



Aakash

Medical | IIT-JEE | Foundations

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MM : 720

Final Test Series(P2)-2024-25_Test-10D

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

- Monochromatic light of wavelength 5×10^{-7} m illuminates a pair of slits 1 mm apart. The distance of third bright fringe in the interference pattern from centre on a screen 2 m away, is
 - 3.0 mm
 - 1.5 mm
 - 1.0 mm
 - 0.01 mm
- Two vibrating tuning forks produce progressive waves given by $y_1 = 4 \sin(500 \pi t)$ and $y_2 = 2 \sin(506 \pi t)$. These tuning forks are held near the ear of a person. The person will hear α beats/s. The value of α is
 - 6
 - 9
 - 3
 - 1
- The equation of a progressive wave is given by $y = 0.09 \sin 8\pi \left(t - \frac{x}{20}\right)$. After reflection of this wave from rigid end, the amplitude becomes $\frac{2}{3}$ of initial amplitude. The equation of reflected wave is
 - $y = -0.06 \cos \left(t - \frac{x}{20}\right)$
 - $y = -0.08 \cos \left(t + \frac{x}{20}\right)$
 - $y = -0.06 \sin 8\pi \left(t + \frac{x}{20}\right)$
 - $y = -0.08 \sin \left(t + \frac{x}{20}\right)$
- A bimetallic strip has two different metal bars 1 and 2 welded parallel to their length. If thermal coefficient of linear expansion $\alpha_1 > \alpha_2$ and length of bars is same initially, then upon cooling, the strip will bend
 - Towards metal bar 1
 - Towards metal bar 2
 - Towards metal with lower value of α
 - Both (2) & (3)

5. Consider the given statements and choose the correct option.

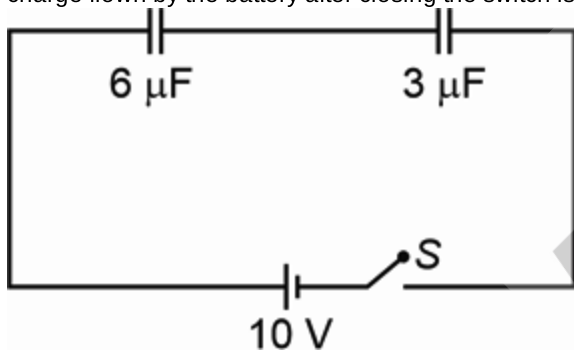
Statement A: Photons are electrically neutral and are not deflected by electric or magnetic field.

Statement B: By increasing the intensity of light of given wavelength, there is only an increase in the number of photons per second crossing a given area, with each photon having the same energy. Thus, photon energy is independent of intensity of radiation.

- (1) Statement A is true but B is false
 (2) Statement A is false but B is true
 (3) Both statements are false
 (4) Both statements are true
6. A body of mass of (m) is moving in a circular path of radius (r) with constant speed (v). The work done by centripetal force in one complete revolution will be

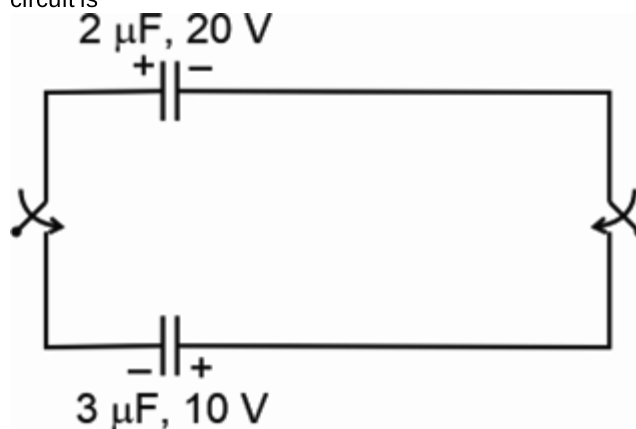
- (1) $\frac{mv^2}{2}$
 (2) mv^2
 (3) Zero
 (4) $2mv^2$

7. Consider the given circuit of $6 \mu\text{F}$ and $3 \mu\text{F}$ capacitors connected to a 10 V battery through a switch as shown. The charge flown by the battery after closing the switch is



- (1) $12 \mu\text{C}$
 (2) $6 \mu\text{C}$
 (3) $22 \mu\text{C}$
 (4) $20 \mu\text{C}$

8. Capacitors $2 \mu\text{F}$ and $3 \mu\text{F}$ are charged to 20 V and 10 V respectively. Now both capacitors are connected in parallel with opposite polarity as shown, then the heat loss in the circuit is



- (1) $100 \mu\text{J}$
 (2) $400 \mu\text{J}$
 (3) $540 \mu\text{J}$
 (4) $360 \mu\text{J}$

9. In column-II, variation of escape speed (v_e) with radius of planet (R_e) is given, when different parameters are varied in column-I. Match the columns and choose the correct option.

	Column-I		Column-II
a.	If mass of planet is variable but acceleration due to gravity is constant	(p)	$v_e \propto R_e^\alpha$
b.	If mass of planet is constant	(q)	$v_e \propto \frac{1}{\sqrt{R_e}}$
c.	If density of planet is constant	(r)	$v_e \propto \sqrt{R_e}$
d.	If mass of the body to be projected is variable but mass of the planet is constant	(s)	$v_e \propto R_e^2$

- (1) a(r), b(s), c(q), d(p)
 (2) a(p), b(q), c(s), d(r)
 (3) a(r), b(q), c(p), d(q)
 (4) a(r), b(q), c(s), d(q)
10. A planet revolves about the sun in elliptical orbit. The areal velocity ($\frac{dA}{dt}$) of the planet is $4.0 \times 10^{16} \text{ m}^2/\text{s}$. The least distance between planet and the sun is $2 \times 10^{12} \text{ m}$. Then the maximum speed of the planet in km/s is
- (1) 10
 (2) 20
 (3) 40
 (4) 50

11. The Young's modulus of steel wire is $Y = 2 \times 10^{11} \text{ N/m}^2$. The force required to double the length of the steel wire of area of cross-section $4 \times 10^{-5} \text{ m}^2$ in N is

- (1) 2×10^6
- (2) 4×10^6
- (3) 6×10^6
- (4) 8×10^6

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

Assertion (A): The time period of a simple pendulum increases if it is taken to a higher altitude.

Reason (R): The acceleration due to gravity decreases with an increase in altitude.

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

- (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

13. Match column-I (concepts) with column-II (relevant expression), where symbols have their usual meaning.

Column-I	Column-II
a. Capillary rise in a tube	(p) $P + \frac{1}{2}\rho v^2 + \rho gh = \text{constant}$
b. Hydrostatic pressure	(q) $h = \frac{2s \cos \theta}{r \rho g}$
c. Bernoulli's theorem	(r) $F_v = 6\pi\eta r v$
d. Stoke's law	(s) $\Delta P = h \rho g$

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

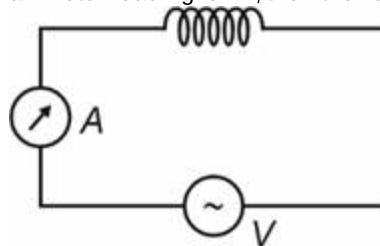
14. **Statement A:** If the frequency of a sinusoidal AC source is f , then the voltage becomes zero $2f$ times in one second.

Statement B: Average value of sinusoidal ac current for one time period can not be zero.

Consider the given statements and choose the correct option.

- (1) Statement A is true but statement B is false
- (2) Statement A is false but statement B is true
- (3) Both statements are true
- (4) Both statements are false

15. In the given circuit an inductor is connected across an AC source. If applied voltage is $V = 50\sqrt{2}\sin(100\pi t)$ volt and ammeter reading is 2A, then the value of L is



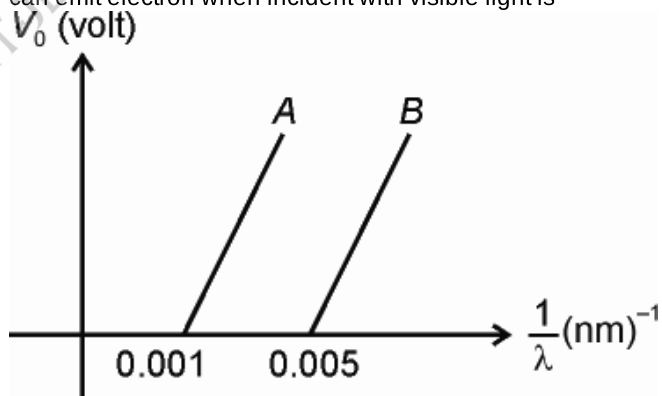
- (1) $\frac{1}{\pi} \text{ H}$
- (2) $\frac{1}{2\pi} \text{ H}$
- (3) $\frac{1}{4\pi} \text{ H}$
- (4) $\pi \text{ H}$

16. The average kinetic energy of one mole of an ideal gas is $E = \frac{5}{2}RT$.

Then molar specific heat at constant volume will be

- (1) $\frac{R}{2}$
- (2) $\frac{3R}{2}$
- (3) $\frac{5R}{2}$
- (4) $\frac{7R}{2}$

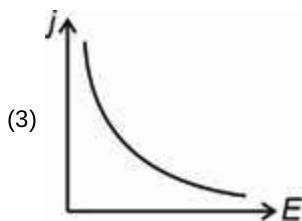
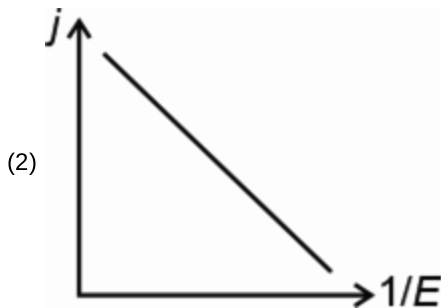
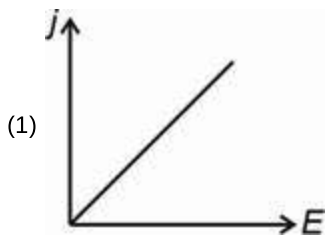
17. The variation of stopping potential (V_0) and $\frac{1}{\lambda}$ where λ is wavelength of incident light in nm for a photoelectric experiment for metals A and B is as shown. The metal that can emit electron when incident with visible light is



- (1) Both metal A and B
- (2) Neither metal A nor B
- (3) Only metal B
- (4) Only metal A

18. A liquid cools from 80°C to 50°C in 5 minutes. The time taken by the liquid to cool from 70°C to 50°C , if the temperature of the surrounding is constant at 30°C , is nearly
- (1) 2 minute
 - (2) 2.8 minute
 - (3) 3.9 minute
 - (4) 4.2 minute
19. A Carnot engine takes 400 calories of heat from a source at 500 K and rejects 120 calories of heat to the sink. The temperature of the sink is
- (1) 500 K
 - (2) 250 K
 - (3) 150 K
 - (4) 160 K
20. In a new system of units, unit of mass is 4 kg, unit of length is 4 m and unit of time is 2 s. How much joule is equal to 10 unit of energy in this new system?
- (1) 160
 - (2) 40
 - (3) 80
 - (4) 16
21. The magnitude of electric field, which will balance an oil drop of mass m carrying charge q is (g = acceleration due to gravity)
- (1) $\frac{q}{m}$
 - (2) $\frac{mg}{q^2}$
 - (3) $\frac{mg}{q}$
 - (4) mgq
22. The potential energy of system of two charges, $2\ \mu\text{C}$ and $-6\ \mu\text{C}$ placed at a separation of 3 m is
- (1) $36 \times 10^{-3}\ \text{J}$
 - (2) $-36 \times 10^{-3}\ \text{J}$
 - (3) $18 \times 10^{-3}\ \text{J}$
 - (4) $-18 \times 10^{-3}\ \text{J}$
23. A particle starts from rest and moves at an acceleration of $4\ \text{m/s}^2$ for 10 second and then decelerates uniformly for another 5 second to come to rest. Distance covered by particle in this journey is
- (1) 300 m
 - (2) 600 m
 - (3) 400 m
 - (4) 900 m
24. Which of the following is incorrect statement?
- (1) Conductance of a metallic conductor decreases with increase in temperature
 - (2) If the radius of a metallic wire is halved by stretching it, its resistance becomes doubled
 - (3) On increasing length of a metallic conducting wire by stretching, its specific resistance remains unchanged
 - (4) SI unit of conductance is siemens
25. The magnetic field associated with a current carrying hollow pipe will be
- (1) Only outside
 - (2) Only inside
 - (3) Both inside and outside
 - (4) Neither inside nor outside
26. How many minimum NAND gates are required to form an AND gate?
- (1) 1
 - (2) 2
 - (3) 3
 - (4) 4
27. Displacement current exists
- (1) Wherever there is a time varying magnetic field
 - (2) Wherever there is a time varying electric field
 - (3) Wherever there is space varying electric field
 - (4) Both (2) and (3)
28. The potential at a point in space due to a surrounding charge distribution is $V = (x^2 + y^2 + z^2)\ \text{V}$, then the electric field at point (1, 2, 3) is
- (1) $(\hat{i} + 2\hat{j} + 3\hat{k})\ \text{V/m}$
 - (2) $(2\hat{i} + 4\hat{j} + 6\hat{k})\ \text{V/m}$
 - (3) $(-\hat{i} - 2\hat{j} - 3\hat{k})\ \text{V/m}$
 - (4) $(-2\hat{i} - 4\hat{j} - 6\hat{k})\ \text{V/m}$
29. A pair of adjacent coils has a mutual inductance of 1.5 H. If the current in one coil changes from 0 to 20 A in 0.5 s, what is the change of flux linkage with the other coil?
- (1) 30 Wb
 - (2) 33 Wb
 - (3) 23 Wb
 - (4) 42 Wb

30. If a voltage V is applied across a conductor of length l having constant cross-sectional area throughout, then choose the correct relation between current density (j) and electric field (E).
(Given – pressure, temperature remains constant)



31. A uniform conducting wire is connected to a battery of emf E . If l and r are length and radius of given wire respectively, then drift velocity of electrons

- (1) Depends on length but does not depend on radius
- (2) Depends on radius but does not depend on length
- (3) Depends on both length and radius
- (4) Does not depend on either length or radius

32. Given below are two statements:

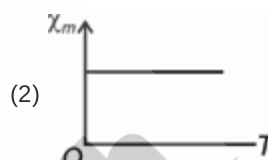
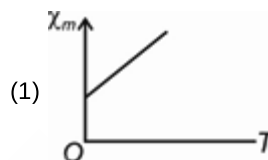
Statement I: Zero error is always subtracted from measured reading for a vernier calliper.

Statement II: When the jaws are made to touch each other, then zero of main scale and zero of vernier scale always coincide with each other.

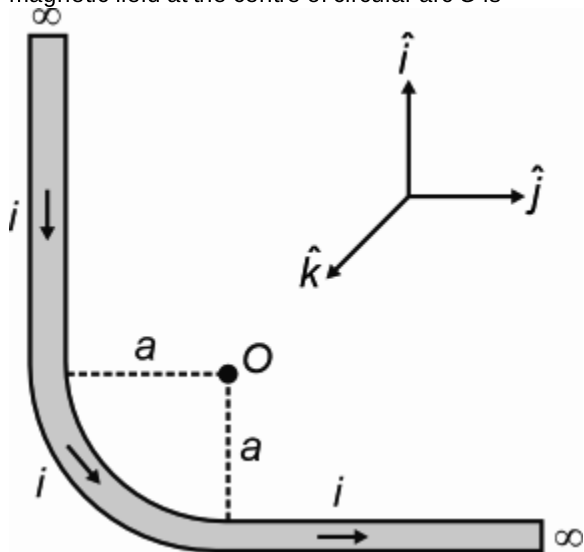
In the light of the above statements, choose the most appropriate answer from the options given below.

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

33. The graph representing variation of magnetic susceptibility of a diamagnetic substance with temperature is

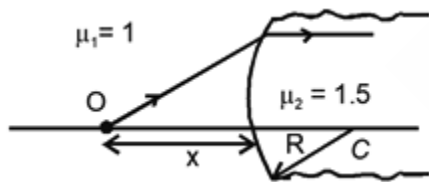


34. A long wire carrying a current i is bent in between to form a quarter circular arc of radius a as shown in the figure. The magnetic field at the centre of circular arc O is



- (1) $\frac{\mu_0}{4\pi} \frac{i}{a} (2 + \frac{\pi}{2}) \hat{j}$
- (2) $\frac{\mu_0}{4\pi} \frac{i}{a} (2 - \frac{\pi}{2}) \hat{j}$
- (3) $\frac{\mu_0}{4\pi} \frac{i}{a} (2 + \frac{\pi}{2}) \hat{k}$
- (4) $\frac{\mu_0}{4\pi} \frac{i}{a} (2 + \frac{\pi}{2}) \hat{i}$

35. In the following diagram what is the distance x if the radius of curvature $R = 15$ cm?

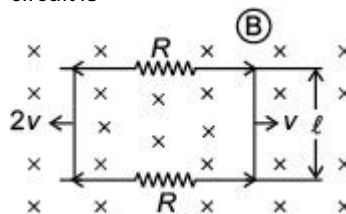


- (1) 30 cm
- (2) 20 cm
- (3) 15 cm
- (4) 10 cm

36. For an astronomical telescope, focal length of the objective is 200 cm and that of eyepiece is 40 cm. For the final image to form at infinity, the tube length of the telescope is

- (1) 160 cm
- (2) 200 cm
- (3) 240 cm
- (4) 180 cm

37. Two conducting rods each of length l are moving with velocity v and $2v$ respectively as shown in the given figure, in presence of external magnetic field B . The current in the circuit is



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

38. Find the Binding energy (in MeV) of a nitrogen nucleus (${}^{14}_7\text{N}$). Given $m({}^{14}_7\text{N}) = 14.00307\text{u}$

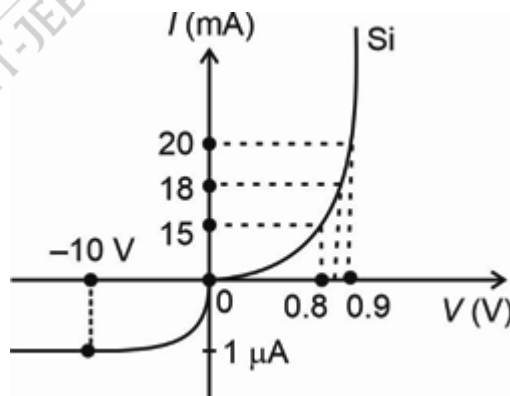
$m_n = 1.008665 \text{ u}$

$m_H = 1.007825 \text{ u}$

$1 \text{ u} = 931.5 \text{ MeV}/c^2$

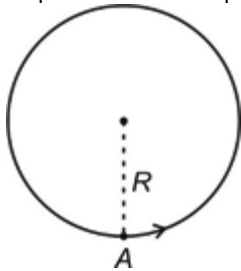
- (1) 90.2 MeV
- (2) 104.7 MeV
- (3) 120.8 MeV
- (4) 130.2 MeV

39. The V - I characteristic of a silicon diode is shown in figure. Calculate the resistance of the diode at $I = 18$ mA



- (1) 10Ω
- (2) 20Ω
- (3) 5Ω
- (4) $5 \times 10^{-3} \Omega$

40. A particle is moving on a circular path of radius ' R ' as shown in the figure. If it starts from point A , then displacement of the particle after rotating through 780° is



- (1) $R\sqrt{3}$
 (2) $R\sqrt{2}$
 (3) R
 (4) Zero
41. During a projectile motion, if the maximum height equals the horizontal range, then angle of projection with horizontal is

- (1) $\tan^{-1}\left(\frac{3}{2}\right)$
 (2) $\tan^{-1}(4)$
 (3) $\tan^{-1}(2)$
 (4) $\tan^{-1}(5)$

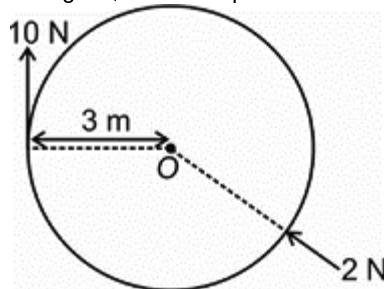
42. A body is moving with uniform velocity of 10 m/s on a level rough surface. The frictional force acting on it is 5 N. If it moves with a constant velocity of 5 m/s on the same surface, then frictional force acting on it is

- (1) Zero
 (2) 2.5 N
 (3) 5 N
 (4) 10 N

43. When the kinetic energy of a body is doubled, its momentum becomes

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

44. The magnitude of net torque acting on the body shown in the figure, about the point O is



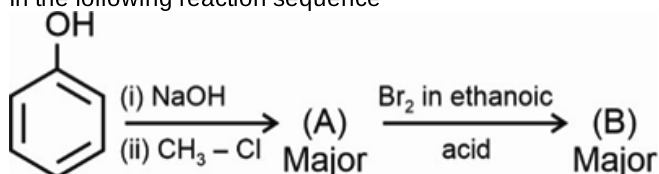
- (1) 12 N-m
 (2) 30 N-m
 (3) 18 N-m
 (4) 42 N-m

45. Among the following, the hydrogen spectral lines that lie in ultraviolet region of electromagnetic spectrum is

- (1) Lyman series
 (2) Paschen series
 (3) Brackett series
 (4) Pfund series

CHEMISTRY

46. In the following reaction sequence



The product (B) will be

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

47. Given below are two statements

Statement I: Chloromethane on reduction with zinc and dilute HCl gives methane.

Statement II: Methane on heating with oxygen in the presence of Cu at 523 K and 100 atm gives methanol as a major product.

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

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

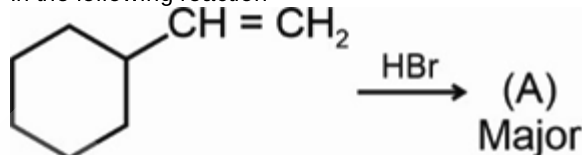
Assertion (A): Boiling point of 2-Methylbutane is higher than 2,2-Dimethylpropane.

Reason (R): With increase in number of branched chains, the molecule attains the shape of a sphere which results in weak intermolecular forces between spherical molecules.

In the light of above statements, choose the most appropriate answer from the options given below

- (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

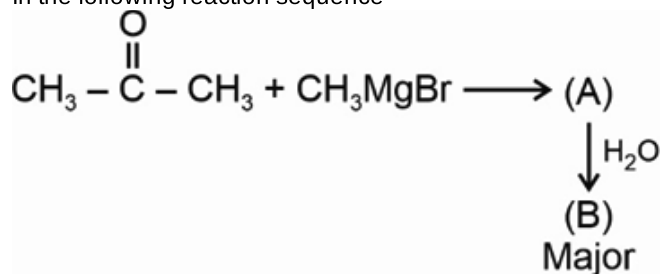
49. In the following reaction



The product (A) will be

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

50. In the following reaction sequence



The product (B) will be

- (1) Primary alcohol
- (2) Secondary alcohol
- (3) Tertiary alcohol
- (4) Ether

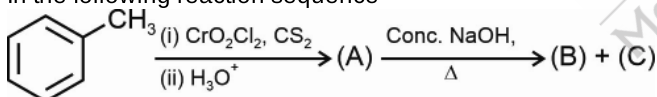
51. Mesityl oxide on oxidation with sodium hypochloride gives

- (1) $(\text{CH}_3)_2\text{CH} - \text{CH}_2 - \text{COONa}$ and CHCl_3
- (2) $\text{CH}_3 - \text{CH}_2 - \text{CH}_2 - \text{COONa}$ and CHCl_3
- (3) $\text{CH}_2 = \text{CH} - \text{CH}_2 - \text{COONa}$ and CHCl_3
- (4) $(\text{CH}_3)_2\text{C} = \text{CH} - \text{COONa}$ and CHCl_3






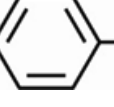

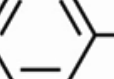
52. The correct decreasing order of acidic strength of given carboxylic acids is

- (1) $\text{CHCl}_2\text{COOH} > \text{NC} - \text{CH}_2\text{COOH} > \text{HCOOH} > \text{C}_6\text{H}_5\text{COOH}$
- (2) $\text{NC} - \text{CH}_2\text{COOH} > \text{CHCl}_2\text{COOH} > \text{HCOOH} > \text{C}_6\text{H}_5\text{COOH}$
- (3) $\text{C}_6\text{H}_5\text{COOH} > \text{NC} - \text{CH}_2\text{COOH} > \text{CHCl}_2\text{COOH} > \text{HCOOH}$
- (4) $\text{HCOOH} > \text{NC} - \text{CH}_2\text{COOH} > \text{C}_6\text{H}_5\text{COOH} > \text{CHCl}_2\text{COOH}$

53. In the following reaction sequence



Products (B) and (c) are

- (1)  $-\text{CH}_2\text{OH}$ and  $-\text{COOH}$
- (2)  $-\text{CH}_2\text{ONa}$ and  $-\text{CH}_2\text{OH}$
- (3)  $-\text{CH}_2\text{OH}$ and  $-\text{COONa}$
- (4)  $-\text{COOH}$ and  $-\text{CH}_2\text{CH}_3$

54. Match List-I with List-II

	List-I (Complex)		List-II (Number of unpaired electron(s))
a.	$[\text{Co}(\text{H}_2\text{O})_6]^{3+}$	(i)	5
b.	$[\text{CoF}_6]^{3-}$	(ii)	2
c.	$[\text{MnBr}_4]^{2-}$	(iii)	0
d.	$[\text{NiCl}_4]^{2-}$	(iv)	4

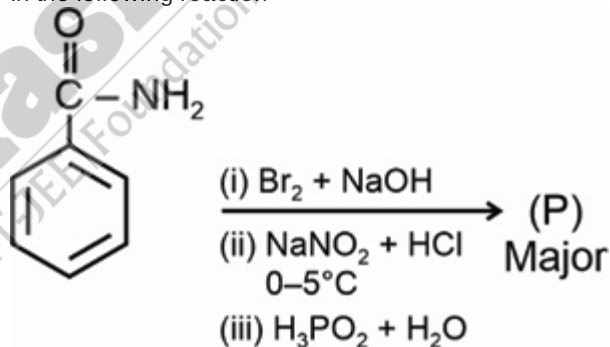
The correct match is

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

55. Which of the following is homoleptic complex?

- (1) $[\text{Co}(\text{NH}_3)_5\text{Cl}]^{2+}$
- (2) $[\text{CoCl}_2(\text{en})_2]^+$
- (3) $[\text{Co}(\text{C}_2\text{O}_4)_3]^{3-}$
- (4) $[\text{Co}(\text{NH}_3)_5(\text{CO}_3)]^+$

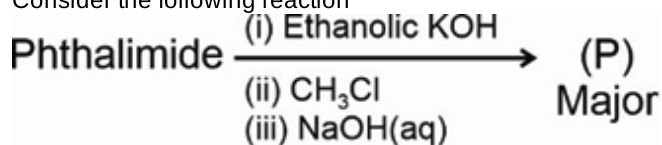
56. In the following reaction



The product (P) will be

- (1) Phenol
- (2) Benzene
- (3) Bromobenzene
- (4) Aniline

57. Consider the following reaction



The incorrect statement about (P) will be

- (1) It gives isocyanide test
- (2) It reacts with Hinsberg's reagent
- (3) It reacts with bromine water at room temperature to give a white ppt of 2,4,6-tribromoaniline
- (4) It reacts with benzoyl chloride gives N-Methyl benzamide

58. Which of the following has highest enthalpy of atomisation?

- (1) V
- (2) Ti
- (3) Sc
- (4) Ni

59. Consider the following statements

- (a) Ce (IV) is a good analytical reagent
- (b) Both La^{3+} and Yb^{2+} are diamagnetic
- (c) Due to lanthanoid contraction, Zr and Hf have almost identical radii

The correct statement(s) is/are

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

60. Match List-I with List-II

	List-I (Oxide)		List-II (Common method of preparation)
a.	N_2O_5	(i)	$\text{Pb}(\text{NO}_3)_2 \xrightarrow{673\text{ K}}$
b.	NO_2	(ii)	$\text{NaNO}_2 + \text{FeSO}_4 + \text{H}_2\text{SO}_4 \rightarrow$
c.	NO	(iii)	$\text{HNO}_3 + \text{P}_4\text{O}_{10} \rightarrow$
d.	N_2O	(iv)	$\text{NH}_4\text{NO}_3 \xrightarrow{\Delta}$

The correct match is

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

61. Which of the following is manufactured by the contact process?

- (1) Chlorine
- (2) Phosphene
- (3) Sulphuric acid
- (4) Nitric acid

62. Given below are two statements

Statement I: Boric acid is a weak monobasic Lewis acid.

Statement II: Boric acid is prepared by acidifying an aqueous solution of borax.

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

63. Consider the following reaction at equilibrium $2\text{A}(\text{g}) + 3\text{B}(\text{g}) \rightleftharpoons 5\text{C}(\text{g})$, if equilibrium concentration of A, B and C are 4M, 1M and 2M respectively at 298 K, then ΔG° of the reaction will be

- (1) $-1.72 \text{ kJ mol}^{-1}$
- (2) $-2.56 \text{ kJ mol}^{-1}$
- (3) $-3.04 \text{ kJ mol}^{-1}$
- (4) $-4.15 \text{ kJ mol}^{-1}$

64. If K_a for an acid is 10^{-6} , then the value of $\text{p}K_b$ for its conjugate base at 298 K is

- (1) 8
- (2) 10
- (3) 12
- (4) 6

65. Given below are two statements

Statement-I: The increase of pressure on $\text{ice}(\text{s}) \rightleftharpoons \text{water}(\text{l})$ system at constant temperature will lead to forward shift of equilibrium.

Statement-II: The decrease of pressure on $\text{H}_2\text{O}(\text{l}) \rightleftharpoons \text{H}_2\text{O}(\text{g})$ system at constant temperature will lead to the backward shift of equilibrium.

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

66. An element X has the following isotopic composition. X^{200} : 90% and X^{202} : 10%. The weighted average atomic mass of the naturally occurring element X is closest to

- (1) 201.5 amu
- (2) 200.8 amu
- (3) 200.5 amu
- (4) 200.2 amu

67. In the reaction, $3\text{H}_2(\text{g}) + \text{N}_2(\text{g}) \rightarrow 2\text{NH}_3(\text{g})$, when 9 mole of H_2 and 7 mol of N_2 are made to react to completion, then
- (1) All the N_2 will be consumed
 - (2) 5 mol of NH_3 is formed
 - (3) 4 mol of N_2 is left in excess
 - (4) 1 mol of H_2 is left in excess
68. Maximum kinetic energy of photoelectrons emitted when a light of frequency 1.1×10^{12} Hz is irradiated on a metal surface whose threshold frequency is equal to 1.0×10^{11} Hz, is ($h = 6.6 \times 10^{-34}$ J s)
- (1) 6.6×10^{-25} J
 - (2) 1.8×10^{-21} J
 - (3) 5.1×10^{-20} J
 - (4) 6.6×10^{-22} J
69. Which of the following transition in the hydrogen spectrum will give photon of maximum energy?
- (1) $n = 3$ to $n = 2$
 - (2) $n = 4$ to $n = 3$
 - (3) $n = 3$ to $n = 1$
 - (4) $n = 6$ to $n = 5$
70. Match list-I with list-II
- | List-I | List-II |
|---------------|---------------------|
| Atomic number | IUPAC official name |
| a. 107 | (i) Rutherfordium |
| b. 103 | (ii) Bohrium |
| c. 105 | (iii) Lawrencium |
| d. 104 | (iv) Dubnium |
- The correct match is
- (1) a(ii), b(iii), c(iv), d(i)
 - (2) a(iii), b(ii), c(iv), d(i)
 - (3) a(ii), b(iii), c(i), d(iv)
 - (4) a(iv), b(iii), c(ii), d(i)
71. Match the species in List-I with hybridisation of central atom in List-II and choose the correct answer.
- | List-I | List-II |
|-------------------|----------------|
| a. I_3^+ | (i) sp^3d^3 |
| b. XeF_4 | (ii) sp^3d^2 |
| c. IF_7 | (iii) sp |
| d. CO_2 | (iv) sp^3 |
- (1) a(iv), b(ii), c(i), d(iii)
 - (2) a(ii), b(iv), c(i), d(iii)
 - (3) a(iv), b(ii), c(iii), d(i)
 - (4) a(iv), b(i), c(ii), d(iii)
72. During the conversion of O_2 to O_2^+ ion, the electron is removed from which of the following molecular orbitals?
- (1) π^*
 - (2) π
 - (3) σ
 - (4) σ^*
73. 1 mole of an ideal gas at 300 K and 10 atm is expanded to 1.0 atm pressure isothermally and reversibly then work involved is
- (1) -5.74 kJ
 - (2) -5744 kJ
 - (3) -57.44 kJ
 - (4) -5.7 J
74. If enthalpies of combustion of glucose, $\text{C}(\text{s})$ and $\text{H}_2(\text{g})$ are $-x$ kJ, $-y$ kJ and $-z$ kJ respectively then enthalpy of formation of glucose is
- (1) $x - 6y - 6z$
 - (2) $-6z - 6y - x$
 - (3) $x + 6y - 6z$
 - (4) $x + 6y + 6z$
75. If oxidation number of X, Y and Z in a compound are -3 , $+5$ and -1 respectively then possible formula of compound will be
- (1) $\text{X}_2(\text{YZ})_2$
 - (2) $\text{X}_3(\text{YZ}_2)_2$
 - (3) $\text{X}(\text{Y}_2\text{Z})_2$
 - (4) $\text{X}(\text{YZ}_4)_3$
76. Given below are the two statements
- Statement I** : Aquatic species are more comfortable in warm water rather than in cold water.
- Statement II** : At 303 K temperature, the Henry's law constant of N_2 is higher than that of O_2 .
- In the light of above statements, choose the correct option
- (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
77. If 0.2 molal aqueous solution of weak monobasic HA undergoes 40% dissociation then the boiling point of the solution will be (K_b of water = $0.52 \text{ K kg mol}^{-1}$)
- (1) 100.14°C
 - (2) 100.11°C
 - (3) 100.21°C
 - (4) 100.25°C

78. Match List I with List II

	List I (Conversion)		List II (Number of Faraday required)
a.	2 moles of SO_4^{2-} to $\text{S}_2\text{O}_8^{2-}$	(i)	6F
b.	2 moles of H_2O to O_2	(ii)	2F
c.	1.5 moles of $\text{Cr}_2\text{O}_7^{2-}$ to Cr^{3+}	(iii)	4F
d.	1.2 moles of MnO_4^- to Mn^{2+}	(iv)	9F

Choose the correct answer from the options given below.

- (1) a(ii), b(iii), c(iv), d(i)
 (2) a(ii), b(iii), c(i), d(ii)
 (3) a(iii), b(ii), c(iv), d(i)
 (4) a(i), b(iv), c(iii), d(ii)
79. If 0.2 M CH_3COOH has molar conductivity $\Lambda_m = 20 \text{ S cm}^2 \text{ mol}^{-1}$ and the value of $\Lambda_m^0 = 400 \text{ S cm}^2 \text{ mol}^{-1}$, then the value of $K_a(\text{CH}_3\text{COOH})$ will be

- (1) 5×10^{-5}
 (2) 5×10^{-4}
 (3) 5×10^{-6}
 (4) 5×10^{-7}

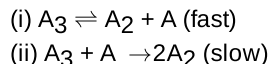
80. For the given cell, $\text{Mg}|\text{Mg}^{2+}(0.001\text{M})||\text{Cu}^{2+}(0.01\text{M})|\text{Cu}$ the approximate value of equilibrium constant at 25°C will be
 (Given $E_{\text{Mg}^{2+}/\text{Mg}}^0 = -2.32 \text{ V}$ and $E_{\text{Cu}^{2+}/\text{Cu}}^0 = 0.34 \text{ V}$)

- (1) e^{90}
 (2) e^{60}
 (3) 10^{30}
 (4) 10^{90}

81. If rate constant 'k' of a reaction varies with temperature as $\ln k = 2 - \frac{200}{T}$, then Arrhenius constant (A) and activation energy (E_a) of the reaction respectively are

- (1) 100, 200 R
 (2) 100, 20 R
 (3) e^2 , 200 R
 (4) e^2 , 20 R

82. Mechanism of a hypothetical reaction $2\text{A}_3 \rightarrow 3\text{A}_2$ is given below



The overall order of the reaction will be

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

83. Alcoholic compounds on reaction with ceric ammonium nitrate gives a red colouration due to the formation of

- (1) $[\text{Ce}(\text{NO}_3)_4(\text{ROH})_3]$
 (2) $[\text{Ce}(\text{NH}_4)_4(\text{ROH})_3](\text{NO}_3)_3$
 (3) $[\text{Ce}(\text{H}_2\text{O})_4(\text{ROH})_2](\text{NO}_3)_2$
 (4) $[\text{Ce}(\text{ROH})_6](\text{NO}_3)_2$

84. Consider the following statements

- (a) Fehling solution B is aqueous copper sulphate.
 (b) Benzaldehyde does not give positive Fehling's test
 (c) On warming acetaldehyde with freshly prepared ammoniacal silver nitrate solution, a bright silver mirror is produced due to formation of silver metal.

The correct statements are

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

85. Given below are two statements :

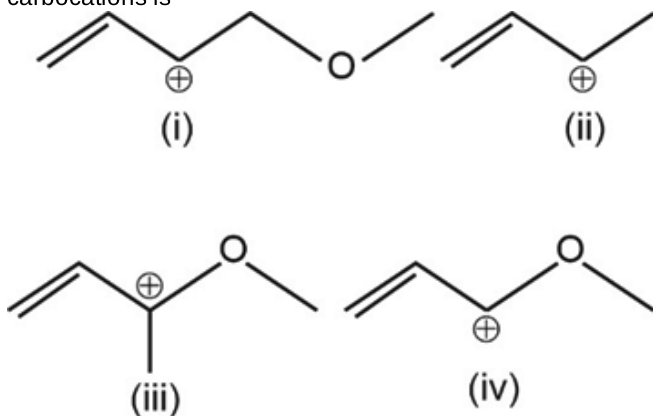
Statement I : Kjeldahl method is not applicable to compounds containing nitrogen in azo and nitro groups.

Statement II : Compounds containing nitrogen in azo and nitro group do not give ammonium sulphate when treated with concentrated H_2SO_4 .

Choose the correct answer from the options given below.

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

86. The correct decreasing order of stability of following carbocations is



- (1) (iv) > (iii) > (i) > (ii)
 (2) (iii) > (iv) > (ii) > (i)
 (3) (ii) > (iii) > (iv) > (i)
 (4) (ii) > (iii) > (i) > (iv)
87. Match the column I containing vitamins with column II containing respective diseases caused on their deficiency and choose the correct option.

	Column-I		Column-II
(a)	Thiamine	(i)	Scurvy
(b)	Pyridoxine	(ii)	Cheilosis
(c)	Riboflavin	(iii)	Convulsions
(d)	Ascorbic acid	(iv)	Beri-Beri

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

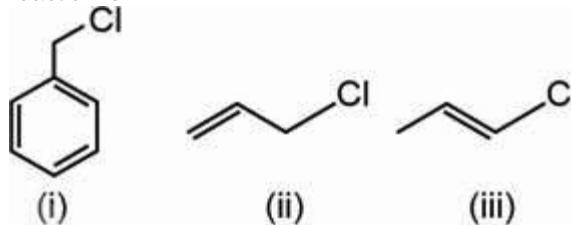
88. Given below are two statements:

Statement I: Sucrose on hydrolysis gives equimolar mixture of D – (+) – glucose and D – (–) fructose.

Statement II: Sucrose is a reducing sugar.

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

- (1) Statement I is correct but statement II is incorrect
 (2) Statement I is incorrect but statement II is correct
 (3) Both statement I and statement II are correct
 (4) Both statement I and statement II are incorrect
89. Correct order of reactivity of given compounds towards S_N1 reaction is



- (1) (iii) > (ii) > (i)
 (2) (i) > (iii) > (ii)
 (3) (i) > (ii) > (iii)
 (4) (ii) > (i) > (iii)
90. 2-Bromo-3-methylpentane is heated with potassium ethoxide in ethanol. The major product obtained is

- (1) 3-Methylpent-2-ene
 (2) 2-Ethoxy-3-methylpentane
 (3) 2-Methylpent-2-ene
 (4) 4-Methylpent-2-ene

BIOLOGY

91. Which of the following is known to reproduce only by asexual means?

- (1) *Ustilago*
 (2) *Alternaria*
 (3) *Aspergillus*
 (4) *Mucor*

92. (A) determines the shape of a cell and provides a strong structural support to prevent the bacterium from bursting or collapsing.

Choose the **correct** option for (A).

- (1) Slime layer
 (2) Cell wall
 (3) Capsule
 (4) Cell membrane

93. Identify the **incorrect** match from the following.

- (1) Inclusion bodies – Storage of reserve material in eukaryotes
- (2) Ribosomes – Translate mRNA into proteins
- (3) Fimbriae – Attach bacteria to the host tissue
- (4) Mesosomes – Helps in cell wall formation

94. Which of the following component cannot synthesize proteins?

- (1) Mitochondria
- (2) Chloroplasts
- (3) Vacuoles
- (4) Ribosomes

95. Read the statements given below and choose the **correct** option.

Statement A: T.W. Engelmann used a prism to split light into its spectral components and illuminated *Cladophora* placed in a suspension of aerobic bacteria to detect the site of O₂ evolution.

Statement B: Jan Ingenhousz conducted the bell jar experiment to prove that plants restore to the air whatever breathing animals and burning candle remove.

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

96. Respiratory ratio of proteins is about

- (1) 1
- (2) 0.7
- (3) 1.2
- (4) 0.9

97. The gaseous plant growth regulator

- (1) Is synthesized in large amounts by tissues undergoing division
- (2) Influences lateral shoot growth and adventitious shoot formation in dicots
- (3) Promotes seed and bud dormancy along with root growth and root hair formation
- (4) Promotes rapid internode or petiole elongation in deep water rice plants

98. PGR that have specific effects on cytokinesis, were discovered as a modified form of adenine from the

- (1) Human urine
- (2) Autoclaved herring sperm DNA
- (3) Extracts of vascular tissues
- (4) Tips of coleoptiles of oat seedlings

99. Wind-pollinated plants must have

- (1) Light weight sticky pollens
- (2) Fragrant flowers
- (3) Colourful flowers
- (4) Chasmogamous flowers

100. Choose the **odd** one w.r.t. outbreeding devices.

- (1) Dichogamy
- (2) Self-incompatibility
- (3) Dioecy
- (4) Cleistogamy

101. Which of the following statements is **false**?

- (1) Embryo develops at the micropylar end of the embryo sac.
- (2) In typical dicot embryo, epicotyl terminates with the plumule.
- (3) In embryo of grass, root cap is enclosed in an undifferentiated sheath called coleorrhiza.
- (4) After triple fusion, primary endosperm cell develops into an embryo.

102. Select the incorrect statement.

- (1) Photoperiod affects reproduction in seasonal breeders, both plants and animals.
- (2) Definition of biological species was given by Carolus Linnaeus.
- (3) Binomial nomenclature system has two components, generic name and specific epithet.
- (4) In unicellular organisms, reproduction is synonymous with growth.

103. Pick the odd one w.r.t. the narrowly utilitarian services of ecosystem.

- (1) Firewood
- (2) Fibre
- (3) Pollination
- (4) Drugs

104. Choose the **incorrect** statement from the following.

- (1) Extinctions across a taxa are always random.
- (2) Colonisation of tropical pacific islands by humans is said to have led to the extinction of more than 2000 native bird species.
- (3) Many species extinctions in last 500 years were due to over-exploitation by humans.
- (4) Species diversity is generally highest in the tropics and decreases towards the poles.

105. During the process of decomposition

- Complex inorganic matter breaks down into simple organic matter.
- Leaching results into the unavailability of water soluble inorganic salts that get precipitated.
- Earthworms perform the process of anabolism.
- Humification leads to the formation of a colloidal substance which is further degraded by the process of fragmentation.

Which of the above statement(s) is/are **true**?

- Only a and b
- Only c and d
- Only b
- Only c

106. In frog, cutaneous respiration takes place

- Always, throughout the life
- Only on land
- Only in water along with pulmonary respiration
- Only during aestivation as pulmonary respiration gets suspended to save energy

107. Proboscis gland in hemichordates is associated with

- Locomotion
- Excretion
- Respiration
- Circulation

108. Choose the **incorrect** statement.

- Insulin generates second messengers like cAMP etc., after interacting with its intracellular receptors.
Steroidal hormones regulate chromosome function by
- the interaction of hormone receptor-complex with the genome.
- Receptors are quite hormone specific.
- Cortisol and aldosterone interact with intracellular receptors.

109. A person has the blood group type in which antigens 'A' and 'B' are present on his RBCs but Rh antigen is absent. Which of the following will be the most compatible blood group for blood transfusion in this individual?

- O⁺
- A⁻
- B⁺
- AB⁺

110. Finger-like projections of infundibulum responsible for collection of ovum after ovulation from abdominal cavity are named as

- Ostia
- Ampulla
- Isthmus
- Fimbriae

111. In frogs, the first part of the small intestine

- Is the site where formation of chyme occurs
- Is the site from where bile is synthesised and released
- Is responsible for digestion of food by secreting HCl and gastric juices
- Receives a common bile duct which carries bile and pancreatic juices

112. In cockroach, 100-150 yellow coloured filamentous tubules are present at the junction of midgut and hindgut, and these tubules

- Are responsible for grinding the food particles
- Absorb nitrogenous waste products and convert them into uric acid
- Secrete digestive juices and are involved in storage of food
- Are lined by cuticle and contain only flagellated cells

113. How many of the features mentioned in the box below are associated with the muscle fibres that are involuntary and striated?

Syncytial, Branched, Cylindrical, Fusiform, Possess gap junctions

Choose the **correct** option.

- Two
- Three
- Four
- Five

114. In a hypothetical scenario, if the volume of blood pumped out by each ventricle per minute is 5250 mL and the blood pumped out by the left ventricle is 70 mL per cardiac cycle, then calculate the duration of the cardiac cycle and select the correct option.

- 0.6 seconds
- 0.8 seconds
- 1.2 minutes
- 1.4 minutes

115. Selective secretion of hydrogen ions occurs mainly in all of the following, **except**

- PCT
- DCT
- Collecting duct
- Descending limb of loop of Henle

116. A stable population shows all the given features, **except**

- (1) It is represented by a bell-shaped age pyramid.
- (2) Number of individuals in the reproductive age group is more than the number of individuals in the post-reproductive age group.
- (3) Number of individuals in the pre-reproductive age group is minimum.
- (4) There is no increase or decrease in population size due to growth rate being almost zero.

117. The organism which is capable of meeting its water requirement by producing water as a by product through internal fat oxidation is

- (1) Kangaroo rat
- (2) Polar bear
- (3) Seal
- (4) Siberian crane

118. In which of the given steps/processes microbes are involved?

- a. Secondary treatment of sewage
- b. Anaerobic sludge digestion
- c. Ripening of cheese
- d. Primary treatment of sewage
- e. Distillation of fermented broth

- (1) a, b, c & d only
- (2) b, c, d & e only
- (3) a, b & c only
- (4) All a, b, c, d & e

119. Read the following statements and select the **correct** option(s) for BOD.

- a. It is directly proportional to the polluting potential of a water body.
- b. BOD test measures the rate of uptake of oxygen by microbes in a given water sample.
- c. Growth of flocs during sewage treatment significantly reduces the BOD.

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

120. The number of nucleotides found in $\phi \times 174$ bacteriophage is

- (1) 48502
- (2) 4.6×10^6
- (3) 5386
- (4) 3.3×10^9

121. Which of the following traits of *Pisum sativum* can only be expressed in homozygous condition?

- (1) Violet flowers
- (2) Axial flowers
- (3) Wrinkled seeds
- (4) Inflated pods

122. During dihybrid cross performed by Mendel on pea plant

- (1) Percentage of recombinants were more than the parental types
- (2) Phenotypic and genotypic ratio of F_2 generation was same
- (3) The two traits of a character got mixed and segregation was not seen during gamete formation
- (4) The F_2 ratio of dominant and recessive traits of a character was 3 : 1

123. Which of the following characteristics of euglenoids is similar to plants?

- (1) Presence of protein rich layer called pellicle
- (2) Presence of photosynthetic pigments
- (3) Presence of contractile vacuole
- (4) Formation of non-motile gametes during sexual reproduction

124. Mark True (T) or False (F) for the following statements and select the **correct** option.

A : The sporophyte in *Polytrichum* is more developed than *Riccia*.

B : In angiosperms, ovules remain enclosed within the ovary wall.

C : *Fucus* exhibits oogamous reproduction.

- | | A | B | C |
|-----|---|---|---|
| (1) | T | T | F |
| (2) | F | T | F |
| (3) | F | F | T |
| (4) | T | T | T |

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

125. Thorns and spines of plants are similar in being

- (1) Modified structures of the same part of the plants
- (2) The structures for self defence
- (3) The structures for vegetative propagation
- (4) Perennating organs of the plant

126. How many plants among mustard, china rose, brinjal, *Petunia*, plum, guava and peach have hypogynous flower?

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

127. In a flower of lotus

- (1) Carpels are united
- (2) Carpels are free
- (3) Ovary is syncarpous
- (4) Only one carpel is present

128. The function of root hair and trichome respectively are

- (1) Absorption of water along with minerals and gaseous exchange
- (2) Transpiration and gaseous exchange
- (3) Gaseous exchange and protection
- (4) Absorption of minerals and preventing transpiration

129. The anatomical features which are common to both monocot stem and dicot leaf are the presence of

- (1) Endodermis and sub-stomatal cavity
- (2) Conjoint and closed vascular bundle
- (3) Palisade and spongy mesophyll parenchyma
- (4) Phloem parenchyma and water containing cavities in vascular bundles

130. Read the following Assertion (A) and Reason (R) statements and select the correct option.

Assertion: Centrosome is an organelle usually containing two cylindrical structures called centrioles.

Reason: Both the centrioles in a centrosome lie perpendicular to each other and each has a cartwheel appearance.

- (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

131. In humans, the part of myofilament which has binding sites for ATP and active sites for thin filaments is

- (1) Head of heavy meromyosin
- (2) Short arm of light meromyosin
- (3) Tail part of light meromyosin
- (4) Short arm of heavy meromyosin

132. Which of the following is **correct** w.r.t. glucagon?

- (1) Causes hypoglycaemia by stimulating glycogenesis and gluconeogenesis
- (2) Causes hyperglycaemia by stimulating glycogenolysis and gluconeogenesis
- (3) Causes hypoglycaemia by inhibiting glycogenesis and gluconeogenesis
- (4) Causes hyperglycaemia by inhibiting glycogenolysis and gluconeogenesis

133. Select the **incorrect** option w.r.t. mutation and variation.

- (1) Former is random and directionless
- (2) Latter is directional and small
- (3) Darwin believed that former causes speciation
- (4) Hugo deVries believed that former can lead to the formation of new species

134. How many of the IUDs given in the box below is/are hormone releasing IUDs?

Lippes loop, Multiload-375, Progestasert, LNG-20

Choose the **correct** option.

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

135. Select the **correct** statement w.r.t. tissue culture.

- (1) The capacity to generate a whole plant from the explant is called micro-propagation.
- (2) Somaclones are genetically distinct from the parent plants.
- (3) Protoplast is surrounded by cell wall but lacks plasma membrane.
- (4) Axillary meristem is free of virus even if the plant is infected with virus.

136. Choose the odd one w.r.t. auto-immune disorders.

- (1) Psoriasis
- (2) Rheumatoid arthritis
- (3) Malaria
- (4) Vitiligo

137. Antitoxin contains pre-formed antibodies which provide passive immunity to the patients whereas the oral polio vaccine that is administered to the children is composed of

- (1) Immunoglobulins
- (2) Weakened pathogenic strain
- (3) Activated pathogenic strain
- (4) Harvested antibodies

138. In which of the following ARTs, fertilisation occurs outside the body of the female?

- (1) IUI
- (2) AI
- (3) ICSI
- (4) GIFT

139. The hypothesis which states that the formation of biomolecules preceded the appearance of the first cellular forms of life, was experimentally proved by

- (1) Alfred Wallace
- (2) Louis Pasteur
- (3) Charles Darwin
- (4) S.L. Miller

140. Which of the following is true w.r.t. RNAi?

- (1) Involves silencing of the target mRNA by preventing its translation.
- (2) *M. incognita* was used as a vector to get rid of *Agrobacterium*.
- (3) DNA is introduced in such a manner that only sense RNA is produced in the host cells.
- (4) Takes place only in prokaryotic organisms as a method of cellular defense

141. Read the following statements w.r.t. humans:

Statement A: They perform positive pressure breathing in which the intra-pulmonary volume in the lungs increases during inspiration.

Statement B: Movement of air into and out of the lungs is carried out by creating a pressure gradient between the lungs and the atmosphere.

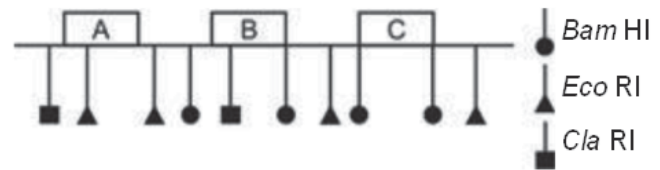
Choose the **correct** option.

- (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

142. Difference between oogenesis and spermatogenesis is

- (1) Oogenesis begins at puberty while spermatogenesis during embryonic development.
Oogenesis results in formation of four haploid ova from a primary oocyte while during spermatogenesis only one sperm is formed from a primary spermatocyte.
- (2) a primary oocyte while during spermatogenesis only one sperm is formed from a primary spermatocyte.
- (3) Cytoplasmic division is unequal in oogenesis while it is equal in spermatogenesis.
- (4) Spermatogenesis is not completed until after fertilization occurs, but oogenesis is completed at the time of birth.

143. If only gene 'C' without flanking sequences is to be isolated from the given fragment of DNA, what should be the choice of enzyme from the options given below according to labelling?



- (1) *Eco* RI
- (2) *Eco* RI and *Cla* I
- (3) *Cla* I
- (4) *Bam* HI

144. If gene of interest is cloned at *Bam*HI site of pBR322, recombinants will be

- (1) Susceptible to tetracycline
- (2) Resistant to tetracycline
- (3) Susceptible to ampicillin
- (4) Not growing on media lacking tetracycline

145. Elution is the technique of

- (1) Separation of DNA fragments of various size through gel matrix under electrical field
- (2) Observing bright orange coloured DNA bands in a stained gel under UV radiation
- (3) Extraction of DNA bands from the gel piece
- (4) Construction of recombinant DNA by joining DNA fragments with cloning vectors

146. Excessive dosage of A causes hallucinations.

Choose the option that **correctly** fills the blank.

- (1) Heroin
- (2) Benzodiazepines
- (3) Cocaine
- (4) Barbiturates

147. Read the following statements carefully w.r.t. AIDS. Choose the option with all the **correct** statements.

- a. HIV has a protein coat and only one molecule of RNA and reverse transcriptase
- b. Macrophage acts like a HIV factory
- c. Viral RNA incorporates into host genome to produce new viral RNA
- d. HIV starts destroying helper-T lymphocytes

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

148. Which of the following is present in ovarian cortex of a female child at the time of her birth?

- (1) First polar body
- (2) Primary oocyte
- (3) Secondary oocyte
- (4) Second polar body

149. Which of the following techniques can be used for early detection of diseases?

- a. rDNA technology
- b. PCR
- c. ELISA

Choose the **correct** option.

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

150. 'X' are arranged in such an intricate manner that they leave some minute spaces which act as filtration slits during ultrafiltration. Here, 'X' are

- (1) Brush-bordered cuboidal cells of Bowman's capsule
- (2) Epithelial cells of Bowman's capsule
- (3) Endothelium of glomerular blood capillaries
- (4) Basement substance present between cellular layers of Bowman's capsule

151. The ancestor of modern human with brain size more than 900cc was

- (1) *Homo habilis*
- (2) *Dryopithecus*
- (3) *Homo sapiens neanderthalensis*
- (4) *Ramapithecus*

152. Assertion (A): Ribozymes are proteinaceous enzymes and their catalytic power get affected at high temperature.

Reason (R): The activity of proteinaceous enzyme can be affected by a change in the conditions which can alter the tertiary conformation of the proteins that form the active sites in the enzyme.

In the light of the above statements, choose the correct option.

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

153. Choose the **correct** statement w.r.t Saheli.

- (1) It is a 'once a month' pill containing steroidal preparation
- (2) It is an oral contraceptive containing a non-steroidal preparation for females
- (3) Very dangerous side effects are associated with its usage
- (4) It has low contraceptive value

154. In humans, the long slender collar bone articulates with the

- (1) Head of humerus, which forms the shoulder joint
- (2) Scapula, a triangular flat bone present in the ventral part of the thorax
- (3) Acromion, a flat expanded process of spine of scapula
- (4) Glenoid cavity, a depression present above the acromion

155. Triploblastic animals having bilateral symmetry and pseudocoelom are placed in phylum

- (1) Platyhelminthes
- (2) Aschelminthes
- (3) Annelida
- (4) Arthropoda

156. Which of the following takes place in most dramatic phase of the cell cycle?

- (1) Chromosomes align at equator
- (2) DNA replication
- (3) Chromosome duplication
- (4) Cell organelles duplication

157. Prophase I is similar to prophase II as

- (1) Both always occur in haploid cells
- (2) Both include five substages
- (3) Nuclear membrane disappears in both
- (4) Both are equally complex and prolonged stages

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

Statement I: Anaphase marks the end of cell division.

Statement II: In animal cells, cytokinesis is achieved by the formation of furrow.

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

- 159.** Consider the following statements and select the **correct** option.
 (a) Light reactions are temperature sensitive.
 (b) Photorespiration involves 3 organelles- peroxisome, chloroplast and mitochondria.
 (c) The protons produced by photolysis of water accumulate within stroma.
 (d) Conformational change occur only in CF_0 part of ATP synthase enzyme to form ATP.
- (1) Only (a) is correct
 (2) (c) and (d) are incorrect
 (3) (b) and (c) are correct
 (4) Only (d) is incorrect
- 160.** Identify the **wrong** statement for sex determination in honey bee.
- (1) Females are diploid
 (2) Both male and female bees undergo meiosis to form gametes
 (3) Males do not have father
 (4) Males develop through parthenogenesis
- 161.** How many types of gametes can be produced by a diploid organism, if it is heterozygous for 3 loci?
- (1) 6
 (2) 4
 (3) 8
 (4) 3
- 162.** Choose the **incorrect** statement w.r.t. Turner's syndrome.
- (1) It represents a genetic disorder which is due to the absence of one of the 'X' chromosomes
 (2) The individual has the chromosome complement as $45 + X0$
 (3) It represents monosomy of X chromosome
 (4) The individuals inflicted with this disorder are sterile with rudimentary ovaries
- 163.** Read the given statements and select the correct option.
Statement-I : Glucose or galactose cannot act as inducers for lac operon.
Statement-II : Lac operon is under the control of both positive regulation as well as negative regulation.
- (1) Both statements are true
 (2) Both statements are false
 (3) Only statement I is true
 (4) Only statement II is true
- 164.** Select which is **wrongly** matched pair w.r.t. *lac* operon.
- (1) *lac* operon – Inducible system
 (2) Regulator gene – Non-constitutive gene
 (3) Promoter gene – Site for RNA polymerase attachment
 (4) *lac z* gene – β -galactosidase
- 165.** Which one of the following statements about histones is **wrong**?
- (1) Histones carry positive charge in the side chain of amino acids
 (2) Histones are organized to form a unit of 8 molecules
 (3) The pH of histones is slightly acidic
 (4) Histones are rich in amino acids - Lysine and Arginine
- 166.** Read the given assertion (A) and reason (R) and choose the **correct** option.
Assertion (A) : The roots found in wheat plant are known as fibrous roots.
Reason (R) : In wheat, the primary root is short lived and is replaced by a large number of roots originating from base of the stem.
- (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
- 167.** (A) The abaxial epidermis generally bears more stomata than the adaxial epidermis.
 (B) The epidermis of both the upper surface and lower surface of the leaf has a conspicuous cuticle
 (C) The tissue between the upper and the lower epidermis is made up of parenchyma.
 (D) The vascular bundles are surrounded by a layer of bundle sheath cells.
 Identify the features that are common in both dorsiventral and isobilateral leaves and choose the **correct** option
- (1) (A) and (B) only
 (2) (B) , (C) and (D) only
 (3) (A), (C) and (D) only
 (4) (B) and (D) only
- 168.** The meiotic stage in which X-shaped structure is clearly visible in bivalents is
- (1) Pachytene
 (2) Diplotene
 (3) Diakinesis
 (4) Metaphase I
- 169.** The steps of Krebs cycle where decarboxylation occurs are
- (a) Pyruvic acid \rightarrow Acetyl CoA
 (b) Oxalosuccinic acid \rightarrow α -KGA
 (c) Succinyl-CoA \rightarrow Succinic acid
 (d) α -KGA \rightarrow Succinyl CoA
 The correct ones are
- (1) (a), (b) and (d) only
 (2) (b), (c) and (d) only
 (3) (b) and (d) only
 (4) All (a), (b), (c) and (d)

170. Select an option that shows the **correct** sequence of the events involved in the translation mechanism.
- Binding of mRNA to smaller subunit of ribosome
 - Aminoacylation of tRNA
 - Binding of initiator tRNA to the P-site of the ribosome
 - Formation of polypeptide
 - Formation of peptide bond between first and second amino acids at the A site

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

171. Complete the analogy by selecting the **correct** option.

Placoid scales : *Carcharodon* :: Cycloid scales : _____

- (1) *Labeo*
- (2) *Pristis*
- (3) *Trygon*
- (4) *Scoliodon*

172. Find the **correct** match.

	Column - I (Group)		Column - II (Secondary metabolite examples)
a.	Pigment	(i)	Morphine
b.	Alkaloid	(ii)	Ricin
c.	Toxin	(iii)	Rubber
d.	Polymer	(iv)	Monoterpene
		(v)	Anthocyanin

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

173. Antibodies belong to the same category of biomacromolecules as that of

- (1) Guanosine
- (2) GLUT-4
- (3) Cellulose
- (4) Cholesterol

174. All of the given functions are performed by conducting part of the human respiratory system, **except**

- (1) Humidifying and bringing air to body temperature
- (2) Transport atmospheric air to alveoli
- (3) Clear air from foreign particles
- (4) Gaseous exchange with blood

175. The factor **not** responsible for increasing the cardiac output is

- (1) Release of epinephrine
- (2) Neural signals from sympathetic nervous system
- (3) Release of adrenaline
- (4) Parasympathetic neural signals

176. **Assertion (A)** : Events of uterine cycle will not take place in a woman who has undergone hysterectomy.

Reason (R) : Ovarian cycle will remain unaffected in hysterectomised female.

In the light of above statements, 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 statement but (R) is false
- (4) Both (A) and (R) are false statements

177. During resting stage, the axonal membrane is comparatively more permeable to **A** and nearly impermeable to **B**.

Select the option that fills the blanks **correctly**.

- (1) A = Sodium ions, B = Potassium ions
- (2) A = Potassium ions, B = Sodium ions
- (3) A = Calcium ions, B = Sodium ions
- (4) A = Calcium ions, B = Potassium ions

178. Read the following statements A and B and choose the **correct** answer.

Statement A : An enzyme catalysing the removal of nucleotides from the ends of DNA is called exonuclease.

Statement B : Transfer of any gene into a completely different organism can be done through genetic engineering.

- (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

179. If by any means, the release of LH gets inhibited in a human female, then which of the following will not occur?

- (1) Maturation of a primary follicle into secondary follicle
- (2) Production of estrogen by granulosa cells
- (3) Ovulation of a secondary oocyte
- (4) Release of GnRH from the hypothalamus

180. Sieving effect for separation of DNA fragments in gel electrophoresis is provided by

- (1) Agarose gel
- (2) Size of DNA molecules
- (3) Charge of electrodes
- (4) Charge of DNA molecules



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