus is turned down, just above the	a) Vagina	b) Uterus
	c) Fallopian tubed	d) Cervix
140) Childbirth begins when the muscular layers of the uterus start to	a) Contract	b) Relax
	c) Both of these	d) Non of these
141) The contraction and relaxation of muscular layer are felt as	a) Pain	b) Labour pain
	c) Hard pain	d) Non of these
142) Head of the baby act as a wedge to, assist	a) Cervical contraction	b) Cervical dilation
	c) Vaginal contraction	d) Vaiginal relaxation
143) The ..... breaks at some stage in labour and the fluid excape	a) Amniotic sacs	b) Chorian sac
	c) Umbilical sac	d) Non of these
144) Baby is pushed through .....and now called birth canal	a) Vagina	b) Uterus
	c) Fallopian tubed	d) Cervix
145) After birth the umbilical cord is	a) Cut	b) Tied
	c) Cut and tied	d) Non of these
146) The sudden fall in temperature felt by the newly born baby stimulate it to	a) Cry	b) Take first breath
	c) Weep	d) Crawl
147) The mammary gland of mother produce milk at the	a) Start of pregnancy	b) Mid of pregnancy
	c) End of pregnancy	d) All of these
148) The milk produced initially by the mammary glands contains special lymph like fluid called	a) Organizer	b) Secretor
	c) Beta amyloid protein	d) Colostrum
149) Colostrum is much rich in	a) Proteins	b) Lipids
	c) Carbohydrates	d) Antibodies
150) Usually, the baby is fed on the maternal milk for upto .....years	a) 1	b) 1.5
	c) 2	d) 2.5
151) As soon as mother stops feeding the baby, her reproductive cycle	a) Stops forever	b) Stop for nine month
	c) Begins again	d) Begin after a month
152) Advantages of breast milk, that breast milk	a) Contain perfect balance of nutrients	
	b) Are easily digestible	
	c) Have optimum temperature and Available at any time and any place	
	d) All of these	
153) Advantage of bottle feeding	a) Have optimum temperature	
	b) Available at any time and any place	
	c) Presence of mother is not necessary	
	d) Non of these	
154) Disadvantages of bottle feeding	a) Can create unhygienic circumstances for the baby	
	b) Can carry an infection	
	c) Can cause indigestion	
	d) All of these	
155) Disadvantages of bottle feeding	a) Can cause stomach disorders	
	b) Are not efficiently utilized	
	c) Can cause infection with particular formula	
	d) All of these	
156) Disorders During Embryonic		

## Development

- Neural tube defect is incomplete development of
- Brain
  - Spinal cord
  - Protective covering of brain and spinal cord
  - All of these
- 157) Rubella are commonly known as
- German measles
  - American measles
  - England measles
  - Non of these
- 158) If mother is infected by rubella within the first ..... weeks of pregnancy , the child may be born with congenital rubella syndrome
- 10
  - 20
  - 30
  - 40
- 159) The syndrome (CRS) follows intrauterine infection by Rubella virus and comprises of defects of
- Cardiac
  - cerebral
  - ophthalmic and auditory
  - all of these
- 160) The CRS may cause
- Prematurity
  - low birth weight
  - anemia and hepatitis
  - all of these
- 161) Abnormal neural tube occurs when the foetus' spine fails to close properly during early stage of
- Pregnancy
  - Child
  - Baby
  - Non of these
- 162) In newborn infants with congenital hypothyroidism frequently have
- Hyperbilirubinemia
  - Hypobilirubinemia
  - Both of these
  - Non of these
- 163) In first trimester the miscarriages are due to a chromosome abnormality in the foetus and this is about ....%
- 20
  - 40
  - 50
  - 80
- 164) An extra chromosome or a missing chromosome can cause miscarriage usually in the usually in the .....and can lead with children with Learning difficulties and mental retardation
- 1<sup>st</sup> trimester
  - 2<sup>nd</sup> trimester
  - Both of these
  - Non of these
- 165) Chromosomes abnormalities involving missing or extra chromosomes are
- Inherited
  - caused by an exposure
  - both of these
  - non of these
- 166) Missing or extra chromosome are caused by chance mistake in cell division soon after the
- Time of division
  - Time of conception
  - Time of mitosis
  - Time of meiosis
- 167) Chance mistake error a random event that can occur in
- Someones pregnancy
  - Only poor people pregnancy
  - Only American people pregnancy
  - Anyones pregnancy
- 168) An inherited problem with the chromosomes can also cause
- Lowe weight child birth
  - Short stature baby birth
  - Miscarriage
  - Non of these
- 169) Parent have their rearrangement of their chromosomes called

- Transformation
- Translocation
- Transduction
- All of these

- 170) A highly experienced multidisciplinary team includes a:
- Perinatal obstetrician
  - An ultrasonographer
  - A pediatric surgeon and neonatologist
  - All of these
- 171) In human beings intrauterine treatment has been performed in the:
- Erythroblastosis
  - Foetalis
  - Urinary tract obstruction with encouraging results
  - All of these

## Postnatal Development

The term allometric growth means

- Differential growth
- Same growth
- Normal growth
- Non of these

- 173) Not all parts of the organism developed at the same rate
- Differential growth
  - Same growth
  - Normal growth
  - Allometric growth

## Aging

The legs of the foetal and newborn baby are

- Short
- Chubby
- Ineffectual
- All of these

- 175) The adult height accumulated by the leg length is
- Half
  - One third
  - One fourth
  - One fifth

- 176) Physiological changes that occur in all individuals due to age are
- Timing
  - Childing
  - Younging
  - Aging

- 177) Age-related changes are impacted by
- Genetic
  - Environment
  - Both of these
  - Non of these

- 178) Loss of function reserves impairs an individual's ability to cope with physiological challenges like
- Anaesthesia
  - Surgery
  - Both of these
  - Non of these

- 179) Person who maintain greater than average functional capacity are
- Physiological young
  - Physiological old
  - Physiological child
  - Non of these

- 180) Persons whose function declines at an earlier age appear to be
- Physiological young
  - Physiological old
  - Physiological child
  - Non of these

- 181) Which one of the following is not sign of aging
- Overall decrease in energy and vigour
  - Change in sleeping patterns
  - Skin hair changes such as wrinkles, brown spots on the skin, loss of skin elasticity, and hair loss
  - Increase in hearing

- 182) Which one of the following is not sign of aging
- Sexual dysfunction
  - Change in menstrual cycle
  - Abdominal obesity
  - ability to weight loss

- |   |  |
|---|--|
| 183) Urinary problems which does not occur at aging<br>a) Incontinence b) Dribbling<br>c) Change in frequency of urination<br>d) Redness of urine   | a) 30-40      b) 20-30<br>c) 40-50      d) 5-10  |
| 184) A decrease in metabolism has several effects except<br>a) Tolerance of cold is less<br>b) A tendency to gain weight increases<br>c) Decreased efficiency in the body's use of glucose<br>d) Collagen and elastin increase                          | 190) Osteoporosis is then .....degree of osteopenia and involves decrease in bone mineral and bone matrix<br>a) Smaller      b) Greater<br>c) Same      d) Non of these                          |
| 185) A decrease in metabolism has several effects;<br>a) Collagen and elastin decreases in connective tissue formation<br>b) Lipid content remains same<br>c) fat content of tissue changes<br>d) Total amount of water in the body gradually decreases | 191) Usually aging is accompanied by a lower production of <b>neurotransmitters</b> , but only when the drop approaches .....% will dementia ensues.<br>a) 15      b) 50      c) 75      d) 40   |
| 186) Cell level changing in aging:<br>a) All cell changes as age<br>b) Cell become larger<br>c) Capacity and reproduction property of cell decrease<br>d) Ability of cell to repair increase  | 192) About .....% of the elderly have a severe dementia<br>a) 15      b) 50      c) 75      d) 40  |
| 187) DNA is damaged through aging process and changes occur in<br>a) Cellular membrane<br>b) Enzymes<br>c) Transport of ions and nutrients<br>d) All of these   | 193) The heart of the elderly person could be<br>a) Smaller      b) Larger<br>c) Unchanged      d) All of these  |
| 188) GI tract maintains its functional level well in old age except of ;<br>a) Altered taste decreased stomach acid<br>b) Decrease blood flow to the liver<br>c) Decrease in saliva that affect chewing and swallowing<br>d) All of these               | 194) Heart become smaller than normal due to<br>a) Malnutrition b) High blood pressure<br>c) Both of these d) Non of these   |
| 189) Age....., men and women start to lose bone mass and enter a condition called osteopenia, a decreased or lower mineral content of the bone  | 195) Heart become larger than normal de to<br>a) Malnutrition b) High blood pressure<br>c) Both of these d) Non of these   |
|   | 196) Aging cause the left ventricle wall to ..... and diameter and length of aorta increase<br>a) Thinner      b) Thicken<br>c) Remain same d) All of these                                      |
|   | 197) Infection occurs more frequently in the elderly and are more often serves due to low degree working of<br>a) Immune system      b) Blood system<br>c) Digestive system      d) Non of these |

## CHAPTER 22

### INHERITANCE

#### Mendels law of inheritance

- |   |  |
|---|--|
| 1) Mendel's law of independent assortment can be explained by: <b>ETEA 2023</b><br>a) Behavior of chromosomes in mitosis<br>b) Behavior of chromosomes in meiosis<br>c) Gene behavior in mitosis<br>d) Both a and b | 2) G. J. Mendel chose plant for his study: as an experimental <b>ETEA 2023</b><br>A) <i>Medicago saliva</i><br>B) <i>Pisum sativum</i><br>C) <i>Delonix regia</i><br>D) <i>Lens culinaris</i>                |
|   | 3) When round and yellow color seeded plant ( $RrYy$ ) is self-crossed the number of plants with round and yellow color seeds obtained in 32 plants: <b>ETEA 2023</b><br>A) 18      B) 9      C) 3      D) 1 |
|   | 4) in Mendelian cross for heterozygous flower ( $Pp$ ). what is the probability that the dominant allele will be in sperm and the recessive, in the eggs: <b>ETEA 2023</b>                                   |

A. 0.05 B. 0.5 C. 0.25 D. 0.75	d. Two different alleles of a gene
5) 50) If the homozygous white eyed Drosophila female is crossed with red eyed Drosophila male, what is the probability of the male Offspring having white color eye: <b>ETEA 2022</b> A) 0% B) 25% c) 50% d) 100%	14) A cross in which one organism is heterozygous and the other is homozygous recessive is called: <b>MDCAT 2018</b> a. test cross b. hereditary cross c. dihybrid cross d. mono-hybrid cross
6) When both the allele of a genes are same, The organism is said to be: <b>ETEA 2020</b> a) Heterozygous b) genotype c) homozygous d) phenotype	15) Choose the correct statement about allele. <b>MDCAT 2018</b> a. Alleles are always liked b. Each allele of gene pair has same gene locus c. Alleles on one locus are always identical d. Alleles on one locus are always different
7) "Law of independent assortment" states : <b>ETEA 2020</b> a) The each pair of alleles assort independent of other pairs of alleles during gamete formation b) That allele of each pair of contrasting trait have unequal probability to assort with the alleles of other pairs c) That the coexisting alleles for each Trait segregate (separate) from each Other at meiosis so that each gamete Receives only one of the two alleles d) That pertain to inheritance of single trait (monohybrid cross)	16) When both the allele of a genes are same, The organism is said to be <b>MDCAT 2020</b> a) Heterozygous b) genotype c) homozygous d) phenotype
8) . Phenotype is: <b>ETEA 2020</b> a) The genetic complement ie the genes in an individual for a particular trait b) Partner of gene pair c) The form of appearance of a trait d) The position of a gene on the chromosome	17) Phenotype is <b>MDCAT 2020</b> a) The genetic complement ie the genes in an individual for a particular trait b) Partner of gene pair c) The form of appearance of a trait d) The position of a gene on the chromosome
9) The particular array of chromosomes that an individual possess is called its: <b>ETEA 2020</b> a) Genotype b) Phenotype d) Karyotype d) Allele	18) "Law of independent assortment" states <b>MDCAT 2020</b> a) The each pair of alleles assort independent of other pairs of alleles during gamete formation b) That allele of each pair of contrasting trait have unequal probability to assort with the alleles of other pairs c) That the coexisting alleles for each Trait segregate (separate) from each Other at meiosis so that each gamete Receives only one of the two alleles d) That pertain to inheritance of single trait (monohybrid cross)
10) A pure breeding tall plant was crossed to dwarf plant. What would be the probability of "T" genotype in F2?: <b>ETEA 2019</b> a) 0 b) 0.25 c) 0.5 d) 0.75	19) If allele frequency for a dominant allele is 0.4. what will be number of heterogeneous individuals if population is of 100 individuals with diploid traits. <b>NUMS 2015</b> a) 36 b) 48 c) 52 d) 74
11) Self fertilization of F-1 dihybrids, following independent assortment of alleles result in <b>MDCAT 2017</b> a. 3/16 tall-round; 3/16 dwar-wrinkled b. 9/16 tall-round; 3/16 dwarf-round c. 9/16 tall-wrinkled; 3/16 dwarf-round d. 3/16 tall-wrinkled; 3/16 dwarf-round	20) Hybrid black Guinea pigs are crossed with each other. The resulting offspring will be: <b>NUMS 2016</b> a. All black b. All white c. 3 black, 1 white d. 3 white, 1 black
12) As a result of cross-fertilization of a true breeding pea plant having purple coloured flowers; with that of white coloured flowers, the offsprings will have flowers with; <b>MDCAT 2017</b> a. 1/4 purple; 3/4 white b. 1/4 white; 3/4 purple c. All white d. All purple	21) In the F2 generation of a dihybrid cross between
13) Homozygous means <b>MDCAT 2019</b> a. Having two identical alleles of a gene b. Having two identical genes c. Alleles in an organism	

<p><b>yellow, round seeded and green, wrinkled seeded pea plants, 17 out of 254 seeds were green and wrinkled other seeds were:</b> <b>FMDC 2013</b></p> <p><b>Yellow and round</b></p> <p><b>Green and round</b></p> <p><b>Yellow and wrinkled</b></p> <p><b>What do these results indicate?</b></p> <p>A) Crossing-over has occurred</p> <p>B) Green and wrinkled are both recessive characters</p> <p>C) The alleles for green and wrinkled are linked</p> <p>D) The allele for green is recessive but not the allele for wrinkled</p> <p>E) The allele for wrinkled is recessive but not the allele for green</p>	<p>c. RNA</p> <p>d. Histone</p>
<p><b>22) A Plant with heterozygous alleles for height is</b> <b>KMU-CAT 2021</b></p> <p>A) Dihybrid</p> <p>B) dual hybrid</p> <p>C) Heterotype</p> <p>D) Hybrid</p>	<p>30) Position of a gene on the chromosome is called its <b>MDCAT 2018</b></p> <p>a. Phenotype</p> <p>b. Junction</p> <p>c. Locus</p> <p>d. Genotype</p>
<p><b>23) Chances for a son or daughter in human birth is:</b> <b>KMU-CAT 2021</b></p> <p>A) 3:1 between son and daughter</p> <p>B) 1:3 between son and daughter</p> <p>C) 1:1 between son and daughter</p> <p>D) None of the above</p>	<p>31) In which situation, Genes are not assorted independently during meiosis in a chromosome? <b>MDCAT 2019</b></p> <p>a. When genes are not linked and their loci are far apart</p> <p>b. When there are too many genes on a chromosome</p> <p>c. When some genes have mutated on the chromosome</p> <p>d. When genes are linked and their loci are close to each other.</p>
<p><b>24) A cross between F1 hybrid with either of parents is called;</b> <b>[ETEA 2007]</b></p> <p>(a) Back cross</p> <p>(b) Test cross</p> <p>(c) Reverse cross</p> <p>(d) None of the above</p>	<p>32) Locus stands for <b>MDCAT 2017</b></p> <p>a. Position of gene on homologous chromosome</p> <p>b. Regions of chromosome</p> <p>c. Position of an allele within a DNA molecule</p> <p>d. Close regions of same chromosome</p>
<p><b>25) Who is considered to be the father of genetics?</b> <b>[ETEA 2007]</b></p> <p>(a) Weismann</p> <p>(b) Bateson</p> <p>(c) Mendel</p> <p>(d) Morgan</p>	<p>33) In genetics, the terms locus refers to the _____ of the gene on the chromosome: <b>MDCAT 2019</b></p> <p>a. Frequency</p> <p>b. Copy</p> <p>c. Position</p> <p>d. Inversion</p>
<p><b>26) Recombinants contains DNA from:</b> <b>ETEA 2019</b></p> <p>a) 2 different sources      b) single source</p> <p>c) 2 same sources      d) 3 same sources</p>	<p>34) The tendency of individuals to resemble their parents are called</p> <p>a) Heredity                  b) Variation</p> <p>c) Both of these            d) Non of these</p>
<p><b>27) The allele that exist in more than two different forms are called ;</b> <b>[2005]</b></p> <p>(a) Polygenic alleles</p> <p>(b) Multigenic alleles</p> <p>(c) Multiple alleles</p> <p>(d) Heterogenic alleles</p>	<p>35) The difference between offspring and their parents are called</p> <p>a) Heredity                  b) Variation</p> <p>c) Both of these            d) Non of these</p>
<p><b>28) The total number of genes in a population is called</b> <b>MDCAT 2016</b></p> <p>a. Gene pool</p> <p>b. Allele pool</p> <p>c. Genome</p> <p>d. Genomic library</p>	<p>36) Heredity and variation play important role in the formation of</p> <p>a) New genus                b) New species</p> <p>c) New family               d) Non of these</p>
<p><b>29) Unit of inheritance is</b> <b>MDCAT 2018</b></p> <p>a. Gene</p> <p>b. Carbon</p>	<p>37) The science which deals with the study of heredity and variation</p> <p>a) Genetics                  b) Inheritance</p> <p>c) Both of these            d) Non of these</p>
	<p>38) Genetics are also referred to the study of</p> <p>a) DNA                        b) Chromosomes</p> <p>c) Genes                      d) Non of these</p>
	<p>39) The science of genetics originated in the year 1900 with the rediscovery of an article originally published in 1866 by an Augustinian .....named Gregor John Mendel</p> <p>a) Monk                      b) Teacher</p> <p>c) Professor                  d) Politician</p>
	<p>40) The one who successfully explained the mechanism of inheritance during his research work on ..... plant was mendel</p>

BOM SERIES	Page 295	BOM ACADEMY Online & Swat
a) Pea c) Been	b) Onion d) Corn	a) Axial c) Mid
41) Mendel was an Austrian monk and is properly known is a) Mother of genetics b) Father of genetics c) Father of inheritance d) Grand father of genetics	56) The flower colour that is dominant a) Green c) White	b) Terminal d) Non of these
42) Mendel was born on July 22, 1822 in a) America b) China c) Germany d) Czech republic	57) The stem height that is dominant a) Tall c) Very short	b) Short d) Very very short
43) Between 1856 and 1863 Mendel carefully analyzing the seven pairs of seed and plant characteristic and cultivated and tested about ..... pea plants a) 14000 b) 28000 c) 10000 d) 20000	58) A cross between two individuals that differ with one particular trait is called a) Monohybrid cross c) Trihybrid cross	b) Dihybrid cross d) Non of these
44) Mendel first delivered his lecture on pea plants in the year of a) 1859 b) 1865 c) 1866 d) 1870	59) The character that appeared in F <sub>1</sub> generation are called a) Dominant character b) Recessive trait c) Both of these d) Non of these	60) The hidden character that appear in F <sub>2</sub> generation are called a) Dominant character b) Recessive trait c) Both of these d) Non of these
45) Mendel published hi paper "Experiments on plants hybridization" in a) 1859 b) 1865 c) 1866 d) 1870	61) The offspring of F <sub>1</sub> generation of true red round seed shape plant with true bred wrinkled seed shape will a) All round shape c) More round less wrinkled	b) All wrinkled shape d) More wrinkled less round
46) Later on in 1900, Mendel work was recognized by: a) A Dutch botanist Hugo de Vries b) De Correns of Germany c) Tschmarck of Austria d) All of these	62) Mendel observed that the recessive character appeared in the F <sub>2</sub> offspring in an average ratio of a) 3:1 b) 1:3 c) 4:1 d) 1:1	63) During Mendel's time the study of cytology was in its a) Low stage b) High stage c) Primitive stage d) Non of these
47) The Darwin's theory of evolution was appeared in the year of a) 1859 b) 1865 c) 1866 d) 1870	64) Mendel visualized the cause of inheritance as a) Factors b) Elements c) Both of these d) Non of these	65) Factors/elements was named by Johannsen in ..... as genes a) 1800 b) 1900 c) 1901 d) 1909
48) The journal in which Mendel work was republished was a) Greatly recognized b) Not recognized c) Very famous d) Published world wide	66) According to Mendel, each male and female contain a pair of factors and they passed to its offspring a) One factor b) Pair of factor c) Triple factors d) Quadruples factor	67) Which one of the following law is not Mendels law of heredity a) Law of dominance b) Law of segregation c) Law of independent assortment d) Non of these
49) The scientist od Mendel era was not familiar with the a) Biology b) Chemistry c) Mathematics d) Statistical analysis of data	68) Dominant allele is represented by a) Capital letter b) Small letter c) Bold letter d) Italic letter	69) The recessive allele is represented by a) Capital letter b) Small letter c) Bold letter d) Italic letter
50) Which one of the following is not main character of pea plant a) Short life cycle b) Self pollinating flowers c) Cross pollination is possible d) Need a large area to grow	70) The condition of albinism is characterized by the lack of a) Alinin c) Calcium	b) Melanin d) magnesium
51) The seed shape which is dominant a) Sphericle b) Wrinkled c) Both of these d) Non of these		
52) The seed colour which is dominant a) Yellow b) Green c) White d) Black		
53) The pod shape which is dominant a) Infalated b) Constricted c) Both of these d) Non of these		
54) The pod colour which is dominant a) Green b) Yellow c) White d) purple		
55) The flower position that is dominant		

- 71) Lack of melanin pigment occurs in the  
 a) Hair                            b) Eyes  
 c) Skin                            d) All of these
- 72) Out of two phenotype the more common is called  
 a) Wild phenotype              b) Mutant phenotype  
 c) Both of these                d) Non of these
- 73) The rare form of phenotype is called  
 a) Wild phenotype              b) Mutant phenotype  
 c) Both of these                d) Non of these
- 74) The symbol used to indicate normal allele for wildlife is  
 a) +                            b) -                            c) -                            d) Non of these
- 75) According to the ..... different characters are controlled by the factors  
 a) Law of dominance  
 b) Law of segregation  
 c) Law of independent assortment  
 d) Non of these
- 76) Factors are present in pairs, of which  
 a) Are dominant  
 b) Are recessive  
 c) One is dominant over another  
 d) Non of these
- 77) The offspring of two organisms that are particularly different for two traits are called  
 a) Monohybrid                b) Dihybrid  
 c) Trihybrid                    d) Non of these
- 78) The fundamental law of genetics is called  
 a) Law of dominance  
 b) Law of segregation  
 c) Law of independent assortment  
 d) Non of these
- 79) The offspring of the RRYY x rryy were all heterozygous with  
 a) Round yellow  
 b) Wrinkled green  
 c) Round yellow and wrinkled green  
 d) Wrinkled yellow
- 80) Mendel crossed RrYy x RrYy and the round yellow in result was  
 a) 9/16                        b) 3/16  
 c) 1/16                        d) Non of these
- 81) Mendel crossed RrYy x RrYy and the round green in result was  
 a) 9/16                        b) 3/16  
 c) 1/16                        d) Non of these
- 82) Mendel crossed RrYy x RrYy and the wrinkled yellow in result was  
 a) 9/16                        b) 3/16  
 c) 1/16                        d) Non of these
- 83) Mendel crossed RrYy x RrYy and the wrinkled green in result was  
 a) 9/16                        b) 3/16  
 c) 1/16                        d) Non of these
- 84) Two pairs of contrasting traits when followed in a cross, the alleles of one pair assort independently with the alleles of the other pair, this is law  
 a) Law of dominance  
 b) Law of segregation  
 c) Law of independent assortment  
 d) Non of these

- 85) Independent assortment of gene was studied by Mendel in  
 a) 1859                        b) 1865  
 c) 1866                        d) 1870
- 86) Independent assortment of gene occurs during  
 a) Mitosis in eukaryotes  
 b) Meiosis in eukaryotes  
 c) Both of these                d) Non of these
- 87) After meiosis occur, each haploid cell contains a mixture of gene from the organism's  
 a) Father                      b) Mother  
 c) Mother and father            d) Non of these
- 88) Independents event will occurs simultaneously is the product of their individual probabilities  
 a) Product rule                b) Sum rule  
 c) Division rule                d) Non of these
- 89) Probability of an event that can occur in two or more independent ways is the sum of the separate probabilities of the different ways  
 a) Product rule                b) Sum rule  
 c) Division rule                d) Non of these
- 90) If male plant is Pp and female plant is Pp, the probability of heterozygous plant are  
 a)  $\frac{1}{2}$                         b) 1                            c)  $\frac{1}{3}$                             d)  $\frac{1}{4}$
- 91) **Exception to mendelian behavior**
- In complete dominance: ETEA 2020
- a) Different alleles of a gene are both expressed in heterozygous condition  
 b) One allele (R) is completely dominant over the other (r) and the presence of recessive allele is functionally hidden the heterozygote (Rr) has the same round phenotype (RR) heterozygote  
 c) The phenotype of the heterozygote is intermediate between phenotypes of the homozygotes  
 d) Gene mutation may produce many different alleles of a gene
- 92) alleles both have an effect on the Phenotype heterozygotic organism.: ETEA 2020
- A) Dominant  
 b) Recessive  
 c) Multiple  
 d) Co-dominant
- 93) When phenotype of a hetrozygote is in between the phenotypes of both the homozygote parents, it is called **NUMS**  
**2016**
- Incomplete dominance
  - Epistasis
  - Pleiotropy
  - Codominance
- 94) Red flower is a dominant trait whereas white flower is a recessive trait. But in F2 generation, a pink colored flower as obtained. Which phenomenon explains this? **NUMS**  
**2019**

<p>a) Law of independent assortment b) Law of segregation c) Incomplete dominance d) Test cross</p>	<p>d) Over-dominance 103) When one allele is completely dominant over another in heterozygous state is called a) Complete dominance b) Incomplete dominance c) Co-dominance d) Over-dominance</p>
<p>95) Pure breeding lines of pea were taken regarding seed shape – Round and wrinkled and were crossed with no intermediate between parents. All offsprings were found to be round. These results show: <b>MDCAT</b></p>	<p>104) When neither of the two alleles express independently in heterozygous state is called a) Complete dominance b) Incomplete dominance c) Co-dominance d) Over-dominance</p>
<p><b>2017</b> a. Co-cominance b. Dominance-recessive relationship c. Incomplete dominance d. Over dominance relationship</p>	<p>105) Cross of true breeding red flowered plant with a true breeding white flowered of 4' o clock plant, all the hybrid orbitals are a) Red flower      b) Pink flower c) White flower    d) Non of these</p>
<p>96) Law of independent assortment cannot be applied on; <b>[2005]</b> (a) Dominant genes (b) Recessive genes (c) Linked genes <b>(d)</b> Autosomal genes</p>	<p>106) When Corren crossed two pink flowers, the ratio of pink flower: red flower: white flower a) 1:2:1      b) 2:1:1 c) 1:1:2      d) 1:1:1"</p>
<p>97) The florescent pigments in the eyes of fruit fly is an example of: <b>[ETEA 2016]</b> <b>a) Over dominance</b> b) Complete dominance c) Incomplieate d) Co-dominance</p>	<p>107) When different alleles of a genes that are both expressed in a hetrozygote condition are called a) Complete dominance b) Incomplete dominance c) Co-dominance d) Over-dominance</p>
<p>98) alleles both have an effect on the Phenotype heterozygotic organism. A) Dominant b) Recessive c) Multiple d) Co-dominant</p>	<p>108) When phenotypic expression of heterozygote become more intense than the homozygous state of the dominant allele are called a) Complete dominance b) Incomplete dominance c) Co-dominance d) Over-dominance</p>
<p>99) alleles both have an effect on the Phenotype heterozygotic organism. A) Dominant b) Recessive c) Multiple d) Co-dominant</p>	<p>109) Allele which code for one possible outcome of a phenotype are called a) Genetic codes b) Genes c) Chromosomessd) All of these</p>
<p>100) In which case the genotypic and phenolypic ratio will be 1:2:1? <b>[ETEA 2008]</b> (a) Complete dominance (b) incomplete dominance (c) Co-dominance (d) None</p>	<p><b>ABO and Rh blood group system</b> When the Rh antibodies produced in Rh-ve persons? <b>ETEA 2023</b> a) Naturally before birth b) Naturally after birth c) After exposure to Rh antigen d) After exposure to Rh antibodies</p>
<p>101) In which of the following the phenotypic and genotypic ratio is the same? <b>[ETEA 2013]</b> (a) Co-dominance (b) Over dominance (c) Epitasis (d) Incomplete dominanc</p>	<p>111) Which of the following is true about occurrence of erythroblastosis foetalls? <b>ETEA 2023</b> a) Occurs when both father and mother are Rh +ive b) Occurs when both father and mother are Rh - ve c) Occurs when mother is Rh +ive and father is Rh -ive d) Occurs when mother is Rh - ive and father is Rh +ive</p>
<p>102) Blood group is type of a) Complete dominance b) Incomplete dominance c) Co-dominance</p>	<p>112) A man of blood group A marries a woman of blood group Band they have one child. Which</p>

<p>one Of the following statements about the child's blood is correct? <b>ETEA 2022</b></p> <p>A. It could be group A only B. It could be group AB only C. It could be group A or group B only D. It could be any of the groups A, B, AB and O</p>	<p>blood type. A man has AB- negative blood type. What is the probability that the couple's child will be type B – negative? <b>[ETEA 2011]</b> (a) 0 %      (b) 25 % (c) 50 %      (d) 75 %</p>
<p>113) Rh antigen was first studied in <b>ETEA 2022</b></p> <p>A) Monkey B) Man C) Dog D) Mouse</p>	<p>122) Which blood group transfusion can be made without risk? <b>[ETEA 2012]</b> (a) Group A to group B (b) Group AB to group O (c) Group A to group O (d) Group B to group AB</p>
<p>114) Blood group which is known as universal donor is <b>NUMS 2022</b></p> <p>a. A+ b. O+ c. AB+ d. O-</p>	<p>123) Gene interaction (epistasis, Bombay phenotype, polygenic inheritance, wheat grain colour, human skin colour)</p>
<p>115) Blood group which is known as a universal donor is <b>NUMS 2022</b></p> <p>a. A<sup>+ve</sup> b. O<sup>+ve</sup> c. AB<sup>+ve</sup> d. O<sup>-ve</sup></p>	<p>124) In geneaction the gene that mark the expression of another gene is formed as: <b>[ETEA 2006]</b> (a) Hypostatic (b) Epistatic (c) Hemistatic (d) Neostatic</p>
<p>116) <b>The four children of two parents each have different blood group of the ABO series, what were the blood</b> groups of the parents? <b>FMDC 2017</b></p> <p>a) A and AB b) A and B c) A and O d) None of these</p>	<p>125) The interaction between different genes occupying different loci is: <b>MDCAT 2017</b></p> <p>a. Dominance b. Co-dominance c. Pleiotropy d. Epistasis</p>
<p>117) Blood group of a person having and hh genotypes <b>NUMS 2015</b></p> <p>a) Have AB phenotype b) Only be Rh-ive c) Do not have antigens attached on RBCs d) None of given</p>	<p>126) Human skin colour is a good example of? <b>MDCAT 2015</b></p> <p>a. Sex-linked inheritance b. Polygenic inheritance c. X-linked inheritance d. Y-linked inheritance</p>
<p>118) Blood group AB is an example of ____: <b>MDCAT 2019</b></p> <p>a. compete dominance b. recessive alleles c. incomplete dominance d. co-dominance</p>	<p>127) Blood group system was discovered at the university of the Karl Landsteiner in a) 1901      b) 1801 c) 1888      d) 1988</p>
<p>119) A character determined by three alleles is <b>MDCAT 2016</b></p> <p>a. Human skin colour b. Human blood group c. Human eye colour d. Human RH factor</p>	<p>128) ABO blood group system was found in the a) humans b) chimpanzees, baboons c) gorillas and apes d) all of these</p>
<p>120) ABO blood system is an example of <b>MDCAT 2015</b></p> <p>a. Polygenes b. Multiple genes c. Multiple alleles d. Multiple mutation</p>	<p>129) Donor for blood group type A a) A, O      b) B, O c) A, B, AB, O      d) O</p> <p>130) Donor for blood group type B a) A, O      b) B, O c) A, B, AB, O      d) O</p> <p>131) Donor for blood group type AB a) A, O      b) B, O c) A, B, AB, O      d) O</p> <p>132) Donor for blood group type O a) A, O      b) B, O c) A, B, AB, O      d) O</p>
<p>121) A woman is homozygous for A- negative</p>	<p>133) A Blood group type contain antigen for a) A      b) B      c) AB      d) None</p>

134) B Blood group type contain antigen for a) A      b) B      c) AB      d) None	c) Both of these      d) Non of these
135) AB Blood group type contain antigen for a) A      b) B      c) AB      d) None	155) Donors for Rh- is a) Rh+      b) Rh- c) Both of these      d) Non of these
136) O Blood group type contain antigen for a) A      b) B      c) AB      d) None	156) Genotype of Rh+ are a) DD      b) Dd c) dd      d) Both a and b
137) The blood group type which is universal donor a) A      b) B      c) AB      d) None	157) Genotype for Rh- are a) DD      b) Dd c) dd      d) Both a and b
138) A Blood group type contain antibodies for a) B      b) A      c) None d) A,B	158) The antigen of Rh was discovered in the Rhesus monkey by ..... in 1930s a) Landsteiner b) Bernstein c) Dr. Y.M bhende d) Non of these
139) B Blood group type contain antibodies for a) B      b) A      c) None d) A,B	159) The Rh blood group system currently consist of a) 30      b) 50 c) More than 100      d) More than 200
140) AB Blood group type contain antibodies for a) B      b) A      c) None d) A,B	160) The more common of Rhesus blood groups are a) C,D,d,E,e      b) C,D c) C,D,d,E,e      d) C,c,D,E,e
141) O Blood group type contain antibodies for a) B      b) A      c) None d) A,B	161) The commonly-used terms Rh factor, Rh positive and Rh negative refer to the a) C      b) D c) E      d) C,D,E
142) The genetic basis of ABO system in 1925 was discovered by a) Landsteiner      b) Bernstein c) Dr. Y.M bhende      d) Non of these	162) ABO blood type antigens are also secreted by some people in their body fluids including a) Saliva      b) Tears c) Urine      d) All of these
143) ABO blood group system is encoded by the single polymorphic gene "I" on a) Chromosomes 9      b) Chromosome 11 c) Chromosome 19      d) Non of these	163) People which secrete ABO blood type antigens are called a) Producers      b) Secretors c) Reproducers      d) All of these
144) Multiple alleles of gene "I" a) IA, IB, IC , i      b) IA, IB , i c) IA, IB      d) IA, IB	164) ABO blood group system are controlled by a dominant secretor gene "Se" on a) Chromosomes 9      b) Chromosome 11 c) Chromosome 19      d) Non of these
145) IA and IB are .....over i. a) completely dominant b) co-dominant c) incomplete dominant d) non of these	165) Rh blood group system is encode by three genes C, D & E which occupy a) 2 tightly linked loci b) 3 tightly linked loci c) 4 tightly loci d) 1 tightly linked loci
146) IA and IB are .....over each other a) completely dominant b) co-dominant c) incomplete dominant d) non of these	166) Formation of D antigen is commonly known as a) Rh+ factor      b) Rh - factor c) Rh factor      d) Nno of these
147) Genotype for blood group is A a) IA IA , IA I      b) IB IB , IB i c) IA IB      d) II	167) The mother immunity destroy the red blood cells of an Rh-positive foetus, it is called a) Erythroblastosis foetalis b) An erythroblast c) Non-allelic interactions or inter-genic interaction d) Non of these
148) Genotype for blood group is B a) IA IA , IA I      b) IB IB , IB i c) IA IB      d) II	168) A type of red blood cell which still retains a cell nucleus, it is the immediate precursor of a normal erythrocyte a) Erythroblastosis foetalis b) An erythroblast c) Non-allelic interactions or inter-genic interaction
149) Genotype for blood group is AB a) IA IA , IA I      b) IB IB , IB i c) IA IB      d) II	
150) Genotype for blood group is A a) IA IA , IA I      b) IB IB , IB i c) IA I      d) II	
151) The major types of blood group systems are a) 30      b) 60 c) More than 100      d) More than 200	
152) The minor blood group systems(rare blood types are a) 30      b) 50 c) More than 100      d) More than 200	
153) Rh factor integen is absent in a) Rh+      b) Rh- c) Both of these d) Non of these	
154) Donors for Rh+ is a) Rh+      b) Rh-	

<p>169) The interaction between the alleles of different pair located on different loci of same or different chromosomes are called            a) Erythroblastosis foetalis            b) An erythroblast            c) Non-allelic interactions or inter-genic interaction            d) Bombay Phenotype</p> <p><b>Gene Interactions</b></p> <p>An example of non-allelic interaction is            a) Hypostatic gene            b) Epistatic gene            c) Dominance            d) Epistasis</p> <p>171) The phenomenon in which the effect caused by one gene at one locus interferes with or hides the effect caused by another gene at another locus            a) Hypostatic gene      b) Epistatic gene            c) Dominance      d) Epistasis</p> <p>172) The gene which is suppressed is called            a) Hypostatic gene      b) Epistatic gene            c) Dominance      d) Epistasis</p> <p>173) The gene which is dominant is called            a) Hypostatic gene      b) Epistatic gene            c) Dominance      d) Epistasis</p> <p>174) The relation between alleles of same gene on same locus            a) Hypostatic gene      b) Epistatic gene            c) Dominance      d) Epistasis</p> <p>175) The interaction between different gene of different loci            a) Hypostatic gene      b) Epistatic gene            c) Dominance      d) Epistasis</p> <p>176) When individual are phenotypically O but genotypically they may be like A, B or AB, this is            a) Erythroblastosis foetalis            b) An erythroblast            c) Non-allelic interactions or inter-genic interaction            d) Bombay Phenotype</p> <p>177) The Bombay phenotype was first discovered in 1952 by            a) Landsteiner      b) Bernstein            c) Dr. Y.M bhende      d) Non of these</p> <p>178) Bombay phenotype is present about            a) 0.004%      b) 0.0004%            c) 0.01%      d) 0.001%</p> <p>179) The maximum possibility of Bombay phenotype is            a) a. 0.004%      b) 0.0004%            c) 0.01%      d) 0.001%</p> <p>180) Bombay phenotype is present about            a) 4 per million      b) 4 per billion            c) 4 per trillion      d) Non of these</p> <p>181) The maximum possibility of Bombay phenotype is            a) 1 in 10      b) 1 in 1000            c) 1 in 100      d) 1 in 10,000</p> <p>182) To produce phenotype, genotype interact with            a) Environment      b) Near genes            c) Near chromosomes      d) Non of these</p>	<p>183) Qualitative traits have few phenotypes that have sharp difference so they show            a) Discontinuous variation            b) Continuous variation            c) Both of these            d) Non of these</p> <p>184) Quantitative traits comparatively have large number of phenotype small difference so they show            a) Discontinuous variation            b) Continuous variation            c) Both of these            d) Non of these</p> <p>185) Number of phenotypes of Pea seed shape            a) 2      b) 3      c) 4      d) 5</p> <p>186) Number of phenotypes of 4' O clock flower            a) 2      b) 3      c) 4      d) 5</p> <p>187) Number of phenotypes of ABO blood group system            a) 2      b) 3      c) 4      d) 5</p> <p>188) Which one of the following is not qualitative trait            a) Pea seed shape            b) 4' O clock flower            c) ABO blood group system            d) Height</p> <p>189) Which one of the following is quantitative trait            a) Height, Weight, Intelligence            b) Skin colour            c) Wheat grain colour            d) All of these</p> <p>190) Quantitative traits are also called            a) Polygenic traits      b) Multiple genes            c) Both of these      d) Non of these</p> <p>191) All the genes that control quantitative traits are called            a) Poly genes      b) Multigenes            c) Many genes      d) Non of these</p> <p>192) Number of population of all phenotypes of wheat population are            a) 5      b) 6      c) 7      d) Unlimited</p> <p>193) Most grain have shades in between from .....to.....            a) Dark red, Moderately dark red            b) Red , Light red            c) Pink , moderately dark red            d) Light pink, moderately dark red</p> <p>194) When red green grain is crossed with true breeding white grain the            a) Dark red            b) Moderately dark red            c) Red            d) Light red</p> <p>195) When dark red was crossed with white grain the number of dark red grain in F2 generation were            a) 1      b) 6      c) 1      d) 20</p> <p>196) When dark red was crossed with white grain the number of moderately dark red grain in F2 generation were            a) 1      b) 6      c) 15      d) 20</p> <p>197) When dark red was crossed with white grain the number of red grain in F2 generation were            a) 1      b) 6      c) 15      d) 20</p>
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198) Hen dark red was crossed with white grain the number of light red grain in F2 generation were a) 1    b) 6    c) 15    d) 20	c) Aabbcc, aaBbcc, aabbCc d) Aabbcc
199) Hen dark red was crossed with white grain the number of pink grain in F2 generation were a) 1    b) 6    c) 15    d) 20	216) Alleles A,B and c codes for an equal amount (dose) of a) Red pigment b) White pigment c) Light colour pigment d) Non of these
200) Hen dark red was crossed with white grain the number of light pink grain in F2 generation were a) 1    b) 6    c) 15    d) 20	217) Environmental factors that can influence the amount of grain colour a) Light                      b) Water c) Nutrients                  d) All of these
201) Hen dark red was crossed with white grain the number of white grain in F2 generation were a) 1    b) 6    c) 15    d) 20	218) How many genes regulate the amount of melanin produced a) 2    b) 3    c) 4    d) 5
202) The number of red pigment in Dark red grain a) 2    b) 4    c) 6    d) 8	219) Involved in permanent survival, proliferation and migration of melanocytes. This is function of a) Gene A                      b) Gene B c) Gene C                      d) All of these
203) The number of red pigment in Moderately dark red grain a) 1    b) 3    c) 5    d) 7	220) Encodes the enzyme tyrosinase which is involved in the production of melanin from tyrosine. This is function of a) Gene A                      b) Gene B c) Gene C                      d) All of these
204) R The number of red pigment in red grain a) 2    b) 4    c) 6    d) 8	221) Primarily responsible for determining whether pheomelanin or eumelanin is produced in humans. This is function of a) Gene A                      b) Gene B c) Gene C                      d) All of these
205) The number of red pigment in Light red grain a) 1    b) 3    c) 5    d) 7	222) The pigment present in skin when its colour is Dark brown a) 7    b) 6    c) 5    d) 4
206) The number of red pigment in Pink grain a) 2    b) 4    c) 6    d) 8	223) The pigment present in skin when its colour is Moderate dark brown a) 7    b) 6    c) 5    d) 4
207) The number of red pigment in Light pink grain a) 1    b) 3    c) 5    d) 7	224) The pigment present in skin when its colour is Brown a) 7    b)        c) 5    d) 4
208) The number of red pigment in White grain a) 2    b) 4    c) 6    d) 0	225) The pigment present in skin when its colour is Light brown a) 3    b) 2    c) 1    d) 4
209) Genotype for grain of which colour is Dark red a) AABBCC b) AaBBCC, AABbCC, AABCcC c) AABBcc, AAAbCC, AAAbCC d) AaBbCc, AABbcc,aaBbCC	226) The pigment present in skin when its colour is Pinkish brown a) 3    b) 2    c) 1    d) 0
210) Genotype for grain of which colour is Moderately dark red a) AABBCC b) AaBBCC, AABbCC, AABCcC c) AABBcc, AAAbCC, AAAbCC d) AaBbCc, AABbcc,aaBbCC	227) The pigment present in skin when its colour is White brown a) 3    b) 2    c) 1    d) 0
211) Genotype for grain of which colour is Red a) AABBCC b) AaBBCC, AABbCC, AABCcC c) AABBcc, AAAbCC, AAAbCC d) AaBbCc, AABbcc,aaBbCC	228) The pigment present in skin when its colour is Pure white a) 3    b) 2    c) 1    d) 0
212) Genotype for grain of which colour is Light red a) AABBCC b) AaBBCC, AABbCC, AABCcC c) AABBcc, AAAbCC, AAAbCC d) AaBbCc, AABbcc,aaBbCC	229) The dark brown skin when crossed with pure white skin, the ratio in F2 generation produced of Dark brown a) 1    b) 6    c) 15    d) 20
213) Genotype for grain of which colour is Pink a) AaBbCc, AABbcc,aaBbCC b) AaBbcc, AabbCc, aaBbCc c) Aabbcc, aaBbcc, aabbCc d) Aabbcc	230) The dark brown skin when crossed with pure white skin, the ratio in F2 generation produced of Moderate dark brown a) 1    b) 6    c) 1    d) 20
214) Genotype for grain of which colour is Light pink a) AaBbCc, AABbcc,aaBbCC b) AaBbcc, AabbCc, aaBbCc c) Aabbcc, aaBbcc, aabbCc d) Aabbcc	231) The dark brown skin when crossed with pure white skin, the ratio in F2 generation produced of Brown
215) Genotype for grain of which colour is white a) AaBbCc, AABbcc,aaBbCC b) AaBbcc, AabbCc, aaBbCc	

- a) 1    b) 6    c) 15    d) 20
- 232) The dark brown skin when crossed with pure white skin, the ratio in F2 generation produced of Light brown  
a) 1    b) 6    c) 15    d) 20
- 233) The dark brown skin when crossed with pure white skin, the ratio in F2 generation produced of Pinkish brown  
a) 1    b) 6    c) 15    d) 20
- 234) The dark brown skin when crossed with pure white skin, the ratio in F2 generation produced of White brown  
a) 1    b) 6    c) 15    d) 20
- 235) The dark brown skin when crossed with pure white skin, the ratio in F2 generation produced of Pure white  
a) 1    b) 6    c) 15    d) 20
- 236) Gene linkage, Sex linkage and crossing over**
- In crossing over, exchange of maternal and paternal chromatid parts occurs while homologous chromosomes are paired during:  
**ETEA 2023**
- A) Prophase of meiosis I  
B) Prophase of meiosis II  
C) Metaphase of meiosis I  
D) Metaphase of meiosis II
- 237) In crossing over, exchange of maternal and paternal chromatid parts occurs while homologous chromosomes are paired during:  
**ETEA 2023**
- A) Prophase of meiosis I  
B) Prophase of meiosis II  
C) Metaphase of meiosis I  
D) Metaphase of meiosis II
- 238) An exception to Mendel's law is **ETEA 2022**
- A) Linkage  
B) Dominance  
c) Purity of gametes  
d) Independent assortment
- 239) The phenomenon of presence of two or more genes on same chromosomes is termed:  
**MDCAT 2018**
- a. Linkage  
b. Crossing over  
c. Epistasis  
d. Metastasis
- 240) The number of gene is ..... than number of chromosomes
- a) More  
b) Less  
c) Same  
d) Non of these
- 241) Gene located on same chromosomes that tend to be inherited together in genetic crosses are said to be
- a) Relatives genes      b) Linked genes  
c) unlinked genes d) non of these
- 242) The phenomenon of staying together of more than
- gene on the same chromosomes are called  
a) Relativity of genes    b) Gene linkage  
c) Linked genes d) Non of these
- 243) If gene are linked on autosomes, their linkage are called  
a) Gene linkage    b) Autosomal linkage  
c) Sex linkage      d) Linkage group
- 244) If gene are linked on sex chromosomes, they are called  
a) Gene linkage    b) Autosomal linkage  
c) Sex linkage      d) Linkage group
- 245) All the linked gene found on the same homologous pair of chromosome form a group, known as  
a) Gene linkage    b) Autosomal linkage  
c) Sex linkage      d) Linkage group
- 246) In humans, the sickle cell anemia, leukemia and albinism are found on  
a) Chromosomes 9      b) Chromosome 11  
c) Chromosome 19      d) Non of these
- 247) The linked genes tend to be inherited together and this is  
a) Gene linkage    b) Autosomal linkage  
c) En bloc inheritance    d) Linkage group
- 248) Heterozygous individual( $F_1$ ) is crossed with recessive parent( $P_1$ ), then if all phenotype are produced in equal (1:1:1:1) then there is ..... between genes.
- a) no linkage  
b) incomplete or partial linkage  
c) then tight or complete linkage  
d) non of these
- 249) Heterozygous individual( $F_1$ ) is crossed with recessive parent( $P_1$ ), then if more parental and less recombinant are produced then it is.....
- a) no linkage  
b) incomplete or partial linkage  
c) then tight or complete linkage  
d) non of these
- 250) Heterozygous individual( $F_1$ ) is crossed with recessive parent( $P_1$ ), then If only parental types are produced .....is believed.
- a) no linkage  
b) incomplete or partial linkage  
c) then tight or complete linkage  
d) non of these
- 251) T.H morgan when crossed normal black with vestigial black, the number of produced gray normal was  
a) 965 b) 944 c) 216 d) 185
- 252) T.H morgan when crossed normal black with vestigial black, the number of produced black vestigial was  
a) 965 b) 944 c) 216 d) 185
- 253) T.H morgan when crossed normal black with vestigial black, the number of produced gray vestigial was  
a) 965 b) 944 c) 216 d) 185
- 254) T.H morgan when crossed normal black with vestigial black, the number of produced black normal was

- a) 965 b) 944 c) 216 d) 185
- 255) The process which is responsible for gene recombination of linked gene is  
 A) OVER DOMINANCE B) Deletion  
 C) Crossing over D) Mutation
- 256) Recombinant frequency % = .....  
 a) sum of recombinants / sum of combination x 100  
 b) sum of recombinants / parental + Maternal x 100  
 c) both of these  
 d) non of these
- 257) The gene that affect the eye colour of drosophila is  
 a) b b) cn c) vg d) non of these
- 258) Distance between b and vg  
 a) 17% b) 9% c) 9.5% d) 1%
- 259) Distance between b and cn  
 a) 17% b) 9% c) 9.5% d) 1%
- 260) Distance between cn and vg  
 a) 17% b) 9% c) 9.5% d) 1%
- 261) The map units are  
 a) Real b) Arbitrary  
 c) Both of these d) Non of these
- 262) One map unit is supposed to equal to ..... recombinant frequency  
 a) 17% b) 9% c) 9.5% d) 1%
- 263) Relationship between allele of the same gene occupying same locus  
 a) Dominance b) Epistasis  
 c) Both of these d) Non of these
- 264) The interaction between different gene occupying different loci  
 a) Dominance b) Epistasis  
 c) Both of these d) Non of these
- 265) **Sex determination**  
 J. Seiler in 1914 discovered which type of sex determination in months?  
**NUMS 2015**  
 a) XO-XX  
 b) XY-XX  
 c) ZZ-ZW  
 d) None of these
- 266) XO-XX sex determining mechanism is present in  
 a) Grasshopper and protenor bug  
 b) Drosophila and humans  
 c) Birds, butterflies and moths  
 d) baboons
- 267) XY-XX sex determining mechanism is present in  
 a) Grasshopper and protenor bug  
 b) Drosophila and humans  
 c) Birds, butterflies and moths  
 d) baboons
- 268) XX-XY sex determining mechanism is present in  
 a) Grasshopper and protenor bug  
 b) Drosophila and humans  
 c) Birds, butterflies and moths  
 d) baboons
- 269) WZ-ZZ sex determining mechanism is present in  
 a) Grasshopper and protenor bug  
 b) Drosophila and humans
- c) Birds, butterflies and moths  
 d) baboons
- c) Birds, butterflies and moths  
 d) baboons
- 270) A trait whose gene is present on X-chromosomes are called  
 a) X-linked trait b) Nullo gamete  
 c) X-linked genes d) Ylonked genes
- 271) A gemmate without any sex chromosomes are called  
 a) X-linked trait b) Nullo gamete  
 c) X-linked genes d) Ylonked genes
- 272) A gene which is present on X-chromosomes with no counter part on Y-chromosomes are called  
 a) X-linked trait b) Nullo gamete  
 c) X-linked genes d) Ylonked genes
- 273) The sex chromosomes for human female  
 a. XX b. XY c. YX d. YY
- 274) The sex chromosomes for drosophila female  
 a. XX b. XY c. YX d. YY
- 275) The sex chromosomes for human male  
 a. XX b. XY c. YX d. YY
- 276) The sex chromosomes for drosophila male  
 a. XX b. XY c. YX d. YY
- 277) The sex chromosomes is if XO Then it is  
 a) Human female b) Drosophila female  
 c) Both of these d) Non of these
- 278) The sex chromosomes is if XO Then it is for  
 a) Human male b) Drosophila male  
 c) Both of these d) Non of these
- 279) The sex chromosomes is if XXY Then it is for  
 a) Human male b) Drosophila male  
 c) Both of these d) Non of these
- 280) The sex chromosomes is if XYY Then it is for  
 a) Human female b) Drosophila female  
 c) Both of these d) Non of these
- 281) An X:A ratio of .....produces females  
 a) 1.00 or high b) 0.5 or lower  
 c) 0.5 or higher d) 1.0 or lower
- 282) X:A ratio of .....produces of males  
 a.1.00 or high b) 0.5 or lower  
 c) 0.5 or higher d) 1.0 or lower
- 283) **Sex linkage (recessive & dominant inheritance)**  
 Drosophila melanogaster is the scientific name of: **ETEA 2023**  
 A) House fly  
 B) Fruit fly  
 C) Flash fly  
 D) Sand fly
- 284) A condition that renders the individual less able to form blood clot is: **ETEA 2023**  
 A) Alport's syndrome  
 B) Coffin-Lowry syndrome  
 C) Hemophilia  
 D) Thalassemia
- 285) A male or female child of an affected mother has 50% chance of acquiring the disorder. Such a disorder is **ETEA 2023**  
 a) X linked recessive disorder  
 b) X linked Dominant disorder

- c) Y linked Dominant disorder  
d) Y linked recessive disorder
- 286) Which of the following types of Haemophilia is more common in the human population? **ETEA 2023**  
a) Haemophillia A  
b) Haemophillia B  
c) Haemophillia C  
d) Haemophillia VI
- 287) Which trait are most likely to affect men Than women? : **ETEA 2020**  
a) X linked recessive  
b) X linked dominant  
c) Autosomal dominant  
d) Autosomal recessive
- 288) 63) What are the chances that the daughter of a normal man and a heterozygous female will have hemophilia? **ETEA 2022**  
A) 75%                    B) 5%  
C) 25%                    D) 0%
- 289) Number of pairs of autosomes in humans in **MDCAT 2015**  
a. 23                      b. 24  
c. 21                      d. 22
- 290) In human being, the carrier of colour blind is: **[ETEA 2012]**  
(a) Male  
(b) Female  
(c) Both male and female  
(d) None of them
- 291) Haemophillia A and B, color blindness and testicular feminization are example of: **ETEA 2020**  
a) X-linked dominant trait  
b) Y-linked recessive trait  
c) Y linked inheritance  
d) Pseudosotosomal trait
- 292) Which one of the following is a sex-linked inheritance? **[ETEA 2013]**  
(a) Baldness  
(b) Albinism  
(c) Eye colour  
(d) Myopia
- 293) What is the risk of color blind baby boy in a family when mother is color blind but father is normal? **NUMS 2019**  
a) 25%  
b) 50%  
c) 75%  
d) 100%
- 294) **Which triain is not sex-linked recessive:** **FMDC 2015**  
a) Haemophilia  
b) Colour blindness  
c) Hypophosphatemic ricket  
d) tfm syndrome
- 295) A woman with normal colour vision, whose father was red-green colour blind, married a red-green colourblind man. What is the probability of her born child being red-green colour blind? **FMDC 2017**  
a) 1.0                    b) 0.75  
c) 0.50                    d) 0.25
- 296) if a man is color blind and marry with normal woman what will be correct????? **FMDC 2012**  
a. 0% of females will be carrier and 100% of males will be normal  
b. 0% normal males 100% affected females  
c. 50 % males affected 50% female carriers  
d. 100 % females normal 50 % males affected
- 297) Drosophila sperm cell contains **NUMS 2015**  
a) 4 chromosomes  
b) 8 chromosomes  
c) 8 pair of chromosomes  
d) 3 chromosomes
- 298) If a carrier haemophilic female ( $X^hX^h$ ) is married to a haemophilic male ( $X^hY$ ). what will be ratio of presence of haemophilia in the children. Select best answer from given condition: **MDCAT 2019**  
a. 100% of females and males will be haemophilic  
b. Carrier female 25% haemophilic female 25%, 25% normal male and 25% haemophilic male  
c. Female and male both have 50% chances of getting haemophilia  
d. Females have 50% chances of getting haemophilia and males will be 100% haemophilic
- 299) When a hemophilic carrier woman marries a normal man, who among her offspring may be affected: **NUMS 2017**  
a) All her children  
b) All her daughters  
c) Half of her daughters  
d) None of above
- 300) Two parents one haemophilic & other carrier, chances among the male offspring to be haemophilic: **NUMS 2017**  
a) 25%                    b) 50%  
c) 75%                    d) 100%
- 301) Haemophilia affects males more than females because of: **[ETEA 2012]**  
(a) Dominant autosomes  
(b) Dominant X- linked  
(c) Recessive X- linked  
(d) y- chromosome linked
- 302) x-linked recessive trait is **MDCAT 2015**

- a. Hypophosphatemia  
b. Vitamin-D resistant rickets  
c. Hemophilia  
d. Diabetes mellitus
- 303) Which one of the following is X-linked trait?  
**MDCAT 2016**  
a. Male pattern baldness  
b. Diabetes mellitus  
c. Hemophilia  
d. Erythroblastosis fetalis
- 304) Which trait is not sex-linked recessive:  
**NUMS 2017**  
a) Hemophilia  
b) Colour blindness  
c) Hypophosphatemic rickets  
d) tfm syndrome
- 305) A trait whose alleles are present in both male and female but expresses more in one sex than other.  
**NUMS 2016**  
a. Sex linked trait  
b. Sex limited trait  
c. Sex influenced trait  
d. X-linked trait
- 306) ----- are more common in human males than females  
**NUMS 2016**  
a. X-linked dominant traits  
b. X-linked recessive traits  
c. Y-linked dominant traits  
d. Autosomal linked recessive traits
- 307) Red green colour blindness is a recessive sex linked trait that renders individuals unable to distinguish shades of red or green and both appear as;  
**ETEA 2022**  
A. Red  
C. Gray  
D. Yellow
- 308) When a hemophilic carrier woman marries a normal man, who among her offsprings may be affected:  
**FMDC 2015**  
a) All her children  
b) All her daughters  
c) Half of her daughters  
d) None of above
- 309) Two parents one haemophilic & other carrier, chances among the male offspring to be haemophilic:  
**FMDC 2015**  
a) 25 %      b) 50%  
c) 75%      d) 100%
- 310) When a haemophilic carrier woman marries a normal man, who among her offspring may be affected:  
**FMDC 2013**  
A) All her children  
B) All her daughters  
C) Half of her daughters
- D) Half of her sons  
E) All her sons
- 311) Which of the following does not belong to same linkage group? **NUMS 2015**  
a) Sickle cell anemia  
b) Albinism  
c) Leukemia  
d) Gout
- 312) A person was married to his cousin and both are heterozygous for sickle cell anemia. Among their four kids, what will be proportion of affected homozygotes?  
**MDCAT 2019**  
a. 50%  
b. 25%  
c. 75%  
d. 100%
- 313) The gene for red-green colour blindness is present on **MDCAT 2017**  
a. Y-chromosome  
b. X-chromosome  
c. Autosome 7  
d. Autosome 9
- 314) Which one of the following characteristics in man is controlled by a recessive gene?  
**ETEA 2008**  
(a) tongue rolling  
(b) Diabetes  
(c) Skin colour  
(d) Eye colour
- 315) Genetic drift is change in the allele frequency of population due to  
**ETEA 2022**  
A) Random chance  
B) Non random mating  
C) Natural selection  
D) Artificial selection
- 316) The type of gene interaction in which the effect caused by a gene at one locus interfere with the effect caused by another gene at another locus is known as  
**NUMS 2018**  
a) Pleiotropy  
b) Epistasis  
c) Polygenic inheritance  
d) Gene linkage  
e) Crossing over
- 317) SRY genes on Y chromosome of man determines  
a) Maleness  
b) Femaleness  
c) Both of these  
d) Non of these
- 318) Sons do not inherit their father  
a) X chromosomes      b) Y chromosomes  
c) Both of these      d) Non of these
- 319) Which one of the following is X-linked recessive disorders  
a) Hemophilia A and B  
b) Colour blindness  
c) Diabetes insipidus

- |  |   |
|--|---|
| 320) Which one of the following is X linked dominant disorders<br>a) Alport's syndrome<br>b) Coffin - Lowry syndrome (CLS)<br>c) Both of these d) Non of these           | 323) Chromosomes Y deletion are frequent genetic cause of a<br>a) Male fertility b) Male infertility<br>c) Female fertility d) Female infertility |
| 321) Which one of the following is X linked dominant disorders<br>a) Idiopathic hypoparathyroidism<br>b) Vitamin D resistant rickets<br>c) Both of these d) Non of these | 324) A chance that a man will inherit the colour blind trait from a carrier mother is<br>a) 10% b) 50%<br>c) 90% d) 100%                          |
| 322) Y-linked inheritance is also known as<br>a) En bloc inheritance<br>b) Holandric inheritance<br>c) Both of these d) Non of these                                     |   |

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## MCQS SOLUTION

### Chapter-1: CELL STRUCTURES & FUNCTIONS key

1)	A	Gel electrophoresis is a method used to separate mixtures of DNA, RNA, or proteins based on their size and charge. Molecules are forced through a gel matrix by an electric field, with smaller molecules moving faster and further than larger ones.	19)	
2)	B		20)	
3)	A		21)	A The cell walls have three fundamental parts namely i) Middle lamella ii) Primary wall iii) Secondary wall.
4)			22)	C Middle lamella cements together the walls of the neighboring cells. It is usually thin and about 1 um in thickness. In woody tissues the middle lamella is commonly lignified.
5)			23)	B Primary wall is the first wall formed in a developing cell. It is usually 1-3 um in thickness.
6)			24)	c The secondary wall follows the order of primary wall in development. It is laid down inside the primary wall. Its thickness is about 5-10 um, more or less rigid, crystalline, and strongly optically active.
7)	B	<b>Paper Chromatography:</b> It is used for the separation of photosynthetic pigments, sugar or amino acids. The mixture is spotted near one end of a paper strip and then dipped into a specific solvent which moves through the paper by capillary action carrying the molecules with it. Similarly, a thin layer of silica may be used instead of paper.	25)	a Middle lamella cements together the walls of the neighboring cells. It is usually thin and about 1 um in thickness. In woody tissues the middle lamella is commonly lignified.
8)	D	<b>Paper Chromatography</b> It is used for the separation of photosynthetic pigments, sugar or amino acids. The mixture is spotted near one end of a paper strip and then dipped into a specific solvent which moves through the paper by capillary action carrying the molecules with it. Similarly, a thin layer of silica may be used instead of paper.	26)	C Phospholipids are major components of cell membranes, where they arrange themselves into a bilayer. The bilayer forms a barrier that separates the cell from its external environment and regulates the passage of substances in and out of the cell.
9)	C	Prokaryotic cell walls, such as those found in bacteria, are primarily composed of murein, also known as peptidoglycan. Murein provides structural support and protection to the bacterial cell.	27)	D This statement describes the Fluid Mosaic Model of the cell membrane, proposed by S.J. Singer and Garth L. Nicholson in 1972. The model suggests that the cell membrane is a fluid combination of lipids and proteins, with proteins floating in or on the fluid lipid bilayer like boats on a sea.
10)	D	Liver cells, like other animal cells, do not have a cell wall. The cell wall is a characteristic of plant cells, fungal cells, and many bacterial cells, providing structure and protection.	28)	A In the fluid mosaic model, the phospholipid bilayer of the cell membrane has hydrophobic (water-fearing) tails that face inward, away from water, and hydrophilic (water-loving) heads that face outward towards the water on both sides of the membrane. Proteins and other molecules float within or on this bilayer, contributing to the "mosaic" aspect.
11)	B	The Golgi complex, or Golgi apparatus, is responsible for modifying, sorting, and packaging proteins and lipids into vesicles for transport to various cellular locations, including the synthesis of plant cell wall components.	29)	D Hydrogen bonding between water molecules contributes to the cohesion of water molecules and helps maintain the structural integrity of cell membranes by providing stability and fluidity to the phospholipid bilayer.
12)	C	The cell wall is fully permeable, allowing the movement of substances like water, ions, and some molecules through it. Its primary function is to provide structure, support, and protection to the cell.	30)	C The lipid bilayer of cell membranes is hydrophobic, allowing the passive transport of non-polar, lipophilic substances, while polar or charged substances require specific transport mechanisms.
13)	B		31)	C The plasma membrane is considered asymmetrical because the lipid composition and the types and distributions of proteins
14)	S			
15)	B			
16)	D			
17)	B			
18)	B			

	differ between the inner and outer leaflets of the bilayer, contributing to its functional diversity.		other proteins are smaller and are placed among the phospholipids molecules. These are on one side of the membrane and are called extrinsic proteins.
32) C	The cell membrane contains protein channels and pores that facilitate the movement of ions and molecules across the membrane through both active transport (requiring energy) and passive transport (not requiring energy).	52) D	The cytoplasm of a cell includes cell organelles, insoluble waste products, and storage products, among other components. It is the site of many cellular processes.
33) C	The lipid components of the plasma membrane, particularly phospholipids and cholesterol, play a key role in controlling the membrane's fluidity. Cholesterol, for example, can modulate fluidity by preventing phospholipid fatty acid chains from packing too closely.	53) A	In cytosol, small molecules and ions may form true solutions, and some large molecules form colloidal solutions.
34) A	Membrane proteins regulate the selective permeability of the plasma membrane, allowing movement of molecules according to the needs of the cells. The internal composition of the cell is maintained because the plasma membrane is selectively permeable to small molecules.	54) B	In cytosol, small molecules and ions may form true solutions, and some large molecules form colloidal solutions. A colloidal solution may be a sol (non viscous) or a gel (jelly like or viscous).
35) C		55) A	In the cytosol mitochondria move about in cytoplasm due to cytoplasmic streaming movements. This is an active mass movement of cytoplasm which is called cyclosis.
36) A		56) B	The chloroplast is a plastid which contains chlorophyll (green pigment) within the thylakoid membranes of the organelle. This organelle is present in the green parts of plants where photosynthesis takes place. It is the main site of synthesis of glucose by the process called photosynthesis. The chlorophyll pigment captures the sunlight and converts it into chemical energy and thus, helps in the process of photosynthesis. So, the correct answer is 'Chloroplast'.
37) A		57) D	70S ribosomes are characteristic of prokaryotes, including bacteria. Eukaryotic cells typically contain 80S ribosomes, although 70S ribosomes can also be found within the organelles of eukaryotes, such as mitochondria and chloroplasts.
38) D		58) D	Ribosomes can be found floating freely within the cytosol and bound to the rough endoplasmic reticulum (RER). Both sets are involved in protein synthesis, but those attached to the RER specifically synthesize proteins destined for secretion or for use in membranes.
39) B	Phospholipids	59) B	Mg++ ions play a crucial role in the structural stabilization of ribosomes and their attachment to mRNA during translation, facilitating the process of protein synthesis.
40) D	Phospholipids	60) A	
41) B)		61) D	
42) D	)	62) C	
43)		63) D	
44) B	Some proteins extend completely through the double layer of lipids from one side to the other and are called intrinsic proteins. Some other proteins are smaller and are placed among the phospholipids molecules. These are on one side of the membrane and are called extrinsic proteins.	64) D	
45) A	Carbohydrates extend out from the outer surface of the membrane and are attached either to membrane lipids as glycolipids or to proteins as glycoproteins.	65) A	Protein
46) B	Carbohydrates extend out from the outer surface of the membrane and are attached either to membrane lipids as glycolipids or to proteins as glycoproteins.	66) D	Ribosome
47) B	Jf Danielle & Davon 1935	67) C	Ribosomes
48) A	Gorter & Grendel 1925	68) A	
49) C	Roberston 1959	69)	
50) B	In 1972, Singer and Nicolson proposed a most acceptable model for membranes called Fluid Mosaic Model. This model is in agreement with photograph of cell membrane by electron microscope. This model explains that the membrane is like a sea of lipids in which protein are floating".	70) D	The head of chlorophyll contains a central magnesium atom to which are attached four N-rings called Pyrrole rings.
51) A	Some proteins extend completely through the double layer of lipids from one side to the other and are called intrinsic proteins. Some		

71)	A	The 70S ribosomes are found in prokaryotes while slightly larger 80S in eukaryotes.	<p>particularly lipid synthesis. They also help to detoxify the harmful drugs. In some cells SER is responsible for the transmission of impulses, for example, muscle cells, nerve cells etc) In addition, SER play an important role in the transport of materials from one part of the cell to the other. It provides mechanical support to the cell so that its shape is maintained.</p>
72)	b	The 70S ribosomes are found in prokaryotes while slightly larger 80S in eukaryotes.	
73)	D	Ribosomes are synthesized in nucleolus of the nucleus. An example of protein synthesized by free ribosomes is Haemoglobin in young RBCs.	
74)	A	The two subunits on attachment with each other require Mg <sup>2+</sup> ions. The ribosomes are attached to mRNA through small ribosomal units.	
75)	D	Ribosomes are tiny cell organelles, about 20 nm in diameter and were first studied by Palade (1955).	
76)	B	Ribosomes exist in two forms; either freely dispersed in the cytosol or attached with RER as tiny granules and are the site of protein synthesis.	
77)	D	Lipid synthesis primarily occurs in the smooth endoplasmic reticulum (ER) of the cell. The smooth ER contains enzymes involved in lipid metabolism, including the synthesis of phospholipids and cholesterol.	
78)	D	The smooth endoplasmic reticulum (SER) is involved in various metabolic processes, including the detoxification of drugs and poisons. It lacks ribosomes on its surface, which differentiates it from the rough endoplasmic reticulum (RER).	
79)	A	The smooth endoplasmic reticulum (SER) is involved in lipid metabolism, detoxification, and the transport of synthesized proteins in the cell. It does not play a role in the transmission of impulses, which is a function of the nervous system.	
80)	A		
81)	A		
82)	D		
83)			
84)	D		
85)	A		
86)	A	Smooth endoplasmic reticulum	
87)	B		
88)	A		
89)	A		
90)	B		
91)	C	Endoplasmic reticulum membranes vary widely in appearance from cell to cell. These channels are separated from the cytoplasmic materials by the spherical or tubular membranes one above the other, called cisternae (singular: cisterna).	<p>The Golgi complex (or Golgi apparatus) consists of flattened membranous sacs known as cisternae, which are organized into units called dictyosomes, especially in plant cells. The Golgi complex is involved in the modification, sorting, and packaging of proteins and lipids for secretion or delivery to other organelles.</p> <p>The Golgi complex plays a critical role in modifying, sorting, and packaging proteins for secretion. Therefore, it would be more abundant in secretory cells, such as those producing hormones or digestive enzymes, than in non-secretory cells.</p> <p>Golgi complex</p> <p></p> <p></p> <p></p> <p></p>
92)	B	Rough endoplasmic reticulum (RER) are mostly present outside the nuclear membrane and thus involved in protein synthesis. The Smooth Endoplasmic Reticulum (SER) helps in metabolism of a number of different types of molecules	
93)	C	Rough endoplasmic reticulum (RER) are mostly present outside the nuclear membrane and thus involved in protein synthesis. And also primary lysosomes.	
94)	D	The Golgi complex (or Golgi apparatus) consists of flattened membranous sacs known as cisternae, which are organized into units called dictyosomes, especially in plant cells. The Golgi complex is involved in the modification, sorting, and packaging of proteins and lipids for secretion or delivery to other organelles.	
95)	B	The Golgi complex plays a critical role in modifying, sorting, and packaging proteins for secretion. Therefore, it would be more abundant in secretory cells, such as those producing hormones or digestive enzymes, than in non-secretory cells.	
96)	B	Golgi complex	
97)	D		
98)	D		
99)	D		
100)	A		
101)	B	The Golgi apparatus was discovered by Camillo Golgi in 1898, using special staining techniques. This apparatus which was found virtually in all eukaryotes consists of stacks of flattened, membrane bounded sacs called cisternae. These cisternae together with associated vesicles are called Golgi-complex. It is a complex system of interconnected tubules around the central stack.	<p>Lysosomes are bounded by single membrane and contain numerous hydrolytic and acid phosphatase enzymes. These enzymes are synthesized on RER and are further processed in the Golgi apparatus. The processed enzymes are budded off as Golgi vesicles and are called primary lysosomes. These contain those enzymes which can digest the phagocytosed food particles.</p> <p>The Golgi complex consists of units called dictyosomes. Each dictyosome is formed of bundles of curved and flattened cisternae, associated tubules and secretory vesicles.</p> <p>Each dictyosome is formed of bundles of curved and flattened cisternae, associated tubules and secretory vesicles.</p>
102)	D		
103)	A		
104)	C		
105)	D	Glyoxysomes are present only in plant cells. It contains a number of enzymes including glycolic acid, oxidase and catalase.	

106) b	Lysosomes are bounded by single membrane and contain numerous hydrolytic and acid phosphatase enzymes. These enzymes are synthesized on RER and are further processed in the Golgi apparatus. The processed enzymes are budded off as Golgi vesicles and are called primary lysosomes.	However each of the nine microtubules is further composed of three tubules.
107) A	The Smooth Endoplasmic Reticulum (SER) helps in metabolism of a number of different types of molecules particularly lipid synthesis. They also help to detoxify the harmful drugs. In some cells SER is responsible for the transmission of impulses, for example, muscle cells, nerve cells etc. In addition, SER play an important role in the transport of materials from one part of the cell to the other. It provides mechanical support to the cell so that its shape is maintained.	125) B The two centrioles are usually placed at right angle to each other. 126) A Microtubules are long, unbranched slender tubulin protein structures 127) B Microfilaments are considerably more thin cylinders made up of contractile actin proteins, linked to the inner face of the plasma membrane.
108) B	Storage diseases are caused by the excessive accumulation of substances within the cell, due to defects (mutations) in one of the Lysosomal enzymes.	128) C Intermediate filaments are made of fibrous units. 129) C Virtually all eukaryotic cilia and flagella are remarkably similar in their organization, possessing a central bundle of microtubules, called the axoneme, in which nine outer doublet microtubules surround a central pair of singlet microtubules.
109) C	Tay-Sachs disease is a genetic disorder caused by the absence or malfunctioning of a specific enzyme within lysosomes. This leads to the accumulation of lipids in the brain, causing progressive neurological damage.	130) A Virtually all eukaryotic cilia and flagella are remarkably similar in their organization, possessing a central bundle of microtubules, called the axoneme, in which nine outer doublet microtubules surround a central pair of singlet microtubules. 131) a Under the compound microscope chromosome appear to be made up of arms and centromeres. Centromere is the place on which chromosome where spindle fibers are attached during cell division.
110) C	Lysosomes are membrane-bound organelles that contain enzymes used for breaking down all types of biological polymers—proteins, nucleic acids, carbohydrates, and lipids—into their monomers.	132) C Animal cells, cells of some microscopic organisms and lower plants for example mosses, liverworts etc. contain two centrioles located near the surface of the nucleus. These are small hollow cylinders (about 0.3–0.5 um long & about 0.2 um in diameter) that occur in pair.
111) D	Nucleus	133) B Chloroplasts vary in their shape and size with a diameter of about 4–6 um.
112) D		134) C Mitochondria are considered self-replicating organelles because they contain their own DNA and machinery for replication, separate from the cell's nuclear DNA. This process allows mitochondria to reproduce independently within the cell, contributing to their dynamic nature and ability to meet the cell's energy demands.
113) B		135) C Mature red blood cells (RBCs) in mammals are unique in that they do not contain mitochondria. This absence allows for more space for hemoglobin, the protein that carries oxygen, and is a specialization that enables RBCs to efficiently transport oxygen throughout the body.
114) A		136) C Mitochondria were first observed as granules in muscle cells by Richard Altman in 1894. Muscle cells have a high demand for ATP (produced by mitochondria), which correlates with a high density of mitochondria within these cells.
115) D		137) B ATP synthase is located in the inner membrane of the mitochondria. It plays a critical role in the production of ATP during
116) A	peroxisome	
117) C	In animals, peroxisomes are most common in liver and kidney cells.	
118) D	Both A & B	
119) A	Centrioles	
120) B	Microtubules	
121) A	the mammalian spermatozoon has a single flagellum, the unicellular green alga Chlamydomonas has two flagella, and the unicellular protozoan Paramecium is covered with a few thousand cilia.	
122) B	the mammalian spermatozoon has a single flagellum, the unicellular green alga Chlamydomonas has two flagella, and the unicellular protozoan Paramecium is covered with a few thousand cilia.	
123) D	the mammalian spermatozoon has a single flagellum, the unicellular green alga Chlamydomonas has two flagella, and the unicellular protozoan Paramecium is covered with a few thousand cilia.	
124) c	In cross section each centriole consists of cylindrical array of nine microtubules.	

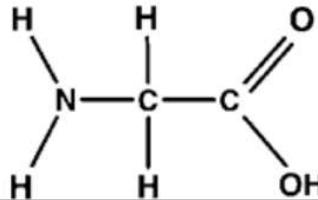
		oxidative phosphorylation by utilizing the proton gradient established by the electron transport chain.	
138) B	Mitochondria		161) D A granum appears to be a pile of thylakoids stacked on each other like coins. On average there are 50 or more thylakoid piled to form one granum.
139) A	Cristae		162) B Chloroplasts and mitochondria are also self replicating organelle like mitochondria.
140) C			163) A Plastids are the unique organelles found only in plant cells. Glyoxysomes are present only in plant cells It contains a number of enzymes including glycolic acid, oxidase and catalase
141) D )			
142)			
143) C			164) C Nucleoli are present in almost every eukaryotic cell type and represent the most prominent compartment of the cell nucleus. The primary function of the nucleolus consists in ribosomal RNA (rRNA) transcription, rRNA processing and ribosome subunit assembly
144) C	The inner surface of cristae in the mitochondrial matrix has small knob like structures known as elementary particles (F., F. particles).		
145) A	The presence of ribosomes and DNA inside mitochondria indicate that some proteins are synthesized in it, so it is a self replicating organelle.		165) C Explanation: Nucleoplasm is the transparent, semi fluid and colloidal substance present in the nucleus
146) B	Mitochondria are found with in the cytoplasm of all eukaryotic cells, although in highly specialized cells such as mature RBCs, they may be absent.		166) A mRNA (messenger RNA) is synthesized in the nucleus through the process of transcription, where a gene's DNA sequence is copied to make an RNA molecule.
147) A	Mitochondria were first seen as granules in muscle cells in 1850. They are known as the power house of the cell.		167) C
148) D	Under the electron microscope, mitochondria appear to be vesicles, rods or filaments and also show complex morphology.		168) B
149) D	Chloroplasts, like mitochondria, contain their own DNA and ribosomes. The DNA is usually circular and, along with proteins synthesized by their ribosomes, allows for some degree of autonomous control over their replication and function.		169)
150) C	Magnesium is a central component of the chlorophyll molecule, which plants use to capture light energy for photosynthesis.		170) D
151) B			171) C
152) B			172) A Nucleus stands out as slightly darker than the surrounding cytoplasm. They are typically about 10 um in diameter.
D			173) A Drosophila
153) C			174) A 48
154) C	Chloroplast		175) a 46
155)			176) B 48
156) C			177) D 80
157) D			178) D 26
158) a	On the layers of the thylakoids, chlorophyll molecules are arranged and that is why granum appears to be green. Each granum is inter-connected with other by the non green part called intergrannum		179) B 20
159) B	Chromoplasts impart colour to the plant parts other than green. They are present in the petals of the flower and in the ripened fruits. They help in pollination and dispersal of seeds.		180) C The tonoplast is the membrane that encloses the central vacuole in plant cells, separating the vacuolar contents from the cytoplasm.
160) C	Leucoplasts are colorless. They are triangular, tubular or of some other shape.		181) A
			182) C
			183) A Single, circular, double stranded molecule not bound by membrane
			184) D Animal cell
			185) D Prokaryotic Cell wall is made of Murein.
			186) C Cellulose fibers, structural proteins, and other polysaccharides help to maintain the shape and form of the cell.

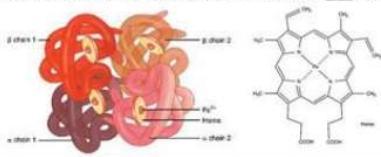
## Chapter 02 Biological Molecules key

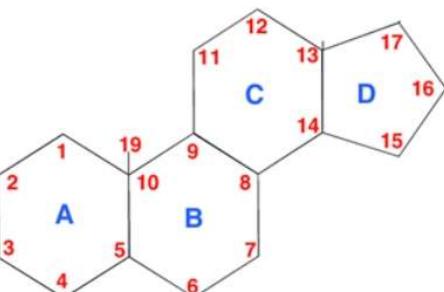
1) D	All are properties of water: a) Universal solvent b) Polar nature c) Hydrogen bonding	15) A if one out of 574 amino acids in a haemoglobin molecule is not present in its specific position then haemoglobin changes its normal globular shape and becomes sickle-shaped) As a result the disc-shaped red blood cells also become sickle-shaped) In sickle cell haemoglobin molecule glutamic acid is replaced by valine. Such type of haemoglobin cannot perform its function and the person with sickle cell haemoglobin dies.
2) A	Heat of vaporization is the heat required to convert a gram of water into vapours at its boiling point.	16) A Carotene and xanthophyll are the two types of carotenoids.
3) A	Explanation: Cohesion refers to the attraction of molecules for other molecules of the same kind, and water molecules have strong cohesive forces thanks to their ability to form hydrogen bonds with one another.	17) A DNA molecule is double helix. The double helix can be visualized as spiral staircase wound around a central axis. Watson and Crick suggested that base pair always consists of purine pointing toward pyrimidines, keeping the molecule diameter at a constant 2nm.
4) C	Water's ability to act as a universal solvent is primarily due to its polarity and ability to form hydrogen bonds with other molecules, enabling it to dissolve a wide variety of solutes.	18) A DNA molecule is double helix. The double helix can be visualized as spiral staircase wound around a central axis. Watson and Crick suggested that base pair always consists of purine pointing toward pyrimidines, keeping the molecule diameter at a constant 2nm. The base pair are flat with distance of 0.34 nm between them.
5) B	The high heat of vaporization of water makes it an effective cooling agent through the process of evaporative cooling (e.g., sweating in humans)	19) B Disaccharides are the most common oligosaccharides. Common disaccharides are sucrose, lactose and maltose. Sucrose is present in sugarcane and is hydrolyzed into glucose and fructose. Maltose + water → glucose + glucose Lactose + water → glucose + galactose Sucrose + water → glucose + fructose
6) a		20) B Monosaccharides have carbon backbone that may contain from three to seven carbon atoms. They have names which end in -ose.
7) B		21) B Ribulose is its ketonic form. Glucose, fructose and galactose are hexoses.
8) B		22) C Ribulose is its ketonic form. Glucose, fructose and galactose are hexoses.
9) C	Explanation: Oxygen is the most common element in the human body, comprising approximately 65.0% of body mass. Most of the oxygen present is found in the form of water. Carbon is the next most common element in the human body, making up 18% of the body by mass.	23) D sceloheptose
10) C	Explanation: Protoplasm is not a chemical, but an elaborate organization of some of the most complex chemical substances known. Moreover, the chemical composition differs in every species and in every cell of the same organism. As studies on the transcriptome, posttranscriptome, proteome, lipidome, metabolome, signalome, ionome, and all other "-omes" intimate, the chemical composition also varies during the lifetime of a single cell. As a first approximation, however, protoplasm contains proteins, lipids, carbohydrates, nucleic acids,	24) A Lipogenesis is defined as the synthesis of fatty acids from nonlipid precursors. It is a pathway for metabolism of excess carbohydrate and is activated by high carbohydrate availability.
11) C	Hydrolysis is a chemical process that breaks bonds between two molecules by the addition of water; it is how polymers are broken down into monomers.	25) B Lipolysis is the metabolic process through which triacylglycerols (TAGs) break down via hydrolysis into their constituent molecules: glycerol and free fatty acids (FFAs).
12) A	Water is the most abundant of all compounds of protoplasm. It forms almost three-fourth of the body by weight, next to water are proteins.	26) B The liver is a complex organ. It performs over 500 different functions. Two of these are the control of amino acid concentration and detoxification. Urea is produced in the liver and is a metabolite (breakdown product) of amino acids. Ammonium ions are formed in the breakdown of amino acids. Some are used in the biosynthesis of nitrogen compounds. Excess ammonium ions are converted to urea.
13) C	Carotene and xanthophyll are the two types of carotenoids.	27) A Trioses are the simplest monosaccharides with three carbon atoms. Glyceraldehyde is triose with aldehyde group.
14) D	Carbohydrates contain either aldehyde or ketone as functional groups attached to one of the carbon atoms. In aldehyde, the double bond is present at 1st carbon atom with oxygen.	

	Ribose is a pentose. It also contains aldehyde group. Ribulose is its ketonic form. Glucose, fructose and galactose are hexoses. They have the same empirical formula ( $C_6H_{12}O_6$ ) but different structural formula. Such molecules with the same empirical formula but different structures are called isomers. Glucose is aldehyde while fructose is ketone. Therefore glucose, fructose and galactose are isomers. They are inter-convertible. Ribose and glucose when put in water form ring structures.	42) B 43) B 44) B 45) B 46) D 47) D 48) B 49) A 50) D Carbohydrates 51) C Maltose 52) A Muscle and liver 53) A Macromolecule 54) B Sucrose 55) B Sugarcane 56) A 57) C 58) 59) D Monosaccharides have carbon backbone that may contain from three to seven carbon atoms. 60) a Maltose are present in Fruits 61) B Lactose are present in Milk 62) C Sugarcane contain mostly sucrose. 63) A Disaccharides are the most common oligosaccharides. Common disaccharides are sucrose, lactose and maltose. Sucrose is present in sugarcane and is hydrolyzed into glucose and fructose. Maltose + water → glucose + glucose Lactose + water → glucose + galactose Sucrose + water → glucose + fructose 64) B Disaccharides are the most common oligosaccharides. Common disaccharides are sucrose, lactose and maltose. Sucrose is present in sugarcane and is hydrolyzed into glucose and fructose. Maltose + water → glucose + glucose Lactose + water → glucose + galactose Sucrose + water → glucose + fructose 65) C Disaccharides are the most common oligosaccharides. Common disaccharides are sucrose, lactose and maltose. Sucrose is present in sugarcane and is hydrolyzed into glucose and fructose. Maltose + water → glucose + glucose Lactose + water → glucose + galactose Sucrose + water → glucose + fructose 66) B Chitin is a polysaccharide. It is found in the exoskeleton of arthropods such as crabs and insects. It is also a polymer of glucose but an amino (-NH) group is attached to each molecule. Like cellulose, chitin is also not digestible. 67) A Carbohydrates are used as source of energy. The C-H bonds in the carbohydrate molecules are broken down during respiration and the stored energy in these bonds is released which is made available to the cells for performing various functions. Human blood contains 100 mg of glucose per 100 ml of blood.
28)	D (Hydro-water)lysis-splitting) Polymers (macromolecules) are broken down into monomers by a process called hydrolysis. It is the reverse of condensation.	
29)	C Sucrose → Glucose and fructose Lactose → Glucose and galactose Maltose → glucose and glucose	
30)	B The exoskeleton of arthropods, including crabs, is primarily composed of chitin. Chitin is a polysaccharide that provides rigidity and protection to the exoskeleton, similar to how it functions in the cell walls of fungi.	
31)	B Lactose, also known as milk sugar, is a disaccharide composed of two monosaccharides: glucose and galactose. It is commonly found in mammalian milk and is broken down by the enzyme lactase into its constituent sugars for absorption in the digestive tract.	
32)	a Explanation: Glycerol is a trihydroxy sugar alcohol with three carbon atoms and three hydroxyl groups.  $\begin{array}{c} \text{CH}_2-\text{OH} \\   \\ \text{CH}-\text{OH} \\   \\ \text{CH}_2-\text{OH} \end{array}$	
33)	A Monosaccharides, the simplest form of carbohydrates, have a general formula represented by $C_n(H_2O)_n$ , where "n" represents the number of carbon atoms in the molecule.	
34)	D Glycogen is the primary storage form of glucose in animal cells, found mainly in the liver and muscles. It serves as a form of energy storage.	
35)	D A glycosidic bond is a covalent bond that links a carbohydrate (sugar) molecule to another group, which can be another sugar.	
36)	D Lactic acid is an organic acid, not a carbohydrate. Glucose, sucrose, and rhamnose are all carbohydrates.	
37)	C Sucrose is a disaccharide made up of glucose and fructose. Hydrolysis of sucrose yields these two monosaccharides.	
38)	D	
39)		
40)	C	
41)	B	

- 68) D The kinds of amino acids which are involved in the synthesis of proteins are 20.
- 69) D Oligosaccharides are hydrolyzed to form (break up) from two to ten simple monosaccharide units. The units or monomers are bonded together by glycosidic bonds.
- 70) D Carbohydrates are stored in the cells as reserve food. Grapes contain as much as 27 % glucose. Honey contains large amounts of glucose and fructose.
- 71) b Haemoglobin is an oxygen carrying protein in the red blood cells which consists of four polypeptide chains while an Insulin molecule consists of two polypeptide chains. The number and sequence of amino acids in a protein molecule is highly specific for its normal function.
- 72) A Haemoglobin is an oxygen carrying protein in the red blood cells which consists of four polypeptide chains while an Insulin molecule consists of two polypeptide chains. The number and sequence of amino acids in a protein molecule is highly specific for its normal function.
- 73) B The Adenine - Thymine base pair is held together by 2 hydrogen bonds while the Guanine - Cytosine base pair is held together by 3 hydrogen bonds.
- 74) C The Adenine - Thymine base pair is held together by 2 hydrogen bonds while the Guanine - Cytosine base pair is held together by 3 hydrogen bonds.
- 75) A Of the 64 existing codons, UAA, UAG and UGA act as stop codons or termination codons, as they do not code for any amino acid. Their role is to act as stop signals for protein synthesis. Since they do not code for any amino acid, they obviously, do not have corresponding tRNA molecules that have the respective anticodons or carry the amino acids. Thus, the corresponding anticodons do not exist.
- 76) C Most of fatty acids in cell contain 16-18 carbon atoms per molecule. Fatty acids may be saturated or unsaturated.
- 77) C In sickle cell disease, the sixth amino acid in the beta chain of hemoglobin, glutamic acid, is replaced by valine. This substitution causes the hemoglobin molecules to stick together under low oxygen levels, forming rigid structures that distort the red blood cells into a sickle shape.
- 78) A Amino acids are organic molecules that differ from each other primarily in their side chains, known as R groups. The R group determines the chemical nature of each amino acid (e.g., acidic, basic, polar, nonpolar).
- 79) C Explanation: Glycine (Gly/G) is the amino acid with the shortest side chain, having an R-group consistent only of a single hydrogen.

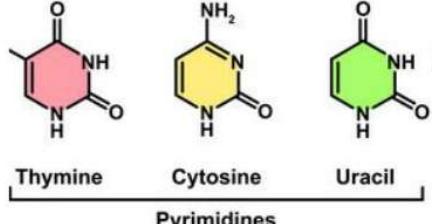
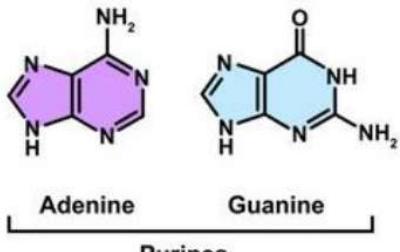


- 80) d Explanation: Globin consists of 4 polypeptide chains of two different primary structures. The common form of adult's haemoglobin is made up of 2 $\alpha$  and 2 $\beta$  chains. Each  $\alpha$  chain contains 141 amino acids while  $\beta$ -chain contains 146 amino acids. So total 574 amino acid residues.
- 
- 81) B Explanation: The most abundant protein in nature is probably the chloroplast enzyme ribulose bisphosphate carboxylase/oxygenase (Fraction I protein). It is arguably the most important enzyme because it catalyses the carbon dioxide-fixing step in photosynthesis.
- 82) B Collagen is a protein, and proteins are made up of amino acids. Cellulose and sucrose are carbohydrates, and ascorbic acid is Vitamin C, none of which contain amino acids.
- 83)
- 84)
- 85) C
- 86) B
- 87) B 20
- 88) C 20
- 89) D 20
- 90) C
- 91) D
- 92) B
- 93) B
- 94) A
- 95) C
- 96) B
- 97) A
- 98)
- 99) B
- 100) C
- 101) B Keratin
- 102) A Secondary structure
- 103)
- 104) D ]
- 105) C
- 106) B There are four different groups attached to the alpha carbon of amino acids. These are amino group, carboxyl group, hydrogen of alpha carbon and R group. The former three groups attached to the alpha carbon are constant members and are present in all amino acids

	while the fourth one i.e. R-group is variable	
107) D	Examples of fibrous proteins are keratin found in hairs, nails, fur, outer skin, myosin present in muscle cells, collagen which is the most abundant protein in higher vertebrates found in skin, ligaments, tendons, bones and in the cornea of the eyes.	123) A compounds such as rubber, carotenoids, etc.
108) D	Examples of globular proteins are hemoglobin, albumen of egg white, enzymes, antibodies and the proteins of cell membranes.	124) D Beta carotene is a vitamin A precursor (retinol) and the most important of the provitamins A) It is cleaved to form two molecules of retinal, one of which is further metabolized to form retinol and retinoic acid.
109) a	As regards the shape, proteins are classified into two types; fibrous proteins and globular proteins	125) C Unsaturated fatty acids have one or more double bonds in their hydrocarbon chain, which introduces kinks in the chain and prevents tight packing. Oleic acid is an example of an unsaturated fatty acid, as it contains one double bond in its hydrocarbon chain.
110) d	When two or more polypeptide chains are arranged into a large sized molecule, it is called a quaternary structure e.g. haemoglobin.	126) C Explanation: The steroid molecule is the only one amongst the choices that has no fatty acid in its structure.
111) A	Starch is a polymer made up of many glucose units bonded together forming unbranched or branched chain.	127) D Explanation: steroid, any of a class of natural or synthetic organic compounds characterized by a molecular structure of 17 carbon atoms arranged in four rings.
112) B	Glycogen is stored in animal cells. It is also a polymer made up of glucose monomers forming extensively branched chains.	
113) C	Cellulose is another polysaccharide, formed of branched chain of glucose units.	128) A
114) D	Chitin is a polysaccharide. It is found in the exoskeleton of arthropods such as crabs and insects. It is also a polymer of glucose but an amino (-NH) group is attached to each molecule. Like cellulose, chitin is also not digestible.	Lipids store more energy per gram than carbohydrates due to their higher proportion of carbon-hydrogen (C-H) bonds, which contain more energy than carbon-oxygen (C-O) bonds found in carbohydrates.
115) C	Starch and cellulose are present in plants while glycogen and chitin are present in animals only.	129) D Oleic acid is an example of an unsaturated fatty acid because it contains one or more double bonds between carbon atoms in its hydrocarbon chain, resulting in kinks and preventing the fatty acid molecules from packing tightly together at room temperature.
116) D	Starch and cellulose are present in plants while glycogen and chitin are present in animals only.	The complete oxidation of each acetyl-CoA via the citric acid cycle and oxidative phosphorylation yields about 12 ATPs (this is a simplified estimate as actual ATP yield can vary). Therefore, 9 acetyl groups would generate approximately $9 \times 12 = 108$ ATP molecules.
117) B	Saturated fatty acids have no double bond between carbon atoms. Such molecules cannot accommodate any more hydrogen atoms if added to them. Acylglycerol with saturated fatty acids such as palmitic acids are called fats and are solid at room temperature. Saturated fatty acids are stored in animals as fats.	130) A
118) A	Unsaturated fatty acids have one or more double bonds between some carbon atoms (C=C). In such molecules the number of hydrogen is less than two per carbon atom. Any hydrogen can be added to these molecules. Unsaturated fatty acids such as oleic acids are stored in plant seeds.	131) A
119) a	Right handed sugar	132) A
120) C	Steroids are lipids that do not contain fatty acids. Each steroid is formed of a backbone of four fused carbon rings containing 17 carbon atoms. They differ from one another by the type of functional group attached.	133) A
121) A	Waxes are formed by long chain fatty acid bonded to long chain alcohol.	134) D
122) A	The terpenoids are formed of units called isoprenoid units. They join by the process of condensation and give rise to different types of	135) A Oils
		136)
		137) D Oleic acid
		138) C No double bonds

- 140) B )  
 141) C C - O - P - O - C  
 142) A  
 143) A Alcohol  
 144) D  
 145) C Nicotinamide adenine dinucleotide is composed of the vitamin B3 nicotinic acid. It is a dinucleotide. The first nucleotide AMP is used by enzymes for recognition and can be phosphorylated at the 2' position in ribose to make NADP+, which can be recognized by a set of enzymes.  
 146) A Muscle fatigue results due to deficiency of ATP and excess accumulation of lactic acid

- 147) A Purines have a double ringed aromatic structure. Adenine and guanine are examples of purines. Pyrimidines have a single ringed structure. Cytosine, thymine and uracil are examples of pyrimidine.



- 148) B FAD (flavin adenine dinucleotide) is a prosthetic group present in many enzymes. Coenzyme: *A coenzyme binds to an enzyme only during catalysis.*  
 149) B NAD (Nicotinamide Adenine Dinucleotide) is a coenzyme involved in redox reactions and is composed of two nucleotides joined together.  
 150) A Cytocines, adenine & thymine  
 151)  
 152) B  
 153) C  
 154)  
 155) C DNA, NADP, ATP and ribulose bisphosphate  
 156) A 2 nm  
 157)  
 158) B )  
 159) C )  
 160) B  
 161) B

- 162) D  
 163) B  
 164) C  
 165) A  
 166) A Purines are double ring compounds. Purines are classified into two types i.e. Adenine and Guanine  
 167) A Purines are double ring compounds. Purines are classified into two types i.e. Adenine and Guanine  
 168) D Pyrimidines are single ring compounds. Pyrimidines are further classified into three types, i.e. Thymine. Cytosine and Uracil.  
 169) a Adenine base linked to pentose sugar (ribose) forms a structure called adenosine.  
 170) B Adenosine triphosphate is an energy rich molecule and is commonly called energy currency. It provides energy to cells of all living organisms for their functions. The wavy bonds between the phosphate groups indicate high-energy bonds. Usually the bond between the second and third phosphate breaks up releasing the energy used by the cell. An ATP molecule is hydrolyzed into ADP and P and almost 7 Kcal energy is produced.  
 171) a Vitamin B2, or riboflavin, is naturally present in foods, added to foods, and available as a supplement.  
 172) c When two nucleotides are linked together, a structure called dinucleotide is formed.  
 173) D If the dinucleotide contains adenine as nitrogenous base, then it will be called adenine dinucleotide. The adenine dinucleotide in combination with different vitamins important compounds called co enzymes.  
 174) B Nicotinic acid (niacin)  
 175) C Riboflavin (Vitamin B12)  
 176) C Sugar phosphate strand  
 177) B  
 178) C  
 179) C )  
 180) D Egg albumin primarily consists of proteins, with glycoproteins being one of the main types. Glycoproteins are proteins that have carbohydrate chains attached to them. In egg albumin, these glycoproteins contribute to its structure and function.  
 181) D Biological membranes are primarily composed of lipids (phospholipids), proteins (including glycoproteins), but not nucleoproteins, which are complexes of nucleic acids and proteins found in the nucleus, not membranes.  
 182) D A conjugated molecule is defined as a molecule that is formed by the combination of two different molecules belonging to different categories. For example when a carbohydrate molecule combines with protein, a conjugated molecule called glycoprotein is formed.

- 183) A Lipoprotein are formed by the combination of lipids and proteins. Lipoproteins are the basic structural framework of plasma membrane and all other types of membranes in the cell.
- 184) b Nucleoproteins are formed by the combination of nucleic acids with proteins. A eukaryotic chromosome is basically a nucleoprotein that is formed by the DNA and protein. These are slightly acidic and soluble in water.
- 185) c Glycoproteins are formed by the combination of carbohydrates and proteins.
- 186) d Glycolipids are formed by the combination of carbohydrates and lipids. Glycolipids are important components of brain and plasma membrane.

### Chapter 03 Enzymes key

23)	B	4.6 – 5.2
24)	C	7.0
25)	D	7.8 – 8.7
26)	B	Inhibitors that bind weakly and can be removed out easily are sometimes called reversible inhibitors, while those that bind tightly and cannot be removed out are called irreversible inhibitors. Poisons like cyanide, heavy metal ions and some insecticides are all non-competitive inhibitors.
27)	B	Cofactor
28)	D	Fischer in 1890 suggested that each enzyme had a particular shape into which the substrate fit exactly. This was known as the lock and key hypothesis. According to this hypothesis the substrate is imagined like a lock while the enzyme is imagined like a key.
29)	C	In an enzyme-catalyzed reaction, the substrate first binds to the active site of the enzyme to form an enzyme-substrate (ES) complex, then the substrate is converted into product while attached to the enzyme, and finally the product is released.
30)	C	In an enzyme-catalyzed reaction, the substrate first binds to the active site of the enzyme to form an enzyme-substrate (ES) complex, then the substrate is converted into product while attached to the enzyme, and finally the product is released.
31)	B	Many of these coenzymes are derived from vitamins and minerals that are essential for life. The absence of these cofactors can lead to vitamin and mineral deficiency diseases e.g. lack of Vitamin B produces beriberi. Examples of coenzymes are NAD, FAD, NADP.
32)	B	cofactors are an "on-off" switch for activating an enzyme. If the cofactor is a non-protein like a metallic ion (i.e. zinc, copper, or iron) it is referred to as a prosthetic group. Some cofactors are small organic molecules called coenzymes.
33)	A	cofactors are an "on-off" switch for activating an enzyme. If the cofactor is a non-protein like a metallic ion (i.e. zinc, copper, or iron) it is referred to as a prosthetic group. Some cofactors are small organic molecules called coenzymes.
34)	C	The absence of cofactors can lead to vitamin and mineral deficiency diseases e.g. lack of

	Vitamin B produces beriberi. Examples of coenzymes are NAD, FAD, NADP.	of the given options directly correspond to the common nature of coenzymes.
35) A	Many enzymes but not all end in the suffix "ase". (exceptions: pepsin, trypsin). They are named for the substrate they act on or the action they perform.	46) B Most human enzymes work best at around 37°C, which is the normal body temperature, indicating their optimal activity range is close to the body's temperature.
36) D	These enzymes catalyze various types of oxidation-reduction reactions. Subclasses of this group contain oxidases, oxygenases and peroxidases.	47) B Enzymes speed up chemical reactions by lowering the activation energy required for the reaction to proceed, making it easier for the substrate molecules to undergo the chemical change.
37) D	These enzymes catalyze the reactions in which the cleavage of bonds is accomplished by the addition of water. The hydrolases include the esterases, phosphatases and peptidases.	48) C Phosphatases are enzymes that remove a phosphate group from a molecule by hydrolysis, thus belonging to the hydrolases category.
38) d	Ligases catalyze bond formation between two substrate molecules. The energy for these reactions is always supplied by ATP hydrolysis.	49) B Urease, an enzyme that catalyzes the hydrolysis of urea into carbon dioxide and ammonia, has an optimal pH range around neutral to slightly alkaline conditions (7.8-8.7).
39) B	Lyases catalyze reactions in which groups (eg. H, O, CO, and NH) are removed to form a double bond or added to a double bond. Decarboxylases, deaminases and synthases are examples of Lyases.	50) D Pancreatic lipase works in the alkaline environment of the small intestine, where it breaks down fats into fatty acids and glycerol. Pepsin works in the acidic pH of the stomach.
40) A	When few enzyme molecules are left unsaturated, adding substrates will NOT make a difference to the enzyme catalyzed reaction.	51) D This question seems a bit unclear, but typically, the term "minimum temperature" might refer to the lowest temperature at which an enzyme remains active. Below this temperature, enzyme activity slows down and can become dormant but not denatured, and can be reactivated by warming.
41) D	While temperature, substrate concentration, and enzyme concentration significantly influence the rate of enzyme action by affecting the speed of enzymatic reactions and the formation of enzyme-substrate complexes, water concentration is not typically considered a direct factor in the rate of enzyme activity under physiological conditions.	52) B In non-competitive inhibition, the inhibitor binds to an allosteric site (not the active site) on the enzyme, causing a change in the enzyme's shape that reduces its activity. This binding does not directly compete with the substrate for the active site.
42) C	The optimal temperature for enzyme activity in mammals is typically around 37°C, which is close to the body temperature of most mammals, including humans. Therefore, 40°C is the closest option and reflects the general range where mammalian enzymes are most active.	53)
43) B	Sulphonamides act as competitive inhibitors by mimicking the natural substrate (para-aminobenzoic acid, PABA) of the enzyme dihydropteroate synthase, which is involved in the synthesis of folic acid in bacteria. By competing with PABA for the active site of the enzyme, sulphonamides inhibit bacterial growth, making them effective antibiotics.	54) B
44) C	Pancreatic lipase, an enzyme that breaks down fats into fatty acids and glycerol in the small intestine, works best at an alkaline pH. The optimal pH for pancreatic lipase is around 8.0, reflecting the slightly alkaline environment of the small intestine where it operates.	55) D
45) B	Most coenzymes are derivatives of vitamins. Coenzymes are organic non-protein molecules that bind to enzymes and help them catalyze reactions. Since "Vitamins" isn't an option provided, this question may be considered incorrectly or incompletely presented as none.	56) B
		57) B
		58) D Tertiary structure
		59) B Cofactor
		60) C 2.00
		61) D Melonate
		62) B Activator
		63) A Non-competitive
		64) A)
		65) B)
		66) A)
		67) D )
		68) B)
		69) B)
		70) D
		71)
		72) D

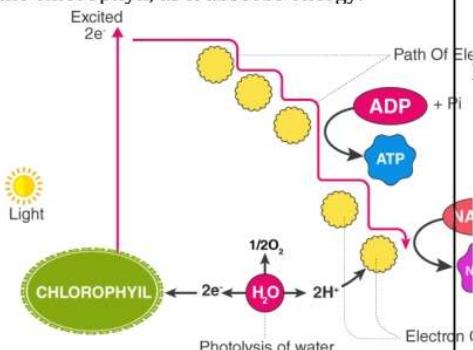
73) A	The rate of an enzyme- catalyzed reaction shows a curve dependence on substrate concentration. As the substrate concentration increases, the rate increases because more substrate molecules can collide with enzyme molecules, so more reactions will take place. At higher concentrations the enzyme molecules become saturated with substrate, so there are few free enzyme molecules, so adding more substrate doesn't make much difference	few enzymes can work at extreme pH, such as protease enzymes in animal stomachs, which have an optimum pH 1.
74) B	In feedback inhibition, there is a second binding site on the enzyme where the inhibitor binds, so that the inhibitor is not necessarily similar in structure to the substrate.	79) D Rate of enzyme reactions depend on the following factors. 1. Temperaute 2. Enzyme concentration 3. Substrate concentration 4. inhibitor 5. pH
75) C	The absence or presence of the inhibitor at this second binding site activates or deactivates the enzyme, by changing the conformation of the enzyme so that the active site is made available or unavailable to the substrate	80) A Animals present in different environments are adopted to range of temperature, for example, enzymes of the arctic snow flea work at -10°C whereas in thermophilic bacteria enzymes work at a temperature of 90°C.
76) C	The inhibitor is usually the product of a reaction formed during the metabolic pathway.	81) B Enzymes works best at an optimum temperature. Enzymes present in mammals works best at about 40°C.
77) B	The rate of an enzyme- catalyzed reaction shows a curve dependence on substrate concentration. As the substrate concentration increases, the rate increases because more substrate molecules can collide with enzyme molecules, so more reactions will take place.	82) C Animals present in different environments are adopted to range of temperature, for example, enzymes of the arctic snow flea work at -10°C whereas in thermophilic bacteria enzymes work at a temperature of 90°C.
78) B	Enzymes have an optimum pH at which they work fastest. For most enzymes this is about pH 7-8 (physiological pH of most cells), but a	

### Chapter 04 Bioenergetics key

1) D	The carotenoids absorbs light in the visible spectrum between 500-600nm	ring with magnesium at its center and a phytol tail, but they do not have a terminal carbonyl group as part of their structure.
2) C	Explanation: The visible light spectrum is the segment of the electromagnetic spectrum that the human eye can view. More simply, this range of wavelengths is called visible light. Typically, the human eye can detect wavelengths from 380 to 750 nanometers.	7) B 8) D 9) C 10) C 11) c
3) A	Explanation: In the bacteria that he was studying, hydrogen sulfide ( $H_2S$ ), not water, is used in photosynthesis. These bacteria produce yellow globules of sulfur as a waste, rather than oxygen. Thus, van Niel hypothesized that plants split water as a source of electrons from hydrogen atoms, releasing oxygen as a byproduct.	12) D 13) D 14) C 15) B 16) B 17) A 18) d
4) B	Photosystem is the correct term for the organization of photosynthetic pigments into clusters within the thylakoid membranes of chloroplasts. These pigments capture light energy during the light-dependent reactions of photosynthesis.	19) C 20) C 700 nm 21) A $-CH_3$ 22) A $Mg^{++}$ 23) B Thylakoid membrane 24) D Blue-violet range 25) C $-CH_3$ 26) 27) A 28) C
5) A	Chlorophyll, the green pigment in plants, absorbs light most effectively in the violet-blue and red parts of the electromagnetic spectrum and reflects green light, which is why plants appear green.	29)
6) A	Chlorophyll molecules contain a porphyrin	

30)	C			
31)	A	Wavelengths shorter than the visible light i.e. ultraviolet radiation are more energetic and are dangerous to the cells because they can break organic molecules.	48)	B
32)	B	Our eyes are sensitive to only a small portion of this solar radiation i.s. visible light that ranges from about 390 nm to 760 nm in wavelength.		The cycle starts when ribulose bisphosphate, a 5-carbon sugar, already present in stroma reacts with CO <sub>2</sub> of air to form a 6-Carbon compoundD This compound is unstable and soon splits up into two molecules of 3-carbon compound called Phosphoglycerate (PGA). PGA is regarded as the first product of photosynthesis to be identified. RuBP+CO <sub>2</sub> → short lived 6-Carbon compound 6-C compound → 2PGA
33)	D	Wavelengths shorter than the visible light i.e. ultraviolet radiation are more energetic and are dangerous to the cells because they can break organic molecules.	49)	C
34)	B	Wavelengths longer than visible light i.C) infrared have low energy content that cannot affect photosynthetic process.	50)	C
35)	D	40 %		Chlorophyll "a" has methyl group (-CH <sub>3</sub> ) while Chlorophyll "b" has carbonyl group (-CHO). The empirical formula of chlorophyll "a" and "b" are Chlorophyll "a" (C <sub>55</sub> H <sub>72</sub> O <sub>5</sub> N <sub>4</sub> Mg) Chlorophyll "b" (C <sub>55</sub> H <sub>70</sub> O <sub>6</sub> N <sub>4</sub> Mg)
36)	C	Chlorophylls absorb mostly violet-blue wavelengths (390-460nm) and red wavelengths (630-700nm).	51)	D
37)	B	Chlorophyll "a" is the most abundant and most important photosynthetic pigment. It is found in all green plants except bacteria.		Chlorophyll "a" has methyl group (-CH <sub>3</sub> ) while Chlorophyll "b" has carbonyl group (-CHO). The empirical formula of chlorophyll "a" and "b" are Chlorophyll "a" (C <sub>55</sub> H <sub>72</sub> O <sub>5</sub> N <sub>4</sub> Mg) Chlorophyll "b" (C <sub>55</sub> H <sub>70</sub> O <sub>6</sub> N <sub>4</sub> Mg)
38)	A	Chlorophyll "b" is found in all higher plants and green algae.	52)	D
39)	A	Chlorophyll "c", and "e" are found in various groups of algae.		In 1930, Van Neil hypothesized that plants split water to release oxygen as a by-product. The idea of Neil was supported by Hill.
40)	B	Bacterio-chlorophyll is found in bacteria	53)	A
41)	B	The head of chlorophyll is hydrophilic and lies on the surface of the thylakoid membrane. Long hydrocarbon chain called phytol side chain (tail) is attached to one of the Pyrrole rings. It is hydrophobicC) It lies embedded in the thylakoid membrane.	54)	A
42)	D	Chlorophyll molecule is composed of two parts, i.e. head and tail. The head contains a central magnesium atom to which are attached four N-rings called Pyrrole rings. The four rings (tetra Pyrrole ring) are collectively called porphyrin.	55)	B
43)	C	Carotenoids include carotenes and xanthophylls. They are yellow, orange, red or brown pigments.	56)	A
44)	B	Carotenoids protect chlorophyll from intense light and from oxidation by oxygen produced in photosynthesis.	57)	A
45)	d	When electrons are passed through electron transport chain, they lose energy. This energy is used in making ATP from ADP and inorganic phosphate using energy from sunlight in a process called as photophosphorylation.	58)	A
46)	A	In non-cyclic electron transport chain, transport of electrons is called Non cyclic electron transport because electrons don not move in a cycle. The ATP synthesis during this non-cyclic electron flow is called Non-cyclic Photophosphorylation.	59)	C
47)	B	ATP synthesis during this cyclic electron	60)	B
			61)	a
			62)	B
			63)	C
			64)	A
			65)	A
			66)	A
			67)	B
			68)	A
			69)	B
			70)	A
			71)	B
			72)	a
			73)	B
			74)	B
			75)	A
			76)	C
			77)	C
			78)	A
			79)	B
			80)	A
			81)	A

- 82) b Respiration
- 83) B In the non-cyclic electron transport of light reaction', the deficit of 2 electrons occur in the chlorophyll, as it absorbs energy.



- 84) B Photophosphorylation is the process of generating ATP using the energy of sunlight during photosynthesis. This process occurs in the chloroplasts of plant cells, specifically in the thylakoid membranes where the photosynthetic pigments are located.
- 85) C The light reactions of photosynthesis occur in the thylakoid membranes of the chloroplast, specifically within the granum. The granum is a stack of thylakoid discs where light energy is captured by chlorophyll and converted into chemical energy in the form of ATP and NADPH.

- 86) D In the preparatory phase of glycolysis, ATP is actually consumed rather than produced. Two ATP molecules are used to phosphorylate glucose and its intermediate, fructose-6-phosphate, which later results in the generation of four ATP molecules in the payoff phase, leading to a net gain of two ATP molecules per glucose molecule overall. Therefore, the correct answer indicating ATP formed in this phase as "0" reflects that no ATP is generated during this initial phase.

- 87) D Explanation: In the process of cellular respiration, a single molecule of glucose can yield up to 36 molecules of ATP

- 88) A Explanation: Ribose is an aldopentose (a monosaccharide containing five carbon atoms that, in its open chain form, has an aldehyde functional group at one end).



- 89) B Explanation: The fixation of carbon dioxide and the formation of carbohydrates takes

**BIOLOGY**  
place in the chloroplast present in plant cells. The enzymatic reactions help incorporate carbon dioxide into the plants which lead to the synthesis of sugar molecules and it takes place in the stroma of chloroplasts.

Explanation: The Calvin cycle is organized into three basic stages: fixation, reduction, and regeneration. The Calvin cycle refers to the light-independent reactions in photosynthesis that take place in three key steps. Although the Calvin Cycle is not directly dependent on light, it is indirectly dependent on light since the necessary energy carriers (ATP and NADPH) are products of light-dependent reactions.

- In fixation, the first stage of the Calvin cycle, light-independent reactions are initiated; CO<sub>2</sub> is fixed from an inorganic to an organic molecule.
- In the second stage, ATP and NADPH are used to reduce 3-PGA into G3P; then ATP and NADPH are converted to ADP and NADP<sup>+</sup>, respectively.
- In the last stage of the Calvin Cycle, RuBP is regenerated, which enables the system to prepare for more CO<sub>2</sub> to be fixed.

91) A The first stable compound formed in the Calvin cycle after carbon dioxide fixation is 3-phosphoglycerate (3-PGA).

92) A Ribulose bisphosphate (RuBP) is a five-carbon sugar that acts as an intermediate in the photosynthesis process, specifically in the Calvin cycle where it combines with CO<sub>2</sub> to form 3-phosphoglycerate.

93) B The Calvin cycle is part of photosynthesis in plants and does not involve pyruvic acid as a substrate. Instead, it uses carbon dioxide, ATP, and NADPH to produce glucose.

94) C Plastocyanin is a copper-containing protein that plays a role in the electron transport chain during photosynthesis in plants.

95) b Photophosphorylation, the process of converting light energy into chemical energy (ATP and NADPH) during photosynthesis, occurs in the thylakoid membranes which are stacked into structures called grana (plural for granum) in the chloroplasts.

96) C Light-dependent reactions of photosynthesis occur in the thylakoid membranes of chloroplasts and produce ATP, oxygen (as a byproduct of water splitting), and NADPH (reduced NADP).

97) B In the light-dependent reactions, water is split to provide electrons, protons, and oxygen (as a byproduct). Thus, water acts as an electron donor.

98) C This is a tricky question because CO<sub>2</sub> does not directly work as a source of O<sub>2</sub>. CO<sub>2</sub> is fixed and reduced in the Calvin cycle to produce glucose, while O<sub>2</sub> is produced from

		the splitting of water in the light-dependent reactions. A better description for CO <sub>2</sub> would be a carbon source for glucose synthesis.	137) B	Oxygen
99)	C	The Calvin cycle's primary product is glyceraldehyde-3-phosphate (G3P), a three-carbon sugar molecule from which glucose and other carbohydrates can be synthesized.	138) A	Photosystem I absorbs light of 700 nm and is called P700 whereas photosystem II absorbs light of 680 nm and is called P680.
100)	B		139) C	Photosystem I absorbs light of 700 nm and is called P700 whereas photosystem II absorbs light of 680 nm and is called P680.
101)	A		140) B	The cycle of dark reaction starts when ribulose bisphosphate, reacts with CO <sub>2</sub> of air to form a 6-Carbon compound. This compound is unstable and soon splits up into two molecules of Phosphoglycerate (PGA). PGA is regarded as the first product of photosynthesis to be identified.
102)	B	Ribulose	141) B	Since two molecules of ATP are utilized to start the process of glycolysis and four molecules of ATP are produced in the metabolic pathway, therefore there is a net gain of two molecules of ATP.
103)	C		142) A	Glycolysis is the breakdown of glucose, a 6-C molecule, in two molecules of pyruvate (3C molecule) and a net gain of two ATP molecules.
104)	D		143) A	1 ATP is produced in 1 Krebs cycle but for 1 glucose molecule, two Krebs cycles take place so there is a gain of 2 ATP.
105)	C		144) C	Compared to aerobic respiration which yields 36 ATP molecules from the breakdown of one glucose, anaerobic respiration yields only 2 ATP molecules.
106)	D		145) B	Mitochondria
107)	C		146) D	Zigzag Scheme
108)	C		147) B	RuBP + CO <sub>2</sub> → short lived 6-Carbon compound 6-C compound → 2PGA
109)	B		148) C	PGA + ATP + NADPH → PGAL + ADP + Pi + NADP
110)	C		149) C	Out of every six molecules of PGAL formed, only one molecule leaves the cycle to be used by the plant for making glucose and other organic compounds. The other five PGAL molecules are recycled to regenerate 3 molecules of five carbons RuBP by means of several intermediates including 3-C, 4-C, 6-C, 7-C etc
111)	D		150) A	Out of every six molecules of PGAL formed, only one molecule leaves the cycle to be used by the plant for making glucose and other organic compounds. The other five PGAL molecules are recycled to regenerate 3 molecules of five carbons RuBP by means of several intermediates including 3-C, 4-C, 6-C, 7-C etc
112)	B		151) D	Glucose + ATP → Glucose-6 Phosphate + ADP Glucose-6-Phosphate → Fructose-6 Phosphate. Fructose-6 Phosphate ATP + ADP → Fructose-1-6 bisphosphate + ADP. Fructose-1-6-bisphosphate splits into 3-carbon Phosphoglycerate (PGAL) and dihydroxyacetone phosphate (DAP).
113)	D		152) D	Some of the energy produced in the
114)	A	Ribulose bisphosphate		
115)	B			
116)	B			
117)	A			
118)	B			
119)	A	Ribulose bisphosphate		
120)	A	Unstable 6 carbon compound		
121)	A	3-carbon compound		
122)	B	Stroma of chloroplast		
123)	D	H <sub>2</sub> O		
124)	A	Water molecules are formed		
125)				
126)				
127)	D			
128)	B			
129)	E			
130)	C			
131)	B			
132)	B			
133)	B			
134)	B	NADH		
135)	D	From FRS in electron transport chain, electrons are passed to oxidized NADH (Nicotinamide adenine dinucleotide phosphate). The reduced NADP receives hydrogen from water and is converted into NADPH.		
136)	B	2PGAL → 2Pi → 2 BPGA + 2H <sub>2</sub> 2NAD + 2H <sub>2</sub> → 2NADH <sub>2</sub> 1-3 bisphosphoglycerate+ADP → 3 - Phosphoglycerate +ATP 2PGA → 2PEP + 2H <sub>2</sub> O 2PEP+2ADP → <b>2 Pyruvic Acid +2 ATP.</b> Two molecules of pyruvate are the end product of glycolysis. Since two molecules of ATP are utilized to start the		

		oxidation in glycolysis is used in the synthesis of ATP.	170) D Co-enzyme Q
		The energy of the substrate used in the generation of ATP is called substrate- level phosphorylation.	171) C Inner membrane of mitochondria
			172) A Glutamate cycle
			173)
			174)
			175)
153)	B	2 molecules of Pyruvate Last reaction of glycolysis is $2\text{PEP} + 2\text{ADP} \rightarrow 2 \text{Pyruvic Acid} + 2 \text{ATP}$ .	176) C
154)	C	2 molecules of $\text{CO}_2$	177) C
155)	B	Vitamins B	178) D
156)	d	108	179) B
157)	A	Compared to aerobic respiration which yields 36 ATP molecules from the breakdown of one glucose, anaerobic respiration yields only 2 ATP molecules.	180) C
158)	B	Glycine is the simplest amino acid.	181) C In aerobic respiration, glycolysis results in the formation of pyruvate, which then enters the mitochondria to be further processed in the citric acid cycle and oxidative phosphorylation, ultimately producing ATP.
159)	C		182) D In prokaryotes, the complete aerobic breakdown of one molecule of glucose can yield up to 38 ATP molecules. This includes ATP produced during glycolysis, the Krebs cycle, and oxidative phosphorylation.
160)	B	the answer is '3'. Number of carbon atoms present in citric acid, oxaloacetic acid and pyruvic acid are respectively . Pyruvic acid (IUPAC name: 2-oxopropanoic acid, also called acetoic acid) ( $\text{CH}_3\text{COCOOH}$ ) is the simplest of the alpha-keto acids, with a carboxylic acid and a ketone functional group.	183)
161)	A		184) A
162)	A		185) A
163)	A		186) A In alcoholic fermentation, glycolysis converts 1 molecule of glucose into 2 molecules of pyruvate, producing a net gain of 2 ATP molecules. The pyruvate is then converted into ethanol and carbon dioxide, but no additional ATP is produced in these later steps.
164)	A		187) D
165)	B		188) B ATP
166)	B		
167)	C		
168)	C	1	
169)	C	NAD	

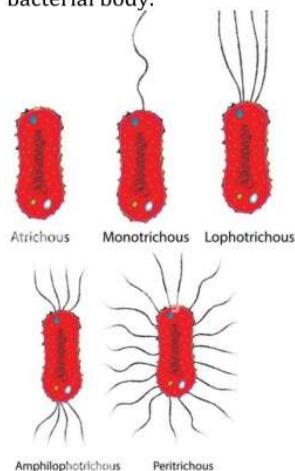
### Chapter 05 ACellular Life key

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### Chapter 06 Prokaryotes key

1)	B	Algae and bacteria are examples of prokaryotes.	causing diseases with distinct symptoms and modes of transmission.
2)	A	Both <i>Salmonella typhi</i> , which causes typhoid fever, and <i>Clostridium tetani</i> , which causes tetanus, are examples of bacilli. Bacilli are rod-shaped bacteria. These pathogens are known for their significant impact on human health,	3) D Monotrichous. - Single polar flagellum. - Example: <i>Vibrio cholerae</i> . Amphitrichous. - Single flagellum on both sides. - Example: <i>Alkaligenes</i> . Lophotrichous. - Tufts of flagella at one or both sides. - Example: <i>Spirillum</i> .
3)	D		

Peritrichous. - Numerous flagella all over the bacterial body.

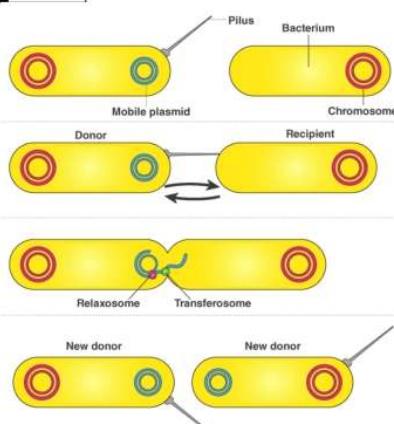


- |  |  |
|--|--|
| 4) B   | 31) C  |
| 5) B   | 32) A  |
| 6) C Lophotrichous bacteria have a tuft or cluster of flagella at one or both ends of the cell, aiding in their mobility.  | 33) B  |
| 7) A   | 34) B  |
| 8) D   | 35) B  |
| 9) B   | 36) B  |
| 10)  | 37) C Explanation: Bacterial cell walls are made of peptidoglycan also called as murein, which is made from polysaccharide chains cross-linked by unusual peptides containing D-amino acids.   |
| 11)  | 38) D A typical bacterium has a cell wall, which provides structural support and protection; cytoplasm, where cellular processes occur; and genetic material, typically a single circular DNA chromosome, which contains the necessary information for the bacterium's life processes. |
| 12)  | 39) B Chitin is a polysaccharide, specifically a long-chain polymer of N-acetylglucosamine. It is a major component of the exoskeletons of arthropods (such as insects and crustaceans) and the cell walls of fungi.   |
| 13) D  | 40) B Bacteriophages are viruses that infect and replicate within bacteria. They use the bacterial cell's machinery to produce more phages until the cell bursts, releasing new phages.  |
| 14) B  | 41) A  |
| 15) C  | 42) A  |
| 16) A  | 43) D  |
| 17) C  | 44) D  |
| 18) A A capsular layer of extracellular polysaccharide material can enclose many bacteria into a biofilm and serves many functions. Streptococcus mutans, which causes dental caries, splits the sucrose in food and uses one of the sugars to build its capsule, which sticks tightly to the tooth. | 45) D  |
| 19) A  | 46) A Single, circular, double stranded molecule not bound by membrane   |
| 20) C  | 47) D Goblet cells   |
| 21) B  | 48) A Bacteria   |
| 22) B  | 49) D 70S  |
| 23) C  | 50) B Mitochondria   |
| 24) D  | 51) D Spores   |
| 25) A Wall teichoic acids are found only in certain Gram-positive bacteria (such as staphylococci, streptococci, lactobacilli, and Bacillus spp.); so far, they have not been found in gram-negative organisms.  | 52) A Flagella   |
| 26) C  | 53) C Mesosome   |
| 27) C  | 54) C  |
| 28) B  | 55) A  |
| 29) C  | 56) B Some members of autotrophs group like Nostoc are involved in the fixation of atmospheric nitrogen  |
| 30) B The capsule of a bacterial cell is a protective outer layer composed of polysaccharides, which   | 57) C The oxygen-producing bacteria like cyanobacteria took up this task. Cyanobacteria play an important role in the evolution of life as their photosynthetic activity gradually oxygenated the atmosphere and the oceans about two billion years ago.                               |
|  | 58) B The capsule prevents dehydration of bacterial cell. A capsule which is less tightly bound to the cell is commonly called glycocalyx.   |
|  | 59) A Gram-negative bacteria are more complex; the thin peptidoglycan layer is covered externally  |

	by a layer of lipopolysaccharides. Gram-negative bacteria are more resistant than Gram-positive bacteria because the outer layer of lipopolysaccharides impedes the entry of antibiotics	Extreme halophiles live in high-salt environments such as Utah's Great Salt Lake and Dead Sea.
60)	A The hook and the filament of bacteria are made up of a protein called flagellin.	75) B Bacteria are the most abundant organisms. The classification of bacteria is based on the morphology, mode of nutrition, biochemical and genetic characteristics.
61)	C Bacterial diseases: 1. Bacterial leaf spots (Plants) 2. Bacterial wilt (Plants) 3. Bacterial soft rot(Plants) 4. Bacterial galls(Plants) 5. Bacterial blights (Plants) 6.Cholera(humans) 7.Typhoid fever(humans) 8.Tuberculosis(humans) 9.Pneumonia (humans)	76) B Bioremediation 77) B Humulin, human insulin is produced by using recombinant DNA technology. 78) A Bacteria are involved in symbiotic nitrogen fixation in the roots of leguminous plants. Herbivorous mammals cannot break down cellulose. Bacteria live in their guts and help in the digestion of cellulose by breaking it down. The relationship is called commensalism.
62)	B Pasteurization is a process to prevent the spoilage of beverages such as juices, milk etc A more effective method of pasteurization of milk is through ultra high temperature (UHT) in which milk is treated at 140°C for 3 seconds and then cooled suddenly in a vacuum chamber. Milk treated by UHT can be stored at room Temperature for several months	79) D All of these 80) C Aerobic and anaerobic 81) D All of these 82) D Cyanobacteria 83) D All of these 84) C Mycoplasma is the only genus of bacteria known to lack cell walls.) 85) A Many species of bacteria possess a tight protective covering around the cell called capsule. It is a very sticky, gelatinous structure made up of polysaccharides and proteins.
63)	C 170 degree 2 hour	86) a The capsule prevents dehydration of bacterial cell. A capsule which is less tightly bound to the cell is commonly called glycocalyx.
64)	D 100 degree 10 min	87) C Many species of bacteria possess a tight protective covering around the cell called capsule. It is a very sticky, gelatinous structure made up of polysaccharides and proteins.
65)	C Pili are small filamentous appendages scattered all over the surface of bacterial cell. They play no part in motility. Pili are smaller than flagella in size. They are made up of protein called pilin.	88) A 9 89) B 500 90) C 6000 91) D 20,000 - 25,000
66)	C Super kingdom	92) A Based on the variations in the chemical constituents of cell wall. Hans Christian Gram, a Danish physician, developed a staining technique in 1884. He divided bacteria in two groups i.e. Gram-positive and Gram-negative bacteria.
67)	D About 6300 species of prokaryotes have been identified and many more will be identified in the days to come.	93) D Cell walls in Gram-negative bacteria are more complex; the thin peptidoglycan layer is covered externally by a layer of lipopolysaccharides. Gram-negative bacteria are more resistant than Gram-positive bacteria because the outer layer of lipopolysaccharides impedes the entry of antibiotics
68)	D All of these	94) A The flagella may vary in number and placement. A monotrichous bacterium possesses a single flagellum. A lophotrichous organism has a group of two or more flagella inserted at one pole of the cell.
69)	A Ancestors	95) A The flagella may vary in number and placement. A monotrichous bacterium possesses a single flagellum. A lophotrichous organism has a group of two or more flagella inserted at one pole of the cell
70)	A Archaea live in both extreme and moderate environments. Those inhabiting extreme condition are called extremophile (lovers of extreme environment) and the other group living in moderate conditions are known as methanogens.	
71)	B Archaea live in both extreme and moderate environments. Those inhabiting extreme condition are called extremophile (lovers of extreme environment) and the other group living in moderate conditions are known as methanogens.	
72)	c The extremophiles are further divided into extreme halophiles and extreme thermophiles. Extreme halophiles live in high-salt environments such as Utah's Great Salt Lake and Dead Sea.	
73)	C The extremophiles are further divided into extreme halophiles and extreme thermophiles. Extreme halophiles live in high-salt environments such as Utah's Great Salt Lake and Dead Sea.	
74)	A The extremophiles are further divided into extreme halophiles and extreme thermophiles.	

96) B	The flagella may vary in number and placement. A monotrichous bacterium possesses a single flagellum. A lophotrichous organism has a group of two or more flagella inserted at one pole of the cell	114) C	Sulfur bacteria, which oxidize sulfur compounds, belong to various groups, but delta proteobacteria include many sulfur-reducing bacteria, which are important in the sulfur cycle.
97) c	An amphitrichous bacterium is characterized by groups of flagella inserted at both end of the cell. In peritrichous bacterium flagella are dispersed on the entire surface of the cell. Some bacteria lack flagella and are called as atrichous.	115) A	
		116) A	
		117) D	Rod
		118) D	
		119)	
		120) A	
		121) A	Energy is provided by mitochondria
		122) D	
98) D	An amphitrichous bacterium is characterized by groups of flagella inserted at both end of the cell. In peritrichous bacterium flagella are dispersed on the entire surface of the cell. Some bacteria lack flagella and are called as atrichous.	123) A	Many species of alpha bacteria subgroup are associated with eukaryotic hosts su symbiotic association of Rhizobium species with the roots of leguminous plants f the fixation of atmospheric nitrogen.
99) B	Cell membrane invaginates into cytoplasm to form pocket-like structure called mesosome. They help in cell division and replication of DNA.	124) B	Beta bacteria is a nutritionally diverse group. The bacteria are involved in nitrogen recycling oxidizing ammonium, producing nitrites as a waste product.
100) C	In bacteria, The chromosome is located in a specific region of cytoplasm called nucleoid). In addition to its single circular chromosome, the cell also possesses extra chromosomal DNA rings of small size called plasmids.	125) c	Gamma group includes sulphur bacteria which obtain energy by oxidizing H <sub>2</sub> S instead of water.
101) D	P In bacteria, The chromosome is located in a specific region of cytoplasm called nucleoid). In addition to its single circular chromosome, the cell also possesses extra chromosomal DNA rings of small size called plasmids.	126) C	This subgroup includes the slime-secreting myxobacteriA) When the soil is dry or food is scarce, they aggregate into fruit bodies releasing resistant myxospores. The members of the subgroup may get attached to other bacteria.
102) A	Cocci are spherical bacteria and are non-motile because they lack flagellA) When these bacteria remain together in pairs after division, they are called diplococci. Those which form chains of diplococci are called streptococci.	127) D	Most species included in this sub-group are pathogenic and cause diseases in humans and animals
103) B	Bacilli are rod-shaped bacteriA) Most rods occurs singly but some form pairs and are called diplobacilli, others forming chains are known as streptobacilli.Salmonella typhi causes typhoid and Clostridium tetani causes tetanus are bacilli bacteria.	128) A	Some Gram-positive bacteria produce highly resistant structures called endospores. The spores remain alive for many years under extremely harsh conditions with regarded to temperature, radiations and water shortage prevailing on earth in its early days.
104) C	Spirilla are corkscrew-shaped bacteriA) They are motile and flagella are attached at the ends. Spirilla never form clusters or colonies.	129) C	The saprobes are called recyclers of nutrients. As they clean the earth by their action, they are also called the scavengers of earth.
105) A	Some spirilla have less than one complete twist, look like commas and are called vibrios.	130) C	The parasitic bacteria do not possess the enzyme system for the breakdown of organic matter of their live hosts which include humans, plants and animals. Many parasitic bacteria cause diseases and are called pathogens.
106) B	An endospore is a dormant, tough, and non-reproductive structure produced by some bacteria in the phylum Bacillota	131) C	In photoautrophic Bacteria , The source of hydrogen is hydrogen sulphide instead of water. Sulphur is released in the process instead of oxygen. $\text{CO}_2 + \text{H}_2\text{S} \rightarrow (\text{C}_6\text{H}_{12}\text{O}_6) + \text{S}$
107) C		132) B	In humans, the disease symptoms develop during the log phase because the bacterial production attains such a high level which damages the tissues. Later on, the growth slows down because of the shortage of nutrients and is called as stationary phase.
108) C		133) A	Streptococcus pneumonia has two strains, one
109) C			
110) A	Photoautotrophic bacteria		
111) B	Saprophytic bacteria are organisms that decompose dead organic matter, recycling nutrients back into the ecosystem. They play a crucial role in breaking down complex organic compounds into simpler substances that can be utilized by other organisms.		
112) D			
113) D			

	causes pneumonia but the other is unable to do so. The cells of the virulent strain are capsulated from smooth colonies and are called S-types. The non-virulent strain is non-capsulated, forms rough colonies and is called R-type.	affected by temperature, availability of nutrients, pH and ionic concentration.
134) A	Chemoautotrophs bacteria do not use sunlight as a source of energy. They derive the energy by the oxidation of inorganic substances such as hydrogen sulphide, ammonia, nitrates, nitrites called chemosynthesis. and iron compounds. Such a process of food formation is.	149) A Under favorable conditions, a bacterium divides after every 20 minutes. The number of cells doubles at the end of each division. It is called exponential growth and the interval between two successive divisions is called generation time.
135) B	Heterotrophic bacteria bacteria are unable to prepare their own food) These organisms obtain energy from organic compounds prepared by other organisms. There are three types of heterotrophic bacteria i.e. saprophytic bacteria, parasitic bacteria and symbiotic bacteria.	150) c Under favorable conditions, a bacterium divides after every 20 minutes. The number of cells doubles at the end of each division. It is called exponential growth and the interval between two successive divisions is called generation time.
136) c	Saprophytic bacteria, commonly known as saprobes, feed exclusively on dead organic matter which is derived from plants and animals remains.	151) C Under favorable conditions, a bacterium divides after every 20 minutes. The number of cells doubles at the end of each division. It is called exponential growth and the interval between two successive divisions is called generation time.
137) A	Sometimes a piece of DNA of donor bacterium may become attached to the DNA of phage, the recombinant DNA is known as prophage. Many phages are assembled in the bacterial cell which bursts and a crop of phages is released completing a lytic cycle. Phages which cause lysis are called virulent phages	152) B Under favorable conditions, a bacterium divides after every 20 minutes. The number of cells doubles at the end of each division. It is called exponential growth and the interval between two successive divisions is called generation time.
138) B	Minnesota's lake	153) A The lag phase covers the first few hours when there appears no growth. During this period, the bacteria become accustomed to their new environment.
139) A	Nomally Escherichia coli can synthesize all amino acids it requires. It was exposed to shortwave radiation and two mutants were isolateD) One mutant was unable to synthesize biotin (a vitamin) and amino acid methionine. The other mutant could not synthesize amino acids threonine and leucine. The four chemicals are essential for the growth of bacteria.	154) B The lag phase is followed by a period of fast growth called log phase. It represents an active stage of growth. The mass of cells increases and reproduction follows it
140) B	Photoautotrophic bacteria possess chlorophyll and can manufacture their food) The source of energy is sunlight which they capture through chlorophyll. The chlorophyll is not contained in chloroplasts but it dispersed in the infolded region of cell membrane in cytoplasm.	155) C Does not form
141) A	Golden Rice contains beta-carotene, sor of A needed for normal vision. Bacteria are modified by genetic a precursor of vitamin A	156) C The genetic variation in bacteria is achieved either by mutation or genetic recombination. Mutation is a major source of variation in bacteria but additional diversity arises from genetic recombination.
142) A	The log phase (exponential growth phase) of a microbial population is when symptoms of infection typically become apparent, as the pathogen population is rapidly increasing.	157) C Bacterial conjugation is one of the three major known modes of genetic exchange between bacteria, the other two being transduction and bacterial transformation. Of these three modes, conjugation is the only one that involves cell-to-cell contact.
143) B		
144) B		
145) C		
146) D		
147) B	In case of bacteria, growth means the increase in the total population rather than increase in the size of organism.	
148) D	Bacteria grow very fast and their growth is	



- 158) C Binary fission is an asexual reproduction method where a single bacterium divides into two identical daughter cells. Transformation, transduction, and conjugation involve genetic material exchange but are not sexual reproduction methods; conjugation is the closest to sexual reproduction among them.
- 159) d
- 160) A In 1928 Frederick Griffith, an German microbiologist, injected live R-type cell into the body of a healthy mouse, the mouse remained alive and showed no symptoms of pneumonia. Then S type live cells were injected into the body of another mouse, the mouse suffered from pneumonia and died. Heat-killed S-type cells were injected into the body of a healthy mouse, the mouse remained alive.
- 161) B In 1928 Frederick Griffith, an German microbiologist, injected live R-type cell into the body of a healthy mouse, the mouse remained alive and showed no symptoms of pneumonia. Then S type live cells were injected into the body of another mouse, the mouse suffered from pneumonia and died. Heat-killed S-type cells were injected into the body of a healthy mouse, the mouse remained alive.
- 162) A In 1928 Frederick Griffith, an German microbiologist, injected live R-type cell into the body of a healthy mouse, the mouse remained alive and showed no symptoms of pneumonia. Then S type live cells were injected into the body of another mouse, the mouse suffered from pneumonia and died. Heat-killed S-type cells were injected into the body of a healthy mouse, the mouse remained alive.
- 163) B A mixture of heat killed S type and live R-type was injected into the body of a healthy mouse, the mouse died from pneumonia. The autopsy revealed the presence of many living S-type cells in the dead body of the mouse.
- 164) a Transduction
- 165) B Virulent phages
- 166) B Temperate phage
- 167) A The process of conjugation was studied in 1946 by Lederberg and Tatum in Escherichia coli.
- 168) B The incubation period of syphilis is 2-3 weeks
- 169) A Both *Salmonella typhi*, which causes typhoid fever, and *Clostridium tetani*, which causes tetanus, are examples of bacilli. Bacilli are rod-shaped bacteria. These pathogens are known for their significant impact on human health, causing diseases with distinct symptoms and modes of transmission.
- 170) A Syphilis is a bacterial infection caused by the bacterium *Treponema pallidum*. It is primarily transmitted through sexual contact.
- 171) C The most common symptom of gonorrhea, a sexually transmitted infection caused by the bacterium *Neisseria gonorrhoeae*, in males is painful or burning sensations during urination. Other symptoms can include discharge from the penis and painful or swollen testicles, but painful urination is often the most immediate and noticeable symptom.
- 172) C Helical
- 173) D The cells of the nonvirulent strain of *streptococcus pneumoniae* are Non-capsulated and R-type
- 174) C *Agrobacterium tumefaciens* is a bacterium commonly used in genetic engineering to introduce foreign genes into plant genomes. It naturally infects plants and transfers a segment of its DNA (known as T-DNA) into the plant cell, leading to the formation of a gall or tumor. Scientists exploit this natural process to introduce desired genes into plant cells for the production of transgenic plants like golden rice.
- 175) C 70 %
- 176) A Widal and typhoid test is used for diagnosis of typhoid fever.
- 177) C Immunization against the disease gives protection for about six months
- 178) B 23
- 179) A 0° C to 70°
- 180) A Airborne Bacterial diseases
- 181) B Waterborne Bacterial diseases
- 182) C Foodborne Bacterial diseases
- 183) A Cholera is caused by *Vibrio cholera*, a curved Gram-negative bacterium. It enters the intestinal tract from contaminated water and food. Bacteria secrete a toxin that stimulates the loss of fluid.
- 184) B Typhoid is caused by a rod-shaped Gram-negative bacterium called *Salmonella typhi*. This bacterium causes disease only in humans and is transmitted by flies, food, fingers, feces and fomites
- 185) C Tuberculosis is caused by *Mycobacterium tuberculosis*. It is a contagious disease.
- 186) D Pneumonia refers to a microbial disease of bronchial tubes and lungs. It is caused by bacteria, viruses and fungi. Over 80 percent of bacterial cases are due to *Streptococcus pneumoniae*.
- 187) A *E.coli*

**BOM SERIES**

Page 329

**BIOLOGY**

188) A	Bacterial leaf spots disease is caused by Pseudomonas spp. and Xanthomonas spp. Its host includes Chrysanthemum, Delphinium, Heuchera, Hypericum etc.	203) A	Atrichous
189) B	Bacterial wilt (BW) is yet another plant disease caused by Ralstonia solanacearum that affects pepper, tomato and eggplant. At	204) D	Sexual reproduction
190) c	Soft rots are caused by several bacteria, most commonly Pectobacterium carotovorum (previously called Erwinia carotovora), Dickeya dadantii (previously called Erwinia chrysanthemi), and certain species of Pseudomonas, Bacillus and Clostridium.	205) A	Bacteria
191) C	gown gall is caused by a soil-inhabiting bacterium, Agrobacterium tumefaciens, which occurs worldwide and attacks over 600 plant species in more than 90 plant families	206) A	Cellulose breakdown
192) D	Bacterial blights on different plants are known by different names and are caused by different species of bacteria. For example, bacterial blight of bean is caused by Xanthomonas axonopodis pv. Phaseoli, bacterial blight of cotton is caused by X. axonopodis pv. Malvacearum, Bacterial leaf blight of rice is caused by X. oryzae pv. Oryzae etc.	207) D	All of these
193) D	All of these	208) C	Dry heat sterilization, such as incineration or hot air ovens, causes oxidation of cellular components, effectively killing the bacterial cells. It's a method used for sterilizing materials that can withstand high temperatures.
194) A	Immunization to tuberculosis is done by injecting the vaccine called Bacille Calmette Guerin (BCG).	209) A	autoclaves are widely used for heat sterilisation and commonly use steam heated to 121–134 °C (250–273 °F) with a holding time of at least 15 minutes at 121 °C or 3 minutes at 134 °C, longer for liquids and surgical instruments packed in layers of cloth.
195) C	5 fs	210) B	
196) D	The drug given to pneumonia patient is penicillin with tetracycline and chloramphenicol used for people who are allergic to penicillin.	211) C	
197) A	Binary Fission	212) C	Explanation: The pasteurization of milk is done effectively through ultra-high temperature (UHT) in which milk is treated for 3 seconds at 1400C.
198) D	All of these	213) C	
199) A	Bacilli bacteria	214) A	Formalin, which is a solution of formaldehyde gas in water, is commonly used to preserve biological specimens by fixing tissues. It works by cross-linking proteins in the tissues, preventing their degradation and maintaining their structural integrity.
200) A	Bacterial diseases	215) B	
201) b	cyanobacteria	216) D	
202) A	Sporozoites	217) B	)

**Chapter 07 Protista & Fungi key**

1) A	18) A
2) B	19) D
3) C	20) A
4) B	21) C
5) C	22) C
6) C	23) D
7) D	24) C
8) B	25) B
9) D	26) A
10) B	27) D
11) D	28) B
12) A	29) C
13) B	30) A Zygospore
14) D	31) C Euglena
15) B	32) B Fungi
16) D	33) B Zooflagellates
17) B	34) B )

35) C		5. Chlorophyta:
)		1. Dinoflagellates: 2. Diatoms 3. Brown Algae: 4. Rhodophyta: 5. Chlorophyta:
36) A		60) D Plant like Protists: 1. Dinoflagellates: 2. Diatoms 3. Brown Algae: 4. Rhodophyta: 5. Chlorophyta:
)		61) D Animal like Protists (Protozoa) 1. Zooflagellates or kinetoplastid: 2. Amoeboid protozoan or sarcodines: 3. Apicomplexans or Sporozoans: 4. Ciliates
37) E		62) a Trypanosoma a parasite which is a case of any commandes Time familiar beige trypanosoma, are known as Africa in sleeping disease. Trypanosoma belongs to Zooflagellates or kinetoplastid.
38) B		63) A Trichonympha lives in the digestive tract of termites in produce an enzyme that helps in the digestion of wood.
39) A		64) B Ameoba is soft shapeless masses of cytoplasm. The change in shape is brought about by cytoplasmic streaming which forms cell extensions called pseudopodia.
40) D		65) B Amoeba reproduces by binary fission.
41) C		66) C Foraminifera
42) A		67) C Foraminifera
43) D		68) D The best-known apicomplex is the main parasite Plasmodium, Female Anopheles mosquito is the carrier plasmodium.
44)		69) D All ciliates have two different types of nuclei within the cells. Small micronuclei and larger macronuclei. Macronuclei are essential for the physiological function whereas micronuclei are needed only for sexual reproduction.
45) C		70) D Paramecium and balantidium coli are examples of Ciliates
46) A		71) A Balantidium coli inhabits intestinal tracts of pigs and rats. People working in slaughter houses may become infected by Balantidium coli.
47) D		72) a All ciliates have two different types of nuclei within the cells. Small micronuclei and larger macronuclei. Macronuclei are essential for the physiological function whereas micronuclei are needed only for sexual reproduction.
48) E		73) A Trichonympha lives in the digestive system of termites and produces cellulose, an enzyme that enables termites to digest wood.
49) D		74) B Amoeboid protozoan or sarcodines organ of locomotion are pseudopodia which are temporary protoplasmic outgrowth. These are also used for engulfing food particles
50) C		75) B Amoeba
51) C	Red algae contribute to making coral reefs and forming limestone deposits due to their calcium carbonate structures. They do not contribute to forming chalk deposits, which are primarily the result of the accumulation of calcium carbonate from the skeletal remains of microscopic marine organisms such as foraminifera.	76) A Age of Strata
52) d	Amoeba move and capture food through the extension of pseudopodia, which are temporary projections of the cell's cytoplasm. This movement allows them to engulf food particles and navigate through their environment.	77) B When an infected female Anopheles mosquito bites a person, sporozoites are injected into the blood stream. Sporozoites are carried to the liver where they stay and divide forming large number of merozoites, Merozoites emerge from the liver and invade red blood cells and start producing more merozoites within these cells.
53) B	Lichens are symbiotic associations between fungi and algae (or cyanobacteria). The algae provide photosynthetically derived nutrients to the fungus, while the fungus offers protection and moisture to the algae.	
54) D	Safranin is a biological stain used in microbiology and histology to stain certain types of cells and tissues, including blood cells, for microscopic examination	
55) C	Scientists think that protists are the oldest eukaryotes. If so, they must have evolved from prokaryotic cells.	
56) C	Protists are the simplest eukaryotes. Protists are not animals, plants, or fungi. The protist kingdom is sometimes called the trash can" kingdom. It includes all eukaryotes that don't fit in one of the other three eukaryote kingdoms: Animalia, Plantae, or Fungi.	
57) C	The protist kingdom is very diverse. There are thought to be between 60,000 and 200,000 protist species. Many have yet to be identified.	
58) C	It is thought that ancestral prokaryotic cells, which then became mitochondria in the eukaryotic cells. The process is called endosymbiosis.	
59) D	Plant like Protists: 1. Dinoflagellates: 2. Diatoms 3. Brown Algae: 4. Rhodophyta:	