

# BIOLOGY

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## 1. INTRODUCTION

### Branches of Botany

Branches	Study of
Morphology	Form, structure and development of plants
Anatomy	Internal structure of plant parts
Physiology	Functional aspects of life processes
Ecology	Relation of plants with environment
Taxonomy	Classification, identification and nomenclature of plants
Paleobotany	Fossil plants
Cytology	Cells
Genetics	Heredity and variation
Embryology	Development of egg after fertilisation & embryo formation
Phycology	Algae
Mycology	Fungi
Lichenology	Lichens
Bacteriology	Bacteria
Bryology	Bryophytes
Silviculture	Development & utilization of forest
Horticulture	Propagation of plants for fruits & ornamental value
Microbiology	Microbes
Pomology	Fruits
Dendrology	Shrubs & trees

### Branches of Zoology

Branches	Study of
Anthropology	Natural history of man
Apiculture	Rearing of honey bees
Batrecology	Frogs
Carcinology	Crustaceans
Cnidology	Coelenterates

Conchology	Molluscan shells
Entomology	Insects
Herpetology	Reptiles
Icthyology	Fishes
Karyology	Nucleus
Malacology	Mollusces
Mammology	Mammals
Nematology	Nematodes
Ophiology	Snakes
Palaeontology	Fossils
Parasitology	Parasites
Parazoology	Sponges
Phenology	Bird migration
Pisciculture	Rearing of fish in ponds
Sauromy	Lizards
Sericulture	Rearing of silk worms

### Fathers of various branches of Biology

Name	Field
Aristotle	Zoology, Biology
Mendel	Genetics
Hugo de Vries	Mutation
Van Baer	Modern Embryology
Carolus Linnaeus	Taxonomy
K. Land steiner	Blood groups
Vinci	Palaeontology
Harvey	Blood circulation
Hippocrates	Medicine
Louis Pasteur	Microbiology
Robert Koch	Bacteriology
AV Leeuwenhoek	Microscopy
Theophrastus	Botany
Robert Hooke	Cytology

### Important connecting links

Virus	: Living and non-living
Fuglena	: Plant and animal
Peripatus	: Annelida and arthropoda
Neopalina	: Annelida & mollusca
Ornithorynchus	: Reptile and mammals

### Different kinds of receptors related to Animals

Photoreceptor	- Light
Phonoreceptor	- Hearing
Olfactoreceptor	- Smell
Gustatoreceptor	- Taste
Tango receptor	- Touch, pressure
Thermo receptor	- Temperature
Rheo receptor	- Current of water hair
Galvono receptor	- Electric current
Algesi receptor	- Pain

### Various Adaptation

Volant	Aerial adaptation
Fossorial	Digging
Arboreal	Living on trees
Scansorial	Climbing & living on tree
Saltatorial	Jumping
Cursorial	Fast running
Sanguivorous	Feeding on blood
Phytophagous	Plant eaters

## 2. CLASSIFICATION OF ANIMALS

- Aristotle made the first recorded attempt to classify animals in his book *Historia Animalium*.

### Two kingdom system

- Biologist divided the living world into two kingdoms: Plants and Animals.
- It was given by Linneaus in 1758.

### Five kingdom system

- Given by Robert H Whittaker.
- Comprises of monera, protista, fungi, plantae & animalia.
- Based on (a) complexity of cell (b) complexity of organism (c) mode of nutrition (d) major ecological role.
- Most widely accepted.

### Kingdom Monera

- Prokaryote unicellular
- Include bacteria, filamentous actinomycetes & cyanobacteria (blue-green algae)

### Kingdom Protista

- Unicellular eukaryote

### Kingdom Fungi

- Non-motile fungi, heterotrophic, cell wall made of chitin.

### Kingdom Planae

- Non-motile, terrestrial and multicellular.
- Phototrophic, cells with cellulosic cell wall.

### Kingdom Animalia

- Eukaryotic, multicellular, heterotrophic, mostly motile.
- Cells without cell wall.

### Protozoa

- Unicellular or acellular animalcule, microscopic.
- Protoplasmic grade of organization.
- Locomotion by pseudopodia, flagella, cilia or non.
- Respiration and excretion through general body surface.
- Nutrition is holozoic, saprozoic or parasitic.

Eg. *Amoeba*, *Mycoplasma* (smallest protozoa), *Volvox*, *Trichomonas*, *Trypanosoma*, *Giardia*, *Leshmania*, *Entamoeba*, *Plasmodium*, *Paramecium*.

### Porifera

- Porous body.
- Sessile, diploblastic (ectoderm and endoderm).
- Cellular level of organization.
- Holozoic nutrition, excretion by general body surface by diffusion.
- Reproduction by budding or sexual.
- Internal skeleton.

Eg. *Sycon*, *Leucosolenia*, *Hyalonema*, *Euspongilla*, *Spongilla*.

### Coelenterata

- Stinging animals.
- Have one continuous space called coelenteron.
- Radially symmetrical, diploblastic.
- Coelom is absent i.e. acelomates. Single opening cavity called coelenterons functioning as both mouth and anus.
- Circulatory, respiratory and excretory systems are absent.
- Low-grade tissue organization.

- Short or slender tentacles serving for food intaking, capturing and defence.
- Reproduction by budding or sexually.

Eg. *Aurelia, Hydra, Zoochlorelia, Physalia, Obelia*

### **Platyhelminthes**

- Dorsoventrally flattened leaf like body & segmented.
- First to have tissue organ system of organization.
- First animal to have cephalization (head formation).
- First triploblastic & first bilateral symmetry.
- Aceolomate (body cavity absent).
- Skeleton, respiratory, circulatory systems are absent.
- Incomplete digestive system without anus.
- Nervous system with a pair of ganglia with longitudinal nerve cord.
- Excretion by solenocytes or flame cells.
- Larval stage in life cycle.
- Hermaphrodite (bisexual).

Eg. *Planaria, Fasciola hepatica, Schistosoma, Taenia solium, Hymenolepsis nana*.

### **Aschelminthes**

- Aquatic, terrestrial, free living as well as parasitic.
- Pseudoceolomate (false coelom).
- Cylindrical and unsegmented.
- Body covered by protective cuticle (syncitial).
- No distinct head, complete digestive system with mouth and anus.
- No circulatory and respiratory system.
- Excretion by protonephridia.
- First unisexual phylum (sexual dimorphism).

Eg. *Ascaris, Oxyrius, Rhabodites, Rotora, Limnias, Ancylostoma duodenale, Wuchereria bancroftii*.

### **Annelida**

- Elongated body, cylindrical or flattened and divided into segments by ring like grooves called annuli.
- Triploblastic (developing from three germ layers).
- True coelom (lined by mesodermal epithelium).
- First time circulatory system present.
- Excretion by nephridia consisting of coiled tubules.

Eg. *Nereis, Pheretima* (earthworm) *Hirudinaria, Polygordius*.

### **Arthropoda**

- Largest group of animal kingdom both in number of individuals and diversity of their ecological distribution.
- Bilaterally symmetrical, metamerically segmented.
- Jointed legs with variable function.
- Exoskeleton made of chitinous cuticle.
- Body divided into head, thorax and abdomen.
- Complete alimentary canal.
- Open type circulatory system. Blood is colourless & contains WBC only.

Eg. *Peripatus, Prawn, Crab, Scolopendra, Bombyx mori* etc.

### **Mollusca**

- Mostly marine, fresh water or found in damp soil.
- Unsegmented body, organ system organization and bilateral symmetry.
- Body with foot, head and visceral mass of digestive and circulatory organs.
- Body covered by calcareous shell.
- Blood vascular system is open type; blood blue colored due to presence of copper containing respiratory pigment called Haemocyanin.
- Excretion by kidney like sacs or by gills.
- Developed nervous system.

Eg. *Pila, Unio, Sepia, Octopus*.

### **Echinodermata**

- Spiny skinned; all marine.
- Body star shaped, spherical or cylindrical.
- Head absent.
- Water vascular system or ambulacrinal system.
- Tube feet for locomotion, respiration, food capturing.
- Sex separated.

Eg. *Sea cucumber, Sea lilies, Sea urchin, Starfish, Solaster*.

### **Chordata**

- Highest and most important phylum comprising a vast majority of living and extinct animals including human.
- Fundamental characters:  
All chordate possess three outstanding unique characteristics at some stage in their life cycle. They are:

- A dorsal hollow or tubular nerve cord.
- Notochord –longitudinal supporting rod.
- Series of pharyngeal gill slits.

#### General characteristics

- Aquatic, terrestrial or aerial.
- Bilateral symmetry, metamerically segmented.
- Postnatal tail at some stage.
- Exoskeleton often present in some forms.
- Cartilaginous or bony living endoskeleton.
- Triploblastic, coelomate.
- Developed digestive, respiratory, circulatory & other systems.

#### Pisces

- All true fishes, aquatic.
- Paired as well as median fins.
- Respiration by gills, cold blooded, scaly skin.

Eg. *Climatius, Dincithys, Labeo, Hippocampus, Salmon, Hilsa.*

#### Amphibia

- First cold blooded vertebrates.
- Amphibious animals, non marine.
- Skin thin, moist, glandular, respiratory and vascular, no exoskeleton.
- Two pairs of limbs.
- Respiration by lungs, buccopharyngeal cavity, skin & gills.
- Double circulation.

Eg. *Rana, Rhacophorus, Ichthyophis, Necturus, Siren.*

#### Reptiles

- Creeping and borrowing cold blooded vertebrates.
- Skin no glandular, exoskeleton of epidermal scales.
- Pulmonary respiration, Heart 3 to 4 chambered.
- Internal fertilization, oviparous (egg laying), some viviparous.

Eg. *Chelone, Lizard, Snake, Crocodile.*

#### Aves

- Warm blooded.
- Forelimbs modified into wings for aerial adaption.
- Endoskeleton bony.

- Food storing crop & masticating gizzard present.
  - Sound producing organ syrinx.
- Eg. Parrot, Peigon, *Dodo, Archateoperyx*.

#### Mammalia

- Hairy exoskeleton, locomotion or 4 limbs.
- Presence of nails, claws or hooves on digits.
- Oil & sweat gland in skin.
- Teeth heterodont, thecodont (embedded in cavity) & diphyodont (2 sets).
- Four chambered heart, RBC biconcave and denucleated, viviparous (directly birth of young ones).

Eg. *Echidna, Duck billed platypus, Kangaroo, Human.*

#### Multiple Choice Questions:

1. Fruit eating animals are:  
a) Carnivorous                            b) Insectivorous  
c) Sanguivorous                            d) Frugivorous
2. What would you call the study of fishes?  
a) Ichthyology                            b) Herpetology  
c) Ornithology                            d) Mammalogy
3. Binomial system of nomenclature in classification was devised by C. Linnaeus. It provides the names pertaining to:  
a) One scientific and one popular  
b) The two given by taxonomists  
c) One generic and one specific epithet  
d) International identifying catalogue
4. Which of the following is known as father of taxonomy?  
a) Engler                                    b) Aristotle  
c) Linnaeus                                    d) Eichler
5. Which is the national bird of Nepal?  
a) *Passer domesticus*                    b) *Pavo cristatus*  
c) *Columba livia*                            d) *Lophophorus impejanus*
6. Study of reptiles is called:  
a) Reptology                                    b) Gerontology  
c) Hematology                                    d) Herpetology
7. Linnaeus had the credit for:  
a) Discovery of microscope  
b) Discovery of blood circulation  
c) Theory of biogenesis  
d) Binomial nomenclature

8. Blood do not transport oxygen in:  
 a) Cockroach                    b) Bird  
 c) Earthworm                  d) Rabbit
9. Diffused Nervous System is found in ---  
 a) Porifera                    b) Coelenerata  
 c) Platyhelminthy            d) Annelida
10. The most primitive placental mammal is:  
 a) Platypus                    b) Bat  
 c) Shrew                        d) Mice
11. How many segments present in Leech:  
 a) 23                            b) 33  
 c) 43                            d) 53
12. A characteristic feature of insects is:  
 a) Antennae  
 b) 3 pair of legs  
 c) A pair of compound eyes  
 d) 2 pair of wings
13. Larva of Butterfly and moth is called as:  
 a) Caterpillar                b) Maggot  
 c) Wriggler                    d) Grub
14. Which among the following belong to Pisces?  
 a) Jell fish                    b) Silver fish  
 c) Sea horse                  d) Sea mouse
15. *Hemidactylus* is the zoological name of:  
 a) Wall lizard                b) Garden lizard  
 c) Flying lizard              d) Tuatara lizard
16. Parrot is:  
 a) Polygamous  
 b) Gregarious  
 c) Crepuscular  
 d) All of the above
17. *Amoeba* is:  
 a) Parasitic Protozoan  
 c) Holophytic Protozoan  
 b) Free-living Protozoan  
 d) Saprophytic Protozoan
18. Sponge is:  
 a) Monoblastic animal  
 c) Triploblastic animal  
 b) Diploblastic animal  
 d) None
19. Excretion in mammal is:  
 a) Ammonotelic  
 c) Ureotelic  
 b) Uricotelic  
 d) None
20. *Peripatus* is the connecting link between:  
 a) Annelida – Arthropoda    b) Annelida – Mollusca  
 c) Annelida – Echinodermata    d) Aschelminthes – Annelida
21. Whale is a:  
 a) Fish                        b) Amphibia  
 c) Reptile                    d) Mammal
22. Tapeworm has no digestive system because:  
 a) it is a parasite  
 b) it lives in intestine  
 c) it doesn't need food  
 d) it absorbs its food from general body surface
23. Flatworms are devoid of:  
 a) Circulatory system        b) Respiratory system  
 c) Skeletal system            d) All of the above
24. Hooks & powerful suckers found in tapeworm are meant for:  
 a) Attachment with hosts body    b) Sucking food from host  
 c) Both a & b                    d) None
25. Anaerobic respiration is found in:  
 a) Earthworm                b) Leech  
 c) *Paramecium*              d) Tapeworm
26. The space between body wall and alimentary canal of *Ascaris* is known as:  
 a) Haemocoel                b) Coelom  
 c) Pseudocoel                d) None
27. Which of the class of phylum arthropoda has no antennae?  
 a) Crustacea                b) Myriapoda  
 c) Insecta                    d) Arachnida
28. Cuticle of *Ascaris* is an adaptation for:  
 a) Parasitism                b) Growth  
 c) Reproduction             d) Locomotion
29. Insects are active because:  
 a) They are small  
 b) They have open vasulation  
 c) They have developed respiratory organs  
 d) They are adapted for flight
30. Pupa of butterfly is called as:  
 a) Caterpillar                b) Chrysalis  
 c) Imago                      d) Nymph
31. The body of all vertebrates is:  
 a) Bilaterally symmetrical  
 b) Radially symmetrical  
 c) Spherically symmetrical  
 d) Asymmetrical
32. Water vascular system is found in:  
 a) Porifera                    b) Annelida  
 c) Mollusca                    d) Echinodermata

33. In the larva of frog the respiration is carried out by:  
a) Gills                    b) Lungs  
c) Skin                    d) Skin & gills
34. Which one of the following is a viviparous snake?  
a) *Bungarus*              b) *Naja naja*  
c) *Natrix*                d) *Vipera*
35. A centipede has:  
a) 50-100 legs              b) 100 legs  
c) As many legs as body segments              d) As many pairs of legs as body segments except the anteriormost
36. Which is the common character between all the mammals?  
a) They are viviparous      b) They are herbivorous  
c) They are carnivorous      d) They have 7 cervical vertebrae
37. Birds are characterized by the presence of:  
a) Wings                    b) Feathers  
c) Beak                    d) Four chambered heart
38. Snakes lack:  
a) Limbs                    b) Girdles  
c) Eyelids                  d) All of above
39. *Octopus* belongs to which phylum?  
a) Echinodermata          b) Arthropoda  
c) Mollusca                d) Porifera
40. *Helix* is the name of:  
a) Apple snail              b) Garden snail  
c) Snail                    d) Slug
41. Anus is situated in the last segment in:  
a) Annelids                b) Chordates  
c) Non-chordates          d) Vertebrates
42. Which of the following is warm blooded animal?  
a) Rabbit                    b) Turtle  
c) Frog                    d) Fish
43. Piscivorous fishes feed on:  
a) Jelly fish                b) Globe fish  
c) Fish                    d) Mollusca
44. Largest number of cells are found in:  
a) Brain                    b) Spinal cord  
c) Retina                    d) Tongue
45. Cloacal aperture is present in one of the following:  
a) Frog                    b) Earthworm  
c) Cockroach              d) Rabbit
46. For seeing a Haemocoel which animal you will select:  
a) Earthworm              b) Hydra  
c) Sponge                  d) Cockroach
47. As a basic character, dorsal tubular nerve cord is present in:  
a) Some chordates          b) All chordates  
c) Some invertebrates      d) All vertebrates
48. Which is common in cockroach and earthworm?  
a) Dorsal nerve cord      b) Ventral nerve cord  
c) Cocoon                  d) Ommatidia
49. Bilateral symmetry, metameric segmentation, coelom and open circulatory system are characteristics of:  
a) Annelida                b) Arthropoda  
c) Mollusca                d) Echinodermata
50. Which one of the following features is found in chordates but not in non-chordates?  
a) Gills                    b) Spiracles  
c) Post anal tail          d) Chitinous exoskeleton
51. In which phylum adults have radial symmetry but the larvae have bilateral symmetry?  
a) Porifera                b) Coelenterata  
c) Annelida                d) Echinodermata
52. Contractile vacuole in a protozoan is responsible for:  
a) Ingestion                b) Digestion  
c) Locomotion              d) Osmoregulation
53. In *Hydra*, the non-cellular layer is:  
a) Epidermis                b) Hypodermis  
c) Mesodermis              d) Mesogloea
54. *Hydra* can be called:  
a) Coelomate                b) Pseudocoelomate  
c) Acoelomate              d) Haemocoelomate
55. Animals of phylum porifera are characterized by:  
a) Coelenteron              b) Canal system  
c) Coelom                    d) Haemocoel
56. Cavity of *Ascaris* is:  
a) Coelom                    b) Haemocoel  
c) Pseudocoel                d) Coelenteron
57. Life span of adult silkworm is about:  
a) 10 to 15 days            b) 5 to 6 days  
c) 20 days                  d) 2 weeks
58. Genus is a group of similar and related:  
a) Families                b) Orders  
c) Species                  d) Genera

59. Which of the following animals is sedentary as adult but active as larva?
- Frog
  - Sponge
  - Jelly fish
  - Rat flea
60. Nervous system in sponges is:
- Very primitive
  - Well developed
  - Without definite brain and nerves
  - Absent
61. Asexual reproduction during schizogony of malarial parasite is a kind of:
- Binary fission
  - Budding
  - Fragmentation
  - Multiple fission
62. The main purpose of classification is:
- To locate animals
  - To study facts of evolution
  - To establish relationships
  - To study ecology of animals
63. Which of the following protozoa is considered as connecting link between animals and plants?
- Entamoeba*
  - Paramecium*
  - Euglena*
  - Monocystis*
64. The basic unit of taxonomy is:
- Genus
  - Species
  - Order
  - Class
65. Which of the following group is exclusively marine?
- Porifera
  - Coelenterata
  - Mollusca
  - Echinodermata
66. In which animal diploblastic acelomate condition is present?
- Planaria*
  - Ascaris*
  - Sea anemone
  - Earthworm
67. Radial symmetry is found in:
- Coelenterata
  - Annelida
  - Echinodermata
  - both a & c
68. Which one is a matching set in animal taxonomy?
- Planaria*, Round worm, Earthworm
  - Millipede, Centipede, Cockroach
  - Starfish, Cuttlefish, Jellyfish
  - Leech, Sea-urchin, Liver fluke
69. Which set of the characters, phylum Arthropoda possesses?
- Jointed legs, triploblastic, bilaterally symmetrical, metamerically segmented.
  - Jointed legs, diploblastic, bilaterally symmetrical, metamerically segmented.
  - Jointed legs, diploblastic, radially symmetrical, metamerically segmented.
  - Jointed legs, triploblastic, radially symmetrical, non-metamerically segmented.
70. In classification the descending order of taxa is:
- Kingdom-division-order-class-genus-species
  - Kingdom-order-class-division-genus-species
  - Kingdom-phylum-order-class-species-genus
  - Kingdom-phylum-class-order-genus-species
71. Cold blooded animals are those having:
- Cold blood
  - Variable body temperature according to the temp. of atmosphere
  - Always constant temp.
  - Blood which can down even below 4°C
72. The main basis of classification of protozoa is:
- Number of nuclei
  - Method of reproduction
  - Shape of organisms
  - Locomotory device.
73. Which one of the following sets of animals belong to the same phylum?
- Earthworm, Tapeworm, Leech
  - Prawn, Cockroach, Scorpion
  - Sea urchin, Sea horse, Starfish
  - Sea urchin, Cuttlefish, Flying fish
74. In course of evolution, true coelom first evolved in:
- Echinodermata
  - Annelida
  - Chordata
  - Aschelminthes
75. The biggest phylum in regard to the number of species is:
- Arthropoda
  - Platyhelminthes
  - Chordata
  - Protozoa
76. Protozoans are:
- Non-cellular
  - Acellular
  - Unicellular
  - Any of the above
77. Which one of the sponges, corresponds to the mouth of other animals?
- Osculum
  - Incurrent canal
  - Ostia
  - Excurrent canal.

78. The cavity in the body of *Hydra* is:  
a) Hydrocoel                  b) Coelenteron  
c) Haemocoel                  d) Coelom
79. Platyhelminthes are:  
a) Acoelomate                  b) Coelomate  
c) Haemocoelomate                  d) Pseudocoelomate
80. *Ascaris* is:  
a) Bisexual                  b) Unisexual  
c) Host                  d) Marine
81. The hind wings of mosquito are represented by:  
a) Elytra                  b) Halters  
c) Pulvilli                  d) Scutella
82. Malpighian tubules are:  
a) Excretory organs of insects  
b) Excretory organs of frog  
c) Respiratory organs of insects  
d) Endocrine glands of insects
83. Imago is the name for the young ones of:  
a) Butterfly                  b) Beetle  
c) Housefly                  d) Mosquito
84. Oviparity is common in:  
a) Rabbit                  b) Whale  
c) Parrot                  d) Bat
85. In honey bee, the larvae are at first fed on a secretion, the royal jelly which is produced by:  
a) Drones                  b) Neuters  
c) Queen                  d) Workers
86. Phylum which includes animals, which live in land, water and can fly is:  
a) Annelida                  b) Porifera  
c) Arthropoda                  d) Protozoa
87. *Gambusia* is a:  
a) Pest on fishes                  b) Pathogenic fish  
c) Parasitic fish                  d) Fish predator of mosquito larvae
88. Among following which is true fish?  
a) Devil fish                  b) Flying fish  
c) Cray fish                  d) Cuttle fish
89. A frog lives in water or near water because:  
a) It can get its food easily in water  
b) Its hind limbs are webbed and help in swimming  
c) It respires through skin  
d) It can see through its transparent eye
90. The most highly advanced character in crocodile is the presence of:  
a) Powerful jaws                  b) Shelled eggs  
c) Thecodont dentition                  d) Four chambered heart
91. Mark the odd member from following:  
a) Turtle                  b) Lizard  
c) Crocodile                  d) Dolphin
92. Chief distinguishing features of mammals:  
a) Hairy skin and oviparity  
b) Hairy skin and mammary glands  
c) Mammary glands and teeth  
d) Pinnae and teeth
93. Homiothermic animals are:  
a) Animals                  b) Mammals  
c) Birds and mammals                  d) Man & Birds
94. Bats and birds are good fliers but the bat differs from bird in having:  
a) Diaphragm                  b) Four-chambered heart  
c) Wings                  d) Homiothermic
95. Temperature regulation is found in:  
a) Rat                  b) Fish  
c) Frog                  d) Lizard
96. The biggest living creature in the world belongs to:  
a) Echinodermata                  b) Mammalia  
c) Aves                  d) Reptilia
97. First step in taxonomy is:  
a) Naming                  b) Identification  
c) Description                  d) Classification
98. The tapeworm takes its food through:  
a) Suckers                  b) Mouth  
c) Scolex                  d) Skin
99. A triploblastic, unsegmented animal with complete alimentary canal could be a:  
a) Round worm                  b) Planaria  
c) Liverfluke                  d) Earthworm
100. Which of the following will have greater number of organisms?  
a) Species                  b) Genus  
c) Class                  d) Phylum
101. In which of the following insect, the pupal stage is active:  
a) Housefly                  b) Mosquito  
c) Butterfly                  d) None

102. Find out the unmatching set in animal taxonomy.  
a) Sea urchin, Sea cucumber, Sea lily  
b) Sea horse, Rohu fish, Ray fish  
c) Cuttle fish, Cray fish, Devil fish  
d) Jelly fish, Obelia, Sea anemone
103. Find out the unmatching set from the following.  
a) Setae/Earthworm      b) Podia/Starfish  
c) Flagella/Plasmodium    d) Fins/Fish
104. If thyroid gland is removed from a tadpole, it will:  
a) Die immediately  
b) Grow into a giant frog  
c) Turn into a dwarf frog  
d) Remain tadpole throughout life
105. Triploblastic acelomate condition is the characteristic of :  
a) Hydra                   b) Liverfluke  
c) Roundworm              d) Earthworm
106. The class of Arthropoda without antennae is:  
a) Crustacea              b) Myriapoda  
c) Insecta                 d) Arachnida
107. Animals modified for climbing are called:  
a) Cursorial              b) Arboreal  
c) Fossorial              d) Volant
108. Adults of one of the following phylum are sessile but the larvae are free living. It is:  
a) Arthropoda              b) Annelida  
c) Coelenterata            d) Porifera
109. Main basis of classification of phylum Protozoa is:  
a) Locomotory device  
b) Number of nuclei  
c) Shape of organism  
d) Method of reproduction
110. Heart of Frog is:  
a) 2-chambered            b) 3-chambered  
c) 4-chambered            d) none
111. Fertilization in Earthworm (*Pheretima posthuma*) is:  
a) External                b) Internal  
c) Both                    d) None
112. Osmoregulation in Protozoa is the function of:  
a) Contractile vacuoles    b) Food vacuoles  
c) Nucleus                d) Mitochondria
113. *Hydra* is:  
a) Bilaterally Symmetrical    b) Radially Symmetrical  
c) Asymmetrical            d) None
114. Diploblastic condition is found in:  
a) *Amoeba*                b) Sponges  
c) Flatworms                d) Roundworms
115. Highest unit of classification is:  
a) Kingdom                b) Phylum  
c) Genus                    d) Species
116. Which of the following includes highest number of organisms?  
a) Kingdom                b) Phylum  
c) Family                    d) Species
117. Viviparity can be seen among:  
a) Amphibians              b) Reptiles  
c) Birds                    d) Mammals
118. Duck billed platypus is the connecting link between:  
a) Reptiles & Birds        b) Amphibians & Reptiles  
c) Reptiles & Mammals    d) Birds & Mammals
119. Blood eaters are called:  
a) omnivorous              b) sanguivorous  
c) gregarious              d) coprophagous
120. Frog has what type of vision?  
a) monocular vision      b) binocular vision  
c) triclar vision            d) both a and b
121. What type of symmetry is found in coelenterates?  
a) Asymmetry              b) Radial  
c) Bilateral                d) Spherical
122. Body is unsegmented in:  
a) Mosquito                b) Earthworm  
c) Roundworm              d) Scorpion
123. Which of the following statements about Linnaeus's system of classification is false?  
a) Every organism has a genus and a species name.  
b) Organisms are classified mainly according to habitat  
c) Humans are classified as *Homo sapiens*  
d) A species consists of closely related organisms that are similar in structure and can interbreed
124. What is the most common characteristics of phylum porifera and phylum echinodermata?  
a) Both are marine            b) Both have canal system  
c) Both are triploblastic    d) Both a and b
125. Larva of housefly is called:  
a) Nymph                    b) Imago  
c) Maggot                  d) Tumbler

126. The erythrocytic phase of the life cycle of Plasmodium occurs in:  
 a) Hepatic cells                    b) WBC  
 c) Blood                            d) RBC
127. Animal phylum containing largest no. of species is Arthropoda.  
 The second largest phylum is:  
 a) porifera                        b) pisces  
 c) mollusca                        d) protozoa
128. In *Paramecium*, the cilia at caudal region are longer than other areas. This arrangement is called:  
 a) Amphitrichous                b) monotrichous  
 c) haptotrichous                d) holotrichous
129. *Fasciola hepatica* is commonly called:  
 a) Blood fluke                    b) tape worm  
 c) liver fluke                    d) planaria
130. Choanocyte cells are the distinguishing characters of phylum:  
 a) Porifera                        b) Coelenterata  
 c) Platyhelminthes              d) Echinodermata
131. Sea – anemone lies in the phylum:  
 a) porifera                        b) echinodermata  
 c) mollusca                        d) coelenterata
132. Frog respires through:  
 a) skin                            b) lungs  
 c) buccal cavity                d) all of these
133. The excretory organ of annelida is nephridia. The excretory organ of platyhelminthes is:  
 a) solencocyte                    b) madreporite  
 c) radula                        d) gynaecophoric canal
134. The main purpose of classification is:  
 a) to locate animals  
 b) to study facts of evolution  
 c) to establish relationships  
 d) to study the ecology of animals
135. Which of the following mentioned below shows the maximum adaptation both externally and internally?  
 a) monkey                        b) birds  
 c) chameleon                    d) tortoise
136. Connecting link between Annelida and Arthropoda is:  
 a) *Archaeopteryx*              b) *Peripatus*  
 c) Duck billed platypus        d) Spiny ant eater
137. Animals modified for running are called as:  
 a) Cursorial                    b) Ambulatory  
 c) Volant                        d) Arboreal
138. The larva of mosquito is called as:  
 a) Maggot                        b) Nymph  
 c) Wriggler                     d) Tumbler
139. *Ascaris* is:  
 a) Bisexual                      b) Unisexual  
 c) Host                          d) Marine
140. Tubefeet are locomotory organs found in:  
 a) Echinoderms                b) Molluscs  
 c) Arthropods                  d) Annelids
141. Malaria is caused by the infection of:  
 a) Plasmodium                  b) Mosquito  
 c) Ascaris                      d) Bad air
142. The characteristic feature of sponges is:  
 a) gastro vascular cavity    b) tentacles  
 c) hypostome                    d) canal system
143. The posterior end of male *Ascaris* remains:  
 a) curved                        b) cylindrical  
 c) spiral                        d) straight
144. Sporogony in life *Plasmodium* occurs in:  
 a) Liver of man  
 b) RBCs of man  
 c) Salivary glands of mosquito  
 d) On the wall of the mosquito's stomach
145. The poisonous fluid in the nematocysts of Hydra is:  
 a) hypnotoxin                    b) toxin  
 c) heparin                      d) haematin
146. Amphibian heart is:  
 a) one chambered              b) two chambered  
 c) three chambered            d) four chambered
147. Tusk of an elephant is an enlarged:  
 a) upper canines                b) upper incisors  
 c) lower incisor                d) premolars
148. Flame cells are excretory organs of:  
 a) *Ascaris*                    b) *Taenia* and other flatworms  
 c) Sponges                      d) none
149. The mosquitoes having blood sucking mouth parts are:  
 a) Only male                    b) Only female  
 c) Both                        d) None
150. Body is un-segmented in:  
 a) mosquito                    b) ascaris  
 c) earthworm                    d) scorpion

151. Difference between larvae of *Culex* and *Anopheles* is in the presence of:  
a) Eyes                    b) tail  
c) respiratory trumpet      d) curved body shaped
152. *Ascaris* is found as endoparasite in:  
a) blood of man            b) intestine of man  
c) muscles of pig          d) body cavity of man
153. Which of the parasite has no alimentary canal?  
a) liverfluke                b) ascaris  
c) tapeworm                 d) pinworm
154. From which stage of silk moth, the silk is obtained:  
a) Adult                    b) Egg  
c) Caterpillar              d) Cocoon
155. Tumbler is the name given to the pupa of:  
a) Butterfly                b) mosquito  
c) housefly                 d) beetle
156. Which of the following animal is a poikilotherm?  
a) Fish                      b) Frog  
c) Snakes                    d) All of there
157. Fertilization in frog takes place in  
a) Uterus                    b) Fallopian tube  
c) Water                     d) Upper part of oviduct
158. Metamorphosis occurs in:  
a) Ascaris                    b) Earthworm  
c) Tapeworm                d) Frog
159. When a frog is transferred from  $20^{\circ}\text{C}$  to  $30^{\circ}\text{C}$ , its body temperature:  
a) Rise to  $20^{\circ}\text{C}$             b) Rises to  $30^{\circ}\text{C}$   
c) Falls to  $15^{\circ}\text{C}$             d) Remains constant
160. Frog produces sound during rainy season to:  
a) Terrify the enemies      b) Warn other frogs from enemies  
c) Invite female frogs      d) None of these
161. Which feature of the life history of a female mosquito makes it an effective vector of malaria?  
a) It has three pairs of legs      b) It has wings  
c) It lays eggs in water          d) It mates frequently
162. Pneumatic bones of birds:  
a) Increase the respiratory rate  
b) Increase the heart beat rate  
c) Increase the  $\text{CO}_2$  output  
d) Increase the buoyancy
163. How many days does an adult Silkworm survive?  
a) 10- 12 days              b) 5- 6 days  
c) 1 – 2 weeks              d) 2 – 3 weeks
164. Vector insects are which:  
a) Spread diseases          b) Destroy crops  
c) Spoil soil                 d) Act as Scavengers
165. Kala-azar disease is transmitted by:  
a) House fly                b) Bed bug  
c) Louse                    d) Sand fly
166. Which disease is caused by a nematode?  
a) Amoebiasis              b) Filariasis  
c) Tuberculosis             d) Leprosy
167. The single-celled organism that causes malaria is transmitted by mosquitoes. Mosquito are best described as:  
a) a disease                b) a pathogen  
c) a phagocyte              d) a vector
168. In rabbit, the digestion of cellulose takes place in:  
a) Colon                    b) Ileum  
c) Caecum                  d) Rectum
169. During course of evolution, true coelom is first evolved in:  
a) Coelenterata            b) Aschelminthes  
c) Annelida                d) Arthropoda
170. Connecting link between animals and plants is:  
a) virus                    b) euglena  
c) bacteria                d) yarshagumba
171. Which control measure would not prevent the spread of malaria?  
a) boiling drinking water  
b) covering windows with netting  
c) draining swamps  
d) spraying insecticides onto stagnant water
172. Connecting link between reptiles and birds is:  
a) *Dodo*                    b) *Sphenodon*  
c) *Dimetrodon*            d) *Archaeopteryx*
173. Paleontology is the study of:  
a) Birds                    b) Bones  
c) Breasts                  d) Fossils
174. Branch of zoology dealing with study of behaviour of animals is:  
a) Sociology                b) Ethology  
c) Ecology                  d) Ichthyology
175. Relation between malaria and mosquito was discovered by:  
a) Ronald Ross            b) William Harvey  
c) Pasteur                  d) A. Laveran

176. The study of cause of disease is known as:  
a) Pathology                    b) Etiology  
c) Ethology                    d) Parasitology
177. Scientific culture of silkworm is:  
a) Apiculture                b) Pisciculture  
c) Sericulture                d) Silkworm farming
178. Which of the following branches of biology applies both to plants and animals?  
a) Virology                    b) Taxonomy  
c) Bacteriology              d) Entomology
179. Term biology is coined by:  
a) Lamarck                    b) Darwin  
c) Aristotle                  d) Mandel
180. The light source in electron microscope is:  
a) Normal day light        b) Infrared light  
c) UV light                    d) Beam of electrons
181. The science which deals with the study of insects is:  
a) Insectology                b) Parasitology  
c) Entomology                d) Ornithology
182. Entomology deals with:  
a) Protozoans                b) Parasites  
c) Insects                    d) Fishes
183. Homologous structure have:  
a) Similar origin but similar or dissimilar functions  
b) Dissimilar origin but similar functions  
c) Dissimilar origin but dissimilar functions  
d) Dissimilar origin and dissimilar structures
184. The circulation of blood was first demonstrated by:  
a) Metchnikoff                b) Pasteur  
c) A. V. Leeuwenhoek        d) Harvey
185. The theory of inheritance of acquired characters was disproved by:  
a) A. Weismann              b) J.B. Lamarck  
c) Charles Darwin            d) Robert Koch.
186. Study of the history of human development  
a) Embryology                b) Anthropology  
c) Phylogeny                d) Evolution
187. Malarial parasite was first discovered by:  
a) Ronald Ross              b) Charles Laveren  
c) Louis Pasteur            d) Jenner
188. "Philosophie Zoologique" a book published in 1809 was written by:  
a) Darwin                    b) Lamarck  
c) Mendel                    d) Weismann
189. The study of fish culture is:  
a) Ichthyology                b) Herpetology  
c) Pisciculture                d) Apiculture
190. Animals living and subsisting on other organisms come under:  
a) Pathology                b) Parasitology  
c) Parazooology              d) Helminthology
191. The branch of science that deals with the study of identification, nomenclature and classification of the organisms is:  
a) Anatomy                    b) Morphology  
c) Zoology                    d) Taxonomy
192. Darwin is famous for:  
a) Theory of mutation      b) Inheritance of acquired characters  
c) Natural selection        d) Law of independent assortment
193. Co-worker of Darwin was:  
a) Mendel                    b) Wallace  
c) Bateson                    d) Lamarck
194. The circulation of blood in closed circulatory system was discovered by:  
a) Francis Darwin            b) William Harvey  
c) Theophrastus             d) Hippocrates
195. Biochemical theory of origin of life was proposed by:  
a) Miller & Urey            b) Aristotle  
c) Oparin & Haldane        d) Darwin
196. Which of the following was not present in the primitive Earth?  
a) Hydrogen gas            b) Oxygen gas  
c) Methane                    d) Ammonia
197. Which one of the following best supports about evolution?  
a) paleontological evidence    b) study of bio-geography  
c) embryological evidence    d) atavism
198. Theory of natural selection was proposed by:  
a) Lamarck                    b) Darwin  
c) Linnaeus                  d) Mendel
199. The term evolution in Biology means that:  
a) Fossils are old            b) Living things constantly change  
c) Life began in sea        d) Man descended from Apes
200. Analogous organs are those, which are:  
a) Structurally similar  
b) Structurally as well as functionally similar  
c) Functionally similar  
d) Normally non-functional

201. Which statement does not describes an example of artificial selection?  
a) It has been found that some strains of bacteria produce antibiotics.  
b) It is common practice to mate bulls with cows that produce the most milk.  
c) It is possible to control caterpillars on food crops by releasing small wasps which lay their eggs in caterpillars and kill them.  
d) Mosquitoes have developed strains that are resistant to insecticides.
202. The ultimate source of organic variation is:  
a) Natural selection      b) Sexual reproduction  
c) Hormonal                d) Mutations
203. The theory of inheritance of acquired characters was disproved by:  
a) A Weismann            b) J.B. Lamarck  
c) Louis Pasteur          d) Charles Darwin
204. Branch of Biology dealing with distribution of plants on earths surface is called:  
a) Phytogeography        b) Phytosociology  
c) Ecology                  d) Phytology
- Plasma membrane is made of phospholipid and protein.  
• The chromosome is composed of nucleo-proteins.  
• Golgi body or dictyosomes are secretory in function.  
• Mitochondria are the power house of the cell and site for respiration and ATP synthesis.  
• Enfolding in mitochondrial inner membrane is called cristae.  
• ATP is considered as currency of cell.  
• Chloroplast is site of photosynthesis. Chloroplast contains grana & stroma.  
• Granum is formed by thylakoids while stroma is a homogeneous matrix.  
• Lysosomes are called suicidal bags of the cells containing hydrolytic enzymes.  
• Anthocyanin pigment is found in vacuoles responsible for different colours of flowers.  
• Membrane of vacuole is called tonoplast and vacuole contains cell sap.  
• Ribosomes are made up of rRNA and protein.  
• 70s ribosomes are found in prokaryotes as well as in mitochondria and chloroplast.  
• 80s ribosomes are found in eukaryotes.  
• Measuring unit of ribosome size is svedberg unit (s).  
• Ribosome is site for protein synthesis.  
• Nucleus is absent in RBC of animal cells & sieve tube cells of vascular plant.  
• Nuclear membrane and nucleous are absent in prokaryotes.  
• DNA is genetic material of cell.  
• DNA has deoxyribose sugar (pentose sugar) while RNA has ribose sugar.  
• In DNA Guanine pairs with cytosine while Adenine pairs with Thymine.  
• Pyrimidine base thymine is absent and is replaced by uracil in RNA.  
• Combination of a base and sugar is called Nucleotide.  
• Nucleotide and phosphate group is called Nucleotide.  
• Length of one complete turn of DNA helix is  $34\text{A}^\circ$ .  
• DNA is also present in chloroplast and mitochondria so they are called semi-autonomous organelles.  
• Genes are segment of DNA that gives functional protein.

### 3. CELL BIOLOGY AND GENETICS

- The cell is structural and functional unit of organisms.
- Cell theory was propounded by Schleiden and Schwann.
- The rigid cell wall is present in plant cell while absent in animal cell.
- The cell wall is made up of cellulose in most plant except Fungi, Bacteria & Blue green algae.
- Cell wall has middle lamella made of calcium pectate.
- Cytoplasma with nucleus is called protoplasm.
- Protoplasmic connection between adjacent cells in a multicellular organism is called plasmodesmata.
- Huxley defined protoplasm as physical basis of life.
- Cytoplasm without cell organelles is cytosol.
- Largest component of cell is nucleus.
- DNA of bacteria and viruses are circular.
- Endoplasmic reticulum and Golgi bodies have cisternae, tubule & vesicles.

- m-RNA synthesis from DNA is transcription and synthesis of protein from m-RNA is translation.
- Centrosomes are present in animal cells but absent in plant.
- Set of chromosomes inherited as a unit is called genome.
- The gene is heredity unit.
- Longest phase of cell cycle is Interphase.
- Replication of DNA takes place in S phase of Interphase.
- Longest phase of cell division is Prophase.
- During Prophase nuclear membrane and nucleolus disappear.
- In Mitosis the no of chromosomes do not change.
- Mitosis occurs in somatic or vegetative cells.
- Chromosomes are arranged in single line (at equator) during mitotic Metaphase.
- Separation of chromatids occurs in Anaphase & chromosomes move towards their respective poles.
- Characteristics of Telophase is just opposite of Prophase.
- In Meiosis the no of chromosomes is reduced to half.
- Meiosis occurs in reproductive cells.
- Pairing of homologous chromosomes is called synapsis. It occurs in Zygotene of Prophase I.
- Exchange of chromatid segments between maternal and paternal chromosomes during Meiosis is called crossing over.
- Crossing over takes place in Pachytene stage.
- Chiasma formation is during Diplotene stage.
- Terminalisation or shifting of chiasmata occurs in Diakinesis stage of Meiosis.
- Double Metaphase plate is formed during Metaphase I of Meiosis.
- Separation of homologous chromosomes (disjunction) occurs during Anaphase I.
- Cell plate formation occurs during Cytokinesis in plant cells.

## GENETICS

- Mendel is father of Genetics.
- Heredity is the transmission of characters from one generation to the next generation.
- Differences between offspring of same parent is example of variation.
- In asexually reproducing organisms there is no any differences between parent and offspring.

- Mendel performed hybridization experiments for 8 years from 1856 to 1864. His paper was entitled 'Experiment in Plant Hybridization'.
- Mendel performed his experiments on garden pea (*Pisum sativum*).
- Mendel used the term element for factor or gene.

### Mendel's laws of Inheritance

- Law of dominance:**  
When two pure lines with contrasting characters are crossed, only one (dominant) character is expressed in the offspring while other remains unexpressed (recessive).
  - Law of Segregation or Purity of Gametes:**  
The factors for each character separate during gamete formation. As a result each gamete receives only one factor for each character and hence is always pure.
  - Law of Independent Assortment:**  
The factors of each character are distributed into the gametes independently of the factor of any other character and any one pair of characteristics may combine with any one of the other pairs.
- The cross between F<sub>1</sub> individual with either of two parents is called **back cross**.
  - The cross between F<sub>1</sub> individual with recessive parent is called **test cross**.
  - Monohybrid test cross ratio is **1:1** & dihybrid test cross ratio is **1:1:1:1**.
  - Monohybrid Mendelian phenotypic ratio is **3:1** and genotypic ratio is **1:2:1**.
  - Dihybrid Mendelian phenotypic ratio is **9:3:3:1** and genotypic ratio is **1:2:2:4:1:2:1:2:1**.

### Multiple Choice Questions:

205. Who first discovered virus?
- |            |             |
|------------|-------------|
| a) Stakman | b) Iwanoski |
| c) Stanley | d) Smith    |
206. The branch of science that deals with the study of prehistoric forms of life through fossils of plants and animals is known as:
- |                  |               |
|------------------|---------------|
| a) Cytology      | b) Physiology |
| c) Palaeontology | d) Embryology |
207. Who first of all saw the cell under microscope?
- |                     |                 |
|---------------------|-----------------|
| a) A.V. Leeuwenhoek | b) Robert Hooke |
| c) M.I. Schleiden   | d) T. Schwann   |

208. The term cell was coined by:  
 a) Robert Hooke      b) Huxley  
 c) Durjardin      d) Schwann.
209. Smallest known cell is that of:  
 a) Coccidi      b) Pleuro pneumonia  
 c) Virus      d) Yeast.
210. The term protoplasm was proposed by:  
 a) Corti      b) Huxley  
 c) Purkinje      d) A. Fleming
211. The term nucleus is coined by:  
 a) Robert Brown      b) Dougherty  
 c) Mc. Clintoch      d) Carl Nagelia
212. Darwin's theory of natural selection:  
 a) did not account for fossils  
 b) was the first theory of evolution  
 c) failed to explain the sources of evolution  
 d) has been changed completely
213. Cell as a unit was first seen by:  
 a) Robert Hook      b) Leeuwenhoek  
 c) Robert Koch      d) Louis Pasteur
214. What is the practice of making gardens called?  
 a) Sericulture      b) Floriculture  
 c) Horticulture      d) Olericulture
215. Study of fruits is called pomology. The study of seed is called:  
 a) germination      b) embryology  
 c) spermology      d) seedology
216. The science of counting the age of tree is called:  
 a) Dendrology      b) Silviculture  
 c) Olericulture      d) Dendrochronology
217. Study of flower is called:  
 a) Anthology      b) Pomology  
 c) Dendrology      d) Inflorescence
218. Chiropterophily is the pollination done by:  
 a) birds      b) mammals  
 c) bats      d) air
219. The electron microscope is made up of:  
 a) Fluorochromes  
 b) Polariser and analyser filters  
 c) Electromagnetic lenses  
 d) Objectgive and ocular lenses
220. Who is called the father of modern botany?  
 a) Aristotle      b) Theophrastus  
 c) Carolus Linnaeus      d) Mendel
221. The study dealing with the structure of cell is:  
 a) Cytology      b) Breeding  
 c) Biotechnology      d) Genetics
222. What is the scientific name of Wheat?  
 a) *Oryza stiva*      b) *Horeum vulgare*  
 c) *Triticum aestivum*      d) *Lycopersicum esculentum*
223. Binomial system of Nomenclature in classification was devised by C. Linnaeus. It provides the names pertaining to:  
 a) One scientific and one popular  
 b) The two given by taxonomists  
 c) One generic and one specific epithet  
 d) International identifying catalogue
224. Most important criteria used for the present day classification of living organisms is based on:  
 a) presence and absence of notochord  
 b) resemblances in external features  
 c) breeding habits  
 d) anatomical and physiological characteristics
225. Study of heredity and hereditary characters is known as:  
 a) Genetics      b) Evolution  
 c) Eugenics      d) Euthenics
226. "Father of Genetics" is referred to:  
 a) Hugo De Vries      b) G. Mendel  
 c) Darwin      d) Spencer
227. Which of the following is Mendel's Dihybrid cross ratio?  
 a) 9:5:1:1      b) 9:3:1  
 c) 9:3:2:2      d) 9:3:1:3
228. Which is not correct about characters chosen by Mendel?  
 a) Broad fruit is dominant  
 b) Axillary flower is dominant  
 c) Yellow seed is dominant  
 d) Yellow pod is dominant
229. In some of Mendel's experiments, three quarters of the offspring showed the dominant trait. Which of the following is most likely to be true about the parents?  
 a) Both were recessive  
 b) Both were heterozygous  
 c) Both were dominant  
 d) One was heterozygous; and the other, homozygous dominant
230. A man who is normal for colour vision marries a carrier woman. What is the chance of their son being colour blind?  
 a) 0%      b) 25%  
 c) 50%      d) 75%

231. Which of the following concept is not associated with the work of Gregor Mendel?  
 a) Dominant trait      b) Segregation  
 c) Structure of gene    d) Independent assortment
232. In some of Mendel's experiments, three quarters of the offspring showed the dominant trait. Which of the following is most likely to be true about the parents?  
 a) Both were recessive  
 b) Both were heterozygous  
 c) Both were dominant  
 d) One was heterozygous; and the other, homozygous dominant
233. Mendel was successful in formulating the laws of inheritance where his predecessors were not because:  
 a) Of the right choice of material  
 b) He considered one clear cut character at a time  
 c) The characters he considered were present on separate chromosome and showed no linkage  
 d) All of the above
234. The name of discipline dealing with the study of inheritance is:  
 a) Cytology      b) Evolution  
 c) Genetics      d) Anatomy
235. Pure breeding pea plants with green pods are crossed with pure breeding pea plants with yellow pods. All the F<sub>1</sub> generation have green pods. Plants from the F<sub>1</sub> generation are allowed to be interbred. What colour are pods of the F<sub>2</sub> generation?  
 a) all green      b) all yellow  
 c) 1 green : 1 yellow    d) 3 green : 1 yellow
236. Which of the following cell organelles have no membrane?  
 a) Mitochondria and Chloroplast  
 b) Mitochondria and Ribosome  
 c) Ribosome and Centriole  
 d) Lysosome and Lysosome
237. The "cell theory" was given by:  
 a) Robert Hooke      b) Leeuwen hoek  
 c) Schledian & Schwan    d) Purkinjee
238. Constructive metabolism is:  
 a) Catabolism      b) Anabolism  
 c) Both      d) None
239. Which one of the following traits was not studied by Mendel in the pea plants?  
 a) flower colour      b) flower position  
 c) seed colour      d) seed size
240. Building blocks of proteins are  
 a) Fatty acids      b) Glucose  
 c) Amino acids      d) Glycerol
241. All mammalian cells have nucleus except:  
 a) Muscle cells      b) Neurons  
 c) RBC      d) Liver cells
242. Fat soluble vitamins are:  
 a) A, D, & E      b) B, C, and D  
 c) B and C      d) A, B and C
243. Name the main constituent of the food, in the absence of that one cannot live:  
 a) Carbohydrate      b) Mineral salts  
 c) Proteins      d) Vitamins
244. A vitamin formed in skin upon exposure to UV rays is vitamin:  
 a) A      b) B<sub>2</sub>  
 c) C      d) D
245. The end product(s) of protein digestion is/are:  
 a) Glucose      b) Amino acids  
 c) Fatty acids      d) Glycerol
246. Enzymes are:  
 a) Chemical messengers  
 b) Secreted by endocrine glands  
 c) Biocatalysts  
 d) All
247. Proteins are digested by:  
 a) Bile juice      b) HCL of gastric glands  
 c) Lipolytic enzyme      d) Proteolytic enzyme
248. Fine products of protein digestion are:  
 a) Glucose      b) Amino acids  
 c) Fatty acids      d) Glycerol
249. Metabolic processes in the body are catalysed by:  
 a) Enzymes      b) Hormones  
 c) Proteins      d) Lipids
250. Which of the following is not a monosaccharide?  
 a) Glucose      b) Fructose  
 c) Galactose      d) Maltose
251. All of the following organic compounds are carbohydrates except:  
 a) Lactose      b) Glucose  
 c) Galactose      d) Glycerol
252. Which of the following gives the highest calorie per gram?  
 a) carbohydrate      b) alcohol  
 c) fat      d) minerals

254. Excess carbohydrates are stored in the body in liver and muscles in the form of:  
 a) Glucose                    b) Glycogen  
 c) Starch                    d) Lactose
255. Proteolytic enzymes act on:  
 a) Proteins                    b) Fats  
 c) Vitamins                    d) Carbohydrates
256. The first person to see a 'free cell' under the microscope was:  
 a) Robert Hooke              b) Schwann  
 c) Schlieden                  d) Darwin
257. An example of a cell devoid of nuclear membrane and mitochondria is:  
 a) Bacterial cell              b) Protozoan cell  
 c) Sponge cell                d) Sperm cell
258. Living cells cannot be observed by:  
 a) light microscope            b) electron microscope  
 c) phase-contrast             d) all
259. Who observed living cell first?  
 a) Robert Hooke              b) Robert Brown  
 c) Louis Pasteur             d) Anton Von Leeuwenhoek
260. Which of the following organelles contains cisternae?  
 a) Lysosome                    b) Chloroplast  
 c) Golgi body                d) Mitochondria
261. The most abundant substance in protoplasm is:  
 a) Protein                    b) Fat  
 c) Carbohydrate             d) Water
262. Meiosis is the process of cell division which:  
 a) Results in an increase in size of organism  
 b) Occurs in somatic as well as germ cells  
 c) Results in formation of cells with same number of chromosome  
 d) Maintains the chromosomes to a particular species constant.
263. Mitosis results in:  
 a) Reduction in number of chromosomes  
 b) Duplication of chromosomes  
 c) Increase in the cell volume  
 d) No change in number of chromosomes
264. An animal cell can be differentiated from a plant cell by the presence of:  
 a) Endoplasm                b) Mitochondria  
 c) Ribosome                d) Centriole
265. The activities of all living cells are controlled by:  
 a) Chloroplast                b) Tonoplast  
 c) Nucleus                    d) Auxins
266. Protein synthesis is associated with or center of protein synthesis is:  
 a) Ribosomes                b) Cell membrane  
 c) Nucleus                    d) Chromatin
267. Main difference in between animal and plant cell is of:  
 a) Nutrition                b) Growth  
 c) Movement                d) Respiration
268. The longest phase in meiotic division is:  
 a) Prophase I                b) Metaphase I  
 c) Anaphase I                d) Telophase I
269. Dictyosome is also known as:  
 a) Golgi body                b) Ribosome  
 c) Lysosome                d) Mitochondria
270. Meiosis is also known as:  
 a) Equational division      b) Reduction division  
 c) Both                      d) None
271. In which form the energy is stored in a cell obtained in catabolic reactions?  
 a) ATP                        b) DNA  
 c) Pyruvic acid             d) Glucose
272. ATP is synthesized in:  
 a) Mitochondria              b) Cytoplasm  
 c) Golgi body                d) Endoplasmic reticulum
273. Cellular organelles containing hydrolytic enzymes are:  
 a) Lysosomes                b) Ribosomes  
 c) Mitochondria             d) Golgi bodies
274. Anaphase:  
 a) Is a phase restricted to amitosis.  
 b) Is seen during the nuclear division of somatic cell  
 c) Occur only during meiosis  
 d) Is seen during nuclear division of somatic as well as germ cell
275. The separation of chromosome takes place in:  
 a) Prophase                    b) Metaphase  
 c) Anaphase                d) Telophase
276. The spindle fibre arises from:  
 a) Centriole                b) Nucleus  
 c) Centromere                d) Mitochondria

277. Which of the following is described as "Energy currency of the cells"?
- DNA
  - RNA
  - ATP
  - Vitamins
278. Which of the following in a sense is a reversible process of prophase?
- Interphase
  - Metaphase
  - Telophase
  - Anaphase
279. A single cell gives rise to 32 cells by dividing mitotically. How many times has it undergone mitotic division?
- 16
  - 8
  - 4
  - 5
280. In how many cells the meiotic division has taken place if the total number of pollen grains is 32?
- 16
  - 8
  - 4d) 5
281. The type of cell division in which nuclear membrane does not disappear is:
- Mitosis
  - Free nuclear division
  - Amitosis
  - Cytokinesis.
282. Prophase of reduction division is divided into number of stages, the correct chronological sequence is:
- Leptotene, pachytene, zygotene, diplotene, diakinesis
  - Leptotene, zygotene, pachytene, diplotene, diakinesis
  - Leptotene, zygotene, diplotene, pachytene, diakinesis
  - Leptotene, zygotene, diplotene, pachytene, diakinesis
283. By mitosis an equilibrium is maintained in the amount of:
- DNA
  - DNA & RNA
  - RNA
  - RNA & protein
284. Meiosis occurs in:
- Haploid organisms only
  - Diploid organisms only
  - Both a and b
  - Polypliods only
285. Water content of protoplasm is:
- 75%
  - 75-90%
  - 80%
  - 60%
286. The most important chemical in a cell is:
- DNA and RNA
  - Nucleic acid and proteins
  - DNA
  - Proteins
287. Prokaryotic cells contain:
- Ribosomes
  - Lysosomes
  - Centrosomes
  - All of the above
288. Which of the following organelles contain DNA?
- Nucleus
  - Plastids
  - Mitochondria
  - All of the above
289. RNA is different from DNA in:
- Types of sugar content
  - Types of nitrogen bases
  - Both a & b
  - None
290. The replication of DNA occurs in:
- Interphase
  - Mitosis
  - Prophase
  - Anaphase
291. Physiologically most active stage in cell cycle is:
- Interphase
  - Prophase
  - Metaphase
  - Anaphase
292. Precisely speaking, protoplasm is a:
- Colloid solution
  - Crystallloid solution
  - Crystallo-colloidal solution
  - None of these
293. Cells of reproductive organs are divided by the process of:
- Mitosis
  - Meiosis
  - Both
  - None
294. Transfer RNA (tRNA) is also known as:
- Messenger RNA
  - rRNA
  - Microsomal RNA
  - Soluble RNA
295. The basis of grouping of living organisms into eukaryotes are prokaryotes is:
- Ribosomes
  - Nucleus
  - Plasma membrane
  - None of the above
296. Which of the following is regarded as "brain of a cell"?
- Mitochondria
  - Lysosome
  - Nucleus
  - Ribosome.
297. How many types of RNA are found in plant cells?
- One
  - Two
  - Three
  - Four
298. Generally the smaller the cell:
- The larger the nuclei
  - The smaller the nuclei
  - It will be more metabolically active
  - It will be less metabolically active
299. Liquid food drinking is:
- Pinocytosis
  - Phagocytosis
  - Imbibition
  - None of the above
300. The chief role of nucleolus in a nucleus concerns:
- Organization of chromosomes
  - DNA replication
  - Ribosome synthesis
  - Chromatid separation

301. Which of the following structures is the functional unit of golgi complex?
- Cristae
  - Cisternae
  - Thyllakoid
  - Cytoplasm
302. Nucleoproteins in a cell are synthesized in:
- Nucleolus
  - Nucleoplasm
  - Nuclear membrane
  - Chromatins
303. The process of nuclear division in which nuclear membrane does not breakdown, so that spindle fibres are formed inside the nuclear membrane is termed as:
- Karyochoresis
  - Karyokinesis
  - Cytokinesis
  - Binary fission
304. Most abundant RNA in a cell is:
- rRNA
  - mRNA
  - tRNA
  - tRNA lucine
305. Okazaki segments are:
- DNA segments capable of free replication
  - DNA segments formed during replication
  - Nucleotide segments formed during transcription
  - Segments of genes that undergo mutation
306. Non-living substances of the protoplasm are collectively known as:
- Deutoplasm
  - Plasmagel
  - Mesoplasm
  - Cytoplasm
307. Nucleoproteins in a cell are synthesized in:
- Nucleolus
  - Nucleoplasm
  - Nuclear membrane
  - Out side the nucleus
308. Cell organelles are embedded in:
- Protoplasm
  - Cytoplasmic membrane
  - Mitochondrion
  - Nucleolus
309. The main function of the cell membrane is to:
- Regulate the flow of materials into and outside the cell.
  - Maintain the shape and size.
  - Control of all cellular activities.
  - Store cell material.
310. Protoplasm found inside nucleus is known as:
- Nucleoplasm
  - Cytoplasm
  - Matrix
  - Stroma
311. Cell membrane is:
- Permeable
  - Impermeable
  - Selectively permeable
  - Plasmodesmata
312. RNA differs from DNA in substitution of sugar ribose with deoxyribose and of the nitrogenous base thymine with:
- Adenine
  - Guanine
  - Uracil
  - Water
313. What distinguishes a prokaryotic cell from a eukaryotic cell?
- Prokaryotic cells have a cell wall and a nucleus
  - Prokaryotic cells have no membrane bound organelles
  - Prokaryotic cells have a Centriole
  - Prokaryotic cells do not have ribosomes
314. All are membrane bound organelles, except:
- Mitochondria
  - Lysosome
  - Golgi complex
  - Ribosomes
315. The cell organelle which has electron transport system is:
- Nucleus
  - Mitochondrion
  - Ribosome
  - Centriole
316. "Protoplasm is the physical basis of life" was said by:
- Huxley
  - Watson
  - Schwann
  - Mendel
317. Physical basis of life is:
- Nucleus
  - Protoplasm
  - Cytoplasm
  - Chloroplast
318. Cell organelle responsible for autolysis of cell is:
- Dictysome
  - Lysosome
  - Peroxisome
  - Ribosome
319. Centrosome is found in:
- Cytoplasm
  - Nucleus
  - Chromosome
  - Nucleolus
320. Number of mitochondria in a cell is:
- 10
  - 100
  - 1000
  - Variable
321. Which of the following is diagnostic difference between Prokaryotes and Eukaryotes?
- presence of 70s ribosome
  - presence of DNA
  - Lack of histone protein
  - lack of Plasmodesmata
322. The inherent capacity of a cell to regenerate a total plant is known as:
- Cell fractionation
  - Cellular totipotency
  - Cell migration
  - Fission
323. During which stage of meiosis do chromatids separate completely?
- Anaphase I
  - Anaphase II
  - Metaphase II
  - Telophase II

324. Infolding of mitochondria is:  
 a) Cristae                      b) Matrix  
 c) Grana                      d) Stroma
325. The active mitosis is found in:  
 a) fruits                      b) root tips  
 c) root and shoot tips      d) telophane
326. Which one of the following steps can be called as "meiosis"?  
 a) meiosis I                  b) anaphase  
 c) anaphase I                d) meiosis II
327. How many meiosis can give 300 seeds?  
 a) 375                        b) 150  
 c) 75                         d) none
328. In cells, ribosomes are found in:  
 a) cytoplasm                  b) nuclear membrane  
 c) chloroplast                d) all
329. An additional amount of DNA found in cell is called:  
 a) plasmids                  b) chondroid  
 c) mesosomes                d) chromosome
330. Different flowers colour i.e. red, blue, purple is due to:  
 a) chromoplast               b) anthocyanin of vacuole  
 c) chloroplast                d) cytoplasm
331. What is total number of cell division during formation of 50 zygotes?  
 a) 62.5                       b) 63  
 c) 61                         d) 62
332. Ribosome of bacteria, mitochondria and chloroplasts are of:  
 a) 30S type                  b) 50S type  
 c) 70S type                  d) 80S type
333. What is the function of chlorophyll?  
 a) to convert light energy to chemical energy  
 b) to release energy from carbohydrates  
 c) to store magnesium ions  
 d) to store raw materials for photosynthesis
334. Which of the following is the characteristic of zygotene?  
 a) Crossing over              b) Synapsis  
 c) Terminalization            d) Cytokinesis
335. A green and chlorophyllous autotrophic cell of a plant contains all of the following except:  
 a) Genes                      b) DNA  
 c) Centriole                 d) Cell wall
336. What is the name of the chemical that makes plant cells rigid and plants crunchy?  
 a) Protein                    b) Skin  
 c) Chitin                    d) Cellulose
337. A group of relatively simple unicellular organisms lacking a nucleus and other complex cell features.  
 a) Diatom                    b) Thallophytes  
 c) Prokaryotes              d) Arthropod
338. Which of the following plastids is found in the cells not exposed to light?  
 a) leucoplast                b) chromoplast  
 c) chloroplast              d) none of the above
339. Physical basis of life is:  
 a) Cytoplasm                b) Protoplasm  
 c) Nucleoplasm             d) Carbohydrates
340. Which type of cell has half the number of chromosomes found in body cells?  
 a) Bone cell                b) Neurone  
 c) Sperm                    d) Epithelial cell
341. Where are most proteins made?  
 a) chromosomes             b) mitochondria  
 c) nucleus                  d) ribosomes
342. A chromosome:  
 a) is found only on gametes  
 b) carries genetic information  
 c) is present at all times in cells  
 d) can migrate across the nuclear membrane
343. Which of the following statements is not correct for mitosis?  
 a) It is equational division because number of chromosomes and amount of genetic materials remain the same.  
 b) It is equational division because the number of chromosomes remains the same but amount of genetic materials reduces to half.  
 c) It occurs in somatic cells so can be called as somatogenesis.  
 d) It is responsible for reproduction
344. How many membranes comprise the nuclear envelope?  
 a) Four                      b) One  
 c) Two                        d) Three
345. Which of the following cell organelle has double membrane?  
 a) ER                        b) Golgi bodies  
 c) lysosome                d) chloroplast

346. Which of the following is not a plastid?  
 a) leucoplast                  b) chloroplast  
 c) chromoplast                  d) anthoplast
347. The inner core of the virus is made up of:  
 a) Protein                  b) Envelope  
 c) Capsid                  d) Nucleic acid
348. One of the following has a doubtful biological status:  
 a) Bacteria                  b) Virus  
 c) Blue green algae                  d) None
349. Virus vary in size from:  
 a) 2nm to 200nm                  b) 2nm to 100nm  
 c) 2nm to 300nm                  d) 2nm to 150nm
350. The genetic material in viruses can be:  
 a) DNA                  b) RNA  
 c) DNA or RNA                  d) DNA and RNA
351. Bacteria cannot survive in a highly salted pickle because:  
 a) salt inhibits reproduction of bacteria  
 b) enough light is unavailable for photosynthesis  
 c) they become plasmolysed and death occur  
 d) nutrients in the pickle medium cannot support life
352. The type of reproduction common in prokaryotes is:  
 a) Sexual                  b) Asexual  
 c) Both                  d) None
353. Which of the following is a prokaryote:  
 a) Green algae                  b) Bacteriophage  
 c) Salmonella                  d) Agaricus
354. Viruses are:  
 a) Cellular organisms                  b) Non-cellular organisms  
 c) Uncellular organisms                  d) Cellular without wall
355. Bacteria are present everywhere except:  
 a) Soil                  b) Ice  
 c) Sea water                  d) Distilled water
356. Which among the following contains only one type of nucleic acid?  
 a) Yeast                  b) Bacteria  
 c) Mycoplasma                  d) Virus
357. The basis of grouping of living organisms into eukaryotes and prokaryotes is:  
 a) Ribosomes                  b) Nucleus  
 c) Plasma membrane                  d) None
358. A complete set of chromosomes inherited as a unit from one parent is known as:  
 a) Karyotype                  b) Gene pool  
 c) Genome                  d) Genotype
359. Rod shaped bacteria are called:  
 a) Bacilli                  b) Spirilla  
 c) Cocci                  d) Streptococci
360. Viruses are essentially made up:  
 a) proteins and nucleic acids  
 b) non-cellular organisms  
 c) lipids and nucleic acids  
 d) starch, protein and lipids
361. Where can a virus develop and reproduce?  
 a) in decayed fruit                  b) in fresh milk  
 c) in human cells                  d) in meat soup
362. Which shows the increasing level of complexity in plants?
- |    | simplest    | →           |             |        | most complex |
|----|-------------|-------------|-------------|--------|--------------|
| a) | cell        | chloroplast | organ       | tissue |              |
| b) | cell        | tissue      | chloroplast | organ  |              |
| c) | chloroplast | cell        | tissue      | organ  |              |
| d) | chloroplast | organ       | tissue      | cell   |              |
363. The transfer of amino acids during protein synthesis is the function of:  
 a) m RNA                  b) r RNA  
 c) s RNA                  d) hn RNA
364. The cells of a *Drosophila* fly have been shown to contain 8 chromosomes. The number of chromosomes in the fertilized egg is:  
 a) 2                  b) 4  
 c) 8                  d) 16
365. Number of autosomes in human sperm is:  
 a) 11                  b) 22  
 c) 44                  d) 45
366. Which of the following nitrogenous base is not found in DNA?  
 a) Thymine                  b) Cytosine  
 c) Uracil                  d) Adenine
367. The number of hydrogen bonds that bind guanine (G) and cytosine (C) is:  
 a) One                  b) Two  
 c) Three                  d) Four
368. All of the following nitrogenous bases can be attached to the sugar of DNA except:  
 a) Adenine                  b) Cytosine  
 c) Guanine                  d) Uracil

369. Which is the correct sequence of code transfer involved in the formation of a polypeptide?  
a) DNA, tRNA, rRNA, mRNA  
b) rRNA, DNA, mRNA, tRNA  
c) mRNA, tRNA, DNA, aminoacids  
d) DNA, mRNA, tRNA, aminoacids
370. Which one is not a matching pair?  
a) Thymine: DNA      b) Uracil: Nitrogen base  
c) Fruit: Spermatophyta      d) Yeast: Eukaryotic
371. The smallest RNA is:  
a) mRNA      b) RNA  
c) tRNA      d) Genetic RNA
372. RNA molecule is synthesized from a single strand of DNA by a process called:  
a) Transcription      b) Translation  
c) Mutation      d) Evolution
373. Which of the following type of RNA carries amino acids during protein synthesis?  
a) rRNA      b) tRNA  
c) mRNA      d) All
374. Chimpanzees have 48 chromosomes in each normal body cell. How many chromosomes does a chimpanzee gamete contain?  
a) 23      b) 24  
c) 46      d) 48
375. Which process is mainly responsible for the production of energy?  
a) Circulation      b) Digestion  
c) Respiration      d) Homeostasis
376. What is the net yield of ATP when a glucose molecule is broken down anaerobically into lactate?  
a) 2 ATP      b) 8 ATP  
c) 30 ATP      d) 38 ATP
377. Micro-organisms such as yeast and certain bacteria obtain most of their energy by a form of anaerobic respiration known as:  
a) Fermentation      b) Osmosis  
c) Transpiration      d) Embryology
378. Respiration in Plants:  
a) Results in the formation of vitamins.  
b) Is characteristic of all living cells.  
c) Often requires carbon dioxide.  
d) Occurs only during day.
379. Photosynthesis is:  
a) Destructive process      b) Catabolic process  
c) Anabolic process      d) None
380. Respiration is a:  
a) Constructive process      b) Destructive process  
c) Anabolic reaction      d) Building up process
381. Respiration is mainly concerned with:  
a) Release of Carbon dioxide      b) Inhalation of oxygen  
c) Preparation of glucose      d) Release of energy
382. Ethanol may be produced by growing yeast in sugar solution. This process of production of alcohol by using living organisms is called:  
a) Combustion      b) Cracking  
c) Fermentation      d) Anabolism
383. Lactic acid, alcohol and 2ATPs are produced as a result of which of the following process?  
a) Aerobic respiration      b) Anaerobic respiration  
c) Photosynthesis      d) All
384. Of the following terms, the one that includes all others is:  
a) oxidation      b) respiration  
c) excretion      d) metabolism
385. One of the characteristics of all living things is that they  
a) require oxygen for respiration  
b) originate from pre-existing life  
c) carry on heterotrophic nutrition  
d) carry on autotrophic nutrition
386. The difference in concentration which brings about diffusion is:  
a) Osmosis      b) Diffusion gradient  
c) Osmotic pressure      d) Water potential
387. When more fertilizers are added to plant, the plant dies due to:  
a) over abundance of nutrients  
b) fertilizers get collected in leaf  
c) excessive osmosis and diffusion  
d) blockage of plant's water channel
388. The elements which is required in largest quantity by plants is:  
a) calcium      b) sodium  
c) phosphorus      d) nitrogen
389. Ethylene gas:  
a) slows down ripening of apples  
b) speeds up maturation of fruits  
c) is a saturated hydrocarbon  
d) retards ripening of tomatoes

390. What do microorganisms make and release during the manufacture of bread and cheese?

	<b>Bread</b>	<b>Cheese</b>
a)	Acid	acid
b)	Acid	alcohol
c)	alcohol	acid
d)	alcohol	alcohol

391. Yeast respires using sugar. What conditions are needed to make which product?

	<b>Conditions</b>	<b>Product</b>
a)	aerobic	alcohol
b)	aerobic	lactic acid
c)	anaerobic	alcohol
d)	anaerobic	lactic acid

392. Which element in the molecule of urea shows that it is formed from amino acids and not from glucose?

- a) carbon                            b) hydrogen  
c) nitrogen                          d) oxygen

393. During the production of yoghurt and cheese, the pH of the mixture changes due to:

- a) milk proteins becoming solid  
b) the changing of lactose to lactic acid  
c) the production of carbon dioxide  
d) the production of ethanol

394. Which statement about sexual reproduction is correct?

- a) All types of organism reproduce by this process.  
b) Many cells of one type fuse with a single cell of another type.  
c) Nuclei of two specialized cells fuse together.  
d) Parents produce genetically identical offspring.

395. Which of the following molecules is glucose?

- a)  $C_3H_6O_3$                             b)  $C_6H_{12}O_6$   
c)  $C_3H_5OH$                             d)  $C_6H_{10}O_5$

396. When yeast cells respire anaerobically, what substance is used and what substances are produced?

	<b>Substance used</b>	<b>Substances produced</b>
a)	alcohol	carbon dioxide and water
b)	alcohol	lactic acid and water
c)	sugar	alcohol and carbon dioxide
d)	sugar	carbon dioxide and water

397. Photosynthesis is not:

- a) Catabolic process                    b) Anabolic process  
c) Constructive process                d) Building up process

#### 4. HUMAN SYSTEM

398. The blood pressure is:

- a) pressure exerted by blood on veins  
b) speed of flow of blood in vessel  
c) pressure exerted by blood on artery  
d) pressure exerted by blood on heart

399. The outermost part of the bone is called:

- a) Epiphysis                            b) Periosteum  
c) Mergings                            d) Pericardium

400. Membrane surrounding the brain is called:

- a) Pericardium                        b) Perichondrium  
c) Periosteum                        d) Meninge

401. Which one of the following is regarded as main cellular fuel?

- a) Protein                              b) Fat  
c) Fructose                            d) Glucose

402. The metal associated with haemoglobin is:

- a) Iron                                b) Copper  
c) Magnesium                        d) Manganese

403. Which gas makes the most stable combination with Hb of RBC?

- a)  $CO_2$                                 b) CO  
c)  $O_2$                                     d)  $N_2$

404. Urea is transported by:

- a) Plasma                              b) Blood  
c) RBC                                 d) WBC

405. Blood vessels, alveoli of lungs, heart and kidney are internally lined by:

- a) Pavement or squamous epithelium  
b) Cubical epithelium  
c) Columnar epithelium  
d) Glandular epithelium

406. Group of cells morphologically similar and physiologically identical is known as:

- a) Tissue                                b) Organ  
c) System                                d) None

407. Some cells of our body can be over a foot long. These are:

- a) Muscle cells                        b) Nerve cells  
c) Bone cells                            d) Gland cells

408. Which one of the following, is a tissue?

- a) Ovary                                b) Kidney  
c) Lungs                                d) Blood

409. Voluntary muscle is present in:  
 a) Lungs                    b) Liver  
 c) Hind limb              d) Heart
410. Simple cuboidal epithelium are found in:  
 a) Buccal cavity            b) Trachea  
 c) Ureters                 d) Urinary tubules of kidney
411. The pinna is made up of:  
 a) Bone                    b) Tendon  
 c) Ligament                d) Cartilage
412. A strip of elastic tissue called ligament connects:  
 a) Muscle to muscle      b) Muscle to cartilage  
 c) Muscle to bone          d) Bone to bone
413. Tendons and ligaments are made up of:  
 a) Connective tissue        b) Epithelial tissue  
 c) Muscular tissue          d) Skeletal tissue
414. Which of the following structures are the speciality of nerve cells:  
 a) Nucleus and cytoplasm    b) Axon and dendrites  
 c) Vacuoles and fibres      d) Synapse and ganglia
415. The germinal epithelium found in the ovary of mammals is:  
 a) Squamous epithelium      b) Cubical epithelium  
 c) Columnar epithelium      d) Glandular epithelium
416. Tendon is a structure which connects:  
 a) Bone to bone              b) Muscle to a bone  
 c) Nerve to muscle          d) Skin to muscle
417. Cells of pavement epithelium usually are of:  
 a) Cubical shape             b) Rod like shape  
 c) Goblet shape              d) Polygonal shape
418. All the body organs are made up of:  
 a) Two types of tissues      b) Two or more types of tissues  
 c) One type of tissue        d) None of these
419. Blood is a:  
 a) Connective tissue          b) Muscular tissue  
 c) Epithelium tissue        d) Nervous tissue
420. Cells which help in stopping the flow of blood are:  
 a) WBC                      b) Leucocytes  
 c) RBC                      d) Thrombocytes
421. Serum can be defined as:  
 a) Blood devoid of cells  
 b) Plasma devoid of clotting factor  
 c) Blood devoid of plasma  
 d) Plasma devoid of water
422. Ligament connects:  
 a) Muscle to muscle        b) Muscle to bone  
 c) Muscle to cartilage      d) Bone to bone
423. Power of regeneration is lowest in:  
 a) living cell                b) muscle cell  
 c) brain cell                d) skin cell
424. Serum differs from blood as it lacks:  
 a) blood cells and plasma proteins  
 b) formed elements and fibrinogen  
 c) only fibrinogen  
 d) only formed elements
425. Which part of bone makes it hard and rigid?  
 a) calcium phosphate        b) collagen fibres  
 c) living cells              d) yellow elastin
426. Cartilage in a synovial joint serves to:  
 a) give the body its shape    b) protect the muscles at the joint  
 c) reduce friction            d) allow for extra movement
427. Fibrinogen is necessary for  
 a) keeping the colour of blood  
 b) the clotting of blood  
 c) the formation of haemoglobin  
 d) removing carbon dioxide from blood.
428. Which substance increases in the blood plasma when there is an uptake of Carbon dioxide?  
 a) Carbonic Acid            b) Potassium bicarbonate  
 c) Sodium bicarbonate      d) Sodium chloride
429. Hairs are mainly for:  
 a) Differentiation of sex    b) Defense of the body  
 c) Trap layer of air        d) Beautify the body
430. Shivering in cold is a method for:  
 a) Preventing radiation of heat from body  
 b) Production of heat by muscular contraction  
 c) Production of heat by dermal friction  
 d) Increasing blood supply to skin
431. Which one of the following diseases results from endocrine disorder?  
 a) Pneumonia                b) Goitre  
 c) Typhoid                    d) Jaundice
432. Rickets is a kind of:  
 a) Communicable disease    b) Deficiency disease  
 c) Genetic disease          d) Infective disease

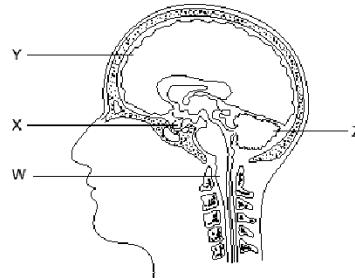
433. Haemophilia is a disease which is:
- Hereditary and sex linked.
  - Caused by deficiency of calcium.
  - Caused by deficiency of blood.
  - None of the above.
434. Substances obtained from micro-organisms and used to kill other microbes are:
- vaccines
  - antibiotics
  - antiseptic
  - all of them
435. Botulism is a type of most dangerous food poisoning caused by:
- bacteria
  - virus
  - fungi
  - food colour
436. SARS (Severe Acute Respiratory Syndrome) is due to:
- virus
  - bacteria
  - influenza
  - pneumonia
437. Cancer is due to:
- Hazardous pollutants
  - Uncontrolled mitosis
  - UV rays
  - Inflamed tissue
438. Chemicals in tobacco smoke lead to the breakdown of the elastic tissue in the walls of the alveoli. What is the name of this condition?
- bronchitis
  - emphysema
  - heart disease
  - lung cancer
439. Which condition can be treated with antibiotics?
- AIDS
  - constipation
  - diabetes mellitus
  - syphilis
440. Which disease is caused directly by a pathogen?
- coronary heart disease
  - influenza
  - lung cancer
  - sickle cell anaemia
441. How is typhoid fever usually spread?
- by a bite from an insect vector
  - by breathing droplets containing the pathogens
  - by coming into contact with an infected person
  - by people handling food
442. Why is a cholera patient given injections of salt solution?
- to help prevent dehydration of the body
  - to increase antibody production
  - to prevent the cholera bacteria from multiplying
  - to remove the cholera bacteria from the intestines
443. Polio generally affects:
- Kidney
  - Skin
  - Nerves
  - Bones
444. In acute constipation, purgatives containing magnesium salts are used to cause the evacuation of faeces by:
- stimulating sensory neurones of intestinal mucosa
  - acting as a lubricant
  - preventing absorption of water from the intestine
  - acting as an irritant on the intestinal mucosa
445. Hepatic portal vein terminates in:
- Stomach
  - Liver
  - Heart
  - Kidney
446. Follicles are present in:
- Ovary
  - Testes
  - Kidney
  - Lung
447. Cervical vertebrae are found in:
- Neck
  - Thorax
  - Abdomen
  - Tail region
448. Structural & functional unit(s) of kidney is/are:
- Uriniferous tubules
  - Seminiferous tubules
  - Urinary bladder
  - Hepatic cells
449. Bones present in our wrist are:
- Carpals
  - Trasals
  - Humerus
  - Metacarpals
450. Learning is realted to:
- Hypothalamus
  - Cerebellum
  - Cerebrum
  - Medulla
451. Number of cranial nerves in man is:
- 10
  - 10 pairs
  - 12
  - 12 pairs
452. Number of spinal nerves in human beings is:
- 12 pairs
  - 33 pairs
  - 31 pairs
  - 37 pairs
453. Growth hormone is produced in:
- Thyroid
  - Adrenal
  - Gonads
  - Pituitary
454. Pancreas secretes:
- Insulin
  - Trypsin
  - Amylase
  - All of these
455. Oxytocin hormone is secreted by:
- Adrenal
  - Ovary
  - Pituitary
  - Thyroid
456. Hormone involved in the discharge of pancreatic juice in mammal is:
- Secretin
  - Gastrin
  - Cholecystokinin
  - Enterogastrone

457. Selective accumulation of iodine occurs in:  
 a) Liver                            b) Thymus  
 c) Thyroid                        d) Liver
458. Sympathetic nervous system is also called as:  
 a) Central nervous system  
 b) Peripheral nervous system  
 c) Autonomous nervous system  
 d) None
459. The structure which prevents the entry of food into respiratory tract is:  
 a) Larynx                        b) Pharynx  
 c) Glottis                        d) Epiglottis
460. Liver secretes:  
 a) No enzymes                    b) Digestive enzymes  
 c) Hormones                      d) Succus entericus
461. Which is the element that hardens the tooth enamel?  
 a) Calcium                        b) Fluorine  
 c) Iodine                        d) Sodium
462. In man, the bile juice secreted per day is:  
 a) 250ml                        b) 600ml  
 c) 1000ml                      d) 1500ml
463. Which one of the following acts both as endocrine and exocrine gland?  
 a) Adrenal                        b) Pancreas  
 c) Kidney                        d) Liver
464. Maximum absorption of water in mammals is in:  
 a) Lungs                        b) Skin  
 c) Kidney                        d) Spleen
465. Which one of the followings, is not the excretory organ:  
 a) Kidney                        b) Liver  
 c) Lung                          d) Spleen
466. Axial skeleton is made up of:  
 a) Skull only  
 b) Sternum only  
 c) Complete vertebral column  
 d) All of the above
467. Humerus is a bone of:  
 a) Ankle                        b) Hind arm  
 c) Upper arm                    d) Thigh
468. Total number of bones in human body is:  
 a) 203                          b) 206  
 c) 306                          d) 270
469. Number of cervical vertebrae in a typical mammal is:  
 a) 6                              b) 7  
 c) 8                              d) 9
470. The total number of bone in your right arm is:  
 a) 30                            b) 32  
 c) 35                            d) 40
471. The longest and strongest bone in the body is:  
 a) Femur                        b) Tibio-fibula  
 c) Humerus                      d) Radio-ulna
472. Which bone in man is concerned with locomotion?  
 a) Ulna                        b) Femur  
 c) Humerus                      d) None of the above
473. The number of ribs in your body is:  
 a) 12                            b) 48  
 c) 24                            d) 36
474. In man coccygeal bone is formed by the fusion of:  
 a) 3 vertebrae                b) 6 vertebrae  
 c) 5 vertebrae                d) 4 vertebrae
475. In man coccygeal bone is found in:  
 a) Pectoral girdle            b) Pelvic girdle  
 c) Skull                        d) Vertebral column
476. How many bones are present in human skull?  
 a) 30                            b) 42  
 c) 32                            d) 22
477. The number of bones in half of the lower jaw of man is:  
 a) 4                            b) 6  
 c) 8                            d) 1
478. The smallest bone in man's skeleton is:  
 a) Nasal                        b) Stapes  
 c) Patella                      d) Palatine
479. The total number of bones present in the face of a man is:  
 a) 12                            b) 11  
 c) 13                            d) 14
480. Which pair do not have corresponding bone?  
 a) Humerus and femur        b) Pectoral and pelvic girdle  
 c) Atlas and coccyx            d) Carpals and tarsals
481. In a man total number of vertebrae is:  
 a) 30                            b) 31  
 c) 32                            d) 33
482. The major constituent of vertebrate bone is:  
 a) Calcium phosphate        b) Sodium chloride  
 c) Potassium hydroxide      d) Calcium carbonate

483. In man axial skeleton is made up of:  
 a) 80 bones                    b) 100 bones  
 c) 103 bones                d) 206 bones
484. The pectoral and pelvic girdles and the bones of the limb form  
 a) Axial skeleton            b) Appendicular skeleton  
 c) Visceral skeleton        d) Outer skeleton
485. The articulation of femur and pelvic girdle is an example of:  
 a) Gliding joint            b) Pivot joint  
 c) Hinge joint              d) Ball and socket joint
486. Limb muscles of man are:  
 a) Voluntary                b) Involuntary  
 c) Both a and b            d) None of the above
487. The knee joint in between the thigh and lower leg is:  
 a) Hinge joint              b) Gliding joint  
 c) Pivot joint              d) Fixed joint
488. Our wrist joint is:  
 a) Hinge joint              b) Gliding joint  
 c) Pivot joint              d) Fixed joint
489. Hinge joint is present between:  
 a) Humerus and radioulna  
 b) Femur and pelvic girdle  
 c) Femur and acetabulum  
 d) Humerus and pectoral girdle
490. Which joint is responsible to make you able to turn your head from side to side?  
 a) Imperfect joint          b) Hinge joint  
 c) Fixed joint              d) Pivot joint
491. The immovable joints in mammals are found in:  
 a) The neck zone            b) The skull  
 c) The pelvic girdle        d) The lower jaw
492. The only movable bone of the skull is:  
 a) Mandible                b) Maxilla  
 c) Zygomatic              d) Nasal
493. How many separate bones are there in the vertebral column of adult man?  
 a) 33                        b) 26  
 c) 32                        d) 28
494. Which of the following vertebrae are larger and heavier than others?  
 a) Cervical vertebrae     b) Thoracic vertebrae  
 c) Lumbar vertebrae       d) Sacral vertebrae
495. Sacrum is formed by the fusion of  
 a) 7 cervical vertebrae    b) 4 coccygeal vertebrae  
 c) 5 lumbar vertebrae    d) 5 sacral vertebrae
496. Trypsinogen is secreted by:  
 a) Duodenum                b) Liver  
 c) Pancreas                d) Stomach
497. Digestion of starch takes place in:  
 a) Stomach and duodenum  
 b) Buccal cavity and duodenum  
 c) Buccal cavity and stomach  
 d) Duodenum only
498. The balance of the living organisms is maintained through the process of:  
 a) Respiration              b) Photosynthesis  
 c) Reproduction            d) Exercises
499. Which of the following is not true about enzymes?  
 a) Enzymes are proteins  
 b) Specific in nature  
 c) Do not destroy on heating  
 d) Always forms the same end products
500. For reaching left side of heart blood must pass through:  
 a) Liver                    b) Kidneys  
 c) Lungs                    d) Brain
501. The artery can be distinguished from the vein in having:  
 a) Thicker wall with no valves  
 b) More blood cells with valves  
 c) Impure blood only  
 d) Carrying blood to various parts
502. The filtered fluid obtained by glomerular filtration does not contain:  
 a) Glucose                b) Salts  
 c) Nitrogenous wastes    d) Fibrinogen and other proteins
503. Which enzymes can digest plant protein?  
 a) Pepsin                  b) Erepsin  
 c) Renin                    d) All of the above
504. Glycogen is stored in our body in:  
 a) Liver only              b) Liver & muscles  
 c) Liver & spleen        d) Spleen & muscles.
505. The metal associated with Haemoglobin is:  
 a) Copper                  b) Iron  
 c) Magnesium              d) Manganese

506. Which of the following part of brain when damaged results the immediate death?  
 a) cerebrum                    b) cerebellum  
 c) hypothalamus              d) medulla oblongata
507. The enzymes responsible for the digestion of starch in food of man is present in:  
 a) Salivary & gastric secretions.  
 b) Salivary & Pancreatic secretions.  
 c) Gastric & Pancreatic secretions.  
 d) Gastric & duodenal secretions.
508. Which of the following is the integration system in our body?  
 a) Blood vascular system      b) Nervous system  
 c) Endocrine system            d) Both c and d
509. Which of the following is not an endocrine gland?  
 a) Adrenal gland              b) Pancreas  
 c) Salivary gland             d) Thyroid gland
510. Maximum absorption of water in mammals takes place in:  
 a) Lung                        b) skin  
 c) Kidney                     d) Small intestine
511. Fat is stored in:  
 a) Liver                        b) Muscles  
 c) Adipose tissue            d) Areolar tissue
512. Structural & functional units of kidney are:  
 a) Nephrons                    b) Seminiferous tubules  
 c) Acini                        d) Medulla
513. Excretion is best defined as:  
 a) Removal of undigested food materials.  
 b) Elimination of Carbon dioxide  
 c) Voiding of urine.  
 d) Elimination of metabolic wastes.
514. Urea formation takes place in:  
 a) Kidney                      b) Liver  
 c) Urinary bladder            d) Brain
515. The chief function of bile is:  
 a) emulsification of fats for digestion  
 b) to regulate the process of digestion  
 c) to digest fats by enzymatic activity  
 d) to remove waste products
516. Hormones are distributed through the body by:  
 a) Blood plasma              b) ducts  
 c) lacteals                    d) endocrines
517. Special structures for absorption in the small intestine are called:  
 a) Alveoli                    b) tubules  
 c) mucous glands            d) villi
518. Which statement is correct for cerebro-spinal fluids?  
 a) it makes brain tissue moist, nourishes them and reduce friction  
 b) It is basis for testing the brain disorder  
 c) it contains ions for impulse conduction  
 d) all of above
519. A synapse is:  
 a) part of an axon            b) part of a neuron  
 c) a gap between neurons    d) a chemical impulse
520. The adrenal gland is located next to the:  
 a) liver                        b) brain  
 c) bladder                    d) kidney
521. Pancreas is:  
 a) Exocrine gland            b) Endocrine gland  
 c) Heterocrine gland        d) None
522. The drugs taken by us are metabolized in:  
 a) small intestine            b) stomach  
 c) liver                        d) large intestine
523. The blood pressure is measured by the instrument called:  
 a) sphygmomanometer        b) pressure meter  
 c) electro-cardio gram      d) endoscope
524. Which is the largest organ of human body?  
 a) liver                        b) skin  
 c) brain                        d) lungs
525. Eustachian tube connects:  
 a) Pharynx with middle ear  
 b) Middle ear with external ear  
 c) Middle ear with internal ear  
 d) External ear with internal ear
526. Thermoregulatory center in brain of man is:  
 a) Pituitary                    b) Diencephalon  
 c) Hypothalamus             d) None
527. Muscular movements in vertebrates are coordinated by:  
 a) Cerebrum                    b) Cerebellum  
 c) Pituitary                    d) Thyroid
528. Oxygenated blood is carried by:  
 a) pulmonary vein            b) pulmonary artery  
 c) renal vein                  d) hepatic portal vein

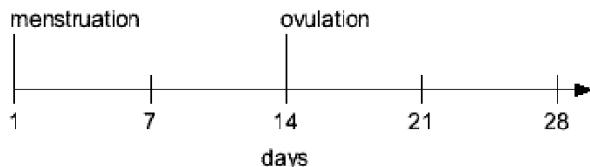
529. Eye is made up of 3 layers , which is not a layer of the eye?  
 a) Retina                                  b) Sclera  
 c) Dermis                                d) Choroid
530. After muscular exercise, which blood vessel carries the most carbon dioxide?  
 a) Aorta                                    b) hepatic artery  
 c) pulmonary vein                        d) vena cava
531. The diagram shows a section through the head showing the brain and part of the spinal cord.



Which structures carry out the functions below?

	<b>Conscious thought and memory</b>	<b>Control of balance and posture</b>
a)	X	W
b)	W	X
c)	Y	Z
d)	Z	Y

532. The diagram shows a 28 day menstrual cycle.



During which days would a woman be most and least fertile?

	<b>Most fertile</b>	<b>Least fertile</b>
a)	1-7	14-21
b)	7-14	21-28
c)	14-21	1-7
d)	21-28	7-14

533. Which process, occurring in the human body, does not involve energy from respiration?  
 a) contraction of heart muscle  
 b) diffusion of oxygen from the alveoli into the blood  
 c) digestion of bread  
 d) maintaining a constant body temperature
534. The pH in the mouth decreases after eating. Which statement explains the decrease in pH?  
 a) Bacteria release acids when respiring food substances.  
 b) Enzymes in saliva release acids during digestion.  
 c) Food substances become alkaline when chewed.  
 d) Salivary glands release an alkaline solution.
535. Which process is used to produce insulin commercially?  
 a) Extract glycogen from the liver to stimulate production of insulin  
 b) Extract insulin from the pancreas of human volunteers  
 c) Insert a bacterial gene into a person's pancreas  
 d) Insert the human insulin gene into a bacterium
536. The table shows the characteristics of the blood in one blood vessel in the body.

<b>oxygen concentration</b>	<b>carbon dioxide concentration</b>	<b>pressure</b>
high	low	high

Which blood vessel contains blood with these characteristics?

- a) aorta                                      b) pulmonary artery  
 c) pulmonary vein                            d) vena cava
537. Large, insoluble molecules have to be digested before they can be:  
 a) absorbed.                                    b) assimilated.  
 c) egested.                                     d) ingested
538. A person's diet contains more protein than is needed for growth and repair. This causes increased production of:  
 a) carbon dioxide                              b) hormones  
 c) sweat                                        d) urea
539. Which sequence of structures does an oxygen molecule pass through as it is taken into the body?

	<b>first</b>	<b>→</b>				<b>last</b>
a)	larynx	→	trachea	→	bronchioles	→ capillaries
b)	trachea	→	larynx	→	bronchioles	→ capillaries
c)	larynx	→	trachea	→	capillaries	→ bronchioles
d)	trachea	→	larynx	→	capillaries	→ bronchioles

540. Which occur during breathing out?

	<b>Volume of thorax</b>	<b>Air pressure in lungs</b>
a)	decreases	increases
b)	decreases	remains constant
c)	increases	increases
d)	increases	remains constant

541. A child is frightened by a loud noise and shouts for help. In which order are the different types of neurone involved in this response?

	involved first	→	involved last
a)	motor neurone	relay neurone	sensory neurone
b)	motor neurone	sensory neurone	relay neurone
c)	sensory neurone	motor neurone	relay neurone
d)	sensory neurone	relay neurone	motor neurone

542. Which changes take place in the iris of the eye when a person moves quickly from darkness into bright light?

	<b>Circular muscles of the iris</b>	<b>Radial muscles of the iris</b>	<b>Diameter of pupil</b>
a)	contract	relax	increases
b)	contract	relax	decreases
c)	relax	contract	decreases
d)	relax	contract	increases

543. In the table below, which nutrient is correctly linked to its use?

	<b>Nutrient</b>	<b>Use</b>
a)	fat	to prevent anaemia
b)	protein	to make insulin
c)	starch	to make amylase
d)	sugar	to prevent rickets

544. Litmus paper is red in acid solutions and blue in alkaline solution. Which part of the alimentary canal has secretions that would change litmus paper from blue to red?

- a) colon                      b) duodenum  
c) ileum                      d) stomach

545. What is the function of lymphocytes?

- a) to carry carbon dioxide  
b) to convert fibrinogen to fibrin  
c) to produce antibodies  
d) to produce lymph

546. Which describes breathing?

- a) The movement of air into and out of the lungs.  
b) The release of carbon dioxide in the alveoli.  
c) The release of energy from substances in living cells.  
d) The uptake of oxygen in the alveoli.

547. Between which structures does a motor neurone transmit impulses?

- a) from a muscle to an intermediate neurone  
b) from an intermediate neurone to a sensory neurone  
c) from the skin to the spinal cord  
d) from the spinal cord to a muscle

548. Iodine is essential in the diet because it:

- a) helps to prevent tooth decay  
b) is an antiseptic  
c) is needed to produce thyroxine  
d) is needed to produce vitamin D

549. Which organ is damaged as it breaks down alcohol?

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

550. Total number of bones in the hind limb of a man is:

- a) 14                        b) 30  
c) 24                        d) 21

551. When the eyeball is longer than normal and the point of focus for distant objects is in front of retina, a person suffers from:

- a) Hypermetropia            b) Myopia  
c) Presbyopia                d) Glaucoma

552. The spinal cord

- a) allows the spine to be flexible  
b) supports the weight of the back  
c) allows the passage of nerve  
d) protects the spine from damage

553. When digestion takes place in the stomach, the condition should be:

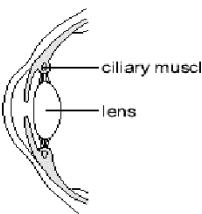
- a) alkaline                    b) neutral  
c) acidic                      d) basic

554. Which one of the following is not a salivary gland?

- a) Parotid gland            b) Brunner's gland  
c) Sub maxillary gland     d) Sublingual gland

555. In which of the following parts of the body is a hinge joint found?

- a) the shoulder              b) the knee  
c) the hip                    d) the skull

556. The medulla oblongata of the brain controls:  
 a) balance                            b) hearing  
 c) learning                            d) breathing
557. Iodine is essential in the diet because it:  
 a) helps to prevent tooth decay  
 b) is an antiseptic  
 c) is needed to produce thyroxine  
 d) is needed to produce Vitamin D.
558. Vitamin K is necessary for blood clotting because it plays a vital role in the synthesis of:  
 a) Thromboplastin                    b) Fibrinogen  
 c) Prothrombin                        d) All of them
559. The bile juices are:  
 a) a secretion of the liver        b) an excretion of the liver  
 c) both a and b                      d) a secretion of Pancreas
560. In Rabbit, the digestion of cellulose takes place in:  
 a) Rectum                            b) Ileum  
 c) Colon                             d) Caecum
561. The strongest muscles of the body are found in:  
 a) wrist                             b) eyes  
 c) jaws                              d) thighs
562. At which part of the tongue are the taste buds for sweet taste located?  
 a) tip                                b) back  
 c) sides                             d) middle
563. The adrenal glands are located adjacent to the:  
 a) Larynx                            b) Urinary bladder  
 c) kidneys                            d) Gonads
564. The diagram shows the front part of an eye. Which changes take place in the eye when a person looks up from reading a book to view a distant object?
- 
- |    | Ciliary muscle | Lens            |
|----|----------------|-----------------|
| a) | contracts      | becomes thicker |
| b) | contracts      | becomes thicker |
| c) | relaxes        | becomes thicker |
| d) | relaxes        | becomes thicker |
565. The first hormone to be isolated was:  
 a) Thyroxine                        b) Testosterone  
 c) Aldosterone                      d) Progesterone
566. The coronary arteries carry blood to the:  
 a) brain tissue.                    b) heart muscle.  
 c) liver cells.                      d) walls of alveolus.
567. Which of the following hormone is capable of delaying senescence?  
 a) Auxin                             b) Gibberellin  
 c) Cytokinin                        d) Ethylene
568. Which one is not vestigial organ of man?  
 a) Wisdom teeth                    b) Muscles of ear pinna  
 c) Vermiform appendix            d) Ileum
569. Mature RBCs of male lacks nucleus except:  
 a) Cow                              b) Camel  
 c) Tiger                             d) Deer
570. A tissue is a group of cells having:  
 a) Similar cells with dissimilar function  
 b) Similar cells with similar functions  
 c) Dissimilar cells with dissimilar function  
 d) Dissimilar cells with similar functions
571. What is an example of excretion?  
 a) release of adrenalin from the adrenal glands  
 b) release of sweat from the sweat glands  
 c) removal of carbon dioxide from the lungs  
 d) removal of faeces from the alimentary canal
572. The Process of pairing of homologous chromosomes is called synapsis. Which of the following stage of cell division is characterized by synapsis?  
 a) Leptotene                        b) Zygote  
 c) Pachytene                        d) Diplotene
573. Animal cell lacking nucleus would also lack in:  
 a) Chromosomes                    b) Ribosomes  
 c) Lysosome                        d) Centrioles

## 5. DIVERSITY OF PLANT LIFE

### Taxonomic Hierarchy:

Putting up of the taxonomic categories in a logical sequence is called hierarchy. The hierarchy of categories consists of a descending sequence of seven obligatory categories. They are: Kingdom, Division, Class, Order, Family, Genus, Species.

### **Biological concept of species:**

Group of organisms similar in structure and function and can produce fertile offspring.

### **Viruses**

- Lack cellular organization and consists of only DNA and RNA surrounded by protein coat.
- Use host for multiplication.
- Viruses that attack bacteria are Bacteriophage similarly, Algae – Phycophages, Fungi – Mycophages, Blue green algae – Cyanophage, Yeast – Zymophage, E.coli – Coliphage etc.
- Coat is also called capsid made up of units called capsomeres.
- Viral genome:
  - DNA or RNA (single stranded or double stranded).
  - Animal virus usually contain DNA except Retro virus (RNA).
  - Plant virus usually contains RNA (single stranded) like TMV.
- Shape- Rod: Tobacco mosaic virus; Tadpole like: Bacteriophage.
- Their multiplication cycles can be lytic or lysogenic.
- In lytic cycle, virus is virulent and multiplication in host leads to its lysis while in lysogenic cycle, the viral nucleic acid gets incorporated into host DNA and may be silent for many generations.

### **Fungi**

- Heterotrophic organism, cell wall made up of chitin.
- Glycogen as reserve food material.
- Nutrition is absorptive type and absorptive organ is haustoria.
- Body of fungi is thallus called hyphae and group of hyphae from mycelium.
- May be in symbiotic relation. Example: Lichen (algae & fungi), Mycorrhiza (fungi and roots of higher plants).
- Vegetative reproduction by fragmentation, budding & fusion or sexually.

Eg. *Usnea, Cladonice, Rhizopus, Mucor, Yeast.*

### **Bryophytes**

- Amphibians of plant kingdom.
- Lack vascular tissue.
- Main body is free living gametophyte.
- Sex organs are multicellular and covered by jacket layer.
- Male and female sex organs are antheridium and archegonium respectively.

- Antherozoids are motile and flagellated.
- Archegonium consists of lid cell, neck canal cells, venter canal cells and egg cell.
- Fertilization is water dependent.
- Sporophytic body is fully dependent on gametophytic body.
- Shows heteromorphic alternation of generation.  
Eg. *Marchantia, Funaria, Polytrichum, Cladonia.*

### **Pteridophytes**

- Vascular cryptograms.
- Plant body is sporophytic and differentiated into fibrous roots rhizome and leaves.
- Sex organs are antheridium and archegonium.
- Male games are motile and fertilization is water dependent.
- Each sorus is covered by kidney shaped indusium & consists of a number of sporangia.
- Spores are released from sporangium and after germination they form multicellular gametophytic body called prothallus.
- The sporophytic body is initially dependent and finally independent of gametophytic body.
- Shows distinct alternation of generations.
- Mature leaves contain sori.
- Sporangium bearing leaf of a fern is called sporophyll.
- Leaves are large sized & called frond.
- Rhizome and sometime rachis of fern is occupied by hairy scaly structure called ramenta.

### **Gymnosperms**

- Dominant flora of earth about 200 million years back in Mesozoic era.
- Dominant vegetation in colder region.
- No gymnosperms are annual.
- Also called naked seeded plant because ovary is absent.
- Show extreme xerophytic adaption.
- Sporophytic body is differentiated into roots (tap root), stem and leaves.
- Leaves are dimorphic i.e scale leaves & foliage leaves.
- Leaves lack lateral veins.

**Multiple Choice Questions:**

574. Sorus is:  
a) a group of sporangia.  
b) a place where sporangia are borne.  
c) a structure which keeps sporangia.  
d) a structure which covers sporangia.
575. Unicellular Eukaryotes are kept in the kingdom:  
a) Monera                    b) Protista  
c) Mycota                    d) Animalia
576. Which of the following has no cotyledons but is placed in dicot?  
a) Cycas                    b) Potato  
c) Cuscuta                  d) Bamboo
577. The mode of nutrition in fungi is mostly:  
a) Autotrophic              b) Saprophytic  
c) Chemotrophic            d) Parasitic
578. Which of the following is not the characteristic of population?  
a) Density                  b) Growth  
c) Age                        d) Diversity of species
579. The framework elements of plants are:  
a) Magnesium, copper, iron  
b) Copper, carbon, oxygen  
c) Magnesium, calcium, nitrogen  
d) Carbon, hydrogen, oxygen
580. The movement of microscope particles is named for this influential British botanist, who not only discovered nucleus but also determined the distinction between gymnosperms and angiosperms.  
a) Robert Brown            b) Bentham  
c) Hutchinson              d) Artistole
581. Double fertilization occurs in:  
a) All plants                b) Pteridophytes  
c) Gymnosperms            d) Angiosperms
582. Which of the following organism has cell wall but no chloroplast?  
a) Amoeba                  b) *Spirogyra*  
c) *Volvox*                d) *Mucor*
583. Which is not the character of cell membrane?  
a) Elastic                  b) Cellulosic  
c) Semi-permeability      d) regenerative
584. The fluid inside the chloroplast is:  
a) Karyoplasm             b) Matrix  
c) Chloroplasm            d) Stroma
585. Meiosis does not occur at the time of gamete formation from:  
a) Prothallus  
b) Protonema  
c) Sporangium of fern  
d) Anthers for pollen formation
586. What would cause the death of a tree?  
a) The loss of its bark      b) Loss of all the leaves  
c) Loss of its branches     d) Loss of its 50% leaves
587. Minute breaks in cell wall, through which delicate strands of cytoplasm pass into adjoining cells are known as:  
a) Plasmalemma            b) Plasmodesmata  
c) Cell wall pore          d) Dictyosome
588. Chloroplasts occur in the form of spiral bands in:  
a) *Nostoc*                b) *Diatoms*  
c) *Spirogyra*             d) *Oscillatoria*
589. In *Spirogyra*, meiosis takes place in:  
a) Zygospore germination    b) Spore formation  
c) Gamete formation        d) Akinate formation
590. Yellow and orange colour of petals and fruits is due to:  
a) Chloroplast              b) Chromoplast  
c) Chromatophores        d) Anthocyanins.
591. Meiosis occurs in fern during:  
a) Spore production        b) Spore formation  
c) Zygote formation        d) Inside Zygote
592. Budding is type of:  
a) Vegetative propagation    b) Sexual reproduction  
c) Fragmentation            d) All
593. The modified stem of fern plant is called:  
a) Rhizoid                  b) Stamen  
c) Ramenta                d) Rhizome
594. In which of the following groups would you place a plant, which produces spores has vascular tissue and lacks seeds?  
a) Gymnosperms            b) Algae  
c) Bryophytes              d) Pteridophytes
595. One of the following events in a vegetable garden is never directly effected by light. That is:  
a) Flowering                b) Fertilization  
c) Food manufacturing    d) Seed germination
596. Thallophytes having chloroplast are:  
a) Bacteria                b) Fungi  
c) Algae                    d) Moss

597. Flowering plants are included under:  
 a) Cryptogams                    b) Phanerogams  
 c) Bryophytes                    d) Pteridophytes
598. Mycellial plant body is present in:  
 a) Thallophyta                    b) algae  
 c) Fungi                            d) Bacteria
599. Algae do not need vascular bundles because:  
 a) They are not plant            b) They are thallophyta  
 c) They are green                d) They are aquatic.
600. The most common type of sexual reproduction in *Spirogyra* is:  
 a) Fragmentation                b) Scalariform conjugation  
 c) Lateral conjugation            d) Both b and c.
601. Green photosynthetic sporogonium is found in:  
 a) Fern                            b) *Funaria*  
 c) *Marchantia*                d) Bryophyta
602. The plant groups which produce embryo are:  
 a) Thallophyta & bryophyta  
 b) Thallophyta, bryophyta and pteridophyta  
 c) Bryophyta, pteridophyta and spermatophyta  
 d) Pteridophyta and spermatophyta
603. Fern plant body is:  
 a) Gometophytic                b) Sporophytic  
 c) Xerophytic                    d) Hydrophytic
604. Mosses occur in moist regions because:  
 a) Rate of transpiration is very high in them  
 b) Need water for fertilization  
 c) Need water to float in water  
 d) None of the above
605. The flagellated cells in pteridophyta are:  
 a) Rhizoids                      b) Spores  
 c) Gametes                      d) Antherozoids.
606. Circinate vernation in fern refers to:  
 a) Types of leaves                b) Uncoiling of large leaf  
 c) Types of young leaves        d) Modified leaf
607. Fern bears sporangia in:  
 a) Placenta                      b) In the leaf surface directly  
 c) Sorus                          d) Indusium
608. Two distinct generations in life cycle is common is:  
 a) *Spirogyra*                    b) *Mangifera*  
 c) *Dryopteris*                d) *Pinus*
609. Needles in pine are:  
 a) Leaves                        b) Leaflets  
 c) Stem                          d) Sporophylls
610. Most of the angiosperm differs from most of the gymnosperm in having:  
 a) Flowers                        b) Ovules  
 c) Carpel                        d) Seeds
611. Among the following which does not belong to its sporophyte:  
 a) Root                          b) Megasporophyll  
 c) Endosperm                    d) Needle
612. The type of flower most of the monocotyledons is:  
 a) Monoecious                    b) Trimerous  
 c) Tetramerous                d) Pentamerous
613. Tracheophytes are suited in land life because:  
 a) They need no water  
 b) They do not transpire much  
 c) They have xylem and phloem  
 d) All of the above
614. The arrangement of flowers in the flowering axis is:  
 a) Inflorescence                b) Phyllotaxy  
 c) Phylogeny                    d) Aestivation
615. Which of the following groups of plants is known as "Vascular cryptograms"?  
 a) Fungi                        b) Bryophytes  
 c) Pteridophytes                d) Angiosperms
616. Which one is a matching set in plant taxonomy?  
 a) *Siprogyra*, *Mucor*, yeast  
 b) Liverworts, Ferns, *Pinus*  
 c) *Mucor*, Yeast, Mushroom  
 d) *Oscillatoriella*, Horsetail, Mosses
617. Which of the following is not the characteristic of monocotyledons?  
 a) Adventitious root            b) Tap root  
 c) Parallel venation            d) Bears only one cotyledon
618. Under the surface of leaf of fern, there are large numbers of small dark, brown structures known as:  
 a) Rhizome                      b) Porthallus  
 c) Sori                          d) Frond
619. Which of the following is the sets of reproductive parts?  
 a) Calyx and Corolla  
 b) Calyx and Androecium  
 c) Androecium and Gynoecium  
 d) Corolla and Gynoecium
620. In which of the following groups would you place a plant which produces seeds but lacks flowers?  
 a) Fungi                        b) Gymnosperms  
 c) Bryophytes                    d) Pteridophytes

621. The mycelium is typically coenocytic in  
 a) Phycomycetes                    b) Ascomycetes  
 c) Basidiomycetes                d) Deuteromycetes
622. Cycas has an embryo with two cotyledons yet it is not classified as dicotyledonous plant because:  
 a) It has compound leaves      b) It bears megasporophyll  
 c) It looks like a palm tree    d) Its ovules are naked
623. Largest Ovules are found among:  
 a) Monocots                      b) Dicots  
 c) Gymnosperms                 d) Angiosperms
624. Production of two kinds of spores by a plant in called:  
 a) Apogamy                      b) Heterospory  
 c) Homospory                    d) Sporogenesis
625. In moss sporophyte, following is absent:  
 a) Foot                            b) Seta  
 c) Capsule                      d) Elater
626. The reserve food in *Spirogyra* is:  
 a) Starch                        b) Fat  
 c) Glycogen                     d) Protein
627. The gymnosperms differ from angiosperms in:  
 a) Habit                         b) Habitat  
 c) Presence of wood            d) Absence of ovary
628. Pteridophytes are also called:  
 a) Vascular Cryptogams        b) Amphibians  
 c) Homospory                    d) Sporogenesis
629. Which of the following is not a characteristic of lichen?  
 a) Bear root  
 b) Does not bear leaf and stem  
 c) Symbiotic association of algae and fungi  
 d) Plant body is thallus
630. Alga used for the construction of sound proof rooms, is:  
 a) Diatom                        b) Volvox  
 c) Laminaria                    d) Chara
631. Root hair of a fern is:  
 a) Unicellular                  b) Multicellular  
 c) Prokaryotic                 d) None
632. Which of the following is prokaryote?  
 a) *Spirogyra*                  b) *Nostoc*  
 c) *Marchantia*                d) Fern
633. Which of the following is the prothallus of fern?  
 a) Gametophyte                 b) Sporophyte  
 c) Dikaryotic                    d) Diploid
634. What are the sterile cells found in the hymenium of basidiocarp of mushroom called?  
 a) Paraphyses                    b) Basidia  
 c) Pileus                        d) Annulus
635. Usually fungi store:  
 a) Starch                        b) Glycogen  
 c) Fats                         d) Starch
636. Botanical name of garden pea is:  
 a) *Pisum sativum*            b) *Mimosa pudica*  
 c) *Brassica campestris*    d) *Raphanus sativus*
637. All except one are the characteristic of algae:  
 a) Posses chlorophyll         b) They are aquatic  
 c) Posses vascular bundles    d) Autotrophic nutrition
638. All of the following are found in the prothallus of fern except:  
 a) Antheridia                    b) Archegonia  
 c) Mallic acid                 d) Rhizobium
639. The part of apple which we actually eat as fruit is really:  
 a) ovary                        b) enlarged hypothalamus  
 c) succulent calyx            d) modified corolla
640. In monoceious plants:  
 a) male and female parts are borne by the same flower  
 b) male and female parts are borne by different plants  
 c) male and female parts are borne by the same plant but not by same flower  
 d) male and female and neuter flower are borne by the same plant
641. What are the brownish hair like structures found on the petiole and rhizome of fern called?  
 a) Frond                        b) Scale  
 c) Ramenta                     d) Sorus
642. Monocarpic plants produce flowers and fruit once in life time.  
 Which of the following is monocarpic?  
 a) mango                        b) mustard  
 c) bamboo                      d) both b and c
643. Algae are great source of nutrients. Which of algae is richest source of protein?  
 a) *Laminaria*                b) *Chlorella*  
 c) *Spirogyra*                d) *Spirullinna*
644. The tendril of pea plant is the modification of:  
 a) leaf                         b) stem  
 c) stipule                      d) calyx

645. Which of the following is called amphibian plants?  
 a) Thallophyta                    b) Bryophyte  
 c) Pteridophyta                d) Gymnosperm
646. In pteridophytes, the plant body represents:  
 a) Gametophyte                b) Sporophyte  
 c) Both a and b              d) None
647. Which of the given plants does not produce fruits?  
 a) Cycas                        b) Rice  
 c) Barley                      d) Mango
648. Phyllotaxy is the mode of arrangement of leaves and the principle underlying it is  
 a) to hide leaves against sunlight  
 b) to expose leaves equally to sunlight  
 c) to minimize number of leaves  
 d) to maximize number of leaves
649. Mushroom (Basidiomycetes) are different from other fungi in having:  
 a) Coenocytic hyphae        b) Spores  
 c) Dikaryotic hyphae        d) All of the above
650. What is the unit of male reproductive part in flower called?  
 a) Carpel                      b) Stamen  
 c) Sepal                      d) Petal
651. What is 'vivipary' in plants?  
 a) Production of eggs        b) Production of spores  
 c) Formation zygote        d) Germination of seed inside fruit
652. Double fertilization in the characteristics of the:  
 a) angiosperms                b) alga  
 c) gymnosperms              d) bryophytes
653. World famous penicillin was extracted from:  
 a) Algae                      b) Bacteria  
 c) Fungi                      d) Virus
654. Which of the following is not found in the basidiocarp of mushroom?  
 a) Rhizomorph                b) Stipe  
 c) Trama                      d) Rhizoid
655. What is the gametophyte of fern called?  
 a) Thallus                      b) Frond  
 c) Capsule                    d) Prothallus
656. A bean seed contains all except:  
 a) Seed coat                 b) Cotyledons  
 c) Hypocotyl                d) Hypha
657. Ferns have feather like leaves in their sporophyte, so they are grouped under:  
 a) Pteridophyta              b) Tracheophyta  
 c) Embryophyta              d) Spermatophyta
658. This plant of the legume family is unusual in that the edible fruit or pod develops under the soil.  
 a) Walnut                      b) Peanut  
 c) Pea                        d) Cauliflower
659. Gametophytic generation is prominent in:  
 a) angiosperms              b) pteridophytes  
 c) bryophytes                d) gymnosperms
660. The dominant generation in pteridophytes is:  
 a) sporophyte                b) gametophyte  
 c) thallophyte              d) all
661. Potato tuber is a modified:  
 a) root                        b) stem  
 c) bulb                      d) leaf
662. Which of the following plants has parallel venation in its leaves?  
 a) castor                      b) grass  
 c) moss                        d) fern
663. Which group of plants has the most highly developed gametophyte?  
 a) Liverworts                b) Mosses  
 c) Ferns                      d) Seed plants
664. Ginger is a stem , not a root because:  
 a) it stores food material  
 b) it grows parallel to soil surface  
 c) it lacks chlorophyll  
 d) it has nodes and internodes
665. Which of the following mushroom is highly poisonous?  
 a) Agaricus bisporus        b) Pleurotus sp  
 c) Amanita muscaria        d) Agaricus campestris
666. Which one of the following organisms is not an autotroph?  
 a) Grass                      b) Moss  
 c) Mushroom                 d) Fern
667. A flower with stamens carpels sepals and petals is said to be:  
 a) tetraform                b) complete  
 c) perfect                    d) bisexual
668. Which of the plant mentioned below is devoid of vascular bundles?  
 a) Moss                        b) Club moss  
 c) Pine                        d) Lotus

669. The visible or expressed characteristics of an organism is called:  
 a) Morphology                    b) Phenotype  
 c) Anatomy                      d) Vegetative
670. Collective term applied to vascular plants of nine divisions, or phyla, all of which grow on land:  
 a) Laburnum                    b) Monocots  
 c) Gymnosperms                d) Tracheophytes
671. The vascular bundle is first time present in:  
 a) Thallophyta                b) Bryophyta  
 c) pteridophyta                d) angiosperm
672. The juice of orange is obtained from:  
 a) modified calyx             b) succulent ovary hairs  
 c) androecium                d) modified corolla
673. Which of the following has an embryo but lacks vascular tissue?  
 a) bryophyte                    b) pteridophyta  
 c) gymnospermae              d) angiospermae
674. All of the following are true for bryophytes except:  
 a) they have no vascular bundle  
 b) they need water for fertilization  
 c) they have independent sporophyte  
 d) their antherozoides are motile
675. *Drosophila* is insect heavily used in genetic experiments.  
*Drosophila* of plant kingdom is:  
 a) *Aspergillus*                b) *Pencillium*  
 c) *Neurospora*                d) *Mucor*
676. Which statement is true of asexual reproduction in plants?  
 a) Insects are needed to transfer pollen.  
 b) New plants grow from seeds.  
 c) Offspring are genetically identical to their parents.  
 d) Two types of gamete are involved.
677. Which of the following is not a method of vegetation propagation?  
 a) sowing                        b) cutting  
 c) layering                      d) grafting
678. What is the post fertilization product of ovary?  
 a) Fruit                        b) seed  
 c) Ovule                        d) Carpel
679. Stem cutting are commonly used for propagation:  
 a) cotton                        b) mango  
 c) sugarcane                    d) banana

## 6. ECOLOGY

- Term ecology was first used by Reiter.
- Study of relationship between organism and their environments.
- Autecology: Branch of ecology dealing with interaction of individual or a single species with the environmental complex.
- Synecology: Branch of ecology dealing with interaction of communities with environmental complex.
- Four main ecological factors are: (1) Climate (2) Edaphic (soil) (3) Topographic (4) Biotic.

### Interactions

- Mutualisms:**
  - Both species derive benefit.
  - Close and often permanent and obligatory association and more or less essential for the survival.  
Eg. *Rhizobium* in roots of legumes.
- Commensalism:**
  - One is benefited while other is not harmed.
  - Eg. Epiphytes & Lianas.
- Ammensalism:**
  - One species caused harm to other often without gaining any benefit.
  - Eg. *Penicillium* produces antibiotic that inhibit growth of bacteria.
- Parasitism:**
  - Parasites harming host. Eg. Bacteria, Fungi.

### Ecosystem

- Term ecosystem was coined by A.G. Tansley.
- Structural and functional unit of ecology.
- Cycling of materials and flow of energy (unidirectional).
- Consists of abiotic components, biotic components & decomposers.
- Biotic component include producer, primary consumer, secondary consumer and tertiary consumer.
- Decomposers include bacteria & fungi. They decompose complex organic compounds into simpler organic compounds and make them suitable for the reuse by producers.

### Food chain

- Process of eating & being eaten.
- Types: predator or grazing, parasitic, detritious.

### **Food web**

- Net work of food chain.
- Provides more feeding opportunities.

### **Ecological pyramid**

- Graphic representation of successive trophic level (feeding levels) in decreasing or increasing order.
- It is of three types:
  - i) **Pyramid of number:**
    - Relationship between producers and primary, secondary and tertiary consumers.
    - Upright for forest, grassland and pond ecosystem but inverted for tree ecosystem.
  - ii) **Pyramid of biomass:**
    - Relationship of biomass of body weight between producer and consumers.
    - It is usually erect or upright in grassland or forest ecosystem while inverted in pond ecosystem.
  - iii) **Pyramid of energy:**
    - It is always upright as there is always loss of energy at every trophic level transfer.

### **Biome**

Each of the major terrestrial ecosystem or distinctive terrestrial area with their group of climax plants and associated animals constitute a biome.

### **Multiple Choice Questions:**

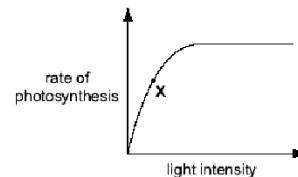
680. Saprophytes are:  
a) Producer                    b) Consumer  
c) Decomposer                d) Predator
681. In the ecosystem, which of the following is an abiotic factor?  
a) Lichen                      b) fungus  
c) Alga                        d) water
682. Biomes are:  
a) Major ecological groupings of animals and plants  
b) Major ecological grouping of plants  
c) Aquatic vegetation  
d) All of the above
683. Prothallus of fern produces:  
a) Spores                      b) Gametes  
c) Both spores and gamete    d) None
684. The study of interaction between living organisms and their environment is called:  
a) Phytogeography            b) Ecology  
c) Phytosociology            d) Ecosystem
685. With regard to ecological food chain, man is a:  
a) Producer  
b) Consumer  
c) Both producer and consumer  
d) Producer and decomposer
686. If all green plants on earth are destroyed:  
a) All pests shall die  
b) Only herbivorous animals shall die  
c) All animals shall die ultimately  
d) Nothing shall happen to animals
687. The source of energy in an ecosystem is:  
a) Sunlight                    b) ATP  
c) RNA                        d) DNA
688. Competition for food, light and space is most severe between two:  
a) Distantly related species growing in different Regions (habitat)  
b) Distantly related species growing in same habitat  
c) Closely related species grown in different habitat  
d) Closely related species growing in the same area
689. When numbers of food chains are interlocked, this is called:  
a) Food link                  b) Food Chain  
c) Food web                    d) Ecological pyramid
690. The transfer of energy and matter in ecosystem occurs through:  
a) Food chain                b) Carbon cycle  
c) Rain cycle                d) None
691. Study of inter-relationship between individual species or its population and its environment is known as:  
a) Ecology                    b) Adaptation  
c) Mutation                    d) Ecosystem
692. The ecological food chain can not begin in the absence of:  
a) Producers                b) Carnivores  
c) Decomposers              d) Consumers

693. Living things that make up the greatest mass of living substance (biomass) in a food chain:  
 a) Producers                    b) Primary consumers  
 c) Decomposers                d) Tertiary consumers
694. The relationship between hermit crab and sea-anemone can be best described as:  
 a) commensalism              b) parasitism  
 c) atavism                    d) sanguivorous
695. Study of soil and soil content is called:  
 a) Angiology                  b) Saurology  
 c) Edaphology                d) Palynology
696. The transfer of energy from one trophic level to the next trophic level in an ecosystem is called food chain. The flow of energy in an ecosystem is always:  
 a) Unidirectional  
 b) Bidirectional  
 c) Multidirectional  
 d) There is no direction of flow of energy
697. The entire surface of Earth livable for living things is:  
 a) Atmosphere                b) Lithosphere  
 c) Biosphere                  d) Hydrosphere
698. Which shows a result of deforestation and the effect it has on the environment?  

	<b>Result</b>	<b>Effect</b>
a)	fewer flowering plants	reduced CO <sub>2</sub> in air
b)	fewer trees	increased humidity of air
c)	more ground cover	wind removes soil
d)	more water drains away	soil washed away
699. Energy absorbed by the grassland community enters as:  
 a) light and is lost as light      b) light and is lost as heat  
 c) heat and is lost as light      d) heat and is lost as heat
700. Autecology refers to:  
 a) Effect of soil on vegetation  
 b) The ecological study of individual organisms  
 c) Effect of precipitation on vegetation  
 d) Effect of temperature on vegetation
701. Which of the following contains nitrogen fixing bacteria?  
 a) Fungi                        b) Cycas  
 c) Leguminous plant            d) Fern
702. Venus fly trap shows a response:  
 a) Thigmonasty                b) Seismonasty  
 c) Phototropism                d) None
703. Some plants grow on the surface of other plants are called:  
 a) Xerophytes                b) Epiphytes  
 c) Mesophytes                d) Hydrophytes
704. Denitrifying bacteria convert:  
 a) Nitrates to nitrites        b) Nitrates to molecular nitrogen  
 c) Nitrates of nitrites        d) Molecular nitrogen to nitrates
705. Fungi which grow on animal faeces or dung are termed as:  
 a) Coprophilous              b) Facultative saprophyte  
 c) Parasite                    d) None of the above
706. Which of the following plants have maximum power of adaptability?  
 a) Pteridophytes              b) Angiosperms.  
 c) Gymnosperms.              d) Bryophytes.
707. Spines in cactus are:  
 a) Stem                        b) Leaves  
 c) Bud                        d) Thorn.
708. Fungi that grow inside the host tissues are:  
 a) Lithophyte                b) epiphyte  
 c) Endophyte                d) Ecophyte
709. Insectivorous plants grow in the soil where:  
 a) Water is very little  
 b) Minerals are not found for making food  
 c) Nitrogen is deficient  
 d) All of the above
710. Tertiary roots are:  
 a) Positive geotrophic        b) Negative geotrophic  
 c) Plagio geotrophic         d) Ageotropic
711. Movements induced by injury are called:  
 a) Aerotropism                b) Tromatropism  
 c) Tromonasty                d) Tromatacty
712. Obligate parasites:  
 a) Can multiply outside the living cell  
 b) Can multiply on soil  
 c) Can multiply on dead organic matter  
 d) Cannot multiply outside the living cell
713. The interaction of *Rhizobium* with root nodules of plant is called as:  
 a) Predation                    b) Commensalism  
 c) Symbiosis                  d) Parasitism
714. When an organism is benefited without affecting the other. The phenomenon is known as:  
 a) Parasitism                  b) Commensalism  
 c) Symbiosis                  d) Predation.

715. In cycas pollination is by:  
 a) Insects                    b) Birds  
 c) Bats                      d) Wind
716. Which one is omnipresent organism?  
 a) Angiosperm              b) Bacteria  
 c) Fungi                    d) Grass
717. The primary purpose of flower is to attract insect for pollination.  
 Pollination done by insects is called:  
 a) insectophily             b) anemophily  
 c) zoophily                d) entomophily
718. Tulip flower opens in higher temperature. It is an example of:  
 a) Phototropism            b) Thigmotropism  
 c) Hydrotropism            d) Thermotropism
719. Plants that grow in water are called hydrophytes; plants that grow on salty water are called:  
 a) saltophyte              b) halophytes  
 c) mesophytes             d) xerophytes
720. Plants are similar to animals because:  
 a) They respire during night  
 b) They respire during the day and night  
 c) They respire when it is required  
 d) They respire during the day only
721. Plants found in dry climate is called Xerophytes, animals found in such climate is called:  
 a) Xerophyta              b) Xerozoon  
 c) Xeroans                d) Xerocles
722. In pitcher plant, the pitcher or trap is modified:  
 a) leaf                     b) leaf apex  
 c) petiole                d) leaf lamina
723. Plant which can purify domestic or industrial waste in water:  
 a) *Spirogyra*            b) *Vallisnaria*  
 c) *Eichhornia*           d) Lotus
724. The pollination done by snails is called malacophily. The pollination done by snakes is called:  
 a) Ornithophily            b) Chropterophily  
 c) Anemophily            d) Ophiophily
725. The loss of water in the form of vapour from aerial plant parts is known as:  
 a) osmosis                b) respiration  
 c) photosynthesis          d) transpiration
726. What are roots having symbiotic association with algal cells called?  
 a) Nodulated root        b) Coralloid root  
 c) Mycorrhizal root      d) Tap root
727. The opening and closing of stomata is controlled by:  
 a) Subsidiary cells      b) Guard cells  
 c) Epidermal cells        d) None of these
728. Transpiration is carried out by:  
 a) Stomata                b) Cuticle  
 c) Lenticel                d) All of the above
729. Find the odd one out:  
 a) Nyctinasty            b) Phototropism  
 c) Chemotaxis            d) Imbition
730. How is oxygen released through the stomata of leaves?  
 a) Diffusion              b) Evaporation  
 c) Osmosis                d) Transpiration
731. The process of conversion of ammonia into nitrites and nitrates is called:  
 a) Nitrogen fixation      b) Ammonification  
 c) Nitrification           d) Denitrification
732. Transpiration is highest for ----- transpiration.  
 a) Stomatal                b) Cuticular  
 c) Lenticular             d) Epidermal
733. Osmosis means:  
 a) movement of molecules from higher concentration to lower concentration  
 b) uptake of water by roots  
 c) passage of solute from a weaker solution to stronger solution across a semi-permeable membrane  
 d) passage of solvent from a weaker solution to stronger solution across a semi-permeable membrane
734. Insectivores plants feed on insects mainly for:  
 a) phosphorous            b) oxygen  
 c) proteins                d) nitrogen
735. Exudation of water in the form of liquid from the margin of leaf is called:  
 a) evaporation            b) osmosis  
 c) transpiration           d) guttation
736. Transpiration occurs through:  
 a) stomata                b) cuticle  
 c) lenticels               d) all of the above

737. In the transpiration and evaporation, water is lost in the form of vapour, yet they differ in that:  
 a) both transpiration and evaporation are similar but the rate of water loss differs  
 b) frequency of water loss is different in both of them  
 c) transpiration is a physical process and evaporation is a physiological process  
 d) transpiration is a physiological process and evaporation is a physical process
738. A community is:  
 a) Autotrophs and heterotrophs  
 b) A collection of plants and animals  
 c) Organisms living in a habitat  
 d) Web of life
739. The pyramid of energy is always:  
 a) Upright                            b) Inverted  
 c) Both                              d) Horizontal
740. Ozone layer is present in:  
 a) Stratosphere                    b) Troposphere  
 c) Ionosphere                      d) Mesosphere
741. The graph shows the results of an experiment measuring the rate of photosynthesis in a pond plant at differing light intensities.



- At point X on the graph, what is the limiting factor in this experiment?  
 a) carbon dioxide                    b) light intensity  
 c) temperature                      d) water
742. In an aqueous environment microscopic animals and plants are collectively known as:  
 a) Planktons                        b) Commensals  
 c) Herbivores                      d) Flora and fauna
743. A plant is exposed to different temperatures and humidities. Which set of conditions cause the plant to lose most water?

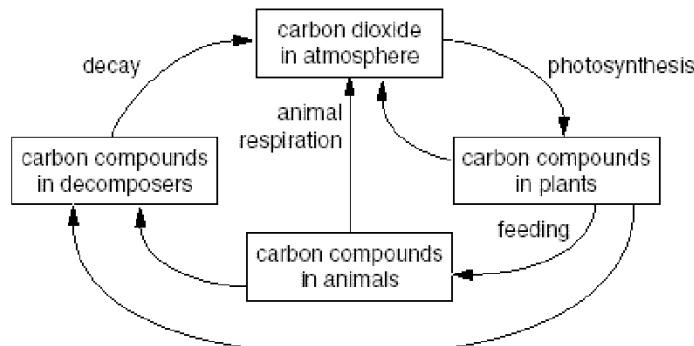
	Temperature/°C	Humidity/%
a)	15	30
b)	15	60
c)	25	30
d)	25	60

744. All the living organisms of the earth constitute:  
 a) Biosphere                        b) Community  
 c) Association                     d) Population
745. Abiotic component of an ecosystem is:  
 a) Bacteria                        b) *Daphnia*  
 c) Water                            d) *Chlorella*
746. Graphic representation of relationship between the producers and the consumers in an ecosystem is known as:  
 a) Ecological niche                b) Ecological pyramid  
 c) Ecological system              d) Trophic levels
747. The use of energy entering in an organism from the outside is 100% efficient in:  
 a) All green plants                b) Some photosynthetic bacteria only  
 c) No plants                        d) Unicellular green algae only
748. The importance of ecosystem lies in:  
 a) Flow of energy                 b) Cycling of materials  
 c) Both of the above              d) None of the above
749. The pyramid of biomass indicates the:  
 a) The total living organisms remains the same  
 b) There is gradual decrease in total mass as it goes from lower level to higher trophic level.  
 c) There is gradual increase in total mass of consumers from base to apex  
 d) All of the above
750. Which one of the following components of ecosystem comes from outside?  
 a) Oxygen                            b) Temperature  
 c) Insects                          d) Energy
751. Adjustment or the modification shown in response to the environment is:  
 a) Ecology                         b) Adaptation  
 c) Mutation                        d) Ecosystem
752. If all green plants on earth are destroyed:  
 a) All pests shall die.  
 b) Only herbivorous animals shall die.  
 c) All animals die ultimately.  
 d) Nothing shall happen to animals.
753. The most northern biome on earth is:  
 a) Desert                            b) Tundra  
 c) Grassland                        d) Deciduous forest

754. Scientists believe that global warming is caused by:

- a) Atom bomb testing
- b) The spread of warfare in equatorial region
- c) Acid rain
- d) The greenhouse effect

755. The diagram shows part of the carbon cycle.



Which process converts most carbon from one form to another?

- a) animal respiration
- b) decay
- c) feeding
- d) photosynthesis

756. All biomes on earth together from:

- a) Ecosystem
- b) Community
- c) Biosphere
- d) Biota

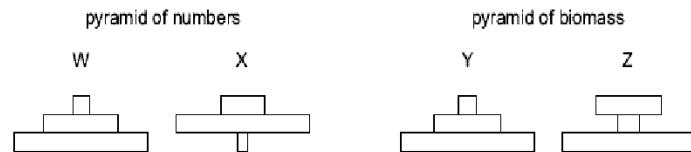
757. Which of the following conditions is not essential in a self-sustained ecosystem?

- a) A means to permit the cycling of carbon between living organism and their environment
- b) Cycling of water between living organism and environment
- c) A living system capable of incorporating energy into living compounds
- d) Equal numbers of plants and animals

758. Which of the following statements is most true of producer organisms?

- a) They are eaten by carnivores
- b) They are eaten by scavengers
- c) They are parasitic
- d) They contain chlorophyll

759. A single plant provides food for many herbivores. The herbivores supply food for a few carnivores.



Which pyramid of numbers and which pyramid of biomass show this information?

	Pyramid of numbers	Pyramid of biomass
a)	W	Y
b)	W	Z
c)	X	Y
d)	X	Z

760. Which is the most direct way that the carbon in starch stored in cereal grain can return to the atmosphere as carbon dioxide?

- a) Grain is destroyed by fire during storage.
- b) Grain is eaten by birds.
- c) Grains are made into bread and eaten by humans.
- d) Grain stored in damp conditions goes mouldy and decays.

761. The ultimate biological energy comes from:

- a) mitochondria
- b) sunlight
- c) glucose
- d) ATP

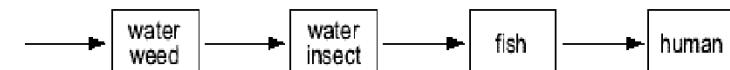
762. A food chain starts with:

- a) nitrogen
- b) decay
- c) photosynthesis
- d) respiration

763. Which processes occur during the carbon cycle?

	Carbon compounds absorbed by living organisms	Carbon compounds excreted by living organisms
a)	yes	yes
b)	yes	no
c)	no	yes
d)	no	no

764. The diagram shows the passage of energy through some organisms.



What is the source of the energy?

- a) carbon dioxide
- b) the soil
- c) the sun
- d) water

## 7. PLANT ANATOMY

- The mass of group of cells, which are alike in origin, form and function constitute a tissue.
- The tissue in which cells are constantly dividing is called meristematic tissue. They originate from embryonic stage of plant called primary meristem.
- Primary meristem occurs in stem apex, leaf primordia and root apex.
- Apical meristems occur at the apex of root and stem and are responsible for growth in length of plant.
- Intercalary meristem are derived from apical meristem and are common at base of leaf, leaf sheath and base of internode.
- Apical cell theory states that single apical cell leads to the development of entire plant in algae, bryophytes and few pteridophytes.
- Histogen theory is applicable to root and shoot meristem of higher plant.
- Process by which plant becomes woody is called lignification.
- The parenchyma cells are living, thin walled, isodiametric and have inter cellular spaces. They are specialized for storage of food and water.
- Parenchyma containing chloroplast is called chlorenchyma & that having air cavity is called aeranchyma helping in floating and gaseous exchange.
- In collenchyma thickening of cell wall occurs at corners or angles due to deposition of cellulose and pectin & usually found in dicot stem, petioles & midrib (hypodermis).
- Collenchyma is known as living mechanical tissue.
- Sclerenchyma cells are thickwalled, lignified and dead.
- Sclerenchyma cells are stained with safranin.
- Xylem conductus water and mineral nutrients from root to leaves.
- Xylem is made up of 4 kinds of cells viz tracheids, vessels, xylem fibre and wood parenchyma.
- Tracheids are narrower as compared to vessels. Tracheids are made up of single cells as compared to vessels, which is made up of many cells.
- Tracheids are main conducting tissue of gymnosperm and also common in pteridophyte.
- In angiosperms vessels are present along with tracheids.
- Vessels are common in angiosperms.
- Xylem parenchyma is the only living element of xylem.

- The main elements of ploem are sieve tube, companion cells, phloem parenchyma and bast fibres.
- In sieve tubes nucleus is absent.
- Companion cells occurs only in angiosperms and are absent in pteridophytes and gymnosperms.
- Tissue secreting latex is called laticiferous tissue.
- Digestive glands are found in insectivorous plants like *Drosera*, *Nepenthes*, *Urticularia*.

## 8. PLANT MORPHOLOGY

### Root

- Descending or underground part of plant arising from radical of embryo.
- Lack distinct nodes and internodes, buds & leaves.
- Each functional root is covered by root cap at its tip.

### Root system

#### 1. Tap root system

- Mass of roots arising from radical of embryo.
- Includes tap root, secondary root & tertiary roots & rootlets.
- Common features of a dicot.

#### 2. Adventitious/Fibrous root

- Grow from any part of plant other than radical.
- May be underground or aerial.
- Fibrous root arises from base of erect stem (wheat, maize) or from nodes of horizontal stem (grasses).

### Stem

- For support and conduction of food and water.
- Differentiated into nodes and internodes.

### Leaf

- Leaf is a green, dissimilar exogenous lateral outgrowth which is borne on the node of a stem or its branch and is specialized to perform photosynthesis.
- Leaf consists of leaf base, petiole and lamina (leaf blade).
- Phyllotaxy is the arrangement of leaves on stem or its branches.

### Venation

- The arrangement of veins and veinlets of lamina is called venation.

- Chiefly there are 2 venations:
  - a) Reticulate venation:
    - Veins and veinlets form a reticulum or networks
    - Common in dicots
  - b) Parallel venation:
    - Common in monocots

### **Inflorescence**

- The arrangement and distribution of flowers over a plant is called inflorescence.
- The axis of inflorescence is called peduncle.

### **Flower**

- Flower is a modified shoot and floral parts are modified leaves.
- Complete flower consists of mainly 4 parts calyx, corolla, androecium and gynoecium.
- Bisexual: Both male (androecium) and female (gynoecium) are present in same flower. Eg. Mustard, *Hibiscus*, *Datura*, *Pisum*.
- Unisexual: Only one sex present in flower (incomplete). Eg. Cucumber.
- Stamine: Only male; pistillate only female.
- Monoecious: male and female flower borne on same plant.
- Dioecious: male and female plants are separated. Eg. Papaya, mulberry.

### **Calyx or sepal**

- Outermost whorl.

### **Androecium:**

- Unit structure stamen consisting of anther, connective and filament.

### **Gynoecium**

- Unit structure called carpel consisting of ovary, style and stigma.
- Ovary has one or more chambers or locule in which ovules are located.

### **Fruit**

- Fertilised ovary; consist of fruitwall (pericarp) & seeds.
- True fruit develops from ovary while false fruit develop from other parts than ovary (e.g apple).

### **Multiple Choice Questions:**

765. Phloem consists of one dead cell which is:
- a) Sieve tube
  - b) Phloem parenchyma
  - c) Phloem fibre
  - d) Companion cell
766. Hard wood is obtained from:
- a) Bryophyte
  - b) Pteridophytes
  - c) Angiosperm
  - d) Gymnosperm
767. Wood is a common name of:
- a) Phloem
  - b) Secondary xylem
  - c) Cambium
  - d) Vascular bundles
768. A simple mechanical tissue devoid of lignin is:
- a) Collenchyma
  - b) Parenchyma
  - c) Chlorenchyma
  - d) Sclerenchyma
769. The chief function of sieve tubes is:
- a) To conduct minerals
  - b) To translocate the organic materials manufactured by the leaves
  - c) To provide mechanical support
  - d) To transport water from root to leaves
770. Companion cells are seen associated with:
- a) Sieve tubes
  - b) Wood parenchyma
  - c) Tracheids
  - d) Wood fibers
771. The chief function of parenchymatous tissue is to:
- a) Store food materials
  - b) Synthesize food
  - c) Absorb moisture
  - d) Conduct food materials
772. Mechanical tissue consisting of living cell is:
- a) Sclerenchyma
  - b) Collenchyma
  - c) Chlorenchyma
  - d) Parenchyma
773. Thickening of cell wall, elongation and specialization for mechanical functions are characteristics of:
- a) Collenchyma
  - b) Sclerenchyma
  - c) Parenchyma
  - d) Stone cells
774. Which tissue contributes most to the mechanical strength of plants?
- a) Parenchyma
  - b) Xylem
  - c) Sclerenchyma
  - d) Phloem
775. Sieve tubes and companion cells are found in:
- a) Xylem
  - b) Meristem
  - c) Phloem
  - d) Vessel
776. Which of the following is responsible for the increase in thickness?
- a) Apical meristem
  - b) Lateral meristem
  - c) Intercalary meristem
  - d) Xylem

777. Increase in length of plant organs take place due to the activities of:  
 a) Apical meristem      b) Lateral meristem  
 c) Intercalary meristem      d) Xylem
778. Xylem is responsible to conduct water from:  
 a) Roots to stem      b) Tracheids to the vessels  
 c) Roots to leaves      d) Leaves to root
779. Laticiferous tissues are found in:  
 a) Opium      b) Poppy  
 c) Fig      d) All of the above
780. The woody tissue in vascular plants that not only conducts water and inorganic salts throughout the plant body but also provides mechanical support to the plant.  
 a) Sap      b) Xylem  
 c) Phloem      d) Sclerenchyma
781. The xylem and phloem are arranged together in compact masses known as:  
 a) Vascular bundles      b) Cambium  
 c) Cortex      d) Pith
782. The xylem cells are responsible for:  
 a) Transport of sugar      b) Conduction of water and salt  
 c) Loss of water      d) None of above
783. In Grafting, small branch which is inserted into the stem of rooted plant is known as:  
 a) Stock      b) Scion  
 c) Rhizome      d) Bud
784. Safranin stains which element of tissues:  
 a) Starch element      b) Cellulose  
 c) Protein element      d) Lignified element
785. The functions of complex permanent tissue are:  
 a) Conduction      b) Mechanical support  
 c) Storage      d) All of the above
786. Maximum growth in roots occurs:  
 a) At its tip      b) In presence of light  
 c) Behind the apex      d) Towards darkness
787. Rubber is obtained from:  
 a) cell sap      b) resin duct  
 c) latex      d) phloem
788. Parenchymatous cell with large intercellular spaces is a feature of hydrophytic adaptation in plants. What is the parenchyma with air cavities called?  
 a) Sclerenchyma      b) Chlorenchyma  
 c) Aerenchyma      d) Collenchyma
789. Food is transported by phloem in form of starch and stored in the form of:  
 a) glucose      b) glycogen  
 c) starch      d) lipids
790. When a fresh twig of a plant is dipped in ink-solution and after sometimes the section of stem is cut and observed. Which part becomes coloured?  
 a) collenchyma      b) phloem  
 c) xylem      d) sclerenchyma
791. The tissue absent in xylem and phloem is:  
 a) Parenchyma      b) Meristem  
 c) Sclerenchyma      d) All of the above
792. Velamen, the spongy tissue, is present in:  
 a) breathing root      b) parasitic root  
 c) tuberous root      d) epiphytic root
793. Buds are typically found:  
 a) at the apex or axil of leaves  
 b) at the tips of branches  
 c) at the base of the branches  
 d) at the tips of the roots
794. Mechanical of tissue consisting of living cells is:  
 a) sclerenchyma      b) colenchyma  
 c) chlorenchyma      d) parenchyma

