



Aakash

Medical | IIT-JEE | Foundations

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FINAL TEST SERIES for NEET-2024

MM : 720

Test -II

Time : 3 Hrs. 20 Mins.

Mock Test for NEET (Complete Syllabus of Class XI & XII)

Instructions :

- There are two sections in each subject, i.e. Section-A & Section-B. You have to attempt all 35 questions from Section-A & only 10 questions from Section-B out of 15.
- 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

Choose the correct answer :

SECTION-A

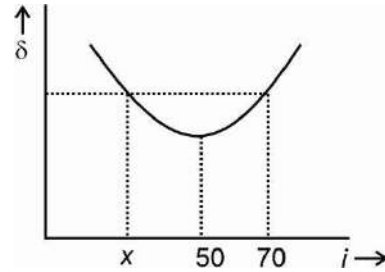
- A 100 V battery is connected across a $10\ \Omega$ resistor and current of 5 A flows. The internal resistance of the battery is
 - $5\ \Omega$
 - $10\ \Omega$
 - $20\ \Omega$
 - $2.5\ \Omega$
- The main objective of taking mean of several observations in an experiment is
 - To avoid zero error in the instrument
 - To increase the precision of measurement
 - To take observations keenly
 - To minimize random errors in an experiment
- A truck 24 m long moving on a road at 20 m/s starts chasing a 100 m long train running on a track parallel to road at 72 km/h. If the truck is 200 m behind, and starts accelerating at $0.5\ \text{m/s}^2$ then the time taken by truck to overtake the train is
 - $\sqrt{28}$ seconds
 - $\sqrt{18}$ seconds
 - 36 seconds
 - $\sqrt{40}$ seconds
- A particle projected obliquely from ground at an angle of 30° from vertical. If it strikes the ground at a speed of 20 m/s then its speed at highest point would have been
 - 10 m/s
 - $10\sqrt{3}$ m/s
 - $20\sqrt{3}$ m/s
 - 5 m/s
- A particle in circular motion has angular acceleration $4\ \text{rad/s}^2$. If radius of its circular path is 2 m and angular speed at $t = 2$ second is 12 rad/s, then choose the correct statement:
 - Angular speed of particle at $t = 0$ is 6 rad/s
 - Angular speed of particle remains constant
 - Magnitude of centripetal acceleration is variable
 - Tangential acceleration of particle is zero

6. The centripetal force on a bicycle bending to maneuver a circular turn is provided by
- Friction
 - Normal reaction
 - Weight
 - Resultant of normal force and weight
7. Two smooth spheres of mass 4 kg and 2 kg moving in same direction at a speed of 20 m/s and 10 m/s respectively, collide elastically. The ratio of their speed after collision is
- 1 : 2
 - 2 : 3
 - 3 : 4
 - 7 : 4
8. A plank of mass 40 kg and length 8 m rests on a frictionless surface with a person of mass 80 kg standing at one of its end. If the person moves towards the other end then centre of mass of system
- Moves backwards
 - Remains at rest
 - Moves forwards
 - Moves backwards initially then moves forwards
9. The SI unit of angular impulse is
- kg m s^{-1}
 - $\text{kg m}^2 \text{s}^{-1}$
 - g cm s^{-1}
 - $\text{g cm}^3 \text{s}^{-1}$
10. The number of photons emitted per second by 60 W source of monochromatic light of wavelength 5000 Å are
- 1.5×10^{20}
 - 1.5×10^{-18}
 - 3×10^{22}
 - 3.5×10^{-18}
11. A plank is balanced when two small blocks of 4 kg each are kept at its end (fulcrum at centre). Length of plank is 8 m and its mass is 18 kg. If one of the mass is removed then the initial angular acceleration of the plank is [$g = 10 \text{ m/s}^2$]
- 1 rad/s^2
 - 5 rad/s^2
 - 0.5 rad/s^2
 - 2 rad/s^2
12. A hydraulic pressure of 2 GPa is subjected to a sphere in which fractional change of volume is observed to be unity. The Bulk modulus of material of sphere is
- 2 GPa
 - 0.2 GPa
 - $\frac{1}{2}$ GPa
 - $2 \times 10^5 \text{ Pa}$
13. Electric potential in a region varies as $V(x, y) = x^2y - y^2$ (in SI units), the electric field at (1,2) m is
- $(-4\hat{i} + 3\hat{j}) \text{ V/m}$
 - $(\frac{3}{5}\hat{i} - \frac{2}{5}\hat{j}) \text{ V/m}$
 - $(\hat{i} - \hat{j}) \text{ V/m}$
 - $(2\hat{i} - 3\hat{j}) \text{ V/m}$
14. Kirchoff's current law is based on
- Law of conservation of charge
 - Law of conservation of mass
 - Law of conservation of energy
 - Law of conservation of momentum
15. The resistance of an ideal ammeter is
- Zero
 - 10Ω to 100Ω
 - $10 \text{ k}\Omega$ to $100 \text{ k}\Omega$
 - Infinite
16. The magnetic moment associated with an electron in first orbit of H-atom is known as
- Bohr magneton
 - Bohr angular momentum
 - Bohr quantisation condition
 - Fermi angular momentum

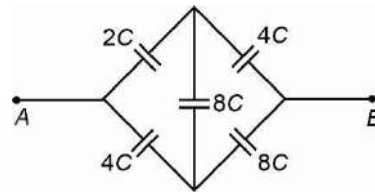
Space for Rough Work

17. A coil of resistance 10Ω and area 20 cm^2 is subjected to a magnetic field varying from 4 T to 0 in one second. The charge flown through coil in this time interval is
- (1) 20 mC
 - (2) 2 mC
 - (3) 0.8 mC
 - (4) 12.33 mC
18. Average value of an alternating current $I = 4 \sin(100\pi t)$ A in half cycle is
- (1) $4\sqrt{2} \text{ A}$
 - (2) $\frac{4}{\sqrt{2}} \text{ A}$
 - (3) $\frac{4}{\pi} \text{ A}$
 - (4) $\frac{8}{\pi} \text{ A}$
19. The frequencies of x-rays, γ -rays and ultraviolet rays are respectively a , b and c . Then chose the correct option.
- (1) $a < b, b < c$
 - (2) $a < b, b > c$
 - (3) $a > b, b > c$
 - (4) $a > b, b < c$
20. A convex lens made of a material having refractive index 1.5 has focal length 2 cm in air. Its focal length when immersed in a liquid of refractive index 1.25 becomes
- (1) 2 cm
 - (2) 5 cm
 - (3) 2.5 cm
 - (4) 10 cm
21. The wavefront associated with a point source of light at finite distance is
- (1) Spherical
 - (2) Cylindrical
 - (3) Elliptical
 - (4) Plane
22. Energy of a photon of wavelength ' λ ' is
- (1) $\frac{hc^2}{\lambda}$
 - (2) $\frac{\lambda c}{h}$
 - (3) λhc
 - (4) $\frac{hc}{\lambda}$

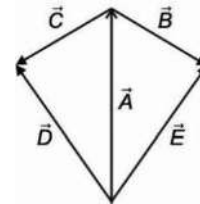
23. The variation of angle of deviation and angle of incidence for a triangular prism is shown below. The value of ' x ' is



- (1) 30°
 - (2) 28°
 - (3) 20°
 - (4) 35°
24. The effective capacitance between points A and B is



- (1) $2C$
 - (2) $\frac{4}{3} C$
 - (3) $4C$
 - (4) $\frac{8}{3} C$
25. In the figure, $\vec{E} - \vec{D} + \vec{C}$ equals to



- (1) \vec{A}
- (2) \vec{B}
- (3) $-\vec{A}$
- (4) $-\vec{B}$

Space for Rough Work

26. If R and h represent the horizontal range and maximum height respectively of an oblique projectile, then $\frac{R^2}{8h} + 2h$ is equal to (speed of projection is u)

- (1) $\frac{2u}{g}$ (2) $\frac{u^2}{g}$
 (3) $\frac{u}{g}$ (4) $\frac{2u^2}{g}$

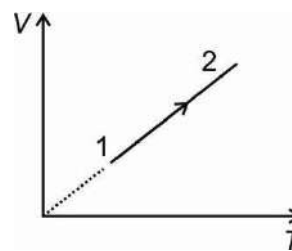
27. A uniform rod AB of mass m and length $2a$ is allowed to fall under gravity with AB in horizontal position. When the speed of rod is ' v ' suddenly the end ' A ' is fixed. The angular velocity of rod with which it begins to rotate will be

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

28. A particle performing SHM with frequency 10 Hz and amplitude 5 cm is initially at negative extreme position. The equation of its displacement will be (x is in metre)

- (1) $x = 0.05 \sin\left(20\pi t + \frac{3\pi}{2}\right)$
 (2) $x = 0.05 \sin\left(20\pi t + \frac{\pi}{2}\right)$
 (3) $x = 0.05 \sin(10\pi t)$
 (4) $x = 0.05 \sin(20\pi t + \pi)$

29. Volume versus temperature graph of two moles of helium gas is as shown in figure. The ratio of change in internal energy and the work done by the gas in process 1-2 is



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

30. Consider the following statements and select the correct option.

- (i) The density of water is minimum at 4°C
- (ii) The density of water increases with increase in temperature above 4°C
- (iii) The density of water increases with increase in temperature from 0°C to 4°C

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

31. Charge Q is distributed on two metallic spheres having radii R and $3R$. If both spheres have equal charge densities, then the charge on smaller sphere will be

- (1) $\frac{Q}{10}$ (2) $\frac{Q}{9}$
 (3) $\frac{9Q}{10}$ (4) $\frac{10Q}{11}$

32. A ray of light passes normally through a slab ($\mu = 1.5$) of thickness 50 mm. If speed of light in vacuum be 3×10^8 m/s, then time taken by the ray to cross the slab will be

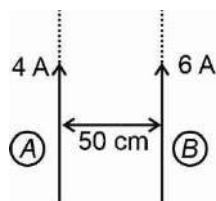
- (1) 250 ps (2) 5 ps
 (3) 250 ns (4) 5 ns

Space for Rough Work

33. The wavelength of light used in two Young's double slit experiments are 400 nm and 500 nm. The fringe width are equal when the screen are placed at 1.2 m and 1.6 m respectively. The ratio of the distance between the slits in them is

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

34. Two long parallel straight wires A and B carrying currents of 4 A and 6 A respectively in same direction are kept 50 cm apart. Magnetic field will be zero at a point



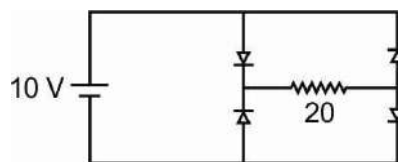
- (1) 20 cm from wire A (2) 20 cm from wire B
 (3) 30 cm from wire A (4) 40 cm from wire A

35. In a moderately doped p-type semiconductor, the fermi energy level lies

- (1) In the forbidden energy gap nearer to the conduction band
 (2) In the forbidden energy gap nearer to the valence band
 (3) In the middle of forbidden energy gap
 (4) Outside the forbidden energy gap

SECTION-B

36. Four ideal diodes are connected as shown in circuit. The current through 20 Ω resistor will be



- (1) 0.2 A (2) 0.3 A
 (3) 0.5 A (4) Zero

37. A particle of mass m , is projected horizontally from a height h above earth's surface with speed v where v_0 is the optimum orbital velocity. Column I contains the speed of projection and column II contains the respective trajectory followed by the particle. Match the columns and choose the correct option (v_e = escape speed)

	Column-I		Column-II
A.	$v = v_0$	P.	Parabolic
B.	$v_0 < v < v_e$	Q.	Circular
C.	$v = v_e$	R.	Elliptical
D.	$v > v_e$	S.	Hyperbolic

- (1) A → Q; B → R; C → P; D → S
 (2) A → Q; B → S; C → P; D → R
 (3) A → Q; B → P; C → R; D → S
 (4) A → Q; B → R; C → S; D → P

38. A concave mirror of focal length 20 cm (in air) is immersed in liquid ($\mu = 2$). The focal length of the mirror in liquid will be

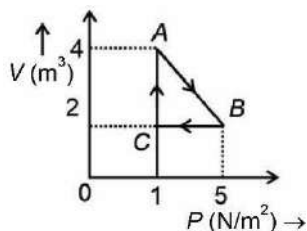
- (1) 10 cm (2) $\frac{40}{3}$ cm
 (3) 40 cm (4) 20 cm

39. A body is projected up from surface of the earth with velocity $\left(\frac{3}{4}\right)^{\text{th}}$ of its escape velocity. If R be the radius of earth, then the height it reaches is

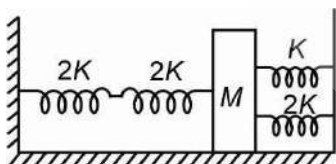
- (1) $\frac{3R}{10}$ (2) $\frac{9R}{7}$
 (3) $\frac{8R}{5}$ (4) $\frac{9R}{5}$

Space for Rough Work

40. An ideal gas is taken through the cyclic process $A \rightarrow B \rightarrow C \rightarrow A$, as shown in figure. The work done by the gas in the process $A \rightarrow B \rightarrow C \rightarrow A$ is



- (1) -2 J
 (2) -3 J
 (3) -4 J
 (4) -5 J
41. Susceptibility is positive and large for
- (1) Paramagnetic substance
 (2) Ferromagnetic substance
 (3) Diamagnetic substance
 (4) Non-magnetic substance
42. Four massless springs whose force constants are $2K$, $2K$, K and $2K$ respectively are attached to mass M kept on a frictionless plane as shown in figure. If the mass M is displaced in the horizontal, then the frequency of the system is



- (1) $\frac{1}{2\pi} \sqrt{\frac{K}{4M}}$ (2) $\frac{1}{2\pi} \sqrt{\frac{4K}{M}}$
 (3) $\frac{1}{2\pi} \sqrt{\frac{K}{7M}}$ (4) $\frac{1}{2\pi} \sqrt{\frac{7K}{M}}$

43. **Assertion (A):** The kinetic energy of charge particle moving in a uniform magnetic field does not change.

Reason (R): Work done by the magnetic field on the charge is zero.

In the light of above statements, select 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 but (R) is false
 (4) Both (A) and (R) are false
44. Current i is carried in a wire of length L . If the wire is turned into a circular coil, the maximum magnitude of torque acting on it, (when placed in a uniform magnetic field B) will be

- (1) $\frac{LiB^2}{2}$ (2) $\frac{Li^2B}{2}$
 (3) $\frac{L^2iB}{4\pi}$ (4) $\frac{Li^2B}{4\pi}$

45. Two masses of 1 kg and 4 kg are moving with equal kinetic energies. The ratio of the magnitudes of their linear momentum is

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

46. The mass and volume of a body are 6.237 g and 3.5 cm^3 , respectively. The density of the material of the body upto correct significant figures is

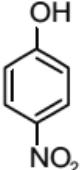
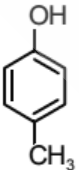
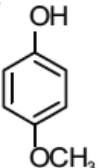
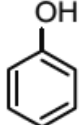
- (1) 1.78 g/cm^3
 (2) 1.782 g/cm^3
 (3) 1.8 g/cm^3
 (4) 1.7 g/cm^3

Space for Rough Work

47. A wire of length L and radius r rigidly fixed at one end. On stretching the other end of the wire with a force F , the increase in its length is l . If another wire of same material but of length $2L$ and radius $2r$ is stretched with a force $2F$, the increase in its length will be
- (1) $\frac{l}{4}$ (2) l
 (3) $\frac{l}{2}$ (4) $2l$
48. A block of wood floats in water with $\left(\frac{4}{5}\right)^{\text{th}}$ of its volume submerged. If the same block just floats in a liquid, then the density of this liquid (in kg m^{-3}) is
- (1) 1250 (2) 600
 (3) 400 (4) 800
49. A charge $+Q$ is at a distance $\frac{L}{2}$ above the centre of a square plate having side L . Total flux linked with the square plate is
- (1) $\frac{Q}{4\epsilon_0}$ (2) $\frac{Q}{\epsilon_0}$
 (3) $\frac{Q}{6\epsilon_0}$ (4) $\frac{4Q}{5\epsilon_0}$
50. A transformer has an efficiency of 75%. It works at input of 6 kW and 100 V. If secondary voltage is 240 V, the current in secondary coil is
- (1) 24.5 A
 (2) 37.25 A
 (3) 9.35 A
 (4) 18.75 A

CHEMISTRY

SECTION-A

51. Number of angular and radial nodes present in $5p$ orbital are respectively
- (1) 2 and 1 (2) 1 and 2
 (3) 1 and 3 (4) 3 and 1
52. The most acidic compound among the following is
- (1)  (2) 
- (3)  (4) 
53. Consider the following statements.
- Actinoids are highly reactive metals, especially when finely divided.
 - Actinoid contraction is greater for element to element than lanthanoid contraction.
 - Trivalent lanthanoid ions are colourless in the solid state.
 - Lanthanoids are good conductors of heat and electricity.
- Which of the above statements are correct?
- (1) a, b and c only (2) b, c and d only
 (3) a, b and d only (4) a, b, c and d
54. P–P–P bond angle in white P_4 molecule is
- (1) 90° (2) 85°
 (3) 75° (4) 60°

Space for Rough Work

55. Which of the following ions gives brown ring test?

- (1) Cl^- (2) SO_3^{2-}
 (3) NO_3^- (4) NH_2^-

56. ΔG° for the following cell reaction will be
 $\text{Ni(s)} + 2\text{Ag}^+(\text{aq}) \rightarrow \text{Ni}^{2+}(\text{aq}) + 2\text{Ag(s)}$

[Given, $E^\circ_{\text{Ni}^{2+}/\text{Ni}} = -0.25 \text{ V}$, $E^\circ_{\text{Ag}^+/\text{Ag}} = 0.80 \text{ V}$]

- (1) -106.15 kJ (2) -101.32 kJ
 (3) -202.65 kJ (4) -53.07 kJ

57. Incorrect statement among the following is

- (1) Sucrose is a non-reducing sugar
 (2) Maltose is a reducing sugar
 (3) β -D- (-) fructofuranose contains four chiral centers
 (4) D-glucose has 6 chiral centers

58. Which of the following halides has highest Lewis acidity?

- (1) BI_3 (2) BCl_3
 (3) BBr_3 (4) BF_3

59. Which among the following is a planar molecule?

- (1) $(\text{CH}_3)_3\text{N}$ (2) XeF_4
 (3) SF_4 (4) H_2SO_3

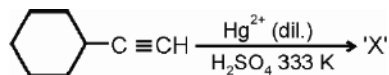
60. For which of the following aqueous salt solutions, the pH is independent of its concentration?

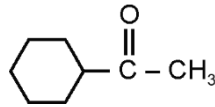
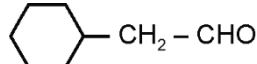
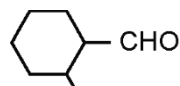
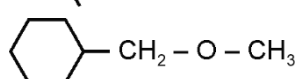
- (1) NH_4Cl (2) CH_3COONa
 (3) NH_4CN (4) NaCN

61. One mole of a perfect gas expands isothermally to ten times its original volume. The change in entropy is

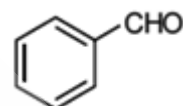
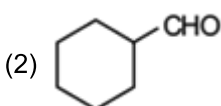
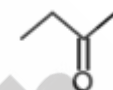
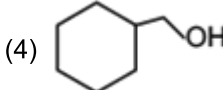
- (1) $0.1R$ (2) $2.303R$
 (3) $10.5R$ (4) $10R$

62. Major product 'X' in the following reaction is

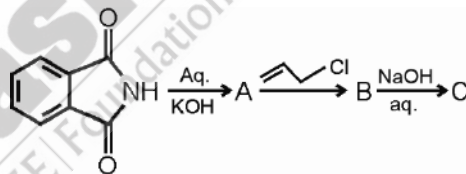


- (1) 
 (2) 
 (3) 
 (4) 



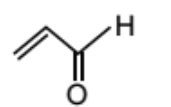
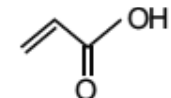
63. The compound which will not give addition product with NaHSO_3 is

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

64. Consider the following reaction



Product C is

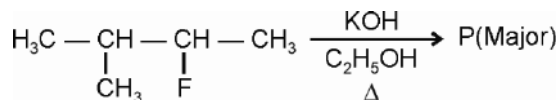
- (1) 
 (2) 
 (3) 
 (4) 

Space for Rough Work

65. Number of Cr—O—Cr bond(s) present in dichromate ion is

- (1) 6 (2) 1
(3) 4 (4) 0

66. Major product of the given reaction is



Major product P is

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

67. Match the compounds given in List-I with their names in List-II and choose the correct option.

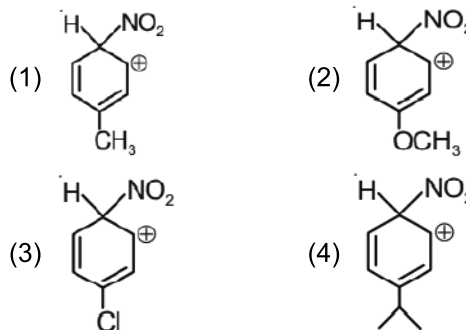
	List I		List II
a.	H ₂ S ₂ O ₈	(i)	Sulphurous acid
b.	H ₂ SO ₃	(ii)	Pyrosulphuric acid
c.	H ₂ SO ₄	(iii)	Peroxodisulphuric acid
d.	H ₂ S ₂ O ₇	(iv)	Sulphuric acid

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

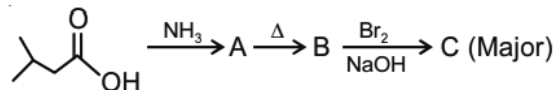
68. Which of the following ions, has the highest limiting molar conductivity in water at 298 K?

- (1) H⁺ (2) OH⁻
(3) K⁺ (4) Mg²⁺

69. Most stable carbocation among the following is



70. Consider the following reactions sequence.



The major product C is

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

71. The reductive ozonolysis of isoprene will give

- (1) Acetone and ethanal
(2) Methylglyoxal and methanal
(3) Acetone and propanal
(4) Glyoxal and methanal

72. If the half-life of first order reaction is 25 minutes then the time required for the completion of 20% of reaction is

- (1) 12.5 minutes (2) 8.0 minutes
(3) 10.2 minutes (4) 6.2 minutes

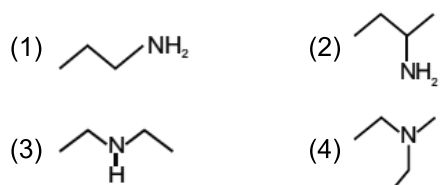
73. If $E^\circ_{\text{MnO}_4^-/\text{Mn}^{2+}} = 1.51 \text{ V}$ and $E^\circ_{\text{MnO}_2/\text{Mn}^{2+}} = 1.23 \text{ V}$, then standard electrode potential of $E^\circ_{\text{MnO}_4^-/\text{MnO}_2}$

is

- (1) 0.28 V (2) 1.70 V
(3) 1.85 V (4) 2.74 V

Space for Rough Work

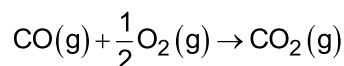
74. The compound which will not react with Hinsberg's reagent is



75. The pair of elements which does not show diagonal relationship is

- (1) Li and Mg (2) Be and Al
(3) Mg and B (4) B and Si

76. Consider the reaction



Find the value of $\Delta H - \Delta U$ for the reaction.

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

77. Which among the following complex has highest value of spin only magnetic moment?

- (1) $\text{Ni}(\text{CO})_4$ (2) $[\text{PtCl}_4]^{2-}$
(3) $[\text{NiCl}_4]^{2-}$ (4) $[\text{CuCl}_4]^{2-}$

78. The pK_b of ammonium hydroxide and pK_a of acetic acid are 4.75 and 4.77 respectively at T(K). The correct option for the pH of ammonium acetate solution is

- (1) 6.99 (2) 7.01
(3) 6.98 (4) 7.02

79. 6.02×10^{21} molecules of urea are present in 100 mL of its solution. The concentration of solution is

- (1) 1 M (2) 0.1 M
(3) 0.01 M (4) 0.02 M

80. Consider the following two statements.

Statement I: Aurous chloride and auric chloride are written as Au(I)Cl and Au(III)Cl_3 in stock notation.

Statement II: A reagent which lowers the oxidation number of an element in given substances is called reductant.

In the light of above two 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 incorrect and statement II is correct
(4) Statement I is correct and statement II is incorrect

81. The correct set of four quantum numbers of the valence electron of K [Z = 19] atom is

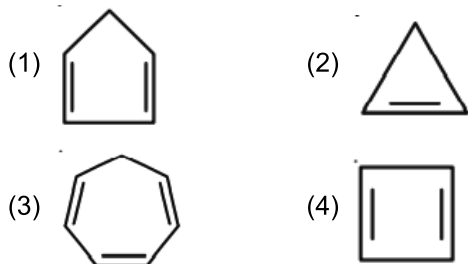
	n	l	m	s
(1)	4	2	0	$+\frac{1}{2}$
(2)	4	2	1	$-\frac{1}{2}$
(3)	4	0	0	$+\frac{1}{2}$
(4)	4	1	0	$-\frac{1}{2}$

82. Select correct statement about boric acid (H_3BO_3).

- (1) It is a Bronsted acid
(2) It is a Lewis acid
(3) It is an Arrhenius acid
(4) It is as stronger acid as chloric acid

Space for Rough Work

83. Which of the following will react with NaOH most readily?



84. Two liquids A and B are mixed in a molar ratio of 2 : 3. If $P_A^o = 100$ mmHg and $P_B^o = 300$ mmHg, then the mole fraction of A in vapour phase is

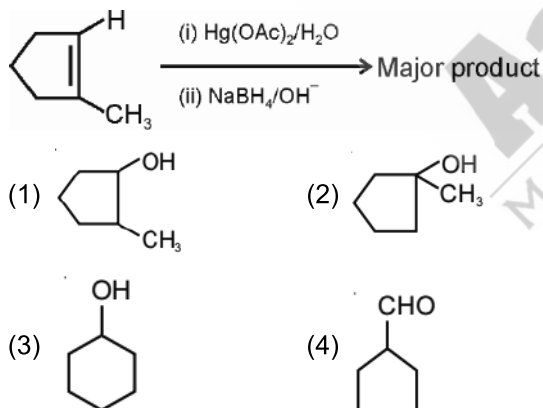
- (1) $\frac{2}{11}$ (2) $\frac{2}{5}$
 (3) $\frac{3}{5}$ (4) $\frac{10}{11}$

85. Structure of XeO_2F_2 is

- (1) Tetrahedral
 (2) Square pyramidal
 (3) See-saw
 (4) T-shaped

SECTION-B

86. Major product in the given reaction is



87. Match cations given in List-I with their colour of flame observed by naked eye in List-II and choose correct option.

	List-I (Cations)		List-II (Colour of flame observed by naked eye)
(a)	Cu^{2+}	(i)	Green flame with blue centre
(b)	Sr^{2+}	(ii)	Brick red
(c)	Ba^{2+}	(iii)	Crimson red
(d)	Ca^{2+}	(iv)	Apple green

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

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

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

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

88. The mole of $\text{K}_2\text{Cr}_2\text{O}_7$ required to oxidise one mole of ferrous sulphate in acidic medium is

- (1) $\frac{1}{7}$ (2) $\frac{1}{3}$
 (3) $\frac{1}{6}$ (4) $\frac{1}{2}$

89. Which of the following group is ortho/para directing when attached with benzene ring?

- (1) $-\text{CHO}$ (2) $-\overset{\text{O}}{\parallel}{\text{C}}-\text{CH}_3$
 (3) $-\text{NHCOCH}_3$ (4) $-\text{NO}_2$

90. A 5% (w/v) solution of sucrose (M.W. = 342 g) is isotonic with 1% (w/v) of a solution having an unknown non-electrolytic/non-associating solute at same temperature. The molar mass of unknown solute (in g/mol) is

- (1) 34.2 (2) 136.2
 (3) 171.2 (4) 68.4

Space for Rough Work

91. Given below are two statements: one is labelled as Assertion (A) and other is labelled as Reason (R).
- Assertion (A):** Aromatic primary amines cannot be prepared by Gabriel phthalimide synthesis.
- Reason (R):** Aryl halides do not undergo nucleophilic substitution with anion formed by phthalimide.
- In light of above statement, choose the most appropriate answer from the options given below.
- (1) Both assertion and reason are true and reason is the correct explanation of the assertion
 (2) Both assertion and reason are true but reason is not the correct explanation of the assertion
 (3) Assertion is true but reason is false
 (4) Both assertion and reason are false statements
92. Consider the following statements.
- Statement I:** ΔH_f° of graphite is zero.
- Statement II:** Reference state of carbon is graphite.
- In the light of above statements, choose the correct option.
- (1) Statement I is correct and statement II is incorrect
 (2) Statement I is incorrect and statement II is correct
 (3) Both statement I and statement II are correct
 (4) Both statement I and statement II are incorrect
93. Number of electrons present in 10 g of D_2O is
- (1) $10N_A$ (2) N_A
 (3) $5N_A$ (4) $20N_A$
94. A first order reaction has a specific reaction rate of $2 \times 10^{-2} \text{ s}^{-1}$. Time taken by 80 g of the reactant to reduce to 20 g is
- (1) 277.2 s (2) 138.6 s
 (3) 104.32 s (4) 69.3 s
95. Consider the following statements.
- a. Chloroform is slowly oxidised by air in presence of light to form phosgene.
 b. The chlorofluorocarbon compounds of methane and ethane are collectively known as freons.
 c. DDT is used as insecticide.
- In the light of above statements, choose the correct option.
- (1) a and b only (2) a and c only
 (3) b and c only (4) a, b and c
96. Following are the two statements labelled as Assertion (A) and Reason (R).
- Assertion (A):** E_{cell} is an extensive property.
Reason (R): The value of E_{cell} changes with change in concentration of electrolyte.
- In the light of above statements, choose the correct option.
- (1) (A) is correct, (R) is incorrect
 (2) (A) is incorrect, (R) is correct
 (3) Both (A) and (R) are correct and (R) is the correct explanation of (A)
 (4) Both (A) and (R) are correct but (R) is not correct explanation of (A)
97. Consider the following statements.
- Statement I:** The low splitting effect caused by anionic ligands can be explained by crystal field theory.
Statement II: Crystal field theory assumes ligands to be point charges.
- In the light of the above statements, choose the correct option.


Space for Rough Work

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

98. Which among the following can show +4 oxidation state?

- (1) Er (2) Pm
 (3) Tb (4) Lu

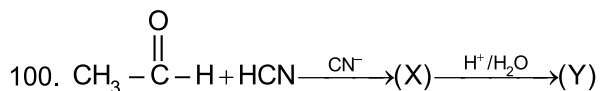
99. Match List I with List II

	List I		List II
(a)	 $\xrightarrow[\text{Anhy. AlCl}_3/\text{CuCl}]{\text{CO, HCl}}$	(i)	Haloform reaction
(b)	$\text{R}-\overset{\text{O}}{\parallel}{\text{C}}-\text{CH}_3 + \text{NaOX} \longrightarrow$	(ii)	Gattermann-Koch reaction

(c)	$\text{C}=\text{O} \xrightarrow[\text{HCl}]{\text{Zn-Hg}}$	(iii)	Wolff-Kishner reduction
(d)	$\text{C}=\text{O} \xrightarrow[\text{(ii) KOH/Ethylene glycol/\Delta}]{\text{(i) NH}_2\text{NH}_2}$	(iv)	Clemmensen reduction

Choose the correct answer from the options given below.

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



Compound (Y) is

- (1) Acetic acid (2) Oxalic acid
 (3) Lactic acid (4) Acetamide

BOTANY

SECTION - A

101. Read the following statements and select the correct option.

Assertion (A): Both DNA and RNA have the ability to direct their duplications.

Reason (R): Both DNA and RNA follows the rule of base pairing and complementarity.

- (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) (A) is false but (R) is true

102. Match the column-I with column-II and select the correct option.

	Column-I		Column-II
A.	Poaceae	(i)	$\text{Epi}_{5-7} \oplus \text{K}_{(5)} \text{C}_5 \text{A}_{(10)} \underline{\text{G}}_{(5)}$
B.	Malvaceae	(ii)	$\% \text{K}_{(5)} \text{C}_{1+2+(2)} \text{A}_{(9)+1} \underline{\text{G}}_1$
C.	Solanaceae	(iii)	$\% \text{P}_{0 \text{ or } 2 \text{ or } 3 \text{ (Lodicules)}} \text{A}_{3 \text{ or } 6} \underline{\text{G}}_1$
D.	Fabaceae	(iv)	$\oplus \text{K}_{(5)} \text{C}_{(5)} \text{A}_5 \underline{\text{G}}_{(2)}$

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

Space for Rough Work

103. Select the **odd** one out w.r.t. role of predators in an ecosystem.
- (1) They act as conduits for energy transfer across trophic levels
 - (2) They help in maintaining species diversity in a community
 - (3) They keep prey populations under control
 - (4) They enhance the intensity of competition among competing prey species
104. According to Species-Area relationship proposed by Alexander von Humboldt,
- (1) Within a region species richness always increases with increasing explored area
 - (2) The relation between species richness and area for a wide variety of taxa turns out to be a rectangular hyperbola
 - (3) The relationship is a hyperbola on a logarithmic scale
 - (4) The slope of the line becomes steeper for smaller areas
105. Which of the following organisms got extinct from Australia?
- (1) Quagga
 - (2) Thylacine
 - (3) Dodo
 - (4) Steller's Sea Cow
106. Select the property that is **incorrect** w.r.t. humus.
- (1) Dark coloured
 - (2) Amorphous
 - (3) Undergoes decomposition at an extremely slow rate
 - (4) Highly susceptible to microbial action
107. Which of the following is **not** a functional aspect of an ecosystem?
- (1) Stratification
 - (2) Productivity
 - (3) Decomposition
 - (4) Nutrient cycling
108. *Trichoderma* is used as a biocontrol agent against
- (1) Several plant pathogens
 - (2) Aphids
 - (3) Mosquitoes
 - (4) Butterfly caterpillars
109. Which of the following chromosomes in humans have least number of genes?
- (1) Chromosome 1
 - (2) Chromosome Y
 - (3) Chromosome X
 - (4) Chromosome 2
110. Which of the following codon does have a specific tRNA?
- (1) AUG
 - (2) UAA
 - (3) UAG
 - (4) UGA
111. Read the following statements and select the **correct** one(s) w.r.t. sickle-cell anaemia.
- (a) Disease is transmitted to the offspring when one of the parent is sickle cell anaemic, and the other one is normal (homozygous).
 - (b) The defect is caused by the deletion of nucleotide from codon that codes for glutamic acid.
 - (c) Heterozygous individual, has 50% probability of transmission of the mutant gene to progeny.
- (1) (a) and (b) only
 - (2) (b) only
 - (3) (c) only
 - (4) All (a), (b) and (c)
112. Read the following characteristics
- (a) They form an aggregation, which may grow and spread over several feet, under favourable conditions.
 - (b) They have spores with true walls.
 - (c) They have heterotrophic mode of nutrition.
- Identify the **correct** group based on the above characteristics.
- (1) Protozoans
 - (2) Dinoflagellates
 - (3) Slime moulds
 - (4) Euglenoids

Space for Rough Work

113. How many of the given statements is/are **correct**?
- (a) Bryophytes are homosporous plants.
 (b) Gymnosperms are first plants to show events precursor to seed habit.
 (c) Heterospory is present in *Selaginella*.
 (d) Prothallus is formed in the life cycle of *Dryopteris*.
- (1) Two (2) Three
 (3) Four (4) One
114. Monocot root differs from dicot root as the former is
- (1) Having sclerenchymatous hypodermis
 (2) Lacking secondary growth
 (3) Having casparian strips in endodermis
 (4) Lacking radial vascular bundles
115. Find the **incorrect** statement regarding the structure of plasma membrane.
- (1) Non-polar tails of phospholipids are composed of saturated hydrocarbons
 (2) Membrane of human RBC approximately has 52 percent proteins and 40 percent lipids
 (3) Polar head of phospholipids are arranged towards outer side of membrane and interact with water
 (4) Peripheral proteins run throughout the lipid bilayer and their removal requires crude methods of treatment like detergents
116. Match the column A and column B and select the **correct** option.
- | Column A | | Column B | |
|--|-------|------------|--|
| a. Bivalent formation | (i) | Pachytene | |
| b. Dissolution of synaptonemal complex | (ii) | Diakinesis | |
| c. Terminalisation of chiasmata | (iii) | Zygotene | |
| d. Crossing over | (iv) | Diplotene | |
- (1) a-(ii), b-(iii), c-(iv), d-(i)
 (2) a-(iii), b-(ii), c-(i), d-(iv)
 (3) a-(iii), b-(iv), c-(ii), d-(i)
 (4) a-(ii), b-(iv), c-(iii), d-(i)
117. Read the following statements and choose the **correct** set of statement(s) w.r.t. ovule of angiosperms.
- a. Megasporangia are commonly called as ovule
 b. Hilum is the region where body of the ovule fuses with funicle.
 c. Each ovule is surround by more than two integuments
 d. Chalaza represents the basal part of ovule
- (1) a and b only (2) a and d only
 (3) b and c only (4) a, b and d only
118. Read the given reasons for choosing *Drosophila melanogaster* as an experimental model to study genetics, and select the **incorrect** ones.
- (a) A single mating produces very few offspring.
 (b) It shows many types of hereditary variations.
 (c) It has a short life span of about two days.
 (d) It has four morphologically distinct chromosomes.
- (1) a and b only (2) a, c and d only
 (3) c and d only (4) a and c only
119. Select a population interaction from the following, in which neither of the interacting species gets harmed.
- (1) Goats and Abingdon tortoise of Galapagos islands
 (2) *Cuscuta* growing on hedge plants
 (3) Orchid growing on the mango branch
 (4) Plants and herbivorous animals

Space for Rough Work

120. Museums have
- (1) Collections of preserved plants only
 - (2) Collections of the living plants and animals
 - (3) Collections of insects preserved after killing and pinning
 - (4) Collections of photographs of animals
121. Read the following statements and select the **correct** option.
- Assertion (A):** Chasmogamous flowers are invariably autogamous.
- Reason (R):** In chasmogamous flowers, there is no chance of cross-pollen landing on the stigma.
- (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
122. Which of the following trait exhibit incomplete dominance?
- (1) Pod colour in pea
 - (2) ABO blood group in humans
 - (3) Starch grain size in pea seeds
 - (4) Eye colour in *Drosophila*
123. Which of the following organisms is used as an experimental organism by T.H. Morgan to verify chromosomal theory of inheritance?
- (1) *Drosophila melanogaster*
 - (2) *E.coli*
 - (3) *Streptococcus pneumoniae*
 - (4) Mice
124. In the grass family, the cotyledon of seed is called
- (1) Epicotyl
 - (2) Radicle
 - (3) Coleoptile
 - (4) Scutellum
125. Which of the following function is **not** related to gibberellins?
- (1) It improves the shape of apples
 - (2) It promotes female flowering in pineapples
 - (3) It speed up the malting process in brewing industry
 - (4) It promotes bolting in beet
126. Which of the following is the **correct** mathematical expression for arithmetic growth?
- (1) $L_t = L_o + rt$
 - (2) $L_t = L_o - rt$
 - (3) $L_t = L_o \times rt$
 - (4) $L_t = L_o / rt$
127. Complex IV of mitochondrial ETS is
- (1) NADH dehydrogenase
 - (2) Cytochrome c oxidase complex
 - (3) Succinate dehydrogenase
 - (4) Cytochrome bc₁ complex
128. The most crucial step of Calvin cycle is
- (1) Aminoacylation
 - (2) Carboxylation
 - (3) Reduction
 - (4) Regeneration
129. In animal cells, centriole duplication occurs during
- (1) G₀-phase
 - (2) G₁-phase
 - (3) S-phase
 - (4) G₂-phase
130. Splitting of centromere takes place during
- (1) Telophase
 - (2) Anaphase
 - (3) Metaphase
 - (4) Prophase
131. If a bacterium whose doubling time is 30 mins, first allow to grow in a medium containing ¹⁴NH₄Cl for many generations and then transferred to a medium with heavy nitrogen, what will be the proportion of light, hybrid and heavy DNA after 90 mins of transfer?
- (1) 0%, 25%, 75%
 - (2) 0%, 50%, 50%
 - (3) 25%, 25%, 50%
 - (4) 75%, 25%, 0%

Space for Rough Work

132. If in a dsDNA 'T' content is 30%, then what is the content of A and C, respectively?
 (1) 30% and 40% (2) 30% and 20%
 (3) 20% and 30% (4) 40% and 20%
133. How many of the given is/are autosomal disorder(s)?
 Haemophilia, Phenylketonuria, Sickle cell anaemia, Myotonic dystrophy, colourblindness, Thalassemia
 (1) Four (2) Two
 (3) Six (4) Three
134. A normal woman whose father was haemophilic, marries a normal man. What will be the probability of their son to be haemophilic?
 (1) 50% (2) 0%
 (3) 100% (4) 25%
135. An immunosuppressive agent used in organ transplant patients is A and it is produced by B.
- | A | B |
|-------------------|-------------------------------|
| (1) Statins | <i>Monascus purpureus</i> |
| (2) Lipase | <i>Candida lipolytica</i> |
| (3) Cyclosporin A | <i>Trichoderma polysporum</i> |
| (4) Streptokinase | <i>Streptococcus</i> |
- SECTION - B**
136. Terminal centromere is observed in
 (1) Metacentric chromosomes
 (2) Telocentric chromosomes
 (3) Acrocentric chromosomes
 (4) Sub-metacentric chromosomes
137. All of the following constitute stele, **except**
 (1) Pericycle
 (2) Endodermis
 (3) Vascular bundles
 (4) Pith
138. Whorled phyllotaxy is seen in
 (1) China rose (2) Mustard
 (3) Sunflower (4) *Alstonia*
139. Which of the following does not has root, stem and leaf like structure?
 (1) *Funaria* (2) *Polytrichum*
 (3) *Marchantia* (4) *Sphagnum*
140. Sleeping sickness is caused by
 (1) *Trypanosoma* (2) *Paramoecium*
 (3) *Amoeba* (4) *Plasmodium*
141. Choose the **correct** option w.r.t *Alternaria*
 (1) Have aseptate mycelium
 (2) Lack sexual reproduction
 (3) Have short lived dikaryophase
 (4) Have endogenously produced asexual spores
142. Find the **correct** one about brown algae
 (1) Phycoerythrin imparts brown colour
 (2) Cell wall contains agar
 (3) Asexual spores are biflagellate pyriform structures
 (4) Reserve food material is floridean starch
143. Select the **correct** match.
 (1) Offset – *Oxalis*
 (2) Rhizome – Ginger
 (3) Sucker – Mint
 (4) Stolon – *Eichhornia*
144. In cymose inflorescence
 (1) Peduncle has unlimited growth
 (2) The main axis terminates into a flower
 (3) The flowers are borne in acropetal order
 (4) Younger flowers are present towards the apex

Space for Rough Work

145. Dicot stem and monocot stem cannot be differentiated on the basis of presence of
- (1) Pith
 - (2) Endodermis
 - (3) Endarch xylem
 - (4) Scattered vascular bundles
146. In a typical nucleus of eukaryotes, euchromatin
- (1) Is said to be transcriptionally active
 - (2) Is densely packed
 - (3) Can be stained darkly
 - (4) Lacks any histone proteins for packaging
147. Select the **correct** statement for pili.
- (1) Help in motility
 - (2) Small bristle like fibres
 - (3) Elongated tubular structures
 - (4) Inward foldings of plasma membrane
148. Select the **incorrect** match.
- (1) Prophase I – Condensation of chromatin material
 - (2) Metaphase I – Formation of double metaphasic plate
 - (3) Anaphase I – Splitting of centromere
 - (4) Telophase I – Reappearance of nuclear membrane
149. Select the **incorrect** statement about PS II.
- (1) It participates in both cyclic as well as non-cyclic flow of electrons.
 - (2) It is associated with oxygen evolving complex
 - (3) The reaction centre is P_{680}
 - (4) It involves splitting of water
150. If fructose-1,6-bisphosphate is used as a respiratory substrate and is oxidised completely, how many ATP molecules are synthesised through substrate level phosphorylation in this process?
- (1) 6
 - (2) 10
 - (3) 34
 - (4) 40

ZOOLOGY

SECTION - A

151. Simple epithelium is not present in the
- (1) Walls of blood vessels
 - (2) Air sacs of lungs
 - (3) Tubular parts of nephrons
 - (4) Inner lining of ducts of salivary glands
152. In the members of the class Chondrichthyes,
- (1) Gill slits are separate and are without operculum
 - (2) Fertilization is always external
 - (3) Sexes are not separate
 - (4) Teeth are modified cycloid scales
153. Which of the following pairs of connective tissues lack fibres of structural proteins?
- (1) Bone and blood
 - (2) Blood and cartilage
 - (3) Blood and lymph
 - (4) Cartilage and adipose tissue
154. Which among the following is not a STI?
- (1) Hepatitis-B
 - (2) Chikungunya
 - (3) Genital herpes
 - (4) Genital warts

Space for Rough Work

155. In case of common Indian male frog, all of the following structures are associated with cloaca, **except**
- (1) Vasa efferentia (2) Urinary bladder
(3) Rectum (4) Urinogenital duct
156. Which of the following is **true** w.r.t. DNA fragments during gel electrophoresis?
- (1) Larger the DNA fragment, the farther it moves from anode
(2) It is used for separation of positively charged DNA fragments
(3) Negatively charged DNA fragments move towards the anode
(4) Bees wax is commonly used as a matrix
157. Choose the **incorrect** statement among the following w.r.t. the respiratory system of *Periplaneta*.
- (1) The respiratory system consists of a network of trachea.
(2) Tracheae open through 10 spiracles present on the lateral side of the body.
(3) The opening of the spiracles are regulated by the sphincters.
(4) Exchange of gases takes place at the tracheoles by diffusion.
158. Select the **correct** sequence from the following w.r.t evolution of plants through geological periods.
- (1) Tracheophyte ancestors → Chlorophyte ancestors → Progymnosperms → *Psilophyton*
(2) *Rhynia*-type plants → Chlorophyte ancestors → Tracheophyte ancestors → *Psilophyton*
(3) Chlorophyte ancestors → Tracheophyte ancestors → *Psilophyton* → *Rhynia*-type plants
(4) Chlorophyte ancestors → Tracheophyte ancestors → *Rhynia*-type plants → *Psilophyton*
159. In *Periplaneta americana*, a ring of 6-8 blind tubules, which secrete digestive juice is present
- (1) At the junction of midgut and hindgut
(2) In the hindgut
(3) Between gizzard and mesenteron
(4) Between crop and gizzard
160. Arrange the given steps of muscle contraction in their chronological order and select the correct option.
- (a) Release of Ca^{2+} into sarcoplasm
(b) Actin – myosin complex formation
(c) Sliding of actin filaments over myosin filaments
(d) Release of acetylcholine at neuromuscular junction
- (1) a → d → c → b
(2) d → c → b → a
(3) d → a → b → c
(4) b → c → d → a
161. Select the **odd** one w.r.t. nucleosides.
- (1) Guanosine (2) Cytosine
(3) Adenosine (4) Uridine
162. Which of the given functions is not associated with glucocorticoids?
- (1) Immuno-suppressive function
(2) Produce anti inflammatory reactions
(3) Stimulate glycogenesis, lipolysis and proteolysis
(4) Stimulate RBC formation
163. All of the following diseases spread by the female members of the largest phylum of the kingdom Animalia, **except**
- (1) Dengue
(2) Chikungunya
(3) Ascariasis
(4) Filariasis

Space for Rough Work

164. Choose the **incorrect** match from the following w.r.t zoological name of the given organisms.

(1)	<i>Pennatula</i>	–	Sea-pen
(2)	<i>Gorgonia</i>	–	Sea-fan
(3)	<i>Adamsia</i>	–	Sea anemone
(4)	<i>Antedon</i>	–	Sea urchin

165. Select the **incorrect** statement w.r.t. different types of respiratory organs found in animals.

- (1) Lower invertebrates like sponges, flatworms etc., exchange O_2 and CO_2 by simple diffusion over their entire body surface.
- (2) Most of the aquatic arthropods perform branchial respiration.
- (3) All fishes, amphibians and reptiles respire through lungs.
- (4) Frogs can respire through their moist skin.

166. All of the following contraceptive methods belong to the same category, **except**

- (1) Coitus interruptus
- (2) Cervical caps
- (3) Periodic abstinence
- (4) Lactational amenorrhea

167. Which of the following statements is **incorrect** w.r.t. regulation of respiration in humans under normal physiological conditions?

- (1) Respiratory rhythm centre is present in the medulla region of the hindbrain.
- (2) Pneumotaxic centre present in the pons region of midbrain can moderate the functions of respiratory rhythm centre.
- (3) Chemosensitive area is highly sensitive to CO_2 and hydrogen ions concentration.
- (4) Neural signal from pneumotaxic centre can reduce the duration of inspiration.

168. Comprehend the given statements.

- (a) LH surge is responsible for causing menstrual phase.
- (b) LH acts at the Leydig cells and stimulates the synthesis and secretion of androgens.

(c) Oogenesis starts at puberty due to significant increase in GnRH.

Select the option with **incorrect** statements only.

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

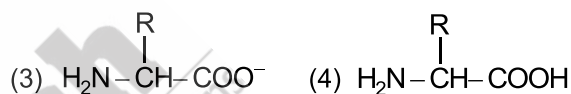
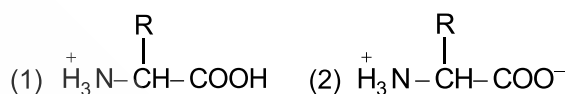
169. How many of the below given features are not true for human heart?

- a. Atria are two relatively large upper chambers w.r.t. ventricles.
- b. Inter-atrial septum is a thick fibrous wall.
- c. Atrio-ventricular septum is a thin muscular tissue
- d. Mitral valve is formed of two muscular flaps.

Select the **correct** option.

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

170. Which of the following is a zwitterionic form?



171. Which of the following correctly defines spermiogenesis?

- (1) The release of sperms from the seminiferous tubules
- (2) The transformation of spermatids into spermatozoa
- (3) The formation of secondary spermatocytes
- (4) Transformation of spermatogonium into primary spermatocytes

172. Which of the following features is **not** true for *Rana*?

- (1) Can live in aquatic as well as in terrestrial habitat
- (2) Body is covered by dry and cornified skin
- (3) The eyes have eyelids
- (4) They are cold-blooded animals

Space for Rough Work

173. Choose the **odd** one w.r.t. paired facial bones in humans.
- (1) Maxilla
 - (2) Mandible
 - (3) Nasal
 - (4) Lacrimal
174. Opening of the wind pipe in pharynx through the larynx is known as
- (1) Epiglottis
 - (2) Primary bronchi
 - (3) Glottis
 - (4) Trachea
175. Which of the following does not hold true for hypothalamus in humans?
- (1) It lies at the base of thalamus in the forebrain.
 - (2) The hypothalamus contains a number of centres which control body temperature, urge for eating and drinking.
 - (3) Adenohypophyseal hormones are secreted by several groups of neurosecretory cells, present in hypothalamus.
 - (4) It is also involved in the regulation of sexual behaviour.
176. **Assertion (A):** Cardiac output is a variable quantity in mammals.
- Reason (R):** Mammals have the ability to alter the stroke volume as well as the heart rate.
- In the light of above statements choose the **correct** answer from the options given below.
- (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, (R) is incorrect
 - (4) Both (A) and (R) are incorrect

177. The medulla oblongata contains centres which control all of the following functions, **except**
- (1) Gastric secretions
 - (2) Expression of emotional reactions
 - (3) Cardiovascular reflexes
 - (4) Respiration

178. Choose the **incorrect** match w.r.t. a normal human.

(1)	Amount of urea excreted	-	25-30 gm/day
(2)	Urine output	-	1.5 litres/day
(3)	GFR	-	235 mL/minute
(4)	Amount of CO ₂ removed by lungs	-	200 mL/minute

179. Choose the **correct** statement.
- (1) Tobacco has been used by human beings for not more than 40 years.
 - (2) Tobacco contains nicotine which is an opioid.
 - (3) Nicotine stimulates adrenal cortex to release adrenaline and nor adrenaline.
 - (4) Tobacco chewing is associated with increased risk of cancer of the oral cavity.
180. Substances like sterols, hydrocarbons and waxes are removed from the human body through
- (1) Expired air
 - (2) Sweat
 - (3) Sebum
 - (4) Saliva
181. Choose the incorrect statement w.r.t. a thyroid hormone which is chemically non-proteinaceous.
- (1) It supports the process of red blood cell formation.
 - (2) It influences the maintenance of water and electrolyte balance.
 - (3) It interacts with membrane-bound receptors.
 - (4) It controls the metabolism of carbohydrates, proteins and fats.

Space for Rough Work

182. Clavicle bone of human articulates with 'A'. Below 'A' is a depression called the 'B' which articulates with the head of the humerus. Identify A and B. Choose the **correct** option.

	A	B
(1)	Spine	Glenoid cavity
(2)	Scapula	Acetabulum
(3)	Acromion process	Glenoid cavity
(4)	Radius	Socket of vertebra

183. Which of the following is not **true** for insulin and glucagon?
- (1) Both are chemically peptides
 - (2) Both play a major role in the regulation of glucose homeostasis
 - (3) Both act mainly on hepatocytes
 - (4) Both reduce the cellular glucose uptake and utilisation
184. In humans, the cerebral cortex contains large regions that are neither clearly sensory nor motor in function. These regions are called
- (1) Appetite centre
 - (2) Neurosecretory areas
 - (3) Pneumotaxic centre
 - (4) Association areas
185. All of the following are paired structures w.r.t. human male reproductive system, **except**
- (1) Bulbourethral gland
 - (2) Prostate gland
 - (3) Seminal vesicle
 - (4) Vas deferens

SECTION - B

186. If more than one adaptive radiations appeared to have occurred in an isolated geographical area, one can call this
- (1) Disruptive selection
 - (2) Genetic drift
 - (3) Co-evolution
 - (4) Convergent evolution

187. In humans, heart failure can be defined as the state of heart when
- (1) The heart muscle is suddenly damaged by an inadequate blood supply
 - (2) The heart stops beating
 - (3) The heart is not pumping blood effectively enough to meet the needs of the body
 - (4) The lumen of coronary arteries become narrower due to deposits of fat, cholesterol, etc.
188. In a plasmid, the specific region of DNA responsible for initiating the replication is
- (1) Antibiotic resistance gene
 - (2) Recognition site
 - (3) *ori*
 - (4) Recombinant site
189. A rapid decline in which of the following factors cannot be considered as probable reason for increase in population growth rate of humans?
- (1) Death rate
 - (2) Maternal mortality rate
 - (3) Infant mortality rate
 - (4) Number of people in reproductive age
190. Read the following statements w.r.t. gestation in a human female and choose the **correct** option.
- Statement A:** During 5th month of gestation, foetus starts to move within the uterus.
- Statement B:** Foetal ejection reflex triggers the release of oxytocin from foetal pituitary gland to induce labor pain.
- (1) Both statements A and B are correct
 - (2) Both statements A and B are incorrect
 - (3) Statement A is correct and B is incorrect
 - (4) Statement A is incorrect and B is correct
191. Select the odd one w.r.t. chemical composition of the given contraceptive methods
- (1) Steroidal oral contraceptive pills
 - (2) Implants
 - (3) Saheli
 - (4) Contraceptive injections

Space for Rough Work

192. Match column **A** with column **B** and select the option containing all the **correct** matches.

	Column A		Column B
(i)	B-lymphocytes	a.	Allergic reactions
(ii)	T-lymphocytes	b.	Colostrum
(iii)	IgE	c.	Humoral immunity
(iv)	IgA	d.	Cell mediated immunity

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

193. Which of the following hormones inhibits the release of a particular hormone, whose hypersecretion cause acromegaly in middle age humans?

- (1) Growth hormone (2) Somatostatin
 (3) GnRH (4) ACTH

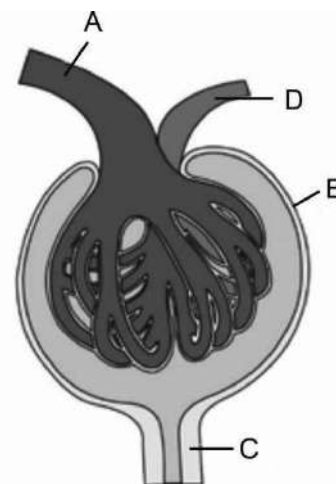
194. The process by which organisms with common ancestry and similar evolutionary history evolve different phenotypic adaptations in response to different environmental challenges is called

- (1) Convergent evolution
 (2) Divergent evolution
 (3) Adaptive convergence
 (4) Saltation

195. Which of the following is not a side-effect of the use of anabolic steroids in human females?

- (1) Enlargement of clitoris
 (2) Breast enlargement
 (3) Masculinisation
 (4) Depression

196. In the below given figure of Malpighian body, identify A, B, C and D.



Choose the option which **correctly** represent A, B, C and D.

	A	B	C	D
(1)	Afferent arteriole	Efferent arteriole	Bowman's capsule	PCT
(2)	Afferent arteriole	Bowman's capsule	PCT	Efferent arteriole
(3)	JG cells	Renal capsule	Ciliated cuboidal epithelium	Efferent arteriole
(4)	Afferent arteriole	Glomerulus	Loop of Henle	Efferent arteriole

197. Which of the following is a hydrophobic compound and its molecular weight is less than 800 Da?

- (1) Insulin
 (2) Polysaccharides
 (3) Palmitic acid
 (4) Adenylic acid

Space for Rough Work

198. Read the following statements carefully and select the **incorrect** one.

- (1) Schwann cells are present in CNS which are responsible for the formation of myelin sheath.
- (2) In neural system, action potential is in fact termed as a nerve impulse.
- (3) Electrical synapses are rare in our system.
- (4) Neurilemma is present around both myelinated and unmyelinated nerve fibres in PNS.

199. Select the incorrect match w.r.t. diseases and their causative agents

- (1) Typhoid – *Salmonella typhi*
- (2) Pneumonia – *Streptococcus pneumoniae*
- (3) Common cold – *Haemophilus influenzae*
- (4) Amoebiasis – *Entamoeba histolytica*

200. Read the following statements carefully.

- a. Age-related disorder characterised by decreased bone mass and increased chances of fracture.
- b. The causative factors include deficiency of calcium, imbalance of hormones like calcitonin, PTH and decreased secretion of sex hormones such as estrogen.

The above statements are associated with which of the following diseases?

- (1) Gout
- (2) Osteoporosis
- (3) Arthritis
- (4) Muscular dystrophy



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Space for Rough Work

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Edition: 2024-25

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FINAL TEST SERIES for NEET-2024

MM : 720

Test - II

Time : 3 Hrs. 20 Mins.

Answers

1. (2)	41. (2)	81. (3)	121. (4)	161. (2)
2. (4)	42. (2)	82. (2)	122. (3)	162. (3)
3. (3)	43. (1)	83. (1)	123. (1)	163. (3)
4. (1)	44. (3)	84. (1)	124. (4)	164. (4)
5. (3)	45. (1)	85. (3)	125. (2)	165. (3)
6. (1)	46. (3)	86. (2)	126. (1)	166. (2)
7. (4)	47. (2)	87. (2)	127. (2)	167. (2)
8. (2)	48. (4)	88. (3)	128. (2)	168. (1)
9. (2)	49. (3)	89. (3)	129. (3)	169. (3)
10. (1)	50. (4)	90. (4)	130. (2)	170. (2)
11. (1)	51. (3)	91. (1)	131. (1)	171. (2)
12. (1)	52. (1)	92. (3)	132. (2)	172. (2)
13. (1)	53. (3)	93. (3)	133. (1)	173. (2)
14. (1)	54. (4)	94. (4)	134. (1)	174. (3)
15. (1)	55. (3)	95. (4)	135. (3)	175. (3)
16. (1)	56. (3)	96. (2)	136. (2)	176. (1)
17. (3)	57. (4)	97. (4)	137. (2)	177. (2)
18. (4)	58. (1)	98. (3)	138. (4)	178. (3)
19. (2)	59. (2)	99. (4)	139. (3)	179. (4)
20. (2)	60. (3)	100. (3)	140. (1)	180. (3)
21. (1)	61. (2)	101. (1)	141. (2)	181. (3)
22. (4)	62. (1)	102. (1)	142. (3)	182. (3)
23. (4)	63. (4)	103. (4)	143. (2)	183. (4)
24. (3)	64. (2)	104. (2)	144. (2)	184. (4)
25. (2)	65. (2)	105. (2)	145. (3)	185. (2)
26. (2)	66. (3)	106. (4)	146. (1)	186. (4)
27. (3)	67. (4)	107. (1)	147. (3)	187. (3)
28. (1)	68. (1)	108. (1)	148. (3)	188. (3)
29. (2)	69. (2)	109. (2)	149. (1)	189. (4)
30. (1)	70. (2)	110. (1)	150. (1)	190. (3)
31. (1)	71. (2)	111. (3)	151. (4)	191. (3)
32. (1)	72. (2)	112. (3)	152. (1)	192. (4)
33. (4)	73. (2)	113. (2)	153. (3)	193. (2)
34. (1)	74. (4)	114. (2)	154. (2)	194. (2)
35. (2)	75. (3)	115. (4)	155. (1)	195. (2)
36. (3)	76. (2)	116. (3)	156. (3)	196. (2)
37. (1)	77. (3)	117. (4)	157. (2)	197. (3)
38. (4)	78. (2)	118. (2)	158. (4)	198. (1)
39. (2)	79. (2)	119. (3)	159. (3)	199. (3)
40. (3)	80. (1)	120. (3)	160. (3)	200. (2)



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FINAL TEST SERIES for NEET-2024

MM : 720

Test - II

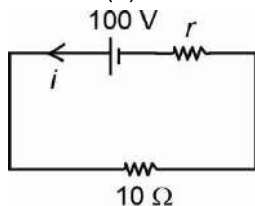
Time : 3 Hrs. 20 Mins.

Answers and Solutions

PHYSICS

SECTION-A

1. Answer (2)



$$i = \frac{100}{10+r}$$

$$\Rightarrow 5 = \frac{100}{10+r}$$

$$\Rightarrow 10+r=20$$

$$r = 10 \Omega$$

2. Answer (4)

Taking mean of several observations minimises the random errors that may occur due to unknown reasons in an experiment.

3. Answer (3)

We know,

Speed of truck w.r.t. train,

$$v = 20 - 72 \left(\frac{5}{18} \right)$$

$$v = 0$$

\therefore Time taken for overtake,

$$t = \sqrt{\frac{(200+100+24)^2}{0.5}}$$

$$t = 36 \text{ s}$$

4. Answer (1)

We know,

(u) speed of projection = speed of strike

\therefore Speed at highest point = $u \sin 30^\circ$

$$= 20 \left(\frac{1}{2} \right) = 10 \text{ m/s}$$

5. Answer (3)

We know,

$$a_t = \alpha r = 2(4) = 8 \text{ m/s}^2$$

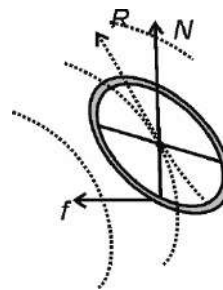
$$a_c = r\omega^2 = r(\omega_0 + \alpha t)^2 = \text{variable}$$

$$\omega_0 = 4 \text{ rad/s}$$

Thus, $a_t \neq 0$

6. Answer (1)

During bending of a cyclist, the centripetal force is provided by friction.



7. Answer (4)

According to conservation of linear momentum,

$$2(10) + 4(20) = 2v_1 + 4v_2$$

$$\therefore v_1 + 2v_2 = 50 \quad \dots(i)$$

Also, $20 - 10 = v_1 - v_2$

$$10 = v_1 - v_2 \quad \dots(ii)$$

From (i) and (ii), we get

$$v_1 = \frac{40}{3} \text{ m/s and } v_2 = \frac{70}{3} \text{ m/s}$$

$$\therefore \frac{v_1}{v_2} = \frac{4}{7}$$

8. Answer (2)

Here $F_{\text{ext}} = 0 \quad \therefore a_{\text{com}} = 0$

Initially COM was at rest

\therefore It will remain at rest

9. Answer (2)

Angular impulse $j = \Delta L \xrightarrow{\text{unit}} \text{kg m}^2 \text{s}^{-1}$

10. Answer (1)

$$\frac{nhc}{\lambda} = P$$

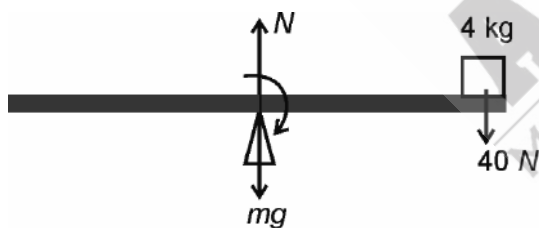
$$n = \frac{P \times \lambda}{hc}$$

$$= \frac{60 \times 5000}{12400 \times 1.6 \times 10^{-19}} = 1.5 \times 10^{20}$$

11. Answer (1)

From the FBD,

$$\tau = I\alpha$$



$$40(4) = \left[\frac{18(8)^2}{12} + (4)(4)^2 \right] \alpha$$

$$40(4) = (160)\alpha$$

$$\therefore \alpha = 1 \text{ rad/s}^2$$

12. Answer (1)

We know,

$$B = v \frac{dp}{dv}$$

$$\therefore \frac{dv}{v} = 1$$

$$\therefore B = dp = 2 \text{ GPa}$$

13. Answer (1)

We know, $E = -\frac{\partial V}{\partial x} \hat{i} - \frac{\partial V}{\partial y} \hat{j}$

$$\therefore E_x = -2xy\hat{i} = -4\hat{i} \text{ V/m}$$

$$E_y = -(x^2 - 2y)\hat{j} = -(1 - 4) = +3\hat{j} \text{ V/m}$$

$$E = -4\hat{i} + 3\hat{j}$$

14. Answer (1)

Kirchoff's current law is based upon conservation of charge.

15. Answer (1)

Resistance of ideal ammeter is zero.

16. Answer (1)

Bohr magneton is the magnetic moment associated with electron in first orbit of H-atom.

17. Answer (3)

We know, $\Delta q = \frac{\Delta \phi}{R} = \frac{A(B_2 - B_1)}{k} = \frac{20 \times 10^{-4}(4)}{10}$

$$\Delta q = 0.8 \text{ mC}$$

18. Answer (4)

We know, in half cycle, $I_{\text{av}} = \frac{2I_0}{\pi}$

$$\therefore I_{\text{av}} = \frac{2(4)}{\pi} = \frac{8}{\pi} \text{ A}$$

19. Answer (2)

γ -rays has highest frequency while ultraviolet has lowest frequency among the given EM waves.

20. Answer (2)

We know, $\frac{1}{f} = (\mu - 1) \left(\frac{1}{R_1} - \frac{1}{R_2} \right)$

In air, $\frac{1}{2} = (1.5 - 1) \left(\frac{1}{R_1} - \frac{1}{R_2} \right) \quad \dots(i)$

In liquid, $\frac{1}{f'} = \frac{1.5 - 1.25}{1.25} \left(\frac{1}{R_1} - \frac{1}{R_2} \right)$

$$\frac{1}{f'} = \frac{0.25}{1.25} \left(\frac{1}{R_1} - \frac{1}{R_2} \right) \quad \dots(ii)$$

From (i) and (ii), we get

$$f' = 5 \text{ cm}$$

21. Answer (1)

Spherical wavefronts are formed by point source of light.

22. Answer (4)

$$\text{Energy of photon} = E = \frac{hc}{\lambda}$$

23. Answer (4)

δ vs i graph for a prism is not a parabola

\therefore it is not symmetric

Hence, $50 - x < 70 - 50$

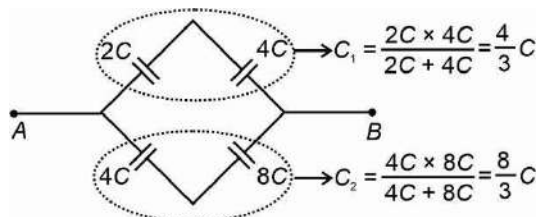
$$-x < -30$$

$$x > 30$$

24. Answer (3)

Balanced Wheatstone bridge condition

\therefore Equivalent circuit can be drawn as



$$C_{eq} = \frac{4}{3}C + \frac{8}{3}C = 4C$$

25. Answer (2)

$$\vec{A} + \vec{B} = \vec{E} \quad \dots(i)$$

$$\vec{A} + \vec{C} = \vec{D}$$

$$-\vec{A} - \vec{C} = -\vec{D} \quad \dots(ii)$$

(i) + (ii)

$$\vec{B} - \vec{C} = \vec{E} - \vec{D}$$

$$\vec{B} = \vec{E} - \vec{D} + \vec{C}$$

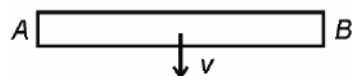
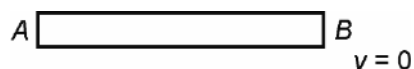
26. Answer (2)

$$\frac{R^2}{8h} + 2h = \frac{\left(\frac{u^2 \sin 2\theta}{g}\right)^2}{8u^2 \sin^2 \theta} + 2 \frac{u^2 \sin^2 \theta}{2g}$$

$$= \frac{u^2 \cos^2 \theta}{g} + \frac{u^2 \sin^2 \theta}{g}$$

$$= \frac{u^2}{g}$$

27. Answer (3)



By conservation of angular momentum about point A,

$$mva = \frac{m(2a)^2}{3} \omega$$

$$\omega = \frac{3v}{4a}$$

28. Answer (1)

$$\omega = 2\pi f$$

$$\omega = 2\pi \times 10$$

$$= 20\pi$$

$$A = 0.05 \text{ m}$$

Equation of SHM

$$x = 0.05 \sin(20\pi t + \delta)$$

$$-0.05 = 0.05 \sin(20\pi t + \delta)$$

$$\sin \delta = -1$$

$$\delta = \left(\frac{3\pi}{2}\right)$$

$$x = 0.05 \sin\left(20\pi t + \frac{3\pi}{2}\right)$$

29. Answer (2)

Given process is isobaric.

So, $W = nR\Delta T$

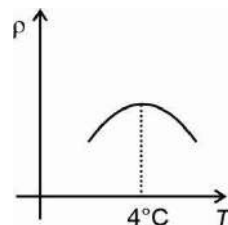
$$\Delta U = \frac{nR\Delta T}{\gamma - 1}$$

$$\frac{\Delta U}{W} = \frac{1}{\gamma - 1}$$

$$= \frac{1}{\frac{5}{3} - 1}$$

$$= \frac{3}{2}$$

30. Answer (1)



31. Answer (1)

$$\frac{Q_1}{4\pi R^2} = \frac{Q - Q_1}{4\pi (3R)^2}$$

$$9Q_1 = Q - Q_1$$

$$10Q_1 = Q$$

$$Q_1 = \frac{Q}{10}$$

32. Answer (1)

$$t = \frac{d}{\frac{c}{\mu}}$$

$$= \frac{\frac{3}{2} \times 50 \times 10^{-3}}{3 \times 10^8}$$

$$= 25 \times 10^{-11}$$

$$t = 250 \text{ ps}$$

33. Answer (4)

$$\beta = \frac{\lambda D}{d}$$

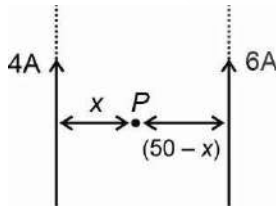
$$\frac{\lambda_1 D_1}{d_1} = \frac{\lambda_2 D_2}{d_2}$$

$$\frac{d_1}{d_2} = \frac{\lambda_1}{\lambda_2} \times \frac{D_1}{D_2}$$

$$= \frac{400}{500} \times \frac{1.2}{1.6}$$

$$= \frac{4}{5} \times \frac{3}{4} = \frac{3}{5}$$

34. Answer (1)



At point P

$$\vec{B}_1 + \vec{B}_2 = 0$$

$$|\vec{B}_1| = |\vec{B}_2|$$

$$\Rightarrow \frac{\mu_0 2I_1}{4\pi x} = \frac{\mu_0 2I_2}{4\pi (50-x)}$$

$$\Rightarrow \frac{4}{x} = \frac{6}{50-x}$$

$$\Rightarrow 100 - 2x = 3x$$

$$x = 20 \text{ cm}$$

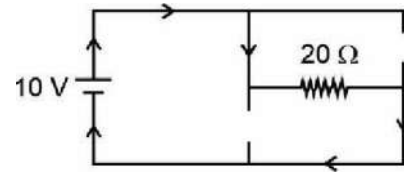
35. Answer (2)

In moderately doped p-type semiconductor, the fermi level lies in the forbidden energy gap nearer to valence band.

SECTION-B

36. Answer (3)

The circuit can be modified as



$$I = \frac{V}{R}$$

$$I = \frac{10}{20}$$

$$= 0.5$$

37. Answer (1)

At orbital speed the particle acquires a circular trajectory which becomes elliptical if speed increases.

At escape speed it becomes parabolic while it changes to hyperbolic on further increasing the speed.

38. Answer (4)

Focal length of concave mirror $f = \frac{R}{2}$

i.e., independent of surrounding medium.

39. Answer (2)

By conservation of energy, we get

$$\frac{1}{2}mv^2 = \frac{mgh}{\left(1 + \frac{h}{R}\right)}$$

Acc. to problem,

$$v = \frac{3}{4}v_e = \frac{3}{4}\sqrt{2gR}$$

$$\frac{1}{2} \times \frac{9}{16} \times 2gR = \frac{gh}{\left(1 + \frac{h}{R}\right)}$$

$$\text{or } \frac{9}{16} = \frac{h}{(R+h)}$$

$$\therefore h = \frac{9R}{7}$$

40. Answer (3)

Work done in cyclic process = Area of the loop

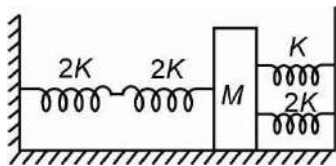
$$= \frac{1}{2} \times 2 \times 4 = 4 \text{ J}$$

$$W_{\text{cycle}} = -4 \text{ J}$$

41. Answer (2)

For ferromagnetic substance susceptibility is positive and large.

42. Answer (2)



Two springs on the L.H.S. of block M are in series and two springs on the R.H.S. of block M are in parallel. These combination of springs will be considered in parallel with each other. Thus effective spring constant.

$$K_{\text{eff}} = \frac{2K \times 2K}{2K + 2K} + (K + 2K) = 4K$$

$$\therefore \text{Frequency } \nu = \frac{1}{2\pi} \sqrt{\frac{K}{M}} = \frac{1}{2\pi} \sqrt{\frac{4K}{M}}$$

43. Answer (1)

Force on moving charge by magnetic field

$$\vec{F} = q(\vec{V} \times \vec{B})$$

$$\therefore \vec{F} \cdot \vec{V} = 0 \Rightarrow \text{work done} = \text{zero}$$

44. Answer (3)

$$\tau_{\text{max}} = NiAB = 1 \times i \times (\pi r^2) \times B$$

$$= \pi i \left(\frac{L}{2\pi}\right)^2 B = \frac{L^2 i B}{4\pi}$$

45. Answer (1)

Relation between kinetic energy (K.E.) and momentum (P)

$$\text{K.E} = \frac{P^2}{2m}$$

$$P = \sqrt{2m(\text{K.E.})}$$

$$P \propto \sqrt{m}$$

46. Answer (3)

$$\text{Density} = \frac{\text{mass}}{\text{volume}}$$

$$= \frac{6.237}{3.5}$$

$$= 1.782$$

In this question density should be reported to two significant figures.

As rounding off the number, we get density = 1.8 g/cm^3

47. Answer (2)

As Young's modulus,

$$Y = \frac{\text{Force} \times \text{original length}}{\text{Area} \times \text{Increase in length}}$$

$$= \frac{FL}{\pi r^2 l} \quad \dots(1)$$

For the same material, Young's modulus is the same.

$$\therefore Y = \frac{2F \times 2L}{\pi(2r)^2 \times l'}$$

$$= \frac{FL}{\pi r'^2 l'} \quad \dots(2)$$

From (1) and (2)

$$\frac{FL}{\pi r^2 l} = \frac{FL}{\pi r'^2 l'}$$

$$\text{or } l' = l$$

48. Answer (4)

Acc. to Archimedes principle, weight of body = weight of liquid displaced

Let V be volume of the block,

$$\text{In water, } V \rho_{\text{block}} g = \left(\frac{4}{5}\right) V \rho_{\text{water}} g$$

$$\text{or } \rho_{\text{block}} = \frac{4}{5} \rho_{\text{water}} \quad \dots(1)$$

$$\text{In liquid, } V \rho_{\text{block}} g = V \rho_{\text{liquid}} g$$

$$\rho_{\text{block}} = \rho_{\text{liquid}} \quad \dots(2)$$

From (1) and (2),

$$\rho_{\text{liquid}} = \frac{4\rho_{\text{water}}}{5} = 800 \text{ kg m}^{-3}$$

49. Answer (3)

$$\text{Total flux linked with the cube of side } L = \frac{Q}{\epsilon_0}$$

$$\therefore \text{Flux with one face of cube } \phi_{\text{face}} = \frac{Q}{6\epsilon_0}$$

50. Answer (4)

$$\eta = \frac{P_{\text{out}}}{P_{\text{in}}} = \frac{3}{4}$$

$$\Rightarrow V_s \cdot I_s = \frac{3}{4} \times 6 \times 10^3$$

$$\Rightarrow I_s = \frac{18000}{4 \times 240} = \frac{18000}{960} = 18.75 \text{ A}$$

CHEMISTRY

SECTION-A

51. Answer (3)

Value of angular node is given by l.

$$\text{Radial node} = n - l - 1$$

$$= 5 - 1 - 1 = 3$$

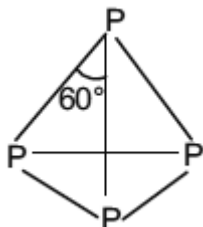
52. Answer (1)

Stronger the -R effect of p-substituent, stronger is the acid.

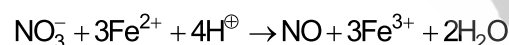
53. Answer (3)

- Actinoids are highly reactive metals, especially when finely divided.
- Actinoid contraction is greater from element to element than lanthanoid contraction resulting for poor shielding by 5f electrons.
- Many trivalent lanthanoids ions are coloured both in solid state and in aqueous solutions.
- Lanthanoids have typical metallic structure and are good conductors of heat and electricity.

54. Answer (4)



55. Answer (3)



Brown ring complex

56. Answer (3)

$$E^\circ_{\text{cell}} = E^\circ_{\text{R}} - E^\circ_{\text{L}}$$

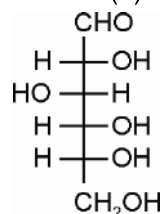
$$= [0.80 - (-0.25)] \text{ V} = 1.05 \text{ V}$$

$$\Delta G^\circ = -nFE^\circ$$

$$= -2 \times 96500 \times 1.05 \text{ J}$$

$$= -202.65 \text{ kJ}$$

57. Answer (4)



58. Answer (1)

Lesser the extent of back bonding, higher is the Lewis acidic strength of boron halide.

59. Answer (2)

XeF₄ is square planar in shape.

60. Answer (3)

For a salt of weak acid and weak base the pH is independent of its concentration.

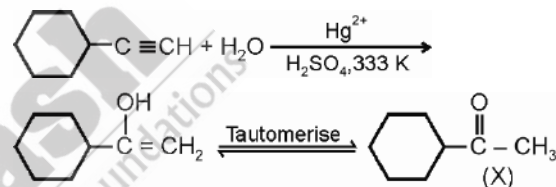
61. Answer (2)

$$\Delta S = 2.303 nR \log \frac{V_f}{V_i}$$

$$\Delta S = 2.303 \times 1 \times R \log \frac{10}{1}$$

$$\Delta S = 2.303R$$

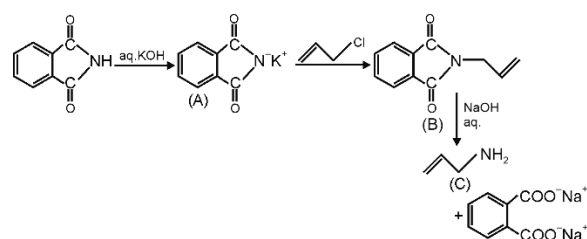
62. Answer (1)



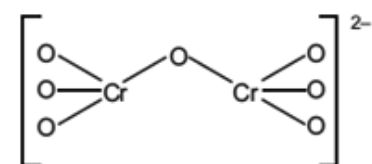
63. Answer (4)

Alcohol does not give addition product with NaHSO₃

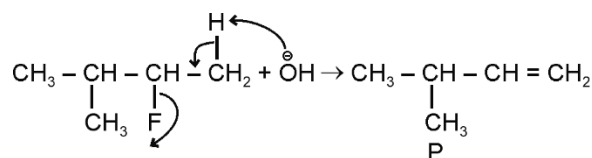
64. Answer (2)



65. Answer (2)



66. Answer (3)



67. Answer (4)

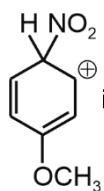
H_2SO_3	: Sulphurous acid
H_2SO_4	: Sulphuric acid
$\text{H}_2\text{S}_2\text{O}_8$: Peroxodisulphuric acid
$\text{H}_2\text{S}_2\text{O}_7$: Pyrosulphuric acid

68. Answer (1)

Ion λ° ($\text{S cm}^2 \text{ mol}^{-1}$) at 298 K

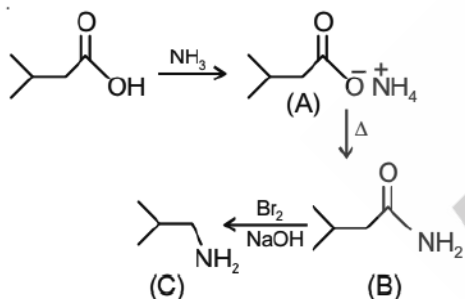
H^+	349.6
K^+	73.5
Mg^{2+}	106.0
OH^-	199.1

69. Answer (2)

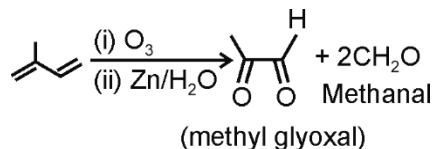

 is most stable due to +M effect of $-\text{OCH}_3$

group.

70. Answer (2)



71. Answer (2)



72. Answer (2)

$$k = \frac{0.693}{t_{1/2}}$$

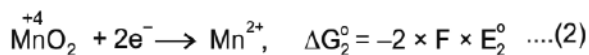
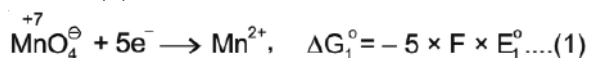
$$t = \frac{1}{k} \times 2.303 \log \frac{a}{a-x}$$

$$= \frac{t_{1/2} \times 2.303}{0.693} \log \frac{100}{80}$$

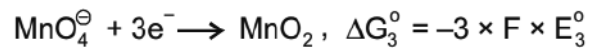
$$= \frac{25 \times 2.303}{0.693} [\log 10 - 3 \log 2] = 8.05 \text{ min}$$

$$\approx 8 \text{ min}$$

73. Answer(2)



On subtracting (2) from (1)



$$\Delta G_3^\circ = \Delta G_1^\circ - \Delta G_2^\circ$$

$$-3FE_3^\circ = -5FE_1^\circ - (-2FE_2^\circ)$$

$$3FE_3^\circ = 5FE_1^\circ - 2FE_2^\circ$$

$$E_3^\circ = \frac{5E_1^\circ - 2E_2^\circ}{3} = \frac{5 \times 1.51 - 2 \times 1.23}{3} = 1.70 \text{ V}$$

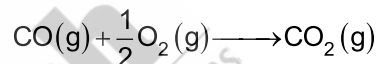
74. Answer (4)

Tertiary amines do not react with Hinsberg's reagent.

75. Answer (3)

B shows diagonal relationship with Si.

76. Answer (2)



$$\Delta n_g = \left(1 - \frac{3}{2}\right) = -\frac{1}{2}$$

$$\Delta H = \Delta U + \Delta n_g RT$$

$$\Delta H - \Delta U = \Delta n_g RT = -\frac{1}{2} RT$$

77. Answer (3)

 $[\text{NiCl}_4]^{2-}$ is sp^3 hybridised. The complex has 2 unpaired electrons.

78. Answer (2)

Ammonium acetate is a salt of weak acid and weak base whose pH can be calculated as.

$$\text{pH} = 7 + \frac{1}{2} (\text{p}K_a - \text{p}K_b)$$

$$= 7 + \frac{1}{2} (4.77 - 4.75)$$

$$= 7 + \frac{1}{2} \times 0.02$$

$$= 7 + 0.01 = 7.01$$

79. Answer (2)

$$\text{Moles of urea} = \frac{6.02 \times 10^2}{6.02 \times 10^{23}} = 10^{-2} \text{ moles.}$$

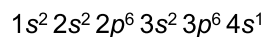
$$\text{Molarity} = \frac{10^{-2} \text{ mol}}{100 \text{ mL}} \times \frac{1000 \text{ mL}}{1 \text{ L}} = 10^{-1} \text{ M} = 0.1 \text{ M}$$

80. Answer (1)

In stock notation, the oxidation number is expressed by putting a Roman numeral representing the oxidation number in parenthesis after the symbol of metal in its molecular formula.

81. Answer (3)

For potassium



For $4s^1$

$$n = 4, \ell = 0, m = 0, s = \pm \frac{1}{2}$$

82. Answer (2)

 H_3BO_3 is a Lewis acid.

83. Answer (1)

Conjugate base of  is aromatic; 

84. Answer (1)

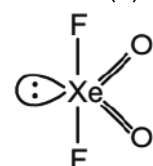
$$P_A = P^\circ_A X_A \Rightarrow P_A = \frac{2}{5} \times 100 = 40 \text{ mmHg}$$

$$P_B = \frac{3}{5} \times 300 = 180 \text{ mmHg}$$

Mole fraction of A in vapour phase (Y_A)

$$= \frac{40}{40 + 180} = \frac{40}{220} = \frac{2}{11}$$

85. Answer (3)



See-saw structure.

SECTION-B

86. Answer (2)

It is Markovnikov addition of water without rearrangement.

87. Answer (2)

	Cations	Colour of flame observed by naked eye
(a)	Cu^{2+}	Green flame with blue centre
(b)	Sr^{2+}	Crimson red
(c)	Ba^{2+}	Apple green
(d)	Ca^{2+}	Brick red

88. Answer (3)



89. Answer (3)

$\ddot{N}HCOCH_3$ is ortho/para directing group due to lone pair of nitrogen.

90. Answer (4)

$$\Delta S \pi_1 = \pi_2$$

$$\therefore C_1 = C_2$$

$$\frac{5}{342} = \frac{1}{M}$$

$$\therefore M = \frac{342}{5} = 68.4 \text{ g}$$

91. Answer (1)

Gabriel synthesis is used for preparation of aliphatic primary amines.

92. Answer (3)

Since reference state of carbon is graphite therefore ΔH_f° of graphite is zero.

93. Answer (3)

$$\therefore \text{No. of moles} = \frac{10}{20} = 1/2$$

$$\therefore \text{No. of molecules} = \frac{N_A}{2}$$

$$\therefore \text{No. of electrons} = 10 \times \frac{N_A}{2}$$

$$= 5N_A$$

94. Answer (4)

1st order reaction,

$$Kt = 2.303 \log \frac{[A]_0}{[A]_t}$$

$$\Rightarrow 2 \times 10^{-2} \times t = 2.303 \log \left(\frac{80}{20} \right)$$

$$t = \frac{2.303}{2 \times 10^{-2}} \log 2^2 = \frac{2 \times 2.303 \times \log 2}{2 \times 10^{-2}} = 69.3 \text{ s}$$

95. Answer (4)

- $CHCl_3$ is oxidised to phosgene.
- DDT is used as insecticide.
- The chlorofluorocarbon compounds of methane and ethane are collectively known as freons.

96. Answer (2)

 E_{cell} is an intensive property.

97. Answer (4)

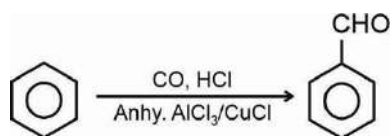
The low splitting effect of anionic ligands cannot be explained by CFT. It is a drawback of CFT.

98. Answer (3)

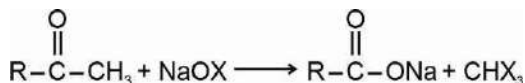
Pr, Nd, Tb and Dy are the lanthanides which can show +4 oxidation state.

99. Answer (4)

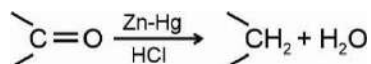
- Gattermann-Koch reaction



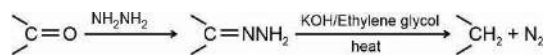
- Haloform reaction



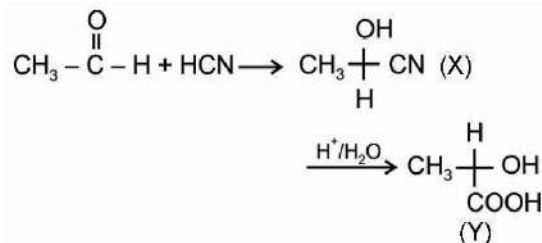
- Clemmensen reduction



- Wolff-Kishner reduction



100. Answer (3)



BOTANY

SECTION - A

101. Answer (1)

Because of the rule of base pairing and complementarity, both the nucleic acids (DNA and RNA) have the ability to direct their duplications.

102. Answer (1)

	Family		Floral formula
A.	Poaceae	–	$\% \overset{\text{♂}}{\text{P}}_0 \text{ or } 2 \text{ or } 3 \text{ (Lodicules)} \text{ } \overset{\text{A}}{\text{A}}_3 \text{ or } 6 \text{ } \overset{\text{G}}{\text{G}}_1$
B.	Malvaceae	–	$\text{Epi}_{5-7} \oplus \overset{\text{♂}}{\text{K}}_{(5)} \overset{\text{C}}{\text{C}}_5 \overset{\text{A}}{\text{A}}_{(∞)} \overset{\text{G}}{\text{G}}_{(5)}$
C.	Solanaceae	–	$\oplus \overset{\text{♂}}{\text{K}}_{(5)} \overset{\text{C}}{\text{C}}_{(5)} \overset{\text{A}}{\text{A}}_5 \overset{\text{G}}{\text{G}}_{(2)}$
D.	Fabaceae	–	$\% \overset{\text{♂}}{\text{K}}_{(5)} \overset{\text{C}}{\text{C}}_{1+2+(2)} \overset{\text{A}}{\text{A}}_{(9)+1} \overset{\text{G}}{\text{G}}_1$

103. Answer (4)

Predators also help in maintaining species diversity in a community, by reducing the intensity of competition among competing prey species.

104. Answer (2)

According to Species-Area relationships proposed by Alexander von Humboldt, the relation between species richness and area for a wide variety of taxa turns out to be a rectangular hyperbola.

105. Answer (2)

According to the Red list (2004), thylacine got extinct from Australia

106. Answer (4)

Humus is highly resistant to microbial action.

107. Answer (1)

Stratification represents the structural aspect of an ecosystem.

108. Answer (1)

Trichoderma are effective biocontrol agents against several plant pathogens.

109. Answer (2)

Chromosome Y has the fewest number of genes (231).

110. Answer (1)

Stop codons do not have specific t-RNA for them.

111. Answer (3)

Sickle-cell anaemia is an autosomal recessive disorder in which substitution (transversion) mutation occurs in the gene controlling β-chain of haemoglobin.

112. Answer (3)

Slime moulds form an aggregation called plasmodium in favourable conditions. Their spores have cellulosic cell walls.

113. Answer (2)

Pteridophytes are first group showing events precursor to seed habit.

114. Answer (2)

Due to absence of cambium, monocot roots lack secondary growth.

115. Answer (4)

Integral proteins run throughout the lipid bilayer and requires crude methods of treatment like detergents for their removal.

116. Answer (3)

- Bivalent formation – Zygotene
- Dissolution of synaptonemal complex – Diplotene
- Terminalisation of Chiasmata – Diakinesis
- Exchange of Genetic segments – Pachytene

117. Answer (4)

Each ovule has one or two protective envelopes called integuments.

118. Answer (2)

Drosophila melanogaster is suitable as experimental model because it produces hundreds of offspring by single mating with high degree of genetic variations, possess by four pair of chromosomes

119. Answer (3)

Orchid growing on mango branch as epiphyte is an example of commensalism, which is a (+, 0) relation, where neither of the interacting species get harmed.

120. Answer (3)

Biological museums have collections of preserved plant and animal specimens for study and reference. Insects are collected, killed and pinned before preserving them in special insect boxes.

121. Answer (4)

Cleistogamous flowers are invariably autogamous as there is no chance of cross-pollen landing on the stigma.

122. Answer (3)

In pea seeds, if starch grain size is considered as the phenotype, the alleles show incomplete dominance.

123. Answer (1)

Morgan worked with the tiny fruit flies, *Drosophila melanogaster* to verify chromosomal theory of inheritance.

124. Answer (4)

In the grass family, the cotyledon is called Scutellum.

125. Answer (2)

Ethylene promotes female flowers.

126. Answer (1)

Mathematically, arithmetic growth can be enumerated by $L_t = L_0 + rt$

127. Answer (2)

In mitochondrial matrix, complex IV refers to cytochrome c oxidase complex.

128. Answer (2)

Carboxylation is the most crucial step of the Calvin cycle.

129. Answer (3)

In animal cells, during the S-phase, centrioles duplicate in the cytoplasm.

130. Answer (2)

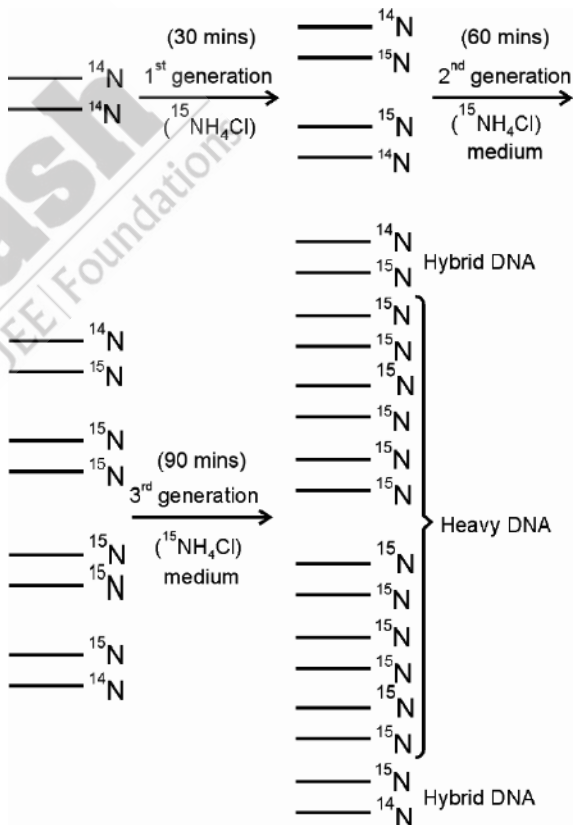
During Anaphase, centromeres split and chromatids separate.

131. Answer (1)

Bacterium replicates in 30 mins.

When allowed to grow in medium ^{14}N for many generations, as a result ^{14}N was incorporated into newly synthesised DNA,

Then transferred to the medium containing $^{15}\text{NH}_4\text{Cl}$,



Light DNA = 0%

Hybrid DNA = 25%

Heavy DNA = 75%

132. Answer (2)

According to Chargaff's rule,

Equimolar concentration of $A = T$ and $G = C$

$A = T = 30$

$$A + T = 30 + 30 = 60\%$$

Thus G + C amount is 40% with 20% C and 20% G

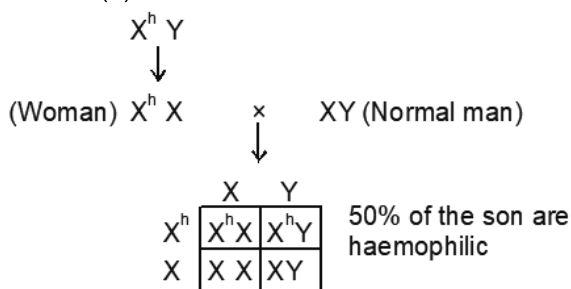
So, A = 30%

C = 20%

133. Answer (1)

Myotonic dystrophy phenylketonuria, thalassemia and sickle cell anaemia are autosomal disorders.

134. Answer (1)



135. Answer (3)

Cyclosporin A is the immunosuppressive agent produced by *Trichoderma polysporum*

SECTION - B

136. Answer (2)

Telocentric chromosome has a terminal centromere.

137. Answer (2)

All tissues on the inner side of the endodermis such as pericycle, vascular bundles and pith constitute the stele.

138. Answer (4)

Whorled phyllotaxy can be observed in *Alstonia*.

139. Answer (3)

Marchantia is an example of liverwort.

140. Answer (1)

Trypanosoma is the causative agent of sleeping sickness.

141. Answer (2)

Alternaria belongs to Deuteromycetes.

They have septate, branched hyphae. Conidia (non motile exogenous) is produced as asexual spores.

142. Answer (3)

- Phycoerythrin imparts red colour
- Cell wall of brown algae contains algin
- Reserve material of brown algae is Mannitol or laminarin

143. Answer (2)

Offset → *Eichhornia*

Stolon → Mint

Runners → *Oxalis*

144. Answer (2)

In cymose inflorescence the flowers are borne in a basipetal order.

145. Answer (3)

Endarch xylem is found in both dicot and monocot stems.

146. Answer (1)

Euchromatin is said to be transcriptionally active and loosely packed. This stains light.

147. Answer (3)

- Pili has no role in motility
- Fimbriae are small bristle like fibres
- Mesosomes are infoldings of plasma membrane

148. Answer (3)

Splitting of centromere takes place in anaphase II.

149. Answer (1)

PS-II is involved in non-cyclic flow of electrons.

150. Answer (1)

From each molecule of fructose-1, 6-bisphosphate, 6 ATP molecules are synthesised by substrate level phosphorylation in aerobic respiration (complete oxidation)

ZOOLOGY

SECTION - A

151. Answer (4)

Simple epithelium is composed of a single layer of cells. These are present in the walls of blood vessels, air sacs of lungs and in ducts of glands and tubular parts of nephrons. The inner lining of ducts of salivary glands is lined by compound epithelium.

152. Answer (1)

Sexes are separate and fertilisation is usually internal in the members of class Chondrichthyes.

Cycloid scales are characteristic of bony fishes.

153. Answer (3)

All connective tissues, except blood and lymph have cells that secrete fibres of structural proteins called collagen or elastin.

154. Answer (2)

Chikungunya is caused by Chikungunya virus. It is a vector-borne disease.

155. Answer (1)

In male frogs, urinary bladder and urinogenital ducts open into cloaca directly. Vasa efferentia are 10-12 in number that arise from testes. They enter the kidney on their side and open into Bidder's canal.

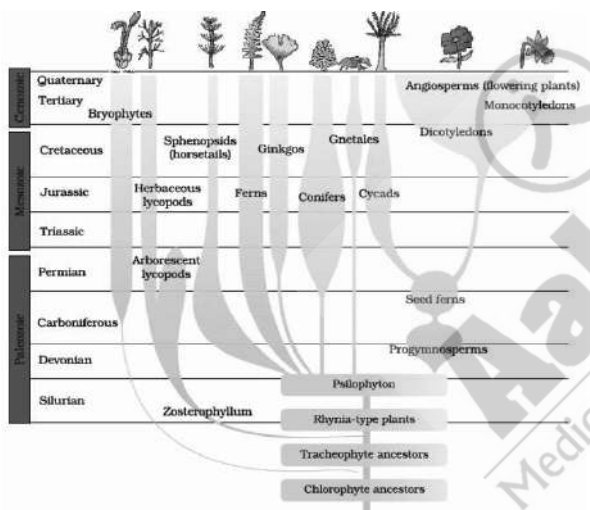
156. Answer (3)

The smaller the DNA fragment size, the farther it moves away from cathode. The separated DNA fragments can be visualised only after staining the DNA with ethidium bromide, followed by exposure to UV radiation.

157. Answer (2)

The respiratory system of *Periplaneta* consists of a network of trachea, that open through 10 pairs of small holes called spiracles present on the lateral side of the body.

158. Answer (4)



159. Answer (3)

In *Periplaneta americana*, a ring of 6-8 blind tubules called hepatic caeca is present at the junction of foregut and midgut, which secrete digestive juice. Gizzard is the posterior most part of foregut.

160. Answer (3)

The correct sequence of events during muscle contraction is:

- (1) Release of acetylcholine at neuromuscular junction
- (2) Release of Ca^{2+} into sarcoplasm
- (3) Actin – myosin complex formation
- (4) Sliding of actin filaments over myosin filaments

161. Answer (2)

Nucleosides are formed of nitrogenous base and pentose sugar. Guanosine, adenosine and uridine are nucleosides while cytosine is a nitrogenous base of pyrimidine group.

162. Answer (3)

Glucocorticoids stimulate gluconeogenesis, lipolysis and proteolysis.

163. Answer (3)

The pathogens of dengue, chikungunya and filariasis are transmitted by female mosquitoes. Mosquitoes are arthropods. Ascariasis is transmitted through faeco-oral route.

164. Answer (4)

Antedon – Sea lily

Echinus – Sea urchin

165. Answer (3)

Among vertebrates, fishes respire through gills. Amphibians, reptiles, birds and mammals respire through lungs.

166. Answer (2)

Coitus interruptus, periodic abstinence and lactational amenorrhoea are natural methods of contraception.

Diaphragms, cervical caps and vaults are the barrier methods of contraception.

167. Answer (2)

Pneumotaxic centre present in pons region of hindbrain can moderate the functions of respiratory rhythm centre.

168. Answer (1)

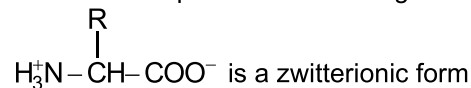
LH surge causes ovulation. Spermatogenesis starts at puberty due to significant increase in GnRH.

169. Answer (3)

Atria are two relatively smaller upper chambers. Inter-atrial septum is a thin muscular wall. Atrio-ventricular septum is a thick fibrous tissue.

170. Answer (2)

Zwitterionic form would always have equal number of positive and negative charges.



171. Answer (2)

Spermiogenesis is the process by which spermatids are transformed into spermatozoa. The release of sperms from seminiferous tubules is called spermiation.

172. Answer (2)

Reptiles have dry and cornified skin, epidermal scales or scutes. Amphibians have moist skin.

173. Answer (2)

All facial bones, except mandible and vomer are paired bones. Total number of facial bones in humans is 14.

174. Answer (3)

Glottis is the opening of trachea through larynx.

Epiglottis is a cartilaginous fold which covers the glottis during food swallowing.

175. Answer (3)

The hypothalamus contains several groups of neurosecretory cells which secrete hormones called hypothalamic hormones. Hypophyseal hormones are secreted by pituitary gland.

176. Answer (1)

The cardiac output is the amount of blood pumped out by each ventricle/min. The body has the ability to alter the stroke volume as well as the heart rate and thereby the cardiac output.

177. Answer (2)

The medulla oblongata contains centres which control respiration, cardiovascular reflexes and gastric secretions. Expression of emotional reactions are regulated by limbic lobe alongwith hypothalamus.

178. Answer (3)

Glomerular filtration rate in a normal healthy individual is 125 mL/min.

179. Answer (4)

Tobacco has been used by human beings for more than 400 years. Tobacco contains nicotine which is an alkaloid. Nicotine stimulates adrenal medulla to release adrenaline and nor adrenaline.

180. Answer (3)

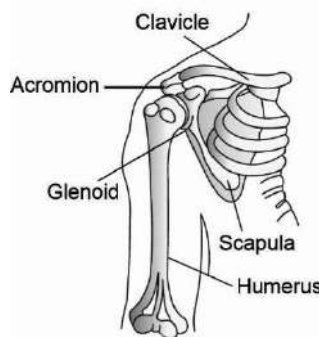
Lungs remove large amount of CO₂ while sweat removes salt, urea and lactic acid.

181. Answer (3)

Thyroxine is a non-proteinaceous hormone secreted by the thyroid gland. It interacts with intracellular receptors and mostly regulates gene expression. Thyroxine is chemically iodothyronine.

182. Answer (3)

Clavicle articulates with acromion process.



183. Answer (4)

Glucagon reduces the cellular glucose uptake and utilisation while insulin enhances cellular glucose uptake and utilisation.

184. Answer (4)

The cerebral cortex contains motor area, sensory area and large regions called the association areas responsible for complex functions like intersensory association, memory and communication.

185. Answer (2)

Bulbourethral glands and seminal vesicles are paired male accessory glands but prostate gland is unpaired male accessory gland. Vas deferens is a paired male sex accessory duct.

SECTION - B

186. Answer (4)

In disruptive selection, extremes are selected by nature.

Genetic drift happens by chance (Founder effect)

Co-evolution is related with evolution of predator with prey.

187. Answer (3)

Heart failure is the state of heart when it is not pumping blood effectively enough to meet the needs of the body.

When the heart stops beating, it is called cardiac arrest.

When the heart muscle is suddenly damaged by an inadequate blood supply, it is called heart attack.

188. Answer (3)

The *ori* is a sequence of genes where replication begins, enabling a plasmid to reproduce itself as it must survive within cells.

189. Answer (4)

A rapid decline in the number of people in reproductive age can decrease the population growth rate of humans. A rapid decline in death rate, MMR, IMR as well as an increase in number of people in reproductive age are probable reasons for increase in population growth rate of humans.

190. Answer (3)

Foetal ejection reflex triggers the maternal pituitary to release oxytocin. Receptors for oxytocin are situated in the myometrium. It acts on uterine muscle fibres for forceful contractions to induce labor pain.

191. Answer (3)

Steroidal oral contraceptive pills, implants and injections exhibit similar mode of action as they all are preparation of either progestogen alone or progestogen-estrogen combination. Saheli is a non-steroidal pill and block estrogen receptors and thereby prevent implantation.

192. Answer (4)

B-lymphocytes are responsible for humoral immunity and T-lymphocytes for CMI (Cell mediated immunity).

193. Answer (2)

Somatostatin from hypothalamus inhibits the release of growth hormone from pituitary gland, whose hypersecretion cause acromegaly in middle age humans.

194. Answer (2)

When similar organisms evolve into different species due to different external factors, such type of evolution is termed as adaptive radiation or divergent evolution.

195. Answer (2)

Breast enlargement is one of the side-effects of use of anabolic steroids in human males.

196. Answer (2)

A – Afferent arteriole

B – Bowman's capsule formed by simple squamous epithelium

C – PCT formed by simple cuboidal epithelium containing microvilli giving brush border appearance

D – Efferent arteriole

197. Answer (3)

Biomacromolecules like proteins, polysaccharides and nucleic acids have molecular weight in the range of 10000 Da and above. Palmitic acid is a saturated fatty acid (lipid). Lipids are hydrophobic and their molecular weight do not exceed 800 Da.

198. Answer (1)

Schwann cells are glial cells in PNS, responsible for formation of myelin sheath. Neurotransmitters are not required in electrical synapses. These transmission of impulse takes place across synapses through gap junctions.

199. Answer (3)

Common cold is a viral disease. *Haemophilus influenzae* is a bacterium that causes pneumonia.

200. Answer (2)

Gout is a metabolic disorder in which uric acid crystals are deposited in the region of joints. Inflammation of joints is called arthritis. Muscular dystrophy is a genetic disorder.



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Edition: 2024-25

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