



8. The two interfering waves have intensities in the ratio 9: 4. The ratio of intensities of maxima and minima in the interference pattern will be

- (1) 1 : 25 (2) 25 : 1
(3) 9 : 4 (4) 4 : 9

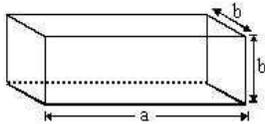
9. A uniform heavy rod of weight 10 kg ms^{-2} , cross-sectional area 100 cm^2 and length 20 cm is hanging from a fixed support. Young modulus of the material of the rod is $2 \times 10^{11} \text{ Nm}^{-2}$. Neglecting the lateral contraction, find the elongation of rod due to its weight :

- (1) $4 \times 10^{-8} \text{ m}$ (2) $4 \times 10^{-5} \text{ m}$
(3) $5 \times 10^{-10} \text{ m}$ (4) $2 \times 10^{-9} \text{ m}$

10. A train A runs from east to west and another train B of the same mass runs from west to east at the same speed along the equator. A presses the track with a force F_1 and B presses the track with a force F_2 .

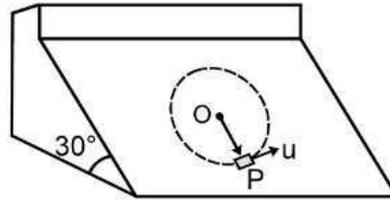
- (1) $F_1 > F_2$
(2) $F_1 < F_2$
(3) $F_1 = F_2$
(4) the information is insufficient to find the relation between F_1 and F_2 .

11. Consider a solid wire of square cross-section (fig.). Its resistance between square faces is R_1 and between rectangular faces is R_2 then R_1/R_2 is



- (1) a/b (2) b/a
(3) a^2/b^2 (4) b^2/a^2

12. A particle is attached with a string of length ℓ which is fixed at point O on an inclined plane what minimum velocity should be given (at the lowest point) to the particle along the incline so that it may complete a circle on inclined plane (plane is smooth and initially particle was resting on the inclined plane.)



- (1) $\sqrt{5g\ell}$ (2) $\sqrt{\frac{5g\ell}{2}}$
(3) $\sqrt{\frac{5\sqrt{3}g\ell}{2}}$ (4) $\sqrt{4g\ell}$

13. Two particles P and Q are located at distances r_P and r_Q respectively from the axis of a rotating disc such that $r_P > r_Q$:

- (1) Both P and Q have the same acceleration
(2) Both P and Q do not have any acceleration
(3) P has greater acceleration than Q
(4) Q has greater acceleration than P

14. A horizontal circular plate is rotating about a vertical axis passing through its centre with an angular velocity ω_0 . A man sitting at the centre having two blocks in his hands stretches out his hands so that the moment of inertia of the system doubles. If the kinetic energy of the system is K initially, its final kinetic energy will be

- (1) $2K$ (2) $K/2$
(3) K (4) $K/4$

15. Which colour of the light has the longest wavelength?

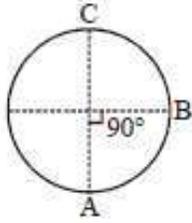
- (1) green (2) violet
(3) red (4) blue

16. Balancing length for a standard cell of emf 1.5 volt is 7.5 m. Balancing length for a 3.5 ohm resistance, through which a current of 0.2 ampere is flowing, will be :-

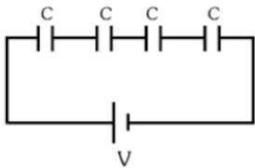
- (1) 3.5 m (2) 5.0 m
(3) 5.7 m (4) 6.5 m



17. A is the bottom most point of a particle describing a vertical circle of radius R. At point B, the acceleration of the particle is $g\sqrt{11}$. Find the velocity of the particle at top point C :

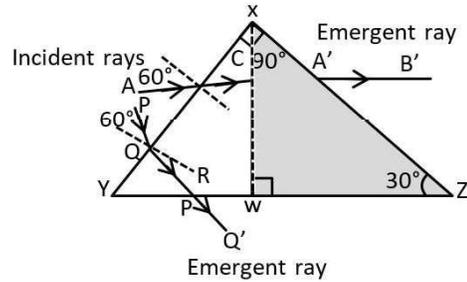


- (1) $[gR(\sqrt{10} - 2)]^{1/2}$
 (2) $[gR]^{1/2}$
 (3) $[gR(\sqrt{11} - 2)]^{1/2}$
 (4) None of these
18. If the distance between sun and earth is made 3 times of the present value then gravitational force between them will become :
- (1) 9 times (2) $\frac{1}{9}$ times
 (3) $\frac{1}{3}$ times (4) 3 times
19. An object is placed in front of a convex mirror at a distance of 50 cm. A plane mirror is introduced covering the lower half of the convex mirror. If the distance between the object and the plane mirror is 30 cm, it is found that there is no gap between the images formed by the two mirrors. The radius of the convex mirror is :
- (1) 12.5cm (2) 25cm
 (3) 50 cm (4) 100 cm
20. For given circuit, the charge on each capacitor is



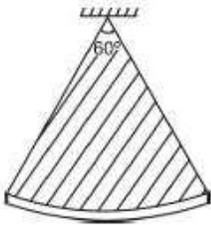
- (1) CV (2) $\frac{CV}{2}$
 (3) $\frac{CV}{4}$ (4) None of these

21. The prism XYZ shown here is made up of two different materials. Section XYW is made up of material of refractive index $\sqrt{3}$, while the other section XWZ is made up of material of unknown refractive index μ . Rays AB and PQ are incident on face XY of the prism as shown corresponding to AB and PQ, A' B' and P' Q' are the emergent rays. What is the value of μ for which A' B' is parallel to P' Q' ?



- (1) $\frac{2}{\sqrt{3}}$ (2) $\sqrt{3}$
 (3) $\frac{4}{\sqrt{3}}$ (4) none of these
22. If the earth suddenly stops rotating, the value of g at any place will
- (1) remain same (2) decrease
 (3) increase (4) none of these
23. A stone tied to a string is rotated in a vertical circle. The minimum speed of the stone during a complete vertical circular motion
- (1) is independent of the mass of the stone
 (2) is independent of the length of the string
 (3) decreases with increasing mass of the stone
 (4) decreases with increasing length of the string
24. To measure which of the following, is a tangent galvanometer used :-
- (1) charge (2) angle
 (3) current (4) magnetic intensity
25. A biconvex lens is used to project a slide on screen. The slide is 2 cm high and the distance between slide and screen is 100 cm. The image is 18 cm high. What is the focal length of the lens?
- (1) 9 cm (2) 18 cm
 (3) 4.5 cm (4) 20 cm



26. A cane filled with water is revolved in a vertical circle of radius 4 m and the water just does not fall down. The time period of revolution will be
- (1) 8 s (2) 4 s
(3) 1 s (4) 10 s
27. An astronomical telescope has objective and eyepiece of focal lengths 40 cm and 4 cm respectively. To view an object 200 cm away from the objective, the lenses must be separated by a distance :
- (1) 37.3 cm (2) 46.0 cm
(3) 50.0 cm (4) 54.0 cm
28. In Young's double slit experiment, if the separation between coherent sources is halved and the distance of the screen from the coherent sources is doubled, then the fringe width becomes :
- (1) four times (2) one-fourth
(3) double (4) half
29. When light ray suffers reflection at the interface between air and glass. Change of phase of reflected wave is equal to :-
- (1) zero (2) $\frac{\pi}{2}$
(3) π (4) 2π
30. Assume that light of wavelength 600 nm is coming from a star. The limit of resolution of telescope whose objective has a diameter of 2m is:
- (1) 7.32×10^{-7} rad (2) 6.00×10^{-7} rad
(3) 3.66×10^{-7} rad (4) 1.83×10^{-7} rad
31. Unpolarized light travels through two linear polarizers. What (minimum) angle should the second polarizer be relative to the first polarizer (the difference between θ_1 and θ_2) so that the final intensity of light is $3/8^{\text{th}}$ of the original value?
- (1) $\frac{\pi}{3}$ (2) $\frac{\pi}{6}$
(3) $\frac{\pi}{4}$ (4) $\frac{\pi}{2}$
32. A uniform sector (part of circular disk) of mass m and radius R is suspended as shown in the figure. It executes small oscillations about an axis passing through point of suspension and perpendicular to the plane of the sector. Its time period of oscillation is
- 
- (1) $2\pi/\sqrt{\frac{F}{g}}$ (2) $\pi\sqrt{\frac{\pi R}{g}}$
(3) $2\pi\sqrt{\frac{R}{2g}}$ (4) $\pi\sqrt{\frac{2\pi R}{g}}$
33. On the average, neutrons lose half their energy per collision with quasi-free protons. Nearly how many collisions, on the average, are required to reduce a 2 MeV neutron to a thermal energy of 0.04 eV –
- (1) 12 (2) 26
(3) 15 (4) 32
34. Electrons with energy 80 keV are incident on the tungsten target of an X-ray tube. K shell electrons of tungsten have –72.5 keV energy. X-rays emitted by the tube contain only
- (1) A continuous X-ray spectrum with a minimum wavelength of 0.155 Å
(2) A continuous X-ray spectrum with all wavelengths
(3) A continuous X-ray spectrum of tungsten
(4) A continuous X-ray spectrum with a minimum wavelength of 0.155 Å and characteristic X-ray spectrum of tungsten
35. The binding energy of the atom of elements A and B are E_a and E_b respectively. Three atoms of the element B fuse together to give one atom of element A. This fusion process is accompanied by release of energy E . Then E_a and E_b are related to each other as
- (1) $E_a + E = 3E_b$
(2) $E_a = 3E_b$
(3) $E_a = 3E_b + E$
(4) $E_a + 3E_b = E$

Physics - Section B

Section B Shall Consist Of 15 (Fifteen) Questions In Each Subject. Candidate Needs To Attempt Any 10 (Ten) Questions Out Of 15 (Fifteen) In Each Subject.

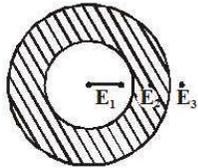
36. A car of mass m is taking a circular turn of radius ' r ' on a fictional level road with a speed v . In order that the car does not skid -

- (1) $\frac{mv^2}{r} \geq \mu mg$ (2) $\frac{mv^2}{r} \leq \mu mg$
 (3) $\frac{mv^2}{r} = \mu mg$ (4) $\frac{v}{r} = \mu mg$

37. If a satellite is orbiting the earth very close to its surface, then the orbital velocity mainly does not depends on -

- (1) The mass of the satellite only
 (2) The radius of the earth only
 (3) The orbital radius only
 (4) The mass of the earth only

38. A conducting hollow



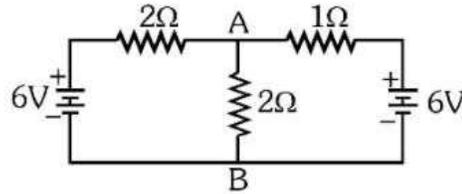
spherical shell (Shown as in fig is given a charge q . then which is true for electric field at given three positions :-

- (1) $E_1 = E_2 = E_3 = 0$
 (2) $E_1 = E_2 = 0, E_3 \neq 0$
 (3) $E_1 = 0, E_2 \neq 0, E_3 \neq 0$
 (4) $E_1 \neq 0, E_2 \neq 0, E_3 \neq 0$

39. The magnetic potential energy stored in a certain inductor is 25 mJ, when the current in the inductor is 60 mA. this inductor is of inductance

- (1) 1.389 H (2) 138.88 H
 (3) 0.138 H (4) 13.89 H

40. The potential difference between the points A and B in the following circuit will be :-

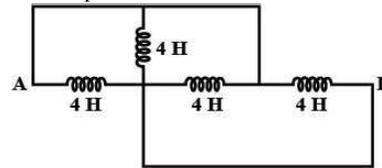


- (1) Zero (2) 2V
 (3) 3.5V (4) 4.5V

41. A long solenoid has 1000 turns. When a current of 4A flows through it, the magnetic flux linked with each turn of the solenoid is 4×10^{-3} Wb. The self inductance of the solenoid is :

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

42. The equivalent inductance between A and B is :

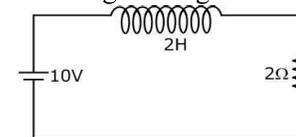


- (1) 1H (2) 4H (3) 0.8H (4) 16H

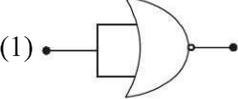
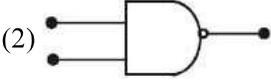
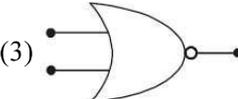
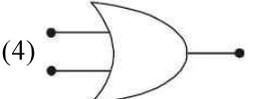
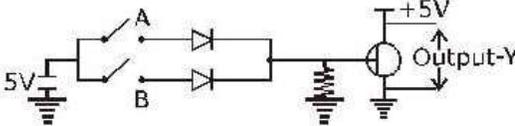
43. A thin plastic ring of radius 6.28 m having charge $2\mu\text{C}$ is rotated about its axis with rotational frequency 1200 cycle/min, then the magnetic field produced at the centre of the ring:-

- (1) 4×10^{-12} T (2) 2×10^{-12} T
 (3) 0.5×10^{-12} T (4) 10^{-12} T

44. In the figure magnetic energy stored in the coil is

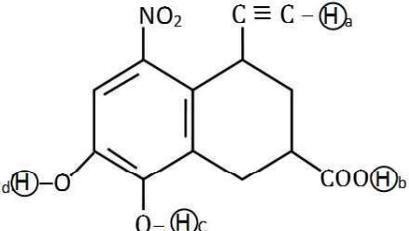


- (1) Zero (2) Infinite
 (3) 25 joules (4) None of above

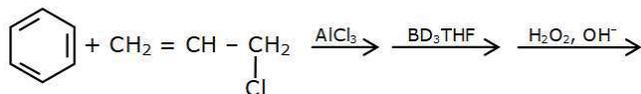
45. In a sample of radioactive material, what percentage of the initial number of active nuclei will decay during one mean life ?
 (1) 37% (2) 50%
 (3) 63% (4) 69.3%
46. In a radioactive sample. ${}^{40}_{19}\text{K}$ nuclei either decay into stable ${}^{40}_{20}\text{Ca}$ nuclei with decay constant 4.5×10^{-10} per year or into stable ${}^{40}_{18}\text{Ar}$ nuclei with decay constant 0.5×10^{-10} per year. Given that in this sample all the stable ${}^{40}_{20}\text{Ca}$ and ${}^{40}_{18}\text{Ar}$ nuclei are produced by the ${}^{40}_{19}\text{K}$ nuclei only. In time $t \times 10^9$ years. If the ratio of the sum of stable ${}^{40}_{20}\text{Ca}$ and ${}^{40}_{18}\text{Ar}$ nuclei to the radioactive ${}^{40}_{19}\text{K}$ nuclei is 99. The value of t will be. [Given : $\ln 10 = 2.3$]
 (1) 1.15 (2) 9.2
 (3) 4.6 (4) 2.3
47. When the conductivity of a semiconductor is only due to breaking of covalent bonds, the semiconductors is called :
 (1) intrinsic (2) extrinsic
 (3) p-type (4) n-type
48. Consider an npn transistor with its base-emitter junction forward biased and collector base junction reverse biased. Which of the following statements are true?
 (1) Electrons crossover from emitter to collector.
 (2) Holes move from base to collector.
 (3) Electrons move from emitter to base.
 (4) Electrons from emitter move out of base without going to the collector.
 (1) 1, 3 (2) 1, 2 (3) 1, 4 (4) 2, 4
49. Which of the following gives a reversible operation?
 (1)  (2) 
 (3)  (4) 
50. Boolean relation at the output stage-Y for the following circuit is :

 (1) $A \cdot B$ (2) $A + B$
 (3) $\bar{A} + \bar{B}$ (4) $\bar{A} \cdot \bar{B}$

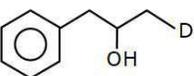
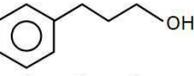
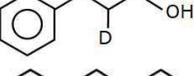
Chemistry - Section A

Section A Shall Consist Of 35 (Thirty-five) Questions In Each Subject .All Questions Are Compulsory.

51. The density of 3M solution of sodium thiosphate ($\text{Na}_2\text{S}_2\text{O}_3$) is 1.58 g/ml. Calculate the amount of $\text{Na}_2\text{S}_2\text{O}_3$ by w/w% -
 (1) 30% (2) 40%
 (3) 49% (4) 55%
52. What is the value of electron gain enthalpy of Na^+ if IE_1 of $\text{Na} = 5.1 \text{ eV}$?
 (1) +0.2 eV (2) -5.1 eV
 (3) -10.2 eV (4) +2.55 eV
53. Arrange the following labelled hydrogens in decreasing order of acidity -

 (1) $b > a > c > d$ (2) $b > c > d > a$
 (3) $c > b > d > a$ (4) $c > b > a > d$
54. Variable covalency is exhibited by:
 (1) P and S (2) N and O
 (3) N and P (4) F and Cl

66. Select the final (major) product (P) formed in the following given sequence of reaction-



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

67. How many tetrahedral holes are occupied in diamond ?

- (1) 25% (2) 50%
(3) 100% (4) 75%

68. Purple-coloured of KMnO_4 is due to-

- (1) d-d transition
(2) charge transfer from O to Mn
(3) due to both d-d transition and charge transfer
(4) None of these

69. Which of the following is not an example of heterogeneous catalysis ?

- (1) $2\text{SO}_2(\text{g}) + \text{O}_2(\text{g}) \xrightarrow{\text{Pt(s)}} 2\text{SO}_3(\text{g})$
(2) $\text{N}_2(\text{g}) + 3\text{H}_2(\text{g}) \xrightarrow{\text{Fe(s)}} 2\text{NH}_3(\text{g})$
(3) $2\text{KClO}_3(\text{s}) \xrightarrow{\text{MnO}_2(\text{s})} 2\text{KCl}(\text{s}) + 3\text{O}_2(\text{g})$
(4) $4\text{NH}_3(\text{g}) + 5\text{O}_2(\text{g}) \xrightarrow{\text{Pt(s)}} 4\text{NO}(\text{g}) + 6\text{H}_2\text{O}(\text{l})$

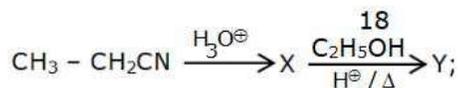
70. NO_2 is obtained by heating -

- (1) CsNO_3 (2) KNO_3
(3) LiNO_3 (4) NaNO_3

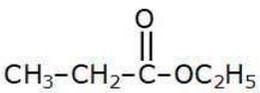
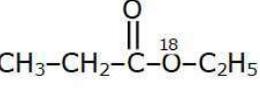
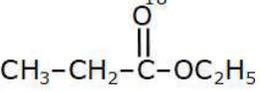
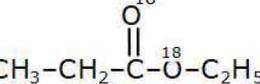
71. Which of the following pairs give positive Tollen's test ?

- (1) Glucose, sucrose (2) Glucose, fructose
(3) Hexanal, acetophenone (4) Fructose, sucrose

- 72.



Y is -

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

73. Which of the following is used for the preparation of colloids?

- (1) Van Arkel Method (2) Ostwald Process
(3) Mond Process (4) Bredig's Arc Method

74. NaOH is manufactured by electrolysis of brine solution. The products of the reaction are -

- (1) Cl_2 and H_2 (2) Cl_2 and Na-Hg
(3) Cl_2 and Na (4) Cl_2 and O_2

75. An organic compound contains 78% (by wt.) carbon and remaining percentage of hydrogen. The right option for the empirical formula of this compound is: [Atomic wt. of C is 12, H is 1]

- (1) CH_4 (2) CH
(3) CH_2 (4) CH_3

76. For which of the following acid prefix "hypo" is used?

- (1) H_2SO_3 (2) H_3PO_2
(3) HOCl (4) 2 & 3 both

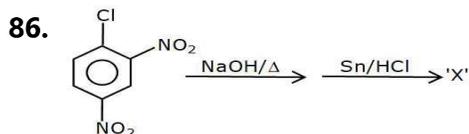
77. Mark the correct statement -

- (1) Ethers behave as Lewis base
(2) Ethers form coordinated complexes with Lewis acids
(3) With cold HI diethyl ether gives ethyl alcohol & ethyl iodide
(4) All are correct

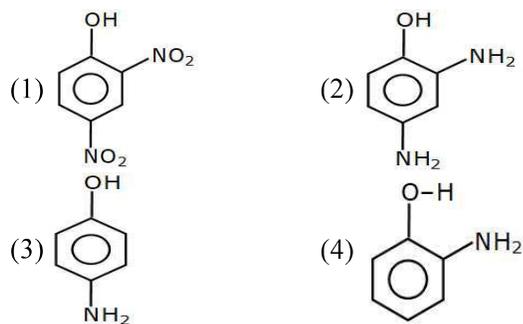
78. Wave-length of the first line of Paschen Series hydrogen spectrum is - ($R = 109700 \text{ cm}^{-1}$)
- (1) 18750 Å (2) 2854 Å
(3) 3452 Å (4) 6243 Å
79. The number of lone pairs and the number of S-S bonds in S_8 molecules are respectively-
- (1) 8, 8 (2) 16, 8 (3) 8, 16 (4) 8, 4
80. A hydrocarbon on ozonolysis give two moles of compound 'X' which undergoes a reaction in the presence of dilute alkali, Δ to form But-2-enal then the hydrocarbon will be-
- (1) $\text{CH}_3 - \text{CH}_2 - \text{CH} = \text{CH}_2$
(2) $\text{CH}_3 - \text{CH}_2 - \text{CH} = \text{CH} - \text{CH}_2 - \text{CH}_3$
(3) $\text{CH}_3 - \text{CH} = \text{CH} - \text{CH}_3$
(4) $(\text{CH}_3)_2\text{C} = \text{CH}_2$
81. Equal masses of three gases CH_4 , SO_2 , O_2 are mixed in empty container at 298 K. The total pressure is 2.1 atm. What is the partial pressure of methane in the mixture ?
- (1) 1.2 atm. (2) 0.7 atm.
(3) 1.4 atm (4) Insufficient data
82. For octahedral complex, the pairing of d electrons of metal ions is irrespective to nature of ligands -
- (1) d^3 and d^8 (2) d^4 and d^8
(3) d^6 and d^5 (4) d^2 and d^7
83. 1 mole N_2 and 3 mole H_2 are placed in a closed container at a pressure of 4 atm. The pressure falls to 3 atm at the same temperature when the following equilibrium is attained.
 $\text{N}_2(\text{g}) + 3\text{H}_2(\text{g}) \rightleftharpoons 2\text{NH}_3(\text{g})$
The equilibrium constant K_p for dissociation of NH_3 is-
- (1) $\frac{1}{0.5} \times (1.5)^3 \text{ atm}^{-2}$
(2) $0.5 \times (1.5)^3 \text{ atm}^2$
(3) $\frac{0.5 \times (1.5)^3}{3 \times 3} \text{ atm}^2$
(4) $\frac{3 \times 3}{0.5 \times (1.5)^3} \text{ atm}^{-2}$
84. A gas expands isothermally and reversibly. The work done by the gas is :-
- (1) Zero (2) Maximum
(3) Minimum (4) Can't say
85. How much NaNO_3 must be weighed out to make 50 ml of an aqueous solution containing 70 mg of Na^+ per mL ?
- (1) 123.94 g (2) 1.29 g (3) 10.934 g (4) 12.934 g

Chemistry - Section B

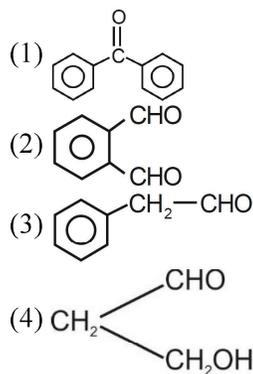
Section B Shall Consist Of 15 (Fifteen) Questions In Each Subject. Candidate Needs To Attempt Any 10 (Ten) Questions Out Of 15 (Fifteen) In Each Subject.



The product 'X' is-



87. Which of the following species can give Intramolecular Cannizzaro reaction on reaction with NaOH?





- 88.** The pair for which electron addition in both the atom are endothermic-
- (1) N, O (2) Be, F
(3) N, Ne (4) B, C
- 89.** In which of the following fluorine atom is present in equatorial plane ?
- (1) PCl_4F (2) PCl_3F_2
(3) $\text{PF}_2(\text{CH}_3)_3$ (4) PCl_2F_3
- 90.** Na and Li are placed in dry air, we get-
- (1) NaOH, Na_2O , Li_2O
(2) Na_2O , Li_2O
(3) Na_2O , Li_2O , Li_3N , NH_3
(4) Na_2O , Li_3N , Li_2O
- 91.** Water and ethanol form non-ideal solution with positive deviation from Raoult's law. This solution will have vapour pressure –
- (1) equal to vapour pressure of pure water
(2) less than vapour pressure of pure water
(3) more than vapour pressure of pure water
(4) less than vapour pressure of pure ethanol
- 92.** For the reaction $\text{CrO}_4^{2-} + ? \rightarrow \text{Cr}_2\text{O}_7^{2-}$, the missing ion is-
- (1) OH^- (2) H^+
(3) H_2O (4) O^{2-}
- 93.** Which of the following has maximum solubility (K_{sp} value is given in brackets)?
- (1) HgS (1.6×10^{-54})
(2) PbSO_4 (1.3×10^{-8})
(3) ZnS (7.0×10^{-26})
(4) AgCl (1.7×10^{-10})
- 94.** Acidified water is electrolysed by using inert electrodes. The volume of gases liberated at STP is 168 mL. The quantity of charge passed is -
- (1) 168 C (2) 965 C
(3) 9650 C (4) 9.65 C
- 95.** For producing the effective collisions, the colliding molecules must possess :
- (1) A certain minimum amount of energy
(2) Energy equal to or greater than threshold energy
(3) Proper orientation
(4) Threshold energy as well as proper orientation of collision
- 96.** 8 : 8 co-ordination is noticed in –
- (1) MgO (2) Al_2O_3
(3) CsCl (4) All
- 97.** What is the de-Broglie wavelength associated with the hydrogen electron in its third orbit ?
- (1) 9.96×10^{-10} cm (2) 9.96×10^{-8} cm
(3) 9.96×10^4 cm (4) 9.96×10^8 cm
- 98.** If volume is reduced, what will be the effect on the given equilibrium $2\text{C}(\text{s}) + \text{O}_2(\text{g}) \rightleftharpoons 2\text{CO}(\text{g})$
- (1) No effect
(2) equilibrium will shift towards left
(3) equilibrium will be shifted towards right
(4) none of these
- 99.** Calculate the heat produced (in kJ) when 280 gm of CaO is completely converted to CaCO_3 by reaction with CO_2 at 27°C in a container of fixed volume. Given :
- $\Delta H_f^\circ [\text{CaCO}_3(\text{s})]$
 $= -1207 \text{ kJ/mol}; \Delta H_f^\circ [\text{CaO}(\text{s})]$
 $= -635 \text{ kJ/mol}$
 $\Delta H_f^\circ (\text{CO}_2, \text{g}) = -394 \text{ kJ/mol};$
[Use $R = 8.3 \text{ K}^{-1} \text{ mol}^{-1}$]
- (1) -877.55 kJ (2) 721.6 kJ
(3) -902 kJ (4) 821 kJ
- 100.** $\text{Zn}^{2+}(\text{aq}) + 2\text{e}^- \rightarrow \text{Zn}(\text{s})$. This is -
- (1) Oxidation (2) Reduction
(3) Redox reaction (4) None of these

Botany - Section A

Section A Shall Consist Of 35 (Thirty-five) Questions In Each Subject .All Questions Are Compulsory.

101. Skeleton of animals are collected in :

- (1) Museum (2) Zoological park
(3) Botanical Garden (4) Key

102. Stolon is common in :

- (1) Banana and jasmine (2) Mint and jasmine
(3) Mango and jasmine (4) Maize and jasmine

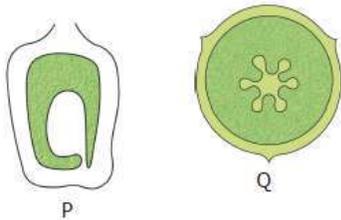
103. Which is not true for facilitated transport :-

- (1) Uphill transport
(2) Requirement of special membrane
(3) high selectivity
(4) Transport saturation

104. How many plants are impure only for one character in F₂ gen. of dihybrid cross out of 800 plant :-

- (1) 200 (2) 400
(3) 600 (4) 800

105. What is true for the (P) and (Q) type of placentation given below



- (1) P = Found in sunflower, Q = Found in pea
(2) P = Found in marigold, Q = Found in Dianthus and Primrose
(3) P = Found in pea, Q = Found in sunflower
(4) P = Found in Dianthus and Primrose, Q = Found in marigold

106. The label of a herbarium sheet does not carry information on

- (1) Name of collector (2) Local names
(3) Height of the plant (4) Date of collection

107. Vein loading is the active transport of sugars from :-

- (1) Vessels to mesophyll cells
(2) Mesophyll cells to sieve tubes
(3) Sieve tubes to mesophyll cells
(4) Mesophyll cells to vessels

108. In birds, sex determination occurs by

- (1) ZW-ZZ type (2) XX-XO type
(3) Haplo-diploidy type (4) XX-XY type

109. Where does the botanical name of plants label?

- (1) Sanctuary (2) National part
(3) Botanical Garden (4) All of the above

110. In leaves the protoxylem elements

- (1) Face towards abaxial surface
(2) Face towards adaxial surface
(3) Are surrounded by metaxylem elements
(4) Are scattered in the vascular bundle

111. Phosphoenol pyruvate , (PEP) is the primary CO₂ acceptor in :

- (1) C₄ plants
(2) C₂ plants
(3) C₂ and C₄ plants
(4) C₃ plants

112. A human female with Turner' s syndrome:

- (1) has one additional X chromosome.
(2) exhibits male characters.
(3) is able to produce children with normal husband
(4) has 45 chromosomes with XO.

113. Which mode of nutrition is found in plant kingdom?

- (1) Photosynthesis (2) Parasitism
(3) Predation (4) Chemosynthesis



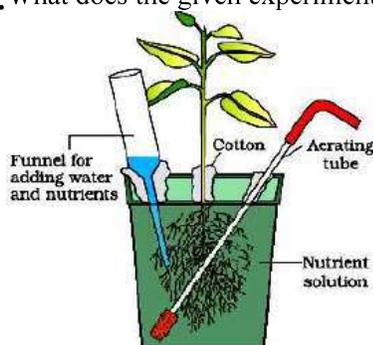
114. Lenticels and hydathodes are small pores with which of the following common attributes-

- (1) They allow exchange of gases
- (2) Their opening and closing is not regulated
- (3) They always remain closed
- (4) They are found on the same organ

115. The enzymes required to obtain protoplast from a plant cell are -

- (1) Cellulase
- (2) Chitinase
- (3) Pectinase
- (4) Both (A) and (C)

116. What does the given experimental set up depict?



Choose the correct option.

- (1) O₂ evolves during photosynthesis
- (2) CO₂ is required during photosynthesis
- (3) Measurement of the growth of a plant
- (4) Plant grown in nutrient solution culture

117. Cauliflower mosaic virus contains :-

- (1) ss RNA
- (2) ds RNA
- (3) ds DNA
- (4) ss DNA

118. DNA-dependent RNA polymerase catalyzes transcription on one strand of the DNA which is called the?

- (1) Coding strand
- (2) Alpha strand
- (3) Anti-strand
- (4) Template strand

119. Which of the following is correct about viroids?

- (1) They have free RNA without protein coat.
- (2) They have DNA with protein coat.
- (3) They have free DNA without protein coat.
- (4) They have RNA with protein coat.

120. Select the **mismatched** pair :-

- (1) Gibberellic acid - Increases yield of sugarcane
- (2) Cytokinin - Promotes apical dominance
- (3) Ethylene - Sprouting of potato tuber
- (4) Abscisic acid - Inhibits seed germination

121. DNA is a genetic material because of?

- I. Its stability
- II. Its replicability
- III. Its mutability
- IV. Its expressibility

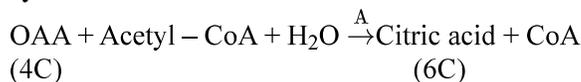
Choose the correct combination:

- (1) I and II
- (2) II and III
- (3) III and IV
- (4) I, II, III and IV

122. Which of the following is not used for vegetative propagation?

- (1) Bud
- (2) Bulbil
- (3) Turion
- (4) Antherozoid

123. Identify enzyme A in the given reaction of Krebs' cycle.



- (1) Oxaloacetate synthetase
- (2) Citrate synthase
- (3) Aconitase
- (4) Dehydrogenase

124. Splicing represent dominance of :-

- (1) RNA world
- (2) DNA world
- (3) Protein world
- (4) Virus

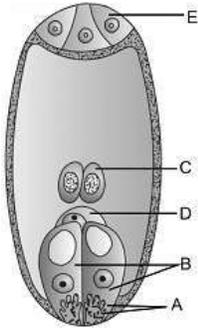
125. Vegetative propagation is the term used for

- (1) Sexual reproduction in animals
- (2) Sexual reproduction in plants
- (3) Asexual reproduction in animals
- (4) Asexual reproduction in plants

126. Only 5C acid formed in TCA cycle is

- (1) Citric acid
- (2) Succinyl CoA
- (3) α -ketoglutaric acid
- (4) Fumaric acid

127. In the below diagram which of the following is correct function of the corresponding labelling



- (1) D = formation of Primary endosperm
 (2) B = Entry of pollen tube in embryo sac
 (3) E = Secrete chemical substances that attract male gametes
 (4) C = Formation of zygote after fusing with one of the male gametes
128. Organisms which are unable to migrate might avoid the stress by escaping in time which includes
- (1) Hibernation - Bear
 (2) Aestivation - Snails
 (3) Diapause - Insects
 (4) More than one option is correct
129. The principle of competitive exclusion was stated by
- (1) Verhulst and Pearl (2) C. Darwin
 (3) G. F. Gause (4) MacArthur

130. In a grazing food chain energy present at primary producer level is 1000 J then what would be energy at tertiary consumer level?

- (1) 100 J (2) 10 J
 (3) 0.1 J (4) 1 J

131. Which of the following statement is not correct for grassland and pond ecosystem?

- (1) Both have more number of producers than consumers
 (2) Producers have more biomass than consumers in pond ecosystem
 (3) Maximum energy exists at the producer level
 (4) Ultimate source of energy is sun

132. Which of the following is correctly matched?

- (1) Stratification-Population
 (2) Aerenchyma-Opuntia
 (3) Age pyramid-Biome
 (4) Parthenium hysterophorus-Threat to biodiversity

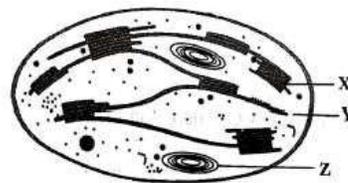
133. Which one of the following is the correct percentage of (out of the total of 4) green house gases that contribute to the total global warming -

- (1) N₂O 6%, CO₂ 86%
 (2) Methane 20%, N₂O 18 %
 (3) CFCs 14%, Methane 20 %
 (4) CO₂ 40%, CFCs 30%

134. Biochemical Oxygen Demand (BOD) in a river water -

- (1) Has no relationship with concentration of oxygen in the water
 (2) Gives a measure of salmonella in the water
 (3) Increases when sewage gets mixed with river water
 (4) Remains unchanged when algal bloom occurs

135. Refer to the given diagrammatic representation of an electron micrograph of a section of chloroplast and select the option which correctly depicts the functions of parts X, Y and Z.



- (1) X-Dark Reaction, Y-Light reaction, Z-Cytoplasmic inheritance
 (2) X-Light Reaction, Y-Carbohydrate synthesis, Z-Carbohydrate storage
 (3) X-Light Reaction, Y-Carbohydrate storage, Z-Carbohydrate synthesis
 (4) X-Carbohydrate synthesis, Y-Carbohydrate storage, Z-Cytoplasmic inheritance

Botany - Section B

Section B Shall Consist Of 15 (Fifteen) Questions In Each Subject. Candidate Needs To Attempt Any 10 (Ten) Questions Out Of 15 (Fifteen) In Each Subject.

136. Read the following matches.

	Family	Symmetry	Petals
(i)	Solanaceae	Zygomorphic	5, polyetalous
(ii)	Fabaceae	Zygomorphic	5, polypetalous
(iii)	Brassicaceae	Actinomorphic	4, polypetalous

Which of these are **correct**?

- (1) (i) and (ii) (2) (ii) and (iii)
 (3) (i) and (iii) (4) All are correct

137. Identify the wrong statement in context of heartwood.

- (1) Organic compounds are deposited in it
 (2) It is highly durable
 (3) It conducts water and minerals efficiently
 (4) It comprises dead elements with highly lignified walls

138. In humans, the largest gene is present on:-

- (1) Chromosome-1 (2) Y-chromosome
 (3) X-chromosome (4) Chromosome-7

139. If there are 999 bases in an RNA that codes for a protein with 333 amino acids, and the base at position 901 is deleted such that the length of the RNA becomes 998 bases, how many codons will be altered?

- (1) 1 (2) 11
 (3) 33 (4) 333

140. The main body of the ovule is made of _____ tissue called as _____

- (1) Parenchyma, Nucellus (2) Collenchyma, Nucellus
 (3) Parenchyma, integument (4) Collenchyma, integument

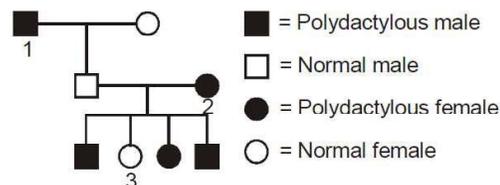
141. If a polygenic trait is controlled by two gene pairs than what will be the probability of individuals in F_2 generation showing exacts resemblance to F_1 progeny

- (1) $\frac{6}{16}$ (2) $\frac{4}{16}$
 (3) $\frac{2}{16}$ (4) $\frac{1}{16}$

142. Double fertilization is

- (1) Fusion of two male gametes of a pollen tube with two different eggs
 (2) Fusion of one male gamete with two polar nuclei.
 (3) Fusion of two male gametes with one egg
 (4) Syngamy and triple fusion

143. In humans, polydactyly (i.e., presence of extra fingers and toes) is determined by a dominant autosomal allele (P) and the normal condition is determined by a recessive allele (p). Find out the possible genotypes of family members 1, 2 and 3 in the given pedigree.



- (1) 1→PP, 2→Pp, 3→pp
 (2) 1→PP, 2→PP, 3→pp
 (3) 1→Pp, 2→PP, 3→Pp
 (4) 1→Pp, 2→Pp, 3→pp

144. Whatever may be the method of the pollen tube into the ovule, it always enters into the embryo sac through the

- (1) Chalaza (2) Micropyle
 (3) Integuments (4) Antipodals

145. With reference to factors affecting the rate of photosynthesis, which of the following statements is **not correct** ?

- (1) Light saturation for CO_2 fixation occurs at 10% of full sunlight
 (2) Increasing atmospheric CO_2 concentration up to 0.05% can enhance CO_2 fixation rate
 (3) C_3 plants respond to higher temperatures with enhanced photosynthesis while C_4 plants have much lower temperature optimum
 (4) Tomato is a greenhouse crop which can be grown in CO_2 enriched atmosphere for higher yield



- 146.** The two most abundant amides found in plants are :-
(1) Asparagine and glutamine (2) Lysine and asparagine
(3) Glutamine and lysine (4) None of the above
- 147.** What is the role of NAD^+ in cellular respiration?
(1) It is a nucleotide source for ATP synthesis
(2) It functions as an electron carrier
(3) It functions as an enzyme
(4) It is the final electron acceptor for anaerobic respiration
- 148.** Choose **correct** option w. r. t. parasites -
a. Loss of unnecessary sense organs
b. Presence of adhesive organs
c. Presence of suckers
d. High reproductive capacity
e. Well developed digestive system
(1) All a to e are correct
(2) Only a, b, d & e are correct
(3) Only a, b, c, d are correct
(4) Only d & e are incorrect
- 149.** Which one of the following statement is incorrect about secondary succession ?
(1) It begins on a bare rock.
(2) It occurs on a deforested site.
(3) It follows primary succession.
(4) It is similar to primary succession except that it has a relatively fast pace.
- 150.** In stratosphere, which of the following elements acts as a catalyst in degradation of ozone and release of molecular oxygen?
(1) Fe (2) Cl
(3) Carbon (4) Oxygen

Zoology -Section A

Section A Shall Consist Of 35 (Thirty-five) Questions In Each Subject .All Questions Are Compulsory.

- 151.** Which one of the following is incorrect about the characteristics of protobionts (coacervates and microspheres) as envisaged in the abiogenic origin of life?
(1) They were partially isolated from the surroundings
(2) They could maintain an internal environment
(3) They were able to reproduce
(4) They could separate combinations of molecules from the surroundings
- 152.** Oocyte is liberated from ovary under the influence of LH, after completing :
(1) Meiosis and before liberating polar bodies
(2) Meiosis I and before liberating second polar bodies
(3) Meiosis
(4) Meiosis II after release of first polar body
- 153.** Random change in allelic frequency in an isolated population occurring by chance is called
(1) Mutation (2) Natural selection
(3) Genetic drift (4) Gene flow
- 154.** Select the incorrect statement:
(1) FSH stimulates the sertoli cells which help in spermiogenesis.
(2) LH triggers ovulation in ovary
(3) LH and FSH decrease gradually during the follicular phase.
(4) LH triggers secretion of androgens from the Leydig cells.



155. The chronological order of human evolution from early to the recent is :-

- (1) Ramapithecus → Homo habilis → Australopithecus → Homo erectus
- (2) Australopithecus → Homo habilis → Ramapithecus → Homo erectus
- (3) Australopithecus → Ramapithecus → Homo habilis → Homo erectus
- (4) Ramapithecus → Australopithecus → Homo habilis → Homo erectus

156. Several hormones like hCG, hPL, estrogen progesterone are produced by-

- (1) Fallopian tube
- (2) Pituitary
- (3) Ovary
- (4) Placenta

157. Match the following columns.

	Column I		Column II
A.	Thomas Malthus	1.	Branching descent
B.	Hugo de Vries	2.	Studies on populations
C.	Charles Darwin	3.	.Use and disuse theory
D.	Lamarck	4.	Saltation

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

158. Mark the option with **wrong** taxonomic group :-

- (1) **Osteichthyes** - Exocoetus, Pristis, Gambusia
- (2) **Urochordata** - Salpa, Ascidia, Doliolum
- (3) **Mollusca** - Dentallium, Chaetopleura, Pinctada
- (4) **Aschelminthes** - Ascaris, Ancylostoma, Wuchereria

159. Find out the incorrect statement.

- (1) Animal husbandry is the agricultural practice of breeding and raising livestock.
- (2) More than 70 per cent of the world's livestock population is in India and China.
- (3) Dairying is the management of animal for milk and its products for human consumption.
- (4) Hissardale is a new breed of sheep developed in Punjab by crossing Bikaneri rams and Merino ewes.

160. Select the group of organism given below those have **diploblastic members** only :-

- (1) Ctenoplana, Taenia, Fasciola
- (2) Euspongia, Physalia, Meandrina
- (3) Wuchereria, Culex, Limulus
- (4) Aedes, Ascaris, Hydra

161. Consider the following statements and select the correct option stating which ones are **true** (T) and which ones are **false** (F) ?

- (i) Amylase hydrolyzes proteins to amino acids
 - (ii) Pancreatic amylase hydrolyses polysaccharides to disaccharides
 - (iii) Enteropeptidase activates pepsinogen to pepsin
 - (iv) Trypsin coagulates the milk protein casein
- (1) T T F F
 - (2) F T F T
 - (3) F T F F
 - (4) F T T F

162. Which of the following animals does **not** undergo metamorphosis?

- (1) Starfish
- (2) Earthworm
- (3) Apis
- (4) Tunicate

163. Secretin and Cholecystokinin are digestive hormones secreted by

- (1) Pyloric stomach
- (2) Duodenum
- (3) Ileum
- (4) Oesophagus

164. Which of the following causes an increase in sodium reabsorption in the distal convoluted tubule

- (1) Increase in aldosterone levels
- (2) Increase in antidiuretic hormone levels
- (3) Decrease in aldosterone levels
- (4) Decrease in antidiuretic hormone levels

165. Gall bladder takes part in

- (1) Secretion of bile
- (2) Storage of bile
- (3) Formation of bile salts
- (4) Formation of enzymes

166. In mammals, which blood vessel would normally carry largest amount of urea?

- (1) Renal Vein
- (2) Dorsal Aorta
- (3) Hepatic Vein
- (4) Hepatic Portal Vein



- 167.** Which of the following is characteristic of mammalian bone?
(1) Collagen (2) Blood vessels
(3) Lymphatic vessels (4) Haversian canals
- 168.** Embryo with more than 16 blastomeres formed due to in vitro fertilization is transferred into
(1) Either uterus or fallopian tube
(2) Only fallopian tube but not uterus
(3) Uterus only
(4) Ampulla region of fallopian tube
- 169.** Consider the following statements about biomedical technologies:
(a) During open heart surgery, blood is circulated in the heart-lung machine.
(b) Blockage in coronary arteries is removed by angiography.
(c) Computerised Axial Tomography (CAT) shows detailed internal structure as seen in a section of the body.
(d) X-rays provide clear and detailed images of organs like the prostate gland and the lungs.
(1) c and d (2) a and c
(3) a and b (4) b and d
- 170.** Use of spermicidal creams, jellies and foams along with diaphragms, cervical caps and vaults leads to
(1) Increased contraceptive efficiency
(2) Prevention of ovulation
(3) Prevention of implantation
(4) Increased sexual desire and drive
- 171.** SA-Node is located at -
(1) Left upper corner of the left atrium
(2) Left lower corner of the left atrium
(3) Right upper corner of the right atrium
(4) Right lower corner of the right atrium
- 172.** Choose that which of the following statement is/are correct ?
(a) Solubility of gases as well as the thickness of membrane can also affect the rate of diffusion.
(b) High H^+ concentration causes shifting of O_2 dissociation curve in left side.
(c) A healthy man can inspire or expire approximately 6000 ml of air per minute
(d) The role of oxygen is quite insignificant in the regulation of respiratory rhythm.
(1) a, b, c & d (2) a, b & d
(3) b, c & d (4) a, c & d
- 173.** Match the items given in Column I with those in Column II and select the correct option given below :
- | Column I | Column II |
|-------------------------------|--------------------|
| a. Tidal volume | i. 2500 – 3000 mL |
| b. Inspiratory Reserve volume | ii. 1100 – 1200 mL |
| c. Expiratory Reserve volume | iii. 500 – 550 mL |
| d. Residual volume | iv. 1000 – 1100 mL |
- (1) a-i, b-iv, c-ii, d-iii
(2) a-iii, b-i, c-iv, d-ii
(3) a-iii, b-ii, c-i, d-iv
(4) a-iv, b-iii, c-ii, d-i
- 174.** Conversion of milk to curd improve its nutritional value by increasing the amount of
(1) Vitamin B_{12} (2) Vitamin A
(3) Vitamin D (4) Vitamin E
- 175.** Pineal gland secretes a hormone called melatonin which is related with all the following except one ?
(1) Regulates sleep-wake cycle
(2) Influences metabolism and pigmentation
(3) Influences menstrual cycle and defense capabilities
(4) Maintains cardio vascular system and kidney functions
- 176.** In gel electrophoresis, at which end of the gel the sample is loaded?
(1) In the wells
(2) Towards positive electrode
(3) Towards negative electrode
(4) A & C both



- 177.** There is a restriction endonuclease called EcoRI. What does "co" part in it stand for ?
(1) Colon (2) Coelom
(3) Coenzyme (4) Coli
- 178.** A human cell has total 46 or 23 pairs of chromosomes. After meiosis I, the two daughter cells would have ___ chromosomes, and after meiosis II ___ chromosomes-
(1) 23,23 (2) 46,46
(3) 46,23 (4) 92,46
- 179.** A probe which is a molecule used to locate specific sequences in a mixture of DNA or RNA molecules could be :
(1) A single stranded RNA (2) A single stranded DNA
(3) Either RNA or DNA (4) Can be ssDNA but not ssRNA
- 180.** In RNAi, genes are silenced using :
(1) ss DNA (2) ds DNA
(3) ds RNA (4) ss RNA
- 181.** GEAC makes decisions regarding -
(1) The validity of GM research
(2) The safety of introducing GM organisms for public services
(3) The validity of biopatents
(4) More than one options are correct
- 182.** Which of the following characteristics is correct about cell wall of plant cells ?
(1) Plays role in protection
(2) Helps in cell – cell interaction
(3) Provides a barrier to undesirable macromolecules
(4) All of the above
- 183.** A major site for synthesis of lipids is-
(1) Nucleoplasm (2) RER
(3) SER (4) Symplast
- 184.** Microtubules are unbranched, hollow, submicroscopic tubules made up of ?
(1) Actin (2) Keratin
(3) Tubulin (4) Dyenin
- 185.** Synapsis occurs between -
(1) mRNA and ribosomes
(2) Spindle fibres and centromere
(3) Two homologous chromosomes
(4) A male and a female gamete

Zoology -Section B

Section B Shall Consist Of 15 (Fifteen) Questions In Each Subject. Candidate Needs To Attempt Any 10 (Ten) Questions Out Of 15 (Fifteen) In Each Subject.

- 186.** The electrical potential difference across the depolarized membrane is called -
(1) Action potential (2) Resting potential
(3) Water potential (4) Solute potential
- 187.** The electrical potential difference across the plasma membrane at the site of depolarisation is called :-
(1) Graded potential (2) Resting potential
(3) Action potential (4) IPSP
- 188.** Above the row of hair cells in organ of Corti, is a thin elastic membrane called -
(1) Basilar membrane (2) Reissner's membrane
(3) Tympanic membrane (4) Tectorial membrane
- 189.** Growth factors, which are essential for the normal growth of tissues and their repairing, are secreted by :-
(1) pituitary gland (2) Thyroid gland
(3) hypothalamus (4) Non-endocrine tissues



190. Three chambered heart found in—

- (1) Fish (2) Frog
(3) Rabbit (4) Man

191. Vaccine produced by recombinant DNA technology?

- (1) Polio vaccine (2) DPT vaccine
(3) Typhoid vaccine (4) Hepatitis B vaccine

192. Which of the following provide the sites for interaction of lymphocytes with the pathogen ?

- (A) Bone marrow
(B) Spleen
(C) Thymus gland
(D) Lymph nodes
(E) Appendix
(F) Peyer's patches of small intestine

- (1) B, C only (2) B, D, E, F
(3) B, D only (4) B, D, F only

193. A slowly developing chronic inflammation of the organs in which they live for many years, usually the lymphatic vessels of lower limbs are the symptoms of :

- (1) Amoebiasis (2) Ascariasis
(3) Ringworms (4) Filariasis

194. Which of the following is not the cranial bone:-

- (1) Frontal (2) Parietal
(3) Mandible (4) Occipital

195. The scapula is a large triangular flat bone situated on the dorsal part of the thorax between

- (1) Second and Seventh rib (2) Third and Fourth rib
(3) Fifth and Sixth rib (4) Second and Fifth rib

196. Match the columns I and II, and choose the correct combination from the options given.

	Column I		Column II
(a)	Incomplete digestive system	(i)	Sponges/Porifera
(b)	Cellular level of organisation	(ii)	Coelentrates
(c)	Radial symmetry	(iii)	Annelids
(d)	Pseudocoelom	(iv)	Platyhelminthes
(e)	Metamerism	(v)	Aschelminthes

- (1) (i) – c; (ii) – d; (iii) – a; (iv) – b; (v) – e
(2) (i) – d; (ii) – e; (iii) – b; (iv) – c; (v) – a
(3) (i) – b; (ii) – c; (iii) – e; (iv) – a; (v) – d
(4) (i) – a; (ii) – b; (iii) – c; (iv) – d; (v) – e

197. In meiosis crossing over is initiated at -

- (1) Pachytene (2) Leptotene
(3) Zygotene (4) Diplotene

198. Choose the incorrect pair ?

- (1) Histone—Basic proteins
(2) Centromere—Primary constriction
(3) Kinetochore—Disc Shaped structure
(4) None of the above

199. Which of the following is the application of PCR ?

- (1) Detection of very low concentration of bacteria or virus
(2) Detection of mutations in genes in suspected cancer patients
(3) Amplification of desired DNA segment
(4) All of these

200. The bacterium *Bacillus thuringiensis* is widely used in contemporary biology as -

- (1) Insecticide
(2) Agent for production of dairy products
(3) Source of industrial enzyme
(4) Indicator of water pollution

STEPS TO APPEAR FOR THE TEST & GET RESULTS



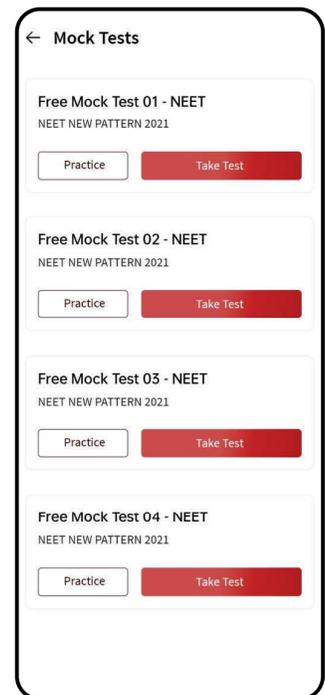
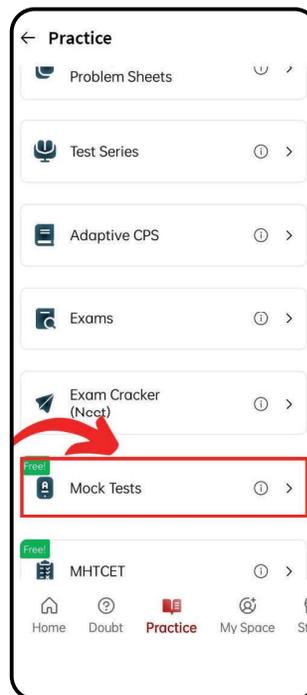
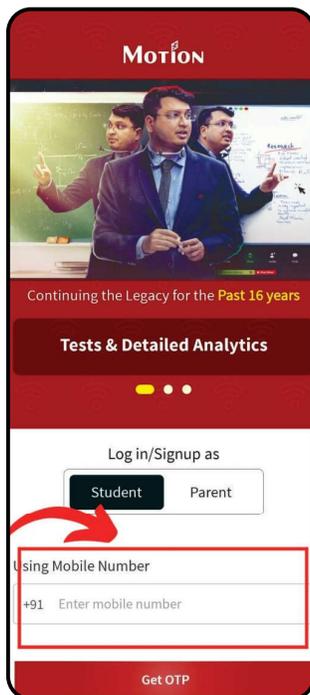
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