Aakash
BYJU'S

MM : 720

Fortnightly Test Series 2023-24_RM(P1)-Test-08A

Time : 200 Min

Topics Covered:
Physics: Waves, Electric Charges & Fields
Chemistry: Organic Chemistry: Basic Principles & Techniques, Hydrocarbons, Haloalkanes and Haloarenes
Botany: Plant Growth and Development, Sexual Reproduction in Flowering Plants
Zoology: Animal Kingdom: chordates, Structural Organisation in Animals— Animal Morphology (Cockroach, Frog, Earthworm)

General Instructions :

1. 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**.
2. 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.
3. Use blue/black ballpoint pen only to darken the appropriate circle.
4. Mark should be dark and completely fill the circle.
5. Dark only one circle for each entry.
6. Dark the circle in the space provided only.
7. 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

SECTION-A

1. An earthquake generates both transverse (S) and longitudinal (P) sound waves in the earth. The speed of S wave is about 6 km s^{-1} and that of P wave is about 12 km s^{-1}. A seismograph records S and P waves from an earthquake. The first P wave arrives 3 minutes before first S wave. The epicentre of earthquake located at the distance is about
   (1) 1540 km
   (2) 1710 km
   (3) 1918 km
   (4) 2160 km

2. The equation of the wave is given by $y = 5\sin(40t - 5x)$ (where x, y are in metre and t is in second). The ratio of the maximum particle velocity to the wave velocity is
   (1) 25 : 1
   (2) 3 : 1
   (3) 2 : 3
   (4) 4 : 3

3. Two sources with intensity $4I_0$ and $16I_0$ respectively interfere at a point in a medium. The ratio of maximum to minimum possible intensity would be
   (1) 36
   (2) 9
   (3) 6
   (4) 16

4. For aluminium, the young's modulus of elasticity is 7.6×10^{10} N m^{-2} and density is 2.7×10^3 kg m^{-3}. The velocity of longitudinal wave in aluminium is
   (1) 3.6×10^2 m/s
   (2) 1.7×10^3 m/s
   (3) 5.3×10^3 m/s
   (4) 2.4×10^3 m/s

5. Ratio of intensities of two waves of same frequency in a medium is given by 4 : 1. The ratio of the amplitudes of the waves is
   (1) 2 : 1
   (2) 5 : 2
   (3) 4 : 1
   (4) 1 : 4

6. In resonance tube experiment, with a tuning fork of particular frequency, first resonance is obtained at 16 cm. Next resonance will be obtained at (consider end correction)
   (1) Exactly at 48 cm
   (2) Less than 32 cm
   (3) More than 48 cm
   (4) Less than 48 cm

7. A : For standing waves on a stretched string, the chances of string breakage is maximum at the nodes.
   R : The maximum longitudinal strains are attained at the displacement nodal points.
   (1) Both Assertion & Reason are true and the reason is the correct explanation of the assertion
   (2) Both Assertion & Reason are true but the reason is not the correct explanation of the assertion
   (3) Assertion is true statement but Reason is false
   (4) Both Assertion and Reason are false statements

8. A uniform rope of mass 2 kg and length 5 m is suspended vertically from a rigid support. A transverse pulse is generated at the lower end of the rope. The time taken by the pulse to reach the top end is [$g = 10$ m/s^2]
   (1) $\sqrt{2}$ s
   (2) 2 s
   (3) $2\sqrt{2}$ s
   (4) $\frac{1}{\sqrt{2}}$ s

9. Two strings x and y of a sitar produce a beat of frequency 5 Hz. When the tension of the string y is slightly increased, the beat frequency is found to be 7 Hz. If the frequency of x is 299 Hz, then the original frequency of y is
   (1) 296 Hz
   (2) 298 Hz
   (3) 302 Hz
   (4) 304 Hz

10. Two tuning forks when sounded together produces 4 beats per second. If one of the tuning fork has a frequency of 150 Hz. What may the frequency of other tuning fork ?
    (1) 154
    (2) 146
    (3) 150
    (4) Both (1) and (2)

11. Two waves $y_1 = 10\sin(\omega t - kx)$ m and $y_2 = 5\sin(\omega t - kx + \pi/3)$ m are superimposed. The amplitude of resultant wave is
    (1) $3\sqrt{7}$ m
    (2) $5\sqrt{7}$ m
    (3) $\sqrt{7}$ m
    (4) $2\sqrt{7}$ m

12. The equation of a transverse wave is given by $y = 10 \sin 2\pi(2x - 3t)$ where x and y are in cm and t is in s. Its frequency is
    (1) 1 Hz
    (2) 4 Hz
    (3) 2 Hz
    (4) 3 Hz

13. The distance between consecutive crest and trough of a wave is 10 cm. If the speed of wave is 200 cm/s. Then the time period of wave is
    (1) 0.01 s
    (2) 0.2 s
    (3) 0.02 s
    (4) 0.1 s

14. An observer moves towards a stationary source of sound, with a velocity one tenth of the velocity of sound. What is the percentage increase in the apparent frequency?
    (1) Zero
    (2) 0.5%
    (3) 5%
    (4) 10%

15. The vibrations of a string of length 60 cm fixed at both the ends are represented by the equation

$y = 2\sin\left(\frac{4\pi x}{15}\right)\cos\left(96\pi t\right)$ where x and y are in cm. The number of loops formed on the string is

 (1) 8
 (2) 16
 (3) 5
 (4) 15

16. A uniform string of length L is suspended from the ceiling. At $t = 0$ a transverse wave is propagated from its lower end. At the same instant a particle is dropped from the ceiling. Distance from the ceiling at which they pass each other is
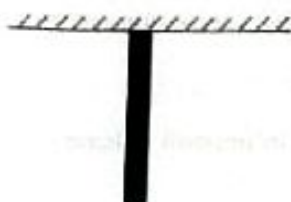
 (1) $\frac{L}{2}$
 (2) $\frac{L}{3}$
 (3) $\frac{2L}{3}$
 (4) $\frac{L}{4}$

17. A bus is moving with a velocity 4 m/s towards a wall, the driver sounds a horn of frequency 173 Hz. If the speed of sound in air is 350 m/s. The number of beats heard per second by a passenger on the bus will be

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

18. Magnitude of electric field due to an electric dipole at a distance r from it, at axial position is given as E. The magnitude of electric field due to the dipole at a distance $2r$ from it, on equatorial line is

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

19. An electron and proton are placed in uniform electric field

 (1) The electric forces acting on them will be equal
 (2) The magnitudes of the forces will be equal
 (3) The acceleration will be equal
 (4) The magnitudes of their accelerations will be equal

20. Four point charges are placed at the corners of a square having side L as shown in the figure
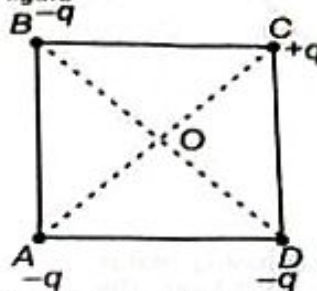
Net force on the charged particle placed at centre 'O' of the square will be along

 (1) Line BD
 (2) Line BC
 (3) Line AC
 (4) Zero

21. An electric dipole of dipole moment $\vec{P}$ is placed in an external uniform electric field $\vec{E}$, then the torque acting on it is given by

 (1) $\vec{\tau} = \vec{P}\vec{E}$
 (2) $\vec{\tau} = \vec{P} \times \vec{E}$
 (3) $\vec{\tau} = \vec{P} \cdot \vec{E}$
 (4) $\vec{\tau} = \vec{P} + \vec{E}$

22. Electric charge q, q and $-2q$ are placed at the corners of an equilateral triangle ABC of side L. The magnitude of electric dipole moment of the system is

 (1) qL
 (2) $2qL$
 (3) $4qL$
 (4) $\sqrt{3}qL$

23. Two parallel infinite line charges λ and $-\lambda$ are placed at a separation $2a$ in free space. The net electric field intensity exactly midway between two line charges is
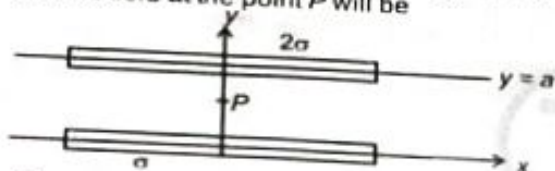
 (1) Zero
 (2) $\frac{\lambda}{\pi\varepsilon_0 a}$
 (3) $\frac{\lambda}{2\pi\varepsilon_0 a}$
 (4) $\frac{2\lambda}{\pi\varepsilon_0 a}$

24. Two concentric spheres A and B exist in space as shown in the figure. A charge q lies at the common centre of the spheres. The ratio of electric flux through sphere A to that through B is
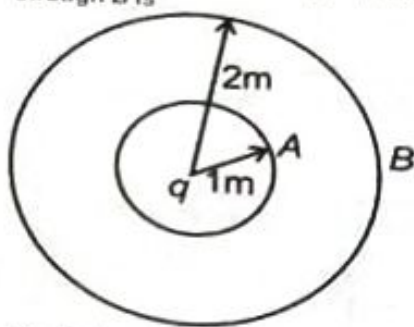
(1) $1:1$
(2) $1:2$
(3) $2:1$
(4) $4:1$

25. Two infinitely charge sheets having charge density σ and 2σ as shown in the figure. The electric field at the point P will be

(1) $-\dfrac{\sigma}{2\varepsilon_0}\hat{j}$

(2) $-\dfrac{3\sigma}{\varepsilon_0}\hat{j}$

(3) $\dfrac{\sigma}{2\varepsilon_0}\hat{j}$

(4) $\dfrac{\sigma}{\varepsilon_0}\hat{j}$

26. Two point charges $+6\ \mu C$ and $+16\ \mu C$ repel each other with a force of 120 N. If a charge of $-8\ \mu C$ is added to each of them, then force between them will becomes

(1) 40 N
(2) 30 N
(3) 20 N
(4) 60 N

27. The electric force experienced by a point charge of $1\ \mu C$ is 5×10^{-3} N. The magnitude of the electric field at that point due to the source charge is

(1) 5×10^3 N/C
(2) 25×10^3 N/C
(3) 5×10^{-3} N/C
(4) 2.5×10^3 N/C

28. Electric field at the centre of a charged circular ring having linear charge density λ and radius R is

(1) Zero

(2) $\dfrac{\lambda}{4\pi\varepsilon_0 R}$

(3) $\dfrac{\lambda}{\pi\varepsilon_0 R}$

(4) $\dfrac{\lambda}{2\pi\varepsilon_0 R}$

29. A long string with linear charge density λ per unit length passes through an imaginary cube of edge a. The maximum flux of the electric field through the cube will be

(1) $\dfrac{\sqrt{2}\lambda a}{\varepsilon_0}$

(2) $\dfrac{\sqrt{3}\lambda a}{\varepsilon_0}$

(3) $\dfrac{\lambda a}{\varepsilon_0}$

(4) $\dfrac{6\lambda a^2}{\varepsilon_0}$

30. An electric dipole is kept in uniform electric field. It may experience

(1) A force and a torque
(2) Neither a force nor a torque
(3) A force but not a torque
(4) Both (2) and (3)

31. A : There are two charges q_1 and q_2. The ratio of magnitude of force acting on q_1 due to q_2 and the force acting on q_2 due to q_1 will be $1:1$
R : Coulomb's force obeys Newton's third law of motion.

(1) Both Assertion & Reason are true and the reason is the correct explanation of the assertion
(2) Both Assertion & Reason are true but the reason is not the correct explanation of the assertion
(3) Assertion is true statement but Reason is false
(4) Both Assertion and Reason are false statements

32. A charge is uniformly distributed in a spherical volume of radius R. The electric field at distance r ($r < R$) from its centre is proportional to

(1) r
(2) r^{-1}
(3) r^2
(4) r^{-2}

33. The electric field lines of forces between two point charges Q_1 and Q_2 are shown in the figure. Then $\left|\dfrac{Q_1}{Q_2}\right|$ will be
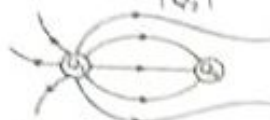
    (1) Greater than 1
    (2) Lesser than 1
    (3) Equal to 1
    (4) Zero

34. If the speed of a point charge increases, then charge on it
    (1) Increases
    (2) Decreases
    (3) Remains same
    (4) Either (1) or (2)

35. Units of electric flux are
    (1) $N\, m^2\, C^{-1}$
    (2) $N\, C^{-1}\, m^{-2}$
    (3) $Volt\, m^2$
    (4) $Volt\, m^3$

SECTION-B

36. What will be the speed of longitudinal wave in a solid material, having Young's modulus $Y = 3 \times 10^{10}\, N/m^2$ and density $d = 1.2 \times 10^3$ kg/m^3?
    (1) 2000 m/s
    (2) 1000 m/s
    (3) 4000 m/s
    (4) 5000 m/s

37. The path difference between the two waves
$$y_1 = a_1 \sin\left(\omega t - \frac{2\pi x}{\lambda}\right) \quad \text{and}$$
$$y_2 = a_2 \cos\left(\omega t - \frac{2\pi x}{\lambda} + \phi\right) \text{ is}$$
    (1) $\frac{\lambda}{2\pi}\phi$
    (2) $\frac{\lambda}{2\pi}\left(\phi + \frac{\pi}{2}\right)$
    (3) $\frac{2\pi}{\lambda}\left(\phi - \frac{\pi}{2}\right)$
    (4) $\frac{2\pi}{\lambda}\phi$

38. A tuning fork produces 5 beats/s with a tuning fork of frequency 246 Hz. The first fork is now loaded with wax and then 5 beats/s are still heard. The frequency of the fork was
    (1) 251 Hz
    (2) 241 Hz
    (3) 246 Hz
    (4) 249 Hz

39. A 1 m long string of mass 40 g is tied tightly at its two ends. If tension in the string is 100 N. The fundamental frequency of string is nearly
    (1) 25 Hz
    (2) 50 Hz
    (3) 100 Hz
    (4) 10 Hz

40. A point source deliver 4π W of sound. At what distance from the source will a man detect 100 dB intensity sound? [Reference intensity of sound is 10^{-12} W/m^2].
   (1) 10 m
    (2) 20 m
    (3) 5 m
    (4) 100 m

41. As the train crosses a stationary observer, the apparent change in frequency of sound is in the ratio 8 : 5. The velocity of train is (Velocity of sound in air is 332 m/s)
   (1) 83.3 m/s
    (2) 76.6 m/s
    (3) 67.7 m/s
    (4) 56.5 m/s

42. The wave function of a pulse is given by $y = \dfrac{2}{(x-3t)^2 + 1}$, where x and y are in metre and t is in second. The velocity of the pulse is

(1) 2 m/s

(2) 3 m/s

(3) 4 m/s

(4) 5 m/s

43. The intensity of sound of 30 dB is (Take reference intensity $I_0 = 10^{-12}$ W/m^2)

(1) 10^3 W/m^2

(2) 10^{-12} W/m^2

(3) 10^{-3} W/m^2

(4) 10^{-9} W/m^2

44. Consider Gauss's law for the situation shown in figure. At the Gaussian surface
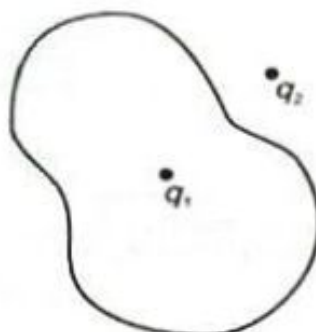
(1) Electric field due to q_2 would be zero

(2) Electric field due to both q_1 and q_2 would be zero

(3) Net flux due to q_1 through Gaussian surface is zero

(4) Net flux due to q_2 through Gaussian surface is zero

45. Electric charges $-q$, $-q$, $-q$ and $3q$ are placed at the corners of a square ABCD of length l as shown in figure. The magnitude of electric dipole moment of the system is

(1) $\sqrt{2}ql$

(2) ql

(3) $2ql$
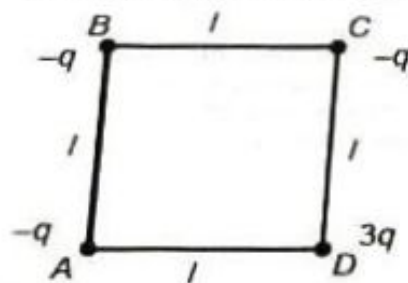
(4) $2\sqrt{2}ql$

46. The number of electric lines of force that radiate outwards from 8.85 µC of charge in vaccum is

(1) 10^{-6}

(2) 10^{-12}

(3) 10^{12}

(4) 10^6

47. A : A gold leaf electroscope is used for detecting the presence of electric charge.

R : Gold leaf electroscope can be used to measure potential difference.

(1) Both Assertion & Reason are true and the reason is the correct explanation of the assertion

(2) Both Assertion & Reason are true but the reason is not the correct explanation of the assertion

(3) Assertion is true statement but Reason is false

(4) Both Assertion and Reason are false statements

48. What is the net flux passing through the curved surface of Cylinder (base radius = r, length l) as shown in figure?

(1) $E(2\pi rl)$

(2) $E(\pi r^2)$

(3) $2E\pi r^2$

(4) Zero

6
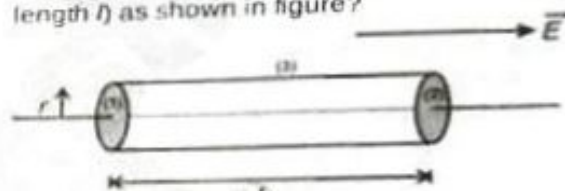
49. In a region of space the electric field is given by $\vec{E} = \left(6\hat{i} + 4\hat{j}\right)$ N/C. The electric flux through a surface of area 5 m² in x-y plane is

   (1) 80 units
   (2) 40 units
   (3) 120 units
   (4) Zero

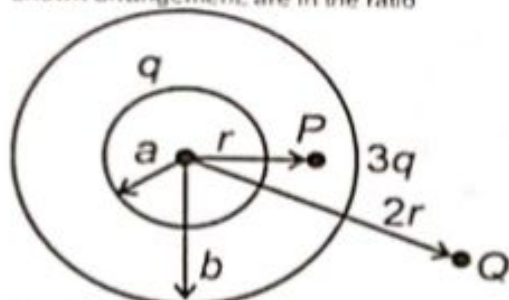50. The electric field intensity at P and Q, in the shown arrangement, are in the ratio

   Fig. : Hollow concentric shell

   (1) $1:2$
   (2) $2:1$
   (3) $1:1$
   (4) $4:3$

CHEMISTRY

SECTION-A

51. In which of the following species hyperconjugation effect does not take place?

   (1) $CH_3 - \overset{+}{C}H - CH_3$
   (2) $(CH_3)_2CH - \overset{+}{C}H_2$
   (3) $CH_3 - CH = CH - \overset{+}{C}H_2$
   (4) $CH_3 - \overset{\ominus}{C}H - CH_3$

52. Which of the following is a temporary effect?
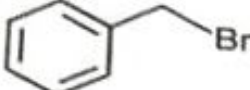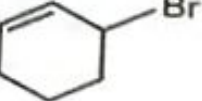
   (1) Electromeric effect
   (2) Inductive effect
   (3) Mesomeric effect
   (4) Hyperconjugation

53. The IUPAC name of $CH_3 - CH = CH - CHO$ is

   (1) 2-propen-1-al
   (2) But-2-en-1-al
   (3) Propenal
   (4) Butanal

54. The composition of prussian blue formed in the test of nitrogen by Lassaigne's test is

   (1) $Na_4[(Fe(CN)_6]$
   (2) $Fe_4[Fe(CN)_6]_3$
   (3) $K_2Fe[Fe(CN)_6]$
   (4) $Fe(SCN)_3$

55. In Carius method of estimation of halogen, 0.5 g of an organic compound gave 0.47 g of AgBr. Percentage of bromine in compound is (molar mass of Br = 80 g mol^{-1})

(1) 20%

(2) 40%

(3) 50%

(4) 80%

56. In which of the following compounds, C-Br bond ionization will give most stable carbonium ion?

(1) $(CH_3)_3C - Br$

(2)

(3)

(4)

57. Number of sp hybridised carbon atoms in the given molecule is

$CH_3 - CH = CH - C \equiv C - CN$

(1) 3

(2) 2

(3) 4

(4) 5

58. A sample of 0.4 g of an organic compound was treated according to Kjeldahl's method. The ammonia evolved was absorbed in 50 ml of 0.5 M H_2SO_4. The residual acid required 60 mL of 0.5 M NaOH for neutralisation. Percentage composition of nitrogen in the organic compound is

(1) 56%

(2) 28%

(3) 70%

(4) 62%

59. Heterocyclic compound among the following is

(1) Cyclopropane

(2) Aniline

(3) Cyclohexene

(4) Tetrahydrofuran

60. Which among the following is an aromatic species?

(1)

(2)

(3)

(4)

61. Which of the following set of groups can show +R effect?

(1) $-COOH, -NH_2, -OH$

(2) $-NH_2, -OH, -COOCH_3$

(3) $-NHCOCH_3, -OR, -NH_2$

(4) $-COCl, -COOCH_3, -CH_3$

62. The best purification method for glycerol is

(1) Vacuum Distillation

(2) Steam Distillation

(3) Fractional Distillation

(4) Differential Extraction

63. Calcium carbide on hydrolysis give

(1) Methane

(2) Ethene

(3) Acetylene

(4) Propyne

64. Methoxy propane and butanol are

(1) Chain isomers

(2) Position isomers
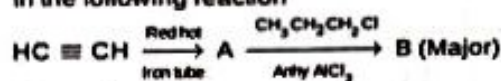
(3) Functional isomers

(4) Metamers

65. Consider the following reaction sequence

Ph – CH – Cl $\xrightarrow[\text{Ethanol}]{\text{KOH}}$ A $\xrightarrow[\text{(ii) }H_2O_2/OH]{\text{(i) }B_2H_6/THF}$ B(Major)
|
CH₃

Major product B is

(1) Ph – CH₂ – CH₂ – OH

(2) Ph – CH – CH₃
|
OH

(3) Ph – CH – CH₂
| |
OH   OH

(4) Ph – CH – CH₂ (epoxide)

66. In the following reaction

HC ≡ CH $\xrightarrow[\text{Iron tube}]{\text{Red hot}}$ A $\xrightarrow[\text{Anhy AlCl}_3]{CH_3CH_2CH_2Cl}$ B (Major)

The product B is

(1) [benzene ring]–CH₂CH₂CH₃

(2) [benzene ring]–CH₂CH₃ with –CH₃

(3) [benzene ring]–CH(CH₃)–CH₃

(4) [benzene ring] with CH₂CH₃ and CH₃

67. n-hexane on heating to 500°C at 10-20 atm pressure in the presence of vanadium pentoxide supported over alumina gives

(1) Cyclohexene

(2) Benzene

(3) Hexene–1–ene

(4) Hex-2-ene

68. Reddish orange colour solution of bromine in carbon tetrachloride is decolourised on reaction with

(1) Ethane

(2) Benzene

(3) But-2-yne

(4) Cyclohexane

69. In the following reaction,

Acetic acid $\xrightarrow{\text{NaOH(aq)}}$ A $\xrightarrow[\Delta]{\text{Soda lime}}$ B
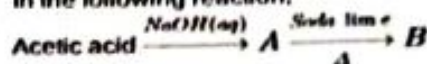
B is

(1) Ethene

(2) Methanol

(3) Ethanol

(4) Methane

70. Which among the following alkanes can be made in good yield by Wurtz reaction?

(1) n-pentane

(2) n-propane

(3) n-heptane

(4) n-hexane

71. Given below are two statements : One is labelled as Assertion A and other is labelled as Reason R.

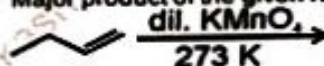Assertion (A) : In Friedel-Crafts alkylation reaction, the function of anhy. AlCl₃ is to produce electrophile.

Reason (R) : AlCl₃ is a Lewis base.

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

(1) Both Assertion & Reason are true and the reason is the correct explanation of the assertion

(2) Both Assertion & Reason are true but the reason is not the correct explanation of the assertion

(3) Assertion is true statement but Reason is false

(4) Both Assertion and Reason are false statements

72. Major product of the given reaction is

[CH₂=CH–CH₂– structure] $\xrightarrow[273 K]{\text{dil. KMnO}_4}$

(1) [cyclic ether structure]

(2) [structure with OH]
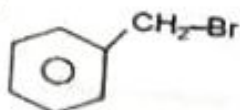
(3) [structure with OH OH]

(4) [structure with O]

73. One mole of a symmetrical alkene on ozonolysis gives two moles of an aldehyde having molecular mass of 44u. The alkene is

(1) 1 - Butene

(2) 1, 3 Butadiene

(3) 2 - Butene

(4) Propene

9

74. Maximum reactivity towards S_N1 reaction among the following is of
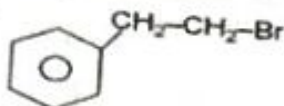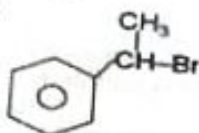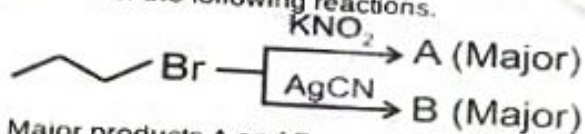
(1)
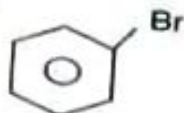
(2)

(3)

(4)

75. $R - Br + AgF \rightarrow R - F + AgBr$
The above reaction is known as
(1) Finkelstein Reaction
(2) Swarts Reaction
(3) Fittig Reaction
(4) Dow's Process

76. Consider the following reactions.
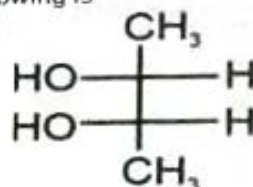
Major products A and B respectively are
(1) $\sim\!\!\sim NO_2$ and $\sim\!\!\sim NC$
(2) $\sim\!\!\sim ONO$ and $\sim\!\!\sim CN$
(3) $\sim\!\!\sim NO_2$ and $\sim\!\!\sim CN$
(4) $\sim\!\!\sim ONO$ and $\sim\!\!\sim NC$

77. $C_2H_5OH \xrightarrow{PCl_5} X + POCl_3 + HCl$
Compound X is
(1) CH_3Cl
(2) C_2H_5Cl
(3) CH_3OCH_3
(4) $C_2H_5OC_2H_5$

78. Optically active compound among the following is

(1)

(2)
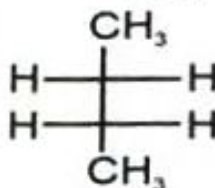
(3)

(4)

79. Chloroform on reaction with O_2 in presence of light gives
(1) CO_2
(2) $COCl_2$
(3) CO
(4) $CCl_3\text{-}CHO$

80. The compound which will react fastest by S_N2 mechanism is
(1)
(2)
(3) $Ph\text{---}CH_2\text{---}Br$
(4) $(Ph)_3C\text{---}Br$

81. Rate of S_N2 reaction will be maximum in which of the following solvents?
(1) DMF
(2) CH_3CH_2OH
(3) H_2O
(4) OH

82. Which of the following is the correct order of reactivity towards nucleophilic substitution with aqueous NaOH for the following compounds ?
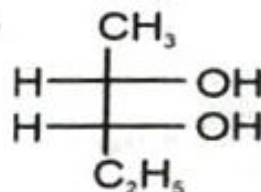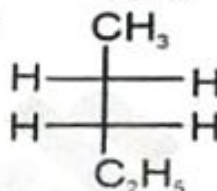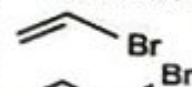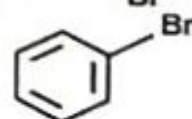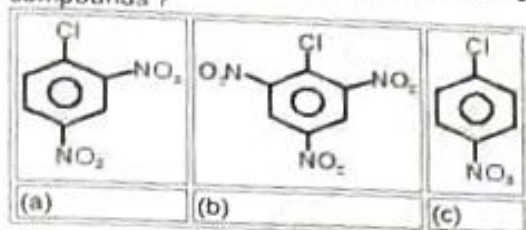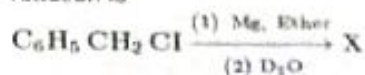

(a)   (b)   (c)

(1) a > c > b
(2) b > c > a
(3) b > a > c
(4) c > a > b

83. The number of monochloro derivatives of isopentane (including stereoisomers) are
(1) 6
(2) 4
(3) 5
(4) 7

84. The major product (X) in the following reaction is

$$C_6H_5\,CH_2\,Cl \xrightarrow[\text{(2) } D_2O]{\text{(1) Mg, Ether}} X$$

(1)   ⬡—CH_2OD
(2)   ⬡—CH_2D
(3)   ⬡—CH_3 with OD
(4)   DO—⬡—CH_3

85. Which of the following compounds will undergo racemisation in presence of aq. KOH?

(1) ⬡—$CH(CH_3)$Br
(2) CH_3—$CH(CH_3)$—CH_2Cl
(3) ⬡—CH_2Br
(4) cyclic—CHBr—cyclic

SECTION-B

86. The most suitable method of separation of 1 : 1 mixture of ortho and para-nitrophenols is
(1) Sublimation
(2) Chromatography
(3) Crystallisation
(4) Steam distillation

87. Which one is the correct order of acidity?
(1) $CH_2 = CH_2 > CH_3 - CH = CH_2 > CH_3 - C \equiv CH > CH \equiv CH$
(2) $CH \equiv CH > CH_3 - C \equiv CH > CH_2 = CH_2 > CH_3 - CH_3$
(3) $CH \equiv CH > CH_2 = CH_2 > CH_3 - C \equiv CH > CH_3 - CH_3$
(4) $CH_3 - CH_3 > CH_2 = CH_2 > CH_3 - C \equiv CH > CH \equiv CH$

88. In pyrrole
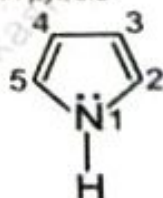
the electron density is maximum on
(1) 2 and 3
(2) 3 and 4
(3) 2 and 4
(4) 2 and 5

89. How many structural isomers of
$$C_5H_{11}OH$$
will be primary alcohol
(1) 2
(2) 3
(3) 4
(4) 5

90. Consider the following statements.
(a) Thin layer chromatography is an example of adsorption chromatography
(b) Silica gel and alumina are common adsorbents used in column chromatography
(c) Paper chromatography is a type of partition chromatography
The correct statement(s) is/are

(1) (a) only

(2) (c) only

(3) (a) and (c) only

(4) (a), (b) and (c)

91. Identify the nucleophile among the following

(1) H_2O

(2) BF_3

(3) $AlCl_3$

(4) $\overset{+}{N}O_2$

92. The halide ion which have maximum nucleophilicity in acetone is

(1) I^-

(2) Cl^-

(3) Br^-

(4) F^-

93. Consider the following sequence of reactions

$$C_2H_5C \equiv CH \xrightarrow{NaNH_2} A \xrightarrow{CH_3CH_2Br} B.$$
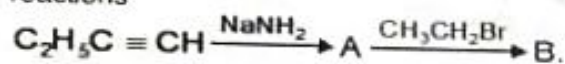
The product (B) is

(1) $C_2H_5CH = C = CH_2$

(2) $C_2H_5C \equiv C - CH_2CH_3$

(3) $C_2H_5C \equiv C - CH_2OH$

(4) $\underset{\underset{CH_2CH_3}{|}}{C_2H_5C} = CH_2$

94. Optically inactive biphenyl among the following is

(1)

(2)

(3)

(4)
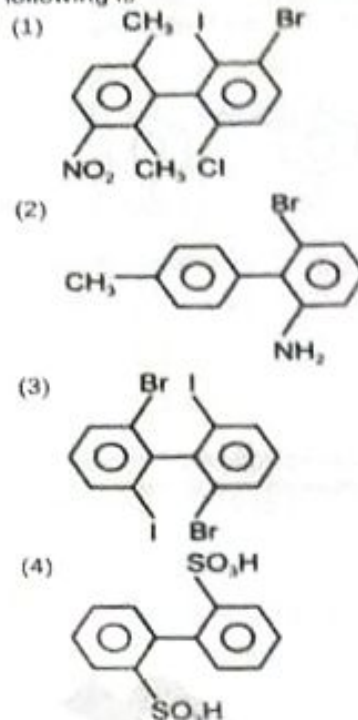
95. Consider the following representations
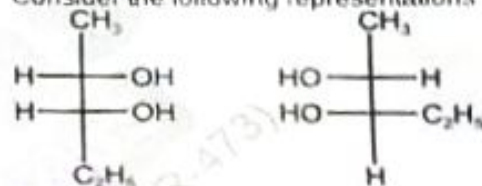
These are

(1) Identical

(2) Enantiomers

(3) Conformational isomers

(4) Diastereomers

96. Consider the given molecules
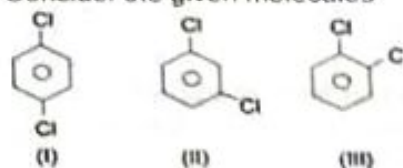
The correct order of melting point will be

(1) I > III > II

(2) III > II > I

(3) II > III > I

(4) I > II > III

97.

$$CH_3 - \underset{\underset{Br}{|}}{CH} - CH_2 - CH_3 \xrightarrow[\Delta]{alc.KOH}$$
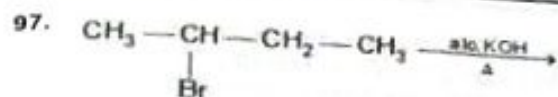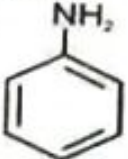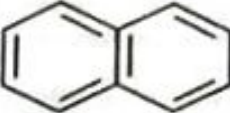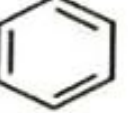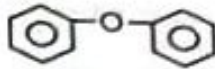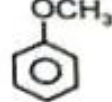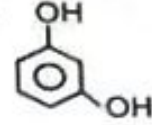
Major product formed in above reaction is

(1) $CH_2 = CH_2$

(2) $CH_2 = CH - CH_2 - CH_3$

(3) $CH_3 - CH = CH - CH_3$

(4) $CH_2 = \underset{\underset{CH_3}{|}}{C} - CH_3$

98. Non-benzenoid compound among the following is

(1) NH_2

(2)

(3)

(4)

99.

OH
+ Zn $\xrightarrow{\Delta}$ X, compound X is

(1)

(2) O

(3) OCH_3

(4) OH
OH

100.

$$Ph - C \equiv CH \xrightarrow[60°C]{Hg^{2+}, H^+ / H_2O} (X),$$
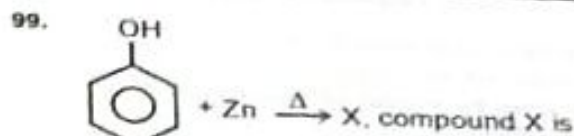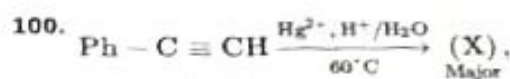
compound (X) is

(1) An alkene

(2) An aldehyde

(3) A ketone

(4) An alcohol

BOTANY

SECTION-A

101. Find the **odd** one out w.r.t. synthetic auxins

(1) IAA

(2) 2, 4, 5-T

(3) NAA

(4) 2, 4-D

102. By the application of which plant hormone we can prepare weed free lawns?

(1) Ethylene

(2) Auxin

(3) Cytokinin

(4) ABA

103. The only gaseous phytohormone
    (1) Induces dormancy of seeds
    (2) Increases the number of male flowers in cucumber
    (3) Is synthesized in almost all plant parts
    (4) Prevents abscission.

104. When apical bud of a plant is removed then
    (1) Auxin shows apical dominance
    (2) Cytokinin is removed along with auxin
    (3) More lateral branches will be seen
    (4) Root formation is promoted

105. The most intensively studied form of Gibberellic acid is
    (1) GA_1
    (2) GA_2
    (3) GA_3
    (4) GA_4

106. Abscisic acid is also known as stress hormone because
    (1) It opens the stomata present on stem
    (2) Its synthesis is stimulated by adverse environmental conditions
    (3) It promotes loss of water through leaves and increases water stress
    (4) It inhibits dormancy of seeds

107. The rosette habit of cabbage can be changed by inducing stem elongation by the application of
    (1) Ethylene
    (2) Gibberellins
    (3) Cytokinins
    (4) ABA

108. Which phytohormone is a derivative of carotenoids?
    (1) Auxins
    (2) Gibberellins
    (3) ABA
    (4) Ethylene

109. Read the given statements and select the **correct** option stating **true(T)** or **false(F)**.
    a. Cytokinins were discovered from the autoclaved herring sperm DNA
    b. Auxin and Cytokinins are antagonistic w.r.t. apical dominance
    c. Ethylene prevents senescence

	a	b	c
(1)	T	T	F
(2)	F	T	F
(3)	F	F	T
(4)	T	F	F

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

110. Read the following statements and select the **correct** option for A and B.
    A : It prevents precocious reproductive development late in the growing season.
    B : Subjecting a biennial plant to a cold treatment stimulates a subsequent photoperiodic flowering response.
    Here A and B represent
    (1) Vernalisation and Photoperiodism respectively
    (2) Photoperiodism and Vernalisation respectively
    (3) A & B-Vernalisation
    (4) A & B-Photoperiodism

111. Consider the following Assertion and Reason and choose the **correct** option.
    Assertion (A) : Development in plants is considered as the sum of growth and differentiation
    Reason (R) : Development in plants is under the control of intrinsic factors only.
    (1) Both Assertion & Reason are true and the reason is the correct explanation of the assertion
    (2) Both Assertion & Reason are true but the reason is not the correct explanation of the assertion
    (3) Assertion is true statement but Reason is false
    (4) Both Assertion and Reason are false statements

112. Select the **mismatched** pair.
    (1) Auxin – Tryptophan
    (2) Ethylene – Violaxanthin
    (3) Cytokinin – tRNA
    (4) Gibberellins – Acetyl CoA

113. Select the **odd** one out w.r.t. ABA.
    (1) Dormin
    (2) ^{6}N-Furfurylamino purine
    (3) Inhibitor B
    (4) Abscission II

114. Which phytohormone helps in chloroplast production in leaves and promote the nutrient mobilisation?
    (1) Auxins
    (2) Gibberellins
    (3) Cytokinins
    (4) Ethylene

115. Which of the following is **incorrect** w.r.t. abscisic acid?
    (1) In most situations, it acts as an antagonistic hormone to gibberellins
    (2) Promotes dormancy in seeds
    (3) It helps in closing of stomata
    (4) It helps in sprouting in potato

116. Inner thin layer of pollen grain is made up of
    (1) Cellulose and pectin
    (2) Sporopollenin only
    (3) Most resistant organic material
    (4) Lipids and sporopollenin

117. In angiosperms, microsporogenesis is referred to
    (1) Formation of pollen mother cell from microspore
    (2) Formation of male gametes in the pollen grain
    (3) Germination of pollen grain on the stigma
    (4) Formation of microspores by meiotic division in pollen mother cell

118. Which of the following plants allow geitonogamy but not autogamy?
    (1) *Vallisneria*
    (2) Papaya
    (3) Castor
    (4) Date palm

119. Shedding of pollen grains in 60% of angiosperms occurs at __A__ celled stage.
    Select the **correct** option for 'A'.
    (1) One
    (2) Two
    (3) Three
    (4) Four

120. Outbreeding devices promote
    (1) Self pollination
    (2) Inbreeding depression
    (3) Xenogamy
    (4) Loss of genetic variation

121. Which of the following is **not** the floral reward for insects?
    (1) Nectar
    (2) Pollen
    (3) Safe place to lay eggs
    (4) Fragrance of the flower

122. Vegetative cell of pollen grain
    (1) Has large irregular shaped nucleus
    (2) Is spindle shaped with dense cytoplasm
    (3) Floats in the cytoplasm of generative cell
    (4) Divides into two male gametes

123. Flowers never open in
    (1) Chasmogamy
    (2) Xenogamy
    (3) Cleistogamy
    (4) Dichogamy

124. Read the following statements and identify them as **true** (T) or **false** (F).
    A. Stalk of the ovule is called placenta
    B. Ovule is surrounded by integuments
    C. Basal part of ovule is the micropyle
    D. Ovule is filled with nucellus tissue

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

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

125. Pollen grains are well-preserved as fossils because of the
    (1) Absence of sporopollenin in germ pores
    (2) Pecto-cellulosic intine
    (3) Presence of sporopollenin in exine
    (4) Long viability and spherical shape

126. The largest cell of embryo sac is
    (1) Synergid
    (2) Egg
    (3) Antipodal cell
    (4) Central cell

127. Read the following statements and select the **correct** option.
 Statement A: Pollen grains loose viability within 30 minutes of their release in members of Rosaceae, Leguminoseae and Solanaceae.
 Statement B: Pollen grains can be stored in liquid nitrogen at −196° C for years.
 (1) Only statement A is correct
 (2) Only statement B is correct
 (3) Both statements A and B are correct
 (4) Both statements A and B are incorrect

128. Chasmogamous and cleistogamous both types of flowers are produced in
 (1) *Oxalis*
 (2) *Hibiscus*
 (3) Maize
 (4) Papaya

129. Apomixis is a mechanism in which
 (1) Nucellus or integuments never participate in embryo formation
 (2) Seeds are produced without fertilization
 (3) A diploid egg is always fertilized by a male gamete
 (4) Embryo always develops from haploid cells

130. PEN in angiosperms
 (1) Is a pre-fertilisation structure
 (2) Is a triploid structure
 (3) Undergoes free nuclear meiotic division
 (4) Is found in antipodal cells

131. Mark the **odd** one w.r.t. characteristics of wind pollinated flowers.
 (1) Flowers packed into an inflorescence
 (2) Large feathery stigma
 (3) Well exposed stamens
 (4) Pollen grains surrounded by mucilaginous covering

132. A typical angiospermic anther is
 (a) Bilobed
 (b) Tetragonal
 (c) Tetrasporangiate
 The **correct** ones is/are
 (1) Only (a)
 (2) All (a), (b), (c)
 (3) Only (a) and (c)
 (4) Only (a) and (b)

133. The following diagram represents L.S. of an embryo of grass

The labelled part A is
 (1) Coleoptile
 (2) Scutellum
 (3) Epiblast
 (4) Radicle

134. Egg apparatus in angiosperms is
 (1) 7 celled 8 nucleated
 (2) 8 celled 7 nucleated
 (3) 3 celled 3 nucleated
 (4) 3 celled 8 nucleated

135. Perisperm is
 (1) Present in all dicot plants
 (2) Persistent nucellus
 (3) Rudimentary endosperm
 (4) Present only in monocot plants

SECTION-B

136. Heterophylly due to different habitats or environment is observed in
    (1) Larkspur
    (2) Cotton
    (3) Buttercup
    (4) Coriander

137. The phenomenon to promote flowering by a period of low temperature is referred as
    (1) Dormancy
    (2) Photoperiodism
    (3) Quiescence
    (4) Vernalization

138. The hormone which promotes bolting also promotes
    (1) Abscission of older leaves and fruits
    (2) Petiole elongation in deep water rice plants
    (3) Flowering in cucumber
    (4) Yield of sugarcane crop

139. Natural cytokinins are found in
    (a) Young fruits
    (b) Developing shoot buds
    (c) Root apices
    (1) Only a
    (2) Only b and c
    (3) Only c
    (4) All a, b and c

140. Match the following columns and select the **correct** option.

	Column I		Column II
a.	Epiblast	(i)	Encloses embryonal root cap in monocots
b.	Coleorhiza	(ii)	A single cotyledon in monocots
c.	Scutellum	(iii)	Encloses leaf primordia in monocot embryo
d.	Coleoptile	(iv)	Remains of second cotyledon in some grasses

    (1) a(iv), b(ii), c(iii), d(i)
    (2) a(iii), b(i), c(ii), d(iv)
    (3) a(iii), b(iv), c(ii), d(i)
    (4) a(iv), b(i), c(ii), d(iii)

141. E. Kurosawa found that 'foolish seedling' disease in rice plant
    (1) Was caused by a fungus *Gibberella fujikuroi*
    (2) Occurred due to high internal concentration of auxins
    (3) Occurred due to high concentration of ABA
    (4) Is induced by a hormone called cytokinin

142. The seed of which plant germinated and flowered after 10,000 years of dormancy?
    (1) *Orobanche*
    (2) *Strobilanthus kunthiana*
    (3) *Lupinus arcticus*
    (4) *Phoenix dactylifera*

143. Megasporogenesis
    (1) Occurs in sporogenous tissue of anther
    (2) Forms gametes without meiosis
    (3) Involves reductional division
    (4) Is not observed in angiosperms

144. Number of antipodal cells in the embryo sac of most of the flowering plants is
    (1) Five
    (2) Two
    (3) Three
    (4) Four

145. For artificial hybridisation, emasculation is done if
    (1) Female parent bears bisexual flowers
    (2) Parent plants are dioecious
    (3) Male parent bears unisexual flowers
    (4) Female parent flowers have all the sterile stamens

146. In the geometrical growth of microorganisms, the initial phase is
    (1) Exponential phase
    (2) Lag phase
    (3) Stationary phase
    (4) Log phase

147. Thinning of cotton, cherry and walnut takes place by
    (1) Abscisic acid
    (2) Ethylene
    (3) Auxin
    (4) Cytokinins

148. Which of the following is **not** a character of arithmetic growth?
    (1) Constant growth rate
    (2) Linear growth curve
    (3) Presence of stationary phase
    (4) Commonly seen in root meristems

149. Presence of all of the given chemical substances causes seed dormancy, **except**
    (1) Abscisic acid
    (2) Phenolic acid
    (3) Nitrates
    (4) Para-ascorbic acid

150. Pollen tube enters the embryo sac through
    a. Chalazal end
    b. Micropylar end
    c. Integuments
    (1) c only
    (2) b only
    (3) a and c only
    (4) All a, b and c

ZOOLOGY

SECTION-A

151. Which pair of animals show all the features (a to e) listed below?
    a. Presence of operculum
    b. Direct development
    c. Streamlined body
    d. Air bladder is present
    e. Marine
    (1) *Labeo* and *Clarias*
    (2) *Scoliodon* and *Pristis*
    (3) *Exocoetus* and *Hippocampus*
    (4) *Exocoetus* and *Pterophyllum*

152. Select the **mismatch**.

(1)	*Pterophyllum*	Angelfish
(2)	*Bangarus*	Krait
(3)	*Macropus*	Flying fox
(4)	*Ichthyophis*	Limbless amphibian

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

153. Complete the analogy and choose the **correct** option.
    Poikilothermous : *Chelone* : :
    Homeothermous : _____.
    (1) *Aptenodytes*
    (2) *Alligator*
    (3) *Bufo*
    (4) *Clarias*

154. A creeping animal has been trapped by a biologist in the jungle. Its characteristic features are
    (a) Dry cornified skin.
    (b) Cold blooded, tetrapod.
    (c) Oviparous
    He should classify the trapped animal under taxon
    (1) Amphibia
    (2) Reptilia
    (3) Aves
    (4) Mammalia

155. Read the following statements and select the **correct** option.
    A. Male sharks bear a pair of claspers attached to the pectoral fins that help in copulation.
   B. Sea horse is viviparous in nature.
    (1) Both statements are incorrect
    (2) Statement A is correct and B is incorrect
    (3) Statement B is correct and A is incorrect
    (4) Both statements are correct

156. Which of the following set of animals is **incorrectly** matched with respect to their taxonomic classification?
    (1) *Carcharodon, Exocoetus, Betta* – Pisces
    (2) *Salamandra, Chelone, Calotes* – Reptilia
    (3) *Aptenodytes, Neophron, Struthio* – Aves
    (4) *Equus, Delphinus, Balaenoptera* – Mammalia

157. Which of the following characteristic features hold **true** for the corresponding group of animals?
    (1) 4-chambered heart, poikilothermy – Birds
    (2) Cartilaginous endoskeleton – Osteichthyes
    (3) Sucking mouth, unpaired appendages – Cyclostomata
    (4) Two chambered heart, dicondylic skull – Amphibia

158. How many of the following organisms can maintain their body temperature constant?
    Corvus, Chameleon, Delphinus, Felis, Hyla
    (1) One
    (2) Two
    (3) Four
    (4) Three

159. Read the following given statements and choose the **correct** option w.r.t. chordates.
    Statement A : Central nervous system is ventral, solid and double.
    Statement B : Heart is ventral.
    (1) Both statements A and B are correct
    (2) Both statements A and B are incorrect
    (3) Only statement A is correct
    (4) Only statement B is correct

160. Choose the organism in which notochord persists throughout life and extend from head to tail region.
    (1) *Ascidia*
    (2) *Salpa*
    (3) *Doliolum*
    (4) *Branchiostoma*

161. Which is **not** a characteristic of *Petromyzon*?
    (1) Ectoparasitism
    (2) Circular mouth
    (3) Notochord
    (4) Only 3-5 pairs of gills are present

162. Copulatory pad in frog is present on the first digit of
    (1) Forelimbs in males
    (2) Hindlimbs in males
    (3) Forelimbs in females
    (4) Hindlimbs in females

163. Select the **correct route** for the passage of sperms in male frogs
    (1) Testes → Bidder's canal → Kidney → vasa efferentia → urinogenital duct → cloaca
    (2) Testes → vasa efferentia → Kidney → seminal vesicle → urinogenital duct → cloaca
    (3) Testes → Bidder's canal → vasa efferentia → cloaca → ureter
    (4) Testes → vasa efferentia → Kidney → Bidder's canal → urinogenital duct → cloaca

164. Bidder's canal in frog is present in
    (1) Testes
    (2) Kidney
    (3) Ovary
    (4) Brain

165. The frogs differ from humans by possessing
    (1) Dicondylic skull
    (2) Urea as nitrogenous waste
    (3) Nucleated RBCs
    (4) Myogenic heart

166. Vasa efferentia of frog's testis open into
    (1) Epididymis
    (2) Ureters
    (3) Bidder's canal
    (4) Urinogenital duct

167. Nitrogenous excretory product of adult and larva of frog are respectively
    (1) Urea and ammonia
    (2) Ammonia and urea
    (3) Ammonia and uric acid
    (4) Urea and uric acid

168. Number of cranial nerves in frog is
    (1) 10 pairs
    (2) 9 pairs
    (3) 12 pairs
    (4) 8 pairs

169. Fertilization and development in frogs is
    (1) External and direct
    (2) Internal and direct
    (3) External and indirect
    (4) Internal and indirect

170. How many eggs are laid by a female frog at a time?
    (1) 100 - 200
    (2) 500 - 1000
    (3) 2500 - 3000
    (4) 5000 - 6000

171. Cloaca in frog has openings of
    (1) Anus only
    (2) Urinogenital aperture and urinary bladder only
    (3) Urinary bladder and anus only
    (4) Rectum, urinogenital aperture and urinary bladder

172. All of the given structures are associated with respiration in frog, **except**
    (1) Skin
    (2) Buccal cavity
    (3) Diaphragm
    (4) Lungs

173. A fully grown tadpole larva of frog respires through
    (1) Gills
    (2) Skin
    (3) Lungs
    (4) Tail fin

174. Frog's eyes are protected under water by the presence of
    (1) Retina
    (2) Upper eyelid
    (3) Nictitating membrane
    (4) Lower eyelid

175. Frog can protect itself from enemies by
    (1) Clawed toes
    (2) Spiny skin
    (3) Camouflage
    (4) Sharp teeth in both jaws

176. Cerebrum in frog is the part of
    (1) Forebrain
    (2) Midbrain
    (3) Hindbrain
    (4) Rhomobencephalon

177. The frog's body is divisible into
    (1) Head, Neck, Abdomen
    (2) Head, Neck, trunk
    (3) Head, trunk
    (4) Head, Neck

178. Pinnae are present in
    (1) Ornithorhynchus
    (2) Echidna
    (3) Whales
    (4) Macropus

179. Which of the following features is shared by Pavo and Hemidactylus?
    (1) Homeothermy
    (2) Three-chambered heart
    (3) Internal fertilization
    (4) Presence of wings

180. Which one of these is not a true fish?
    (1) Flying fish
    (2) Lung fish
    (3) Shark
    (4) Cuttlefish

181. A poisonous sting is found in
    (1) Pristis
    (2) Torpedo
    (3) Trygon
    (4) Carcharodon

182. Teeth are modified placoid scales and backwardly directed in
    (1) Neophron
    (2) Scoliodon
    (3) Bangarus
    (4) Clarias

183. A general character shared by chameleon and frog is
    (1) Moist skin without scales
    (2) Three-chambered heart
    (3) External fertilisation
    (4) Viviparity

184.
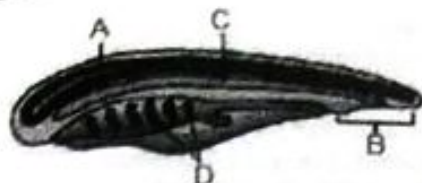
Which structure marked over here represents the notochord?

(1) A
(2) B
(3) C
(4) D

185. "All vertebrates are chordates". The above statement can be justified by the fact that vertebrates possess
(a) Notochord in embryonic life
(b) Post anal tail, only in adult stage
(c) Solid nerve cord which is placed dorsally
(d) Bony or cartilaginous vertebral column in adult life
Choose the **correct** option

(1) Only (a) and (b)
(2) Only (a) and (d)
(3) Only (a), (b) and (d)
(4) (a), (b), (c) and (d)

SECTION-B

186. Read the following statements A and B. Choose the **correct** option.
Statement A : Chondrichthyes show internal fertilization and many of them are viviparous.
Statement B : Due to the absence of air bladder, chondrichthyes have to swim constantly to avoid sinking.

(1) Statement A is correct but B is incorrect.
(2) Statement A is incorrect but B is correct.
(3) Both statements are correct.
(4) Both statements are incorrect.

187. Choose the odd one w.r.t. non-poisonous reptiles.

(1) *Crocodilus*
(2) *Vipera*
(3) *Testudo*
(4) *Calotes*

188. Presence of which of the following is a feature of female cockroach?

(1) Collaterial glands
(2) Conglobate gland
(3) Phallic gland
(4) Mushroom shaped gland

189. Which of the following is a flightless bird?

(1) *Struthio*
(2) *Corvus*
(3) *Psittacula*
(4) *Columba*

190. Which class is **not** a subdivision of superclass tetrapoda?

(1) Reptilia
(2) Osteichthyes
(3) Amphibia
(4) Mammalia

191. Choose **correct** option which fills the blank to complete analogy
Scoliodon : Placoid scale : : *Labeo* : _____

(1) Claspers
(2) Cycloid scale
(3) Poison sting
(4) Viviparous

192. The development in cockroach is

(1) Ametabolus
(2) Paurometabolus
(3) Hemimetabolus
(4) Holometabolous

193. In cockroach, brain is represented by
    (1) Supra-pharyngeal ganglion
    (2) Supra-oesophageal ganglion
    (3) Sub-oesophageal ganglion
    (4) Sub-pharyngeal ganglion

194. The first body segment of earthworm is called
    (1) Peristomium
    (2) Prostomium
    (3) Clitellum
    (4) Metamere

195. Which of the following structures helps to increase surface area of intestine in *Pheretima*?
    (1) Buccal cavity
    (2) Oesophagus
    (3) Typhlosole
    (4) Gizzard

196. Select the **correct** statement w.r.t. digestive system of frog.
    (1) Food is captured by the bilobed tongue and chewed for proper mixing with saliva before engulfing
    (2) Digestion of food begins in the oral cavity
    (3) Pancreatic juices emulsify the fats for proper digestion
    (4) Undigested solid food is pushed into rectum and passed out through the cloaca

197. Sinus venosus of frog
    (1) Receives blood through arteries
    (2) Supplies blood to arteries
    (3) Receives blood through vena cava
    (4) Is a thick walled triangular chamber which opens in the ventricle of the heart

198. Winter sleep of frog is called
    (1) Camouflage
    (2) Aestivation
    (3) Mimicry
    (4) Hibernation

199. The midbrain of frog is characterised by the presence of
    (1) Olfactory lobes
    (2) Optic lobes
    (3) Cerebral hemisphere
    (4) Cerebellum

200. Frog is
    (1) Homeothermic
    (2) Poikilothermic
    (3) Homeostatic
    (4) Warm blooded