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CODE-A



Aakash

Medical | IIT-JEE | Foundations

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AIM - 720

(Advanced INTENSIVE Mastery for 720)

MM : 720

CST-II

Time : 3 Hrs. 20 Mins.

Complete Syllabus of NEET

Instructions :

- (i) There are two sections in each subject, i.e. Section-A & Section-B. You have to attempt all 35 questions from Section-A & only 10 questions from Section-B out of 15.
- (ii) Each question carries 4 marks. For every wrong response 1 mark shall be deducted from the total score. Unanswered / unattempted questions will be given no marks.
- (iii) Use blue/black ballpoint pen only to darken the appropriate circle.
- (iv) Mark should be dark and completely fill the circle.
- (v) Dark only one circle for each entry.
- (vi) Dark the circle in the space provided only.
- (vii) Rough work must not be done on the Answer sheet and do not use white-fluid or any other rubbing material on the Answer sheet.

BOTANY

Choose the correct answer :

SECTION-A

1. Mark the **incorrect** statement w.r.t. systematics
 - (1) It takes into account evolutionary relationships between organisms.
 - (2) It refers to systematic arrangement of organisms.
 - (3) The word systematics is derived from Latin word 'systema'.
 - (4) It does not include identification, nomenclature and classification.
2. There are few organisms which shares the characteristics of animals, plants or fungi, for such organisms a new kingdom was formed, known as
 - (1) Eukarya
 - (2) Protista
 - (3) Animalia
 - (4) Fungi

3. Read the following statements.
 - a. Cyanobacteria are unicellular, colonial or filamentous, fresh water/marine or terrestrial organisms.
 - b. BGA have chlorophyll *b* and phycobilins similar to green plants and are photosynthetic autotrophs.
 - c. Heterotrophic bacteria are helpful in making curd from milk, production of antibiotics, etc.
 - d. Chemosynthetic autotrophic bacteria oxidise various inorganic substances such as nitrates, nitrites and ammonia and use the released energy for their ATP production.

The **correct** statements are

- | | |
|---------------------|---------------------|
| (1) b, c and d only | (2) a, b and c only |
| (3) a, c and d only | (4) c and d only |

4. Which of the following statements is/are **correct** about the floral formula $\oplus \text{K}_{2+2} \text{C}_{x4} \text{A}_{2+4} \text{G}_{(2)}$?
- It belongs to family Cruciferae.
 - They have four sepals, which are free i.e., polysepalous and shows imbricate aestivation.
 - Gynoecium is bicarpellary with free central placentation.
 - Flower is bisexual usually actinomorphic.
 - They have polypetalous cruciform corolla with valvate aestivation.
- a, b, d and e are correct
 - Only b, d and e are correct
 - a, b, c and d are correct
 - only c and e are incorrect
5. Match the **column-I** with **column-II** and select the **correct** option using the codes given below.
- | | Column-I | | Column-II |
|----|-----------------|-------|------------------|
| a. | Polyadelphous | (i) | Pea |
| b. | Epipetalous | (ii) | Citrus |
| c. | Diadelphous | (iii) | China rose |
| d. | Monoadelphous | (iv) | Brinjal |
- Codes:**
- a(iv), b(ii), c(i), d(iii)
 - a(ii), b(iv), c(i), d(iii)
 - a(ii), b(iii), c(iv), d(i)
 - a(iii), b(i), c(ii), d(iv)
6. Which flower can be divided into two equal radial halves in any radial plane passing through the centre?
- Cassia
 - Canna
 - Gulmohur
 - Datura
7. Which of the following statements is **incorrect**?
- Algae such as *Ectocarpus*, *Polysiphonia*, *Kelps* exhibit haplo-diplontic life cycle.
 - In bryophytes, the dominant phase is the independent photosynthetic, thalloid, or erect haploid gametophyte.
- (3) In pteridophytes, the dominant phase is represented by the sporophyte which is haploid, independent photosynthetic plant body.
- (4) Diplontic life cycle is seen in all seed-bearing plants.
8. Which one of the following pairs is **wrongly matched**?
- Coralloid roots - Associated with N₂-fixing cyanobacteria.
 - Bryophytes - Amphibians of the plant kingdom.
 - Gymnosperms - Homosporous plants.
 - Angiosperms – Non-archegoniate phanerogams.
9. Read the following statements and select the **correct** option.
- Statement A:** *Monascus purpureus* is a yeast used commercially in the production of blood cholesterol lowering agent, called statins.
- Statement B:** Besides paddy fields, cyanobacteria are also found inside vegetative part of *Pinus*.
- Only statement A is correct
 - Only statement B is correct
 - Both statements A and B are correct
 - Both statements A and B are incorrect
10. The interaction in which one species is benefitted and other is neither harmed nor benefitted, is called
- Competition
 - Parasitism
 - Commensalism
 - Predation
11. If in a food chain, energy available for herbivores is 1000 J then the amount of energy which gets stored and fixed in tertiary consumer will maximally be
- 10 J
 - 100 J
 - 1 J
 - 0.1 J

Space for Rough Work



12. When xylem and phloem within a vascular bundle are arranged in an alternate manner along different radii, the arrangement is
(1) Radial (2) Conjoint and open
(3) Endarch (4) Conjoint and closed
13. Read the following statements and select the **correct** option.
Assertion (A): Central region of secondary xylem is lighter in colour called sapwood.
Reason (R): Sapwood is not actively involved in conduction of water.
(1) Both A and R are true and R is the correct explanation of A.
(2) Both A and R are true but R is not the correct explanation of A.
(3) A is true but R is false.
(4) Both A and R are false.
14. Which type of growth curve is a characteristic of living organisms growing in a natural environment?
(1) Sigmoid curve
(2) Parabolic curve
(3) Linear curve
(4) J-shaped curve
15. Mass of cells enclosed within the integuments of an ovule is
(1) Micropyle (2) Nucellus
(3) Hilum (4) Funicle
16. Select the **correct** statement(s) w.r.t androecium.
(a) As the anther develops, the cells of sporogenous tissue undergo mitotic divisions to form microspore tetrads.
(b) Innermost wall layer of anther have a role in nourishment of developing pollen grains.
(c) Pollen grains represent the male gamete.
(d) Microsporangia develop further and become pollen sacs.
17. Select the **odd** one w.r.t functions of cytoskeleton.
(1) Mechanical support
(2) Motility
(3) Protect plant cell from the attack of pathogens
(4) Maintenance of the shape of the cell
18. Read the following statements and select the **correct** option.
Statement A: Cilia and flagella are hair-like outgrowths of the cell membrane.
Statement B: Prokaryotic flagella is structurally similar to eukaryotic flagella.
(1) Only statement A is correct
(2) Only statement B is correct
(3) Both the statements are correct
(4) Both the statements are incorrect
19. Which of the following is **not** true regarding axoneme?
(1) Possess a number of microtubules
(2) Has nine radially arranged microtubule doublets
(3) Has only one centrally located microtubule
(4) Shows 9 + 2 arrangement of microtubules
20. The phase that corresponds to the interval between mitosis and initiation of DNA replication is
(1) G₁ phase
(2) G₂ phase
(3) S phase
(4) G₀ phase

Space for Rough Work

TG :- @RAJUHARSH77

21. Read the following statements and mark them as **True (T)** or **False (F)**.

- (A) Mitosis accomplishes segregation of homologous chromosomes into two daughter nuclei.
- (B) At the time of cytokinesis, organelles like mitochondria and plastids get distributed between the daughter cells.
- (C) In all organisms karyokinesis and cytokinesis occurs by same mechanism.

A	B	C
(1) T	T	T
(2) T	F	F
(3) F	T	F
(4) F	F	F

22. Chromosomes appear thickest and shortest during
- (1) Prophase
 - (2) Metaphase
 - (3) Anaphase
 - (4) Telophase

23. In *E.coli*, *i* gene gets mutated in a way that it is unable to express itself. What will be the most probable outcome if this bacteria is grown in lactose rich medium?
- (1) RNA polymerase will not be able to bind to promoter
 - (2) Lactose will not be able to enter into the cell
 - (3) There will be a sharp decline in the production β -galactosidase
 - (4) There will be a constitutive expression of all the structural genes

24. Observe the following diagram



Which of the following option is the **correct** representation of labels?



	A	B	C
(1)	Transcription	Reverse transcription	Translation
(2)	Replication	Translation	Reverse transcription
(3)	Reverse transcription	Transcription	Replication
(4)	Replication	Transcription	Translation

25. Which of the following does **not** confer stability to DNA double helix in comparison to RNA?
- (1) Presence of H-bonds
 - (2) Stacking of base pairs on one another
 - (3) Presence of sugar-phosphate backbone
 - (4) Presence of thymine in place of uracil
26. Which of the following is an inference of experiments conducted by Griffith?
- (1) DNA is the hereditary material
 - (2) R-strain bacteria had somehow been transformed by the heat-killed S-strain bacteria
 - (3) RNA is labile and degradable
 - (4) DNA has evolved from RNA with chemical modifications
27. Shield pigments
- (1) Act as reaction centre in the photosystem
 - (2) Prevent photo-oxidation of chlorophyll pigments
 - (3) Does not absorb the visible spectrum of light
 - (4) Are not found in the light harvesting complex
28. How many water molecules need to be split in order to release two molecules of O_2 during photosynthesis?
- (1) 4
 - (2) 2
 - (3) 8
 - (4) 16

Space for Rough Work

29. The F₁ part of ATP synthase
- Is an integral membrane protein complex
 - Forms the channel through which proton cross the inner membrane
 - Contains the site for ATP synthesis from ADP and inorganic phosphate
 - Involve incomplete oxidation of NADH to form 2 ATP molecules
30. Which among the following groups represents the minimum species diversity among invertebrates?
- Insects
 - Crustaceans
 - Molluscs
 - Reptiles
31. An ecosystem with rich species diversity is characterised by all of the following, **except**
- High variations in productivity from year to year
 - Resilience to man made disturbance
 - Resistance to invasions by alien species
 - Resistance to occasional natural disturbances
32. All the given scientists are involved in the rediscovery of the Mendel's results on the inheritance of characters, **except**
- Hugo de Vries
 - Walter Sutton
 - Carl Correns
 - Von Tschermak
33. All of the following show male heterogamety, **except**
- Grasshopper
 - Humans
 - Drosophila
 - Butterfly
34. Colour blindness
- Is an autosomal recessive trait
 - Trait can be transferred from male to his grandson through daughter
 - Can appear in an individual when both the autosomes carry the recessive genes
 - Refers to a person's inability to see any colour at all
35. Read the following statements and choose the **correct** option
- Statement A:** In codominance, in F₁ hybrid, both the alleles express themselves equally and there is no mixing of the effect of both the alleles.
- Statement B:** Mendel worked on garden pea for fourteen years and proposed law of inheritance.
- Only statement A is incorrect
 - Only statement B is incorrect
 - Both the statements A and B are correct.
 - Both the statements A and B are incorrect.

SECTION - B

36. Select the **incorrectly** matched pair.
- | | |
|---------------------|---------------------------------------|
| (1) Whittaker | - Five kingdom classification |
| (2) D.J. Ivanowsky | - Crystallised TMV for the first time |
| (3) M.W. Beijerinck | - <i>Contagium vivum fluidum</i> |
| (4) Linnaeus | - Gave two kingdom classification |
37. Consider the following statements and select appropriate option.
- The region of meristematic activity of root produce new cells.
 - In pinnately compound leaf, the midrib forms a common axis called rachis.
 - China rose and lemon show axile placentation.
 - C₁₊₂₊₍₂₎ condition depicts vexillary aestivation of sepals in members of Fabaceae family.
- a, b and d are correct
 - a and d are incorrect
 - a, b and c are correct
 - b, c and d are correct

38. Phycoerythrin is the major pigment in
 (1) Brown algae (2) Red algae
 (3) Blue-green algae (4) Green algae
39. The first antibiotic penicillin was produced from
 (1) Bacteria (2) Fungi
 (3) Virus (4) Prions
40. Select the **incorrect** statement.
 (1) Average temperature decreases progressively from the equator towards the poles and from plain to mountain tops.
 (2) Temperature, significantly affects the enzyme kinetics and basal metabolism as well as activity and other physiological function.
 (3) Mango is easily found in tropical, subtropical and temperate countries like Canada.
 (4) Snow leopards are not found in Kerala forest
41. Read the following statements and select the **correct** option.
Statement A: The natural reservoir of phosphorous is rock which contains phosphorous in the form of phosphates.
Statement B: After nitrogen, phosphorous is the second most critical element.
 (1) Only statement A is correct
 (2) Only statement B is correct
 (3) Both statements A and B are correct
 (4) Both statements A and B are incorrect
42. Select the **correctly** matched pair.
 (1) Guard cells – Do not possess chloroplasts
 (2) Root hairs – Unicellular elongations of epidermal cells
 (3) Epidermis – Usually multi-layered
 (4) Cuticle – Present in roots
43. Read the following statements and choose the option for **correct** ones.
Statement I: Development in plants is under the control of intrinsic and extrinsic factors.
Statement II: Growth, differentiation and development are not very closely related events in plant life.
 (1) Only statement I is correct
 (2) Only statement II is correct
 (3) Both statements I and II are correct
 (4) Both statements I and II are incorrect
44. What would be the chromosome number of antipodal cells in a plant if there are 24 chromosomes in megasporangium mother cell?
 (1) 8
 (2) 12
 (3) 4
 (4) 15
45. The largest isolated single cell is
 (1) Mycoplasma
 (2) Red blood cell
 (3) Egg of an Ostrich
 (4) Bacteria
46. Cell plate formation during cytokinesis occurs in
 (1) Shoot tip meristem cells
 (2) Human embryo cells
 (3) Human erythrocytes
 (4) Bacterial cells
47. According to the double helical model of DNA proposed by Watson and Crick, the pitch of the DNA is
 (1) 0.34 nm
 (2) 34 nm
 (3) 3.4 nm
 (4) 20 nm

Space for Rough Work



48. All of the following scientists contributed to prove the semi-conservative nature of replication of DNA, **except**
- Meselson
 - Stahl
 - Chase
 - Taylor
49. In ETS succinate dehydrogenase refers to
- Complex IV
 - Complex I
 - Complex III
 - Complex II
50. Match the column-I with column-II and choose the **correct** option.
- | | Column-I | | Column-II |
|----|-----------------------|-------|-----------------------------------|
| A. | Co-dominance | (i) | Phenylketonuria |
| B. | Polygenic inheritance | (ii) | Gene for starch grain size in pea |
| C. | Incomplete dominance | (iii) | Blood group AB |
| D. | Pleiotropy | (iv) | Human height |
- | A | B | C | D |
|---------|-----|-----|-----|
| (1) i | iii | iv | ii |
| (2) iv | i | ii | iii |
| (3) iv | ii | iii | i |
| (4) iii | iv | ii | i |

ZOOLOGY

SECTION-A

51. Which among the following is an indirect method of gene transfer?
- Gene gun
 - Disarmed vector mediated
 - Micro-injection
 - Biolistics
52. A restriction endonuclease works by cutting each of the two strands of the double helix of DNA at specific points
- Between sugar and purine base
 - Between the hydrogen bonds of nitrogenous bases
 - In its sugar-phosphate-sugar backbone
 - Between sugar and pyrimidine base
53. Arrange the given steps of a PCR in the chronological order and select the **correct** option.
- Denaturation
 - Extension
 - Annealing
- (1) b → c → a (2) a → b → c
 (3) a → c → b (4) c → a → b
54. _____ restriction enzyme can be used to make pBR322 plasmid sensitive to 'ampicillin' antibiotic. Select the **correct** option to fill in the blank.
- EcoR I
 - BamH I
 - Pst I
 - Hind III
55. In *Meandrina*, cnidoblasts are used for
- Anchorage
 - Defense
 - Capturing of prey
- Select the **correct** option.
- a and b only
 - b and c only
 - a and c only
 - a, b and c

Space for Rough Work

56. A tissue has compactly packed fibres and fibroblasts and the collagen fibres are present in rows between many parallel bundles of fibres. Identify the tissue and select the **correct** option.
- Skin
 - Blood
 - Bone
 - Ligament
57. Intercalated discs are associated with the
- Cardiac muscles
 - Smooth muscles
 - Voluntary muscles
 - Skeletal muscles
58. How many estimated varieties of rice are grown in India?
- 27
 - 200,000
 - 20,000
 - 200,000,00
59. Select the **correct** option w.r.t. mature insulin.
- Two disulphide bonds are present between chain A and chain B and one disulphide bond is present in the A chain.
 - One disulphide bond is present between chain A and chain B and one disulphide bond is present in the A chain.
 - Two disulphide bonds are present between chain A and chain B and two disulphide bonds are present in the A chain.
 - Two disulphide bonds are present between chain A and chain B and one disulphide bond is present in the B chain.
60. Which of the following is not a substituted pyrimidine?
- Adenine
 - Cytosine
 - Thymine
 - Uracil
61. Which of the following diseases is caused by the hypersecretion of hormones?
- Addison's disease
 - Diabetes insipidus
 - Acromegaly
 - Cretinism
62. All of the following are correct features w.r.t. cellulose, **except**
- It is found in the acid-insoluble fraction.
 - It is the homopolymer of glucose.
63. Select the **incorrect** option w.r.t. anabolic pathways.
- They are expected to consume energy.
 - Also known as the biosynthetic pathways.
 - Degradation of protein to amino acids is example of anabolic pathway.
 - Lead to the formation of a more complex structure from simpler structures.
64. When a stimulus is applied at a site on the polarised axonal membrane, the membrane at the site becomes
- Freely permeable to Na^+
 - Freely permeable to K^+
 - Impermeable to Na^+
 - Repolarised due to influx of Na^+
65. Choose the **incorrect** match.
- Neurotransmitters – Electrical synapse
 - Neuronal junction – Synapse
 - Synaptic vesicles – Synaptic knob
 - Nodes of Ranvier – Myelinated neuron
66. Which of the following male sex accessory ducts ascends to the abdomen and loops over the urinary bladder?
- Vas deferens
 - Epididymis
 - Rete testis
 - Vasa efferentia
67. In humans, ejaculatory duct is formed by the union of
- Epididymis and duct from prostate gland
 - Vas deferens and a duct from bulbourethral gland
 - Vas deferens and a duct from seminal vesicle of the same side
 - Vas deferens and a duct from seminal vesicle of the opposite side

Space for Rough Work

68. Reproductive cycle in the female primates is called menstrual cycle which starts
 (1) After menstruation phase
 (2) At puberty
 (3) During pregnancy
 (4) During menopause
69. Match column I with column II and select the **correct** option.
- | Column I | Column II |
|--------------------|------------------------------|
| a. <i>Pavo</i> | (i) No external ear openings |
| b. <i>Vipera</i> | (ii) Crop and gizzard |
| c. <i>Pteropus</i> | (iii) Mammary glands |
| d. <i>Clarias</i> | (iv) Operculum |
- (1) a(i), b(ii), c(iii), d(iv) (2) a(ii), b(i), c(iii), d(iv)
 (3) a(iv), b(iii), c(ii), d(i) (4) a(ii), b(iii), c(iv), d(i)
70. All of the following are components of conducting part of the human respiratory system, **except**
 (1) External nostrils
 (2) Terminal bronchioles
 (3) Alveoli
 (4) Trachea
71. Pressure contributed by an individual gas in a mixture of gases is known as
 (1) Partial pressure of that particular gas
 (2) Atmospheric pressure of gaseous mixture
 (3) Total pressure of gases
 (4) Vapour pressure of water in gases
72. In adult humans, under normal physiological conditions, all of the following are reabsorbed actively in tubular parts of nephrons, **except**
 (1) Amino acids (2) Sodium ions
 (3) Glucose (4) Urea
73. Read the following statements carefully w.r.t. human heart.
 (a) It is a mesodermally derived organ.
 (b) It is protected by a single walled membranous bag called pericardium.

- (c) A thin, muscular wall called the inter-atrial septum separates the right and left atria.
 (d) The atrium and the ventricle of the same side are separated by a thick fibrous tissue called the inter-ventricular septum.
- Select the option with correct statements only.
- (1) a, b and d (2) a and c
 (3) b and d (4) a, b and c
74. Select the **correct** statement.
 (1) Rubber and starch are primary metabolites.
 (2) Carbonic anhydrase is a hydrolase.
 (3) Glycine is the simplest amino acid.
 (4) Adenine and cytidine are nucleosides.
75. All of the following are possible ill-effects caused due to the use of various contraceptive methods, **except**
 (1) Breast cancer
 (2) Uncontrolled growth of population
 (3) Abdominal pain and nausea
 (4) Breakthrough bleeding
76. In India, the opinion of how many registered medical practitioner(s) is/are required for the termination of pregnancy, if the pregnancy has lasted for 11 weeks?
 (1) Two (2) One
 (3) Three (4) Four
77. Select the **incorrect** match.
- | | |
|----------------------------|--|
| (1) Lactational amenorrhea | – Absence of menstruation during intense lactation |
| (2) Spermicidal jellies | – Increase contraceptive efficiency of barrier methods |
| (3) Coitus interruptus | – Natural method of conception |
| (4) Tubectomy | – Blocks gamete transport |

Space for Rough Work

78. Choose the **correct** option to complete the analogy w.r.t. a sarcomere.
 'I' band : Actin filaments only :: 'A' band : _____
 (1) Myosin filaments only
 (2) Actin filaments only
 (3) Both actin and myosin filaments
 (4) Neither actin nor myosin filaments
79. Choose the **incorrect** statement.
 (1) Each thick filament is a polymerized protein.
 (2) A complex protein named tropomyosin is distributed at regular intervals on the troponin.
 (3) Each thin filament is made of two filamentous actins helically wound to each other.
 (4) Tropomyosin runs close to the F-actins throughout its length.
80. The scientist who proposed the theory that states 'evolution of life forms had occurred but driven by use and disuse of organs' was
 (1) Ernst Haeckel (2) Charles Darwin
 (3) Louis Pasteur (4) Lamarck
81. Conventional religious literature tells us about the theory of special creation which has three connotations. Choose the odd one w.r.t. it.
 (1) All living organisms that we see today were created as such.
 (2) The diversity was always the same since creation and will be the same in future also.
 (3) Earth is very old, not thousands of years but billion of years old.
 (4) The Earth is about 4000 years old.
82. In the experiment conducted by S.L. Miller, all of the following were present/observed in the flask, **except**
 (1) Temperature of 800°C
 (2) Mixture of CH₄, H₂, NH₃ and water vapour
 (3) Oxidising atmosphere
 (4) Formation of amino acids
83. Choose the odd one w.r.t. paired structures in cockroaches.
 (1) Mandible
 (2) Maxilla
 (3) Collateral gland
 (4) Phallic gland
84. **Assertion (A):** The acid-soluble fraction contains lipids.
Reason (R): Lipids have molecular weights in the range of ten thousand daltons and above.
 In the light of above statements, select the **correct** option.
 (1) Both (A) and (R) are true and (R) is the correct explanation of (A)
 (2) Both (A) and (R) are true but (R) is not the correct explanation of (A)
 (3) (A) is true but (R) is false
 (4) Both (A) and (R) are false
85. In humans, allergy is due to the release of chemicals like
 (1) Histamine and serotonin from lymphocytes
 (2) Steroids and histamine from mast cells
 (3) Antibodies and serotonin from lymphocytes
 (4) Histamine and serotonin from mast cells

SECTION - B

86. In the continuous culture system, the cells are maintained in the
 (1) Lag phase (2) Exponential phase
 (3) Stationary phase (4) Resting phase
87. How many of the animals given in the box below is/are economically beneficial?

Laccifer, Pinctada, Rana, Taenia, Ascaris, Apis

Select the **correct** option.

- (1) Three (2) Four
 (3) One (4) Five

Space for Rough Work

88. In the year 'X', the transgenic cow, 'Rosie' produced human protein enriched milk. Which of the following is also correct for year 'X'?
- First clinical gene therapy was given to a 4 year old girl
 - An American company prepared the human insulin
 - The Indian Parliament cleared the second amendment of the Indian Patents Bill
 - An American company got patent rights on Basmati rice through the US Patent and Trademark Office
89. Identify the hormone that performs the functions given below.
- Stimulates muscular growth
 - Stimulatory role in the process of spermatogenesis
 - Produce anabolic effects on protein metabolism
- Select the **correct** option.
- Glucagon
 - Growth hormone
 - Androgen
 - Adrenaline
90. Which of the following antibodies is received by the foetus from their mother through placenta?
- IgA
 - IgE
 - IgM
 - IgG
91. Which part of our forebrain acts as the master clock in the human body?
- Right cerebral hemisphere
 - Left cerebral hemisphere
 - Thalamus
 - Hypothalamus

92. Match column I with column II.

	Column I	Column II
(A)	Urethral meatus	(i) Male accessory gland
(B)	Bulbourethral gland	(ii) Primary sex organ of females
(C)	Ovary	(iii) External opening of penis
(D)	Uterus	(iv) Also called womb

Choose the option with all the **correct** matches w.r.t. humans.

- | | | | |
|------------|------------|------------|------------|
| (A) | (B) | (C) | (D) |
| (1) (i) | (ii) | (iii) | (iv) |
| (2) (iii) | (i) | (ii) | (iv) |
| (3) (iv) | (iii) | (ii) | (i) |
| (4) (ii) | (iv) | (i) | (iii) |

93. Comprehend the given statements.

Statement A: Analysis of urine helps in the clinical diagnosis of many metabolic disorders as well as malfunctioning of kidneys.

Statement B: Urine formed by the nephrons is carried to the urinary bladder via ureters.

Select the **correct** option w.r.t. humans.

- Both statements A and B are correct
- Both statements A and B are incorrect
- Only statement A is correct
- Only statement B is correct

94. Which of the following volumes/capacities is measured by simple spirometer?

- Residual volume
- Functional residual capacity
- Vital capacity
- Total lung capacity

Space for Rough Work

95. How many of the given statement(s) is/are correct?

- (a) Symptoms of allergic reactions include sneezing, watery eyes, running nose and difficulty in breathing.
- (b) In auto-immune disorders, the body attacks self-cells.
- (c) Active immunity is fast and does not take time to give its full effective response.
- (d) Transmission of HIV infection can occur by sexual contact with the infected person.

Choose the **correct** option.

- (1) Four
- (2) Two
- (3) Three
- (4) One

96. Select the correct pathway for the passage of sperms in male *Rana tigrina*.

- (1) Testes → Vasa efferentia → Seminal vesicle → Kidney → Urinogenital duct → Cloaca
- (2) Testes → Vasa efferentia → Kidney → Bidder's canal → Urinogenital duct → Cloaca
- (3) Testes → Vasa efferentia → Bidder's canal → Cloaca → Ureter
- (4) Testes → Bidder's canal → Kidney → Vasa efferentia → Urinogenital duct → Cloaca

97. Choose the **correct** match among the following.

- | | | |
|---|---|------------------|
| (1) Total number of MTPs performed in a year all over the world | - | 45 to 50 billion |
|---|---|------------------|

- | | | |
|--|---|---------|
| (2) Government of India legalised MTP | - | In 1971 |
| (3) 'Family Planning Programme' initiated by the Government of India | - | In 1957 |
| (4) The Medical Termination of Pregnancy (Amendment) Act | - | In 1998 |

98. Oxygenated blood is pumped by the ventricle of

- (1) *Hippocampus*
- (2) *Bufo*
- (3) *Equus*
- (4) *Chelone*

99. The sum of total number of true ribs and floating ribs in an adult man is

- (1) Equal to the total number of carpals in both forelimbs of man
- (2) Less than the total number of tarsals in both hindlimbs of man
- (3) Less than the total number of phalanges in both forelimbs of man
- (4) Equal to the total number of metacarpals in both forelimbs of man

100. Hugo de Vries believed 'P' caused speciation. This 'P' is

- (1) Small and directional
- (2) Random and directionless
- (3) Large and directional
- (4) Random and directional

Space for Rough Work

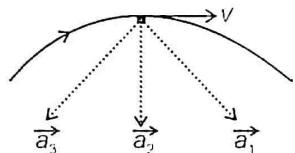
PHYSICS

SECTION-A

101. A person of mass 60 kg is standing in an elevator. If the Column-I certain conditions are given and in Column-II force on floor by person is shown. Match entries in the Column-I with correct entries in Column-II and tick the correct option.

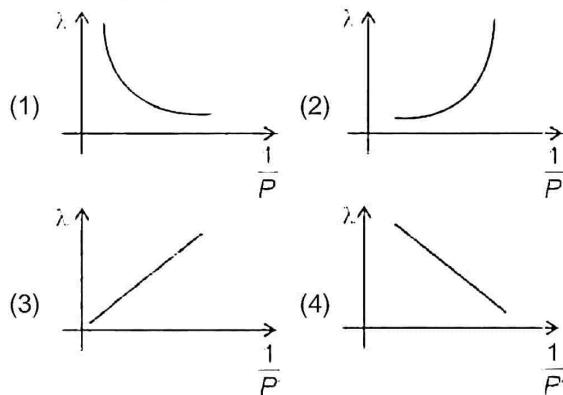
Column-I		Column-II
(A)	Elevator moving with constant speed	(P) Force on floor by person = 600 N
(B)	Elevator accelerates upwards at 3 ms^{-2}	(Q) Force on floor by person = 780 N
(C)	Elevator accelerates downward at 3 m s^{-2}	(R) Force on floor by person = 420 N

- (1) A \rightarrow P, B \rightarrow Q, C \rightarrow R
 (2) A \rightarrow Q, B \rightarrow P, C \rightarrow R
 (3) A \rightarrow R, B \rightarrow P, C \rightarrow Q
 (4) A \rightarrow R, B \rightarrow Q, C \rightarrow P
102. A body moves with constant speed in a curved path in a plane as shown in figure. The direction of acceleration vector at the shown instant is



- (1) \vec{a}_1 (2) \vec{a}_2
 (3) \vec{a}_3 (4) All of these
103. A particle starts from rest and its position after t seconds is given in metre by the relation $x = 7 + 7t^2$. The magnitude of instantaneous velocity at $t = 1 \text{ s}$ is

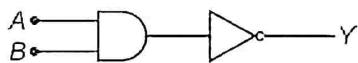
- (1) 10 m s^{-1} (2) Zero
 (3) 14 m s^{-1} (4) 8 m s^{-1}
104. The slope of velocity-time graph represents
 (1) Displacement (2) Distance
 (3) Acceleration (4) Speed
105. A cylindrical vessel contains two non-reactive gases helium and nitrogen. The ratio of their partial pressure is $5 : 3$. The ratio of number of molecules is
 (1) $2 : 3$ (2) $5 : 3$
 (3) $1 : 1$ (4) $3 : 2$
106. The graph which shows the variation of the de Broglie wavelength (λ) of a particle and $\frac{1}{\text{Momentum}} \left(\frac{1}{P} \right)$ is



107. The energy equivalent of 2.5 g of a substance is
 (1) $22.5 \times 10^{14} \text{ J}$ (2) $22.5 \times 10^{13} \text{ J}$
 (3) $22.5 \times 10^{12} \text{ J}$ (4) $22.5 \times 10^{15} \text{ J}$
108. Among the following which one is a forward biased diode?
- (1) 1V \rightarrow \rightarrow 2V
 (2) 0V \rightarrow \rightarrow 4V
 (3) 0V \rightarrow \rightarrow -3V
 (4) 0V \rightarrow \rightarrow -4V

Space for Rough Work

109. For the given logic circuit the value of output Y when $A = 0, B = 1$ and $A = 1, B = 0$



- (1) 0, 0 (2) 0, 1
 (3) 1, 0 (4) 1, 1

110. Image formed by a concave mirror is virtual, erect and magnified when the object is placed

- (1) At focus
 (2) Between focus and pole
 (3) At centre of curvature
 (4) Beyond centre of curvature

111. A compound microscope has two lenses. The magnifying power of objective lens is 8 and the combined magnifying power is 96. The magnifying power of the eye piece lens is

- (1) 5 (2) 10
 (3) 11 (4) 12

112. If critical angle for certain medium is $\sin^{-1}(0.75)$, then the polarizing angle of that medium is

- (1) 45° (2) 53°
 (3) 30° (4) 37°

113. A light wave is travelling along positive x -direction. If the corresponding E vector at any time is along the $-y$ direction, the direction of B vector at that time is along

- (1) $+z$ -axis (2) $+y$ -axis
 (3) $-x$ -direction (4) $-z$ -axis

114. A platinum wire has a resistance of 10Ω at 0°C and 15Ω at 200°C . The temperature coefficient of resistance for the wire is

- (1) $\frac{1}{400} \text{ }^\circ\text{C}^{-1}$ (2) $\frac{1}{100} \text{ }^\circ\text{C}^{-1}$
 (3) $\frac{-1}{200} \text{ }^\circ\text{C}^{-1}$ (4) $\frac{3}{200} \text{ }^\circ\text{C}^{-1}$

115. Core of electromagnet should have

- (1) High retentivity and high coercivity
 (2) High retentivity and low coercivity
 (3) Low retentivity and high coercivity
 (4) Low retentivity and low coercivity

116. **Assertion (A):** There is increase in the temperature of a battery when it is connected in a circuit.

Reason (R): Heat generated in a battery is due to its internal resistance.

In the light of the above statements, choose the **correct** answer from the options given below:

- (1) Both A and R are true and R is the correct explanation of A
 (2) Both A and R are true but R is **NOT** the correct explanation of A
 (3) A is true but R is false
 (4) Both A & R are false

117. An electron of mass $9 \times 10^{-31} \text{ kg}$ in the presence of uniform magnetic field moves in a circle of radius 5 cm at a speed of $9 \times 10^5 \text{ m/s}$. If a proton of mass $1.7 \times 10^{-27} \text{ kg}$ was to move in a circle of the same radius in the mentioned magnetic field, then its speed (approximate) will be

- (1) 4700 m/s (2) 5500 m/s
 (3) 476 m/s (4) 556 m/s

118. Magnetic field at the centre of an infinite solenoid is B . Magnetic field at its end will be

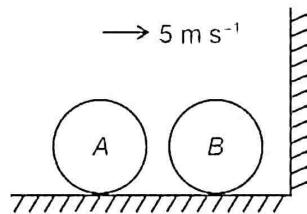
- (1) B (2) $2B$
 (3) $\frac{B}{2}$ (4) Zero

119. The displacement x of a particle of mass 1 kg moving in one dimension, under the action of a force that is related to time t by the equation $x = (t-1)^2$, where x is in meter and t is in second. The work done by the force in $t = 1 \text{ s}$ to $t = 2 \text{ s}$ is

- (1) 2 J (2) 4 J
 (3) 1 J (4) 3 J

120. Two identical balls as shown in the figure given below. The first ball moving with speed 5 m s^{-1} towards the right and the second ball was at rest initially. The walls and floor are smooth. Assuming all collision are elastic choose the correct statements among the following.

Space for Rough Work

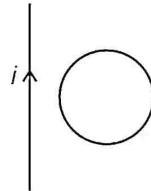


- a. There are only three collisions
- b. There are only two collisions
- c. The velocities of balls remain unchanged after all collisions
- d. The speed of ball B reduced to zero after all collisions

The correct option is

- | | |
|----------|----------|
| (1) a, c | (2) b, d |
| (3) a, d | (4) b, c |

121. A current carrying long wire and a conducting loop placed in a plane without touching each other as shown. The wire is fix but loop is free to move in same plane.



If $\frac{di}{dt} > 0$, then loop

- (1) Will move toward wire
- (2) Will move away from wire
- (3) Will not move at all
- (4) Will start spinning

122. A resistor and a capacitor are connected to an AC supply of 200 V, 50 Hz. The current in the circuit is 4 A and power consumed in the circuit is 100 watt. The power factor in the circuit is

- | | |
|-------------------|--------------------|
| (1) $\frac{1}{2}$ | (2) $\frac{1}{4}$ |
| (3) $\frac{1}{8}$ | (4) $\frac{1}{16}$ |

123. Point masses 1 kg, 2 kg, 3 kg and 4 kg are lying at the points (0, 0, 0), (2 m, 0, 0), (0, 3 m, 0) and (-2 m, -2 m, 0) respectively. The moment of inertia of this system about X-axis will be

- | | |
|--------------------------|--------------------------|
| (1) 43 kg m ² | (2) 34 kg m ² |
| (3) 27 kg m ² | (4) 72 kg m ² |

124. **Assertion (A):** During revolution the earth slows down at aphelion and moves fast at perihelion.

Reason (R): The angular momentum of the earth-sun system is conserved.

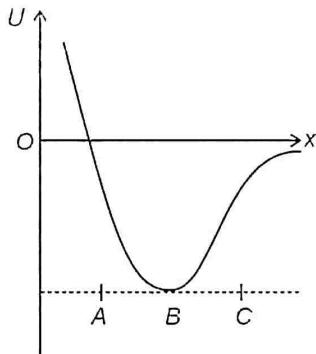
In the light of the above statements, choose the **correct** answer from the options given below:

- (1) Both A and R are true and R is the correct explanation of A
- (2) Both A and R are true but R is NOT the correct explanation of A
- (3) A is true but R is false
- (4) Both A & R are false

125. Intensity of the gravitational field inside the hollow spherical shell is

- (1) Variable
- (2) Decreases from centre to surface
- (3) Increases from centre to surface
- (4) Zero

126. The potential energy U of a diatomic molecule as a function of the distance x between atoms has been shown in the figure. The atoms are



- (1) Attracted when x lies between A and B and are repelled when x lies between B and C
- (2) Attracted when x lies between B and C and are repelled when x lies between A and B
- (3) Always attracted when x lies between A and C
- (4) Always repelled when x lies between A and C

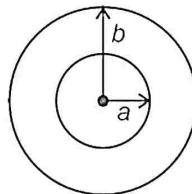
Space for Rough Work

127. The percentage change in length of 1 m iron rod if its temperature changes by 100°C is (α for iron is $2 \times 10^{-5}/^{\circ}\text{C}$)
 (1) 0.2% (2) 0.4%
 (3) 0.6% (4) 0.7%
128. An ideal fluid flows through a pipe of circular cross-section has two sections with diameters 2 cm and 3 cm. The ratio of the velocities in the two sections respectively is
 (1) 9 : 4 (2) 3 : 2
 (3) 2 : 3 (4) 16 : 15
129. In a heat engine, if the efficiency is 40% and the input heat is 500 J, then the useful work output of the engine is
 (1) 200 J (2) 300 J
 (3) 400 J (4) 500 J
130. During an isothermal process, what happens to the internal energy of an ideal gas?
 (1) Increases
 (2) Decreases
 (3) Remains constant
 (4) Depends on the pressure
131. In a vernier callipers each cm on the main scale is divided into 20 equal parts. If tenth vernier scale division coincides with ninth main scale division, then the least count of the vernier callipers will be
 (1) 5 mm (2) 0.5 mm
 (3) 0.05 mm (4) 0.005 mm
132. If a simple harmonic oscillator has acceleration equal to 2.0 m/s^2 when its displacement is .02 m, the angular frequency of the oscillator is equal to
 (1) 10 rad/s (2) 0.1 rad/s
 (3) 100 rad/s (4) 1 rad/s
133. A wave equation is given as

$$y = 0.5 \sin \frac{2\pi}{3.2} (64t - x), \text{ where } t \text{ is time in second, the frequency of the wave is}$$

 (1) 5 Hz (2) 15 Hz
 (3) 20 Hz (4) 25 Hz

134. If the electric potential of the inner metal shell is 10 V and that of the outer shell is 5 V, then the potential at the centre will be



- (1) 5 V (2) 10 V
 (3) 15 V (4) Zero

135. Given below are two statements:

Statement I: If there exists attraction between two bodies, both of them may not be charged.

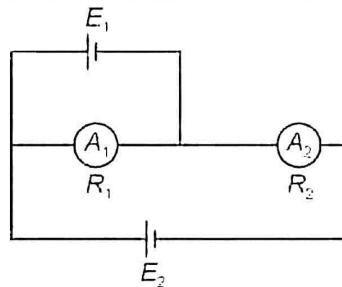
Statement II: Electric field is inversely proportional to square of distance from a point charge.

In the light of the above statements, choose the **correct** answer from the options given below:

- (1) Both Statement I and Statement II are true
 (2) Statement I is true but Statement II is false
 (3) Statement I is false but Statement II is true
 (4) Both Statement I and Statement II are false

SECTION - B

136. Two batteries with zero internal resistance are connected with two ammeters having resistances equal to R_1 and R_2 as shown in the circuit.

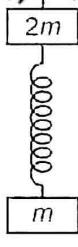


- (1) If $E_2 > E_1$, then readings of both ammeters must be different
 (2) If $E_2 > E_1$, then readings of both ammeters can be same
 (3) If $E_2 > E_1$, then direction of currents in both the ammeters will be different
 (4) If $E_1 = E_2$, then current in A_1 ammeter will be zero

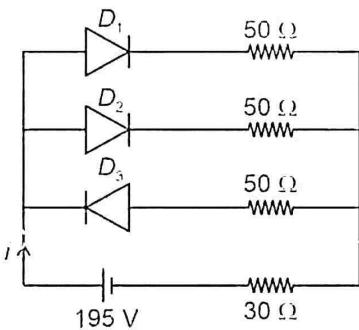
Space for Rough Work

137. Two blocks are connected by a spring. The combination is suspended at rest, from a string attached to ceiling as shown. If the string breaks suddenly then the initial acceleration of upper block of mass $2m$ is

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- (1) g (2) $\frac{2g}{3}$
 (3) $\frac{3g}{2}$ (4) $2g$
138. Let R_1 be the radius of the third stationary orbit and R_2 be the radius of the fifth stationary orbit of an electron in Bohr's model. The ratio $\frac{R_2}{R_1}$ is
- (1) $\frac{9}{25}$ (2) $\frac{3}{5}$
 (3) $\frac{5}{3}$ (4) $\frac{25}{9}$
139. In the given figure, each diode has a forward bias resistance of 20Ω and infinite resistance in reverse bias. The current i will be



- (1) 1 A (2) 2 A
 (3) 3 A (4) 4 A

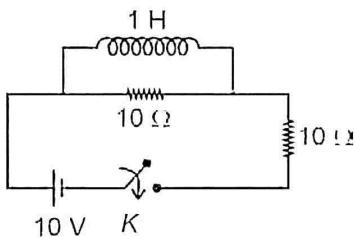
140. A thin prism P_1 with apex angle 3° made from a glass of refractive index 1.51 is combined with another thin prism P_2 made from glass of refractive index 1.68 to produce dispersion without deviation. The apex angle of the prism P_2 is

- (1) 2°
 (2) 4°
 (3) 2.25°
 (4) 2.6°

141. A beam of electron is used in a YDSE experiment. The slit width is w . When the velocity of electron is decreased slightly, then
- (1) No interference is observed
 (2) Fringe width increases
 (3) Fringe width decreases
 (4) Fringe width remain same

142. A series LCR circuit containing 5 H inductor, 2 mF capacitor and a resistance R is connected to 220 V source of angular frequency 10 rad/s . If the current in the circuit is 2 A, then the value of resistance R is
- (1) 10Ω
 (2) 110Ω
 (3) 80Ω
 (4) 40Ω

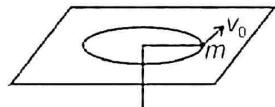
143. In the diagram shown below, the key K is closed at $t = 0$. The rate of change of current in the inductor at $t = 0$ is



- (1) $\frac{1}{2} \text{ A/s}$
 (2) 1 A/s
 (3) 10 A/s
 (4) 5 A/s

Space for Rough Work

144. A mass m moves in a circle on a smooth horizontal plane with velocity v_0 at a radius R_0 . The mass is attached to a string which passes through a smooth hole in the plane as shown.



The tension in the string is increased gradually and finally mass m moves in a circle of radius $\frac{R_0}{2}$.

The final value of the kinetic energy is

- (1) $\frac{1}{4}mv_0^2$ (2) $2mv_0^2$
 (3) $\frac{1}{2}mv_0^2$ (4) mv_0^2

145. Considering rotation of earth, the value of acceleration due to gravity is maximum

- (1) At poles
 (2) At equator
 (3) At $23\frac{1}{2}^\circ$ North (Tropic of Cancer)
 (4) At $23\frac{1}{2}^\circ$ South (Tropic of Capricorn)

146. If the temperature of an ideal gas is kept constant and the pressure is increased, what will be the effect on its volume?

- (1) Its volume will increase
 (2) Its volume will decrease
 (3) Its volume will remain constant
 (4) Depends on the type of gas

147. A fluid is flowing through a pipe of non-uniform cross section. At the cross sections where the diameter of the pipe decreases, velocity of the fluid

- (1) Increases
 (2) Decreases
 (3) Remains constant
 (4) Depends on the viscosity of the fluid

148. The speed of a wave produced in water is given by $v = \lambda^a g^b \rho^c$ where λ , g and ρ are wavelength of wave, acceleration due to gravity and density of water respectively. The value of a , b and c respectively are

- (1) $\frac{1}{2}, \frac{1}{2}, 0$ (2) $-1, 1, \frac{1}{2}$
 (3) $-1, 1, 0$ (4) $\frac{-1}{2}, \frac{-1}{2}, 1$

149. Two point charges A and B , having charges $+Q$ and $-Q$ respectively, are placed at a certain distance apart and force acting between them is F . If 20% charge of A is transferred to B , then force between the charge becomes

- (1) $\frac{9F}{16}$ (2) $\frac{4F}{5}$
 (3) $\frac{16F}{25}$ (4) $\frac{3F}{4}$

150. A parallel plate capacitor with oil between the plates (dielectric constant of oil $K = 3$) has a capacitance C . If the oil is removed, then capacitance of the capacitor becomes

- (1) $\frac{C}{3}$ (2) $3C$
 (3) $\sqrt{3}C$ (4) $\frac{C}{\sqrt{3}}$

CHEMISTRY

SECTION-A

151. Given below are two statements:

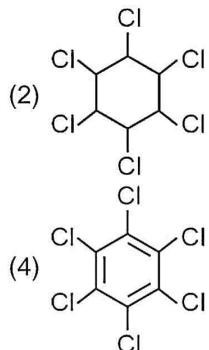
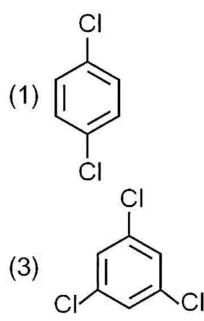
- Statement I:** Vitamin E is a water soluble vitamin.
Statement II: Deficiency of vitamin E causes cheilosis.

In the light of the above statements, choose the **correct** answer from the options given below:

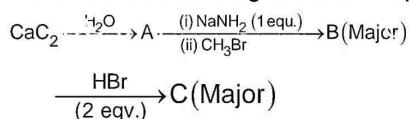
- (1) Both Statement I and Statement II are false
 (2) Statement I is true but Statement II is false
 (3) Statement I is false but Statement II is true
 (4) Both Statement I and Statement II are true

Space for Rough Work

152. Gammaxane is



153. Consider the following reaction sequence



Major product C is

- (1) $\begin{array}{c} \text{CH}_3 - \text{CH} - \text{CH}_2 \\ | \qquad | \\ \text{Br} \qquad \text{Br} \end{array}$
- (2) $\begin{array}{c} \text{CH}_3 - \text{C} - \text{CH}_3 \\ | \\ \text{Br} \end{array}$
- (3) $\text{Br} - \text{CH}_2 - \text{CH}_2 - \text{CH}_2 - \text{Br}$
- (4) $\begin{array}{c} \text{CH}_3 - \text{CH}_2 - \text{CH}_2 \\ \quad \quad \diagdown \\ \quad \quad \text{Br} \end{array}$

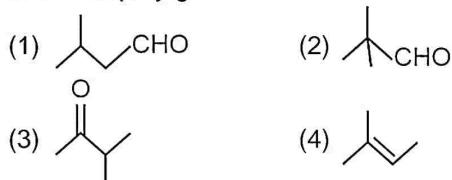
154. Consider the following statements.

- (a) Aspirin possesses anti-inflammatory property
 (b) Solution of ZnCl_2 in conc. HCl is called Lucas reagent
 (c) Primary alcohols do not produce turbidity with Lucas reagent at room temperature

The correct statements are

- (1) (a) and (b) only (2) (a), (b) and (c)
 (3) (a) and (c) only (4) (b) and (c) only

155. Neopentyl alcohol on reaction with copper at 573 K majorly gives



156. What is the wavelength of light emitted when the electron in a hydrogen atom undergoes transition from energy level with $n = 4$ to the energy level with $n = 1$? ($R_H = 109677 \text{ cm}^{-1}$)

(1) $\frac{15 R_H}{16}$

(2) $\frac{R_H}{16}$

(3) $\frac{16}{R_H}$

(4) $\frac{16}{15 R_H}$

157. Which of the following oxoacid of sulphur has $-S-S-$ linkage?

- (1) $\text{H}_2\text{S}_2\text{O}_7$ (2) $\text{H}_2\text{S}_2\text{O}_3$
 (3) $\text{H}_2\text{S}_2\text{O}_8$ (4) $\text{H}_2\text{S}_2\text{O}_6$

158. Identify the incorrect statement related to PCl_5 from the following.

- (1) In gaseous and liquid phases, PCl_5 has a trigonal bipyramidal structure
 (2) The three equatorial P-Cl bonds are equivalent in PCl_5
 (3) The two axial bonds are longer than equatorial bonds in PCl_5
 (4) PCl_5 hydrolyses in moist air to POCl_3 and finally to phosphorous acid

159. Given below are two statements: One is labelled as **Assertion (A)** and the other is labelled as **Reason (R)**:

Assertion (A): One Faraday charge is required for the reduction of one mole of silver ions to silver.

Reason (R): One Faraday always deposits one gram equivalent of any substance.

In the light of the above statements, choose the correct answer from the options given below:

- (1) Both (A) and (R) are true but (R) is NOT the correct explanation of (A)
 (2) (A) is true but (R) is false
 (3) (A) is false but (R) is true
 (4) Both (A) and (R) are true and (R) is the correct explanation of (A)

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160. Given below are two statements: One is labelled as **Assertion (A)** and the other is labelled as **Reason (R)**:

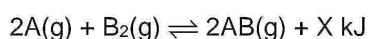
Assertion (A): The solubility of Fe(OH)_3 decreases on increasing pH.

Reason (R): Excess of OH^- ions will give common ion effect to Fe(OH)_3 .

In the light of the above statements, choose the correct answer from the options given below:

- (1) Both (A) and (R) are true but (R) is NOT the correct explanation of (A)
- (2) (A) is true but (R) is false
- (3) (A) is false but (R) is true
- (4) Both (A) and (R) are true and (R) is the correct explanation of (A)

161. In the reaction



The most favourable conditions for higher yield of AB are

- (1) Low temperature and high pressure
- (2) Low temperature and low pressure
- (3) High temperature and high pressure
- (4) High temperature and low pressure

162. Which of the following is a set of isoelectronic species?

- (1) F^- , Na^+ , Ar , Cl^-
- (2) Cl^- , S^{2-} , Ar , N^{3-}
- (3) F^- , O^{2-} , Na^+ , Mg^{2+}
- (4) Mg^{2+} , Al^{3+} , He , Na^+

163. Out of the following, the species having maximum ionization enthalpy is

- (1) Na
- (2) Na^+
- (3) Ne
- (4) O

164. Given below are two statements: One is labelled as **Assertion (A)** and the other is labelled as **Reason (R)**:

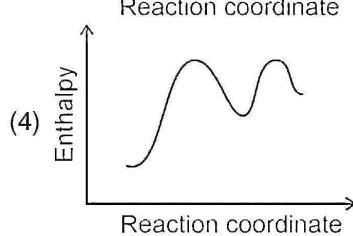
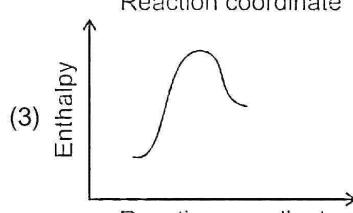
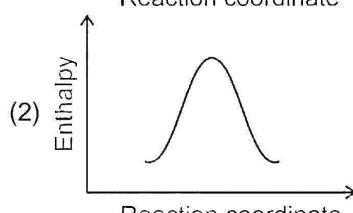
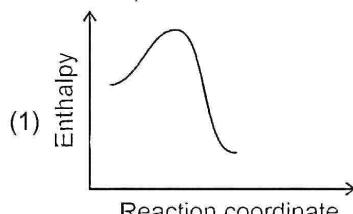
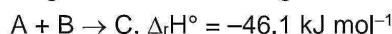
Assertion (A): Greater range of oxidation states are exhibited by actinoids.

Reason (R): In actinoids the 5f, 6d and 7s levels are of comparable energies.

In the light of the above statements, choose the correct answer from the options given below:

- (1) Both (A) and (R) are true but (R) is NOT the correct explanation of (A)
- (2) (A) is true but (R) is false
- (3) (A) is false but (R) is true
- (4) Both (A) and (R) are true and (R) is the correct explanation of (A)

165. Which of the following graph represents enthalpy diagram for the following elementary reaction?



166. The volume occupied by 4.4 g of CO_2 at STP is

- (1) 22.4 L
- (2) 2.24 L
- (3) 0.224 L
- (4) 0.1 L

167. How much water should be added to 100 cm³ of 0.1 M solution of HCl to make it exactly 0.05 M solution?

- (1) 200 cm³
- (2) 100 cm³
- (3) 500 cm³
- (4) 400 cm³

Space for Rough Work

168. Which of the following exhibits highest molar conductivity?

- (1) $[\text{Co}(\text{NH}_3)_6]\text{Cl}_3$ (2) $[\text{Co}(\text{NH}_3)_5\text{Cl}]\text{Cl}_2$
 (3) $[\text{Co}(\text{NH}_3)_4\text{Cl}_2]\text{Cl}$ (4) $[\text{Co}(\text{NH}_3)_3\text{Cl}_3]$

169. Given below are two statements: One is labelled as **Assertion (A)** and the other is labelled as **Reason (R)**:

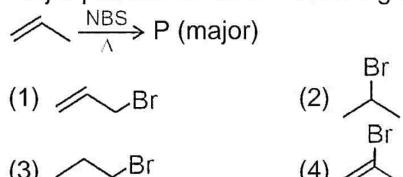
Assertion (A): N, N-Diethylbenzenesulphonamide is insoluble in alkali.

Reason (R): N,N-Diethylbenzenesulphonamide does not contain any hydrogen atom attached to nitrogen atom.

In the light of the above statements, choose the correct answer from the options given below:

- (1) Both (A) and (R) are true but (R) is NOT the correct explanation of A
 (2) (A) is true but (R) is false
 (3) (A) is false but (R) is true
 (4) Both (A) and (R) are true and (R) is the correct explanation of (A)

170. Major product formed in following reaction is



171. The correct order of reactivity towards $\text{S}_{\text{N}}1$ reaction is

- (1) $(\text{CH}_3)_3\text{CBr} > \text{CH}_3\text{CH}_2\text{CH}(\text{Br})\text{CH}_3 > \text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{Br}$
 (2) $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{Br} > \text{CH}_3\text{CH}_2\text{CH}(\text{Br})\text{CH}_3 > (\text{CH}_3)_3\text{CBr}$
 (3) $\text{CH}_3\text{CH}_2\text{CH}(\text{Br})\text{CH}_3 > (\text{CH}_3)_3\text{CBr} > \text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{Br}$
 (4) $\text{CH}_3\text{CH}_2\text{CH}(\text{Br})\text{CH}_3 > \text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{Br} > (\text{CH}_3)_3\text{CBr}$

172. Which of the following colligative properties is the best method for determination of molecular weight of proteins and polymers?

- (1) Lowering in vapour pressure
 (2) Lowering in freezing point
 (3) Osmotic pressure
 (4) Elevation in boiling point

173. Of the following 0.1 M aqueous solutions which will exhibit the lowest freezing point?

- (1) KCl (2) $\text{C}_6\text{H}_{12}\text{O}_6$
 (3) K_2SO_4 (4) $\text{C}_2\text{H}_5\text{OH}$

174. For which of the following molecules removal of an electron will take place from anti bonding molecular orbital?

- (1) N_2 (2) H_2
 (3) O_2 (4) C_2

175. In hybrid state of N-atom is

- (1) sp^2 (2) sp^3
 (3) dsp^2 (4) sp

176. Consider the following statements.

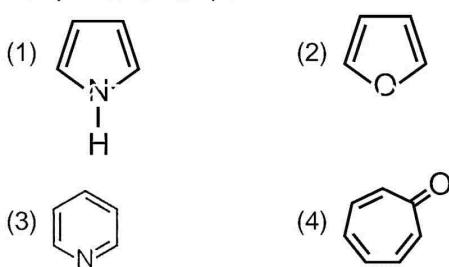
Statement I: Distillation under reduced pressure is used to purify liquid having very high boiling point and decompose at or below their boiling points.

Statement II: Glycerol can be separated from spent lye in soap industry by using distillation under reduced pressure.

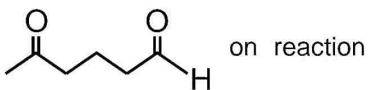
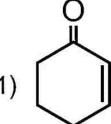
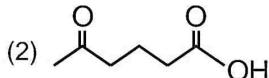
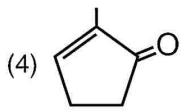
Choose the **correct** option.

- (1) Both the statements are correct
 (2) Both the statements are incorrect
 (3) Statement I is correct but statement II is incorrect
 (4) Statement I is incorrect but statement II is correct

177. All of the following are heterocyclic aromatic compounds, except



Space for Rough Work

178. Which of the given elements of group 14 reacts with steam to form dioxide and dihydrogen?
- (1) Lead (2) Silicon
 (3) Tin (4) Germanium
179. Standard reduction potentials of the two half reactions are given as follows:
- (i) $\text{Sn}^{4+} + 2\text{e}^- \rightarrow \text{Sn}^{2+} E^\circ = +0.15 \text{ V}$
 (ii) $\text{Cr}^{3+} + 3\text{e}^- \rightarrow \text{Cr} E^\circ = -0.74 \text{ V}$
- If the two couples in their standard state are connected to make a cell then the cell potential will be
- (1) +0.89 V (2) +0.59 V
 (3) +1.78 V (4) +0.34 V
180. Identify the change that requires a reducing agent.
- (1) $\text{S}^{2-} \rightarrow \text{S}$ (2) $\text{SO}_3 \rightarrow \text{SO}_4^{2-}$
 (3) $\text{Cr}_2\text{O}_7^{2-} \rightarrow \text{Cr}^{3+}$ (4) $\text{Cl}^- \rightarrow \text{ClO}^-$
181. The compound,  on reaction with dil. NaOH followed by heating gives majorly
- (1) 
 (2) 
 (3) 
 (4) 
182. Match reactions in list-I with their name in list-II and choose the correct answer.
- | List-I | List-II |
|--|------------------------------|
| a. $\text{RCOCl} \xrightarrow[\text{BaSO}_4]{\text{H}_2/\text{Pd}}$ | (i) HVZ reaction |
| b. $\text{RCHO} \xrightarrow{\text{Zn/Hg+HCl}}$ | (ii) Wolff-Kishner reduction |
| c. $\text{RCOR}' \xrightarrow[\epsilon\text{ylene glycol}]{\text{NH}_2\text{NH}_2/\text{KOH}}$ | (iii) Clemmensen reduction |
| d. $\text{RCH}_2\text{COOH} \xrightarrow[\text{(ii) H}_2\text{O}]{\text{(i) Br}_2/\text{Red P}}$ | (iv) Rosenmund reduction |
- (1) a(iv), b(ii), c(i), d(iii) (2) a(iv), b(iii), c(ii), d(i)
 (3) a(ii), b(iv), c(i), d(iii) (4) a(iii), b(iv), c(ii), d(i)
183. A reaction starts with 1 M reactant, after 10 min 0.5 M reactant got consumed and after 30 min 0.125 M reactant left behind. Order of reaction will be
- (1) 0 (2) 1
 (3) 2 (4) $1\frac{1}{2}$
184. Sodium nitroprusside is
- (1) $\text{Na}_4[\text{Fe}(\text{CN})_5\text{NOS}]$ (2) $\text{Na}_4[\text{Fe}(\text{CN})_6]$
 (3) $\text{Na}_2[\text{Fe}(\text{CN})_5\text{NO}]$ (4) $\text{Na}_3[\text{Fe}(\text{CN})_4(\text{NOS})_2]$
185. Match groups of cations in List-I with their group reagent during qualitative analysis in List-II and choose correct answer.
- | List-I | List-II |
|---------------|--|
| a. Group-I | (i) NH_4OH in presence of NH_4Cl |
| b. Group-II | (ii) H_2S in presence of NH_4OH |
| c. Group-III | (iii) Dilute HCl |
| d. Group-IV | (iv) H_2S gas in presence of dil. HCl |
- (1) a(iii), b(iv), c(i), d(ii) (2) a(i), b(ii), c(iii), d(iv)
 (3) a(iv), b(iii), c(ii), d(i) (4) a(ii), b(i), c(iv), d(iii)

SECTION - B

186. Time of completion for a zero-order reaction with rate constant k and initial concentration of reactant a_0 is

- (1) $\frac{a_0}{2k}$ (2) ∞
 (3) $\frac{a_0}{k}$ (4) $\frac{2a_0}{k}$

187. $\text{HCHO} \xrightarrow[\text{(ii) H}_3\text{O}^+]{\text{(i) RMgX}} \text{P}$ (Major)

Major product P is

- (1) Primary alcohol
 (2) Secondary alcohol
 (3) Carboxylic acid
 (4) Tertiary alcohol

Space for Rough Work

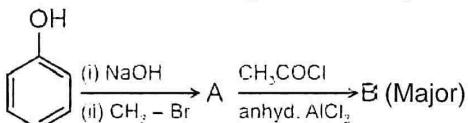
188. Consider the following statements.

- Cytosine is absent in RNA
- Nucleotides are joined together by phosphodiester linkage between 5' and 3' carbon atoms of the pentose sugar
- A unit formed by the attachment of a base at 1' position of sugar is known as nucleoside

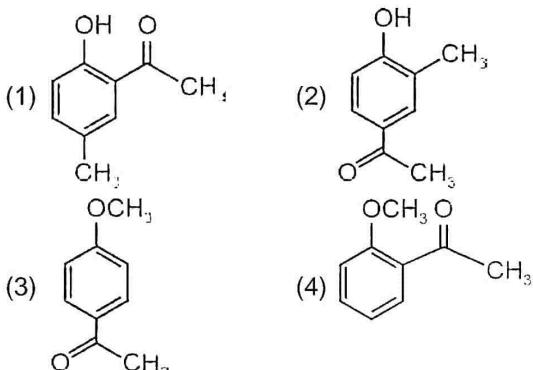
Correct statements are

- (a) and (c) only
- (a) and (b) only
- (a), (b) and (c)
- (b) and (c) only

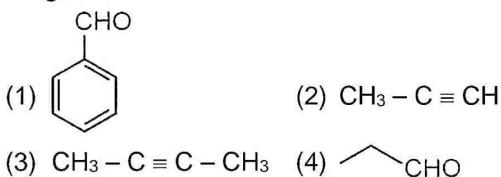
189. Consider the following reaction sequence



Major product B is



190. The compound which does not react with Tollen's reagent is



191. Correct order of energy of following orbitals for a multi electron species is

- $6f > 7p > 5d > 6p$
- $7p > 6f > 5d > 6p$
- $7p > 6f > 6p > 5d$
- $6f > 7p > 6p > 5d$

192. Given below are two statements.

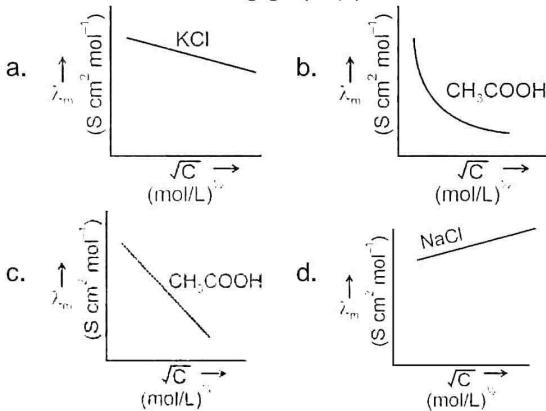
Statement I: Trihalides are more covalent than pentahalides of group 15 elements.

Statement II: For halides of group 15, elements in +5 oxidation state are more polarising than in +3 oxidation state.

In the light of the above statements, choose the most appropriate answer from the options given below:

- Statement I is correct but statement II is incorrect
- Statement I is incorrect but statement II is correct
- Both statement I and statement II are correct
- Both statement I and statement II are incorrect

193. Which of the following graph(s) is/are correct?



- (b) only
- (a), (c) and (d) only
- (a) and (b) only
- (a), (b) and (d) only

194. AB_2 dissociates as

$\text{AB}_2(g) \rightleftharpoons \text{AB}(g) + \text{B}(g)$, when the initial pressure of AB_2 is 400 mm of Hg and the total equilibrium pressure is 600 mm of Hg. Then the value of K_p is

- 50 atm
- 100 atm
- 40 atm
- 200 atm

195. Identify the incorrect statement among the following.

- Entropy increases on boiling of egg
- Entropy is a state property
- Change in entropy for the reaction, $2\text{H}(g) \rightarrow \text{H}_2(g)$ is positive
- $\Delta S_{\text{universe}} > 0$, the reaction is spontaneous

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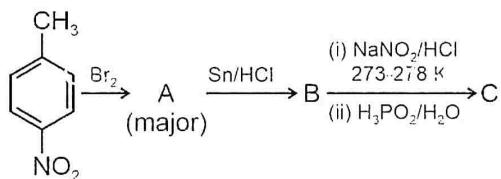
196 Identify the diamagnetic lanthanoid ion among the following.

- (1) Ce^{3+} (2) Lu^{3+}
 (3) Yb^{3+} (4) Pm^{3+}

197. The crystal field stabilization energy (CFSE) of $[\text{Co}(\text{C}_2\text{O}_4)_3]^{3-}$ is

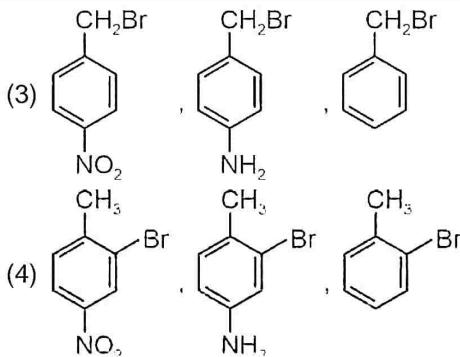
- (1) Zero (2) $-2.4\Delta_0$
 (3) $-1.2\Delta_0$ (4) $-1.6\Delta_0$

198. Consider the following reaction sequence



The compound A, B and C respectively are

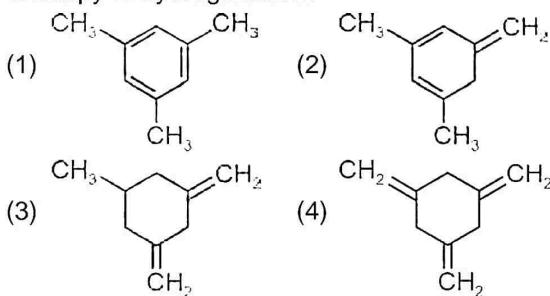
- (1) , ,
 (2) , ,



199. The correct order of bond angles in the following compounds/species is

- (1) $\text{H}_2\ddot{\text{O}} < \text{NH}_3 < \text{BF}_3 < \text{NH}_4^+$
 (2) $\text{NH}_3 < \text{H}_2\ddot{\text{O}} < \text{NH}_4^+ < \text{BF}_3$
 (3) $\text{H}_2\ddot{\text{O}} < \text{NH}_3 < \text{NH}_4^+ < \text{BF}_3$
 (4) $\text{BF}_3 < \text{NH}_4^+ < \text{NH}_3 < \text{H}_2\ddot{\text{O}}$

200. Which of the following compounds has highest enthalpy of hydrogenation?



□ □ □