



**CCT - 10**

**TOPIC COVERED**

Physics:	Class 12 Complete
Chemistry:	Class 12 Complete
Botany:	Class 12 Complete
Zoology:	Class 12 Complete

**Duration: 3 hr 20 min**

**Max Marks: 720**

**General Instructions:**

- The test will contain 200 Questions of Physics, Chemistry, Botany, and Zoology & The test will be objective type. (Attempt only 180).
- Every subject contains two Section A-35 Questions and Section B-15 Questions (Attempt only 10).
- All 35 Questions of Section-A are Compulsory to attempt.
- Time given for test is 200 minutes.
- Marking is +4 for every correct answer, -1 for every wrong answer.
- You can reattempt the test in case of any technical issue.
- Test will start at 2:00 pm and students can attempt test at any time of their own preferences

**PHYSICS**

**SECTION - A**

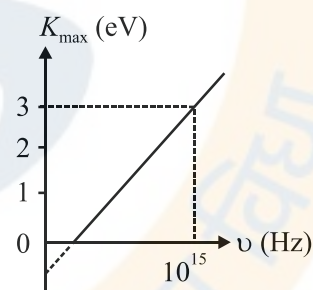
1. A 100 eV electron is fired directly towards a large metal plate having surface charge density  $-2 \times 10^{-6} \text{ C m}^{-2}$ . The distance from where the electron be projected so that it just fails to strike the plate is

- (1) 0.22 mm
- (2) 0.44 mm
- (3) 0.66 mm
- (4) 0.88 mm

2. An electric cable of copper has just one wire of radius 9 mm. Its resistance is  $5 \Omega$ . This single copper wire of cable is replaced by 6 different well insulated copper wires each of radius 3 mm. The total resistance of the cable will now be equal to

- (1)  $7.5 \Omega$
- (2)  $45 \Omega$
- (3)  $90 \Omega$
- (4)  $270 \Omega$

3. Figure represents a graph of kinetic energy of most energetic photoelectrons  $K_{\text{max}}$  (in eV) and frequency  $\nu$  for a metal used as cathode in photoelectric experiment. The threshold frequency of light for the photoelectric emission from the metal is



- (1)  $1 \times 10^{14} \text{ Hz}$
- (2)  $1.5 \times 10^{14} \text{ Hz}$
- (3)  $2.1 \times 10^{14} \text{ Hz}$
- (4)  $2.8 \times 10^{14} \text{ Hz}$

4. The counting rate observed from a radioactive source at  $t = 0$  was  $1600 \text{ counts s}^{-1}$ , and at  $t = 8 \text{ s}$ , it was  $100 \text{ counts s}^{-1}$ . The counting rate observed as  $\text{counts s}^{-1}$  at  $t = 6 \text{ s}$  will be

- (1) 400
- (2) 300
- (3) 250
- (4) 200

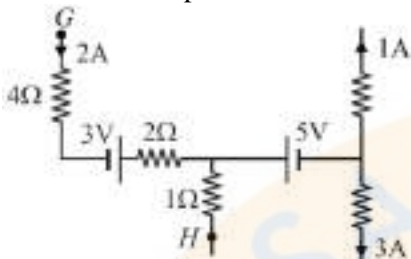
5. The work done by electric field during the displacement of a negatively charged particle towards a fixed positively charged particle is 9 J. As a result, the distance between the charges has been decreased by half. What work is done by the electric field over the first half of this distance?

- (1) 3 J
- (2) 6 J
- (3) 1.5 J
- (4) 9 J

6. A thin prism  $P_1$  with  $4^\circ$  and made from glass of refractive index 1.54 is combined with another thin prism  $P_2$  made from glass of refractive index 1.72 to produce dispersion without deviation. The angle of the prism  $P_2$  is

(1)  $5.33^\circ$  (2)  $4^\circ$   
(3)  $3^\circ$  (4)  $2.6^\circ$

7. In the part of a circuit shown in figure, the potential difference between points  $G$  and  $H$  will be

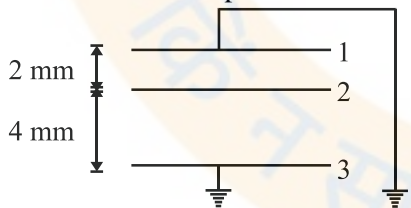


(1) 0 V (2) 12 V  
(3) 7 V (4) 3 V

8. Two long parallel wires carry equal current  $I$  flowing in the same direction and at a distance  $2d$  apart. The magnetic field  $B$  at a point lying on the perpendicular line joining the wires and at a distance  $x$  from the midpoint is

(1)  $\frac{\mu_0 Id}{\pi(d^2 + x^2)}$  (2)  $\frac{\mu_0 Ix}{\pi(d^2 - x^2)}$   
(3)  $\frac{\mu_0 Ix}{(d^2 + x^2)}$  (4)  $\frac{\mu_0 Ix}{(d^2 - x^2)}$

9. Two parallel conducting plates of area  $A = 2.5 \text{ m}^2$  each are placed 6 mm apart and are both earthed. A third plate, identical with the first two, is placed at a distance of 2 mm from one of the earthed plates and is given a charge of 1 C. The potential of the central plate is

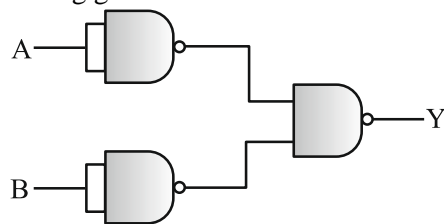


(1)  $6 \times 10^7 \text{ V}$   
(2)  $3 \times 10^7 \text{ V}$   
(3)  $4 \times 10^7 \text{ V}$   
(4)  $2 \times 10^7 \text{ V}$

10. A photosensitive metallic surface has work function,  $h\nu_0$ . If photons of energy  $2h\nu_0$  fall on this surface, the electrons come out with a maximum velocity of  $4 \times 10^6 \text{ m s}^{-1}$ . When the photon energy is increased to  $5h\nu_0$ , then maximum velocity of photoelectrons will be

(1)  $2 \times 10^7 \text{ m s}^{-1}$  (2)  $2 \times 10^6 \text{ m s}^{-1}$   
(3)  $8 \times 10^6 \text{ m s}^{-1}$  (4)  $8 \times 10^5 \text{ m s}^{-1}$

11. The combination given in figure, represents the following gate



(1) OR (2) XOR  
(3) NAND (4) NOR

12. In a Youngs' double slit experiment the slits separation is 0.5 mm and the screen is 0.5 m from the slit. For a monochromatic light of wavelength 500 nm the distance of 3<sup>rd</sup> maxima from the 2<sup>nd</sup> minima on the other side is

(1) 2.75 mm  
(2) 2.5 mm  
(3) 22.5 mm  
(4) 2.25 mm

13. Two objects are placed on the principal axis of a thin converging lens. One is 10 cm from the lens and the other is on the other side of the lens at a distance of 40 cm from the lens. The image of both objects are in the same plane. What is the focal length of the lens (in cm)?

(1) 14  
(2) 15  
(3) 16  
(4) 20

14. In a series LCR circuit, the voltage across the resistance, capacitance and inductance is 10 V each. If the capacitance is short circuited the voltage across the inductance will be

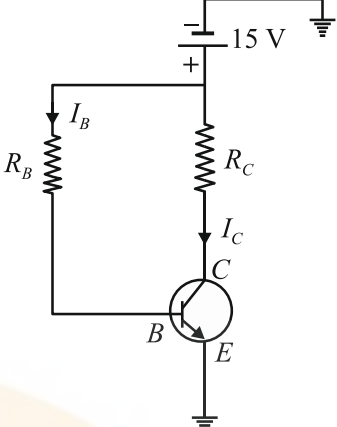
(1) 10 V  
(2)  $10\sqrt{2} \text{ V}$   
(3)  $\frac{10}{\sqrt{2}} \text{ V}$   
(4) 20 V

15. A varying magnetic flux linking a coil is given by  $\phi = xt^2$ . If at a time  $t = 3 \text{ s}$ , the emf induced is 9 V, then the value of  $x$  is

(1)  $0.66 \text{ Wb s}^{-2}$   
(2)  $1.5 \text{ Wb s}^{-2}$   
(3)  $-0.66 \text{ Wb s}^{-2}$   
(4)  $-1.5 \text{ Wb s}^{-2}$

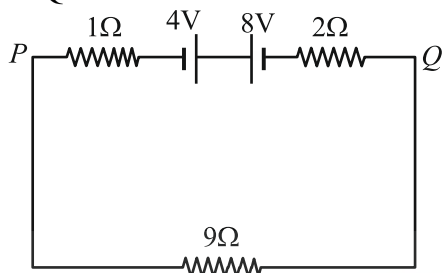
16. A charge of  $q \text{ } \mu\text{C}$  is placed at the centre of the line joining two exactly equal positive charge of  $60 \text{ } \mu\text{C}$ . The system of the three charges will be in equilibrium, if the value of charge  $q$  is

(1)  $45 \text{ } \mu\text{C}$  (2)  $60 \text{ } \mu\text{C}$   
(3)  $15 \text{ } \mu\text{C}$  (4)  $-15 \text{ } \mu\text{C}$

17. The electric potential at point  $(x, y, z)$  is given by  $V = -xy^2 - x^2z + 5$ , then the value of electric field at point  $(1, 1, 1)$  is
- $\hat{i} + 2\hat{j} + \hat{k}$
  - $3\hat{i} + 2\hat{j} + \hat{k}$
  - $2\hat{i} + 3\hat{j} + \hat{k}$
  - $3\hat{i} - 2\hat{j} + \hat{k}$
18. A 220 V input is supplied to a transformer. The output circuit draws a current of 2.0 A at 440 V. If efficiency of transformer is 80%, the current drawn by the primary winding of the transformer is
- 3.6 A
  - 28 A
  - 25 A
  - 5.0 A
19. Which of the following transitions gives photon of maximum energy?
- $n = 2$  to  $n = 1$
  - $n = 1$  to  $n = 2$
  - $n = 2$  to  $n = 6$
  - $n = 6$  to  $n = 2$
20. The power of a biconvex lens is 10 dioptre and the radius of curvature of each surface is 10 cm. Then, the refractive index of the material of the lens is
- $3/2$
  - $4/3$
  - $9/8$
  - $5/3$
21. The work functions of three metal A, B and C are 1.92 eV, 2 eV and 5 eV respectively. Which metals will emit photoelectrons for a radiation of wavelength  $4100 \text{ \AA}$ ?
- A only
  - B only
  - Both A and B
  - C only
22. The radioactivity of a sample is  $I_1$  at a time  $t_1$  and  $I_2$  at a time  $t_2$ . If the half-life of the sample is  $\tau_{1/2}$ , then the number of nuclei that have disintegrated in the time  $t_2 - t_1$  is proportional to
- $I_1 t_2 - I_2 t_1$
  - $I_1 - I_2$
  - $\frac{I_1 - I_2}{\tau_{1/2}}$
  - $(I_1 - I_2)\tau_{1/2}$
23. Two polaroids are crossed. If now one of them is rotate through  $30^\circ$  and unpolarised light of intensity  $I_0$  is incident on the first polaroid, then the intensity of transmitted light will be
- $\frac{I_0}{4}$
  - $\frac{3I_0}{4}$
  - $\frac{3I_0}{8}$
  - $\frac{I_0}{8}$
24. In the following common emitter circuit, if  $\beta = 96$ ,  $V_{CE} = 5\text{V}$ ,  $V_{BC} = \text{negligible}$ ,  $R_C = 3 \text{ k}\Omega$ , then  $I_B = ?$
- 
- 0.012 mA
  - 0.044 mA
  - 0.034 mA
  - 0.082 mA
25. In Young's double slit experiment with sodium vapour lamp of wavelength 589 nm and the slits 0.589 mm apart, then the half angular width of the central maximum is
- $\sin^{-1}(0.01)$
  - $\sin^{-1}(0.0001)$
  - $\sin^{-1}(0.001)$
  - $\sin^{-1}(0.1)$
26. The activity of a radioactive substance decreases to one-third of the original activity number  $N_0$  in a period of 9 yr. After a further lapse of 9 yr. its activity will be
- $\frac{3}{4}N_0$
  - $\frac{N_0}{9}$
  - $N_0$
  - None of these
27. If  $E_a$  be the electric field strength of a short dipole at a point on its axial line and  $E_e$  that on the equatorial line at the same distance, then
- $E_e = 2E_a$
  - $E_a = 2E_e$
  - $E_a = E_e$
  - $E_a = -2E_e$
28. Excitation energy of a hydrogen like ion in its first excitation state is 40.8 eV. Energy needed to remove the electron from the ion in ground state is
- 54.4 eV
  - 13.6 eV
  - 40.8 eV
  - 27.2 eV
29. Two coils have a mutual inductance 0.005 H. The current changes in the first coil according to equation  $I = I_0 \sin \omega t$ , where  $I_0 = 10 \text{ A}$  and  $\omega = 100\pi \text{ rad s}^{-1}$ . The maximum value of emf in the second coil is (in V)
- $2\pi$
  - $5\pi$
  - $\pi$
  - $4\pi$



30. Two batteries of emf 4V and 8V with internal resistance  $1\ \Omega$  and  $2\ \Omega$  are connected in a circuit with a resistance of  $9\ \Omega$  as shown in figure. The current and potential difference between the points P and Q are



- (1)  $1/3\text{ A}$  and  $3\text{ V}$  (2)  $1/6\text{ A}$  and  $4\text{ V}$   
 (3)  $1/9\text{ A}$  and  $9\text{ V}$  (4)  $1/2\text{ A}$  and  $12\text{ V}$
31. In a common emitter amplifier, using output resistance of  $5000\ \Omega$  and input resistance of  $2000\ \Omega$ , if the peak value of input signal voltage is  $10\text{ mV}$  and  $\beta = 50$ , then peak value of output voltage is
- (1)  $5 \times 10^{-6}\text{ V}$  (2)  $12.5 \times 10^{-4}\text{ V}$   
 (3)  $1.25\text{ V}$  (4)  $125\text{ V}$
32. The magnifying power of a telescope is 9. When it is adjusted for parallel rays the distance between the objective and eyepiece is  $20\text{ cm}$ . The focal length of lenses are
- (1)  $10\text{ cm}$ ,  $10\text{ cm}$  (2)  $15\text{ cm}$ ,  $5\text{ cm}$   
 (3)  $18\text{ cm}$ ,  $2\text{ cm}$  (4)  $11\text{ cm}$ ,  $9\text{ cm}$
33. A luminous object is placed at a distance of  $30\text{ cm}$  from the convex lens of focal length  $20\text{ cm}$ . On the other side of the lens, at what distance from the lens a convex mirror of radius of curvature  $10\text{ cm}$  be placed in order to have an upright image of the object coincident with it?
- (1)  $12\text{ cm}$  (2)  $30\text{ cm}$   
 (3)  $50\text{ cm}$  (4)  $60\text{ cm}$
34. Match List – I (Electromagnetic wave type) with List – II (Its association/application) and select the correct option from the choices given below the lists:

List – I		List – II	
A	Infrared waves	(i)	To treat muscular strain
B	Radio waves	(ii)	For broadcasting
C	X-rays	(iii)	To detect fracture of bones
D	Ultraviolet rays	(iv)	Absorbed by the ozone layer of the atmosphere

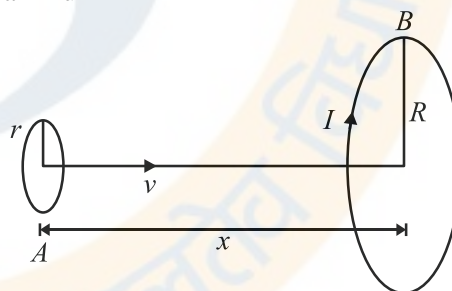
- (1) (A)  $\rightarrow$  (iv); (B)  $\rightarrow$  (iii); (C)  $\rightarrow$  (ii); (D)  $\rightarrow$  (i)  
 (2) (A)  $\rightarrow$  (i); (B)  $\rightarrow$  (ii); (C)  $\rightarrow$  (iv); (D)  $\rightarrow$  (iii)  
 (3) (A)  $\rightarrow$  (iii); (B)  $\rightarrow$  (ii); (C)  $\rightarrow$  (i); (D)  $\rightarrow$  (iv)  
 (4) (A)  $\rightarrow$  (i); (B)  $\rightarrow$  (ii); (C)  $\rightarrow$  (iii); (D)  $\rightarrow$  (iv)

35. The electric and the magnetic field associated with an E. M. wave, propagating along the  $+z$ -axis, can be represented by

- (1)  $[\vec{E} = E_0\hat{i}, \vec{B} = B_0\hat{j}]$   
 (2)  $[\vec{E} = E_0\hat{k}, \vec{B} = B_0\hat{i}]$   
 (3)  $[\vec{E} = E_0\hat{j}, \vec{B} = B_0\hat{i}]$   
 (4)  $[\vec{E} = E_0\hat{j}, \vec{B} = B_0\hat{k}]$

### SECTION - B (ATTEMPT ANY 10 QUESTIONS)

36. The coercivity of a small magnet where the ferromagnets gets demagnetized is  $3 \times 10^3\text{ Am}^{-1}$ . The current required to be passed in a solenoid of length  $10\text{ cm}$  and number of turns  $100$ , so that the magnet gets demagnetized when inside the solenoid, is:
- (1)  $30\text{ mA}$  (2)  $60\text{ mA}$   
 (3)  $3\text{ A}$  (4)  $6\text{ A}$
37. The susceptibility of annealed iron at saturation is  $5500$ . Find the permeability of annealed iron at saturation.
- (1)  $6.9 \times 10^{-3}$   
 (2)  $5.1 \times 10^{-2}$   
 (3)  $5 \times 10^2$   
 (4)  $3.2 \times 10^{-5}$
38. Loop A of radius  $r \ll R$  moves towards loop B with a constant velocity  $v$  in such a way that their planes are always parallel. The distance between the two loops  $x$ . when the induced emf in loop A is maximum



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

39. Three electric dipoles are enclosed with in Gaussian spherical surface of radius  $2\text{ cm}$ . If electric dipole moment of each dipole is  $20\ \mu\text{C}$ , then total electric flux passing through the surface is

- (1)  $\frac{10 \times 10^{-8}}{\epsilon_0}$  (2)  $0$   
 (3)  $\frac{5 \times 10^{-8}}{\epsilon_0}$  (4)  $\frac{20 \times 10^{-8}}{\epsilon_0}$

40. An alternating current,  $I = I_0 \sin \omega t$  is flowing in AC circuit. The ratio of *rms* current in the interval of 0 to  $T$  and average current in the circuit for the time interval  $\frac{T}{8}$  to  $\frac{T}{4}$  (where,  $T$  is time period) is

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

41. In an intrinsic semiconductor, the density of conduction electrons is  $7.07 \times 10^{15} \text{ m}^{-3}$ . When it is doped with indium, the density of holes becomes  $5 \times 10^{22} \text{ m}^{-3}$ . Find the density of conduction electrons in doped semiconductor

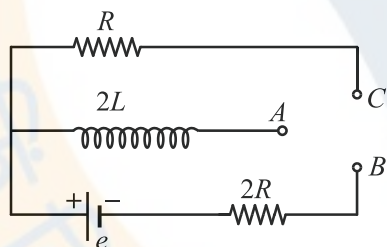
- (1) Zero (2)  $1 \times 10^9 \text{ m}^{-3}$   
 (3)  $7 \times 10^{15} \text{ m}^{-3}$  (4)  $5 \times 10^{22} \text{ m}^{-3}$

42. The net force on an electric dipole placed parallel to the X-axis, where electric field is also parallel to X-axis, will be

- (1) directed along, Y-axis  
 (2) directed along X-axis  
 (3) directed along Z-axis  
 (4) None of these

43. In the circuit shown below, A is joined to B for long and then. A is joined to C. The total heat produced in  $R$  is

- (1)  $\frac{Le^2}{8R^2}$   
 (2)  $\frac{Le^2}{2R^2}$   
 (3)  $\frac{Le^2}{4R^2}$   
 (4)  $\frac{Le^2}{R^2}$



44. Treating the bulb as a point source of electromagnetic radiation, i.e. about 5% efficient in converting electrical energy to visible light. The maximum magnitudes of the electric field of the light that is incident on a page, because of the visible light coming from a desk lamp is

- (1) 40 V/m (2) 30 V/m  
 (3) 45 V/m (4) 25 V/m

45. An uncharged capacitor with a solid dielectric is connected to a similar air capacitor charged to a potential of 50 V. If the common potential after sharing the charges becomes 2V, then the dielectric constant of dielectric must be

- (1) 16 (2) 24  
 (3) 36 (4) 20

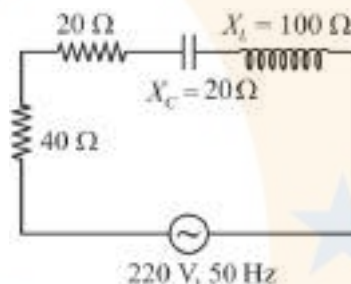
46. A pure Si wafer is doped with Al. The number density of acceptor atoms is approximately  $10^{22} \text{ m}^{-3}$ , if density of the hole in an intrinsic semiconductor is approximately  $10^{20} \text{ m}^{-3}$ . The number density of electron in the wafer is

- (1)  $10^4 \text{ m}^{-3}$   
 (2)  $10^{12} \text{ m}^{-3}$   
 (3)  $10^{18} \text{ m}^{-3}$   
 (4)  $10^{24} \text{ m}^{-3}$

47. In Young's double slit experiment, the fringe width is found to 0.5 mm. If the whole apparatus is immersed in liquid of refractive index  $5/3$ , without disturbing the geometrical arrangement, then new fringe width will be

- (1) 0.35 m  
 (2) 0.6 mm  
 (3) 0.45 mm  
 (4) 0.3 mm

48. The power factor of the circuit shown in the figure is



- (1) 0.2  
 (2) 0.8  
 (3) 0.4  
 (4) 0.6

49. A radioactive substance decays to  $\frac{1}{64}$  of its initial quantity in 30 days. The time during which it will decay  $\frac{1}{128}$  of its initial quantity is

- (1) 50 days  
 (2) 38 days  
 (3) 35 days  
 (4) 46 days

50. Infinite number of charges of magnitude  $6 \mu\text{C}$  each are lying at  $y = 2, 4, 8, 16 \dots$  metre on Y-axis. The value of electric field intensity at point  $y = 0$  due to these charges will be

- (1)  $6.5 \times 10^3 \text{ N/C}$   
 (2)  $4.05 \times 10^4 \text{ N/C}$   
 (3)  $7.2 \times 10^3 \text{ N/C}$   
 (4)  $1.8 \times 10^4 \text{ N/C}$

**SECTION - A**

51. The most unsymmetrical and symmetrical systems are, respectively:

- (1) Tetragonal, Cubic
- (2) Triclinic, Cubic
- (3) Rhombohedral, Hexagonal
- (4) Orthorhombic, Cubic

52. An ideal solution has two components A and B. A is more volatile than B, i.e.,  $P_A^\circ > P_B^\circ$  and also  $P_A^\circ > P_{\text{total}}$ . If  $X_A$  and  $Y_A$  are mole fractions of components A in liquid and vapour phases, then:

- (1)  $X_A = Y_A$
- (2)  $X_A > Y_A$
- (3)  $X_A < Y_A$
- (4) Data insufficient

53. Electrolysis can be used to determine atomic masses. A current of 0.550 A deposits 0.55 g of a certain metal in 100 minutes. Calculate the atomic mass of the metal if eq. mass = mol. mass/3

- (1) 100
- (2) 45.0
- (3) 48.25
- (4) 144.75

54. Which one of the following electrolyte will be most effective in coagulation of arsenousulphide ( $\text{As}_2\text{S}_3$ ) sol?

- (1) KCl
- (2) NaCl
- (3)  $\text{MgCl}_2$
- (4)  $\text{AlCl}_3$

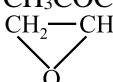
55. The nuclei of elements X, Y and Z have same number of protons, but different numbers of neutrons. According to Mendeleev periodic table, the elements X, Y and Z

- (1) belong to same group and same period
- (2) belong to different groups and different periods
- (3) belong to same group and different periods
- (4) are isotopes, which do not have different positions

56. Choose the compound which does not possess a peroxide group

- (1)  $\text{Na}_2\text{O}_2$
- (2)  $\text{CrO}_5$
- (3)  $\text{Fe}_2\text{O}_3$
- (4)  $\text{BaO}_2$

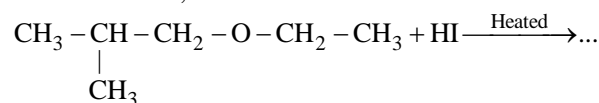
57. 2-Phenylethanol may be prepared by the reaction of phenyl magnesium bromide with:

- (1) HCHO
- (2)  $\text{CH}_3\text{CHO}$
- (3)  $\text{CH}_3\text{COCH}_3$
- (4) 

58. When acetaldehyde is heated with Fehling's solution, it gives a red precipitate of:

- (1) Cu
- (2) CuO
- (3)  $\text{CuSO}_4$
- (4)  $\text{Cu}_2\text{O}$

59. In the reaction,



Which of the following compounds will be formed?

- (1)  $\text{CH}_3 - \underset{\text{CH}_3}{\text{CH}} - \text{CH}_2\text{OH} + \text{CH}_3\text{CH}_3$
- (2)  $\text{CH}_3 - \underset{\text{CH}_3}{\text{CH}} - \text{CH}_3 + \text{CH}_3\text{CH}_2\text{OH}$
- (3)  $\text{CH}_3 - \underset{\text{CH}_3}{\text{CH}} - \text{CH}_2\text{OH} + \text{CH}_3\text{CH}_2\text{I}$
- (4)  $\text{CH}_3 - \underset{\text{CH}_3}{\text{CH}} - \text{CH}_2\text{I} + \text{CH}_3\text{CH}_2\text{OH}$

60. An aqueous solution containing 1 M each of  $\text{Au}^{3+}$ ,  $\text{Cu}^{2+}$ ,  $\text{Ag}^+$ ,  $\text{Li}^+$  is being electrolysed by using inert electrodes. The value of standard potentials are:

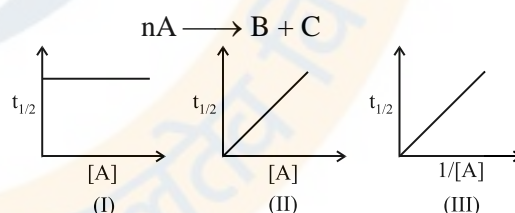
$$E_{\text{Ag}^+/\text{Ag}}^\circ = 0.80 \text{ V}, E_{\text{Cu}^{2+}/\text{Cu}}^\circ = 0.34 \text{ V}, \text{ and}$$

$$E_{\text{Au}^{3+}/\text{Au}}^\circ = 1.50 \text{ V}, E_{\text{Li}^+/\text{Li}}^\circ = -3.03 \text{ V},$$

With increasing voltage, the sequence of deposition of metals on the cathode will be:

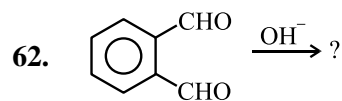
- (1) Li, Cu, Ag, Au
- (2) Cu, Ag, Au
- (3) Au, Ag, Cu
- (4) Au, Ag, Cu, Li

61. Consider the plots, given below, for the types of reaction

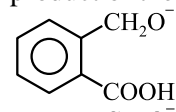
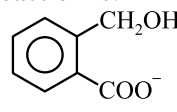
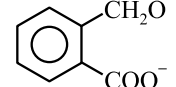
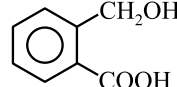


These plots respectively correspond to the reaction orders:

- (1) 0, 1, 2
- (2) 1, 2, 0
- (3) 1, 0, 2
- (4) None of these

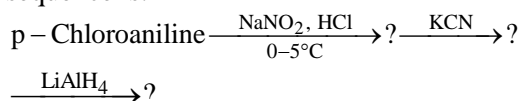


The product of the above reaction is:

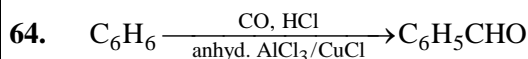
- (1) 
- (2) 
- (3) 
- (4) 



63. The final product in the following reaction sequence is:



- (1) p-Chlorobenzamide
- (2) p-Chlorophenol
- (3) p-Chlorobenzylamine
- (4) p-Chlorobenzyl alcohol



This chemical reaction is known as:

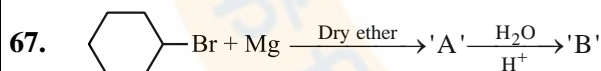
- (1) Gatterman reaction
- (2) Tischenko reaction
- (3) Frankland reaction
- (4) Gatterman-Koch reaction

65. What is the order of basicity of:  
 p-methylaniline, m-methylaniline  
 (I) (II)  
 Aniline, o-methylaniline  
 (III) (IV)

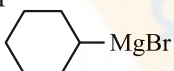
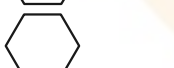
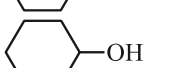
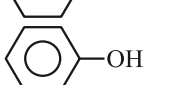
- (1) I > II > III > IV
- (2) I > II > IV > III
- (3) IV > I > II > III
- (4) II > I > IV > III

66. Cleaning action of soap occurs because:

- (1) non-polar tails of soap molecules dissolve in grease
- (2) oil and grease dissolved into hydrophilic centres of soap micelles acid washed away
- (3) hydrophilic head dissolve in grease
- (4) grease dissolve in soap solution



The product 'B' is:

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

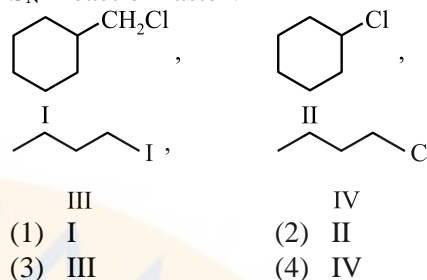
68. The function of fluorspar in the electrolytic reduction of alumina dissolved in fused cryolite ( $\text{Na}_3\text{AlF}_6$ ) is:

- (1) as a catalyst
- (2) to lower the temperature of the melt and to make the fused mixture very conducting
- (3) to decrease the rate of oxidation of carbon at the anode
- (4) none of the above

69. The diamagnetic species is:

- |   |  |
|---|--|
| (I) $[\text{Cu}(\text{CN})_4]^{3-}$     | (II) $[\text{Co}(\text{NH}_3)_6]^{3+}$ |
| (III) $[\text{Ni}(\text{NH}_3)_6]^{2+}$ | (IV) $[\text{Fe}(\text{CN})_6]^{3-}$   |
| (1) I, III                              | (2) I, II                              |
| (3) III, IV                             | (4) only IV                            |

70. Which of the following haloalkanes would undergo  $\text{S}_\text{N}2$  reaction faster?



71. Which of the following statements is not true:

- (1)  $\text{SnCl}_2$  is ionic solid
- (2)  $\text{SnCl}_4$  is reducing in nature
- (3)  $\text{SnCl}_2$  is reducing in nature
- (4)  $\text{SnCl}_4$  is covalent liquid

72. A solution of 18g of non-volatile, non-electrolyte solute in 150 g of water was found to have a boiling point of  $100.34^\circ\text{C}$ . If  $K_b$  for water is  $0.51\text{K molal}^{-1}$ , what is the molar mass of the solute?

- (1) 180
- (2) 60
- (3) 100
- (4) 342

73. Sucrose is made up of:

- (1) D-glucose + L-fructose
- (2) D-glucose + D-fructose
- (3) D-fructose + L-glucose
- (4) L-fructose + L-glucose

74. Amongst the following, the most stable complex is:

- (1)  $[\text{Co}(\text{H}_2\text{O})_6]^{3+}$
- (2)  $[\text{Co}(\text{ox})_3]^{3-}$
- (3)  $[\text{Co}(\text{ONO})_6]^{3-}$
- (4)  $[\text{CoF}_6]^{3-}$

75. Thermally most stable compound is:

- (1)  $\text{HOClO}_3$
- (2)  $\text{HOClO}_2$
- (3)  $\text{HOCl}$
- (4)  $\text{HOClO}$

76. A molecule contains atoms A and B such that A occurs at the corners of the cube and Y at the face centres. The formula of the molecules is

- (1)  $\text{AB}_3$
- (2)  $\text{AB}$
- (3)  $\text{AB}_2$
- (4)  $\text{A}_2\text{B}$

77. In which of the following compounds, does the transition metal atoms have +3 oxidation number?

- (1)  $[\text{Mn}(\text{H}_2\text{O})_3\text{Cl}_3]$
- (2)  $\text{CrO}_5$
- (3)  $[\text{Fe}(\text{CO})_5]$
- (4)  $[\text{Fe}(\text{CN})_6]^{4-}$

78. How many ethers will be formed when a mixture of  $\text{C}_2\text{H}_5\text{OH}$  and  $\text{CH}_3\text{OH}$  are treated with  $\text{con. H}_2\text{SO}_4$ ?

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

79. What happens when 2, 4, 6-trinitrochlorobenzene is just warmed with water?
- (1) No reaction takes place
  - (2) A hydrate is formed
  - (3) 2, 4-dinitrophenol is formed
  - (4) Picric acid is formed
80. Glucose reacts with acetic anhydride to form:
- (1) Mono acetate
  - (2) Tetra acetate
  - (3) Penta acetate
  - (4) Hexa acetate
81. Amongst LiCl, RbCl, BeCl<sub>2</sub> and MgCl<sub>2</sub>, the compounds with the greatest and the least ionic charact. respectively are:
- (1) LiCl and RbCl
  - (2) RbCl and BeCl<sub>2</sub>
  - (3) RbCl and MgCl<sub>2</sub>
  - (4) MgCl<sub>2</sub> and BeCl<sub>2</sub>
82. How many coulombs are required for the oxidation of 1 mole of H<sub>2</sub>O<sub>2</sub> to O<sub>2</sub>?
- (1)  $9.65 \times 10^4$
  - (2) 93000
  - (3)  $1.93 \times 10^5$
  - (4)  $19.3 \times 10^2$
83. Consider the reaction:  $A \rightarrow B + C$  initial concentration of A is 1M. 20 min time is required for completion of 20% reaction. If  $\frac{d}{dt}[B] = K[A]$ , then half-life ( $t_{1/2}$ ) is ( $\log 5 = 0.6989$  and  $\log 4 = 0.6020$ )
- (1) 55.44 min
  - (2) 50 min
  - (3) 62.13 min
  - (4) 76.3 min
84. At 300K 36 g of glucose present in a litre of its solution has an osmotic pressure of 4.98 bar. If the osmotic pressure of the solution is 1.52 bar at the same temperature, what would be its concentration?
- (1) 0.061 M
  - (2) 0.61 M
  - (3) 0.0061 M
  - (4) 6.1 M
85. Which of the following is colourless?
- (1)  $[\text{Cu}(\text{H}_2\text{O})_4]^{+2}$
  - (2)  $[\text{Cu}(\text{CN})_2]^{-1}$
  - (3)  $[\text{Cu}(\text{NH}_3)_4]^{+2}$
  - (4)  $[\text{CuCl}_4]^{-2}$
87. 0.1435 m solution of a non-volatile, non-electrolyte solute has the freezing point 0.73 degrees lower than that of benzene. What is the value of molal freezing point depression constant of benzene?
- (1)  $5.087 \text{ Km}^{-1}$
  - (2)  $40.0 \text{ Km}^{-1}$
  - (3)  $0.52 \text{ Km}^{-1}$
  - (4)  $1.86 \text{ Km}^{-1}$
88. Corrosion of iron can be prevented by coating the Iron surface by \_\_\_\_\_ in galvanisation process
- (1) Zn
  - (2) Pb
  - (3) Ni
  - (4) Sn
89. Zn and Hg do not show variable valency like d-block elements because-
- (1) They are soft
  - (2) Their d-shells are complete
  - (3) They have only two electrons in the outermost subshell
  - (4) Their d-shells are incomplete
90. Which of the following is pair of ionization isomers:
- (1)  $[\text{Co}(\text{NH}_3)_5\text{Br}]\text{SO}_4$  and  $[\text{Co}(\text{NH}_3)_5\text{SO}_4]\text{Br}$
  - (2)  $[\text{Cr}(\text{H}_2\text{O})_5\text{Cl}]\text{Cl}_2 \cdot \text{H}_2\text{O}$  and  $[\text{Cr}(\text{H}_2\text{O})_4\text{Cl}_2]\text{Cl} \cdot 2\text{H}_2\text{O}$
  - (3)  $[\text{Co}(\text{NH}_3)_6][\text{Cr}(\text{CN})_6]$  and  $[\text{Cr}(\text{NH}_3)_6][\text{Co}(\text{CN})_6]$
  - (4)  $\text{cis}[\text{Pt}(\text{NH}_3)_2\text{Cl}_2]$  and  $\text{trans}[\text{Pt}(\text{NH}_3)_2\text{Cl}_2]$
91. Which one of the following will most readily be dehydrated in acidic conditions?
- (1)
  - (2)
  - (3)
  - (4)
92. The increasing order of hydrolysis of the following compounds is
- (i)
  - (ii)
  - (iii)
  - (iv)  $(\text{CH}_3)_3\text{C}-\text{Br}$
- (1) (i) < (iii) < (ii) < (iv)
  - (2) (i) < (iv) < (iii) < (ii)
  - (3) (iv) < (ii) < (iii) < (i)
  - (4) (i) < (iii) < (iv) < (ii)
93. The X – X bond dissociation energy is minimum in
- (1) Fluorine (F<sub>2</sub>)
  - (2) Chlorine (Cl<sub>2</sub>)
  - (3) Bromine (Br<sub>2</sub>)
  - (4) Iodine (I<sub>2</sub>)

### SECTION - B

(ATTEMPT ANY 10 QUESTIONS)

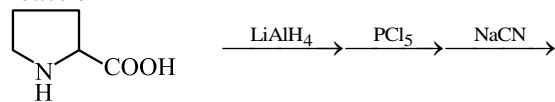
86. How many unit cells are present in a cube shaped ideal crystal of NaCl of mass 1.0g?
- (1)  $5.14 \times 10^{21}$
  - (2)  $1.28 \times 10^{21}$
  - (3)  $1.71 \times 10^{21}$
  - (4)  $2.5 \times 10^{21}$



94. The crystal field stabilization energy (CFSE) is highest for

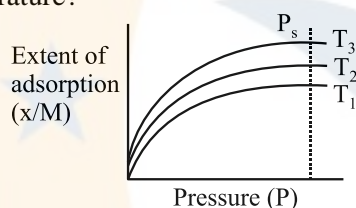
- (1)  $[\text{CoF}_4]^{2-}$  (2)  $[\text{Co}(\text{NCS})_4]^{2-}$   
 (3)  $[\text{Co}(\text{NH}_3)_6]^{3+}$  (4)  $[\text{CoCl}_4]^{2-}$

95. The end product in the following sequence of reaction



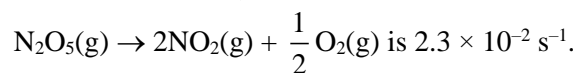
- $\xrightarrow{\text{H}_3\text{O}^{(+)}}$   
 (1) C1CCNC1C(=O)OCC(=O)O  
 (2) C1CCNC1CCC(=O)O  
 (3) C1CCNC1CC(=O)O  
 (4) C1CCNC1CC(C(=O)O)CCl

96. For the graph below, select correct order of temperature?



- (1)  $T_1 > T_2 > T_3$  (2)  $T_2 > T_3 > T_1$   
 (3)  $T_3 > T_2 > T_1$  (4)  $T_1 = T_2 = T_3$

97. The rate constant  $k$ , for the reaction



Which equation given below describes the change of  $[\text{N}_2\text{O}_5]$  with time?  $[\text{N}_2\text{O}_5]_0$  and  $[\text{N}_2\text{O}_5]_t$  correspond to concentration of  $\text{N}_2\text{O}_5$  initially and at time  $t$ ?

- (1)  $[\text{N}_2\text{O}_5]_t = [\text{N}_2\text{O}_5]_0 + kt$   
 (2)  $[\text{N}_2\text{O}_5]_t = [\text{N}_2\text{O}_5]_t e^{kt}$   
 (3)  $\log_{10} [\text{N}_2\text{O}_5]_t = \log_{10} [\text{N}_2\text{O}_5]_0 - kt$   
 (4)  $\ln \frac{[\text{N}_2\text{O}_5]_0}{[\text{N}_2\text{O}_5]_t} = kt$

98. Buna-S is

- (1) Natural polymer  
 (2) Sulphur polymer  
 (3) Synthetic polymer  
 (4) Homopolymer

99. Derivative of Barbituric acid acts as

- (1) antibiotic  
 (2) hypnotic  
 (3) analgesic  
 (4) antacid

100. Nucleic acids are:

- (1) polymers of nucleosides  
 (2) polymers of nucleotides  
 (3) polymers of purine bases  
 (4) polymers of pyrimidine bases

## SECTION - A

**101.** For vegetative propagation in *Bryophyllum* adventitious buds arise from

- (1) Internodes of the stem
- (2) Underground stem
- (3) Notches of the leaves
- (4) Shoot apical meristem

**102.** In how many of the following plants, interflowering period is absent?

Carrot, Neelakuranji, Jackfruit, China rose, Apple, Henbane, Maize

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

**103.** The structure(s) in an angiospermic plant that has/have more than one nucleus in cell(s) is/are

- (i) Nucellus
- (ii) Endothecium
- (iii) Tapetum
- (iv) Developing embryo sac

- (1) (i) and (iii)
- (2) (ii) and (iv)
- (3) (i) only
- (4) (iii) and (iv)

**104.** The pollination type that develops maximum genetic diversity in the offsprings is

- (1) Xenogamy
- (2) Cleistogamy
- (3) Geitonogamy
- (4) Homogamy

**105.** Read the following statements and choose the option which is **true** for them.

**Statement-1:** Parthenocarpic fruits are false fruits as they do not have seeds.

**Statement-2:** Seeds are formed only due to fertilisation.

- (1) Both the statements are incorrect
- (2) Both the statements are correct
- (3) Only statement- 1 is correct
- (4) Only statement-2 is correct

**106.** A pink flowered snapdragon plant when self crossed, the next generation shows red, white and pink flowered plant in 1: 1: 2 ratio. This experiment tells about the

- (1) Segregation of alleles
- (2) Dominance of traits
- (3) Independent assortment of genes
- (4) Co-dominance of alleles

**107.** Select the odd one out w.r.t. chromosomal theory of inheritance

- (1) It was proposed by Sutton and Boveri
- (2) Behaviour of chromosomes is parallel to behavior of genes
- (3) Chromosomes and genes occur in pairs in diploid and haploid cells respectively
- (4) The paired condition of both chromosomes as well as Mendelian factors is restored during fertilization

**108.** In the XX-XO type of sex determination

- (1) Females produce only one type of eggs
- (2) Females have only one X-chromosome
- (3) Males have two X-chromosomes
- (4) Males are homogametic

**109.** The last step of DNA fingerprinting is

- (1) Blotting
- (2) Autoradiography
- (3) Hybridisation
- (4) Isolation of desired DNA

**110.** Choose the **correct** sequence w.r.t. the percentage of different RNAs in a cell.

- (1) rRNA > tRNA > mRNA
- (2) rRNA > mRNA > tRNA
- (3) mRNA > tRNA > rRNA
- (4) mRNA = tRNA > rRNA

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

Column-I	Column-II
a. Promoter gene	(i) Codes for repressor protein
b. VNTR	(ii) Site for RNA polymerase attachment
c. Regulator gene	(iii) The basis of DNA finger printing
d. ESTs	(iv) Identifying all genes that are expressed as RNA

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

112. An improved variety *Brassica*, that is Pusa Swarnim was developed to make it resistant against a fungal disease. Which of the following statement is **true** about this fungus?

- (1) This fungus causes late blight disease
- (2) Mycelium of this fungus is coenocytic
- (3) Sexual spores are formed inside the ascus
- (4) Only sexual mode of reproduction is found in this fungus

113. Formation of which of the following products does **not** involve the activity of prokaryotes?

- (1) Swiss cheese
- (2) Idli
- (3) Methane gas
- (4) Statins

114. A stage of suspended development found in many zooplankton species is called

- (1) Hibernation
- (2) Diapause
- (3) Aestivation
- (4) Migration

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

Column-I (Population interaction)	Column-II (Organisms)
a. Mutualism	(i) Lichens
b. Competition	(ii) Rabbit and grass
c. Predation	(iii) Barnacle and Whale
d. Commensalism	(iv) Abingdon tortoise and goat
(1) a-(iv), b-(iii), c-(i), d-(ii)	
(2) a-(i), b-(ii), c-(iv), d-(iii)	
(3) a-(iv), b-(i), c-(iii), d-(ii)	
(4) a-(i), b-(iv), c-(ii), d-(iii)	

116. Upright pyramid of number is found in all of the following ecosystems, **except**

- (1) Crop field
- (2) Pond
- (3) Tree
- (4) River

117. The reservoir pool for which of the following biogenetic nutrients is atmosphere?

- (1) Sulphur
- (2) Nitrogen
- (3) Calcium
- (4) Phosphorus

118. In a biosphere reserve, human activity can be allowed in

- (1) Transition zone and buffer zone
- (2) Buffer zone and core zone
- (3) Core zone only
- (4) Buffer zone only

119. Ecosystem of a DDT polluted lake will show

- (1) Eutrophication
- (2) Reduction in the number of fish eating birds
- (3) Enormous growth of plankton eating organisms
- (4) Increase in the number of blue-green algae

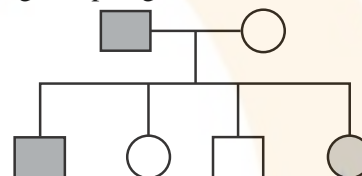
120. Heterochromatin is

- (1) Loosely packed region of chromatin
- (2) Highly condensed and densely packed chromatin region
- (3) Transcriptionally active region of chromatin
- (4) Both (2) & (3)

121. What is the recombination percentage between gene y and w in *Drosophila*?

- (1) 1.3 %
- (2) 98.7 %
- (3) 62.8 %
- (4) 37.2 %

122. Below given pedigree chart cannot be true for



- (1) Sickle cell anaemia
- (2) Colour blindness
- (3) Y-linked trait
- (4) Dominant autosomal disorder

123. Two major environmental issues of global nature are greenhouse effect and depletion of ozone in stratosphere. Enhanced production of which gas is responsible for both environmental issues?

- (1) CO<sub>2</sub>
- (2) CH<sub>4</sub>
- (3) H<sub>2</sub>
- (4) CFCs

124. All of the following are indirect benefits (broadly utilitarian) we receive through ecosystem services, **except**

- (1) Pollination
- (2) Pharmaceuticals
- (3) Pest control
- (4) Flood control

125. Pyramid of energy is always upright because

- (1) Some energy is lost at each step, from particular trophic level to next trophic level
- (2) A given species may occupy more than one trophic level in the same ecosystem at the same time
- (3) Producers are always more in number at first trophic level in each ecosystem
- (4) Energy at higher trophic level is always more than that at a lower trophic level



- 126.** Which one is a **mismatched** pair?
- (1) Primary consumer - Herbivore
  - (2) Tertiary consumer - Secondary carnivore
  - (3) Secondary consumer - T<sub>2</sub> trophic level
  - (4) Primary carnivore - Secondary consumer
- 127.** Phytophagous insects exhibit population interaction that is
- (1) Parasitism
  - (2) Commensalism
  - (3) Predation
  - (4) Mutualism
- 128.** In logistic growth equation  $\left[ \frac{K - N}{K} \right]$  represents
- (1) Biotic potential of organism
  - (2) Influence of environmental resistance on biotic potential
  - (3) Carrying capacity
  - (4) Intrinsic rate of increase
- 129.** Which one is **odd** w.r.t. Human Genome Project?
- (1) Human genome is said to have approximately  $3 \times 10^9$  bp
  - (2) It is closely associated to development of new branch, Bioinformatics
  - (3) The sequence of chromosome 1 was completed at last, after completion of sequencing of other chromosomes
  - (4) More than 10% of the genome codes for proteins
- 130.** VNTR belongs to a class of satellite DNA it is referred as
- (1) Micro-satellite
  - (2) Mini-satellite
  - (3) Non-repetitive DNA fragment
  - (4) SSRs
- 131.** In *lac* operon polycistronic structural genes are regulated by
- (1) Common promoter and regulatory gene
  - (2) Three promoters for each structural genes
  - (3) Regulatory gene and lactose
  - (4) Operator gene only
- 132.** In human, during each pregnancy there is always A probability of either a male or female child. Fill the blank with suitable option.
- (1) 75%
  - (2) 50%
  - (3) 25%
  - (4) 100%
- 133.** Breeding of crops with higher levels of vitamins and minerals or higher protein and healthier fats is called
- (1) Biomagnification
  - (2) Biofortification
  - (3) Bioprospecting
  - (4) Bioremediation
- 134.** In angiosperms most common type of ovule is
- (1) Circinotropous
  - (2) Amphitropous
  - (3) Anatropous
  - (4) Hemianatropous
- 135.** In which of the following plants both autogamy as well as geitonogamy are prevented?
- (1) Castor
  - (2) Maize
  - (3) *Vallisneria*
  - (4) Cucumber
- SECTION – B**  
(ATTEMPT ANY 10 QUESTIONS)
- 136.** In which plant fusing gametes are morphologically distinct type?
- (1) Volvox
  - (2) *Cladophora*
  - (3) *Rhizopus*
  - (4) *Ulothrix*
- 137.** Blood cholesterol lowering agent statins are produced by a/an
- (1) Bacterium
  - (2) Fungus
  - (3) Cyanobacterium
  - (4) Alga
- 138.** Choose the **incorrect** match.
- (1) Conidia - *Penicillium*
  - (2) Zoospores - *Chlamydomonas*
  - (3) Buds - Yeast
  - (4) Bulbil - *Bryophyllum*
- 139.** Pollination by water does **not** take place in
- (1) *Vallisneria*
  - (2) *Hydrilla*
  - (3) *Zostera*
  - (4) *Water lily*
- 140.** What will be genotypic ratio in the F<sub>2</sub> generation of a monohybrid out cross?
- (1) 9 : 3 : 3 : 1
  - (2) 1 : 2 : 1
  - (3) 1 : 1
  - (4) 3 : 1
- 141.** The change in nitrogenous base of DNA which is responsible for sickle-cell anaemia, is
- (1) GAG → GUG
  - (2) GUG → GAG
  - (3) CTC → CAC
  - (4) CAC → CTC

- 142.** Choose the **incorrect** statement.
- (1) Cistron is a segment of DNA which codes for a polypeptide
  - (2) Mostly, structural genes in eukaryotes are monocistronic
  - (3) Mostly in bacteria structural genes are polycistronic
  - (4) Expressed DNA sequences are defined as introns
- 143.** Codons are degenerate. It means
- (1) Some amino acids are coded by more than one codon
  - (2) One codon codes for only one amino acid
  - (3) The codon is read in m-RNA in a contiguous fashion
  - (4) One codon codes for many amino acids
- 144.** In human genome, total locations where single base differences occur are about
- (1) 3164.7 million
  - (2) 80000 million
  - (3) 1.4 million
  - (4) 2968 million
- 145.** Choose the **correct** match regarding the bioactive molecules and the microbes used for their production.
- (1) Cyclosporin A - *Monascus purpureus*
  - (2) Statin - *Trichoderma polysporum*
  - (3) Citric acid - *Aspergillus niger*
  - (4) Lactic acid - *Clostridium*
- 146.** An orchid growing as an epiphyte on a mango tree is the example of
- (1) Mutualism
  - (2) Commensalism
  - (3) Competition
  - (4) Parasitism
- 147.** Least contribution in global warming by a greenhouse gas is of
- (1) CFCs
  - (2) Methane
  - (3) N<sub>2</sub>O
  - (4) Carbon dioxide
- 148.** Which of the following is the semi-dwarf variety of rice?
- (1) Sonalika
  - (2) Kalyan Sona
  - (3) Pusa Swarnim
  - (4) Jaya
- 149.** How many of the following are seral communities of a hydrarch succession?
- |  |
|--|
| Scrub stage, marsh-meadow stage, reed swamp stage, phytoplankton, forest |
|--|
- (1) 2
  - (2) 3
  - (3) 4
  - (4) 5
- 150.** Which of the following have maximum biodiversity among vertebrates?
- (1) Fishes
  - (2) Birds
  - (3) Mammals
  - (4) Reptiles

# ZOOLOGY

## SECTION - A

**151.** Choose the correct statement:

- (1) Size of testis is 4-5 cm in length and 1 cm in width
- (2) The scrotum is maintained at body temperature
- (3) The testes are situated outside the abdominal cavity in humans
- (4) The earliest stages of spermatogenesis occur closest to the lumen of seminiferous tubules

**152.** In males, excretory and reproductive systems share the:

- (1) Testes
- (2) Vas deferens
- (3) Seminal vesicle
- (4) Urethra

**153.** Seminiferous tubule:

- (1) Is lined by two types of cells called spermatogonia and Sertoli cells
- (2) Contains huge number of Leydig cells inside it
- (3) Contains huge number of interstitial cells inside it
- (4) Open directly into vasa efferentia

**154.** The vulva:

- (1) Consists of the external genitalia of a woman
- (2) Includes mons pubis, labia majora, labia minora, clitoris and hymen
- (3) Both (1) and (2)
- (4) Includes mons pubis, labia majora, labia minora, clitoris and vagina

**155.** The part of fallopian tube near uterus is called \_\_\_\_\_ and near ovary is called \_\_\_\_\_.

- (1) Uterus; Isthmus
- (2) Cervical canal; Isthmus
- (3) Isthmus; Ampulla
- (4) Isthmus; Infundibulum

**156.** In humans, during ovulation

- (1) The Graafian follicle ruptures to release the primary oocyte
- (2) The Graafian follicle do not rupture
- (3) Sharp decline in the level of LH and FSH occurs
- (4) The Graafian follicle ruptures to release the secondary oocyte

**157.** Which one is true for the oral contraceptive 'SAHELI'?

- (1) It is 'once a week' pill
- (2) It has multiple side effects
- (3) It is non-steroidal with high contraceptive value
- (4) Both (1) and (3)

**158.** An ideal contraceptive should:

- (1) Interfere with sexual act of the user
- (2) Interfere with the sexual drive of the user
- (3) Always be used orally
- (4) user-friendly and reversible with no side effects

**159.** Match the column:

Column-I	Column-II
A. Condom	(i) Oral
B. Pills	(ii) LNG-20
C. Implants	(iii) Barrier
D. IUDs	(iv) Under-skin

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

**160.** Two contraceptive Methods that are generally irreversible and which block the gametes from moving to a site where fertilisation can occur are:

- (1) Male condom and oral contraceptives
- (2) Male condom and female condom
- (3) Vasectomy and tubectomy
- (4) Coitus interruptus and rhythm method

**161.** Health:

- (1) Means absence of disease and physical fitness of the body
- (2) Is the state of complete physical, mental and social well-being
- (3) Increases longevity of people and reduces infant and maternal mortality
- (4) Is related to all of the above

**162.** The sustained fever of 39° – 40°C, weakness, stomach pain, constipation, headache and loss of appetite are the common symptoms of:

- (1) Typhoid
- (2) Pneumonia
- (3) Amoebiasis
- (4) Filariasis



163. The most serious type of malaria is \_\_\_\_\_ caused by \_\_\_\_\_.

- (1) Malignant malaria; *Plasmodium falciparum*
- (2) Quartan malaria; *Plasmodium malaria*
- (3) Benign tertian malaria; *Plasmodium vivax*
- (4) Mild tertian malaria; *Plasmodium ovale*

164. Common cold infects:

- (1) Lungs
- (2) Nasal and respiratory passage
- (3) Both (1) and (2)
- (4) Lungs and heart

165. The heavy and light chains of an antibody are connected by:

- (1) Phosphoester bond
- (2) Phosphodiester bond
- (3) Disulphide bonds
- (4) Glycosidic bonds

166. Insertional inactivation is related to:

- (1) Microinjection
- (2) Gene gun
- (3) Gel electrophoresis
- (4) Selection of recombinants

167. The DNA fragments separated can be visualised only after staining DNA with a compound followed by exposure to radiations:

- (1) Methylene blue, visible
- (2) Ethidium bromide, UV
- (3) Acetocarmine, UV
- (4) Safranin, visible

168. The techniques in which a foreign DNA is precipitated on the surface of the tungsten or gold particles and shot into the target cells is known as:

- (1) Microinjection
- (2) Chemical-mediated genetic transformation
- (3) Electroporation
- (4) Biolistics

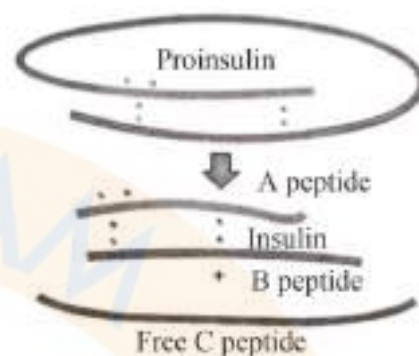
169. Which of the following method can be used for making the bacterial cell 'competent'?

- (1) Treating with specific concentration of divalent cation ( $\text{Ca}^{2+}$ )
- (2) Treating with specific concentration of monovalent cation ( $\text{K}^+$ )
- (3) Heat shock
- (4) Both (1) and (3)

170. An enzyme catalyses the removal of nucleotides from the ends of DNA is:

- (1) Endonuclease
- (2) Exonuclease
- (3) DNA ligase
- (4) Hind II

171. What does the diagram depicts?



- (1) Degradation of insulin
- (2) Formation of proinsulin
- (3) Maturation of pro-insulin into insulin
- (4) Addition of C-peptide to proinsulin

172. Which of the following is correct?

- (1) A nematode *Meloidogyne incognita* infects the roots of tobacco plants and causes a great reduction in yield
- (2) Nematode infection can be prevented in tobacco plants by RNAi technology
- (3) RNA interference takes place in all eukaryotic organisms as a method of cellular defense
- (4) All of these

173. Which step of Government of India has taken to cater to the requirement of patent terms and other emergency provisions in regards?

- (1) Biopiracy act
- (2) Indian Patents bill
- (3) RTI act
- (4) Negotiable instruments act

174. Crystals of Bt toxin produced by some bacteria do not kill the bacteria themselves because:

- (1) Bacteria are resistant to the toxin
- (2) Toxin is immature
- (3) Toxin is inactive
- (4) Bacteria encloses toxin in a special sac

- 175.** Match the terms given in column I with their descriptions given in column II and select the correct option from the given codes.

	Column I		Column II
A.	Out-crossing	(i)	Mating of closely related individuals within the same breed
B.	Interspecific hybridisation	(ii)	Mating of animals of same breed but having no common ancestors on either side of their pedigree for 4-6 generations
C.	Cross-breeding	(iii)	Mating of animals of two different related species
D.	Inbreeding	(iv)	Mating of animals belonging to different breeds

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

- 176.** Which of the following are common freshwater fishes?

- (1) Mackerel and rohu
- (2) Rohu, common carp and Catla
- (3) Hilsa and sardines
- (4) None of these

- 177.** According to Charles Darwin:

- (1) There has been gradual evolution of life forms
- (2) Every population has its own characteristics features that differ from the characteristics of other populations
- (3) Both (1) and (2)
- (4) He believed in theory of special creation

- 178.** According to Lamarckism, long necked giraffes evolved because

- (1) Nature selected only long necked animals
- (2) Of stretching of necks by short one over many generations
- (3) Mutation
- (4) Humans preferred long necked animals

- 179.** Which of the following is correct according to Hugo de Vries?

- (1) Saltation causes speciation
- (2) Mutations can be predicted
- (3) Natural selection is the cause of evolution but not mutation
- (4) Saltation is single step minor mutation

- 180.** Select the analogous structures:

- (1) Wings of butterfly and birds
- (2) Flippers of penguins and dolphins
- (3) Thorns of Bougainvillea and tendrils of Cucurbita
- (4) Both (1) and (2)

- 181.** The Tasmanian wolf is an Australian marsupial is similar in appearance to a placental wolf. This is due to the fact that:

- (1) Marsupial and placental wolf are very closely related
- (2) These showed divergent evolution
- (3) They underwent similar selection pressure
- (4) Marsupium and placenta are vestigial structures

- 182.** What is the total number of non-primate mammals in the given series?

Cow, Sheep, Rat, Deer,  
Dog, Tiger, Monkey, Human, Ape

- (1) Three
- (2) Four
- (3) Six
- (4) Seven

- 183.** The pouched mammals of Australia survived because of

- (1) Lack of competition from any other mammals
- (2) Continental drift
- (3) Pouched mammals take better care of their young ones than placental mammals.
- (4) Both (1) and (2)

- 184.** Homozygous pure lines in cattle can be obtained by

- (1) Mating of individuals of different species
- (2) Mating of animals of different breed
- (3) Mating of unrelated individuals of same breed
- (4) Mating of related individuals of same breed

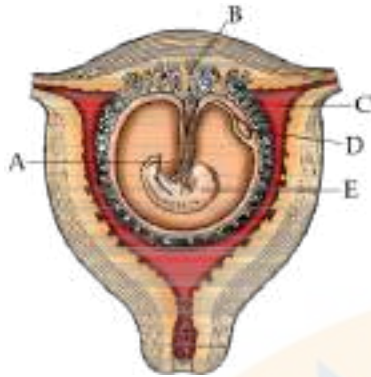
- 185.** Identify the wrong statement.

- (1) A haploid parent produces gamete by mitotic division
- (2) In diploid organisms, specialised cells called meiocytes undergo meiosis
- (3) Zygote is the vital link that ensures continuity of species
- (4) During embryogenesis, zygote undergoes meiosis and cell differentiation.

## SECTION – B

(ATTEMPT ANY 10 QUESTIONS)

186. Identify A, B, C, D and E in the diagram showing human foetus within the uterus:



	A	B	C	D	E
(1)	Umbilical cord	Placental villi	Yolk sac	Uterus cavity	Embryo
(2)	Placental villi	Umbilical cord	Uterus cavity	Yolk sac	Embryo
(3)	Umbilical cord	Placental villi	Uterus cavity	Yolk sac	Embryo
(4)	Umbilical cord	Placental villi	Uterus cavity	Yolk sac	Zygote

187. Choose the odd one out w.r.t. placental hormone.

- (1) hCG and hPL
- (2) Estrogen and progesterone
- (3) Relaxin and prolactin
- (4) Human placental lactogen and progesterone

188. Match the column:

Column-I	Column-II
A. Parturition	(i) Milk production
B. Lactation	(ii) Initial milk with Several antibodies, healthy protein and less fat
C. Colostrum	(iii) Foetus delivery
D. Oxytocin	(iv) Uterine contraction

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

189. In which ART, the semen is artificially introduced into the female?

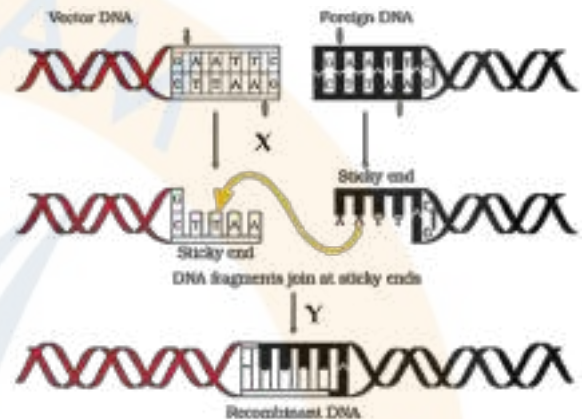
- (1) IUI
- (2) ET
- (3) IUT
- (4) GIFT

190. Read the following statements about a drug and identify the drug.

- I. These are known for their effects on cardiovascular system of the body
- II. These interact with the receptors present principally in brain
- III. Generally taken by inhalation and oral ingestion

- (1) *Papaver somniferum*
- (2) *Erythroxylem coca*
- (3) *Atropa belladonna*
- (4) *Cannabis sativa*

191. The transfer of genetic material from one bacterium to identify the enzyme X and Y?

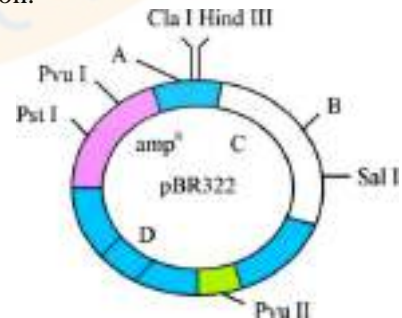


- (1) X = Sma I, Y = DNA ligase
- (2) X = Bam HI, Y = RNA ligase
- (3) X = Eco RI, Y = DNA ligase
- (4) X = Hind III, Y = RNA ligase

192. Which of the following is true for downstream processing?

- (1) The product is formulated with suitable preservatives
- (2) The formulations undergo clinical trial in case of drugs
- (3) Strict quality control testing for each product is done
- (4) All of these

193. Identify A, B, C and D in the given figure of *E. coli* cloning vector pBR322 and select the correct option.



	A	B	C	D
(1)	Hind II	EcoR I	amp <sup>R</sup>	Ori
(2)	Hind II	BamH I	Kan <sup>R</sup>	amp <sup>R</sup>
(3)	BamH I	Pst I	Ori	amp <sup>R</sup>
(4)	EcoR I	BamH I	tet <sup>R</sup>	ori



**194.** What is not true amongst the following w.r.t transgenic cow?

- (1) The milk had a protein called human  $\alpha$ -lactalbumin
- (2) The 1<sup>st</sup> transgenic cow was called Rosie
- (3) The milk produced was more balanced for humans than natural cow milk
- (4) The protein content was 3.4gm/litre of the milk

**195.** Find the True (T)/false (F) statements and choose the correct option:

- (I) Agriculture came around 10,000 years back and human settlement started
- (II) The Neanderthal man with a brain size 1000 cc lived in near east and central asia between 1,00,000 – 40,000 years back
- (III) During ice-age between 75,000 – 10,000 years ago modern *Homo sapiens* arose.
- (IV) *Homo sapiens* arose in Africa and moved across continents and developed into distinct races

	I	II	III	IV
(1)	T	T	T	T
(2)	T	F	T	F
(3)	F	F	T	T
(4)	T	F	T	T

**196.** Artificial insemination means

- (1) Transfer of sperms of husband to a test tube containing ova
- (2) Artificial introduction of sperms of a healthy donor into the vagina
- (3) Introduction of sperms of healthy donor directly into the ovary
- (4) Transfer of sperms of a healthy donor to a test tube containing ova

**197.** Mark the wrong statement

- (1) Giant ferns fell to form coal deposits
- (2) In 1938, a fish caught in South Africa happened to be a coelacanth, which was thought to be extinct.
- (3) Amphibians lay thick-shelled eggs, which do not dry up in sun unlike those of reptiles.
- (4) By 500 million years ago, invertebrates were formed and active.

**198.** Read the following statements:

- (i) Drugs like adrenaline, antihistamines and steroids reduce the symptoms of allergy.
- (ii) In autoimmune diseases, the immune system has the ability to distinguish the foreign organisms from the self.
- (iii) The receptors present on B-lymphocytes that recognize discrete sites on the antigen are the antibodies
- (iv) Interferons are the group of proteins produced by viral infected cells

Which of the above statements are correct?

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

**199.** RNA interference involves

- (1) Synthesis of cDNA and RNA using reverse transcriptase
- (2) Silencing of specific mRNA due to complementary dsRNA
- (3) Interference of RNA in synthesis of DNA
- (4) Synthesis of mRNA from DNA

**200.** Which of the following is an example of artificially acquired active immunity?

- (1) Antivenom
- (2) Immunity acquired after measles
- (3) Vaccination
- (4) Colostrum