



Alpha Waves Coaching Centre

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Mock Test 5

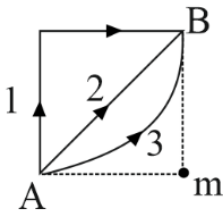
180 x 4 = 720 MARKS

Physics

1. Which of the following is a dimensional constant?

- 1) Refractive index
- 2) Dielectric constant
- 3) Relative density
- 4) Gravitational constant

2. If W_1 , W_2 and W_3 represent the work done in moving a particle from A to B along three different paths 1, 2, 3 respectively (as shown) in the gravitational field of a point mass m , find the correct relation between W_1 , W_2 and W_3

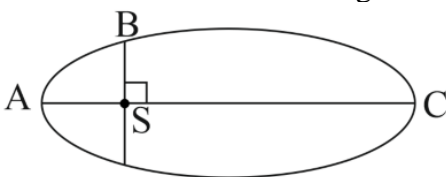


- 1) $W_1 > W_2 > W_3$
- 2) $W_1 = W_2 = W_3$
- 3) $W_1 < W_2 < W_3$
- 4) $W_2 > W_1 > W_3$

3. The work done by a force $\vec{F} = (-6x^3\hat{i})$ N, in displacing a particle from $x = 4$ m to $x = -2$ m is

- 1) 420 J
- 2) 120 J
- 3) -240 J
- 4) 360 J

4. The kinetic energies of a planet in an elliptical orbit about the Sun, at positions A, B and C are K_A , K_B and K_C respectively. AC is the major axis and SB is perpendicular to AC at the position of the Sun S as shown in the figure. Then



- 1) $K_A < K_B < K_C$
- 2) $K_A > K_B > K_C$
- 3) $K_B > K_A > K_C$
- 4) $K_A = K_B = K_C$

5. Following four wires are made of the same material. Which of these wire will have the largest extension when the same tension is applied

- 1) length = 500 cm, diameter = 2mm
- 2) length = 50 cm, diameter = 2mm
- 3) length = 500 cm, diameter = 1mm
- 4) length = 50 cm, diameter = 0.5mm

6. An increase in pressure required to decrease the 200 litres volume of a liquid by 0.004% in container is (Bulk modulus of the liquid = 2100 MPa)

- 1) 188 kPa
- 2) 8.4 kPa
- 3) 18.8 kPa
- 4) 84 kPa

7. A black body is at a temperature of 500K. It radiates energy at a rate which is proportional to

- 1) $(500)^3$
- 2) $(500)^4$
- 3) 500
- 4) $(500)_2$

8. You are given samples of 1 cm^3 of H_2 , 1 cm^3 of O_2 and 1 cm^3 of Cl_2 which are at NTP. The sample which has maximum number of molecules is:

- 1) H_2
- 2) O_2
- 3) Cl_2
- 4) All have same values

9. One mole of an ideal gas at an initial temperature of T_K does $6R$ joules of work adiabatically. If the ratio specific heats of this gas at constant pressure and at constant volume is $5/3$, the final temperature (T_f) of gas will be:

- 1) $(T + 2.4) K$
- 2) $(T - 2.4) K$
- 3) $(T + 4) K$
- 4) $(T - 4) K$

10. Six moles of O_2 gas is heated from $20^\circ C$ to $35^\circ C$ at constant volume. If specific heat capacity at constant pressure is 8 cal/mol-K and $R = 8.31 \text{ J/mol-K}$. What is the change in internal energy of the gas?

- 1) 180 cal
- 2) 300 cal
- 3) 360 cal
- 4) 540 cal

11. A black body has maximum emission at wavelength λ_m at $2000K$. Its corresponding wavelength at $3000K$ will be

- 1) $3/2 \lambda_m$
- 2) $2/3 \lambda_m$
- 3) $16/81 \lambda_m$
- 4) $81/16 \lambda_m$

12. Assertion: The speed of sound in solids is maximum though their density is large.

Reason: The coefficient of elasticity of solid is large.

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

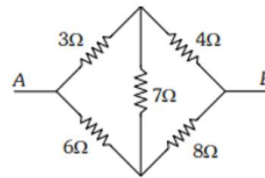
13. Two point charges $+3\mu C$ and $+8\mu C$ repel each other with a force of 40 N . If a charge of $-5 \mu C$ is added to each of them, then the force between them will become:

- 1) 10 N attractive
- 2) $+10 \text{ N}$ repulsive
- 3) $+20 \text{ N}$ repulsive
- 4) 20 N attractive

14. A charge $+q$ is at a distance $L/2$ above the centre of a square of side L . Then what is the flux linked with the surface?

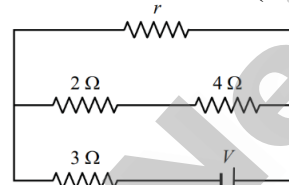
- 1) $q / 4\epsilon_0$
- 2) $2q / 3\epsilon_0$
- 3) $q / 6\epsilon_0$
- 4) $6q / \epsilon_0$

15. In the given figure, equivalent resistance between A and B will be:



- 1) $14/3 \Omega$
- 2) $3/14 \Omega$
- 3) $9/14 \Omega$
- 4) $14/9 \Omega$

16. In the circuit, what should be the value of r in ohm so that power developed in the resistor 3Ω will be maximum? (in Ω)



- 1) 0Ω
- 2) 2Ω
- 3) 3Ω
- 4) 6Ω

17. An electric field of 1500 V m^{-1} and a magnetic field of 0.4 Wb m^{-2} act on a moving electron to produce no net force. The speed of the electron is. Assume electron moves perpendicular to magnetic field.

- 1) $\frac{1500}{0.4} \text{ m s}^{-1}$
- 2) $\frac{0.4}{1500} \text{ m s}^{-1}$
- 3) $\frac{1}{1500 \times 0.4} \text{ m s}^{-1}$
- 4) $1500 \times 0.4 \text{ m s}^{-1}$

18. A diverging lens of focal length 20 cm and a converging mirror of focal length 10 cm are placed 5 cm apart coaxially. Where should an object be placed so that object and its real image coincide?

- 1) 20 cm away from lens
- 2) 60 cm away from lens
- 3) 30 cm away from lens
- 4) 45 cm away from lens

19. Initially an electric dipole is perpendicular to uniform electric field E . If dipole moment is p , then work done to rotate the dipole by an angle 180° from this position is

- 1) pE
- 2) Zero
- 3) $2pE$
- 4) $-pE$

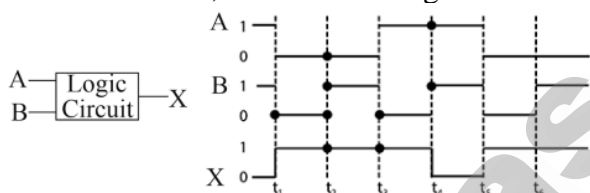
20. A parallel plate capacitor is charged by a battery. After charging the capacitor, distance between the plates is increased to twice the initial separation and a dielectric of dielectric constant 2 is fully filled between plates with the battery connected. Then
- capacitance doubled
 - charge remains same
 - capacitance remains same
 - charge becomes half of the initial
- Which of the following are correct?

- a, b
- b, c
- a, d
- c, d

21. A particle of mass $4m$ at rest decays into two particles of mass m and $3m$. The ratio of de-Broglie wavelength of two particles will be

- $1/2$
- 4
- 2
- 1

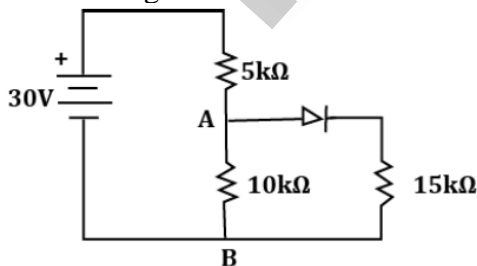
22. Following figure shows a logic gate circuit with two inputs A and B and output X. The voltage waveforms of A, B and X are as given



The logic gate is

- AND
- NAND
- OR
- NOR

23. Find maximum voltage across AB in the circuit shown in figure. Assume that diode is ideal



- 12.36V
- 14.36V
- 16.36V
- 18.36V

24. How long can an electric lamp of 500 W be kept glowing by fusion of 2kg of deuterium? Take the fusion reaction as ${}_1\text{H}^2 + {}_1\text{H}^2 \rightarrow {}_2\text{He} + n + 3.27 \text{ MeV}$

- $3.15 \times 10^{11} \text{ s}$
- $3.15 \times 10^{14} \text{ s}$
- $3.15 \times 10^7 \text{ s}$
- $3.15 \times 10^8 \text{ s}$

25. The phenomenon of polarisation of electromagnetic waves proves that the electromagnetic waves are:

- transverse
- mechanical
- longitudinal
- neither longitudinal nor transverse

26. Three vectors \vec{A} , \vec{B} & \vec{C} satisfy the following relation $\vec{A} \cdot \vec{B} = 0$ and $\vec{A} \cdot \vec{C} = 0$ vector \vec{A} is parallel to

- \vec{B}
- \vec{C}
- $\vec{B} \cdot \vec{C}$
- $\vec{B} \times \vec{C}$

27. Write the dimensions of a/b in the relation $P = \frac{a-t^2}{bx}$, where P = pressure, t = time and x = displacement

- $M^{-1}L^0T^{-2}$
- ML^0T^{-2}
- ML^0T^2
- MLT^{-2}

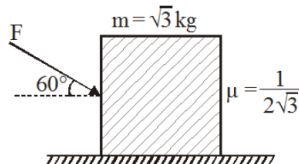
28. If the number of the divisions on the circular scale is 100 and number of full rotations given to screw is 8 and distance moved by the screw is 4 mm, then what will be least count of the screw gauges?

- 0.5 mm
- 0.005 mm
- 0.05 mm
- 5 cm

29. The bulk modulus of a spherical body is 'B'. If it is subjected to uniform pressure P , then fractional decrease in surface area is

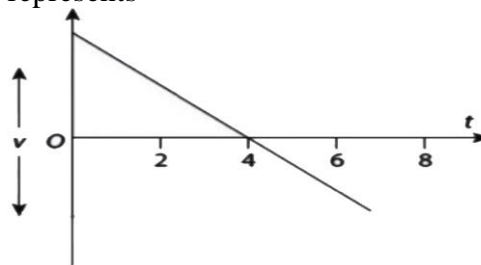
- $P / 3B$
- $2P / 3B$
- P / B
- $P / 2B$

30. If the block shown in figure does not move the maximum value of F is



- 1) 20 N
 - 2) 10 N
 - 3) 15 N
 - 4) 12 N
31. If at some instant of time, the displacement of a simple harmonic oscillator is 0.02m and its acceleration is 2 ms^{-2} , then the angular frequency of the oscillator is:
- 1) 100 rad/s
 - 2) 10 rad/s
 - 3) 1 rad/s
 - 4) 0.1 rad/s
32. The pressure of 10^6 dyne/cm^2 is equivalent to
- 1) 10^5 N/m^2
 - 2) 10^6 N/m^2
 - 3) 10^7 N/m^2
 - 4) 10^8 N/m^2
33. An L-C-R series circuit with 100 ohm resistance is connected to an ac source of 100 V and angular frequency 300 rad/s. When the capacitance is removed, the current lags behind the voltage by 45° , when the inductance is removed, the current leads the voltage by 45° . The current flowing in the original circuit will be
- 1) 1A
 - 2) 1.5 A
 - 3) 2A
 - 4) 3A
34. In a electromagnetic wave the electric field oscillate with amplitude 50 V/m, what is the amplitude of magnetic field:
- 1) $2 \times 10^{-6}\text{ T}$
 - 2) $1.67 \times 10^{-7}\text{ T}$
 - 3) $3.14 \times 10^{-7}\text{ T}$
 - 4) $5 \times 10^3\text{ T}$
35. A paramagnetic substance of susceptibility 3×10^{-4} is placed in a magnetic field of $4 \times 10^{-4}\text{ Am}^{-1}$. Then the intensity of magnetization in the units of Am^{-1} is:
- 1) 1.33×10^8
 - 2) 0.75×10^{-8}
 - 3) 12×10^{-8}
 - 4) 14×10^{-8}

36. Consider the given velocity – time graph. It represents



- 1) a projectile projected vertically upwards from a point.
 - 2) an electron in hydrogen atom.
 - 3) a car with constant acceleration along a straight road.
 - 4) a bullet fired horizontally from the top of tower.
37. Starting from rest, a body travels for 20s with constant acceleration. It covers a distance s_1 during first 10 seconds and distance s_2 during next 10s. The value of s_2 is
- 1) s_1
 - 2) $2s_1$
 - 3) $3s_1$
 - 4) $4s_1$
38. The radius of gyration of a hollow sphere of mass m and radius R about an axis which is at a distance $2R$ from surface and parallel to its diameter will be.
- 1) $R\sqrt{\frac{50}{3}}$
 - 2) $R\sqrt{\frac{29}{3}}$
 - 3) $R\sqrt{\frac{35}{3}}$
 - 4) $R\sqrt{\frac{15}{3}}$
39. A moving block having mass m , collides one dimensionally with another stationary block having mass $4m$. The lighter block comes to rest after collision. When the initial velocity of the lighter block is v , then the value of coefficient of restitution (e) will be:
- 1) 0.5
 - 2) 0.25
 - 3) 0.75
 - 4) 0.4

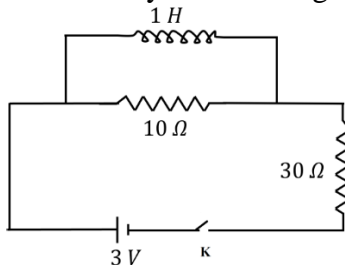
40. Gravitational force between two masses placed on earth, at a distance 'd' apart, is 6N. If these masses are taken to Mars and kept at same separation, then the force between them will become

- 1) 1 N
- 2) $1/6$ N
- 3) 36 N
- 4) 6 N

41. The plane of a rectangular loop of wire with sides 0.05 m and 0.08 m is parallel to a uniform magnetic field of induction 1.5×10^{-2} T. A current of 10 A flows through the loop. If the side of length 0.08 m is normal and the side of length 0.05 m is parallel to the lines of induction, then torque is (in N m)

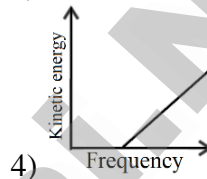
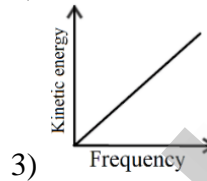
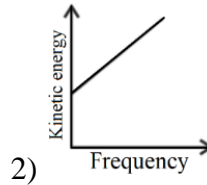
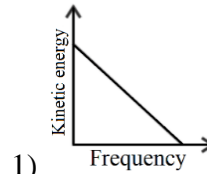
- 1) 0
- 2) 6000
- 3) 6×10^{-4}
- 4) 1.2×10^{-2}

42. In the given circuit, the current in 10Ω resistor immediately after closing the key is



- 1) $3/10$ A
- 2) $3/20$ A
- 3) $3/40$ A
- 4) Zero A

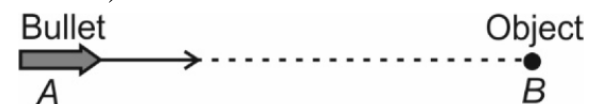
43. According to Einstein's photoelectric equation, the graph between the kinetic energy of photoelectrons ejected and the frequency of incident radiation is



44. The ratio of the longest to shortest wavelengths in Brackett series of hydrogen spectra is

- 1) $25/9$
- 2) $17/6$
- 3) $9/5$
- 4) $4/3$

45. A bullet is fired horizontally aiming at an object which starts falling at the instant the bullet is fired as shown in the figure. The position A is taken as origin and bullet speed 10 m/s. If the bullet hits the object after 1 s then the co-ordinates of the point where it hits is (Take $g = 10 \text{ m/s}^2$)



- 1) (0, 10)
- 2) (10, -5)
- 3) (10, -10)
- 4) (5, -5)

Chemistry

46. Match the following

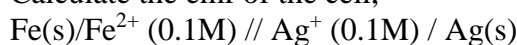
Oxide	Nature
I) CrO ₃	A) Acidic
II) NO	B) Amphoteric
III) ZnO	C) Neutral
IV) V ₂ O ₃	D) Basic

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

47. Which one of the following does not give foul smell when heated with chloroform and caustic potash?

- 1) Diethylamine
- 2) Methanamine
- 3) Aniline
- 4) Benzylamine

48. Calculate the emf of the cell,



$$(E_{\text{Ag}^{+}/\text{Ag}}^0 = +0.8\text{V}; E_{\text{Fe}^{2+}/\text{Fe}}^0 = -0.44\text{V})$$

- 1) 1.27 V
- 2) 1.3 V
- 3) 1.21 V
- 4) 1.18 V

49. The configuration of an element is [Rn]5f¹⁴6d¹⁰7s²7p⁴. The element is

- 1) Og
- 2) Nh
- 3) Mc
- 4) Lv

50. Incorrect relation according to Bohr's theory is

- 1) $E_n \propto -\frac{z^2}{n^2}$
- 2) $V \propto -\frac{z}{n}$
- 3) $r_n \propto \frac{n^2}{z}$
- 4) $P.E \propto -\frac{2z^2}{n^2}$

51. In Lasagne's test, the organic compound containing nitrogen gives Prussian blue colour. The oxidation state of central metal ion in the complex formed is

- 1) +2
- 2) +3
- 3) +4
- 4) +1

52. Statement-I: Acetic acid dissolved in water undergoes dimerisation.

Statement-II: Na₂SO₄ dissolved in water undergoes dissociation.

- 1) I is correct, II is incorrect
- 2) I and II are correct
- 3) I is incorrect, II is correct
- 4) I and II are incorrect

53. Match the following.

Process	ΔG
I) $\text{H}_2\text{O(l)} \xrightarrow{273.15\text{K}} \text{H}_2\text{O(s)}$	A) zero
II) $3\text{O}_2\text{(g)} \rightarrow 2\text{O}_3\text{(g)}$	B) Positive
III) $\text{H}_2\text{O(l)} \xrightarrow{378.99\text{K}} \text{H}_2\text{O(g)}$	C) Negative

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

54. Galena is

- 1) PbS
- 2) SnO₂
- 3) PbCO₃
- 4) Ag₂S

55. With the molecular formula, C₄H₆ an organic compound contains sp, sp² and sp³ carbon atoms. The IUPAC name of the organic compound

- 1) Buta-1,3-diene
- 2) But-1-en-3-yne
- 3) Buta-1,2-diene
- 4) Cyclobut-1-ene

56. Basic buffer among the following is

- 1) 1 mole of H₂SO₄ + 2 moles of NH₄OH
- 2) 2 moles of NH₄OH + 2 moles of CH₃COOH
- 3) 2 moles of CH₃COOH + 1 mole NaOH
- 4) 2 moles of NH₄OH + 1 mole of HCl

57. A + B → products. When [B] is kept constant and [A] is quadrupled then rate doubles. When both [A] and [B] are doubled then rate doubles. Order with respect to 'B' is

- 1) 1
- 2) 1/2
- 3) 2
- 4) -1

58. $\text{XeF}_4 \xrightarrow[143\text{K}]{\text{'X'}}$ XeF₆. 'X' is

- 1) O₂F₂
- 2) SF₄
- 3) F₂
- 4) SF₆

59. Assertion (A): Glucose penta acetate cannot react with NH_2OH

Reason (R): Glucose penta acetate has a hemiacetal structure

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

60. The complex which does not give precipitate with AgNO_3 solution is

- 1) $\text{CoCl}_3 \cdot 4\text{NH}_3$
- 2) $\text{CoCl}_3 \cdot 5\text{NH}_3$
- 3) $\text{CoCl}_3 \cdot 3\text{NH}_3$
- 4) $\text{CoCl}_3 \cdot 6\text{NH}_3$

61. $\text{N}_2(\text{g}) + 3\text{H}_2(\text{g}) \rightleftharpoons 2\text{NH}_3(\text{g})$. According to Lechatlier's principle, decomposition of NH_3 is favoured

- (A) At high 'T'
- (B) At low 'T'
- (C) At high 'P'
- (D) At low 'P'
- 1) A and C
- 2) A and D
- 3) B and C
- 4) B and D

62. A) Aniline can be purified by steam distillation.
B) Aniline + CHCl_3 mixture can be separated by distillation
C) Glycerol can be recovered from spent lye by vacuum distillation
D) Silica gel can be used as a stationary phase in thin layer chromatography. Correct statements are

- 1) A, C and D only
- 2) A, B, C and D
- 3) B and D only
- 4) A, B and D only

63. $\text{C}_6\text{H}_6 \xrightarrow{\text{Cl}_2, \text{AlCl}_3} \text{A} \xrightarrow[\text{Na/ether}]{\text{CH}_2\text{Cl}} \text{B}$. Compound B is

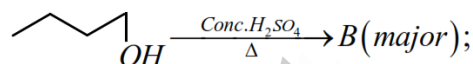
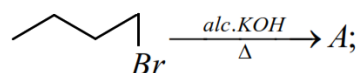
- 1) Chlorobenzene
- 2) Toluene
- 3) o-Dichlorobenzene
- 4) Biphenyl

64. Statement-I: Wave function (Ψ) has no physical meaning

Statement-II: Spin quantum number is derived from schrodinger wave equation.

- 1) I is correct, II is incorrect
- 2) I and II are correct
- 3) I is incorrect, II is correct
- 4) I and II are incorrect

65.



A and B are

- 1) Same compounds
- 2) Pair of positional isomers
- 3) Pair of chain isomers
- 4) Pair of geometrical isomers

66. Solubility of $\text{Zr}_3(\text{PO}_4)_4$ is 10^{-8} M. K_{SP} of Zirconium phosphate is 6.912×10^{-x} 'x' is

- 1) 56
- 2) 53
- 3) 60
- 4) 51

67. Incorrect statement is

- 1) n-hexane+n-heptane form an ideal solution
- 2) Blood is isotonic with 0.9% (w/v) NaCl solution.
- 3) 1 mole of HCl dissolved in one litre solution is 1N HCl solution
- 4) Vapour pressure of a liquid is a colligative property

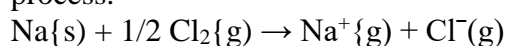
68. $(\text{CH}_3)_3\text{CBr} \xrightarrow{\text{C}_2\text{H}_5\text{ONa}} \text{X}$. 'X' is

- 1) A saturated hydrocarbon
- 2) A symmetrical ether
- 3) An unsaturated hydrocarbon
- 4) An unsymmetrical ether

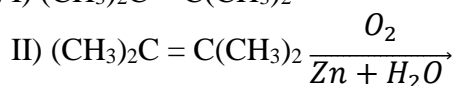
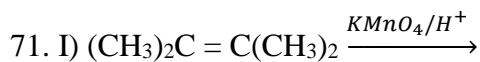
69. IP_2 is highest for

- 1) S
- 2) Cl
- 3) P
- 4) Si

70. Enthalpy of atomization of sodium 108 kJ/mole. Enthalpy of atomization of chlorine is 242 kJ/mole. Ionization enthalpy of sodium is 492 kJ/mole. What additional information is required to find the enthalpy change for the following process.



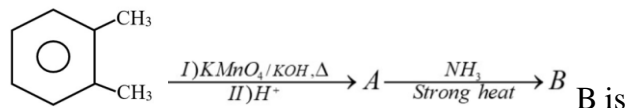
- 1) Ionization enthalpy of chlorine
- 2) Enthalpy of sublimation of sodium
- 3) Electron gain enthalpy of chlorine
- 4) Bond dissociation enthalpy of chlorine

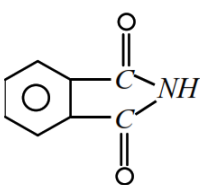
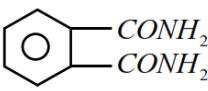
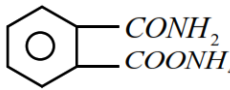
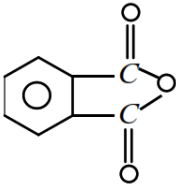


Only acetone is formed as product in

- 1) I only
- 2) II only
- 3) Both I & II
- 4) Neither I nor II

72.

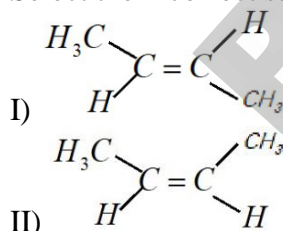


- 1) 
- 2) 
- 3) 
- 4) 

73. Bond order is least in

- 1) O_2^-
- 2) O_2^+
- 3) C_2^{2-}
- 4) C_2

74. Select the incorrect statement



- 1) Boiling point of I < II
- 2) Dipole moment of II is zero
- 3) Melting point of I > II
- 4) Stability of I > II

75. $\text{MnO}_2 + \text{NH}_4^+ + \text{e}^- \rightarrow \text{MnO}(\text{OH}) + \text{NH}_3$. This half reaction occurs at

- 1) Cathode in dry cell
- 2) Cathode in mercury cell
- 3) Cathode in Ni-Cd cell
- 4) Cathode in Lead accumulator

76. The order of electronegativity of 16th group elements is:

- 1) $\text{S} > \text{Se} > \text{Te} > \text{Po} > \text{O}$
- 2) $\text{Se} > \text{S} > \text{Te} > \text{O} > \text{Po}$
- 3) $\text{O} > \text{S} > \text{Se} > \text{Te} > \text{Po}$
- 4) $\text{Te} > \text{O} > \text{Se} > \text{Po} > \text{S}$

77. Internal energy is

- 1) A state function and intensive property
- 2) A state function and extensive property
- 3) A path function and extensive property
- 4) A path function and intensive property

78. Hexaamminechromium (III) sulphate is

- 1) $[\text{Cr}(\text{NH}_2)_6]_2(\text{SO}_4)_3$
- 2) $[\text{Cr}(\text{NH}_3)_6](\text{SO}_4)$
- 3) $[\text{Cr}(\text{NH}_3)_6]_2(\text{SO}_4)_3$
- 4) $[\text{Cr}(\text{NH}_2)_6](\text{SO}_4)$

79. Identify incorrect statements about the reactivity of ethyl alcohol.

- A) It readily reacts with Na
 - B) It readily reacts with HCl + anhydrous ZnCl_2
 - C) It can react with NaOI
- 1) A, B & C
 - 2) A & C only
 - 3) B only
 - 4) B & C only

80. $\text{A} + \text{B} \rightleftharpoons \text{C}$, $K_{\text{eq}} = 10^{-2}$. At certain instant $[\text{A}] = [\text{C}] = 10^{-4}$ and $[\text{B}] = 10^{-1}$. Correct statement is

- 1) $Q_c > K_c$, reaction proceeds in forward direction
- 2) $Q_c > K_c$, reaction proceeds in backward direction
- 3) $Q_c < K_c$, reaction proceeds in forward direction
- 4) $Q_c < K_c$, reaction proceeds in backward direction

81. 68% by mass of HNO_3 and 32% by mass of H_2O forms

- 1) Ideal solution
- 2) Minimum boiling azeotrope
- 3) Maximum boiling azeotrope
- 4) Immiscible liquid mixture

82. The species which is coloured but diamagnetic is

- 1) MnO_4^{2-}
- 2) Cr^{3+}
- 3) CrO_4^{2-}
- 4) Mn^{3+}

83. Assertion (A): Increase in temperature increases the rate of chemical reaction.

Reason (R): With the increase in temperature, fraction of activated molecules increases.

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

84. Acetal among the following is

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

85. $\text{CH}_3\text{C}\equiv\text{CH} \xrightarrow{\text{NaNH}_2} \text{A} \xrightarrow{\text{C}_2\text{H}_5\text{I}} \text{B}$. Functional isomer of 'B' cannot be

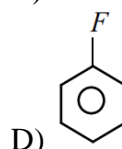
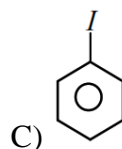
- 1)
- 2) $\text{CH}_2=\text{CH}-\text{CH}_2-\text{CH}=\text{CH}_2$
- 3) $\text{CH}_3-\text{CH}_2-\text{CH}_2-\text{C}\equiv\text{CH}$
- 4) $\text{CH}_2=\text{C}=\text{CH}-\text{CH}_2-\text{CH}_3$

86. The salt which undergoes anionic hydrolysis only is

- 1) CuSO_4
- 2) NaCl
- 3) CH_3COONa
- 4) HCOONH_4

87. Which of the following cannot be prepared by Sandmeyer's reaction

- A)
- B)



- 1) A & B
- 2) C & D
- 3) A & C
- 4) B & D

88. Shape of polypeptide chain is explained by _____ structure of proteins

- 1) 1°
- 2) 2°
- 3) 3°
- 4) 4°

89. p^{k_b} is highest for

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

90. Bohr's theory is applicable to

- 1) H-atom
- 2) H^- ion
- 3) Be^{2+} ion
- 4) Both 1 & 3

Botany

91. *Petunia* and *Datura* are placed in the family

- 1) Solanaceae
- 2) Poaceae
- 3) Anacardiaceae
- 4) Liliaceae

92. On the basis of five kingdom system of classification, *Chlorella* and *Amoeba* belong to kingdom

- 1) Monera
- 2) Plantae and Animalia respectively
- 3) Protista
- 4) Plantae and Protista respectively

93. The term 'virus' that means venom was coined by

- 1) D. J. Ivanowsky
- 2) M.W. Beijerinck
- 3) W.M. Stanley
- 4) Pasteur

94. Assertion (A): The flowers found in the members of family Poaceae are zygomorphic.

Reason (R): Flowers in family Poaceae can be divided into two similar halves only in one vertical plane.

- 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

95. 'Bicarpellary, syncarpous, superior ovary with oblique septa' is seen in family

- 1) Fabaceae
- 2) Liliaceae
- 3) Cruciferae
- 4) Solanaceae

96. A student while cutting transverse section of plant part observed scattered vascular bundles of various sizes, covered by bundle sheath cells. He also observed water containing cavities inside vascular bundle. This indicates that it is a transverse section of

- 1) Cucurbit stem
- 2) Maize stem
- 3) Rice root
- 4) Mustard root

97. Which of the following functions are irrelevant to xylem?

- i) Radial conduction of water
 - ii) Maintains pressure gradient in the sieve tubes
 - iii) Provides mechanical support
 - iv) Bast fibres of jute, flax and hemp
- Which are used commercially for various purposes are obtained from xylem.

- 1) (i) & (ii)
- 2) (ii) & (iv)
- 3) (iii) & (iv)
- 4) (ii) & (iii)

98. A correct situation of mesophyll in an isobilateral grass leaf is shown by

- 1) Palisade tissue towards adaxial surface
- 2) Palisade tissue towards abaxial surface
- 3) Undifferentiated mesophyll
- 4) Palisade along both the surface

99. The members of phaeophyceae possess

- 1) Chlorophyll a, c, phycoerythrin and fucoxanthin.
- 2) Chlorophyll a, b, Carotenoids and xanthophylls.
- 3) Chlorophyll a, c, Carotenoids and xanthophylls.
- 4) Chlorophyll a, d phycocyanin and fucoxanthin.

100. Statement-I: *Spirogyra* has rigid cell wall made of an inner layer of cellulose and an outer layer of pectose.

Statement-II: Pyrenoids are storage bodies that are present in chloroplasts of green algae.

- 1) Both the statements are correct
- 2) Both the statements are incorrect
- 3) Statement I is only correct
- 4) Statement II is only correct

101. How many of the following is/are filamentous algae?

Ulothrix, *Laminaria*, *Chlamydomonas*, *Ectocarpus*, *Spirogyra*, *Volvox*, *Eudorina*

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

102. How many of the given statements are correct about bryophytes?

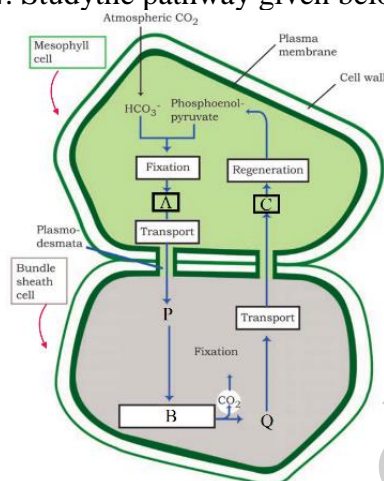
- A) They are dependent on water for sexual reproduction,
- B) The plant body is more differentiated than that of algae.
- C) The sex organs are multicellular and jacketed.
- D) They produce biflagellated antherozoids.

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

103. Select incorrect statement.

- 1) In C_4 plants, bundle sheath cells are rich in enzyme RuBisCO but lack PEPcase
- 2) C_4 plants are better photosynthesizer than C_3 plants
- 3) Calvin pathway is common for both C_3 and C_4 plants
- 4) PEP synthetase is cold insensitive enzyme

104. Study the pathway given below:



In which of the following options correct terms for all A, B and C are given?

- 1) A- C_3 acid, B- C_4 acid, C- Fixation
- 2) A- C_4 acid, B- Fixation, C- C_3 acid
- 3) A- C_4 acid, B- Decarboxylation, C- C_3 acid
- 4) A- C_3 acid, B- C_4 acid, C- Decarboxylation

105. Assertion (A): PS I and PS II are named in the sequence of their discovery

Reason (R): PS I has been discovered first and then PS II

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

106. Filling the blanks w.r.t. chemiosmotic hypothesis.

(i) Primary acceptor of electron is located towards the _a_ side of the thylakoid membrane.

(ii) First, transfer of H^+ takes place from _b_ to thylakoid lumen.

(iii) Protons get accumulated in _c_.

(iv) Photolysis of water takes place towards the _d_

1) a-Outer, b-Outer thylakoid membrane, c-Stroma, d-Stroma

2) a-Inner, b-Inner thylakoid membrane, c-Thylakoid membrane, d-Outer thylakoid membrane

3) a-Outer, b-Stroma, c-Lumen, d-Thylakoid lumen

4) a-Inner, b-Stroma, c-Stroma, d-Thylakoid lumen

107. The final produces) of ETS and oxidative phosphorylation is/are

- 1) Oxygen
- 2) NADPH
- 3) $FADH_2$
- 4) ATP and H_2O

108. Cytochromes present in the complex IV of ETS are

- 1) Cytochromes b and c
- 2) Cytochromes b and c_1
- 3) Cytochromes c and c_1
- 4) Cytochromes a and a_3

109. Net gain of ATP molecules during aerobic respiration of six molecules of glucose is

- 1) 180
- 2) 228
- 3) 48
- 4) 84

110. Assertion (A): Gibberellins promote bolting in many rosette habit plants.

Reason (R): Gibberellins hasten the maturity period which leads to early seed production in some conifers.

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

111. Identify the incorrect statement(s) from the following.

- Auxin and cytokinin show their synergistic effect on cell division.
- ABA and ethylene are antagonistic w.r.t. shedding of leaves.
- Cytokinin inhibits the growth of apical buds.
- Gibberellins break the dormancy of seeds.

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

112. The xylem is said to be endarch when

- Metaxylem lies towards pith
- Protoxylem lies peripherally
- Protoxylem lies towards pericycle
- Protoxylem lies towards pith

113. Wrongly matched pair of the following

- Nucellus – Megasporangium property
- Ovule – Integumented embryo sac
- Placenta – Nutritive tissue to embryo sac
- Chalaza – Base of ovule

114. How many of the following features are not present in the plants showing wind pollination?

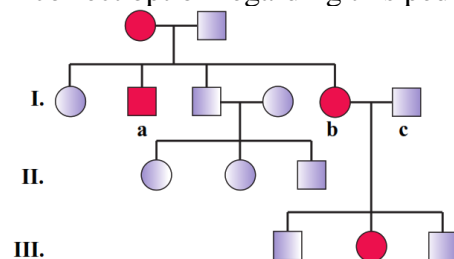
- Pollen grains are sticky and light
- Well exposed stamen
- Feathery stigma
- Many ovules in each ovary
- Large sized single flower

- Two
- One
- Three
- Four

115. In a pea plant, each leaf cell has 14 chromosomes. The number of chromosomes present in, synergids and PEN respectively in same plant will be

- 14, 7
- 7, 14
- 7, 21
- 21, 7

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



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

117. Choose the incorrect match.

	Blood group of offspring	Genotype of offspring	Blood groups of both parents
1)	AB	$I^A I^B$	A and B
2)	A	$I^A I^O$	A and AB
3)	B	$I^B I^B$	A and AB
4)	O	$I^O I^O$	A and A

118. Who united the knowledge of chromosomal segregation with Mendelian principle and called it the chromosomal theory of inheritance?

- T.H. Morgan
- Walter Sutton
- Theodore Boveri
- Gregor Mendel

119. Heterochromatin differs from euchromatin as the former is

- More densely packed region of chromatin
- Transcriptionally active
- Lacking histone proteins
- Lightly stained region of chromatin

120. Which of the given statements is not true w.r.t. UTRs?

- These are present at both 5' end after start codon and at 3' end before stop codon
- These are additional sequences which are not translated
- These are found on mRNA
- They are required for efficient translation process

121. The bioactive substance produced by a bacterium and used for the patients undergone myocardial infarction, is

- Lactic acid
- Statins
- Cyclosporin A
- Streptokinase

122. Which of the following is an example of "Sexual deceit"?

- Pronuba* moth and *Yucca* plant
- Cuckoo bird and crow
- Chathamalus* and Clown fish
- Ophrys* and a bee species

123. What kind of pyramid would you get when number of insects feeding on big tree?

- 1) Spindle shaped
- 2) Upright pyramid
- 3) Inverted pyramid
- 4) both 1 and 2

124. Soil fertility is maintained by the activity of

- 1) Decomposers
- 2) Consumers
- 3) Transducers
- 4) Producers

125. Identify the incorrect statement w. r. t ecological pyramids.

- 1) Pyramid of number of grassland ecosystem is upright
- 2) Insectivorous plants are not considered in ecological pyramids
- 3) Pyramids assume complex food chain and accommodate food web
- 4) Detritivores and decomposers are not given any place in ecological pyramids

126. The rate of organic matter build up or stored by producers in excess of respiratory utilization per unit time and area is called

- 1) Photosynthetic efficiency
- 2) Secondary productivity
- 3) Net primary productivity
- 4) Gross primary productivity

127. All of the given are reasons for high biodiversity in tropics, except

- 1) Undisturbed for years
- 2) Constant environmental conditions
- 3) Warm temperature
- 4) Low humidity and solar radiations

128. Which of the following is not correct about biodiversity hotspots?

- 1) High degree of endemism
- 2) High degree of species richness
- 3) Offsite conservation strategy
- 4) Total 34 biodiversity hotspots are present in the world

129. Find the incorrect match w.r.t sacred groves and their locations.

- 1) Khasi and Jaintia Hills – Meghalaya
- 2) Aravalli hills – Rajasthan
- 3) Western Ghats – Karnataka
- 4) Bastar – Maharashtra

130. Select the odd one w. r. t functions of tapetum.

- 1) Pollenkitt – Entomophilous plants
- 2) Callose – Release of microspores
- 3) Sporopollenin – Exine of pollen
- 4) Bronchial afflictions – Anemophilous plants

131. Consider the following equation $\log S = \log C + Z \log A$

In the given species-area relationship equation, C represents

- 1) Species richness
- 2) Y-intercept
- 3) Area
- 4) Regression coefficient

132. Assertion (A): The centrioles are found in animal cells. Reason (R): Centriole gives a cartwheel appearance due to the presence of radial spokes and peripheral cell membrane.

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

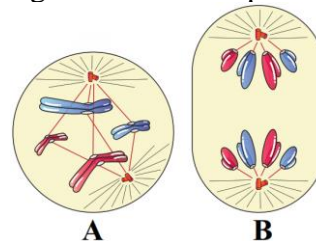
133. The fluid nature of cell membrane helps to perform functions like

- a. Formation of intercellular junctions
- b. Endocytosis
- c. Secretion
- d. Cell division

Select the correct option

- 1) b & c only
- 2) All except b
- 3) all a, b, c & d
- 4) Only a

134. Which stages of cell division do the following figures A and B represent?



- 1) A-Metaphase, B-Anaphase
- 2) A-Anaphase, B-Telophase
- 3) A-Transition to metaphase, B-Anaphase
- 4) A-Metaphase, B-Telophase

135. If a cell has 14 chromosomes and 2C DNA in G_1 phase. What will be the number of chromosomes and DNA amount respectively, after G_2 phase?

- 1) 14, 2C
- 2) 7, 4C
- 3) 14, 4C
- 4) 7, 2C

Zoology

136. Select the incorrect option w. r. t. cockroach.

- 1) Heart consists of 13 funnel-shaped contractile chambers
- 2) The stage in the development of cockroach between two moults is called nymph.
- 3) They can transmit a variety of bacterial diseases by contaminating food material.
- 4) Diurnal and omnivorous

137. The matrix of _a_ is solid and pliable but that of _b_ is hard and non-pliable.

- 1) a-Bone, b-cartilage
- 2) a-Cartilage, b-bone
- 3) a-Blood, b-cartilage
- 4) a-Tendon, b-ligament

138. Identify and observe the given tissue.



Choose the incorrect statement w. r. t. the given tissue.

- 1) It serves weight bearing function in human body
- 2) It provides structural framework to the body
- 3) It has a solid and pliable ground substance rich in collagen fibres
- 4) It protects and supports softer tissues and organs

139. Lecithin found in cell membranes belongs to category of

- 1) Proteins
- 2) Phospholipids
- 3) Polysaccharides
- 4) Glycoproteins

140. Catalytic activity of carboxypeptidase is lost upon removal of cofactor

- 1) Coenzyme
- 2) Prosthetic group
- 3) Cu^{2+}
- 4) Zn^{2+}

141. Select the type of enzyme involved in the following reaction. $\text{S} - \text{G} + \text{S}' \rightarrow \text{S} + \text{S}' - \text{G}$

- 1) Ligases
- 2) Oxidoreductases
- 3) Hydrolases
- 4) Transferases

142. Which of the following organ receives electrical message from the brain for breathing in and out?

- 1) Diaphragm
- 2) Bronchi
- 3) Bronchioles
- 4) Alveoli

143. Which of the following statements is not true?

- 1) The partial pressure of O_2 in deoxygenated blood is 40 mm Hg
- 2) The partial pressure of O_2 in oxygenated blood is 95 mm Hg
- 3) The partial pressure of O_2 in alveolar air is 104 mm Hg
- 4) The partial pressure of CO_2 in alveolar air is 45 mm Hg

144. A unique vascular connection between the digestive tract and largest gland of the body is called

- 1) Hypophyseal portal system
- 2) Hepatic portal system
- 3) Renal portal system
- 4) Coronary circulation

145. A human female with blood group 'A+' has

- 1) Antibody-b on the RBCs and antigen A and D (Rh) in the serum
- 2) Antigen A and D (Rh) on the RBCs and antibody-b in the serum
- 3) Antigen A and D (Rh) on the RBCs and antibody-b and anti-Rh antibodies in the serum
- 4) Antigen D (Rh) on the RBCs and antibody-a in the serum

146. Assertion (a): Maximum filling of ventricles occurs passively.

Reason (R): Two third of ventricular filling occurs during atrial systole when ventricles are relaxing.

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

147. Removal of stretch receptors from wall of urinary bladder results in
- 1) Decline in amount of urine produced
 - 2) Increase in GFR
 - 3) No effect on rate of production of urine
 - 4) Reduction in amount of urine collected in bladder

148. AN F

- 1) Is secreted by ventricular walls of human heart
- 2) Opposes the RAAS pathway
- 3) Increases blood pressure to maintain GFR
- 4) Is a potent vasoconstrictor

149. When damage to kidney causes accumulation of urea in blood, the condition is known as

- 1) Uremia
- 2) Polyuria
- 3) Cystinuria
- 4) Hematuria

150. Read the following statements w. r. t. smooth muscle fibres.

- (a) They are not present in reproductive tract.
- (b) They do not exhibit any striations
- (c) Their activity is not under control of the nervous system
- (d) They assist transportation of both male and female gametes only through female genital tract

How many of the above given statements are incorrect?

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

151. During muscle contraction

- 1) Length of A band reduces
- 2) Length of I band reduces
- 3) Length of sarcomere increases
- 4) Length of sarcomere decreases and length of A band increases

152. In humans, visceral organs are innervated by

- 1) both sympathetic and parasympathetic nerves
- 2) sympathetic nerves but are under conscious control
- 3) both sympathetic and parasympathetic nerves under conscious control
- 4) parasympathetic nerves under conscious control

153. Statement-I: CCK stimulates secretion of pancreatic juice and intestinal juice.

Statement-II: CCK acts on both pancreas and gall bladder.

- 1) Both Statements I & II are correct
- 2) Statement I is correct. Statement II is incorrect
- 3) Statement I is incorrect, statement II is correct
- 4) Both statements I & II are incorrect

154. Match and choose the correct option.

a) Addison's disease	i) Adenohypophysis
b) Exophthalmic goitre	ii) Neurohypophysis
c) Acromegaly	iii) Adrenal cortex
d) Diabetes insipidus	iv) Thyroid gland

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

155. Life saving hormones are secreted by

- 1) Pituitary gland
- 2) Pineal gland
- 3) Adrenals
- 4) Thymus

156. Which of the following is a matching set of phylum and its three examples?

- 1) Platyhelminthes – *Schistosoma*, *Ancylostoma*, *Fasciola*
- 2) Mollusca – *Octopus*, *Aplysia*, *Chaetopleura*
- 3) Cnidaria – *Gorgonia*, *Meandrina*, *Taenia*
- 4) Echinodermata – *Antedon*, *Ophiura*, *Sepia*

157. Read the characteristics given below

- (a) Jointed appendages
- (b) Chitinous exoskeleton
- (c) Parapodia
- (d) Calcareous exoskeleton

How many of these characteristics are found in organism whose excretory structures are Malpighian tubules?

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

158. Alternation of generation between asexual and sexual phases of an organism like *Obelia* is termed as

- 1) Metamorphosis
- 2) Metagenesis
- 3) Metamerism
- 4) Morphallaxis

159. Which among the given organisms, shows ecdysis?

- 1) *Vipera*
- 2) *Bufo*
- 3) *Torpedo*
- 4) *Carcharodon*

160. Water vascular system is unique property of _____

- 1) *Sycon*
- 2) *Echinus*
- 3) *Saccoglossus*
- 4) *Loligo*

161. Hepatic caecae in cockroach are located in/at

- 1) Crop
- 2) Oesophagus
- 3) Junction of foregut and midgut
- 4) Junction of midgut and ileum

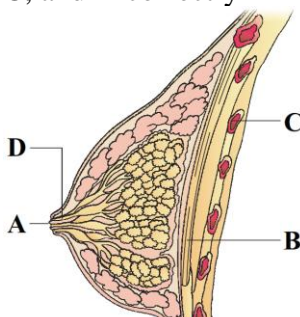
162. In *Rana tigrina*, medulla oblongata passes out through the _a_ and continues into _b_, which is enclosed in the _c_.

- 1) A - Brain stem, B - Spinal cord, C - Neural canal
- 2) A - Foramen magnum, B - Mid-brain, C - Central canal
- 3) A - Foramen magnum, B - Spinal cord, C - Vertebral column
- 4) A - Spinal cord, B - Foramen magnum, C - Vertebral column

163. Select the correct statement w. r. t. digestive system of frog.

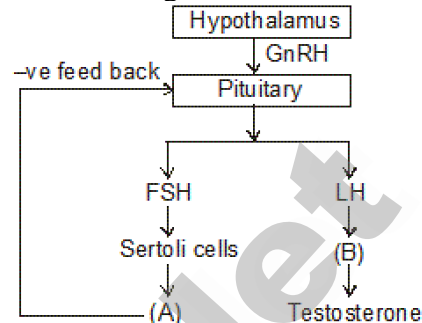
- 1) Food is captured by the bilobed tongue and chewed for proper mixing with saliva before engulfing.
- 2) Digestion of food begins in the oral cavity.
- 3) Pancreatic juices emulsify the fats for proper digestion.
- 4) Undigested solid waste is pushed into rectum and passed out through the cloaca.

164. Diagrammatic sectional view of mammary gland is given in following figure. Identify A, B, C, and D correctly



- 1) A-Fat, B-Mammary lobe, C-Rib, D-Nipple
- 2) A-Nipple, B-Pectoralis major muscle, C-Rib, D-Lactiferous duct
- 3) A-Areola, B-Intercostal muscle, C-Pectoralis major muscle, D-Ampulla
- 4) A-Ampulla, B-Pectoralis major muscle, C-Intercostal muscle, D-Areola

165. Select the correct option w. r. t. (A) and (B) in the following flowchart



- 1) (A) - ABP, (B) - Interstitial cells
- 2) (A) - AMF, (B) - Spermatogonia
- 3) (A) - Inhibin, (B) - Spermatogonia
- 4) (A) - Inhibin, (B) - Leydig cells

166. Which is incorrect regarding human testes?

- 1) They are primary reproductive organs
- 2) They are involved in formation of gametes and hormones
- 3) They are composite or exclusively exocrine glands as sperms are released through a well developed duct system
- 4) They are extra abdominal in position

167. IVF and ET represent ___ and ___ respectively.

- 1) *In vivo* fallopian transfer and embryo transfer
- 2) Intra vaginal fertilization and ejection technique
- 3) *In vitro* fertilization and egg transfer
- 4) *In vitro* fertilization and embryo-transfer

168. Assertion (A): Fitness is the end result of the ability to adapt and get selected by nature.

Reason ®: Adaptive ability is inherited.

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

169. The theory of inheritance of acquired characters was given by

- 1) Darwin
- 2) Malthus
- 3) Lamarck
- 4) Wallace

170. Following are few plant forms

- (i) Chlorophytes
- (ii) Tracheophytes
- (iii) *Rhynia*
- (iv) Conifers
- (v) *Psilophyton*

What was the sequence of these plant forms through geological periods?

- 1) ii → i → iii → iv → v
- 2) i → iii → ii → iv → v
- 3) i → ii → iii → v → iv
- 4) ii → iii → i → v → iv

171. 'Heroin' is synthesized by

- 1) Nitration of morphine
- 2) Glycosylation of morphine
- 3) Acetylation of morphine
- 4) Methylation of morphine

172. Mucosa associated lymphoid tissue (MALT) constitutes about ____ percent of lymphoid tissue in the human body.

- 1) 70
- 2) 50
- 3) 80
- 4) 40

173. Read the following statements & Choose the correct option

- A) After maturation, the lymphocytes migrate to secondary lymphoid organs like spleen, lymph nodes, tonsils, Peyer's patches of small intestine and appendix.
- B) The lymphoid tissue which is located within the lining of the respiratory, digestive and urogenital tracts is called mucosa associated lymphoid tissue.

- 1) Both statements are correct
- 2) Both statements are incorrect
- 3) Statement A is correct but B is incorrect
- 4) Statement A is incorrect but B is correct

174. Immunoglobulins which are present in abundant amount in colostrum are

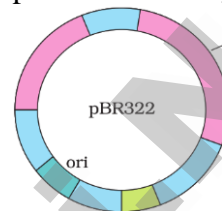
- 1) IgG
- 2) IgA
- 3) IgM
- 4) IgE

175. Assertion: *Ti*-plasmid is used in genetic engineering to transfer the foreign DNA in dicot plants.

Reason: *Ti* plasmid is naturally present in *Thermus aquaticus* bacterium. In the light of above statements, select the correct option.

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

176. Following is a diagram of *E. coli* cloning vector pBR322. Identify A.



- 1) *EcoR* I
- 2) *Bam*H I
- 3) *Pvu* II
- 4) *Pst* I

177. The genetic defect adenosine deaminase (ADA) deficiency may be cured permanently by

- 1) Introducing ADA genes into bone marrow stem cells at early embryonic stage
- 2) Enzyme replacement therapy
- 3) Periodic infusion of genetically engineered lymphocytes having functional ADA cDNA
- 4) Administering adenosine deaminase activators

178. Artificial human insulin, also called 'Humulin' was synthesized by Eli Lilly in _a_ host cells and its structure was composed of _b_ polypeptide chains.

- 1) A-*E. coli*, B-Two
- 2) A-*E. coli*, B-Three
- 3) A-*Salmonella*, B-Two
- 4) A-Yeast, B-Two

179. Which organism is responsible for causing root-knots in tobacco?

- 1) *Nicotiana tabacum*
- 2) *Caenorhabditis elegans*
- 3) *Ascaris lumbricoides*
- 4) *Meloidogyne incognita*

180. In ADA cDNA, 'c' stands for

- 1) Complementary DNA
- 2) Cyclic DNA
- 3) Chimeric DNA
- 4) Clone of DNA

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Mock Test 5

180 x 4 = 720 MARKS

<u>Physics</u>	<u>Chemistry</u>	<u>Botany</u>	<u>Zoology</u>
01. (4)	46. (4)	091. (1)	136. (4)
02. (2)	47. (1)	092. (3)	137. (2)
03. (4)	48. (3)	093. (4)	138. (3)
04. (2)	49. (4)	094. (1)	139. (2)
05. (4)	50. (2)	095. (4)	140. (4)
06. (4)	51. (1)	096. (2)	141. (4)
07. (2)	52. (3)	097. (2)	142. (1)
08. (1)	53. (2)	098. (3)	143. (4)
09. (4)	54. (1)	099. (3)	144. (2)
10. (4)	55. (3)	100. (1)	145. (2)
11. (2)	56. (4)	101. (2)	146. (3)
12. (1)	57. (2)	102. (4)	147. (3)
13. (1)	58. (1)	103. (4)	148. (2)
14. (3)	59. (4)	104. (3)	149. (1)
15. (1)	60. (3)	105. (1)	150. (4)
16. (1)	61. (2)	106. (3)	151. (2)
17. (1)	62. (2)	107. (4)	152. (1)
18. (2)	63. (2)	108. (4)	153. (3)
19. (2)	64. (1)	109. (2)	154. (3)
20. (4)	65. (2)	110. (2)	155. (3)
21. (4)	66. (2)	111. (2)	156. (2)
22. (2)	67. (4)	112. (4)	157. (3)
23. (3)	68. (3)	113. (3)	158. (2)
24. (3)	69. (1)	114. (3)	159. (1)
25. (1)	70. (3)	115. (3)	160. (2)
26. (4)	71. (3)	116. (3)	161. (3)
27. (2)	72. (1)	117. (3)	162. (3)
28. (2)	73. (1)	118. (2)	163. (4)
29. (2)	74. (2)	119. (1)	164. (2)
30. (1)	75. (1)	120. (1)	165. (4)
31. (2)	76. (3)	121. (4)	166. (3)
32. (1)	77. (2)	122. (4)	167. (4)
33. (1)	78. (3)	123. (3)	168. (1)
34. (2)	79. (3)	124. (1)	169. (3)
35. (3)	80. (2)	125. (3)	170. (3)
36. (4)	81. (3)	126. (3)	171. (3)
37. (3)	82. (3)	127. (4)	172. (2)
38. (2)	83. (1)	128. (3)	173. (1)
39. (2)	84. (1)	129. (4)	174. (2)
40. (4)	85. (3)	130. (2)	175. (3)
41. (3)	86. (3)	131. (2)	176. (2)
42. (3)	87. (2)	132. (3)	177. (1)
43. (4)	88. (2)	133. (3)	178. (1)
44. (1)	89. (3)	134. (3)	179. (4)
45. (2)	90. (1)	135. (3)	180. (1)

Solutions

Physics

2. work done by gravitational force do not depend upon the path, it only depend upon the initial & final position of the object.

Initial & final position of the object of all 3 path is same
So, work done is same.

so the Answer is (B) $W_1=W_2=W_3$

3. $F = -6x^3 \hat{i}$

$X = 4$ to $x = -2$

$$\int dw = \int f. dx$$

As displacement is along \hat{i} so $F = -6x^3$

$$-\int_4^{-2} 6x^3 dx = \left[\frac{6x^4}{4} \right]_4^{-2}$$

$$\left[\frac{-6x^4}{4} + \frac{6x^4}{4} \right]_4^{-2}$$

$$\frac{-6 \times (4)^4}{4} + \frac{60 \times (-2)^4}{4}$$

$$= 360 \text{ J}$$

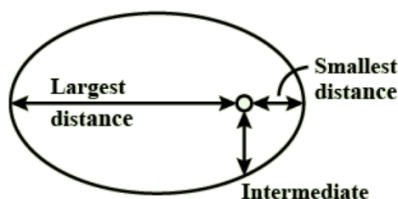
- 4.

Kepler's Law

$$\frac{dA}{dt} = \text{constant} \text{ \& } T^2 \propto r^3$$

$$\frac{dA}{dt} = \text{constant so}$$

$$K_A > K_B > K_C$$



- 5.

$$\text{Using Hook's law } Y = \frac{FL}{\Delta L} \text{ where } A = \frac{\pi D^2}{4}$$

$$\Rightarrow \Delta L = K \frac{L}{D^2} \text{ where } K = \text{constant}$$

$$\text{For wire A: } \frac{L}{D^2} = \frac{50}{(0.05)^2} = 20000$$

$$\text{For wire B: } \frac{L}{D^2} = \frac{100}{(0.1)^2} = 10000$$

$$\text{For wire C: } \frac{L}{D^2} = \frac{200}{(0.2)^2} = 5000$$

$$\text{For wire D: } \frac{L}{D^2} = \frac{300}{(0.3)^2} = 3333.33$$

Thus wire A has the largest extension.

- 6.

$$\text{Bulk modulus (k)} = \frac{P}{\frac{\Delta V}{V}}$$

$$\text{Here, } k = 2100 \text{ MPa}$$

$$= 2100 \times 10^6 \text{ Pa}$$

$$\text{and, } \frac{\Delta V}{V} = \frac{0.004}{100}$$

$$\therefore P = k \times \frac{\Delta V}{V}$$

$$= 2100 \times 10^6 \times \frac{0.004}{100}$$

$$= 84 \times 10^3 \text{ Pa} = 84 \text{ kPa}$$

- 7.

From stefan's boltzmann relation we know that:

$$E \propto T^4$$

$$\text{So, } E \propto 500^4$$

- 9.

$$\Delta = \mu C_v \Delta T \text{ and } 0 = W + \Delta U$$

$$\Rightarrow \Delta U = -6R (\because W = 6R)$$

$$\text{Therefore } -6R = 1 \left(\frac{R}{\gamma-1} \right) \Delta T = \frac{3}{2} R \Delta T$$

$$\Delta T = -4 \Rightarrow T_{\text{final}} = (T - 4) \text{ K}$$

- 10.

Consider n moles of a gas which undergo isochoric process, i.e. $V = \text{Constant}$. From first law of thermodynamics,

$$\Delta Q = \Delta W + \Delta U \dots (i)$$

Here, $\Delta W = 0$ as $V = \text{constant}$

$$\Delta Q = n C_v \Delta T$$

Substituting in Eq. (i), we get

$$\Delta U = n C_v \Delta T \dots (ii) \text{ Mayer's relation can be written as}$$

$$C_p - C_v = R \Rightarrow C_v = C_p - R \dots (iii)$$

$$\text{From Eqs (ii) and (iii), we have } \Delta U = n(C_p - R) \Delta T$$

Given,

$$n = 6, C_p = 8 \text{ cal mol}^{-1} - K^{-1} \approx 2 \text{ cal mol}^{-1} - K^{-1}$$

$$\text{Hence, } \Delta U = 6(8 - 2)(35 - 20) = 6 \times 6 \times 15 = 540 \text{ cal}$$

- 11.

Applying Wein's displacement law.

$$\lambda T = \text{constant}$$

$$\lambda_{1m} T_1 = \lambda_{2m} T_2$$

$$\lambda_m \times 2000 = \lambda \times 3000$$

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

12. The velocity of sound in solid is given by, $v = \sqrt{E/\rho}$. Though ρ is large for solids, but their coefficient of elasticity E is much larger (compared to that of liquids and gases). That is why v is maximum in case of solid.

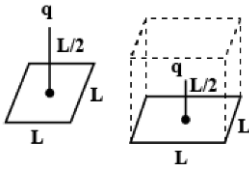
- 13.

$$\text{Initially } F = k \times \frac{3 \times 8 \times 10^{-12}}{r^2}$$

$$\text{Finally } F' = -k \frac{2 \times 3 \times 10^{-12}}{r^2}$$

$$\frac{F'}{F} = -\frac{1}{4} \Rightarrow F' = -10 \text{ N}$$

14.



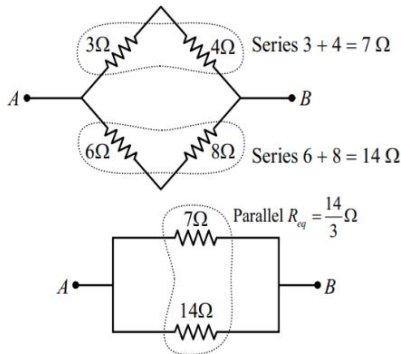
The given square of side L may be considered as one of the faces of a cube with edge L . Then given charge q will be considered to be placed at the centre of the cube. Then according to Gauss's theorem, the magnitude of the electric flux through the face (six) of the cube is given by

$$\phi = \frac{Q}{6\epsilon_0}$$

15.

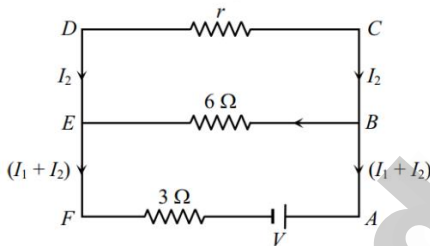
Given Wheatstone bridge is balanced because $\frac{P}{Q} = \frac{R}{S}$

Hence the circuit can be redrawn as follows



16.

The equivalent circuit with the distribution of current is shown in Fig.



Using Kirchhoff's second law, in closed circuit ABEFA, we have, $6I_1 + 3(I_1 + I_2) - V = 0$

$$\text{or } V = 9I_1 + 3I_2 \quad \dots (i)$$

Using Kirchhoff's second law, in closed circuit BCDEB,

$$\text{we have } rI_2 - 6I_1 = 0 \text{ or } I_1 = \frac{I_2 r}{6}$$

$$\text{From (i), } V = 9 \times \frac{I_2 r}{6} + 3I_2 = \frac{3}{2}I_2 r + 3I_2 = \frac{3I_2}{2}(r+2)$$

$$\text{or } I_2 = \frac{2V}{3(r+2)} \text{ Power developed in resistor } r,$$

$$P = I_2^2 r = \frac{4V^2}{9(r+2)^2} \times r$$

Power developed is maximum, when $(r+2)^2$ is minimum

$$\text{or } (r+2)^2 = 0$$

$$\text{or } r^2 + 4r + 4 = 0$$

$$\text{or } r^2 - 4r + 4 + 8r = 0$$

$$\text{or } (r-2)^2 + 8r = 0 \text{ or } r = 2\Omega.$$

17.

Here, $E = 1500 \text{ V/m}$, $B = 0.4 \text{ Wb/m}^2$

Minimum speed of electron

$$\begin{aligned} \text{along the straight line, } v &= \frac{E}{B} \\ &= \frac{1500}{0.4} \end{aligned}$$

18.

If the rays are to retrace the path, light ray must fall normal on the mirror.

Hence l should be 20 cm from mirror and 15 cm from lens.

$$\frac{1}{-15} - \frac{1}{x} = \frac{1}{-20}$$

$$\text{or } \frac{1}{x} = \frac{1}{-15} + \frac{1}{20} = \frac{1}{-60}$$

$x = -60 \text{ cm}$ i.e 60 cm away from lens.

21. According to law of conservation of linear momentum, two particles will have equal and opposite momentum.

The de Broglie wavelength is given by

$$\lambda = \frac{h}{p} \therefore \frac{\lambda_1}{\lambda_2} = 1$$

22. It is clear from given logic circuit, that output Y is low when both the inputs are high, otherwise it is high. Thus, logic circuit is NAND gate.

A	B	Y
1	1	0
0	0	1
0	1	1
1	0	1

23. According to the fig diode will act as forward biased and since it is an ideal diode resistance will be zero.

For calculating potential difference along AB we have to calculate, equivalent resistance

$$\frac{1}{R_{AB}} = \frac{1}{10} + \frac{1}{15},$$

we get, $R_{AB} = 6 \text{ k}\Omega$

$$\text{so } R_{eq} = 6 + 5 = 11 \text{ k}\Omega$$

$$\text{current in the circuit, } I = \frac{30}{11 \times 10^3}$$

$$\text{so } V_{AB} = I \times R_{AB} = \frac{30 \times 6 \times 10^3}{11 \times 10^3} = 16.36 \text{ V}$$

26.

Given, $A \cdot B = 0$, $\therefore A$ is \perp to B

also, $A \cdot C = 0$, $\therefore A$ is perp is to C

As $B \times C$ is \perp to both B and C ,

so $B \times C$ is parallel to A .

27.

$$P = \frac{a - t^2}{bx}$$

$$P = [ML^{-1}T^{-2}]$$

a will have same unit as t^2 . So, $a = [T^2]$

$$b = \left[\frac{a - t^2}{px} \right] = \frac{[T^2]}{[ML^{-1}T^{-2}L]} = [M^{-1}L^0T^4]$$

$$\frac{a}{b} = \frac{[T^2]}{[M^{-1}L^0T^4]} = [ML^0T^{-2}]$$

28.

$$\text{Pitch} = \frac{4 \text{ mm}}{8} = \frac{1}{2} \text{ mm}$$

$$\text{L.C.} = \frac{\text{Pitch}}{\text{Number of Division}}$$

$$= \frac{1}{2 \times 100} = \frac{0.5}{100} = 0.005 \text{ mm}$$

29.

$$B = \frac{\Delta P}{\left(-\frac{\Delta V}{V}\right)} \Rightarrow \frac{-\Delta V}{V} = \frac{P}{B}$$

$$V = \frac{4}{3} \pi r^3 \Rightarrow \frac{\Delta V}{V} = \frac{3 \Delta r}{r} \quad \dots(1)$$

$$A = 4 \pi r^2 \Rightarrow \frac{\Delta A}{A} = \frac{2 \Delta r}{r} \quad \dots(2)$$

$$\text{From eq(1) and (2)} \quad \frac{\Delta A}{A} = \frac{2}{3} \frac{\Delta V}{V}$$

$$\therefore \frac{\Delta A}{A} = \frac{2}{3} \frac{P}{B}$$

30.

For the block not to move, $F_{\text{app}} \leq f_{\ell}$

$$F \cos 60^\circ \leq \mu_s (\sqrt{3}g + F \sin 60^\circ)$$

$$F \cos 60^\circ \leq \frac{1}{2\sqrt{3}} (\sqrt{3}g + F \sin 60^\circ)$$

$$\frac{F}{2} \leq \frac{g}{2} + \frac{1}{2\sqrt{3}} \times F \times \frac{\sqrt{3}}{2}$$

$$\frac{F}{2} \leq \frac{g}{2} + \frac{F}{4}$$

$$\frac{F}{4} \leq \frac{g}{2}$$

$$F \leq 2g$$

$$\text{or } F_{\text{max}} = 20 \text{ N}$$

31.

When a particle undergoes SHM, its acceleration is given by,

$$\alpha = \omega^2 x$$

Given, $\alpha = 2$, $x = 0.02$. Using these values

$$\omega = \sqrt{\frac{\alpha}{x}}$$

$$\text{or, } \omega = \sqrt{\frac{2}{0.02}}$$

or, $\omega = 10 \text{ rad/s}$ is our required answer.

32.

$$\text{Pressure} = \frac{F}{A} \therefore 10^6 \text{ dyne cm}^{-2} = 10^5 \text{ N m}^{-2}.$$

33.

$R = 100 \, \Omega$ (given)

when capacitor is removed then $\phi = 45^\circ$

$$\text{so } \tan \phi = \frac{X_L}{R} = 1$$

$$X_L = R$$

when inductor is removed

then $\phi = 45^\circ$

$$\tan \phi = \frac{X_C}{R} = 1$$

$$X_C = R$$

$$\text{so } X_L = X_C = R$$

so circuit is in resonance so $Z = R$

$$I = \frac{V}{R} = \frac{100}{100} = 1 \text{ A}$$

34.

$$B_0 = \frac{E_0}{C} = \frac{50}{3 \times 10^8} = 1.67 \times 10^{-7} \text{ T}$$

35. Magnetization I is related to magnetic susceptibility by

$$I = \chi H$$

$$\therefore I = 3 \times 10^{-4} \times 4 \times 10^{-4} = 12 \times 10^{-8} \text{ A/m}$$

36. Velocity-time graph, Motion analysis, Kinematics

Explanation:

The given velocity-time graph shows a linear decrease in velocity over time, indicating constant deceleration. This type of motion is characteristic of an object that is slowing down uniformly. Among the options provided, the best fit for this description is (d) a bullet fired horizontally from the top of a tower, as it would experience a constant downward acceleration due to gravity while its horizontal velocity decreases due to air resistance.

Step by Step Solution:

Step 1

Analyze the velocity-time graph: it shows a straight line sloping downwards, indicating constant deceleration.

Final Answer:

a bullet fired horizontally from the top of a tower

37.

$$a = a$$

$$t = 10 \text{ s}$$

$$S_{10} = S_1 = \frac{1}{2} at^2 = \frac{1}{2} a(10)^2$$

$$= 50a$$

$$v_1 = at = 10a$$

$$t = 20 \text{ s}$$

$$S_{20}(S_2 + S_1) = \frac{1}{2} at^2 = \frac{1}{2} a(20)^2 = 200a$$

$$S_2 = 200a - S_1 = 150a$$

$$\frac{S_2}{S_1} = 3.$$

38. Hollow sphere of mass m and radius r .

Radius of gyration at a distance $2r$ from the surface and parallel to the diameter.

First of all, the moment of inertia along the geometric axis of the sphere is :

$$MI = \frac{2}{3} mr^2$$

Now, the new axis is at a distance of $2r + r = 3r$ from the centre of the sphere.

Since the new axis is parallel to the initial axis, we can apply PARALLEL AXES THEOREM :

New moment of Inertia :

$$\therefore MI_{new} = MI + m(3r)^2$$

$$\Rightarrow MI_{new} = \frac{2}{3}mr^2 + 9mr^2$$

$$\Rightarrow MI_{new} = \left(\frac{2+27}{3}\right)mr^2$$

$$\Rightarrow MI_{new} = \frac{29}{3}mr^2$$

Now, radius of gyration is defined as the radius of a ring which will have the same moment of inertia, let radius of gyration be x :

$$\therefore MI_{new} = mx^2$$

$$\Rightarrow mx^2 = \frac{29}{3}mr^2$$

$$\Rightarrow x^2 = \frac{29}{3}r^2$$

$$\Rightarrow x = r \times \sqrt{\frac{29}{3}}$$

So radius of gyration is:

$$x = r \times \sqrt{\frac{29}{3}}$$

39.

Using law of conservation of linear momentum, we get

$$mv = 4mv'$$

velocity of block having mass

$$4m, v' = v/4$$

$$e = \frac{v/4}{v} = 0.25$$



41. Torque τ acting on a current carrying coil of area A placed in a magnetic field of induction B is given by,
 $\tau = NIBA \sin \theta$

where I = current in the coil, θ = angle which the normal the plane of the coil makes with the lines of induction B.

Here, N = 1, B = 1.5×10^{-2} T

$$A = 0.05 \times 0.08 = 40 \times 10^{-4} \text{ m}^2$$

$$I = 10.0 \text{ amp}, \theta = 90^\circ = \pi/2$$

$$\tau = (1.5 \times 10^{-2}) (10.0) \times (1) (40 \times 10^{-4} \sin(\pi/2))$$

$$\tau = 6 \times 10^{-4} \text{ Nm}$$

42.

At t = 0 no current passes through the inductor

$$i = \frac{V}{R_{net}} = \frac{3}{40} \text{ A}$$

$$43. K_{max} = h\nu - \phi_0$$

$$y = mx - C$$

Graph is a straight line with slope 'h'

Till $\nu = \nu_0$, no photoelectric emission occurs

44.

$$\text{For Bracket series: } \frac{1}{\lambda_{max}}$$

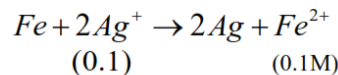
$$= R \left[\frac{1}{4^2} - \frac{1}{5^2} \right] = \frac{9}{25 \times 16} R$$

Chemistry

46. CrO_3 -Acidic; NO -Neutral; ZnO -amphoteric;
 V_2O_3 -Basic

47. Only 1 amines give foul smell in carbyl amine test

48.



$$E_{cell}^0 = 0.8 - (-0.44) = 1.24$$

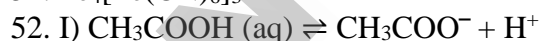
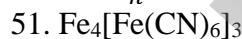
$$E_{cell} = 1.24 - \frac{0.0591}{2} \log \frac{10^{-1}}{(10^{-1})^2}$$

$$E_{cell} = 1.24 - \frac{0.0591}{2} \log 10$$

$$= 1.24 - 0.03 = 1.21V$$

$$49. \text{Lv} = [\text{Rn}]5f^{14}6d^{10}7s^27p^4$$

$$50. V_n \propto \frac{Z}{n}$$



53. I) Equilibrium

II) Non-spontaneous

III) Spontaneous

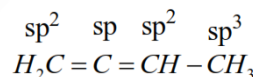
54. PbS -Galena

SnO_2 -Tinstone

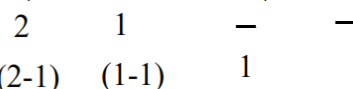
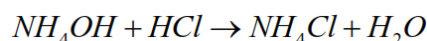
Ag_2S -Silver glance

PbCO_3 -Cerussite

55.



56.



1:1 mole ratio of NH_4Cl + NH_4OH mixture is a basic buffer

57.

I) w.r.t 'A'

$$4^x = 2$$

$$x = \frac{1}{2}$$

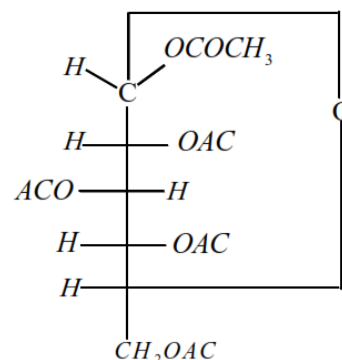
$$\text{II) } 2^x \cdot 2^y = 2$$

$$x + y = 1$$

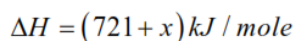
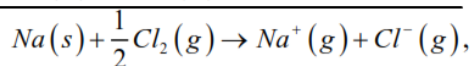
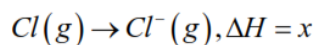
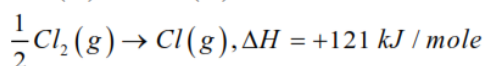
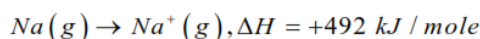
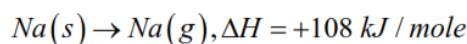
$$y = \frac{1}{2}$$

58. Conceptual

59.

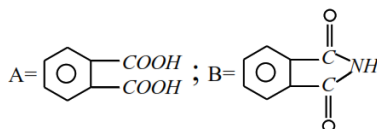


60. $[\text{CoCl}_3(\text{NH}_3)_3]$ – No ionizable Cl^- ion.
 61. Decomposition of $\text{NH}_3(\text{g})$ is endothermic-favoured at high 'T'
 2 volume \rightarrow 4 volume ...favoured at Low 'P'
 62. Conceptual
 63. A = $\text{C}_6\text{H}_5\text{Cl}$: B = $\text{C}_6\text{H}_5\text{CH}_3$
 64. Spin quantum number is not a consequence of SWE
 65. (A)1-butene (E_2); B.....2-butene (E_1)
 66. $K_{\text{SP}} = 6912\text{S}^7$
 $= 6912 \times 10^{-56}$
 $= 6.912 \times 10^{-53}$
 67. LVP is a colligative property
 68. $(\text{CH}_3)_3\text{CBr} + \text{C}_2\text{H}_5\text{ONa} \rightarrow (\text{CH}_3)_2\text{C} = \text{CH}_2 + \text{C}_2\text{H}_5\text{OH} + \text{NaBr}$
 69. $\text{S} > \text{Cl} > \text{P} > \text{Si}$
 70.



71. Conceptual

72.



73. 1.5, 2.5, 3, 2

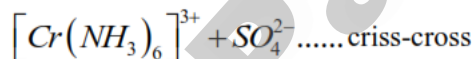
74. Dipole moment of II is greater than zero.

75. Conceptual

76. Conceptual

77. Conceptual

78.



79. $\text{C}_2\text{H}_5\text{OH}$ cannot react with Lucas reagent at room temperature.

80.

$$Q_c = \frac{(10^{-4})}{(10^{-4})(10^{-1})} = 10$$

$Q_c > K_c$, reaction proceeds in backward direction

81. Shows negative deviations from Raoult's law

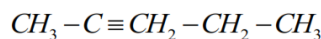
82. CrO_4^{2-} colour due to charge transfer phenomena

83. Conceptual

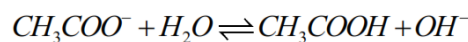
84. (1) formaldehyde acetal formed between formaldehyde and two mole of CH_3OH

85.

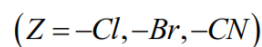
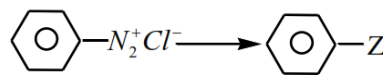
'A' is $\text{CH}_3 - \text{C} \equiv \text{CNa}^+$; B is



86.



87.



88. Conceptual

89. $3 > 2 > 1 > 4$ (p^{k_b})

90. Applicable to one electron species only.