

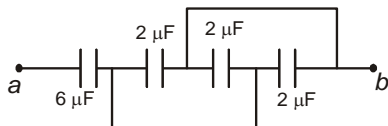
(for NEET-2022)

Test - I**Topics covered :****Physics** : Electric Charges and Fields Electrostatic Potential and Capacitance**Chemistry** : Haloalkanes and Haloarenes**Botany** : Reproduction in Organisms, Sexual Reproduction in Flowering Plants**Zoology** : Reproduction in Organisms, Human Reproduction**Instructions :**

- 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.
- 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.
- Use blue/black ballpoint pen only to darken the appropriate circle.
- Mark should be dark and completely fill the circle.
- Dark only one circle for each entry.
- Dark the circle in the space provided only.
- 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.

PHYSICS**Choose the correct answer:****SECTION - A**

- The effective capacitance between the points a and b in the network shown below is

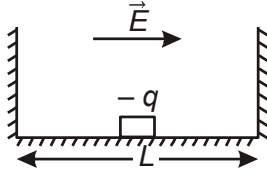


- $2 \mu\text{F}$
- $\frac{20}{3} \mu\text{F}$
- $6 \mu\text{F}$
- $3 \mu\text{F}$

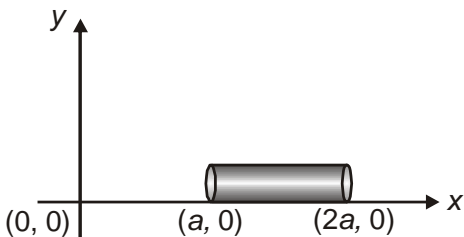
- There are two concentric conducting spherical shells of radi R and $2R$. The outer shell is given a charge Q while inner shell is earthed. The charge on inner shell is

- Q
- $-\frac{Q}{2}$
- $\frac{Q}{2}$
- Zero

13. A block of mass m having charge $-q$ is placed midway between two parallel walls. A uniform electric field \vec{E} is switched on as shown in figure. The time after which it will collide with the right wall for the first time is [All collisions are elastic and surfaces are smooth]

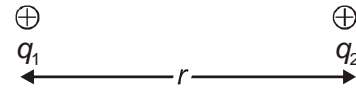


- (1) $\sqrt{\frac{mL}{qE}}$
 (2) $\sqrt{\frac{2mL}{qE}}$
 (3) $\sqrt{\frac{3mL}{qE}}$
 (4) It will not collide with the right wall
14. A uniformly charged conducting sphere of 1.2 m radius has surface charge density of $80.0 \mu\text{C m}^{-2}$. The flux leaving the surface of the sphere is
 (1) $1.64 \times 10^8 \text{ Nm}^2\text{C}^{-1}$ (2) $3.21 \times 10^7 \text{ Nm}^2\text{C}^{-1}$
 (3) $2.6 \times 10^7 \text{ Nm}^2\text{C}^{-1}$ (4) $5.2 \times 10^8 \text{ Nm}^2\text{C}^{-1}$
15. A positive point charge $20 \mu\text{C}$ is located at the point $\vec{r}_0 = (2\hat{i} + 3\hat{j}) \text{ m}$, where \hat{i} and \hat{j} are the unit vectors along the x-axis and y-axis respectively. Electric field at a point having position vector $\vec{r} = (8\hat{i} - 5\hat{j}) \text{ m}$ will be
 (1) $360(3\hat{i} - 4\hat{j}) \text{ N/C}$ (2) $360(6\hat{i} - 8\hat{j}) \text{ N/C}$
 (3) $180(3\hat{i} - 4\hat{j}) \text{ N/C}$ (4) $450(6\hat{i} - 8\hat{j}) \text{ N/C}$
16. A cylinder of radius R is placed in an electric field $\vec{E} = x^2\hat{i}$ as shown in the figure. The net electric flux through the cylinder is (consider SI units for all)

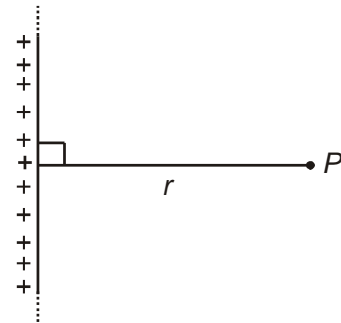


- (1) Zero (2) $(a^2)\pi R^2$
 (3) $(3a^2)\pi R^2$ (4) $(5a^2)\pi R^2$

17. If a dielectric material of dielectric constant ϵ_r is completely filled between two-point charges as shown in the figure, then the net electrostatic force on q_1 is

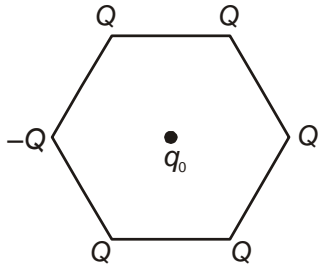


- (1) $\frac{1}{4\pi\epsilon_0} \frac{q_1 q_2}{r^2}$ (2) $\frac{1}{4\pi\epsilon_0 \epsilon_r} \frac{q_1 q_2}{r^2}$
 (3) $\frac{\epsilon_r}{4\pi\epsilon_0} \frac{q_1 q_2}{r^2}$ (4) Zero
18. The angle between the electric dipole moment of a dipole and the electric field produced due to it, on the equatorial line is
 (1) 0° (2) 90°
 (3) 180° (4) 270°
19. An electric dipole of dipole moment $9 \times 10^{-6} \text{ Cm}$ is aligned at 30° with the direction of uniform electric field of magnitude $6 \times 10^5 \text{ N/C}$. The magnitude of torque acting on dipole is
 (1) 6.2 N m (2) 5.4 N m
 (3) $5.4\sqrt{3} \text{ N m}$ (4) 2.7 N m
20. An infinite wire is placed along y-axis having uniform linear charge density λ . The electric field intensity at point P is $\left(K = \frac{1}{4\pi\epsilon_0} \right)$



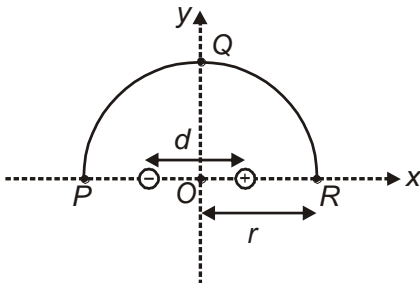
- (1) $\frac{2K\lambda}{r}$ (2) $\frac{K\lambda}{r}$
 (3) $\frac{K\lambda}{2r}$ (4) $\frac{K\lambda}{4r}$

21. Five charged particles each $+Q$ and one $-Q$ are placed at the six corners of a regular hexagon of sides length a . The electrostatic force acting on charge q_0 placed at the centre is



- (1) $\frac{1}{4\pi\epsilon_0} \cdot \frac{6Qq_0}{a^2}$ (2) $\frac{1}{4\pi\epsilon_0} \cdot \frac{2Qq_0}{a^2}$
 (3) $\frac{1}{4\pi\epsilon_0} \cdot \frac{Qq_0}{a^2}$ (4) $\frac{1}{4\pi\epsilon_0} \cdot \frac{4Qq_0}{a^2}$

22. An electric dipole is kept at origin as shown in the figure. The point P, Q, R are on a circular arc of radius r . If the electric fields at P, Q and R respectively are $\vec{E}_1, \vec{E}_2, \vec{E}_3$ respectively then select the correct option ($r \gg d$)



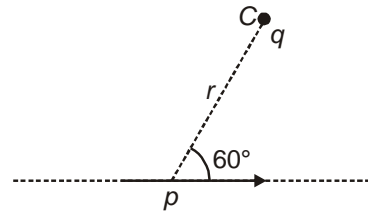
- (1) $\vec{E}_1 = \vec{E}_3$ (2) $\vec{E}_1 = -2\vec{E}_2$
 (3) $\vec{E}_3 = -2\vec{E}_2$ (4) All of these

23. In a certain region of space, electric field is along Z-axis throughout. The magnitude of electric field is not constant but increases uniformly along positive Z-direction at rate of 10^5 N/C per meter. What is force experienced by a system having a total dipole moment equal to 10^{-6} Cm in negative Z-axis direction.
- (1) 10 N in negative Z-axis direction
 (2) 0.10 N in negative Z-axis direction
 (3) 0.01 N in positive Z-axis direction
 (4) 0.2 N in positive Y-axis direction

24. A long cylindrical volume contains a uniformly distributed charge of density ρ . The electric field at a point inside the cylindrical volume at a distance r from its axis is

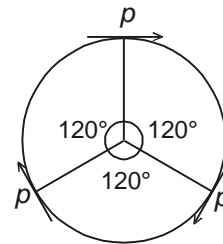
- (1) $\frac{\rho r}{3\epsilon_0}$ (2) $\frac{2\rho r}{\epsilon_0}$
 (3) $\frac{\rho r}{2\epsilon_0}$ (4) $\frac{3\rho r}{\epsilon_0}$

25. A point charge q is placed at rest at point C at distance r from a short electrical dipole of dipole moment p . The force acting on charge particle is



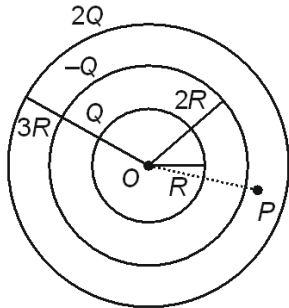
- (1) $\frac{\sqrt{7}qp}{4\pi\epsilon_0 r^3}$
 (2) $\frac{\sqrt{7}qp}{8\pi\epsilon_0 r^3}$
 (3) $\frac{\sqrt{5}qp}{4\pi\epsilon_0 r^3}$
 (4) $\frac{\sqrt{5}qp}{8\pi\epsilon_0 r^3}$

26. Three dipoles each of dipole moment of magnitude p are placed on a circle of radius R as shown. The magnitude of electric field intensity at centre will be

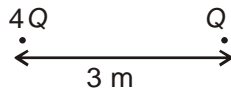


- (1) $\frac{4kp}{R^3}$
 (2) $\frac{2kp}{R^3}$
 (3) $\frac{kp}{R^3}$
 (4) Zero

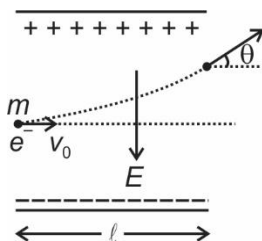
27. There are three conducting concentric spherical shells having charges Q , $-Q$, $2Q$ respectively as shown in figure. The electric field intensity at point P is (where $OP = 2.5R$) $\left(k = \frac{1}{4\pi\epsilon_0}\right)$



- (1) Zero (2) $\frac{3kQ}{4R^2}$
 (3) $\frac{4kQ}{25R^2}$ (4) $\frac{kQ}{4R^2}$
28. Two-point charges $4Q$ and Q are placed on x -axis as shown in the figure. Distance between two charges is 3 m. Net electrostatic field is zero at a distance



- (1) 2 m from Q (2) 1.5 m from $4Q$
 (3) 1 m from Q (4) 0.75 m from $4Q$
29. A uniform electric field E exists between two parallel identical plates having opposite charges on each plate. An electron enters the field between the plates with speed v_0 as shown in figure. If length of each plate is ℓ , then angle with which electron deviates from its initial path (m is mass of electron) as it emerges out is



- (1) $\tan^{-1}\left(\frac{eE\ell}{2mv_0^2}\right)$ (2) $\tan^{-1}\left(\frac{eE\ell}{mv_0^2}\right)$
 (3) $\sin^{-1}\left(\frac{eE\ell}{mv_0^2}\right)$ (4) $\sin^{-1}\left(\frac{eE\ell}{2mv_0^2}\right)$

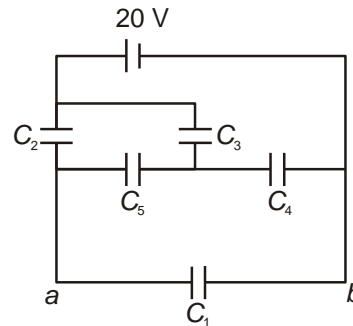
30. Two metal spheres of radii 30 cm and 10 cm are given a charge of $20 \mu\text{C}$ and $60 \mu\text{C}$ respectively. They are then connected by a conducting wire. The final charge on the sphere of radius 10 cm is

- (1) $10 \mu\text{C}$ (2) $30 \mu\text{C}$
 (3) $20 \mu\text{C}$ (4) $60 \mu\text{C}$

31. The diameter of a plate of a parallel plate condenser (composed of a pair of circular plates) is 8 cm. If its capacity is equal to that of a sphere of diameter 160 cm, the separation between the plates of the parallel plate condenser is

- (1) 0.2 mm (2) 0.3 mm
 (3) 0.4 mm (4) 0.5 mm

32. The energy stored in the capacitor C_1 between terminals a and b is (all capacitors are identical with capacitance $2 \mu\text{F}$)



- (1) 2 mJ (2) 1 mJ
 (3) 0.1 mJ (4) 0.2 mJ

33. Two capacitors of capacitance C and $2C$ and breakdown voltages of V and $\frac{V}{2}$ respectively are connected in series. The breakdown voltage of the series combination is

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

34. Consider an electric field $\vec{E} = 10 \frac{N}{C} \hat{j}$. The electric flux through a square of cross-sectional area $(4\hat{i}) \text{ m}^2$ is

- (1) $16 \text{ N m}^2\text{C}^{-1}$ (2) $24 \text{ N m}^2\text{C}^{-1}$
 (3) $32 \text{ N m}^2\text{C}^{-1}$ (4) $40 \text{ N m}^2\text{C}^{-1}$

35. A potential difference of 16 V exists across a parallel plate isolated capacitor with air between the plates. When a dielectric slab is introduced between plates (such that the space between the plates is completely filled up by dielectric) for the same configuration, potential difference is 4 V. The dielectric constant of the material is

- (1) 8 (2) 4
(3) 2 (4) 10

SECTION – B

36. An α particle, initially at rest, moves through a certain distance in a uniform electric field in time t_1 . A proton, also initially at rest, takes time t_2 to move through equal distance in the same uniform electric field. Neglecting the effect of gravity, the ratio $t_1 : t_2$ is equal to

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

37. A charge -2 nC is fixed at each of the points $x = 1$ cm, $x = 2$ cm, $x = 4$ cm, $x = 8$ cm, $x = 16$ cm,, $x = \infty$ on the x -axis. The electric potential at origin ($x = 0$), due to this system of charges, is

- (1) -36 V (2) -1800 V
(3) -3600 V (4) -5400 V

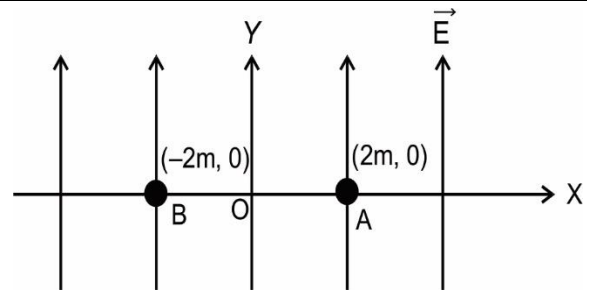
38. Eight identical spherical liquid drops each are at an electric potential 2 V. They coalesce to form one big spherical liquid drop, whose potential is

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

39. Three capacitors $C_1 = 3 \mu\text{F}$, $C_2 = 6 \mu\text{F}$ and $C_3 = 12 \mu\text{F}$ are joined in series. This series combination is connected to a 14 V battery. The potential difference across the capacitor C_2 is

- (1) 2 V (2) 4 V
(3) 6 V (4) 8 V

40. A uniform electric field of 50 V m^{-1} exists in XY-plane, parallel to Y-axis as shown in the figure. The potential difference $[V_A - V_B]$ is

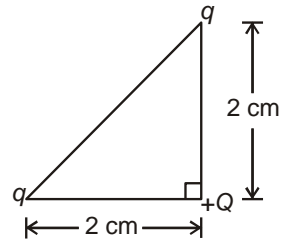


- (1) 200 V (2) Zero
(3) 100 V (4) -200 V

41. Two parallel plate capacitors having capacitances $6 \mu\text{F}$ and $3 \mu\text{F}$ are charged to potentials 25 V and 15 V respectively. If the plates of unlike polarity of the two capacitors are connected together, then the loss of energy in rearrangement of capacitors is

- (1) $100 \mu\text{J}$ (2) $450 \mu\text{J}$
(3) $1600 \mu\text{J}$ (4) $7200 \mu\text{J}$

42. Three charges $+Q$, q and q are placed at the vertices of a right-angled isosceles triangle as shown in figure. The net electrostatic potential energy of the system of these three-point charges is zero, if q is equal to



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

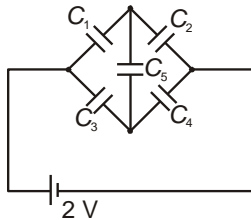
43. The electric potential at a point (x, y, z) in space is given by $V = [x^2y - y^2z - z^2x]$ volt. The electric field at the point $[-1 \text{ m}, -1 \text{ m}, -1 \text{ m}]$ is

- (1) $[\hat{i} - \hat{j} - \hat{k}] \text{ V m}^{-1}$ (2) $[\hat{i} - \hat{j} - 3\hat{k}] \text{ V m}^{-1}$
(3) $[-\hat{i} + \hat{j} + 3\hat{k}] \text{ V m}^{-1}$ (4) $[-\hat{i} + \hat{j} + \hat{k}] \text{ V m}^{-1}$

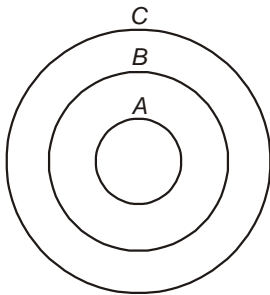
44. Two identical metal plates A and B are given charges $+20 \mu\text{C}$ and $-60 \mu\text{C}$ respectively. Now the plates A and B are brought close together to form a parallel plate capacitor of capacitance $20 \mu\text{F}$. The potential difference between the plates A and B is

- (1) 2 V (2) 4 V
(3) 6 V (4) 8 V

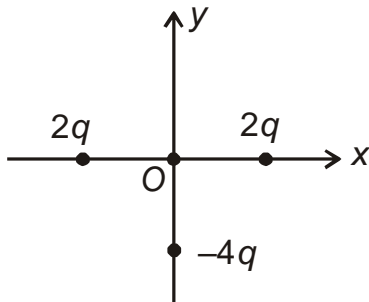
45. In the circuit shown below, $C_1 = 3 \mu\text{F}$; $C_2 = 6 \mu\text{F}$; $C_3 = 6 \mu\text{F}$; $C_4 = 12 \mu\text{F}$ and $C_5 = 9 \mu\text{F}$. The charge drawn from the battery is



- (1) $3 \mu\text{C}$
 (2) $12 \mu\text{C}$
 (3) $24 \mu\text{C}$
 (4) $6 \mu\text{C}$
46. Three conducting shells A, B and C are as shown in figure. If $+3Q$ charge is given on the inner shell, $-2Q$ on the middle shell and $+Q$ on the outer shell, then charge on the inner surface of the outermost shell is



- (1) Q
 (2) $+4Q$
 (3) $-2Q$
 (4) $-Q$
47. Three charges are placed in x - y plane as shown in figure, each is at distance l from the origin O . The dipole moment of this configuration is

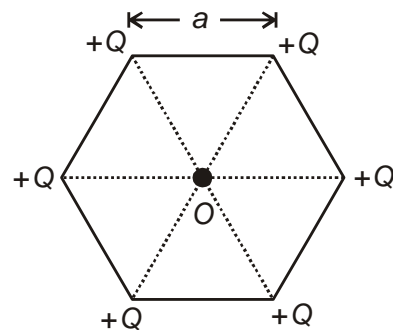


- (1) $-2ql \hat{j}$
 (2) $4ql \hat{j}$
 (3) $-2ql \hat{i}$
 (4) $2ql \hat{i}$

48. A particle of charge $2 \mu\text{C}$ and mass 2 mg is moving with a velocity of 5 m/s and is subjected to a uniform electric field of magnitude 10 V/m for 3 s . The final speed cannot be
- (1) 20 m/s (2) 25 m/s
 (3) 30 m/s (4) 35 m/s
49. Electric field on the equatorial plane of a small electric dipole at a distance r is \vec{E} , then electric field on the axis of the dipole at a distance " $4r$ " will be

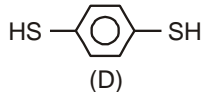
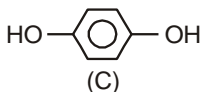
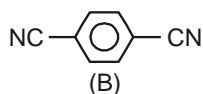
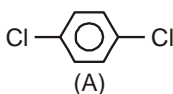
- (1) $\frac{\vec{E}}{64}$
 (2) $\frac{-\vec{E}}{64}$
 (3) $\frac{-\vec{E}}{32}$
 (4) $\frac{\vec{E}}{32}$

50. Six charges are placed at the vertices of a regular hexagon of side a as shown in the figure. The electric field at the centre O is



- (1) Zero
 (2) $\frac{3kQ}{4a^2}$
 (3) $\frac{3kQ}{4\sqrt{3}a^2}$
 (4) $\frac{3\sqrt{3}}{8} \frac{kQ}{a^2}$

62. For which of the following molecules μ (Dipole moment) is/are non-zero?



- (1) Only (A) (2) Both (A) & (B)
 (3) Only (C) (4) Both (C) & (D)

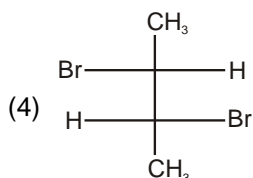
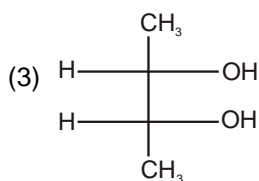
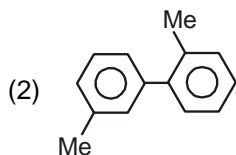
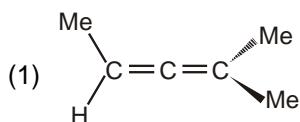
63. HBr reacts fastest with

- (1) 2-methyl propan-2-ol
 (2) Propan-2-ol
 (3) Propanol
 (4) 2-methyl propan-1-ol

64. Which of the following has the highest nucleophilicity?

- (1) F^- (2) OH^-
 (3) CH_3^- (4) NH_2^-

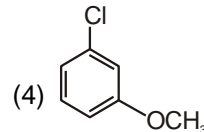
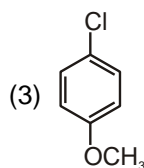
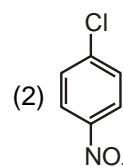
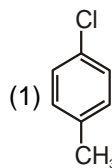
65. The compound which is optically active, is



66. Which among the following will give yellow precipitate with aqueous $AgNO_3$ solution at room temperature?

- (1) Tert-butyl chloride (2) Tert-butyl iodide
 (3) Chlorobenzene (4) Iodobenzene

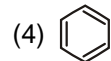
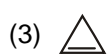
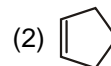
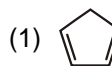
67. Which of the following aromatic compounds undergoes nucleophilic substitution reaction most easily?



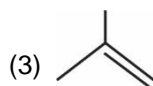
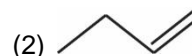
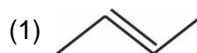
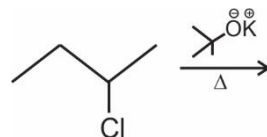
68. Correct order of nucleophilicity is

- (1) $H_2O > \overset{\ominus}{O}H > CH_3COO^\ominus$
 (2) $\overset{\ominus}{O}H > CH_3COO^\ominus > H_2O$
 (3) $CH_3COO^\ominus > \overset{\ominus}{O}H > H_2O$
 (4) $\overset{\ominus}{O}H > H_2O > CH_3COO^\ominus$

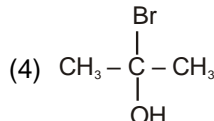
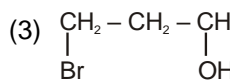
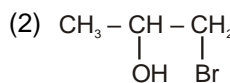
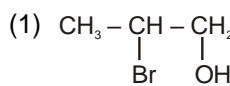
69. Which of the following hydrocarbon is most acidic when reacts with $RMgX$?



70. Find the major product of the following reaction



71. $CH_3 - CH = CH_2 + HOBr \rightarrow P$. The major product P is



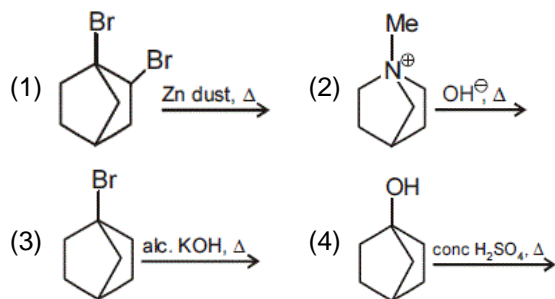
72. Which of the following inorganic fluoride can be used to prepare alkyl fluoride from corresponding chloroalkane?

- (1) HF (2) ClF₃
 (3) BrF₃ (4) Hg₂F₂

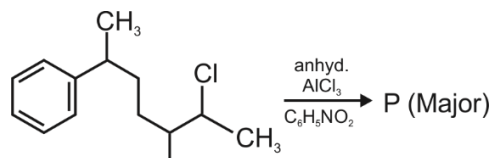
73. Total number of optically active isomers of tartaric acid is

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

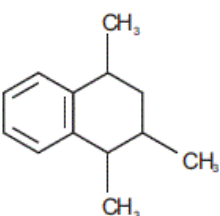
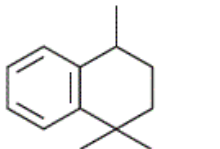
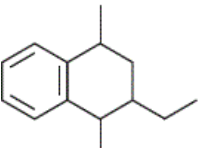
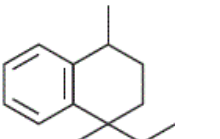
74. Which of the following reaction will undergo an elimination reaction and an alkene will be formed as the product?



75. Consider the following electrophilic aromatic substitution.



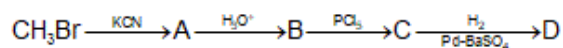
The Product P is

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

76. Ethylene oxide when treated with phenyl magnesium bromide followed by hydrolysis yields

- (1) Benzene (2) Ethylene
 (3) 2-ethylphenol (4) 2-phenylethanol

77. In the following sequence of reaction

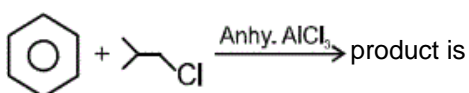


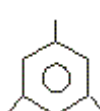
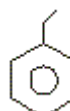
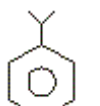
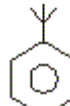
The end product (D) is

- (1) CH₃CH₂OH (2) CH₃CHO
 (3) CH₃CH₃ (4) CH₃OCH₃

78. Ambident nucleophile among the following is

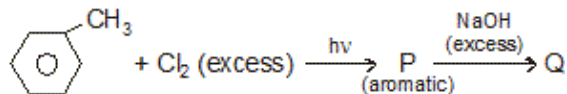
- (1) Nitrite ion (2) Chloride ion
 (3) Carbonate ion (4) Hydroxide ion

79. 

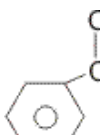
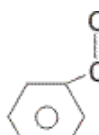
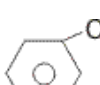

- (1)  (2) 
- (3)  (4) 

80. Ph—CH₂—MgBr on reaction with H₂O produces

- (1) Ph—CH₂—OH (2) Ph—CH₃
 (3) PhH (4) Ph—OH

81. 

Compound Q is

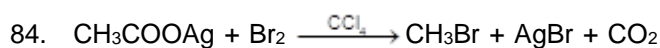
- (1)  (2) 
- (3)  (4) 

82. When 2-bromobutane is heated with alcoholic KOH, the major product formed is

- (1) 1-butene (2) 2-butene
 (3) 1,3-butadiene (4) 2-butanol

83. Electrophile in Friedel-Crafts alkylation of benzene is

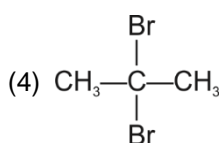
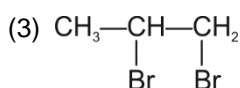
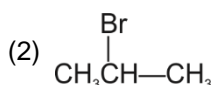
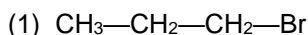
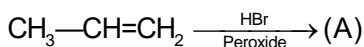
- (1) SO₃ (2) CH₃⁺CO
 (3) Cl⁺ (4) CH₃⁺



Above reaction is known as

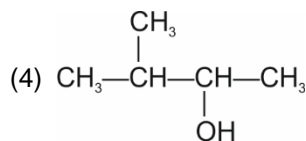
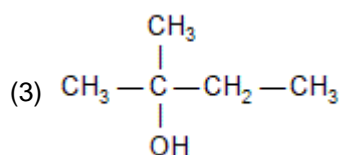
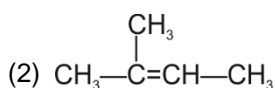
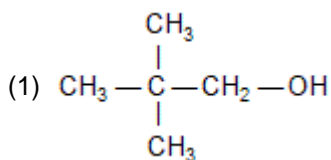
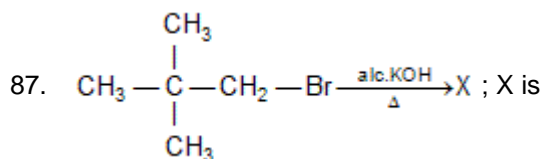
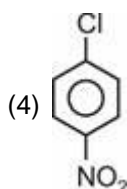
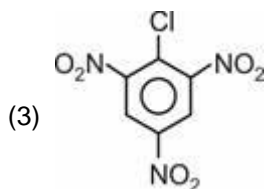
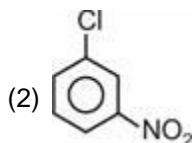
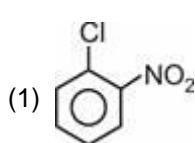
- (1) Hunsdiecker reaction
- (2) Darzen's method
- (3) Finkelstein reaction
- (4) Wurtz reaction

85. The major product (A) of the following reaction is

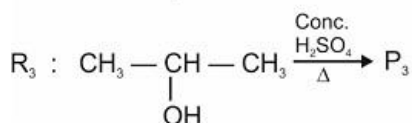
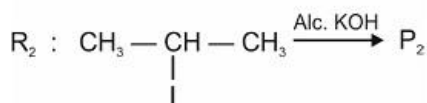
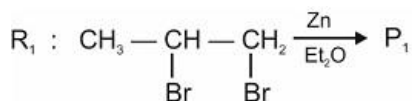


SECTION - B

86. Out of following compounds which one will undergo nucleophilic substitution reaction fastest?



88. Consider the following reactions.



Which of the following represents the relationship between P_1 , P_2 and P_3 ?

- (1) P_1 and P_2 are identical and P_3 is different
- (2) P_1 and P_3 are identical and P_2 is different
- (3) P_2 and P_3 are identical and P_1 is different
- (4) All P_1 , P_2 and P_3 are identical

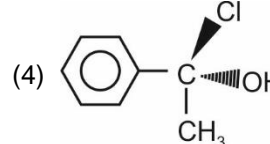
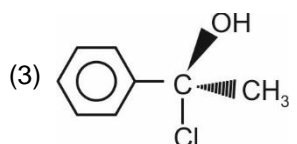
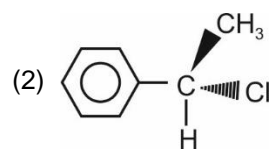
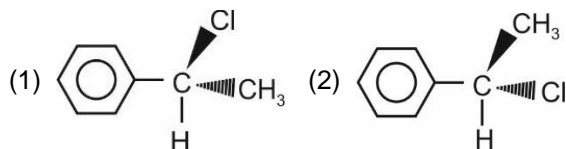
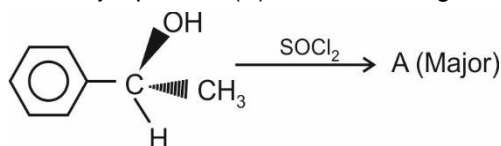
89. Tert-butyl chloride reacts with sodium ethoxide to give

- (1) Alkane
- (2) Alkene
- (3) Alkyl halide
- (4) Ether

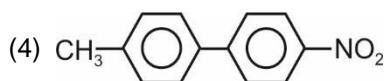
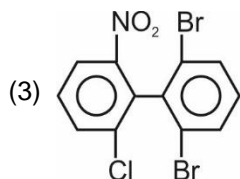
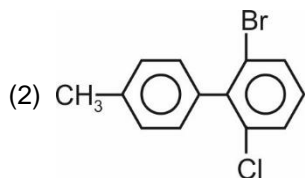
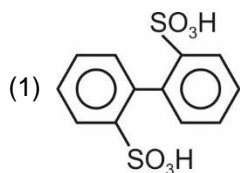
90. Among the following strongest nucleophile in vapour phase is

- (1) F^-
- (2) Cl^-
- (3) Br^-
- (4) I^-

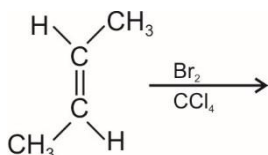
91. The major product (A) in the following reaction is



92. Optically active compound among the following is



93. Total number of optically active compound(s) formed in the given reaction is/are

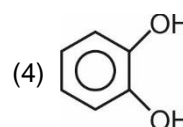
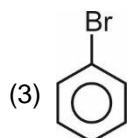
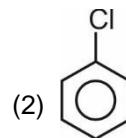
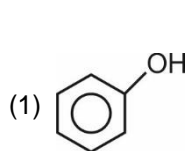


- (1) 1 (2) 2
(3) 3 (4) 0

94. Chloroform reacts with aq. KOH to form which of the following compound?

- (1) Phosgene
(2) Ethanol
(3) Acetaldehyde
(4) Potassium formate

95. Raschig process is used for the commercial preparation of



96. Minimum density among the following is of

- (1) CH₃I (2) CH₃Br
(3) CH₃F (4) H₂O

97. In Groove's process, the reagent used is

- (1) HCl in presence of anhy. ZnCl₂
(2) SOCl₂ in presence of pyridine
(3) NaBr in presence of conc. H₂SO₄
(4) KI in 95% H₃PO₄

98. The reactivity order of halogens towards ethane is

- (1) I₂ > Br₂ > Cl₂ > F₂ (2) F₂ > Cl₂ > Br₂ > I₂
(3) Cl₂ > Br₂ > F₂ > I₂ (4) Cl₂ > F₂ > Br₂ > I₂

99. Peroxide effect is not observed in

- (1) Propylene (2) Ethene
(3) Pent-1-ene (4) Isobutylene

100. Polar aprotic solvent(s) among the following is/are

- (1) DMSO (2) Methanol
(3) Water (4) Both (1) and (2)

BOTANY

SECTION - A

101. The vital link between successive generations that ensures continuity of species from one generation to the next is

- (1) Gamete (2) Zygote
(3) Embryo (4) Egg

102. Mark the **true** statement regarding gamete transfer.

- (1) In a majority of organisms both female and male gametes are motile
(2) In bryophytes, pteridophytes and gymnosperms, water is the medium through which the gamete transfer takes place
(3) Transfer of pollen grains to the stigma is relatively easy in papaya than pea
(4) Successful transfer of gametes is essential for the most critical event of sexual reproduction

103. State **true** (T) or **false** (F) for the following statements and select the **correct** option
- The ploidy level of gamete, embryo and endosperm in the angiosperms is n , $2n$ and $3n$ respectively
 - Both *Agave* and *Bryophyllum* vegetatively propagate by bulbils
 - Strobilanthus kunthiana* is a monocarpic plant that flowers once in 12 years
 - The 'eyes' of *Solanum tuberosum* are floral buds
- | | a | b | c | d |
|-----|----------|----------|----------|----------|
| (1) | T | F | T | T |
| (2) | T | F | T | F |
| (3) | F | T | T | T |
| (4) | T | F | F | T |
104. **Statement A:** In some plants, where flowering occurs more than once, the interflowering period is called juvenile phase.
- Statement B:** Recovery phase is not the juvenile phase but is a part of the mature phase.
- Only statement A is correct
 - Only statement B is correct
 - Both the statements are correct
 - Both the statements are incorrect
105. The anther wall layer(s) that perform(s) the function of protection is/are
- Epidermis
 - Endothecium
 - Middle layers
 - Tapetum
- Only a
 - Only a and c
 - All except c
 - All except d
106. Vegetative cell of pollen grains differs from its generative cell as the former
- Is bigger in size and has abundant food reserve
 - Has a small irregularly shaped nucleus
 - Is smaller in size and has dense cytoplasm
 - Has spindle shaped nucleus
107. As the anther matures and dehydrates, the microspore tetrad dissociate and release
- Pollen sacs
 - Ovules
 - Pollen grains
 - Male gametes
108. The coconut water
- Is free nuclear endosperm
 - Contains only one nucleus
 - Does not contain any nucleus
 - Is cellular endosperm
109. Transfer of pollen grains from anther to the stigma of the flower of different plant of the same species is called
- Geitonogamy
 - Xenogamy
 - Autogamy
 - Cleistogamy
110. Seeds that retain a part of endosperm as it is **not** completely used up during embryo development are found in all, **except**
- Wheat and maize
 - Wheat and castor
 - Maize and castor
 - Pea and groundnut
111. What would be the number of chromosomes in the cells of scutellum and aleurone layer respectively of a maize seed, if it has eight chromosomes in its antipodal cell?
- 32 and 16
 - 16 and 24
 - 8 and 16
 - 24 and 8
112. Parthenocarpy and apomixis are similar in lacking
- Fertilization
 - Embryo formation
 - Fruit formation
 - Seed formation
113. Choose the statement which is **correct** about the post pollination events after the compatible pollination.
- Pollen grains germinate to produce pollen tube through one of its germ pores in anther
 - If pollen grains are shed at three-celled stage, pollen tube carries two male gametes from the beginning
 - Self incompatibility is necessary for self cross
 - Generative cell divides through meiosis to form male gametes during the growth of pollen tube
114. Choose the **correct** match
- Coleoptile – Encloses radical and root cap
 - Coleorhiza – Encloses epicotyl
 - Aleurone layer – Proteinaceous in nature
 - Scutellum – Part of embryonal axis

115. Which of the following devices prevents autogamy as well as geitonogamy?

- (1) Homogamy
- (2) Dioecious condition
- (3) Monoecious condition
- (4) Cleistogamy

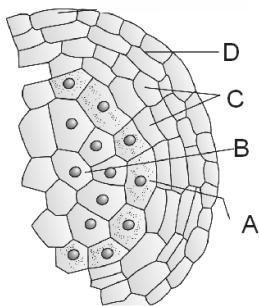
116. Which of the given is largest cell of embryo sac?

- (1) Synergid
- (2) Egg
- (3) Antipodal cells
- (4) Central cell

117. Female sex organ of *Chara*

- (1) Is also called globule
- (2) Has jacket composed of five tube cells
- (3) Occupies lower position to male sex organs
- (4) Is present at abaxial surface of short lateral branches

118. Which of the following parts of a typical anther is **correctly** matched with its functional or structural aspect?



- (1) D – Site of microsporogenesis
- (2) B – Ephemeral layer
- (3) C – Polyploid and secretory layer
- (4) A – Nutritive layer

119. Pollen allergy is/occurs

- (1) Due to pollen grains of many hydrophilous plants
- (2) Not associated with any kind of respiratory disorders
- (3) Due to pollen grains of carrot grass, *Amaranthus* etc.
- (4) Due to megaspores

120. Endosperm is a product of A and develops from B of embryo sac.

Select the option which **correctly** fills A and B.

- (1) A-Syngamy, B- Central cell
- (2) A-Triple fusion, B-Nucellus
- (3) A-Syngamy, B-Nucellus
- (4) A-Triple fusion, B-central cell

121. Identify the **incorrect** statement

- (1) In aquatic plants such as water lily, the flowers are pollinated by insects
- (2) Hydrophily takes place in *Salvia* and water hyacinth
- (3) Sticky pollen grains and presence of nectaries are characteristics of the entomophilous plants
- (4) Larger animals like lemur and tree dwelling rodents are reported as pollinators in some species

122. Which of the following is a form of asexual reproduction that mimics the sexual reproduction?

- (1) Vegetative propagation
- (2) Syngamy
- (3) Triple fusion
- (4) Apomixis

123. The monosporic embryo sac is

- a. The most common embryo sac of angiosperms.
 - b. Formed by one meiosis in megaspore mother cell and only two sequential mitosis in functional megaspore.
- (1) Only a is incorrect
 - (2) Only b is incorrect
 - (3) Both a and b are correct
 - (4) Both a and b are incorrect

124. In *Citrus* plants, many embryos are found in every seed. Some embryos are clones of each other which are **not** formed by

- (1) Nucellus
- (2) Integument
- (3) Zygote
- (4) Antipodals

125. Some plants produce both cleistogamous and chasmogamous flowers. Which of the following plant is **odd** one w.r.t above mentioned flowers?

- (1) *Viola*
- (2) *Oxalis*
- (3) Rice
- (4) *Commelina*

126. The tapetal cells of anther show increase in their DNA content due to all, **except**

- (1) Endomitosis
- (2) Restitution nucleus
- (3) Polyteny
- (4) Haploidy

127. All of the following are monoecious plants, **except**

- (1) Cucurbit
- (2) Coconut
- (3) Maize
- (4) Date palm

128. Mark the statement which is **not** correct for pollen grains.

- (1) In majority of angiosperms, generative cell is absent in pollen grains at the time of dispersal
- (2) Sporopollenin of pollen helps in its fossilization
- (3) Pollen tablets can be used as food supplements
- (4) Pollen grains can be stored at -196°C in pollen banks

129. How many of the following plants flower only once in their life?

Rice, Carrot, Mango, Apple, Jackfruit, China rose

- (1) 6
- (2) 2
- (3) 4
- (4) 3

130. Syngamy refers to fusion of

- (1) Male gamete with one polar nuclei
- (2) Two fused polar nuclei with male gamete
- (3) Egg with male gamete
- (4) Two polar nuclei

131. The junction between ovule and funicle to the body of the ovule is called

- (1) Micropyle
- (2) Chalaza
- (3) Integument
- (4) Hilum

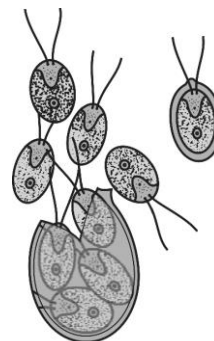
132. All of the following are **true** for diploid gamete mother cell, **except**

- (1) It is a meiocyte
- (2) Produces haploid gametes
- (3) Undergoes meiosis
- (4) Found in most algae and fungi

133. Plant in which roots bear adventitious bud is

- (1) Potato
- (2) *Opuntia*
- (3) *Adiantum*
- (4) *Dahlia*

134. Consider the given figure and select **correct** set of statements



- a. Microscopic motile spores
 - b. Always formed in unfavourable conditions
 - c. Exogenously produced asexual spores
 - d. Pyramid shaped zoospores of *Chlamydomonas*
- (1) a and c
 - (2) b and d
 - (3) a and d
 - (4) c and d

135. Choose the **incorrect** one for water hyacinth.

- (1) Exotic weed introduced in Bengal for its beautiful flowers and shape of leaves
- (2) Highly invasive aquatic weed found in running water
- (3) It drains oxygen from the water
- (4) It reproduces vegetatively by offsets

SECTION-B

136. Life span

- (1) Is a specific trait of each organism
- (2) Is always correlated to the size of an organism
- (3) Is about 60 minutes in *E. coli*
- (4) Of crow is more than that of parrot

137. Select the **correct** match w.r.t. plants and their vegetative propagules.

- | | |
|--------------|------------------------|
| (1) Sucker | – <i>Chrysanthemum</i> |
| (2) Bulbil | – Onion |
| (3) Offset | – Banana |
| (4) Leaf bud | – Potato |

138. Read the following statements carefully.

- a. The most vital event of sexual reproduction is syngamy
- b. In angiosperms, pollen transfer may occur through water
- c. In most angiosperms, pollen grains are the carriers of motile male gametes
- d. Stigma serves as a landing platform for pollen grains after pollination

Correct statements are

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

139. Which of the given structures/modes of reproduction does **not** produce genetically similar individuals?

- (1) Fragmentation in *Hydra*
- (2) Fusion of isogametes of *Rhizopus*
- (3) Binary fission in diatoms
- (4) Foliar buds of *Bryophyllum*

140. The common features between *Chara* and *Marchantia* are

- (a) Mainly dioecious plant body
 - (b) Flagellated antherozoids
 - (c) Jacketed sex organs
 - (d) Protandrus condition
 - (e) Female sex organ is oogonium
- | | |
|---------------------------|---------------------------|
| (1) Only (a), (b) and (c) | (2) Only (b) and (c) |
| (3) Only (a) and (e) | (4) Only (b), (c) and (d) |

141. Which of the given plants prevents autogamy but **not** geitonogamy?

- | | |
|------------|----------------------|
| (1) Castor | (2) Papaya |
| (3) Maize | (4) Both (1) and (3) |

142. Pollen viability

- (1) Is period for which the pollen grains retain the ability to germinate on stigma in most gymnospermic plants
- (2) Is highly variable and depends on prevailing temperature and humidity
- (3) For plants of leguminosae, rosaceae and solanaceae family it is of 30 minutes
- (4) Is several months for plants like rice and wheat

143. The pore or passage present at the tip of ovule where the integument is absent is called

- | | |
|-------------|---------------|
| (1) Funicle | (2) Micropyle |
| (3) Hilum | (4) Nucellus |

144. External fertilization is found in all, **except**

- (1) Majority of algae
- (2) Amphibians
- (3) Flowering plants
- (4) Fishes

145. Which of the given features is **not** associated with nucellus?

- (1) Has parenchymatous mass of tissues
- (2) Stores the reserve food
- (3) Forms the body of the ovule
- (4) Is the protective envelope of the ovule

146. A typical angiospermic anther is

- | | |
|----------------|----------------------|
| (a) Bilobed | (b) Dithecous |
| (c) Tetragonal | (d) Tetrasporangiate |
- (1) Only (a), (b) and (d)
 - (2) All (a), (b), (c) and (d)
 - (3) Only (a) and (d)
 - (4) Only (b) and (d)

147. If a typical angiospermic anther has 25 microspore mother cells in its each sporangium calculate the total number of microspore tetrads, pollen grains and male gametes respectively produced by this anther.

- | | |
|-------------------|-------------------|
| (1) 25, 100, 200 | (2) 100, 400, 800 |
| (3) 100, 100, 400 | (4) 50, 200, 400 |

148. Read the following statements and choose the **correct** option.
- A. Generative cell in a mature pollen grain is spindle shaped which floats in the cytoplasm of the vegetative cell.
- B. In 40% of the angiosperms, pollen grains are shed at two-celled stage.
- (1) Both the statements are correct
 (2) Only statement A is incorrect
 (3) Only statement B is incorrect
 (4) Both the statements are incorrect

149. How many meiotic divisions are required to produce 80 seeds in a typical angiospermic plant?
- (1) 80 (2) 100
 (3) 40 (4) 20
150. Mark the **odd** one w.r.t. the post fertilisation events occurring in a flowering plant.
- (1) Embryo formation
 (2) Ovule develops into a seed
 (3) Gametogenesis
 (4) Ovary ripens into a fruit

ZOOLOGY

SECTION - A

151. Which one of the following options includes diploid cells?
- (1) Spermatogonia, primary spermatocyte, oogonia, ovum
 (2) Spermatogonia, primary spermatocyte, secondary oocyte, sperm
 (3) Spermatogonia, primary spermatocyte, primary oocyte, oogonia
 (4) Oogonia, spermatogonia, secondary spermatocyte, ovum
152. Match the following columns and choose the correct option.
- | Column-I | Column-II | |
|----------------|--|--|
| a. Leydig cell | (i) Sperms are temporarily stored and matured here | |
| b. Prepuce | (ii) Yellow body | |
| c. Corpus | (iii) Secretes androgens | |
| d. Epididymis | (iv) Skin covering the glans penis | |
- (1) a(iii), b(iv), c(ii), d(i) (2) a(ii), b(iii), c(i), d(iv)
 (3) a(i), b(iii), c(ii), d(iv) (4) a(iv), b(ii), c(iii), d(i)
153. Gamete transfer occurs during
- (1) Pre-fertilization event
 (2) Fertilization event
 (3) Gametogenesis
 (4) Embryogenesis

154. Mucous plug is formed in cervix during pregnancy under the influence of hormone
- (1) Estrogen
 (2) Progesterone
 (3) LH
 (4) Estrogen and progesterone
155. Enzyme that is responsible for dissolving the hyaluronic acid cementing the granulosa cells is
- (1) Hyaluronidase
 (2) Corona penetrating enzyme
 (3) Acrosin
 (4) Zona lysin
156. Read the given statements and choose the option which assign them as true(**T**) or false(**F**) correctly.
- The adipose tissue is found between the lobes and covers the surface of the mammary glands.
 Day of ovulation is 24th in a woman whose menstrual cycle is of 48 days.
 Layer of theca cells makes its earliest appearance at secondary follicle.
 Mammary glands are apocrine, endocrine glands, whose alveoli synthesize milk under increased levels of progesterone during pregnancy.
- | | a | b | c | d |
|-----|---|---|---|---|
| (1) | T | T | F | F |
| (2) | T | F | T | F |
| (3) | F | F | F | T |
| (4) | F | T | T | F |

157. Event **not** associated with follicular phase of ovary is
- (1) Rise in level of gonadotrophin FSH
 - (2) Repair of endometrial lining in uterus
 - (3) Positive feedback by estrogen in later part of this phase to increase LH levels
 - (4) Release of inhibin by granulosa cells
158. Select a feature or function **not** applicable to placenta or umbilical cord.
- (1) Placenta acts as an ultra filter and foetal lung.
 - (2) Permits movement of antibodies such as IgG from foetal to maternal circulation
 - (3) All the blood vessels in umbilical cord carry 100% foetal blood only.
 - (4) Placenta acts as temporary endocrine gland.
159. Hormones released exclusively in a pregnant female include
- (1) Estrogen, Progesterone, hCS, hPL
 - (2) hCG, hCS / hPL, Relaxin
 - (3) Thyroxine, Cortisol, Oxytocin, hCG
 - (4) Inhibin, hCG, hPL, Prolactin
160. Choose the **odd** one w.r.t. male reproductive system
- (1) Bartholin's gland
 - (2) Prostate gland
 - (3) Bulbourethral gland
 - (4) Cowper's gland
161. Which of the following is an extra embryonic membrane that acts as shock absorber and prevents desiccation of human embryo?
- (1) Chorion
 - (2) Amnion
 - (3) Trophoblast
 - (4) Allantois
162. Changes in ovary leading to ovarian cycle in primates results from hormones primarily secreted by
- (1) Neurohypophysis
 - (2) Placenta
 - (3) Posterior pituitary
 - (4) Anterior pituitary
163. Non-cellular layer made up of glycoproteins within Graafian follicle around ovum which prevents ectopic pregnancy is
- (1) Corona radiata
 - (2) Granulosa
 - (3) Zona pellucida
 - (4) Theca externa
164. Meiosis I in female gametogenesis is completed in
- (1) Primary oocyte in Graafian follicle
 - (2) Secondary oocyte in Graafian follicle
 - (3) Primary oocyte in tertiary follicle
 - (4) Secondary oocyte in secondary follicle
165. Activation of sperms in female genital tract to facilitate fertilisation is known as
- (1) Insemination
 - (2) Acrosomal reaction
 - (3) Capacitation
 - (4) Spermiation
166. Milk ejecting hormone in a lactating mother is
- (1) Prolactin
 - (2) Oxytocin
 - (3) Progesterone
 - (4) Estrogen
167. In a nonpregnant female, regression of corpus luteum occurs due to fall in level of
- (1) Progesterone
 - (2) Estrogen
 - (3) hCG
 - (4) LH
168. Which of the following hormones is **not** secreted by placenta?
- (1) Chorionic somatomammotropin
 - (2) Chorionic thyrotropin
 - (3) Human chorionic gonadotropin
 - (4) Cortisol
169. Select the **odd one** w.r.t female external genitalia.
- (1) Labia minora
 - (2) Labia majora
 - (3) Hymen
 - (4) Cervix
170. Consider the following statements about male reproductive system with certain blanks A, B, C and D. Choose the option which **correctly** fill up these blanks.
- (i) The scrotum in man helps in maintaining the temperature of testes A lower than normal internal body temperature for normal spermatogenesis.
 - (ii) The normal length of human testis is about B .
 - (iii) Each testis has about C testicular lobules.
 - (iv) Each testicular lobule contains D highly coiled seminiferous tubules.

	A	B	C	D	
	(1) 2-2.5°C	2-3 cm	250	1-3	
	(2) 2-2.5°C	4-5 cm	250	1-3	
	(3) 3.5°C	4-5 cm	300	1-3	
	(4) 3.5°C	2-3 cm	250	1-3	
171.	Select the correct pair of animals reproducing through transverse binary fission.				
	(1) <i>Planaria</i> and <i>Hydra</i>				
	(2) <i>Amoeba</i> and <i>Paramecium</i>				
	(3) <i>Euglena</i> and Yeast				
	(4) <i>Paramecium</i> and <i>Planaria</i>				
172.	A narrow region, called isthmus is a part of which of the following structures?				
	(1) Mammary gland	(2) Fallopian tube			
	(3) Vas deferens	(4) Testis			
173.	Choose the odd one w.r.t. number.				
	(1) Seminal vesicle	(2) Prostate gland			
	(3) Cowper's gland	(4) Bartholin's gland			
174.	Select the odd one w.r.t. sexuality of organism.				
	(1) Cockroach	(2) Earthworm			
	(3) Leech	(4) Tapeworm			
175.	Maximum life span is a characteristic of <u>A</u> and life expectancy is the characteristic of a <u>B</u> . Select the option which fill the blanks correctly .				
	(1) A-Species, B-Population				
	(2) A-Population, B-Species				
	(3) A-Genus, B-Class				
	(4) A-Class, B-Genus				
176.	The organisms which are considered as immortal is/are				
	(1) <i>Amoeba</i> only				
	(2) All unicellular organisms				
	(3) <i>Apis</i>				
	(4) <i>Periplaneta</i>				
177.	Genetic constitution of (22 + Y) is found in				
	(1) Primary spermatocyte				
	(2) Spermatozoa				
	(3) Primary oocyte				
	(4) Ootid				
178.	Choose the correct sequence w.r.t. embryonic stages in humans.				
	(1) Blastocyst → Gastrula → Morula				
	(2) Gastrula → Blastocyst → Morula				
	(3) Morula → Blastocyst → Gastrula				
	(4) Gastrula → Morula → Blastocyst				
179.	Choose the incorrect match.				
	(1) Bulbourethral gland – Lubrication of penis				
	(2) Urethral meatus – External opening of penis				
	(3) Uterus – Known as womb				
	(4) Sertoli cells – Secrete androgens				
180.	Select the mismatch between the type of cells given in Column-I and its corresponding characters/ functions in Column-II.				
	Column-I	Column-II			
	(1) Interstitial cells	– Source of testosterone			
	(2) Sertoli cells	– Secrete androgen binding protein			
	(3) Spermatids	– Haploid			
	(4) First polar body	– Formed at birth of baby body			
181.	Select the correct sequence of reproductive events in humans.				
	(1) Fertilization → Insemination → Gestation → Parturition				
	(2) Insemination → Gestation → Implantation → Parturition				
	(3) Gametogenesis → Fertilization → Implantation → Parturition				
	(4) Gametogenesis → Implantation → Insemination → gestation				
182.	In majority of sexually reproducing organisms, the gametes produced are of morphologically two distinct types.				
	They don't differ generally on the basis of				
	(1) Motility				
	(2) Size				
	(3) Chromosome number				
	(4) Amount of cytoplasm				

183. Among the following, multiple fission is seen in all **except**

- (1) *Amoeba* (2) *Paramoecium*
(3) *Monocystis* (4) *Plasmodium*

184. Sexual reproduction in animals

- (1) Can be uniparental or biparental
(2) Ensures rapid multiplication as it's a faster process
(3) Occurs only under favourable conditions
(4) Requires formation of gametes but never gamete fusion

185. Select the **correct** match between column-I and column-II. All data given is in context of animals.

Column-I **Column-II**

- | | |
|--------------------------|---|
| (1) Cell differentiation | – Involves differential expression of genes that gives rise to different cell types though all cells in an animal contain the same DNA |
| (2) Drones | – Males in honey bee produce sperms meiotically |
| (3) Zygote | – Vital connecting link between members of two generations resulting from both asexual and sexual reproduction |
| (4) Gemmule formation | – Method of reproduction in <i>Spongilla</i> where each archaeocyte of a gemmule can give rise to a new sponge upon return of favourable conditions |

SECTION - B

186. Select the statement/feature that is **incorrect** w.r.t external fertilisation.

- (1) Gamete formation and fusion occurs in water
(2) Organisms that undergo fertilisation in external medium are generally anamniotes among vertebrates
(3) Simultaneous release of gametes by male and female increases chances of zygote formation
(4) Disadvantage involved is susceptibility of gametes to predators and natural calamities

187. Chromosome number in a gamete of *Drosophila* is 4. What is the chromosome number in meiocytes of *Musca*?

- (1) 8 (2) 12
(3) 6 (4) 24

188. 140 years is approximate life span of a

- (1) Butterfly (2) Crocodile
(3) Fruit fly (4) Parrot

189. During embryogenesis, a human zygote undergoes

- (1) Mitosis and meiosis
(2) Mitosis and cell differentiation
(3) Meiosis and cell differentiation
(4) Reductional division and cell differentiation

190. Choose the **incorrect** match:

Column I	Column II
(Organism)	(Chromosome number in meiocyte)

- | | |
|---------------|-----|
| (1) Dog | 78 |
| (2) Butterfly | 380 |
| (3) Cat | 36 |
| (4) Fruit fly | 8 |

191. Which of the following is a monoecious organism?

- (1) *Schistosoma* (2) *Pheretima*
(3) *Ancylostoma* (4) *Bombyx*

192. Read the following statements and choose the **correct** statement.

- (1) Reproductive phase is of same duration in all living organisms
(2) Sexual reproduction always involves the formation of male and female gametes by different individuals of opposite sex
(3) All birds living in nature lay eggs throughout the year
(4) Humans are reproductively active throughout their reproductive phase, hence are called continuous breeders

193. Sexual reproduction in comparison to asexual reproduction is a
- (1) Simple process
 - (2) Fast process
 - (3) Slow and simple process
 - (4) Complex and slow process
194. In which of the following organisms cell division itself is a mode of reproduction?
- (1) *Amoeba* (2) *Asterias*
 - (3) *Aurelia* (4) *Ascaris*
195. The period from birth to natural death of an organism represents its
- (1) Life expectancy (2) Life span
 - (3) Reproductive period (4) Mortality
196. **Correct** sequence of anatomical structures of human male reproductive system is
- (1) Seminiferous tubules → tubuli recti → rete-testis → vas efferentia → epididymis → vas deferens
 - (2) Seminiferous tubules → rete-testis → tubuli-recti → vas efferentia → epididymis → vas deferens
 - (3) Seminiferous tubules → epididymis → vas efferentia → rete-testis → tubuli recti
 - (4) Tubuli recti → seminiferous tubules → rete-testis → epididymis → vas deferens → vas efferentia
197. Secretion of which of the following gland forms maximum part of semen?
- (1) Prostate gland
 - (2) Cowper's glands
 - (3) Seminal vesicles
 - (4) Bulbourethral glands
198. All the statements are incorrect about a human sperm **except**
- (1) Mitochondria are present in the neck region
 - (2) Nucleus is present in middle piece
 - (3) Acrosome is present in head region of sperm outside plasma membrane
 - (4) For normal fertility, at least 72 million sperms from a single ejaculate must have normal shape and size and must show vigorous motility
199. The ducts which open into nipple of a mammary gland are
- (1) Mammary tubules (2) Lactiferous ducts
 - (3) Mammary ducts (4) Alveolar duct
200. The cell which first enters in meiosis during spermatogenesis is
- (1) Spermatogonia
 - (2) Primary spermatocyte
 - (3) Secondary spermatocyte
 - (4) Spermatid

(for NEET-2022)

Test - I**Answers**

1.	(4)	41.	(3)	81.	(4)	121.	(2)	161.	(2)
2.	(2)	42.	(2)	82.	(2)	122.	(4)	162.	(4)
3.	(2)	43.	(3)	83.	(4)	123.	(2)	163.	(3)
4.	(1)	44.	(1)	84.	(1)	124.	(3)	164.	(3)
5.	(1)	45.	(2)	85.	(1)	125.	(3)	165.	(3)
6.	(3)	46.	(4)	86.	(3)	126.	(4)	166.	(2)
7.	(4)	47.	(2)	87.	(2)	127.	(4)	167.	(4)
8.	(3)	48.	(1)	88.	(4)	128.	(1)	168.	(4)
9.	(3)	49.	(3)	89.	(2)	129.	(2)	169.	(4)
10.	(4)	50.	(1)	90.	(1)	130.	(3)	170.	(2)
11.	(2)	51.	(2)	91.	(1)	131.	(4)	171.	(4)
12.	(1)	52.	(3)	92.	(1)	132.	(4)	172.	(2)
13.	(4)	53.	(3)	93.	(4)	133.	(4)	173.	(2)
14.	(1)	54.	(1)	94.	(4)	134.	(3)	174.	(1)
15.	(1)	55.	(2)	95.	(2)	135.	(2)	175.	(1)
16.	(3)	56.	(2)	96.	(3)	136.	(1)	176.	(2)
17.	(2)	57.	(1)	97.	(1)	137.	(1)	177.	(2)
18.	(3)	58.	(2)	98.	(2)	138.	(3)	178.	(3)
19.	(4)	59.	(3)	99.	(2)	139.	(2)	179.	(4)
20.	(1)	60.	(1)	100.	(1)	140.	(2)	180.	(4)
21.	(2)	61.	(4)	101.	(2)	141.	(4)	181.	(3)
22.	(4)	62.	(4)	102.	(4)	142.	(2)	182.	(3)
23.	(2)	63.	(1)	103.	(2)	143.	(2)	183.	(2)
24.	(3)	64.	(3)	104.	(2)	144.	(3)	184.	(1)
25.	(2)	65.	(4)	105.	(4)	145.	(4)	185.	(1)
26.	(4)	66.	(2)	106.	(1)	146.	(2)	186.	(1)
27.	(1)	67.	(2)	107.	(3)	147.	(1)	187.	(2)
28.	(3)	68.	(2)	108.	(1)	148.	(3)	188.	(4)
29.	(2)	69.	(1)	109.	(2)	149.	(2)	189.	(2)
30.	(3)	70.	(2)	110.	(4)	150.	(3)	190.	(3)
31.	(4)	71.	(2)	111.	(2)	151.	(3)	191.	(2)
32.	(3)	72.	(4)	112.	(1)	152.	(1)	192.	(4)
33.	(3)	73.	(3)	113.	(2)	153.	(1)	193.	(4)
34.	(4)	74.	(2)	114.	(3)	154.	(2)	194.	(1)
35.	(2)	75.	(4)	115.	(2)	155.	(1)	195.	(2)
36.	(2)	76.	(4)	116.	(4)	156.	(2)	196.	(1)
37.	(3)	77.	(2)	117.	(2)	157.	(2)	197.	(3)
38.	(3)	78.	(1)	118.	(4)	158.	(2)	198.	(4)
39.	(2)	79.	(4)	119.	(3)	159.	(2)	199.	(2)
40.	(2)	80.	(2)	120.	(4)	160.	(1)	200.	(2)

(for NEET-2022)

Test - I**Answers & Solutions****PHYSICS****SECTION - A**

1. Answer (4)

$$C_{ab} = \frac{6 \times 6}{12}$$

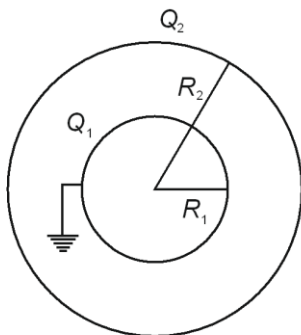
$$= 3 \mu\text{F}$$

2. Answer (2)

Potential of a earthed body will be zero.

$$\frac{KQ_1}{R_1} + \frac{KQ_2}{R_2} = 0$$

$$Q_1 = -\frac{Q_2 R_1}{R_2} = -\frac{Q}{2}$$



3. Answer (2)

$$\text{For } r < R; V = \frac{kq}{R}$$

$$V = \frac{kq}{R}$$

$$V = \frac{9 \times 10^9 \times 10 \times 10^{-6}}{0.1}$$

$$V = 9 \times 10^5 \text{ V}$$

4. Answer (1)

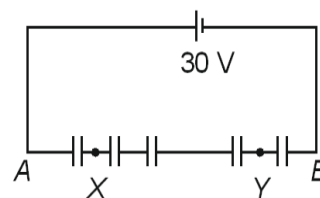
$V = \frac{Q}{C}$ i.e. if C changes with shape then V also changes.

5. Answer (1)

In series combination of capacitors, potential divides as

$$V_1 : V_2 : V_3 : V_4 = \frac{1}{C_1} : \frac{1}{C_2} : \frac{1}{C_3} : \frac{1}{C_4}$$

Potential drop across each capacitor is 6 V.



$$V_x - V_y = 3 \times 6 = 18 \text{ V}$$

6. Answer (3)

$$\vec{F}_{12} + \vec{F}_{21} = 0$$

$$|\vec{F}_{12}| = |-\vec{F}_{21}|$$

7. Answer (4)

$$\vec{\tau} = \vec{P} \times \vec{E}$$

$$\vec{P} = (2\hat{i} + 3\hat{j}) \mu\text{Cm}$$

$$\vec{E} = (3\hat{i} + 2\hat{j}) \times 10^5 \text{ N/C}$$

$$\vec{\tau} = \begin{vmatrix} \hat{i} & \hat{j} & k \\ 2 & 3 & 0 \\ 3 & 2 & 0 \end{vmatrix} \times 10^{-1}$$

$$= [\hat{i}(0-0) - \hat{j}(0-0) + k(4-9)] \times 10^{-5}$$

$$= -0.5k \text{ Nm}$$

8. Answer (3)

Torque on the dipole may be zero.

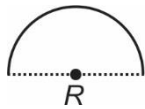
9. Answer (3)

$$E_A = E_C > E_B$$

10. Answer (4)

$$\phi_{\text{Total}} = \frac{q_{\text{en}}}{\epsilon_0}$$

11. Answer (2)



$$\pi R = l$$

$$R = \left(\frac{l}{\pi}\right)$$

$$E = \frac{q}{2\pi\epsilon_0 l R}$$

$$= \frac{q}{l \times 2\pi\epsilon_0 \times \frac{l}{\pi}}$$

$$= \frac{q}{2\epsilon_0 l^2}$$

12. Answer (1)

$$a = \frac{qE}{m}$$

$$v = u + at$$

$$= \frac{qEt}{m}$$

$$P = mv$$

$$= qEt$$

13. Answer (4)

Ball will not collide with right wall.

14. Answer (1)

$$\phi = \frac{q_{\text{en}}}{\epsilon_0}$$

$$q_{\text{en}} = 4\pi R^2 \times \sigma$$

$$\phi = \frac{4\pi R^2 \times \sigma}{\epsilon_0}$$

$$\phi = 16\pi^2 \times (1.2)^2 \times 9 \times 10^9 \times 80 \times 10^{-6}$$

$$\phi = 160 \times 1.44 \times 9 \times 10^9 \times 80 \times 10^{-6}$$

$$\phi = 160 \times 1.44 \times 9 \times 80 \times 10^3$$

$$= 165888 \times 10^3$$

$$\approx 1.64 \times 10^8$$

15. Answer (1)

$$\vec{r}_1 = \vec{r} - \vec{r}_0$$

$$= 6\hat{i} - 8\hat{j}$$

$$E = \frac{kq\vec{r}}{r^3}$$

$$E = \frac{9 \times 10^9 \times 20 \times 10^{-6} (6\hat{i} - 8\hat{j})}{10^3}$$

$$= 360(3\hat{i} - 4\hat{j}) \text{ N/C}$$

16. Answer (3)

$$\phi = \phi_2 - \phi_1$$

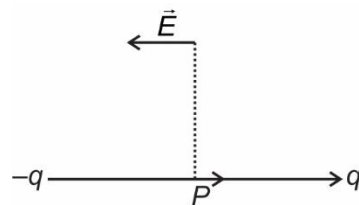
$$= (4a^2 - a^2)\pi R^2$$

$$= 3\pi R^2 a^2$$

17. Answer (2)

$$F = \frac{q_1 q_2}{4\pi\epsilon_0 \epsilon_r r^2}$$

18. Answer (3)



Angle between electric dipole moment and electric field strength is 180° .

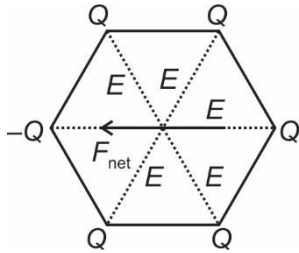
19. Answer (4)

$$\begin{aligned}\tau &= PE \sin \theta \\ &= 9 \times 10^{-6} \times 6 \times 10^5 \times \sin 30^\circ \\ &= 2.7 \text{ N m}\end{aligned}$$

20. Answer (1)

$$\begin{aligned}E &= \frac{\lambda}{2\pi\epsilon_0 R} \\ E &= \frac{2\lambda}{4\pi\epsilon_0 R} \\ &= \frac{2k\lambda}{r}\end{aligned}$$

21. Answer (2)



$$\begin{aligned}F_{\text{net}} &= 2F \\ F &= \frac{Qq_0}{4\pi\epsilon_0 a^2} \\ F_{\text{net}} &= \frac{2Qq_0}{4\pi\epsilon_0 a^2}\end{aligned}$$

22. Answer (4)

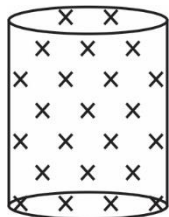
P, R are axial point and Q is equatorial point.

$$\vec{E}_1 = \vec{E}_3, \vec{E}_1 = -2\vec{E}_2 \text{ and } \vec{E}_3 = -2\vec{E}_2$$

23. Answer (2)

$$\begin{aligned}F &= \frac{pdE}{dz} \text{ along positive } z \text{ axis} \\ F &= 10^{-6} \times 10^5 \text{ along negative } z \text{ axis} \\ &= 0.10 \text{ N along negative } z \text{ axis.}\end{aligned}$$

24. Answer (3)



$$q_{\text{en}} = \rho\pi r^2 \ell$$

$$\oint \vec{E} \cdot d\vec{A} = \frac{\rho\pi r^2 \ell}{\epsilon_0}$$

$$E2\pi r \ell = \frac{\rho\pi r^2 \ell}{\epsilon_0}$$

$$E = \frac{\rho r}{2\epsilon_0}$$

25. Answer (2)

$$E = \frac{\rho}{4\pi\epsilon_0 r^3} \sqrt{3\cos^2 \theta + 1}$$

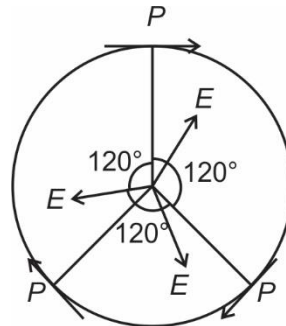
$$E = \frac{\rho}{4\pi\epsilon_0 r^3} \sqrt{\frac{3}{4} + 1}$$

$$E = \frac{\sqrt{7}\rho}{8\pi\epsilon_0 r^3}$$

$$F = qE$$

$$= \frac{\sqrt{7}\rho q}{8\pi\epsilon_0 r^3}$$

26. Answer (4)



$$\vec{E}_{\text{net}} = 0$$

27. Answer (1)

$$\begin{aligned}E &= \frac{k(Q-Q)}{(25R)^2} \\ &= 0\end{aligned}$$

28. Answer (3)



$$\frac{k4Q}{x^2} = \frac{kQ}{(3-x)^2}$$

$$2(3-x) = x$$

$$6 - 2x = x$$

$$3x = 6$$

$$x = 2 \text{ m from } 4Q$$

$$1 \text{ m from } Q$$

29. Answer (2)

$$t = \left(\frac{\ell}{v_0} \right)$$

$$v_y = u + at$$

$$= \frac{eE \ell}{m v_0}$$

$$\tan \theta = \frac{v_y}{v_x}$$

$$= \frac{eE \ell}{m v_0^2}$$

$$\theta = \tan^{-1} \left(\frac{eE \ell}{m v_0^2} \right)$$

30. Answer (3)

$$q \propto C \propto R$$

$$\text{then } q_2 = \left(\frac{R_2}{R_1 + R_2} \right) Q_{\text{total}}$$

$$= \left(\frac{10}{40} \right) \times 80 \times 10^{-6}$$

$$= 20 \times 10^{-6}$$

$$q_2 = 20 \mu\text{C}$$

31. Answer (4)

$$C_{\text{parallel plate}} = C_{\text{sphere}}$$

$$\frac{\epsilon_0 (\pi (0.04)^2)}{d} = 4\pi \epsilon_0 (0.80)$$

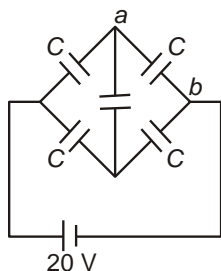
$$\text{then } d = \frac{\epsilon_0 (\pi) 16 \times 10^{-4}}{4\pi \epsilon_0 \times 0.8}$$

$$= \frac{40}{8} \times 10^{-4}$$

$$d = 0.5 \text{ mm}$$

32. Answer (3)

The circuit is a balanced wheatstone bridge

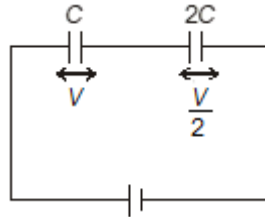


$$U = \frac{1}{2} (2 \times 10^{-6}) (10)^2 \text{ J}$$

$$= 10^{-6} \times 100 \text{ J}$$

$$U = 0.1 \text{ mJ}$$

33. Answer (3)



$$(Q_{\text{max}})_1 = CV$$

$$(Q_{\text{max}})_2 = CV$$

then for CV charge

$$V + \frac{V}{2} \Rightarrow \frac{3V}{2}$$

34. Answer (4)

$$\phi = \vec{E} \cdot \vec{A}$$

$$\phi = 10 \hat{i} \cdot 4 \hat{i}$$

$$= 40 \frac{\text{N}}{\text{C}} \text{m}^2$$

35. Answer (2)

Here voltage is changing. That means battery is disconnected. Therefore, charge remains constant

$$Q = CV$$

$$\text{i.e } C \propto \frac{1}{V}$$

$$\frac{KC_0}{C_0} = \frac{16}{4}$$

$$K = 4$$

SECTION - B

36. Answer (2)

$$S = \frac{1}{2} at^2 = \frac{1}{2} \frac{qE}{m} t^2 \Rightarrow t \propto \sqrt{\frac{m}{q}}$$

$$\therefore \frac{t_1}{t_2} = \sqrt{\frac{m_1}{m_2} \times \frac{q_2}{q_1}} = \sqrt{\frac{4}{1} \times \frac{1}{2}} = \frac{\sqrt{2}}{1}$$

37. Answer (3)

$$V = V_1 + V_2 + V_3 + V_4 + \dots$$

$$V = \frac{q}{4\pi\epsilon_0} \left[\frac{1}{1} + \frac{1}{2} + \frac{1}{4} + \frac{1}{8} + \frac{1}{16} + \dots \right] \times \frac{1}{10^{-2}}$$

$$= (9 \times 10^9)(-2 \times 10^{-9}) \left[1 + \frac{1}{2} + \frac{1}{2^2} + \frac{1}{2^3} + \frac{1}{2^4} + \dots \right] \times 10^2$$

$$= [-1800] \left[\frac{1}{1 - \frac{1}{2}} \right] V$$

$$= -3600 \text{ V}$$

38. Answer (3)

$$V' = n^{2/3} V = 8^{2/3} \times 2 \text{ V}$$

$$= 4 \times 2 \text{ V}$$

$$= 8 \text{ V}$$

39. Answer (2)

Let C_s is the effective capacitance.

$$\frac{1}{C_s} = \frac{1}{C_1} + \frac{1}{C_2} + \frac{1}{C_3} = \frac{1}{3} + \frac{1}{6} + \frac{1}{12}$$

$$\therefore C_s = \frac{12}{7} \mu\text{F}$$

Charge on $C_2 =$ Charge on C_s

$$C_2 V_2 = C_s V$$

$$[6 \mu\text{F}] V_2 = \left[\frac{12}{7} \mu\text{F} \right] [14 \text{ V}]$$

$$\therefore V_2 = 4 \text{ V}$$

40. Answer (2)

$$\Rightarrow V_A - V_B = \int_B^A \vec{E} \cdot d\vec{r}$$

$$= -\vec{E} \cdot [\vec{r}_A - \vec{r}_B]$$

$$= -E \hat{j} \cdot x \hat{i}$$

$$= 0$$

41. Answer (3)

$$\text{Loss in energy} = \frac{1}{2} \left[\frac{C_1 C_2}{C_1 + C_2} \right] (V_1 + V_2)^2$$

$$= \frac{1}{2} \left[\frac{6 \times 3}{6 + 3} \right] (25 + 15)^2 \times 10^{-6} \text{ J}$$

$$= 1600 \mu\text{J}$$

42. Answer (2)

$$U_{\text{net}} = 0$$

$$\Rightarrow U_{12} + U_{23} + U_{31} = 0$$

$$\Rightarrow \frac{1}{4\pi\epsilon_0 (2 \text{ cm})} \left[Qq + Qq + \frac{q^2}{\sqrt{2}} \right] = 0$$

$$\frac{q^2}{\sqrt{2}} = -2Qq$$

$$\therefore q = -2\sqrt{2}Q$$

43. Answer (3)

$$E_x = - \left[\frac{\partial V}{\partial x} \right] = -[2xy - z^2]$$

$$\Rightarrow E_x|_{(-1, -1, -1)} = -1$$

$$E_y = - \left[\frac{\partial V}{\partial y} \right] = -[x^2 - 2yz]$$

$$\Rightarrow E_y|_{(-1, -1, -1)} = +1$$

$$E_z = - \left[\frac{\partial V}{\partial z} \right] = -[-y^2 - 2zx]$$

$$\Rightarrow E_z|_{(-1, -1, -1)} = +3$$

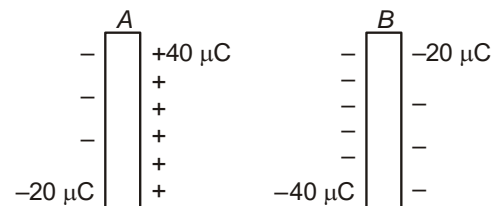
$$\vec{E} = E_x \hat{i} + E_y \hat{j} + E_z \hat{k} = (-\hat{i} + \hat{j} + 3\hat{k}) \text{ V/m}$$

44. Answer (1)

The charge on each outer face of the two plates is

$$\left[\frac{(+20 \mu\text{C}) + (-60 \mu\text{C})}{2} \right] = -20 \mu\text{C}$$

The charge configuration on the plates A and B is shown below.



Charge on capacitor, $Q = 40 \mu\text{C}$

\therefore Potential difference between the plates A and B is

$$V = \frac{Q}{C} = \frac{40 \mu\text{C}}{20 \mu\text{F}} = 2 \text{ V}$$

45. Answer (2)

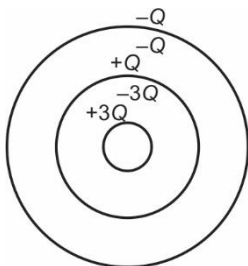
The Wheatstone bridge is in the balanced condition.

$$C_{\text{eff}} = 6 \mu\text{F}$$

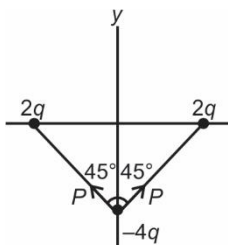
Total charge stored, $Q = C_{\text{eff}} V$

$$Q = (6 \mu\text{F}) \times 2 \text{ V} \\ = 12 \mu\text{C}$$

46. Answer (4)



47. Answer (2)



$$\vec{P}_{\text{net}} = 2P \cos 45^\circ \hat{j}$$

$$P = 2q\ell\sqrt{2}$$

$$\vec{P}_{\text{net}} = \frac{4q\ell\sqrt{2}}{\sqrt{2}} \hat{j}$$

$$\vec{P}_{\text{net}} = 4q\ell \hat{j}$$

48. Answer (1)

$$a = \frac{F}{m}$$

$$= \frac{qE}{m}$$

$$= \frac{2 \times 10^{-6} \times 10}{2 \times 10^{-6}}$$

$$= 10 \text{ m/s}$$

$$V = U + at$$

$$V_{\text{max}} = 5 + 3 \times 10$$

$$= 35 \text{ m/s}$$

$$V_{\text{min}} = 5 - 3 \times 10$$

$$= 25 \text{ m/s}$$

$$V_{\text{min}} \leq V \leq V_{\text{max}}$$

49. Answer (3)

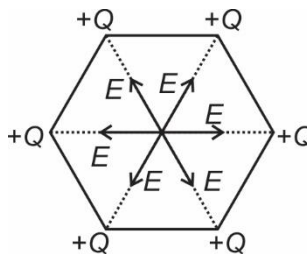
$$\vec{E} = \frac{-\vec{P}}{4\pi\epsilon_0 r^3}$$

$$\vec{E}_1 = \frac{2\vec{P}}{4\pi\epsilon_0 (4r)^3}$$

$$= \frac{\vec{P}}{4\pi\epsilon_0 \times 32r^3}$$

$$= \frac{-\vec{E}}{32}$$

50. Answer (1)



$$\vec{E}_{\text{net}} = 0$$

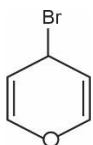
CHEMISTRY

SECTION - A

51. Answer (2)

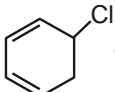
Given reaction is Finkelstein reaction which is based on S_N2 mechanism.

52. Answer (3)



on losing Br^- will acquire aromatic character therefore most readily give yellow ppt of AgBr with AgNO_3 .

53. Answer (3)

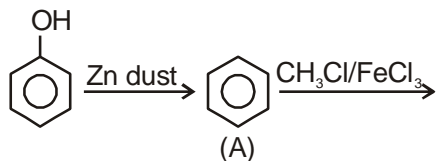
Elimination reaction will be fastest in  as

it leads to the formation of an aromatic compound i.e., benzene. Moreover the α -H atom is also most acidic as it is allylic in conjugation.

54. Answer (1)

Grignard reagent used in THF solution.

55. Answer (2)

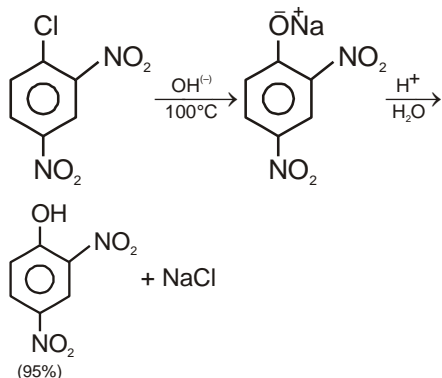


56. Answer (2)

Dichlorocarbene is the electrophile ($:\text{CCl}_2$)

57. Answer (1)

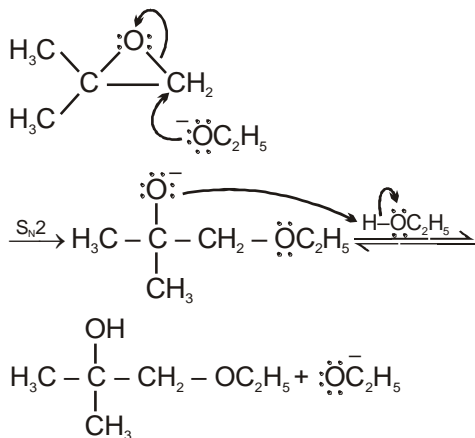
The reaction is followed by addition-elimination mechanism



58. Answer (2)

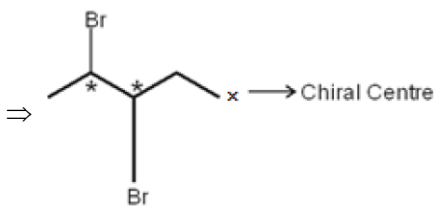
Those haloalkane which have least steric crowding are highly reactive $\text{S}_{\text{N}}2$.

59. Answer (3)



60. Answer (1)

Number of optical isomers = 2^n
where n = number of chiral centre

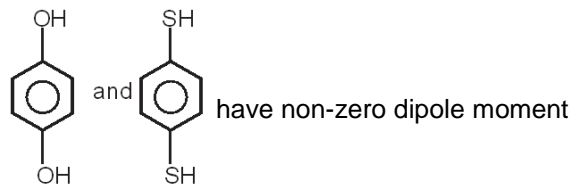


\therefore Number of optical isomers = 4

61. Answer (4)

RMgX reacts with acidic hydrogen to form alkane.

62. Answer (4)

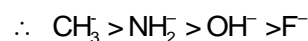


63. Answer (1)

3° alcohols are more reactive with HBr .

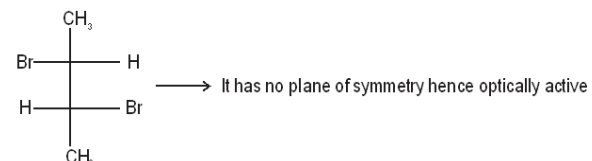
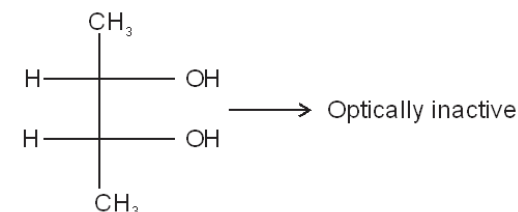
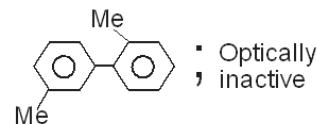
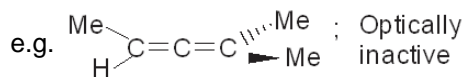
64. Answer (3)

Across period nucleophilicity decrease



65. Answer (4)

The compound which have plane of symmetry are optically inactive



66. Answer (2)

Tertiary alkyl iodide undergoes reaction with AgNO_3 to give yellow precipitate.

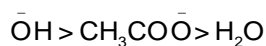
67. Answer (2)

The presence of an electron withdrawing group at ortho and para-positions increases the reactivity of haloarenes towards nucleophilic substitution reaction.

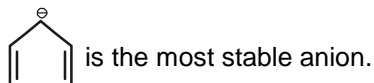
68. Answer (2)

Higher is the electron density greater will be nucleophilicity

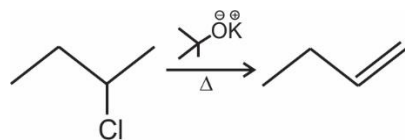
∴ Correct order of Nucleophilicity is



69. Answer (1)

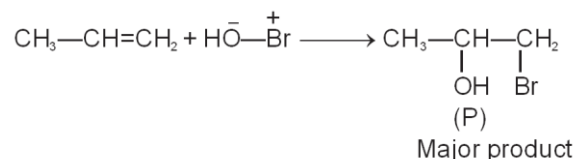


70. Answer (2)



(Hoffman alkene)

71. Answer (2)



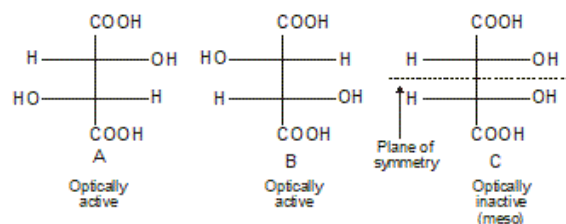
Br^+ acts as an electrophile.

72. Answer (4)

Swarts reaction prepares alkyl fluorides by heating suitable chloroalkanes with SbF_3 , AgF , Hg_2F_2 etc.

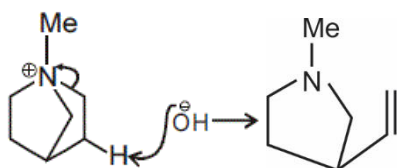
73. Answer (3)

Fischer projections of different stereoisomers of tartaric acid:

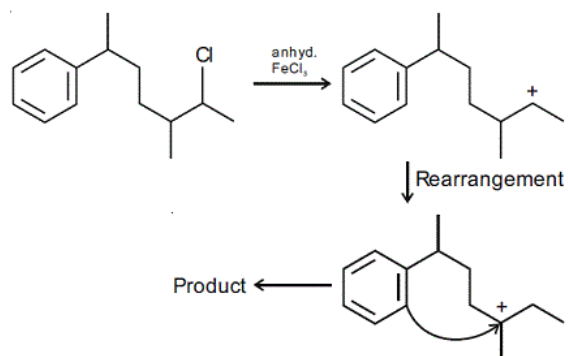


Compounds A and B are enantiomers and each one is optically active. Compound C is optically inactive as it contains plane of symmetry within the molecule.

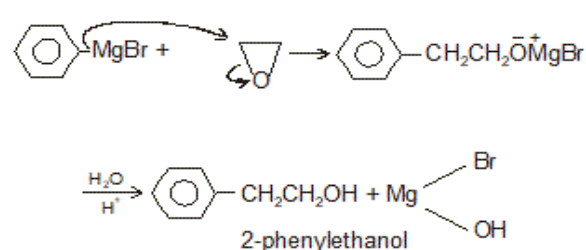
74. Answer (2)



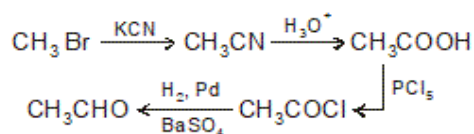
75. Answer (4)



76. Answer (4)



77. Answer (2)

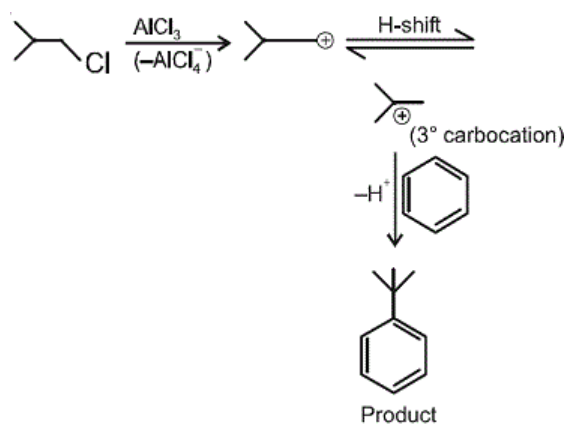


78. Answer (1)

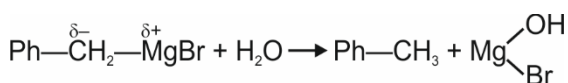
Nitrite ion has two different point of linkage



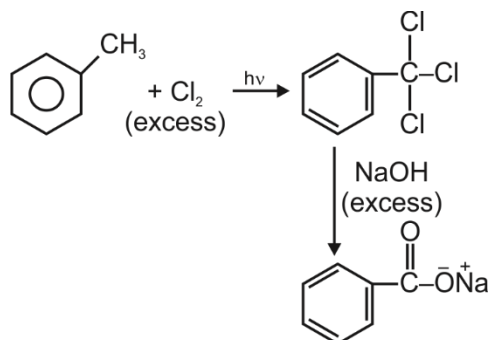
79. Answer (4)



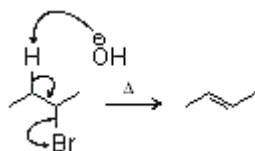
80. Answer (2)



81. Answer (4)

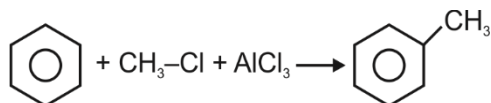


82. Answer (2)

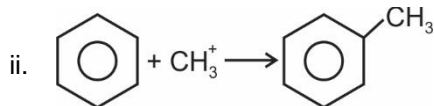


83. Answer (4)

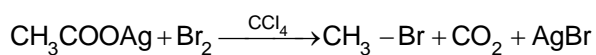
Friedel-Craft alkylation



Mechanism



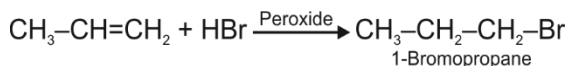
84. Answer (1)



This reaction is called Hunsdiecker reaction.

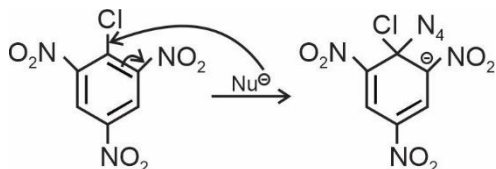
85. Answer (1)

Anti-Markovnikov's rule



SECTION - B

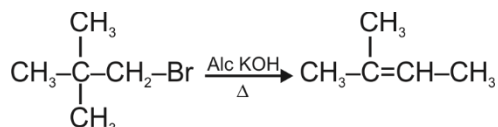
86. Answer (3)



This anion is stabilized by $-\text{NO}_2$ group(s)

So, $-\text{NO}_2$ groups at all o, p positions stabilizes carbanion most, hence rate of reaction will be fastest.

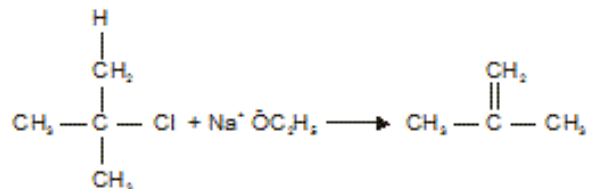
87. Answer (2)



88. Answer (4)

In all reactions, only propene will be formed.

89. Answer (2)



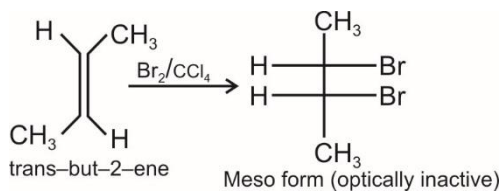
90. Answer (1)

91. Answer (1)

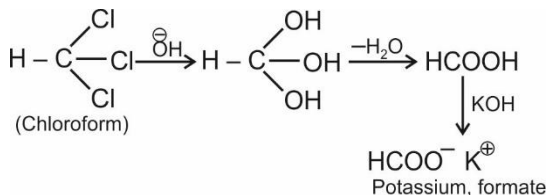
It follows $\text{S}_{\text{N}}1$ pathway

92. Answer (1)

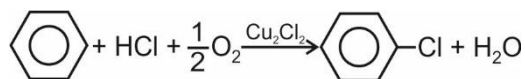
93. Answer (4)



94. Answer (4)



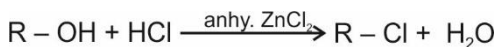
95. Answer (2)



96. Answer (3)

Density :- $\text{CH}_3\text{I} > \text{CH}_3\text{Br} > \text{H}_2\text{O} > \text{CH}_3\text{F}$

97. Answer (1)



98. Answer (2)

99. Answer (2)

On symmetrical alkenes, peroxide effect is not observed.

100. Answer (1)

BOTANY

SECTION - A

101. Answer (2)
Zygote forms the vital link between successive generations that ensures continuity of species from one generation to the next.
102. Answer (4)
In gymnosperms, pollination is anemophilous.
Transfer of pollen grains to the stigma is relatively easy in pea as it is monoecious.
In majority of organisms, male gamete is motile and female gamete is non-motile.
103. Answer (2)
The 'eyes' of *Solanum tuberosum* are nodes. In *Bryophyllum*, adventitious buds arise from notches present at margins of leaves.
104. Answer (2)
Interflowering period is used for building up resources and therefore is a recovery phase. It is part of mature phase.
105. Answer (4)
Epidermis, endothecium and middle layers perform the function of protection of pollen grains.
106. Answer (1)
Vegetative cell of pollen grain is bigger in size and has abundant food reserve.
107. Answer (3)
As anther matures and dehydrates, microspore tetrad dissociates to release pollen grains.
108. Answer (1)
Coconut milk is the free nuclear endosperm of coconut which contains thousands of nuclei.
109. Answer (2)
Xenogamy (allogamy) or cross pollination involves transfer of pollen grains from one plant to the another of the same species.
110. Answer (4)
Pea and groundnut – Dicot seeds which are exalbuminous.
Wheat, maize, barley – Monocot and albuminous seeds.
Castor – Dicot seed but endospermic.
111. Answer (2)
Antipodal cells (n) = 8
Cells of aleurone layer (3n) = $3 \times 8 = 24$
Scutellum (2n) = $2 \times 8 = 16$
112. Answer (1)
In parthenocarpy, fruit is formed without fertilization.
Apomictic embryos are formed without fertilization as well.
So both the phenomenon lack fusion of gametes.
113. Answer (2)
Pollen grains germinate on stigma. Growth of pollen tube is chemotropic. Generative cell divides mitotically to produce two male gametes.
114. Answer (3)
Coleoptile – Hollow foliar structure that covers plumule.
Coleorhiza – Undifferentiated sheath like structure that protects radicle and root cap.
Scutellum – Single cotyledon.
115. Answer (2)
Dioecious condition of plant prevents autogamy as well as geitonogamy.
116. Answer (4)
Central cell is largest cell of embryo sac.
117. Answer (2)
Female sex organ of *Chara* is called nucule. It occupies upper position than globule and has jacket composed of five tube cells.
118. Answer (4)
A represents tapetum which is nutritive layer and nourishes developing pollen grains.
119. Answer (3)
Pollen grains of carrot grass, *Amaranthus* and many anemophilous plants can cause pollen allergy.
120. Answer (4)
Endosperm is a product of triple fusion (1 male gamete + 2 polar nuclei) and develops from central cell of embryo sac.

121. Answer (2)

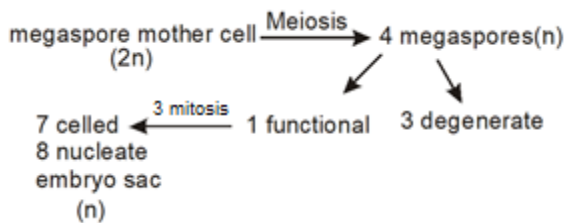
Hydrophily occurs in *Zostera*, *Vallisneria* etc.

122. Answer (4)

Apomixis is a kind of asexual reproduction to produce seeds without fertilization.

123. Answer (2)

Out of 4 megaspores only 1 remains functional in most of the angiosperms (monosporic development).



124. Answer (3)

All the embryos formed other than zygote are apomictic embryos.

Apomictic embryos are not formed by fusion of gametes. Therefore they are clones of each other.

125. Answer (3)

Rice does not have cleistogamous flowers.

126. Answer (4)

Tapetal cells of anther show increase in their DNA content due to endomitosis, restitution nucleus and polyteny.

127. Answer (4)

Date palm is a dioecious plant.

128. Answer (1)

In majority of angiosperms, generative cell is present in pollen grains and pollen is shed at 2-celled stage.

129. Answer (2)

Rice and carrot are monocarpic plants.

130. Answer (3)

Syngamy refers to fusion of egg with male gamete.

131. Answer (4)

Hilum is the junction between ovule and stalk of ovule.

132. Answer (4)

Most of the algae and fungi has haploid gamete mother cell which undergoes mitosis to produce gametes.

133. Answer (4)

Roots of *Dahlia* plant bear adventitious buds.

134. Answer (3)

Zoospores are pyramid shaped microscopic motile spores in *Chlamydomonas*.

135. Answer (2)

Eichhornia is highly invasive aquatic weed found growing in standing water.

SECTION - B

136. Answer (1)

Life span is a specific trait of each organism.

137. Answer (1)

Offset is seen in *Eichhornia*. Bulbil helps in vegetative reproduction in *Agave*.

138. Answer (3)

Angiosperms have non-motile male gametes.

139. Answer (2)

Fusion of gametes occurs in sexual reproduction and produces variations in offspring.

140. Answer (2)

Both *Chara* and *Marchantia* produce flagellated antherozoids and jacketed sex organs.

141. Answer (4)

Maize and castor are monoecious plants.

142. Answer (2)

Pollen viability is period for which pollen grains retain the ability to germinate on stigma in angiospermic plants.

143. Answer (2)

Micropyle is the pore or passage present at the tip of ovule where integument is absent.

144. Answer (3)

Flowering plants show internal fertilization.

145. Answer (4)

Integuments are the protective envelopes of the ovule.

146. Answer (2)

A typical angiospermic anther is bilobed, dithecous, tetragonal and tetrasporangiate.

147. Answer (1)

1 microspore mother cell forms 1 microspore tetrad which produces, 4 pollen grains which finally forms 8 male gametes.

148. Answer (3)

In 60% of the angiosperms, pollen grains are shed at two celled stage.

149. Answer (2)

Number of meiotic divisions to produce seeds

$$= n + \frac{n}{4}$$

$$= 80 + \frac{80}{4}$$

$$= 100$$

150. Answer (3)

Gametogenesis is a pre-fertilisation event.

ZOOLOGY

SECTION - A

151. Answer (3)

Spermatogonia and oogonia are diploid cells.

152. Answer (1)

Leydig cells synthesise and secrete testicular hormones called androgens.

153. Answer (1)

In fertilization event, fusion of gametes occur.

154. Answer (2)

In secretory phase, corpus luteum is formed which secretes high concentration of progesterone and low concentration of estrogen. Progesterone forms thick mucous in cervix so that it protects pathogens from entering the uterus.

155. Answer (1)

Corona penetrating enzyme dissolves corona radiata.

156. Answer (2)

Day of ovulation is 34 (48-14) and mammary glands are exocrine glands.

157. Answer (2)

Proliferative phase in uterus runs parallel to follicular phase. Estrogen in proliferative phase is responsible for repair of endometrium shed during menstrual phase.

158. Answer (2)

IgG moves from maternal to foetal circulation not vice versa.

159. Answer (2)

Oxytocin facilitates parturition while estrogen, inhibin, progesterone, prolactin, thyroxine and cortisol perform varied functions during or before pregnancy.

160. Answer (1)

Bartholin's gland is the part of female reproductive system.

161. Answer (2)

Amnion is derived from extraembryonic mesoderm and ectoderm.

162. Answer (4)

Ovarian cycle is regulated by hormones of adenohypophysis *i.e.*, FSH and LH.

163. Answer (3)

Corona radiata and granulosa are cellular layers. Theca externa is made up of fibrous connective tissue. Zona pellucida is made up of glycoproteins.

164. Answer (3)

Meiosis-I is completed within tertiary follicle to form a tiny 1st polar body and a large haploid secondary oocyte.

165. Answer (3)

Insemination is transfer or deposition of sperms into the female genital tract. Acrosomal reaction involves release of hydrolytic enzymes from sperm's head. Spermiation is a process when sperms are released from seminiferous tubules.

166. Answer (2)

Oxytocin released from posterior pituitary is responsible for release of stored milk in mammary glands.

167. Answer (4)

LH maintains corpus luteum which secretes progesterone and estrogen. hCG mimics the role of LH in a pregnant female.

168. Answer (4)

Cortisol is a glucocorticoid synthesized from zona fasciculata layer of adrenal cortex and not from placenta.

169. Answer (4)

The oviducts, uterus and vagina constitute the female accessory ducts.

170. Answer (2)

In human adults, each testis is oval in shape, with a length of about 4 to 5 cm and a width of about 2 to 3 cm.

171. Answer (4)

Transverse binary fission takes place in *Paramecium*, diatoms, *Planaria*.

172. Answer (2)

Each oviduct is differentiated into three parts namely infundibulum, ampulla and isthmus.

173. Answer (2)

Prostate gland is an unpaired male accessory gland.

174. Answer (1)

Cockroach is a dioecious organism while earthworm, leech and tapeworm are monoecious.

175. Answer (1)

Maximum life span is the characteristic of species and life expectancy is the characteristic of a population.

176. Answer (2)

All individuals are mortal except single-celled organisms.

177. Answer (2)

Spermatozoa is a haploid cell.

178. Answer (3)

The correct sequence w.r.t. embryonic stages in humans:-

Morula → Blastocyst → Gastrula

179. Answer (4)

Sertoli cells provide nutrition to the germ cells. Leydig cells synthesise and secrete testicular hormones called androgens.

180. Answer (4)

First polar body is formed after completion of 1st meiotic division.

181. Answer (3)

Transfer of sperms into the female genital tract is called insemination.

182. Answer (3)

In humans, both sperms and ovum consist of 23 pair of chromosomes.

183. Answer (2)

Transverse binary fission takes place in *Paramecium*.

184. Answer (1)

Sexual reproduction involves formation of the male and female gametes either by the same individual or by different individuals of the opposite sex.

185. Answer (1)

Zygote is the vital link that ensures continuity of species between organisms of one generation and the next.

SECTION - B

186. Answer (1)

Syngamy occurs in the external medium (water), i.e., outside the body of the organism in case of external fertilisation.

187. Answer (2)

The chromosome number in meiocyte of *Musca* (House fly) is 12.

188. Answer (4)

The approximate life span of butterfly is 1-2 weeks.

189. Answer (2)

During embryogenesis, zygote undergoes cell division (mitosis) and cell differentiation.

190. Answer (3)

The chromosome number in meiocyte of cat is 38.

191. Answer (2)

Earthworm is a monoecious organism.

192. Answer (4)

Birds living in nature lay eggs only seasonally.

193. Answer (4)

Asexual reproduction is a rapid mode of reproduction.

194. Answer (1)

In Protists and Monerans, the organism or the parent cell divides by mitosis into two to give rise to new individuals.

195. Answer (2)

Life span can be defined as the period from birth to the natural death of an organism.

196. Answer (1)

The seminiferous tubules of the testis open into the vasa efferentia through rete testis.

197. Answer (3)

Seminal vesicles secrete viscous fluid which constitute the main part of the ejaculate.

198. Answer (4)

The middle piece of sperm possesses numerous mitochondria, which produce energy for the movement of tail.

199. Answer (2)

Several mammary ducts join to form a wider mammary ampulla which is connected to lactiferous duct through which milk is sucked out.

200. Answer (2)

Primary spermatocytes are the first cell to undergo 1st meiotic division to form secondary spermatocytes.

