



# Aakash

Medical | IIT-JEE | Foundations

Corporate Office : AESL, 3rd Floor, Incuspaze Campus-2, Plot No. 13, Sector-18,  
Udyog Vihar, Gurugram, Haryana - 122018, Ph.011-47623456

MM : 720

Final Test Series(P1)-2024-25\_Test-14B

Time : 180 Min.

Topics Covered:  
Complete Syllabus of Class XI & XII

### General Instructions :

Duration of Test is 3 hrs.

The Test consists of 180 questions. The maximum marks are 720.

There are three parts in the question paper consisting of Physics, Chemistry, Biology which have 45 questions each in Physics & Chemistry and 90 questions in Biology.

Each question carries +4 marks. For every wrong response, -1 mark shall be deducted from the total score. Unanswered/unattempted questions will be given no marks.

Use blue/black ballpoint pen only to darken the appropriate circle.

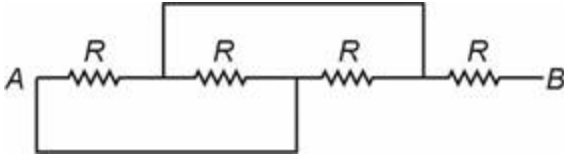
Mark should be dark and completely fill the circle.

Dark only one circle for each entry.

Dark the circle in the space provided only.

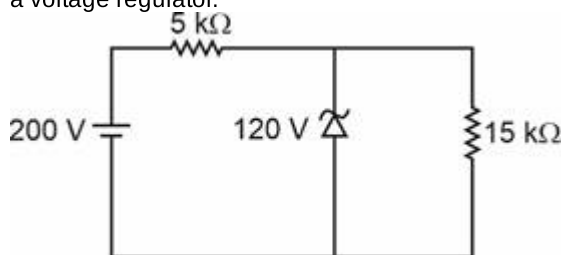
Rough work must not be done on the Answer sheet and do not use white fluid or any other rubbing material on the Answer sheet.

## PHYSICS

- Two very small charged spheres having charges of  $2 \times 10^{-7}$  C and  $3 \times 10^{-7}$  C are placed 30 cm apart in air. The electrostatic force of interaction between these two charges will be
  - $6 \times 10^{-3}$  N
  - $4 \times 10^3$  N
  - $3 \times 10^{-3}$  N
  - $5 \times 10^3$  N
- Which of the following options is **correct**?
  - Electric field is in the direction in which the potential decreases steepest.  
Magnitude of electric field is given by the change in
  - magnitude of potential per unit displacement normal to the equipotential surface at the point
  - The interior of a conductor can have no excess charge in the static situation
  - All of these
- A 600 pF capacitor is charged by 200 V supply. It is then disconnected from the supply and is connected to another uncharged 600 pF capacitor. The energy lost in the process is
  - $3 \times 10^{-6}$  J
  - $4 \times 10^{-6}$  J
  - $5 \times 10^{-6}$  J
  - $6 \times 10^{-6}$  J
- Effective resistance of the network shown, across points A and B is
 
  - $\frac{R}{2}$
  - $\frac{4R}{3}$
  - $\frac{5R}{3}$
  - $\frac{7R}{3}$

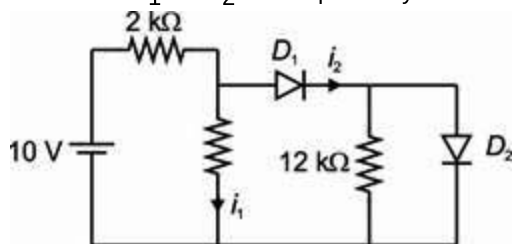
5. A : The drift velocity of electrons in a metallic wire will decrease, if the temperature of the wire is increased.  
R : Relaxation time will decrease on increasing temperature.
- Both Assertion & Reason are true and the reason is the correct explanation of the assertion.
  - Both Assertion & Reason are true but the reason is not the correct explanation of the assertion.
  - Assertion is true statement but Reason is false.
  - Both Assertion and Reason are false statements.
6. A straight wire, carrying a current 8 A and makes an angle  $30^\circ$  with the direction of uniform magnetic field of 1.5 T. The magnitude of magnetic force per unit length on the wire is equal to
- 6 N/m
  - 3 N/m
  - 4 N/m
  - 5 N/m
7. A proton and an  $\alpha$ -particle, having same kinetic energies are moving in a circular path in uniform magnetic field  $B$ . Then
- The radius of circular path is same for both
  - Both will have different radius of circular path
  - Both have same time period of their circular motion
  - None of these
8. The ratio of volume of two nuclei  ${}^{27}\text{A}$  to  ${}^{125}\text{B}$  is
- 3 : 5
  - 27 : 125
  - 125 : 27
  - 5 : 3
9. Current in a coil reduces from 5.0 A to zero in 0.1 second. If an average emf of 200 V is induced, then self-inductance of the coil will be
- 1 H
  - 2 H
  - 3 H
  - 4 H
10. A copper rod is moved in a uniform magnetic field. If the direction of motion of rod is perpendicular to magnetic field, then the emf developed across its ends will be proportional to
- $\frac{1}{\text{Length of rod}}$
  - Velocity of rod
  - $\frac{1}{\text{Velocity of rod}}$
  - $\frac{1}{\text{Magnetic field}}$
11. Given below are two statements: one is labelled as **Assertion (A)** and the other is labelled as **Reason (R)**.  
**Assertion (A):** For making permanent magnet steel is preferred over soft iron.  
**Reason (R):** Coercivity of steel is less than soft iron.  
In the light of above statements, select the **correct** option.
- Both (A) and (R) are true and (R) is the correct explanation of (A).
  - Both (A) and (R) are true but (R) is not the correct explanation of (A).
  - If (A) is true but (R) is false.
  - If (A) and (R) both are false.
12. An alternating current is given by  $I = I_1 \cos \omega t + I_2 \sin \omega t$ . The rms value of current  $I$  will be
- $\frac{I_1 + I_2}{\sqrt{2}}$
  - $\frac{I_1 + I_2}{2}$
  - $\frac{\sqrt{I_1^2 + I_2^2}}{2}$
  - $\frac{I_1^2 + I_2^2}{2}$
13. The Maxwell's equations are written as
- $\oint \vec{E} \cdot d\vec{s} = \frac{q_{\text{enclosed}}}{\epsilon_0}$
  - $\oint \vec{B} \cdot d\vec{s} = 0$
  - $\oint \vec{E} \cdot d\vec{l} = -\frac{d\phi_B}{dt}$
- Which of the Maxwell's equations contains non-conservative electric field?
- (i) only
  - (ii) & (iii)
  - (i) & (iii)
  - (iii) only
14. Time period of revolution of the electron in Bohr's orbit varies with principal quantum number ( $n$ ) as
- $\frac{1}{n}$
  - $n$
  - $n^3$
  - $\frac{1}{n^3}$
15. Which of the following phenomena cannot be explained by wave theory of light?
- Reflection of light
  - Diffraction of light
  - Photoelectric effect
  - Refraction of light

16. A circuit diagram is shown in which Zener diode is used as a voltage regulator.



The current through Zener diode is

- (1) 9 mA  
 (2) 15 mA  
 (3) Zero  
 (4) 8 mA
17. In the following circuit, if  $D_1$  and  $D_2$  are ideal diodes, then the value of  $i_1$  and  $i_2$  are respectively



- (1) Zero, Zero  
 (2) 5 mA, 5 mA  
 (3) 5 mA, Zero  
 (4) Zero, 5 mA

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

**Assertion (A):** In the process of photoelectric emission, the emitted photoelectrons have different kinetic energy.

**Reason (R):** The saturation photocurrent depends on the intensity of incident radiation at a given frequency  $\nu$  and  $\nu > \nu_0$  ( $\nu_0 \rightarrow$  Threshold frequency)

In the light of above statements, select the **correct** option.

- (1) Both (A) and (R) are correct and (R) is the correct explanation of (A)  
 (2) Both (A) and (R) are correct but (R) is not the correct explanation of (A)  
 (3) (A) is correct but (R) is incorrect  
 (4) (A) is incorrect but (R) is correct

19. Ionization energy from ground state of hydrogen atom is  $E$ . Match the following two columns for  $\text{He}^+$  atom.

**Column I**

**Column II**

- |   |           |
|---|-----------|
| a. Ionization energy from ground state        | (p) $-8E$ |
| b. Potential energy in ground state           | (q) $E$   |
| c. Kinetic energy in first excited state      | (r) $4E$  |
| d. Ionization energy from first excited state | (s) $16E$ |

- (1) a(r), b(p), c(q), d(q)  
 (2) a(r), b(p), c(q), d(s)  
 (3) a(r), b(q), c(p), d(q)  
 (4) a(s), b(q), c(q), d(r)

20. A tank is filled to a height  $H_0$ . The apparent depth of a needle lying at the bottom of the tank is measured to be  $H$ , then refractive index of water is

- (1)  $\frac{H}{H_0}$   
 (2)  $\frac{H_0}{H}$   
 (3)  $\frac{3}{2} \frac{H_0}{H}$   
 (4)  $\frac{2H_0}{3H}$

21. A convex lens of focal length 30 cm is in contact with concave lens of focal length 20 cm, then the focal length of this combined lens system is

- (1)  $-10$  cm  
 (2) 15 cm  
 (3) 25 cm  
 (4)  $-60$  cm

22. In a double slit experiment, the slits are separated by distance ' $d$ ' whereas the slits and the screen are separated by distance  $D$ . If the distance between the central bright and fourth bright is ' $y$ ', then wavelength of light used will be

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

23. In Young's double slit experiment using monochromatic light of wavelength  $\lambda$ , the intensity of light at a point where path difference is  $\lambda$ , is  $K$  units. The intensity of light at a point, where path difference is  $\frac{\lambda}{3}$ , will be

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

24. The number of significant zeros present in the measured value 0.010030 is

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

25. A : Dimensional formula for angular velocity and frequency is equal.

R : Physical quantities with same unit always have same nature.

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

26. A stone dropped from the top of a tower is found to travel  $\frac{7}{16}$  of the height of tower during the last second of its fall. The total time of fall is

- (1) 2 s
- (2) 3 s
- (3) 4 s
- (4) 5 s

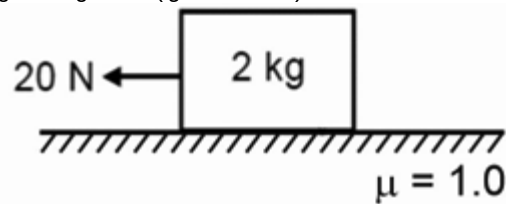
27. For ground to ground oblique projectile motion, the angle between instantaneous velocity vector and acceleration vector at highest point of its motion is (Neglect air drag)

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

28. A projectile is projected from origin in a vertical plane ( $x$ - $y$  plane) as  $\vec{v} = (3\hat{i} + 4\hat{j}) \text{ m s}^{-1}$ . Maximum height attained by the particle in  $y$ -direction is ( $g = 10 \text{ m s}^{-2}$ )

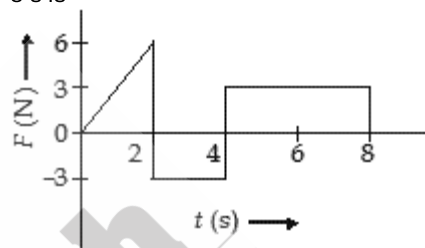
- (1) 0.4 m
- (2) 0.6 m
- (3) 0.8 m
- (4) 1.0 m

29. The net contact force between surface and mass in the given figure is ( $g = 10 \text{ m/s}^2$ )



- (1) 20 N
- (2)  $20\sqrt{2}$  N
- (3) 30 N
- (4) Zero

30. The force  $F$  acting on a particle of mass  $m$  is indicated by the force-time graph shown below. The change in momentum of the particle over the time interval from zero to 8 s is



- (1) 24 N s
  - (2) 20 N s
  - (3) 12 N s
  - (4) 6 N s
31. The angle between force and displacement for maximum and zero work respectively, will be
- (1)  $0^\circ$  and  $180^\circ$
  - (2)  $90^\circ$  and  $0^\circ$
  - (3)  $180^\circ$  and  $0^\circ$
  - (4)  $0^\circ$  and  $90^\circ$
32. In an inelastic collision
- (1) Only momentum is conserved
  - (2) Only kinetic energy is conserved
  - (3) Neither momentum nor kinetic energy is conserved
  - (4) Both momentum and kinetic energy are conserved

33. The moment of inertia of a uniform solid sphere about its diameter is (where  $M$  is mass of solid sphere,  $R$  = radius of sphere)

- (1)  $\frac{MR^2}{5}$
- (2)  $\frac{2MR^2}{5}$
- (3)  $\frac{MR^2}{3}$
- (4)  $\frac{2MR^2}{3}$

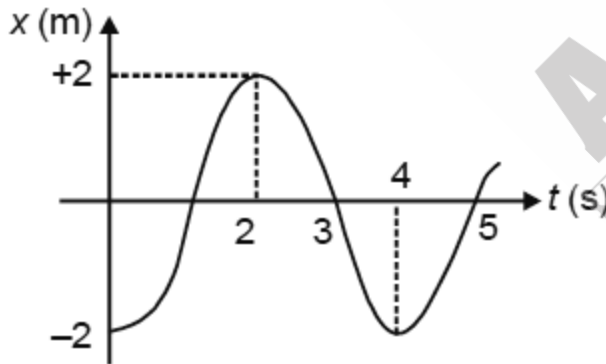
34. If  $\vec{F}$  is the force acting on a particle having position vector  $\vec{r}$  and  $\vec{\tau}$  be the torque of this force, then  $\vec{\tau} \cdot \vec{F}$  is

- (1) Positive
- (2) Negative
- (3) Zero
- (4) May be positive or negative

35. The ratio of orbital speed of two satellites of earth having equal masses and revolving with orbital radii  $R$  and  $4R$  respectively will be

- (1) 1 : 8
- (2) 2 : 1
- (3) 1 : 4
- (4) 16 : 1

36. A particle is executing S.H.M. Graph of its displacement vs time is shown in the figure. Maximum acceleration of the particle is



- (1)  $\frac{\pi^2}{2} \text{ m/s}^2$
- (2)  $\frac{\pi^2}{4} \text{ m/s}^2$
- (3)  $4\pi^2 \text{ m/s}^2$
- (4)  $\frac{\pi^2}{8} \text{ m/s}^2$

37. The kinetic energy of one mole of an ideal gas is  $\frac{5}{2}RT$  at absolute temperature  $T$ . The molar heat capacity at constant volume for the gas is

- (1)  $3.2 R$
- (2)  $0.5 R$
- (3)  $1.5 R$
- (4)  $2.5 R$

38. The wavelength corresponding to maximum intensity of radiation from a black body at temperature 4000 K is 5000 Å. If temperature of body is decreased by 2000 K, then emitted wavelength corresponding to maximum intensity will be

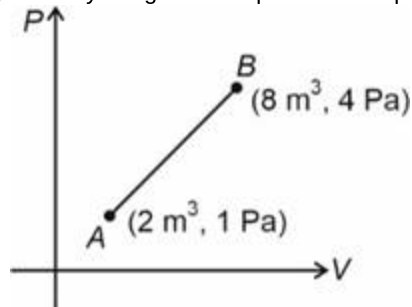
- (1) 8000 Å
- (2) 6000 Å
- (3) 4000 Å
- (4) 10000 Å

39. In the standing wave shown, particles at the position A and B have a phase difference of



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

40. An ideal gas undergoes a thermodynamic process in which the state of gas changes from A to B as shown. The work done by the gas in the process is equal to



- (1) 32 J
- (2) 15 J
- (3) 8 J
- (4) 16 J

41. Heat is supplied at constant pressure to a polyatomic ideal gas ( $\gamma = \frac{4}{3}$ ). The fraction of heat which goes to work done by the gas

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

42. An incompressible fluid flows through horizontal tube as shown in the figure. The velocity of fluid at the inlet will be (the areas of the tube openings are indicated in the figure)



- (1) 4 m/s  
 (2) 3 m/s  
 (3) 5 m/s  
 (4) 6 m/s

43. A 25 kg load is suspended by a uniform wire of cross-sectional area  $5 \text{ mm}^2$ . The stress produced in the wire is (Take  $g = 10 \text{ m/s}^2$ )

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

44. For a uniform hollow sphere, choose the correct option.

- (1) Gravitational field inside the hollow sphere is zero  
 (2) Gravitational potential inside the hollow sphere is constant  
 (3) Gravitational potential inside the hollow sphere is same as its surface  
 (4) All of these

45. The value of acceleration due to gravity reduces to half of its value at surface of earth at a height  $h$ , then

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

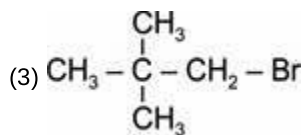
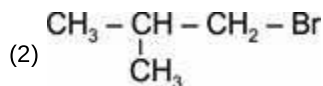
CHEMISTRY

46. In a  $S_N2$  substitution reaction of the type



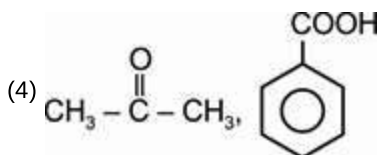
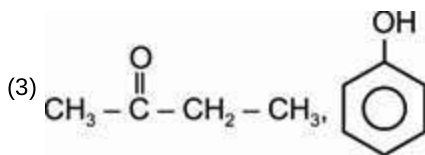
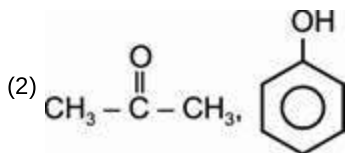
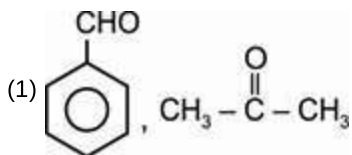
Which one of the following has the lowest relative rate?

- (1)  $\text{CH}_3 - \text{CH}_2 - \text{Br}$



- (4)  $\text{CH}_3 - \text{Br}$

47. Phenol is distilled with Zn dust followed by Friedel crafts alkylation with n-propyl chloride in the presence of anhydrous  $\text{AlCl}_3$  to give a major compound (B). (B) is oxidised in the presence of air to form the compound (C). (C) on acidic hydrolysis gives compound (D) and (E). The structure of (D) and (E) are

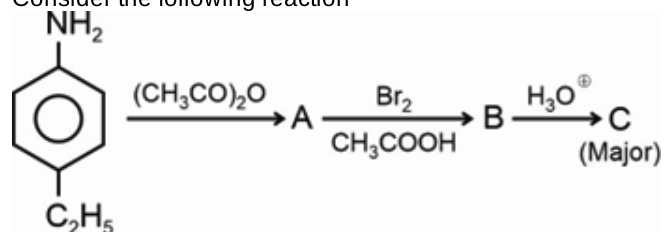


48. Which of the following reactions will result in the formation of new carbon-carbon bond?

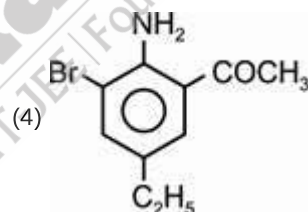
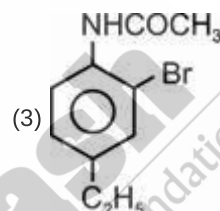
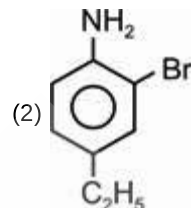
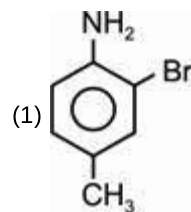
- Cannizzaro reaction
  - Aldol- condensation
  - Reimer – Tiemann reaction
  - Kolbe's reaction
- Choose the correct option

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

49. Consider the following reaction



The product 'C' is



50. Match List-I with List-II

	List-I (Name reaction)		List-II (Product formed)
a.	Gabriel synthesis	(i)	Benzaldehyde
b.	Sandmeyer reaction	(ii)	Ethers
c.	Williamson synthesis	(iii)	Primary amines
d.	Etard reaction	(iv)	Benzene chloride

Choose the correct answer from the options given below :

- a(iii), b(iv), c(ii), d(i)
- a(iii), b(iv), c(i), d(ii)
- a(iv), b(iii), c(ii), d(i)
- a(ii), b(iii), c(i), d(ii)

51. Which of the following is a basic amino acid?

- (1) Alanine
- (2) Tyrosine
- (3) Lysine
- (4) Serine

52. Spin only magnetic moment is same for which of the following ions?

- a.  $\text{Ti}^{3+}$
- b.  $\text{Cr}^{2+}$
- c.  $\text{Mn}^{2+}$
- d.  $\text{Fe}^{2+}$

Choose the most appropriate answer from the options given below

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

53. Given below are two statements :

**Statement I :**  $[\text{Co}(\text{NH}_3)_6]^{3+}$  is a homoleptic complex whereas  $[\text{Co}(\text{NH}_3)_4\text{Cl}_2]^+$  is a heteroleptic complex

**Statement II:**  $\text{cis}[\text{CrCl}_2(\text{ox})_2]^{3-}$  is an optically active complex ion whereas  $\text{trans}[\text{CrCl}_2(\text{ox})_2]^{3-}$  is an optically inactive complex ion.

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

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

54. Heat of reaction for  $\text{C}_6\text{H}_{12}\text{O}_6(\text{s}) + 6\text{O}_2(\text{g}) \rightarrow 6\text{CO}_2(\text{g}) + 6\text{H}_2\text{O}(\text{l})$  at constant pressure is  $-651 \text{ kcal}$  at  $17^\circ\text{C}$ . The heat of reaction at constant volume at  $17^\circ\text{C}$  is

- (1)  $-551 \text{ kcal}$
- (2)  $-651 \text{ kcal}$
- (3)  $-350 \text{ kcal}$
- (4)  $-710 \text{ kcal}$

55. At  $25^\circ\text{C}$ , the dissociation constant of a base, BOH is  $1.0 \times 10^{-10}$ , the concentration of hydroxyl ions in  $0.01 \text{ M}$  aqueous solution of the base would be

- (1)  $1.0 \times 10^{-7} \text{ mol L}^{-1}$
- (2)  $1.0 \times 10^{-6} \text{ mol L}^{-1}$
- (3)  $2.0 \times 10^{-4} \text{ mol L}^{-1}$
- (4)  $1.0 \times 10^{-5} \text{ mol L}^{-1}$

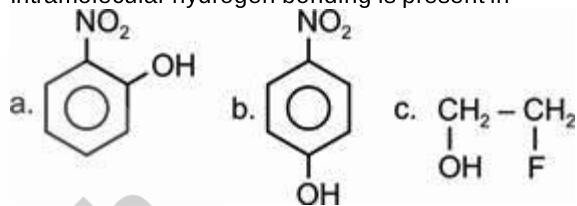
56. When  $44.8 \text{ L}$  of  $\text{H}_2(\text{g})$  is mixed with  $22.4 \text{ L}$  of  $\text{Cl}_2(\text{g})$ , at STP, the moles of  $\text{HCl}(\text{g})$  formed according to reaction  $\text{H}_2(\text{g}) + \text{Cl}_2(\text{g}) \rightarrow 2\text{HCl}(\text{g})$ , is

- (1) 1 mole
- (2) 2 moles
- (3) 0.5 mole
- (4) 1.5 moles

57. According to the Bohr theory, which of the following transitions in the hydrogen atom will give rise to the least energetic photon?

- (1)  $n = 5$  to  $n = 1$
- (2)  $n = 4$  to  $n = 2$
- (3)  $n = 4$  to  $n = 3$
- (4)  $n = 5$  to  $n = 3$

58. Intramolecular hydrogen bonding is present in



Choose the correct option

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

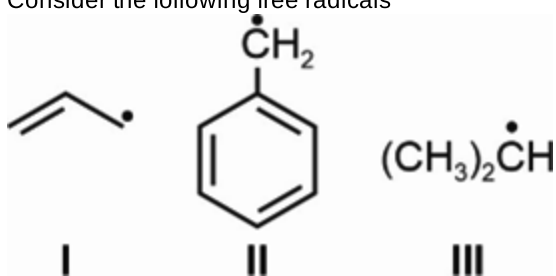
59. Oxidation number of S in  $\text{S}_2\text{O}_8^{2-}$ , P in  $\text{PO}_4^{3-}$  and Mn in  $\text{MnO}_4^{2-}$  respectively are

- (1) +6, +5, +6
- (2) +5, +5, +6
- (3) +5, +5, +7
- (4) +6, +5, +7

60. The hybridization and structure of  $\text{Si}(\text{CH}_3)_4$  respectively are

- (1)  $sp^3d$ , Trigonal bipyramidal
- (2)  $sp^3$ , tetrahedral
- (3)  $sp^3d^2$ , octahedral
- (4)  $sp^2$ , trigonal planar

61. Consider the following free radicals



The correct order of stability is

- (1) I > II > III
  - (2) II > I > III
  - (3) II > III > I
  - (4) I > III > II
62. Which reagent can be used to distinguish between but-1-yne and but-2-yne?

- (1)  $H_2$ , Pd-BaSO<sub>4</sub>
- (2) Dilute  $H_2SO_4$ , HgSO<sub>4</sub>
- (3) Ammoniacal silver nitrate solution
- (4) Bromine, CCl<sub>4</sub>

63. A solution of sodium sulphate in water is electrolysed using inert electrodes the products at cathode and anode respectively are

- (1)  $H_2$ ,  $O_2$
- (2)  $O_2$ ,  $H_2$
- (3)  $O_2$ ,  $SO_3$
- (4)  $O_2$ ,  $SO_2$

64. Which of the following 0.1 m aqueous solution will have the lowest freezing point?  
[Assume 100% ionization of electrolyte]

- (1) Sucrose
- (2) Sodium chloride
- (3) Aluminium sulphate
- (4) Calcium chloride

65. The rate constant of the reaction

$R \rightarrow P$  is  $6 \times 10^{-4}$  molar per second. If the initial concentration of R is 6 M then concentration of P after 20 minutes will be

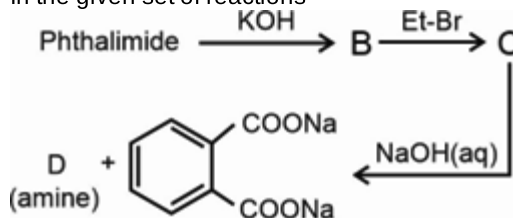
- (1) 4.28 M
- (2) 0.72 M
- (3) 3.72 M
- (4) 5.28 M

66. Consider the following statements

- (i) Insulin is globular protein
  - (ii) Globular proteins are spherical in shape
  - (iii) Myosin is present in muscles
- The correct statements are

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

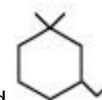
67. In the given set of reactions



D is

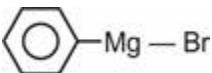
- (1)  $CH_3NH_2$
  - (2)  $CH_3CH_2NH_2$
  - (3)  $CH_3CH_2NHCH_3$
  - (4)  $(CH_3)_2NH$
68. A carbonyl compound reacts with hydrogen cyanide to form cyanohydrin which on hydrolysis forms a racemic mixture of  $\alpha$ -hydroxy acid. The carbonyl compound is
- (1) Propanone
  - (2) Benzaldehyde
  - (3) Benzophenone
  - (4) Formaldehyde

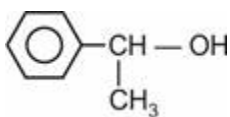
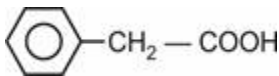
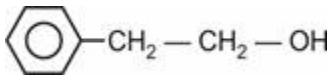
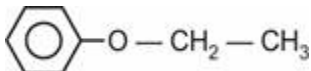
69.



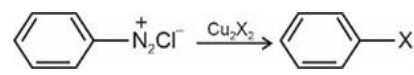
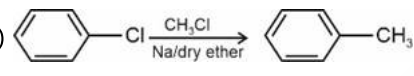
IUPAC name of the compound is

- (1) 3-ethyl-1,1-dimethylcyclohexane
- (2) 1-ethyl-3,3-dimethylcyclohexane
- (3) (3,3-dimethylcyclohexyl) ethane
- (4) 1,3-diethylcyclohexane

70. Ethylene oxide when treated with  followed by hydrolysis yields

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

71. Match the name of reactions given in the column I with their chemical equations given in column II.

- | Column I                  | Column II   |
|---------------------------|---|
| (a) Swarts reaction       | (i)    |
| (b) Wurtz-Fittig reaction | (ii) $RBr \xrightarrow{AgF} RF$   |
| (c) Finkelstein reaction  | (iii)  |
| (d) Sandmeyer reaction    | (iv) $RCl \xrightarrow[\text{dry acetone}]{NaI} RI$                                     |

Identify the **correct** option.

- (1) a(iv), b(iii), c(ii), d(i)  
 (2) a(ii), b(i), c(iv), d(iii)  
 (3) a(ii), b(iii), c(iv), d(i)  
 (4) a(iv), b(i), c(ii), d(iii)
72. Which among the following complexes has zero crystal field stabilization energy?
- (1)  $[Mn(H_2O)_6]^{3+}$   
 (2)  $[Co(H_2O)_6]^{2+}$   
 (3)  $[Co(H_2O)_6]^{3+}$   
 (4)  $[Fe(H_2O)_6]^{3+}$
73. Square planar paramagnetic complex among the following is
- (1)  $[Ni(CN)_4]^{2-}$   
 (2)  $[Ni(CO)_4]$   
 (3)  $[Cu(NH_3)_4]^{2+}$   
 (4)  $[PtCl_2(NH_3)_2]$

74. Consider the following statements about the oxides of nitrogen

(a)  $N_2O$  is a colourless, neutral gas.  
 (b)  $N_2O$  is a resonance hybrid of two canonical structures.  
 (c) N-N bonds are present in  $N_2O_4$  and  $N_2O_5$ .  
 (d)  $N_2O_3$  is blue colour solid and is acidic in nature.

The **correct** statements are

- (1) (a) and (b) only  
 (2) (b) and (c) only  
 (3) (a), (b), (c) and (d)  
 (4) (a), (b) and (d) only
75. Incorrect statement about the catalyst is
- (1) It catalyses the forward as well as the backward reaction  
 (2) It does not alter Gibbs energy of the reaction  
 (3) It catalyses both spontaneous and non-spontaneous reaction  
 (4) It does not change equilibrium constant of the reaction

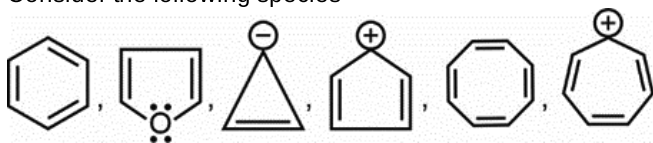
76. The standard reduction potentials of the half reactions are given below

- (a)  $Ag^+(aq) + e^- \rightarrow Ag(s)$ ;  $E^\circ = +0.80 V$   
 (b)  $Fe^{3+}(aq) + e^- \rightarrow Fe^{2+}(aq)$ ;  $E^\circ = +0.77 V$   
 (c)  $Li^+(aq) + e^- \rightarrow Li(s)$ ;  $E^\circ = -3.05 V$   
 (d)  $Co^{3+}(aq) + e^- \rightarrow Co^{2+}(aq)$ ;  $E^\circ = +1.81 V$

The strongest oxidising and reducing agents respectively are

- (1)  $Ag^+$  and Li  
 (2)  $Co^{3+}$  and Li  
 (3)  $Fe^{2+}$  and  $Li^+$   
 (4)  $Co^{2+}$  and  $Li^+$
77. Liquids 'A' and 'B' form an ideal solution. The vapour pressure of solution having 40 mole percent of A in the solution is ( $P_A^0 = 80 \text{ cm Hg}$ ,  $P_B^0 = 30 \text{ cm Hg}$ )
- (1) 20 cm Hg  
 (2) 50 cm Hg  
 (3) 25 cm Hg  
 (4) 55 cm Hg
78. Ratio of crystallization water of potash alum and in Mohr's salt respectively is
- (1) 1 : 3  
 (2) 1 : 2  
 (3) 2 : 1  
 (4) 4 : 1

79. Consider the following species



The total number of aromatic species is

- (1) 2
- (2) 3
- (3) 4
- (4) 5

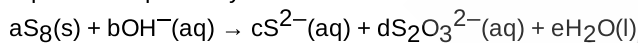
80. Match List-I with List-II

List-I (Mixture/ sample)	List-II (Technique used for purification)
a. Glycerol from spent-lye	(i) Steam distillation
b. Chloroform + Aniline	(ii) Fractional distillation
c. Fractions of crude oil	(iii) Distillation under reduced pressure
d. Aniline + water	(iv) Simple distillation

Choose the correct answer from the options given below.

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

81. Coefficients a, b and d for the given balanced chemical equation respectively are



- (1) 1, 3 and 4
- (2) 1, 12 and 2
- (3) 2, 9 and 4
- (4) 1, 10 and 3

82. pH of a solution obtained by mixing equal volume of two solutions having pH = 2 and pH = 3 is ( $\log 55 = 1.74$ )

- (1) 2.26
- (2) 2
- (3) 5.25
- (4) 3

83. If  $\Delta H$  and  $\Delta S$  for a reaction at  $27^\circ\text{C}$  is  $-20 \text{ kJ mol}^{-1}$  and  $30 \text{ JK}^{-1} \text{ mol}^{-1}$  respectively then  $\Delta G$  for reaction will be

- (1)  $+29 \text{ kJ mol}^{-1}$
- (2)  $+21 \text{ kJ mol}^{-1}$
- (3)  $-21 \text{ kJ mol}^{-1}$
- (4)  $-29 \text{ kJ mol}^{-1}$

84. The pair of hybridized orbitals involved in the formation of  $\text{C}_2 - \text{C}_3$  bond in  $\text{CH}_2 = \text{CH} - \text{C} \equiv \text{CH}$  is

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

85. Match the atomic number given in List-I with the IUPAC official name given in List-II

List-I	List-II
(a) 108	(i) Nobelium
(b) 102	(ii) Hassium
(c) 104	(iii) Dubnium
(d) 105	(iv) Rutherfordium

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

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

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

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

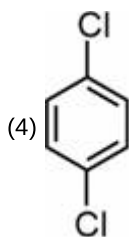
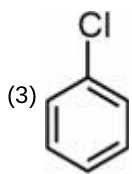
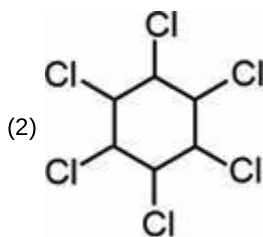
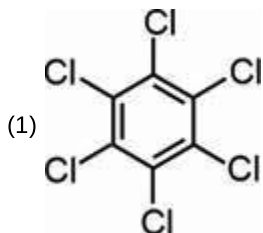
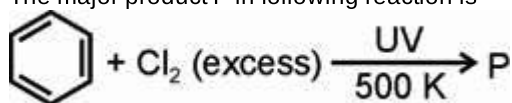
86. If the uncertainty in the velocity of a cricket ball of mass  $\frac{100}{\pi} \text{ g}$  is  $6.626 \times 10^{-24} \text{ m/sec}$  then uncertainty in its position will be

- (1) 1 Å
- (2) 1.5 Å
- (3) 2 Å
- (4) 2.5 Å

87. Calcium carbonate reacts with aqueous HCl to give  $\text{CaCl}_2$  and  $\text{CO}_2$ . The mass of  $\text{CaCO}_3$  required to react completely with 50 mL of 0.5 M HCl is

- (1) 3.5 g
- (2) 2.5 g
- (3) 1.25 g
- (4) 5.5 g

88. The major product P in following reaction is



89. On heating, borax finally gives

- (1)  $\text{Na}_2\text{B}_2\text{O}_5 + \text{B}_2\text{O}_3$
- (2)  $\text{Na}_2\text{B}_4\text{O}_7$
- (3)  $\text{NaBO}_2 + \text{Na}_2\text{BO}_3$
- (4)  $\text{NaBO}_2 + \text{B}_2\text{O}_3$

91. Choose the **incorrect** match from the following.

- (1) Class – Insecta
- (2) Division – Angiospermae
- (3) Order – Anacardiaceae
- (4) Family – Muscidae

90. If for the reaction  $2\text{NOCl}(\text{g}) \rightleftharpoons 2\text{NO}(\text{g}) + \text{Cl}_2(\text{g})$ ,  $K_C$  is  $2 \times 10^{10}$ , then the  $K_P$  for the reaction at the same temperature T K is

- (1)  $2 \times 10^{10}$
- (2)  $2 \times 10^{10} \text{ RT}$
- (3)  $\frac{\text{RT}}{2 \times 10^{10}}$
- (4)  $\frac{2 \times 10^{10}}{\text{RT}}$

**Aakash**  
Medical | IIT-JEE | Foundations

**BIOLOGY**

92. Mycoplasma are the organisms that

- (1) Are the obligate anaerobes
- (2) Are the smallest living eukaryotes
- (3) Lack cell membrane
- (4) Can be pathogenic to animals or plants

93. Read the following characteristics w.r.t. the class of the organism responsible for causing white rust of mustard.
- Heterotrophic mode of nutrition.
  - Aseptate and coenocytic mycelium.
  - Presence of polysaccharides in the cell wall.
  - Reproduction by non-motile, sexual spores, which are produced endogenously on dikaryotic hyphae.
  - Occurrence of dikaryophase in their life.

Select the **correct** answer from the following options.

- a, c and d are true
- b, d and e are true
- All are true except d
- a, b and c are true

94. Members of Rhodophyceae differ from the members of Chlorophyceae, as the former

- Are found in marine water only
- Have 2-8 equal flagella at the apical end of zoospore
- Have cellulose in their cell wall
- Have floridean starch as the reserve food material

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

- Chemotaxonomy is based on the chemical constituents of the plants.
- In pteridophytes, spores germinate to give rise to an inconspicuous, small and living gametophyte called, prothallus.
- Leafy stage of moss develops from primary protonema as lateral bud.
- Biflagellated antherozoids are found in the bryophytes like *Sphagnum*.

Select the **correct** answer from the following options.

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

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

96. Root hairs are found in the

- Root cap region
- Zone of elongation
- Region of meristematic activity
- Zone of maturation

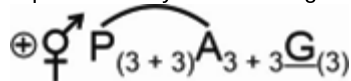
97. Choose the **correct** option after reading the following statements.

**Statement A:** In banyan tree, prop roots arise from parts other than the radicle.

**Statement B:** Fruits, which are formed from the entire inflorescence are called composite fruits.

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

98. Identify the **correct** feature w.r.t. the members of the family represented by the following floral formula.



- The fruit is capsule or rarely berry
- Seeds are non-endospermous
- Often have racemose inflorescence
- Petals are often united into tubes

99. Choose the **correct** one for phloem fibres.

- Are collenchymatous fibres
- Have pointed, needle-like apices with pit fields in their common walls
- Are elongated fibres which are branched
- Provide mechanical support to the plant

100. Read the characteristics given below.

- Xylem and phloem are arranged in an alternate manner along different radii.
- Protoxylem is present towards the centre and metaxylem towards the periphery.
- Endodermis comprises of barrel shaped cells with special thickening of cutin.
- Pith is small and inconspicuous.

How many of the above features is/are **true** for dicot roots?

- 3
- 2
- 4
- 1

101. Appendages present on the body surface of *Trypanosoma* is

- Flagella
- Mesosomes
- Fimbriae
- Pili

**102.** Nucleus has all of the following, **except**

- (1) Transparent, semifluid and colloidal matrix
- (2) Thin nucleoprotein fibres called chromatin
- (3) Pores for passage of substances
- (4) Site for translation of mRNA

**103.** The cell structure discovered by George Palade

- (1) Is found only in eukaryotic cells
- (2) Provides support and shape to the cell
- (3) Is organised in the stacks like the piles of coins
- (4) Is 80S type in animal cells

**104.** In which of the following phases, cell is metabolically active but does not proliferate?

- (1) S phase
- (2) M phase
- (3) G<sub>2</sub> phase
- (4) G<sub>0</sub> phase

**105.** Which of the following events is **odd** w.r.t. 'interphase'?

- (1) Duplication of most of the cell organelles takes place
- (2) Energy currency of the cell is synthesised
- (3) Divided centrioles begin to move towards the opposite poles
- (4) Synthesis of tubulin protein takes place

**106.** Nissl's granules are located in

- (1) Synaptic knob of a multipolar neuron
- (2) Cyton of a multipolar neuron
- (3) Axon and dendrite of a bipolar neuron
- (4) Dendrites and axon of a multipolar neuron

**107.** Consider the table given below representing partial pressure of O<sub>2</sub> and CO<sub>2</sub> at different sites in human body.

Respiratory gas	Alveoli	Deoxygenated blood	Oxygenated blood
O <sub>2</sub>	104	B	95
CO <sub>2</sub>	A	45	C

Select the option which is **correct** w.r.t. relation of A, B and C.

- (1) A = B = C
- (2) A > B = C
- (3) A < B < C
- (4) A = B > C

**108.** In adult humans, all ribs are called bicephalic because each rib has 2 articulation surfaces

- (1) One on its dorsal end and one on ventral end
- (2) At its ventral end
- (3) At its dorsal end
- (4) One at its each lateral side

**109.** Choose an **incorrect** statement w.r.t. RNAi.

- (1) It is a post-translational silencing mechanism
- (2) This method takes place in all eukaryotic organisms
- (3) It is mediated by dsRNA where source of complementary RNA could be from viral infections
- (4) This can be used to obtain nematode resistant plants

**110.** Consider the given statements.

- a. Labia minora are fleshy folds of tissue, which extend down from mons pubis and surround vaginal opening.
  - b. Glandular tissue in each mammary gland is divided into 15-20 mammary lobes.
  - c. In tertiary follicle, theca layer is organised into inner theca interna and outer theca externa.
  - d. Cyclical menstruation is an indication of normal reproductive phase that extends from menopause (at puberty) to menarche (at old age).
- How many of the above statements is/are **correct** w.r.t. normal adult human female?

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

**111.** Restriction enzymes belong to a larger class of enzymes, which are called

- (1) Nucleases
- (2) Lyases
- (3) Dehydrogenases
- (4) Ligases

**112.** A permanent cure for ADA deficiency in humans can be

- (1) Enzyme replacement therapy
- (2) Periodic infusion of functional ADA enzyme into the patient
- (3) Introduction of ADA producing gene into cells at early embryonic stage
- (4) Bone marrow transplant during adult life

113. Select the correct match.

- (1) Tetany – Progressive degeneration of skeletal muscles
- (2) Gout – Inflammation of joints due to accumulation of uric acid crystals
- (3) Osteoporosis – Increased bone mass due to increased levels of estrogen
- (4) Myasthenia gravis – Genetic disorder affecting neuro-muscular junction

114. Choose the **correct** descending order of percentage proportion of leucocytes in human blood under normal conditions

- (1) Neutrophils → Basophils → Lymphocytes → Eosinophils → Monocytes
- (2) Neutrophils → Monocytes → Lymphocytes → Eosinophils → Basophils
- (3) Neutrophils → Eosinophils → Basophils → Lymphocytes → Monocytes
- (4) Neutrophils → Lymphocytes → Monocytes → Eosinophils → Basophils

115. Consider the given statements w.r.t. counter current mechanism.

**Statement A** : NaCl is transported to inner medullary interstitium by ascending limb of Henle's loop which is exchanged with descending limb of vasa recta.

**Statement B** : Small amounts of urea enter the thin segment of ascending limb of Henle's loop which is transported back to the inner medullary interstitium by the collecting tubule.

Select the **correct** option.

- (1) Both statements A and B are correct
- (2) Both statements A and B are incorrect
- (3) Only statement A is correct
- (4) Only statement B is correct

116. Process of synapsis takes place during

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

117. Identify the process that does **not** contribute to generation of the proton gradient in a chloroplast, according to the chemiosmotic hypothesis.

- (1) Splitting of water molecule takes place on the inner side of the thylakoid membrane  
As electrons move through the photosystems, protons are transported across the membrane into the lumen of thylakoid
- (2) NADP reductase enzyme located on the stromal side, leads to the removal of protons from the stroma
- (3) Diffusion of protons through the ATP synthase channel leads to the formation of ATP

118. Read the following statements of **Assertion (A)** and **Reason (R)** and choose the **correct** option.

**Assertion (A)**: Chlorophyll a is the main photosynthetic pigment.

**Reason (R)**: The graph showing the absorption spectrum of photosynthesis superimposes on the action spectrum of chlorophyll a.

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

119. Which of the following enzymes is attached to the inner membrane of mitochondria in eukaryotes?

- (1) Hexokinase
- (2) Citrate synthase
- (3) Succinate dehydrogenase
- (4) Pyruvate dehydrogenase

120. Plant hormone which controls xylem differentiation and helps in cell division, is also responsible for

- (1) Thinning of young fruits
- (2) Promoting petiole elongation in deep water rice plants
- (3) The bending of the tip of coleoptile of canary grass towards light
- (4) Increasing the market period of fruits

121. Hilum represents the junction between

- (1) Funicle and the ovule
- (2) Ovule and the placenta
- (3) Integuments and the nucellus
- (4) Ovary and the funicle

122. How many of the following are endospermous seeds?

Pea, Datura, Wheat, Coconut, Maize, gram

- (1) 4
- (2) 3
- (3) 2
- (4) 5

123. Which of the following genetic disorders is caused due to point mutation?

- (1) Phenylketonuria
- (2) Sickle cell anemia
- (3) Colour blindness
- (4) Haemophilia

124. Polygenic traits are controlled by

- (1) A single gene with multiple alleles
- (2) Three or more genes generally
- (3) Mutations in the genes present on X-chromosome
- (4) Multiple mutations in the genes present on Y chromosome

125. Which of the following are involved in DNA packaging in prokaryotes?

- a. Non-histone proteins
- b. Histone octamer
- c.  $H_1$  histone
- d. Positively charged proteins

Select the **correct** answer from following options.

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

126. Amongst animals, the most species rich taxonomic group is of

- (1) Birds
- (2) Insects
- (3) Fishes
- (4) Mammals

127. The historic Earth Summit in 1992 was held in

- (1) South Africa
- (2) Switzerland
- (3) Mauritius
- (4) Rio de Janeiro

128. Equation  $\frac{dN}{dt} = rN$  describes a growth model, that results in

- (1) Sigmoid curve
- (2) Straight line
- (3) Zig-Zag curve
- (4) J-shaped curve

129. Select the **correct** match from the following.

- (1) Biogas – Major component is  $H_2$
- (2) Statins – *Trichoderma polysporum*
- (3) Flocs – Masses of bacteria associated with fungal filaments
- (4) Swiss cheese – *Penicillium* species

130. Identify the purines found in both DNA and RNA.

- (1) Adenine and Guanine
- (2) Cytosine and Thymine
- (3) Adenine and Thymine
- (4) Guanine and Cytosine

131. Insulin used for treatment of diabetes cannot be orally administered because

- (1) It is highly reactive
- (2) It is extracted from gall bladder of slaughtered cattles and pigs
- (3) It contains carcinogenic properties
- (4) It will be digested by protein digesting enzymes of GIT

132. Select the **incorrect** statement w.r.t. male frogs.

- (1) They have a urinary bladder and a pair of ureters
- (2) Like humans, urethra acts as the urinogenital duct in them
- (3) Fat bodies are structures that store fats
- (4) Cloaca is a median chamber used to pass faeces, urine and sperms to exterior

133. Consider the given statements.

**Statement A** : Areolar connective tissue consists of macrophages, fibres, fibroblasts, mast cells and adipocytes.

**Statement B** : The nucleus of adipocytes is located towards periphery because the fat globule occupies major space inside the cell.

Select the **correct** option.

- (1) Both statements A and B are correct
- (2) Both statements A and B are incorrect
- (3) Only statement A is correct
- (4) Only statement B is correct

134. Choose the **correct** match.

- (1) Spermiation – Spermatids transform into spermatozoa
- (2) Spermiogenesis – Release of sperms from Sertoli cells
- (3) Spermatocytogenesis – Conversion of spermatozoa into spermatids
- (4) Spermatogenesis – Immature male germ cells produce sperms

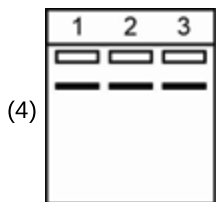
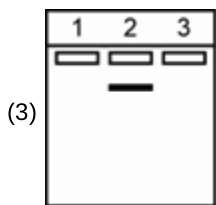
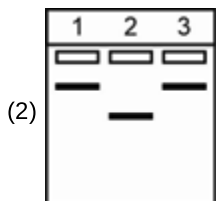
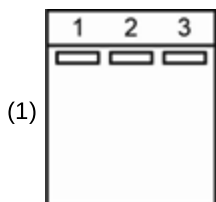
135. Select the **correct** statement w.r.t. members of the phylum to which *Balanoglossus* belong to

- (1) They are bilaterally symmetrical, triploblastic pseudocoelomate organisms.
- (2) They exhibit internal fertilisation with indirect development.
- (3) Their body is composed of anterior proboscis, a collar and long trunk.
- (4) Respiration takes place through tracheal system in them.

136. A biomolecule 'X' is obtained in the acid-insoluble pool upon chemical analysis of living tissues. Its structure constitutes a nitrogen containing choline and fatty acid residues. Identify 'X' among the following and select the correct option.

- (1) Cholesterol
- (2) Lecithin
- (3) Inulin
- (4) Adenine

137. While performing agarose gel electrophoresis, a student forgot to add ethidium bromide by mistake. Which of the following will be the most probable gel profile obtained under UV light if equal size of DNA samples were loaded in all the 3 wells?



138. Match column I with column II w.r.t. respiratory volumes and capacities in a healthy adult human.

Column I	Column II
a. IRV	(i) 1000-1100 mL
b. FRC	(ii) 2100-2300 mL
c. RV	(iii) 1100-1200 mL
d. ERV	(iv) 2500-3000 mL

Select the correct option.

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

139. How many of the hormones mentioned in the box below stimulate the production of RBCs?

Cortisol, Prolactin, Thyroxine, Erythropoietin, ANF, Testosterone

Choose the correct option.

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

140. Consider the given statements w.r.t. circulatory system of cockroaches.

- a. Heart of cockroach is differentiated into funnel shaped chambers with ostia on either side.
- b. Blood vessels are poorly developed and open into space called haemocoel.
- c. Blood from sinuses enter into heart through ostia and is pumped posteriorly to sinuses again.

Select the option representing correct statement(s) only.

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

141. Select the correct statement w.r.t. muscle fibres.

- (1) All uninucleated muscle fibres are involuntary.
- (2) All voluntary muscle fibres are branched.
- (3) All striated muscle fibres are multinucleated.
- (4) All spindle shaped muscle fibres possess intercalated discs.

142. A couple wants to abort a child during 12<sup>th</sup> week of pregnancy. Which of the following cannot be a ground for abortion in India?

- (1) Failure of contraception during coitus
- (2) Continuation of pregnancy is harmful to mother
- (3) Foetus suffers from a genetic disorder
- (4) Sex of the foetus is determined as female

143. Assertion (A): Australian marsupials are an example of process that deals with evolution of different species in a given geographical area which started from a point and radiated to other areas of geography.

Reason (R): A number of marsupials, each different from other evolved from an ancestral stock, but all outside the Australian island continent.

Choose the correct option.

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

- 144.** Heroin, commonly called \_\_\_\_\_ is chemically diacetylmorphine which is a white, odourless, \_\_\_\_\_ crystalline compound.  
Fill in the respective blanks by selecting the **correct** option.
- (1) Coke; sweet
  - (2) Hashish; sweet
  - (3) Crack; bitter
  - (4) Smack; bitter
- 145.** The R group in alanine is 'X' while in serine it is 'Y'. Choose the option that correctly identifies 'X' and 'Y' respectively.
- (1) Methyl, hydroxy methyl
  - (2) Hydrogen, methyl
  - (3) Hydroxy methyl, ethyl
  - (4) Methyl, ethyl
- 146.** Which of the following tissues possess(es) cell junctions in them?
- (a) Smooth muscles
  - (b) Epithelial tissue
  - (c) Cardiac muscles
- Select the **correct** option.
- (1) (a), (b) and (c)
  - (2) Only (c)
  - (3) Only (b) and (c)
  - (4) Only (b)
- 147.** If total amount of adenine in a double stranded DNA is 30%, then what will be the percentage of purine and cytosine respectively?
- (1) 50% and 20%
  - (2) 30% and 50%
  - (3) 40% and 30%
  - (4) 30% and 40%
- 148.** A person tries to hold his breathe for sometime. Which of the following changes in blood would first lead to an urge to breathe?
- (1) Fall in O<sub>2</sub> concentration
  - (2) Rise in CO<sub>2</sub> concentration
  - (3) Rise in pH
  - (4) Fall in osmolarity
- 149.** Select the **incorrect** statement w.r.t. lymph/tissue fluid among the following.
- (1) It has same mineral distribution as that in plasma.
  - (2) Fats are absorbed through lymph in the lacteals present in the intestinal villi
  - (3) It consists of specialised lymphocytes responsible for immune response.
  - (4) It lacks RBCs but its protein content is higher than that of plasma
- 150.** The osmolarity of fluid in the inner medullary interstitium is nearly \_\_\_\_\_ times than the osmolarity of fluid in the cortex.  
Choose the option which **correctly** fills the given blank w.r.t. an adult human under normal condition.
- (1) Sixteen
  - (2) Eight
  - (3) Four
  - (4) Ten
- 151.** Binding of myosin head to actin resulting in formation of cross-bridge is triggered by
- (1) Breakdown of ATP into ADP and Pi on actin head
  - (2) Ca<sup>2+</sup>-induced unmasking of active binding sites for myosin on the actin filaments
  - (3) Binding of ATP with troponin
  - (4) Removal of ADP and Pi from myosin head
- 152.** Find the **odd** one w.r.t. antagonistic pair.
- (1) Epinephrine and norepinephrine w.r.t. lipid breakdown
  - (2) Insulin and glucagon w.r.t. blood glucose level
  - (3) TCT and PTH w.r.t. blood calcium level
  - (4) Angiotensin II and ANF w.r.t. blood pressure
- 153.** The layer of cells which covers the cerebral hemisphere possess
- (1) Fibres of the tracts that are covered with the myelin sheath
  - (2) Large number of the neuronal cell bodies
  - (3) Only sensory areas
  - (4) Only associations area responsible for controlling respiration
- 154.** By the end of   A   of human pregnancy, the foetus develops limbs and digits and by the end of   B  , most of the major organ systems are formed.  
Choose the option that fills the blanks A and B **correctly**.
- (1) A - First month, B - First trimester
  - (2) A - First month, B - Second trimester
  - (3) A - Second month, B - First trimester
  - (4) A - First month, B - Third trimester

155. Match diseases in column-I with their symptoms in column-II. Choose the **correct** option.

	Column-I		Column-II
a.	Pneumonia	(i)	High fever, weakness, stomach pain, loss of appetite and constipation
b.	Amoebiasis	(ii)	Nasal congestion and discharge, cough, sore throat and headache
c.	Common cold	(iii)	Difficulty in respiration, fever, chills, cough, headache and cyanosis in severe cases
d.	Typhoid	(iv)	Constipation, abdominal pain, cramps and blood clots in stool

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

156. Read the following **Assertion (A)** and **Reason (R)**.

**Assertion (A)** : In bacteria, many times the translation can begin much before the mRNA is fully transcribed.

**Reason (R)** : In bacteria, mRNA does not require processing to become active and there is no separation of cytosol and nucleus.

In light of the above statements, choose the correct answer

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

157. Which of the following bond/linkages will be absent in a nucleotide?

- (a) N-glycosidic linkage  
 (b) Hydrogen bond  
 (c) Phosphoester linkage  
 (d) Phosphodiester linkage

- (1) Only (a) & (b)  
 (2) Only (d)  
 (3) Only (b) & (d)  
 (4) Only (c) & (d)

158. Which of the following organisms was used by Meselson and Stahl during the experiment to prove semiconservative mode of DNA replication?

- (1) Yeast  
 (2) *E. coli*  
 (3) *Vicia faba*  
 (4) *Streptococcus*

159. In honey bees, males

- (1) Have 32 chromosomes  
 (2) Are diploid  
 (3) Are produced parthenogenetically  
 (4) Have two sets of chromosomes

160. *Paramecium* and *Plasmodium*

- (1) Both belong to the same kingdom as that of *Penicillium*  
 (2) Both have cilia as locomotory organs  
 (3) Both are endoparasites  
 (4) Both are unicellular protozoans

161. All of the following organisms produce non flagellated gametes, **except**

- (1) *Ulothrix*  
 (2) *Spirogyra*  
 (3) *Gelidium*  
 (4) *Polysiphonia*

162. Read the following statements and choose the **correct** option.

**Statement (A)**: Muliathi is a medicinal plant of Fabaceae.

**Statement (B)**: In seeds of cereals, the seed coat is membranous and generally fused with the fruit wall.

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

163. Conjoint, collateral and open type of vascular bundles are found in a

- (1) Dicot leaf  
 (2) Monocot stem  
 (3) Dicot stem  
 (4) Monocot root

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

Cell Organelle	Function
----------------	----------

- |                   |                      |
|-------------------|----------------------|
| I. SER            | A. Hydrolytic enzyme |
| II. Golgi complex | B. Lipid synthesis   |
| III. RER          | C. Protein synthesis |
| IV. Lysosome      | D. Packaging         |

- (1) I-A, II-C, III-D, IV-B  
 (2) I-D, II-C, III-A, IV-B  
 (3) I-C, II-D, III-B, IV-A  
 (4) I-B, II-D, III-C, IV-A

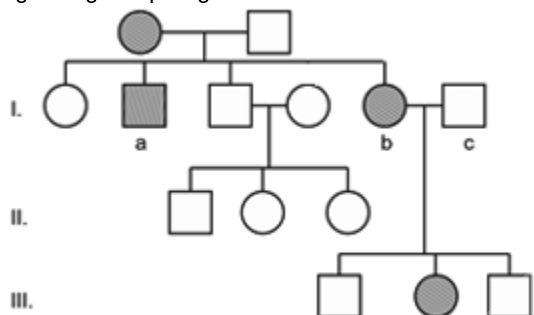
165. Prophase is marked by the

- (1) Initiation of condensation of chromosomal material
- (2) Duplication of centrosome
- (3) Duplication of cell organelles
- (4) Development of nuclear envelope

166. Identify the **incorrect** statement w.r.t. E.M.P pathway.

- (1) It occurs in the cytoplasm of all eukaryotes and prokaryotes
- (2) ATP is utilised in the step, which require hexokinase enzyme
- (3) The conversion of 1,3-bisphosphoglycerate to 3-phosphoglyceric acid is an energy yielding process
- (4) Two molecules of ATP is utilised during conversion of PEP to pyruvic acid

167. A pedigree chart is given below. Identify **incorrect** option regarding this pedigree.



- (1) This pedigree can be applicable for myotonic dystrophy
- (2) Above pedigree can be exemplified by a genetic disorder like thalassemia
- (3) Male (I c) can be carrier if the trait is considered for colour-blindness
- (4) This pedigree is not applicable for Y linked disorders

168. Lactic acid bacteria (LAB) is responsible for

- (1) Production of acid and complete digestion of milk proteins
- (2) Coagulation of partially digested milk lactose
- (3) Improving the nutritional quality of curd by increasing vitamin B<sub>12</sub>
- (4) Improving the aerobic conditions for the growth of beneficial microbes in our stomach

169. The process of decomposition of detritus to form humus is

- (1) Mineralisation
- (2) Humification
- (3) Leaching
- (4) Stratification

170. Aminoacylation of tRNA is a process in which

- (1) rRNA is converted into tRNA
- (2) Amino group is attached to mRNA
- (3) ATP is attached to tRNA
- (4) Amino acids are activated in the presence of ATP and linked to their cognate tRNA

171. In a population which is in Hardy-Weinberg equilibrium, the frequency of the recessive homozygous individuals is 0.09. Calculate the percentage of individuals homozygous for the dominant allele.

- (1) 49%
- (2) 52%
- (3) 20%
- (4) 72%

172. Seed ferns evolved from progymnosperms during which of the following periods?

- (1) Devonian
- (2) Carboniferous
- (3) Triassic
- (4) Jurassic

173. Consider the following events related to parturition.

- (a) Foetal ejection reflex
  - (b) Release of oxytocin from maternal pituitary
  - (c) Expulsion of the baby out of the uterus through birth canal
  - (d) Stronger and stronger uterine contractions
- Arrange the above events in a sequential order of their occurrence.

- (1) (a) → (b) → (c) → (d)
- (2) (a) → (b) → (d) → (c)
- (3) (a) → (d) → (c) → (b)
- (4) (b) → (a) → (c) → (d)

174. Choose the **correct** option which explains physical barriers of innate immunity.

- (1) B-lymphocytes produce immunoglobulins in response to pathogen attack
- (2) PMNL, macrophages and T-lymphocytes in tissue can phagocytose and destroy microbes
- (3) Saliva in the mouth prevents microbial growth
- (4) Mucous coating in urogenital tract helps in trapping microbes entering our body

175. Common feature among *Pavo*, *Vipera* and *Rattus* is

- (1) Indirect development
- (2) External fertilisation
- (3) Internal fertilisation
- (4) Oviparity

176. Consider the following features

- (a) Unisexual
- (b) True metamerism
- (c) Oviparity

Select the **correct** set of animals which exhibit all the above mentioned features.

- (1) *Nereis*, *Adamsia*, *Bombyx*
- (2) *Pheretima*, *Clarias*, *Panthera*
- (3) *Neophron*, *Apis*, *Chelone*
- (4) *Locusta*, *Planaria*, *Hyla*

177. *Crocodylus* and *Macropus* differ from *Chameleon* and *Calotes* as former have/show

- (1) Pulmonary respiration
- (2) Notochord during the embryonic period
- (3) Direct development
- (4) Four chambered heart

178. Read the statements regarding bioreactors.

- a. In continuous culture system, used medium is drained out from one side while fresh medium is added from the other.
  - b. The recombinant cells are maintained at stationary phase in a bioreactor.
  - c. Bioreactors can be thought of as vessels in which raw materials are biologically converted into specific products using microbial plant, animal or human cells.
- Choose the option that mentions only the **correct** statement(s).

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

179. If a foreign DNA is inserted at the *Sal* I site in vector pBR322, then after transformation in *E. coli*

- (1) All the recombinants will grow on tetracycline containing medium
- (2) All the non-recombinants will not grow on ampicillin containing medium
- (3) All recombinant transformants will grow only on ampicillin containing medium
- (4) All non-transformants will grow on tetracycline containing medium

180. **Assertion (A):** A thermostable, DNA polymerase is added to the reaction mixture of PCR.

**Reason (R):** This enzyme remains active at high temperature induced denaturation of dsDNA in PCR. In the light of above statements, select the **correct** answer

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



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