

TOPIC :

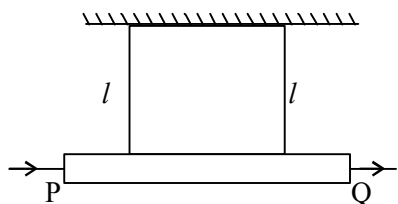
- Physics** : Magnetic Effects of current, Static Magnet, Electromagnetic Induction, Self and Mutual Inductance, Alternating Current, Electromagnetic Waves.
- Chemistry** : Organic Chemistry (Basic Principles and Techniques), Stereochemistry, Hydrocarbons and Environmental Chemistry
- Botany** : Organism and Population, Ecosystem, Biodiversity and Conservation
- Zoology** : Evolution, Human Health and Diseases, Microbes in Human Welfare

PHYSICS

1. A steel wire of length l has a magnetic moment M . It is then bent into a semicircular arc. The new magnetic moment is

- (1) M (2) $2M/\pi$
 (3) M/l (4) $M \times l$

2. A conducting bar PQ of length l carrying a current I is suspended from a rigid support as shown in figure. A uniform magnetic field B perpendicular to PQ and directed away from the reader is applied. If the mass of the bar is M ; the tension in each string is :

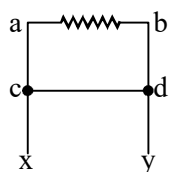


- (1) $Mg/2$ (2) $(Mg + IBL)/2$
 (3) $(Mg - IBL)/2$ (4) $Mg - \frac{IBL}{2}$

3. A particle is moving in a uniform magnetic field, then

- (1) its momentum changes but total energy remains the same
 (2) both momentum and total energy remains the same
 (3) both changes
 (4) total energy changes but momentum remains same

4. A wire cd of length l , mass m , is sliding with - out friction on conducting rails ax and by as shown in figure. The vertical rails are connected to one another via an external resistance R . The entire circuit is placed in a region having a uniform magnetic field B . The field is \perp to the plane of circuit & directed outwards. The steady speed of rod cd is :



- (1) mgR/Bl (2) mgR/B^2l^2
 (3) mgR/Bl^2 (4) mgR/B^2l

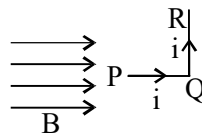
5. A copper ring having a cut such as not to form a complete loop is held horizontally and a bar magnet is dropped through the ring with its length along

the axis of the ring. Then acceleration of the falling magnet is



- (1) g (2) less than g
 (3) more than g (4) 0

6. A wire PQR bent as shown in figure is placed in the region of a uniform magnetic field B as shown in figure PQ = QR = a . The ratio of the force on PQ and QR, when a current i is flowing is

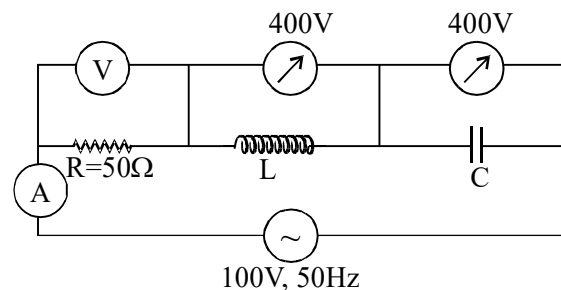


- (1) $Bi \cdot a$ (2) $2Bi \cdot a$
 (3) zero (4) infinity

7. The current passing through a choke coil of 5 henry is decreasing at the rate of 2 amp/sec. The emf developed across the coil is

- (1) 10 volts (2) -10 volts
 (3) 2.5 volts (4) -2.5 volts

8. In the series L-C-R circuit, the voltmeter and ammeter reading are :

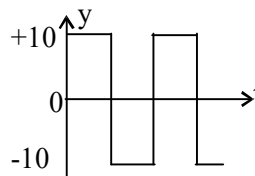


- (1) $V = 100$ volt, $I = 2$ A (2) $V = 100$ volt, $I = 5$ A
 (3) $V = 1000$ volt, $I = 2$ A (4) $V = 300$ volt, $I = 1$ A

9. At Curie point, a ferromagnetic material becomes

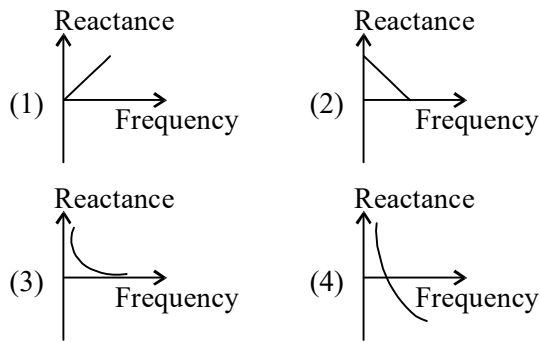
- (1) non - magnetic (2) diamagnetic
 (3) paramagnetic (4) strongly ferromagnetic

10. The rms voltage of the wave form shown is

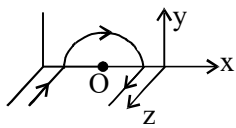


- (1) 10 V (2) 7 V
 (3) 6.37 V (4) none of the above

11. Which of the shown graphs may represent the reactance of a series LC combination



12. A long wire bent as shown in figure carries a current I . If the radius of the semi-circular portion is a , the magnetic induction at centre O is :



- (1) $\frac{\mu_0 I}{4a}$ (2) $\frac{\mu_0 I}{4\pi a} \sqrt{\pi^2 + 4}$
 (3) $\frac{\mu_0 I}{4a} + \frac{\mu_0 I}{2\pi a}$ (4) $\frac{\mu_0 I}{4\pi a} \sqrt{\pi^2 - 4}$

13. In an AC circuit the applied potential difference and the current flowing are given by

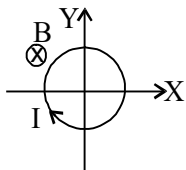
$$V = 200 \sin 100t \text{ volt,}$$

$$I = 5 \sin \left(100t - \frac{\pi}{2} \right) \text{ amp}$$

The power consumption is equal to

- (1) 1000 W (2) 40 W
 (3) 20 W (4) zero

14. A conducting loop carrying a current I is placed in a uniform magnetic field pointing into the plane of the paper as shown. The loop will have a tendency to :



- (1) contract (2) expand
 (3) move towards +ve x-axis
 (4) move towards -ve x-axis

15. A d.c. motor has an internal resistance of 4 ohms. It is operated at 220 volts and draws 5 amp. current. The back emf produced is

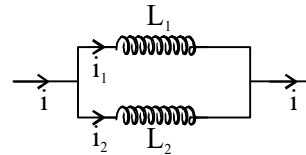
- (1) 80 volts (2) 160 volts

- (3) 200 volts (4) 120 volts

16. Dimension of $\frac{\text{magnetic flux}}{\text{electric flux}}$ are

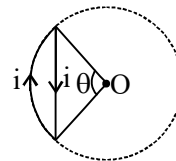
- (1) LT^{-1} (2) $L^{-1}T$
 (3) $L^3T^2A^{-2}$ (4) $M^0L^0T^0$

17. Two inductors L_1 and L_2 are connected in parallel and a time varying current flows as shown. The ratio of currents i_1/i_2 at any time t is



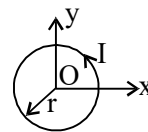
- (1) L_1/L_2 (2) L_2/L_1
 (3) $L_1^2/(L_1 + L_2)^2$ (4) $L_2^2/(L_1 + L_2)^2$

18. Net magnetic field at the centre of the circle O due to a current carrying loop as shown in figure is ($\theta < 180^\circ$) :



- (1) zero
 (2) perpendicular to paper inwards
 (3) perpendicular to paper outwards
 (4) is perpendicular to paper inwards if $\theta \leq 90^\circ$ and perpendicular to paper outwards if $90^\circ \leq \theta < 180^\circ$

19. A circular loop of mass m and radius r is placed in a horizontal (X - Y plane) table as shown in figure A uniform magnetic field B is applied parallel to x -axis. The current i in the loop, so that its one edge just lifts from the table, is :



- (1) $mg/\pi r^2 B$ (2) $mg/\pi r B$
 (3) $mg/2\pi r B$ (4) $\pi r B/mg$

20. A step down transformer reduces voltage from 220 volts to 11 volts. The primary coil draws 5 ampere current. The efficiency of the transformer is

- (1) 20% (2) 40%
 (3) 70% (4) 90%

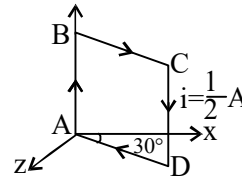
21. The direction of the null points are on the equatorial line of a bar magnet, when the north pole of the magnet is pointing
 (1) north (2) south
 (3) east (4) west
22. A circular coil of radius 4 cm having 50 turns carries a current of 2A. It is placed in uniform magnetic field of intensity 0.1 weber/m². The work done to rotate the coil from the equilibrium position through 180° is
 (1) 0.1 J (2) 0.2 J
 (3) 0.4 J (4) 0.8 J
23. Two identical thin bar magnets each of length l and pole strength m are placed at right angles to each other with north pole of one touching the south pole of other, magnetic moment of the system is
 (1) $1 ml$ (2) $2 ml$
 (3) $\sqrt{(2)} ml$ (4) $\frac{1}{2} ml$
24. A current is flowing in a circular coil of radius R and the magnetic field at its centre is B_0 . At what distance from the centre on the axis of the coil, the magnetic field will be $B_0/8$?
 (1) $\sqrt{7} R$ (2) $\sqrt{3} R$
 (3) $2 R$ (4) $8 R$
25. An aeroplane is flying horizontally with a speed of 350 km/hr. The intensity of earth's field is 2mT and angle of dip of 30°. If the wing span or the aeroplane is 30 m, the induced emf across the tip of the wings is
 (1) 1.05 V (2) 10.5 V
 (3) 2.9 V (4) 9 V
26. What happens when a magnetic substance is heated?
 (1) it loses its magnetism
 (2) it become a strong magnet
 (3) does not effect the magnetism
 (4) either (2) or (3)
27. The reactance of a coil when used in the AC power supply (220 V, 50 cycles per sec) in 50Ω . The inductance of the coil is nearly
 (1) 0.16 H (2) 0.22 H
 (3) 2.2 H (4) 1.6 H
28. To convert a 800 mV range millivoltmeter of resistance 40Ω into a galvanometer of 100 mA range, the resistance to be connected as shunt is
 (1) 10Ω (2) 20Ω

- (3) 30Ω (4) 40Ω

29. In an AC circuit the reactance of a coil is $\sqrt{3}$ times its resistance, the phase difference between the voltage across the coil to the current through the coil will be

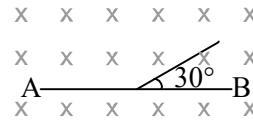
- (1) $\pi/3$ (2) $\pi/2$
 (3) $\pi/4$ (4) $\pi/6$

30. Figure shows a square current carrying loop ABCD of side 2m and current $i = \frac{1}{2} A$. The magnetic moment \vec{M} of the loop is



- (1) $(\hat{i} - \sqrt{3}\hat{k})A - m^2$ (2) $(\hat{j} - \hat{k})A - m^2$
 (3) $(\sqrt{3}\hat{i} + \hat{k})A - m^2$ (4) $(\hat{i} + \hat{k})A - m^2$

31. A conducting rod AB of length $l = 1m$ is moving at a velocity $v = 4 m/s$ making an angle 30° with its length. A uniform magnetic field $B = 2T$ exists in a direction perpendicular to the plane of motion. Then :



- (1) $V_A - V_B = 8V$ (2) $V_A - V_B = 4V$
 (3) $V_B - V_A = 8V$ (4) $V_B - V_A = 4V$

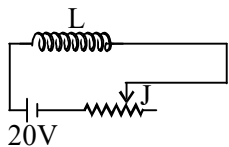
32. The electric current in a circuit is given by $i = 3t$. Here, t is in second and i in ampere. The rms current for the period $t = 0$ to $t = 1s$ is

- (1) 3A (2) 9A
 (3) $\sqrt{3}A$ (4) $\sqrt[3]{3}A$

33. A length of wire carries a steady current. It is bent first to form a circular plane coil of one turn. The same length is now bent more sharply to give a double loop of smaller radius. The magnetic field at the centre caused by the same current is

- (1) A quarter of its first value
 (2) unaltered
 (3) four times of its first value
 (4) half of its first value

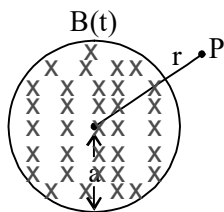
34. In the circuit shown in figure the jockey J is being pulled towards right so that the resistance in the circuit is increasing. Its value at some instant is 5Ω . The current in the circuit at this instant will be



- (1) 4A
 (2) less than 4 A
 (3) more than 4 A
 (4) may be less than or more than 4 A depending on the value of L
35. Quantity that remains unchanged in a transformer is
- (1) Voltage (2) Current
 (3) Frequency (4) None of the above
36. A current i_0 is flowing through an L-R circuit of time constant t_0 . The source of current is switched off at time $t = 0$. Let r be the value of $(-di/dt)$ at time $t = 0$. Assuming this rate to be constant, the current will reduce to zero in a time interval of:

- (1) t_0 (2) et_0
 (3) $\frac{t_0}{e}$ (4) $\left(1 - \frac{1}{e}\right)t_0$

37. A uniform but time-varying magnetic field $B(t)$ exists in a circular region of radius a and is directed into the plane of the paper as shown. The magnitude of the induced electric field at point P at a distance r from the centre of the circular region:



- (1) is zero
 (2) decrease as $1/r$
 (3) increases as r
 (4) decreases as $1/r^2$
38. A long straight wire along the z-axis carries a current I in the negative z direction. The magnetic vector field \vec{B} at a point having coordinates (x, y) in the $z = 0$ plane is

- (1) $\frac{\mu_0 I}{2\pi} \frac{(y\hat{i} - x\hat{j})}{(x^2 + y^2)}$ (2) $\frac{\mu_0 I}{2\pi} \frac{(x\hat{i} + y\hat{j})}{(x^2 + y^2)}$

- (3) $\frac{\mu_0 I}{2\pi} \frac{(x\hat{j} - y\hat{i})}{(x^2 + y^2)}$ (4) $\frac{\mu_0 I}{2\pi} \frac{(x\hat{i} - y\hat{j})}{(x^2 + y^2)}$

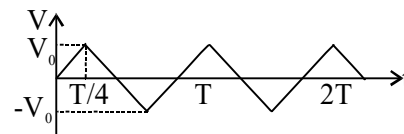
39. Two coils of self inductance L_1 and L_2 are placed close to each other such that the effective flux in one coil is completely linked with the other. The mutual inductance of coils is

- (1) $L_1 L_2$
 (2) $(L_1 + L_2)/2$
 (3) $\sqrt{(L_1 L_2)}$
 (4) L_1 / L_2

40. A coil of inductance 1H and negligible resistance is connected to a source of supply whose voltage is given by $V = 4t$ volt. If the voltage is applied when $t = 0$, then find the energy stored in the coil in 4s

- (1) 512 J (2) 256 J
 (3) 1024 J (4) 144 J

41. The voltage time ($V - t$) graph for a triangular wave having peak value V_0 is as shown in figure. The rms value of V is



- (1) $\frac{V_0}{3}$ (2) $\frac{V_0}{2}$
 (3) $\frac{V_0}{\sqrt{2}}$ (4) $\frac{V_0}{\sqrt{3}}$

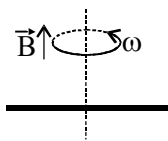
42. Which of the following waves have the maximum wavelength?

- (1) Infrared rays
 (2) UV - rays
 (3) Radio waves
 (4) X - rays

43. A charge q moves with a velocity 2m/s along x-axis in a uniform magnetic field $\vec{B} = (\hat{i} + 2\hat{j} + 3\hat{k})$ tesla.

- (1) Charge will experience a force in z-y plane
 (2) Charge will experience a force along -y axis
 (3) Charge will experience a force along +z axis
 (4) Charge will experience a force along -z axis

44. A conducting rod of length $2l$ is rotating with constant angular speed ω about its perpendicular bisector. A uniform magnetic field \vec{B} exists parallel to the axis of rotation. The emf induced between two ends of the rod is

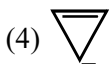
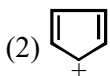
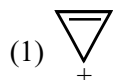


- (1) $B\omega l^2$ (2) $\frac{1}{2}B\omega l^2$
 (3) $\frac{1}{8}B\omega l^2$ (4) zero
45. In an oscillating L-C circuit, the maximum charge on the capacitor is Q . The charge on the capacitor, when the energy is stored equally between the electric and magnetic field is :
- (1) $\frac{Q}{2}$ (2) $\frac{Q}{\sqrt{2}}$
 (3) $\frac{Q}{\sqrt{3}}$ (4) $\frac{Q}{3}$
46. λ_v, λ_x and λ_m represent the wavelengths of visible light, X-rays and microwaves respectively, then :
- (1) $\lambda_m > \lambda_x > \lambda_v$ (2) $\lambda_v > \lambda_m > \lambda_x$
 (3) $\lambda_m > \lambda_v > \lambda_x$ (4) $\lambda_v > \lambda_x > \lambda_m$

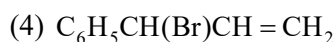
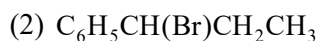
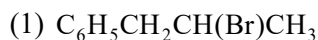
47. In a step-up transformer the turn ratio is 1 : 2. A Leclanche cell (emf 1.5 V) is connected across the primary. The voltage across the secondary is
- (1) 3.0 V (2) 0.75 V
 (3) zero (4) 1.5 V
48. When number of turns in a coil is trippled, without any change in the length of coil, its self-inductance becomes
- (1) one third (2) three times
 (3) six times (4) nine - times
49. When a material is used in a magnetic field B , a magnetic moment proportional to B but opposite in direction is induced. The metal is
- (1) diamagnetic (2) paramagnetic
 (3) ferromagnetic (4) antimagnetic
50. A ring of radius R , made of an insulating material carries a charge Q uniformly distributed on it. If the ring rotates about the axis passing through its centre and normal to plane of the ring with constant angular speed ω , then the magnitude of the magnetic moment of the ring is
- (1) $Q\omega R^2$ (2) $\frac{1}{2}Q\omega R^2$
 (3) $Q\omega^2 R$ (4) $\frac{1}{2}Q\omega^2 R$

CHEMISTRY

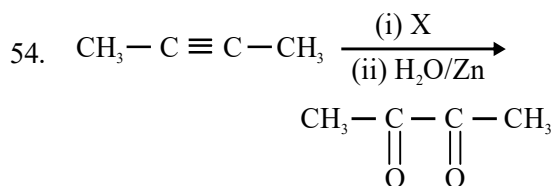
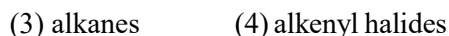
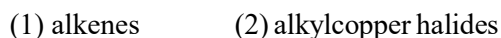
51. Among the following the aromatic compound is



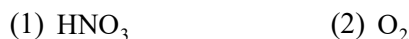
52. 3-Phenylpropene on reaction with HBr gives (as a major product)



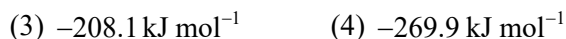
53. Alkyl halides react with dialkylcopper reagents to give



X is



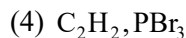
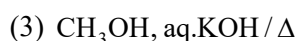
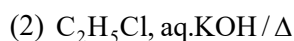
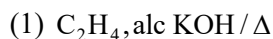
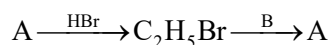
55. Enthalpy of hydrogenation of cyclohexane is $-119.5 \text{ kJ mol}^{-1}$. If resonance energy of benzene is $-150.4 \text{ kJ mol}^{-1}$, its enthalpy of hydrogenation would be



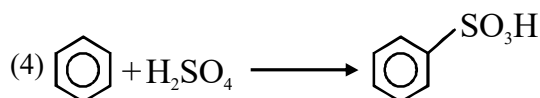
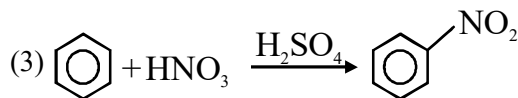
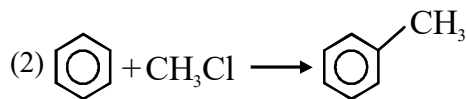
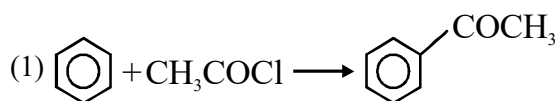
56. The number of σ and π - bonds in alkyl isocyanide are



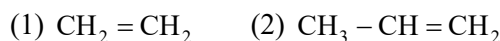
57. In the following reaction, A and B, respectively are



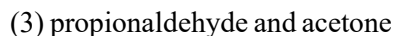
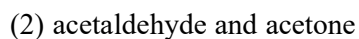
58. In which of the following polysubstitution takes place?



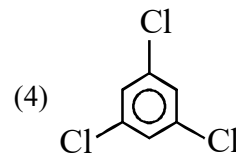
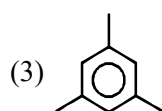
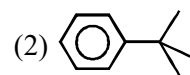
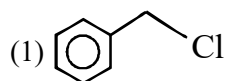
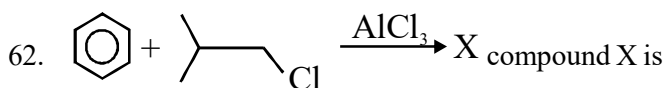
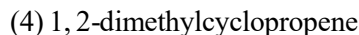
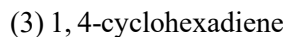
59. An organic compound decolourises Br_2 water and also gives red ppt. with Cu_2Cl_2 solution. The compound is



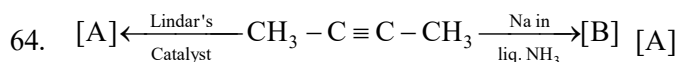
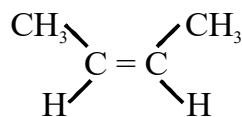
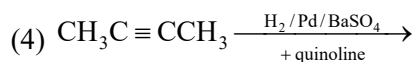
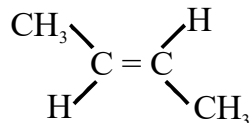
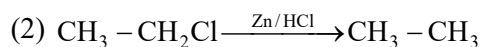
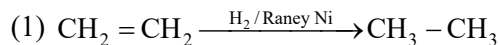
60. The reaction of acetylene and propyne with $HgSO_4$ in presence of H_2SO_4 produces respectively.



61. An alkene on reductive ozonolysis gives two molecules of $CH_2(CHO)_2$. The alkene is



63. Which of the following involves homogeneous reduction.



and [B] are respectively

- (1) cis, trans-2-butene
- (2) both trans-2-butene
- (3) trans, cis-2-butene
- (4) both cis-2-butene

65. BOD_5 is

- (1) waste decomposed in 5 days
- (2) oxygen used in 5 days
- (3) microorganisms killed in 5 days
- (4) dissolved oxygen left after 5 days

66. Which of the following is a secondary pollutant ?

- (1) CO_2
- (2) N_2O
- (3) SO_2
- (4) PAN

67. Which of the following is not considered to be a pollutant?

- (1) NO_2
- (2) CO_2
- (3) O_3
- (4) C_xH_y

68. Which of the following is not involved in formation of photochemical smog ?

- (1) NO
- (2) O_3
- (3) C_xH_y
- (4) SO_2

69. Pick up the correct statement :

- (1) CO which is a major pollutant resulting from the combustion of fuels in automobiles plays a major role photochemical smog.

(2) Classical smog has an oxidizing character while the photochemical smog is reducing in character

(3) Photochemical smog occurs in day time whereas the classical smog occurs in the morning hours

(4) Classical smog is good for health but not photochemical smog

70. In Antarctica, ozone depletion is due to the formation of the following compound :

- (1) Acrolein
- (2) peroxy acetyl nitrate
- (3) SO_2 and SO_3
- (4) chlorine nitrate

71. Which of the following types of hybridization is involved in the formation of cycloalkanes ?

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

72. Two volatile liquids A and B differ in their boiling points by 15K. The process which can be used to separate them is

- (1) fractional distillation
- (2) steam distillation
- (3) distillation under reduced pressure
- (4) simple distillation

73. In Lassaigne's test, a blood red colouration indicates the presence of

- (1) nitrogen
- (2) sulphur
- (3) both nitrogen and sulphur
- (4) both nitrogen and halogen

74. Number of isomers of C_4H_9 - is

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

75. Which of the following is correct regarding the -I effect of the substituents ?

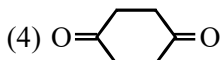
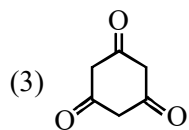
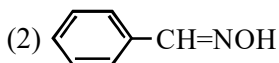
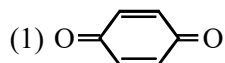
- (1) $-\text{NR}_2 < -\text{OR} < -\text{F}$
- (2) $-\text{NR}_2 > -\text{OR} < -\text{F}$
- (3) $-\text{NR}_2 < -\text{OR} > -\text{F}$
- (4) $-\text{NR}_2 > -\text{OR} > -\text{F}$

76. The IUPAC name of

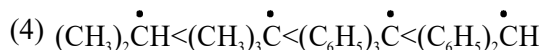
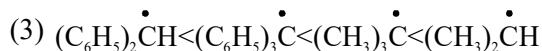
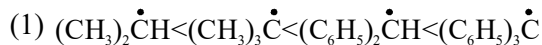


- (1) N-Cyclohexylbenzamide
- (2) N-Phenyl-N-cyclohexylmethanamide
- (3) N-Phenylcyclohexanecarboxamide
- (4) N-Cyclohexyl-N-phenylmethanamide

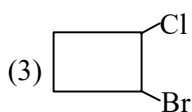
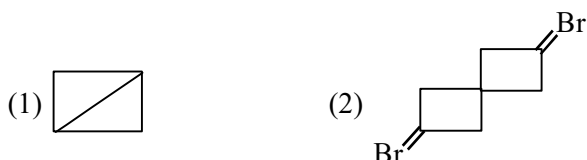
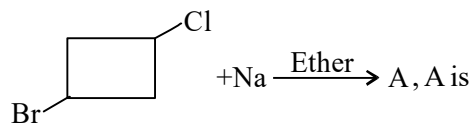
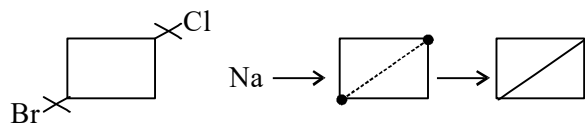
77. Tautomerism is not exhibited by



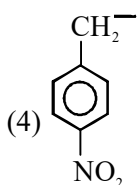
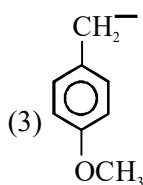
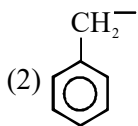
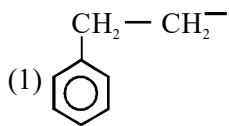
78. The increasing order of stability of the following free radicals is



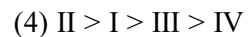
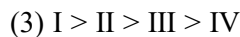
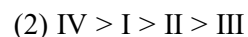
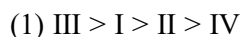
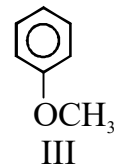
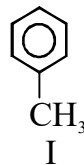
79. Which of the following is the product of the following reaction.



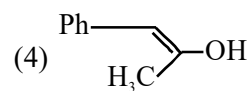
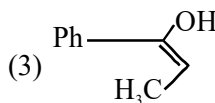
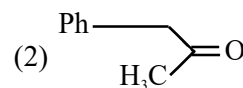
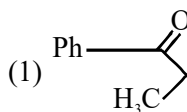
80. The most stable carbanion among the following is



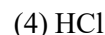
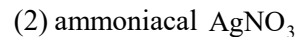
81. Among the following compounds, the decreasing order of reactivity towards electrophilic substitution is



82. $\text{Ph}-\text{C}\equiv\text{C}-\text{CH}_3 \xrightarrow{\text{Hg}^{2+}/\text{H}^+} \text{A}$



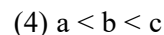
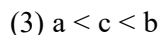
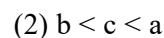
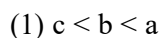
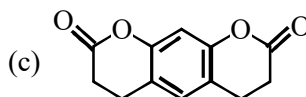
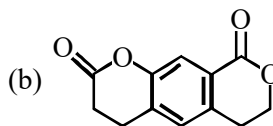
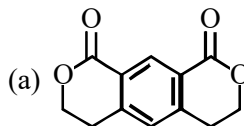
83. Which of these will not react with acetylene ?



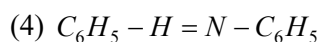
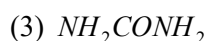
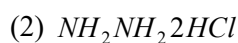
84. The ortho/para-directing group among the following is



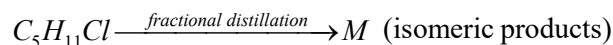
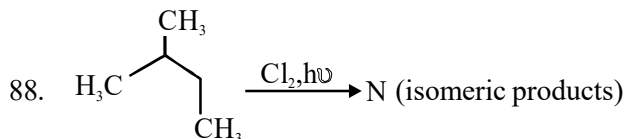
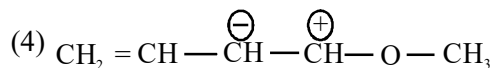
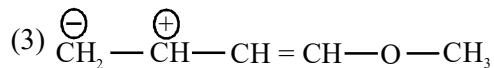
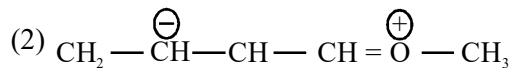
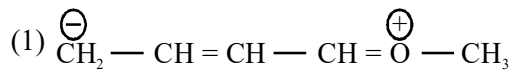
85. Increasing order of rate of reaction with $\text{HNO}_3/\text{H}_2\text{SO}_4$ is



86. For which of the following compounds Lassaigne's test of Nitrogen will fail ?



87. Which of the following resonating structures of 1-methoxy-1,3-butadiene is least stable ?

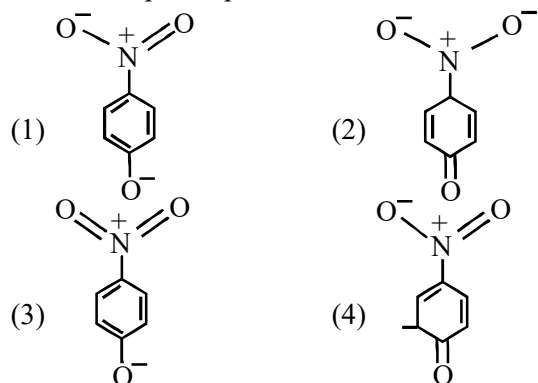


Give the numbers of N and M?

(1) 6, 6 (2) 6, 4

(3) 4, 4 (4) 3, 3

89. The most unlikely representation of resonance structure of p-nitrophenoxide ion is



90. The number of possible enantiomeric pairs that can be produced during mono-chlorination of 2-methylbutane is

(1) 4 (2) 2

(3) 3 (4) 1

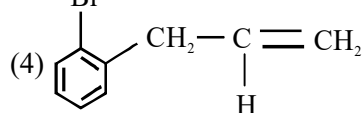
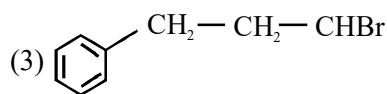
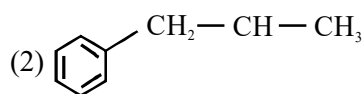
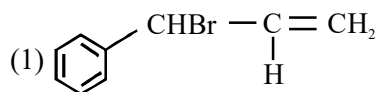
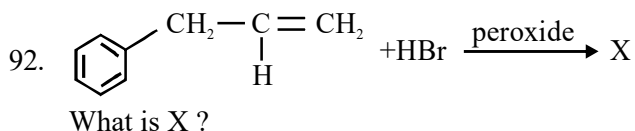
91. 2-Methylbutane on reacting with bromine in the presence of sunlight gives mainly

(1) 1-bromo-3-methylbutane

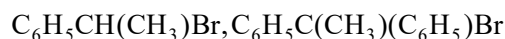
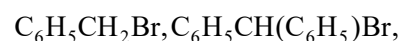
(2) 2-bromo-3-methylbutane

(3) 2-bromo-2-methylbutane

(4) 1-bromo-2-methylbutane



93. The order of reactivity of the following compounds in S_N2 reactions is



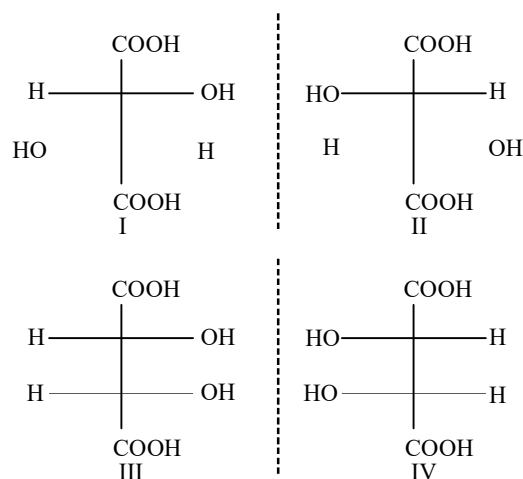
(1) $\text{C}_6\text{H}_5\text{CH}(\text{C}_6\text{H}_5)\text{Br} < \text{C}_6\text{H}_5\text{C}(\text{CH}_3)(\text{C}_6\text{H}_5)\text{Br}$
 $< \text{C}_6\text{H}_5\text{CH}_2\text{Br} < \text{C}_6\text{H}_5\text{CH}(\text{CH}_3)\text{Br}$

(2) $\text{C}_6\text{H}_5\text{C}(\text{CH}_3)(\text{C}_6\text{H}_5)\text{Br} < \text{C}_6\text{H}_5\text{CH}(\text{C}_6\text{H}_5)\text{Br}$
 $< \text{C}_6\text{H}_5\text{CH}(\text{CH}_3)\text{Br} < \text{C}_6\text{H}_5\text{CH}_2\text{Br}$

(3) $\text{C}_6\text{H}_5\text{CH}_2\text{Br} < \text{C}_6\text{H}_5\text{CH}(\text{CH}_3)\text{Br} <$
 $\text{C}_6\text{H}_5\text{CH}(\text{C}_6\text{H}_5)\text{Br} < \text{C}_6\text{H}_5\text{C}(\text{CH}_3)(\text{C}_6\text{H}_5)\text{Br}$

(4) $\text{C}_6\text{H}_5\text{CH}(\text{CH}_3)\text{Br} < \text{C}_6\text{H}_5\text{CH}_2\text{Br} <$
 $\text{C}_6\text{H}_5\text{C}(\text{CH}_3)(\text{C}_6\text{H}_5)\text{Br} < \text{C}_6\text{H}_5\text{CH}(\text{C}_6\text{H}_5)\text{Br}$

94. Which of the following structures represents an enantiomeric pair ?



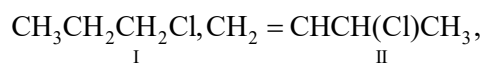
(1) I and II

(2) I and IV

(3) II and III

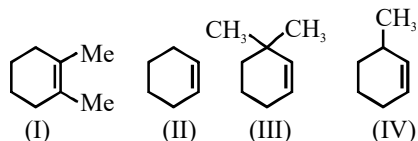
(4) II and IV

95. Arrange the following halides in the decreasing order of S_N1 reactivity

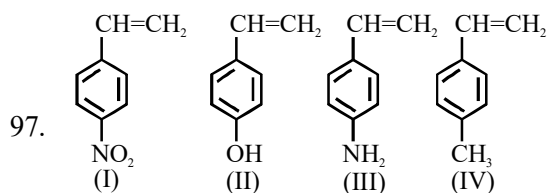


- (1) I > II > III (2) II > I > III
 (3) II > III > I (4) III > II > I

96. What will be the order of reactivity towards electrophile in the following hydrocarbon



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



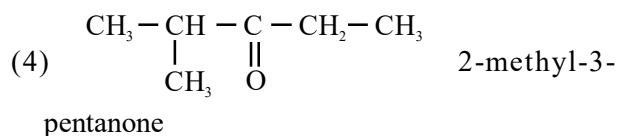
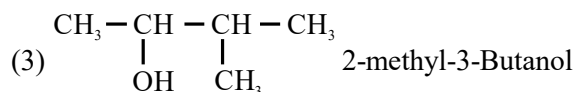
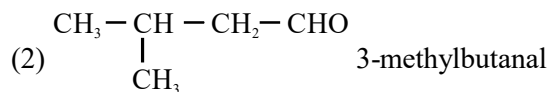
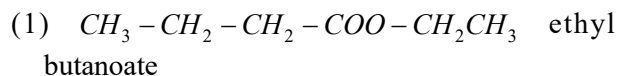
The order of reactivity of the compound are

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

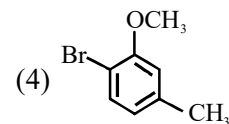
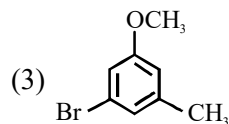
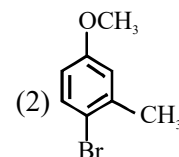
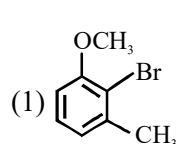
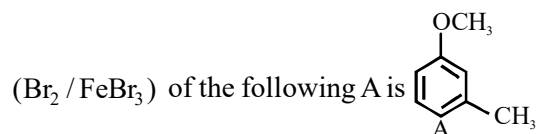
98. The compound with an isopropyl group is

- (1) 2, 2, 3, 3 - Tetramethylpentane
 (2) 2, 2 - Dimethylpentane
 (3) 2,2,3 - Trimethylpentane
 (4) 2 - Methyl pentane

99. Which of the following compound has wrong IUPAC name ?



100. The major product obtained on monobromination



BOTANY

101. Population whose members reproduce sexually are termed
 (1) Panimictic (2) Ecotype
 (3) Apomictic (4) Amphimictic
102. Synecology is the study of
 (1) Biosphere
 (2) Individuals
 (3) Community in relation to environment
 (4) Organism in relation to environment
103. 'Flag - tree' are formed due to
 (1) Lodging (2) Erosion
 (3) Unidirectional wind (4) Salt Spray
104. When one population is harmed and the other remains unaffected the relationship is called as
 (1) Mutualism (2) Neutralism
 (3) Commensalism (4) Amensalism
105. Which of the following is an incorrect match.
 (1) Root succulent - Asparagus
 (2) Stem succulent - Euphorbia
 (3) Leaf succulent - Bryophyllum
 (4) Non - succulent - Opuntia
106. In potamogeton, the stomata are
 (1) Epistomatic (2) Hypostomatic
 (3) Amphistomatic (4) Non - functional
107. The presence of diversity at the junction of territories of two different habitats is known as
 (1) Bottle neck effect (2) Edge effect
 (3) Junction effect (4) Pasteur effect
108. The formula for exponential population growth is
 (1) $dN/dt = rN$ (2) $dt/dN = rN$
 (3) $dN/rN = dt$ (4) $rN/dN = dt$
109. Animals have innate ability to escape from predation. Examples for the same are given below. Select the incorrect example
 (1) Colour change in chameleon
 (2) Enlargement of body side by swallowing air in puffer fish
 (3) Poison fangs in snakes
 (4) Melanism in moths
110. In which of the following ecosystem species diversity is least?
 (1) Tundras (2) Grass lands
 (3) Deciduous forests (4) Deserts
111. Total amount of living material at the various trophic levels of a food chain is depicted by pyramids of
 (1) Numbers (2) Energy
 (3) Biomass (4) All of these
112. The food chain, in which the microorganisms breakdown the energy - rich organic compounds prepared by the producers, is known as
 (1) Detritus food chain (2) Predator food chain
 (3) Parasitic food chain (4) None of these
113. STATEMENT A : Diversity observed in the entire geographical area is called gamma diversity.
 STATEMENT B : Biodiversity decreases from high altitude to low altitude.
 Identify the correct choice from below :
 (1) Statement A and B are correct
 (2) Statement A is correct, B is wrong
 (3) Statement B is correct, A is wrong
 (4) Both the statements A and B are wrong
114. The two main criteria for determining a hot spot are
 i. Number of endemic species
 ii. Degree of threat in terms of habitat loss
 iii. Should have species diversity
 (1) i and ii (2) only ii
 (3) i and iii (4) only iii
115. Which of the following Biosphere Reserve Zone has limited human activity
 (1) Core Zone (2) Buffer Zone
 (3) Manipulation Zone (4) Both (1) and (2)
116. The faeces of sea birds, called guano is rich in
 (1) Calcium (2) Phosphorous
 (3) Sulphur (4) Nitrogen
117. Taiga and Chapparel are
 (1) Estuaries (2) Fresh water biomes
 (3) Marine biomes (4) Terrestrial biomes

118. Pick out the correct stratification in a lake from top to bottom.
- (1) Profundal Zone, Limnetic Zone, Littoral Zone
 - (2) Littoral Zone, Limnetic Zone, Profundal Zone
 - (3) Limnetic Zone, Littoral Zone, Profundal Zone
 - (4) Littoral Zone, Profundal Zone, Limnetic Zone
119. Key industry animals are
- (1) Primary consumers (2) Secondary consumers
 - (3) Tertiary consumers (4) All consumers
120. Maximum temperature change occurs in which strata of a lake
- (1) Epilimnion (2) Metalimnion
 - (3) Thermocline (4) Hypolimnion
121. Ecological hierarchy begins at which level
- (1) Species (2) Population
 - (3) Organism (4) Ecosystem
122. Temperate zone is a zone with
- (1) Average mean temperature of 7° - 17° and mixed coniferous forests
 - (2) Latitude of 0° - 20° having deciduous forests
 - (3) Severe prolonged winter and coniferous forests
 - (4) Mild winter and deciduous forests
123. There is usually a single species in an ecological niche of any habitat. This is an important generalization in ecology called
- (1) Shelford's law (2) Allen's rule
 - (3) Gause's Principle (4) Carrying capacity
124. Ozonosphere is a part of
- (1) Troposphere (2) Stratosphere
 - (3) Mesosphere (4) Thermosphere
125. Which of the following statement is correct
- (1) Ultraviolet rays have a wavelength of 100 nm - 390 nm
 - (2) UV - C (100 nm - 280 nm) is lethal
 - (3) Both
 - (4) None of these
126. Which of the following correctly represents an organism and its ecological niche?
- (1) Vallisnaria and pond
 - (2) Vulture and dense forest
 - (3) Plant lice (aphids) and leaf
 - (4) All the above
127. According to Allen's rule
- (1) Animals of colder regions have short tails, ears as compared to animals of warmer areas
 - (2) Plant growth, distribution and survival depends on abiotic factors of that ecosystem
 - (3) Birds and mammals of colder regions are larger in size as compared to warmer regions
 - (4) Plant growth is determined by scarce nutrients and not by abundant nutrients
128. Factors connected with form and behaviour of earth's surface are
- (1) Edaphic (2) Topographic
 - (3) Geological (4) Geographic
129. 'Nudation' in the process of biotic succession starts with
- (1) a natural agency like fire, volcanic eruption
 - (2) Lichens
 - (3) Herbs and mosses
 - (4) None of these
130. Keystone species in an ecosystem are those
- (1) Present in maximum number
 - (2) That are not frequent
 - (3) Attaining a large biomass
 - (4) Contributing to ecosystem properties
131. Which of the following pairs is mismatched?
- (1) Biomass burning - release of CO_2
 - (2) Fossil fuel burning - release of CO_2
 - (3) Nuclear power - radioactive wastes
 - (4) Solar energy - green house effect
132. Which of the following is not true for a species?
- (1) Members of a species can interbreed
 - (2) Variations occur among members of a species
 - (3) Each species is reproductively isolated from every other species.
 - (4) Gene flow does not occur between the populations of a species
133. The vertical temperature gradient over earth's surface is $6.4^{\circ}C$ - $6.5^{\circ}C/1000$ m elevation. This is called
- (1) Thermocline (2) Thermoperiodicity
 - (3) Lapse rate (4) Thermal stratification

134. Pick up the group of animals which show migration.
- (1) Salmon, Hyla, Salamandra
 - (2) Turkey, Salmon, Hyla
 - (3) Salmon, arctic tern, cell
 - (4) None of these
135. Viceroy butterfly which is palatable resembles Monarch butterfly which is unpalatable. This is called
- (1) Conscious mimicry
 - (2) Aggressive mimicry
 - (3) Mullerian mimicry
 - (4) Batesian mimicry
136. Population explosion is checked by a factor, which is
- (1) Carrying capacity
 - (2) Environmental resistance
 - (3) Natural selection
 - (4) Intra specific interactions
137. A bird introduced from another country becomes a serious pest due to
- (1) Better adaptation to new area
 - (2) Increased sexual reproduction
 - (3) Better nesting habitats
 - (4) Absence of a natural competition
138. Which of the following have accumulation of proline or chaperonins as a physiological adaptations
- (1) Hydrophytes
 - (2) Epiphytes
 - (3) Xerophytes
 - (4) Mesophytes
139. The relationship between leguminous plants roots and Rhizobium can be reproduced by
- (1) +, -
 - (2) +, +
 - (3) -, -
 - (4) None of these
140. Which of the following acts a denitrifying bacteria.
- (1) Pseudomonas aeruginosa
 - (2) Thiobacillum denitrificans
 - (3) Both
 - (4) None of these
141. The 10% law for energy transfer in food chains was given by
- (1) Stanley
 - (2) Transley
 - (3) Lindermann
 - (4) Weismann
142. Soil erosion can be checked by
- (1) Restricted human activity
 - (2) Checking movement of animals
 - (3) Wind screen
 - (4) Good plant cover
143. The worst dangerous threat to wild life is by
- (1) Habitat destruction
 - (2) Hunting
 - (3) Overgrazing
 - (4) Exotic species
144. Bandipur (Karnataka) National park runs a project for
- (1) Peacock
 - (2) Deer
 - (3) Tiger
 - (4) Elephant
145. Increase in floods in the plains of North India is due to
- (1) Increased deforestation
 - (2) Increase in incidence of rainfall
 - (3) Silling of dams
 - (4) More area under cultivation
146. First national park developed in India is
- (1) Gir
 - (2) Kaziranga
 - (3) Jim Corbett
 - (4) None of these
147. Organization responsible for maintaining Red Data Book/Red list is
- (1) IUCN
 - (2) CITES
 - (3) WWF
 - (4) IBWL
148. Which of the following represents the sedimentary type of nutrient cycle?
- (1) Nitrogen
 - (2) Carbon
 - (3) Phosphorous
 - (4) Oxygen
149. Transitional Zone between adjacent biomes is
- (1) Ecosphere
 - (2) Ecotone
 - (3) Seral change
 - (4) Snow line
150. Niche of a species is
- (1) Place of living
 - (2) Specific functions
 - (3) Habitat and specific functions
 - (4) None of these

ZOOLOGY

151. Which of the following periods of the geological time scale is not correctly matched with its characteristic features?
- (1) Tertiary - Mammals, birds & Angiosperms were the dominant
 - (2) Jurassic - Appearance of first angiosperm
 - (3) Carboniferous - Origin of amphibians
 - (4) Ordovician - Appearance of invertebrates
152. Analogous structure are
- (1) Different in origin but similar in function
 - (2) Similar in origin & function
 - (3) Different in origin & function
 - (4) Similar in origin but different in function
153. A population is in Hardy - Weinberg equilibrium for a gene with only two alleles. If the gene frequency of an allele A is 0.7, the genotype frequency of Aa is
- (1) 0.21
 - (2) 0.42
 - (3) 0.36
 - (4) 0.70
154. Appearance of profuse hairs on body and face of Iris dogman is an example of
- (1) Retrogressive metamorphosis
 - (2) Recapitulation Theory
 - (3) Mutation
 - (4) Atavism
155. The basis of Lamarkism is
- (1) Development of organ
 - (2) Reduction of organ
 - (3) Effect of metabolism
 - (4) Effect of environment
156. Age of fossils in the past was generally determined by radio - carbon method and other methods involving radioactive elements found in the rocks. More precise methods, which were used recently and led to the revision of the evolutionary periods for different groups of organisms includes :
- (1) Study of the conditions of fossilization
 - (2) Study of carbohydrates/ proteins in rocks
 - (3) Study of carbohydrates / proteins in fossils
 - (4) Electron spin resonance (ESR) & fossil DNA
157. Consider the following
1. Alanine
 2. Glycine
 3. Aspartic acid
- Which of the above amino acids were produced in Miller's experiment to produce organic molecules from the gaseous composition of early/primitive atmosphere of earth?
- (1) 1 & 2 only
 - (2) 2 & 3 only
 - (3) 1 & 3 only
 - (4) 1, 2 & 3
158. Consider the following statements
1. Wings of insects and birds are homologous organs
 2. Wings of insects and bats are analogous organs
 3. Wings of insects & birds are analogous organs
 4. Wings of birds and bats are homologous organs
- Which of the statements given above are correct?
- (1) 1 & 2 only
 - (2) 2, 3 & 4 only
 - (3) 1 & 4 only
 - (4) 1, 2 & 4 only
159. Match list -I (animal) with list -II (geological period) and select the correct answer using the codes given below the lists.
- | List -I (Animal) | List -II (Geological period) |
|---------------------|------------------------------|
| A. First reptiles | 1. Ordovician |
| B. First amphibians | 2. Devonian |
| C. First dinosaurs | 3. Pennsylvanian |
| D. First fishes | 4. Jurassic |
| | 5. Cretaceous |
| | 6. Triassic |
- (1) A -6, B -4, C -3, D - 1
 - (2) A -3, B -2, C -6, D - 1
 - (3) A -6, B -2, C -3, D - 5
 - (4) A -3, B -4, C -6, D - 5
160. What was the principal missing element in Darwin's concept of evolution?
- (1) Knowledge of heredity & variation
 - (2) Concept of missing links
 - (3) Convincing fossil records
 - (4) Concrete evidence for the operation of natural selection

161. Allopatric populations arise due to
- (1) Mutation of species of populations
 - (2) Geographical separation of population
 - (3) Migration of members of a species from one geographical area to another
 - (4) Hybridization between closely related species belonging to different geographical regions

162. The modern synthetic theory of evolution is based on
- (1) Genetic & chromosomal mutation
 - (2) Genetic recombination & natural selection
 - (3) Reproductive isolation
 - (4) All of the above

163. Consider the following statements

Sibling species exhibits

1. Sympatric distribution
2. Morphological similarity
3. Genetic identify
4. Reproductive isolation

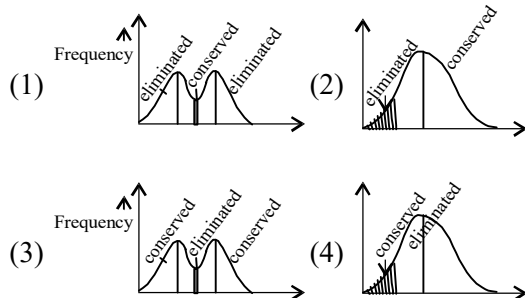
Of these statements

- (1) 3 alone is correct
- (2) 1 & 2 are correct
- (3) 2, 3 & 4 are correct
- (4) 1,2 & 4 are correct

164. *Peripatus* is connecting link between

- (1) Annelids & Arthropods
- (2) Arthropods & Molluscs
- (3) Molluscs & echinoderms
- (4) Annelids & Mulluscs

165. Which of the following graph represents disruptive selection?



166. Serological evidence of organic evolution is confirmed on the basis of the

- (1) α - chain to haemoglobin from different species
- (2) β - chain of haemoglobin from different species

- (3) Molecular weight of haemoglobin from different species
- (4) Haem content of haemoglobin from different species

167. The cranial capacity of which one of the following prehistoric humans was almost the same as that of the modern man?

- (1) Neanderthal man
- (2) Peking man
- (3) Java ape man
- (4) Australopithecus man

168. Consider the following statements

The conditions essential for the operation of the Hardy - Weinberg law are that the

1. Mating should be at random
2. Mutation rate should be very high
3. Individuals should be of unequal viability & fertility
4. Population size should be very large
5. Migrations should not occur

Which of the statements given above are correct?

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

169. The following are some of the well known fossils in the evolution of modern man :

1. Neanderthal
2. Homo crectus
3. Cro-Magnon
4. Australopithecus

What is the correct chronological sequence in which the above appeared

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

170. Match list -I (names of fossil ape-man) with list -II (associated cultures) and select the correct answer using the codes given below the lists.

List - I

List - II

(Name of fossil apeman) (Associated culture)

- | | |
|------------------------|------------------------------|
| A. Java man | 1. Mousterion culture |
| B. Cro-Magnon man | 2. Neo-lithic culture |
| C. Oldest Egyptian man | 3. Upper paleolithic culture |
| D. Neanderthal man | 4. Lower paleolithic culture |

- (1) A - 2, B -3, C - 4, D - 1
- (2) A - 4, B -1, C - 2, D - 3
- (3) A - 2, B -1, C - 4, D - 3
- (4) A - 4, B -3, C - 2, D - 1

171. When children play bare footed in pools of dirty water and flood water, they may suffer from disease like
- (1) Leptospirosis & Bilharzia
 - (2) Malaria, amoebic dysentery & leptospirosis
 - (3) Bilharzia, infective hepatitis & diarrhoea
 - (4) Guinea worm infection, elephantiasis & amoebic dysentery
172. HIV that causes AIDS, first starts destroying
- (1) Leucocytes
 - (2) Thrombocytes
 - (3) B-lymphocytes
 - (4) Helper - T - lymphocytes
173. Match the following bacteria with the disease & choose the correct option
- | | |
|------------------------------|-------------|
| Column - I | Column - II |
| A. <i>Treponema pallidum</i> | 1. Plague |
| B. <i>Yersinia pestis</i> | 2. Anthrax |
| C. <i>Bacillus anthracis</i> | 3. Syphilis |
| D. <i>Vibrio</i> | 4. Cholera |
- (1) A -1, B - 3, C -2, D -4
 - (2) A -3, B - 1, C -2, D -4
 - (3) A -2, B - 3, C -1, D -4
 - (4) A -4, B - 3, C -1, D -2
174. Cancer cells are characterized by
- (1) Spreading to other body parts
 - (2) Invasion of local tissue
 - (3) Uncontrolled growth
 - (4) All fo the above
175. Which of the following is not correctly matched?
- (1) *Bordetella pertussis* - Whooping cough
 - (2) *Salmonella botulinum* - Botulism
 - (3) *Clostridium tetani* - Tetanus
 - (4) None
176. Which of the following pair is correctly matched?
- (1) Kala - azar - *Trypanosma*
 - (2) Filariasis - *Leishmania*
 - (3) Sleeping sickness - *Plasmodium*
 - (4) Creutzfeldt Jacob disease - Bovine spongi form virus
177. 'ELISA' test is done for the diagnosis of
- (1) HIV
 - (2) Malaria
 - (3) Anthrax
 - (4) Hepatitis
178. Carcinoma refers to
- (1) Malignant tumours of the colon
 - (2) Benign tumour of the connective tissue
 - (3) Malignant tumours of the connective tissue
 - (4) Malignant tumours of the skin or mucous membrane
179. Black water fever is caused by
- (1) *Plasmodium vivax*
 - (2) *Plasmodium malariae*
 - (3) *Plasmodium ovale*
 - (4) *Plasmodium falciparum*
180. *Taenia saginata* spread by
- (1) Cow
 - (2) Pig
 - (3) Dog
 - (4) cat
181. The infective stage of *Entamoeba histolytica*
- (1) Binucleate form
 - (2) Tetranucleate form
 - (3) Minuta form
 - (4) Sporozoite stage
182. Column I lists some disorders associated with brain. Column - II list the causes for the disorders. Match the two columns & identify the correct option from the codes given below
- | | |
|------------------------|---|
| Column - I | Column - II |
| A. Epilepsy | 1. Degeneration of neurons in the cerebral cortex |
| B. Alzheimer's disease | 2. Irregular electric discharge in the neurons |
| C. Parkinson's disease | 3. Decreased production of acetyl choline |
| D. Huntington's chorea | 4. Regeneration of dopamine releasing neurons |
| | 5. Formation of blood clots in the brain |
- (1) A-5, B - 4, C - 3, D - 1
 - (2) A-2, B - 3, C - 1, D - 4
 - (3) A-2, B - 3, C - 4, D - 1
 - (4) A-2, B - 4, C - 3, D - 1
183. DPT vaccine is given for
- (1) Tetanus; polio; plague
 - (2) Diphtheria, pneumonia, tetanus
 - (3) diphtheria, whooping cough, tetanus
 - (4) diphtheria, whooping cough & leprosy

184. Hardening of the arteries due to deposition of cholesterol is called
 (1) Rhinitis (2) Thrombosis
 (3) Stenosis (4) Atherosclerosis
185. Cri-du-chat syndrome in human is caused by the
 (1) Trisomy of 21st chromosome
 (2) Loss of half of the long arm of chromosome 5
 (3) Loss of half of the short arm of chromosome 5
 (4) Trisomy of 18th chromosome
186. Phenylketonuria is a genetic disorder of
 (1) X-linked
 (2) Trisomic condition
 (3) Monosomic condition
 (4) Autosomal recessive gene
187. Blackening of urine when exposed to air is a metabolic disorder in human beings. This is due to
 (1) Tyrosine
 (2) Phenylalanine
 (3) Homogentisic acid
 (4) Valine replacing glutamine
188. The most common type of haemophilia results from the congenital absence of
 (1) Factor II (2) Factor V
 (3) Factor VIII (4) Factor XI
189. Down's syndrome is due to
 (1) Linkage
 (2) Duplication
 (3) Crossing over
 (4) Nondisjunction of chromosome
190. Albinism is a congenital disorder resulting from the lack of the enzyme
 (1) Catalase (2) Tyrosinase
 (3) Melanase (4) Xanthine oxidase
191. A person showing distorted thoughts, laughing or crying at completely inappropriate times, often disturbed emotions with rapid shift from one extreme response to other & incoherent & bizarre behaviour lasting for week or more is suffering from
 (1) Schizophrenia (2) Mood disorders
 (3) Addictive disorders
 (4) Borderline personality disorder (BPD)
192. Which of the following drug suppress brain function, relieve intense pain (physical & mental) produce temporary euphoria
 (1) Morphine (2) Valium
 (3) LSD (4) Mescaline
193. If a person is taking Alcohol & Aspirin (drug) together then its effect will be
 (1) Decreased co-ordination, increased reaction time, impaired judgement
 (2) Increased risk of damage to gastric mucosa
 (3) Increased cardiovascular effects
 (4) Hypertension
194. Which one of the following is the correctly matched pair of a product and the microorganism responsible for it?
 (1) Ethyl alcohol - Yeast
 (2) Cheese - *Nitrobacter*
 (3) Acetic acid - *Lactobacillus*
 (4) Curd - *Azotobacter*
195. Chloramphenicol & erythromycin are produced by
 (1) *Rhizobium* (2) *Nitrobacter*
 (3) *Penicillium* (4) *Streptomyces*
196. Curd, Milk, Cheese & butter are produced with the help of
 (1) *Penicillium* (2) *Streptococcus*
 (3) *Saccharomyces* (4) None of the above
197. Which of the following microbes produce vitamin B₂?
 (1) *Ashbya gossypii* (2) *Propionibacterium*
 (3) *Pseudomonas denitrificans*
 (4) None of these
198. The cyanobacteria of great nutritional value being marketed today is
 (1) *Spirulina* (2) *Stigonema*
 (3) *Anabaena* (4) *Serytonema*
199. Which of the following microorganism is used for production of citric acid in industries?
 (1) *Aspergillus niger* (2) *Penicillium citrium*
 (3) *Rhizopus nigricans* (4) *Lactobairillus bulgaris*
200. Humulin is
 (1) Human insulin (2) A form of chitin
 (3) A powerful antibiotic (4) A new digestive enzyme

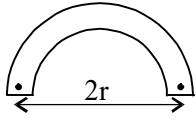
TEST NO. : 7**ANSWERS**

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

PHYSICS

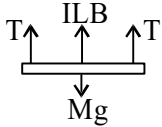
1. $M = m\ell$

When wire is bent into semi-circular arc then



$$M' = m \cdot 2r = m \cdot \frac{2\ell}{\pi} = \frac{2M}{\pi} \text{ (as } \ell = \pi r \text{)}$$

2. From FBD

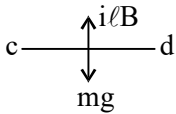


$$2T + ILB = Mg$$

$$T = \frac{Mg - ILB}{2}$$

3. Magnetic field does no work hence k.e. remains constant.

4. Induced e.m.f. = $B\ell v$



$$\therefore i = \frac{e.m.f.}{R} = \frac{B\ell v}{R}$$

For the steady speed of the rod $i\ell B = mg$

$$\frac{B\ell v}{R} \ell B = mg \quad v = \frac{mgR}{B^2 \ell^2}$$

5. \therefore Ring is not closed hence no induced current.

\therefore no opposition to motion.

6. Force on PQ is zero as $\vec{B} \parallel \vec{\ell}$.

7. $\xi = -L \frac{di}{dt} = -5 \times -2 = 10 \text{ volt}$

8. $V_L = V_C$

Circuit is at resonance. Hence circuit is resistive.

10. $V_{rms} = \sqrt{\frac{1}{T} \int_0^T V^2 dt} = \sqrt{\frac{1}{T} \int_0^T 10^2 dt} = 10 \text{ V.}$

12. Field at O due to straight part = $\frac{\mu_0 I}{2\pi a} (-\hat{j})$

Field at O due to semi-circular part = $\frac{\mu_0 I}{4a} (-\hat{k})$

$$\therefore \text{Net field} = \sqrt{\left(\frac{\mu_0 I}{2\pi a}\right)^2 + \left(\frac{\mu_0 I}{4a}\right)^2}$$

$$= \frac{\mu_0 I}{4\pi a} \sqrt{\pi^2 + 4}$$

13. Power factor = 0

15. $I = \frac{E - e}{R}$

$$5 = \frac{220 - e}{4}$$

$$\therefore e = 200 \text{ V}$$

16. $\frac{\text{Magnetic flux}}{\text{electric flux}} = \frac{\text{magnetic field}}{\text{electric field}} = \frac{B}{E}$

$\frac{E}{B}$ has dimension of velocity

$$\therefore \frac{B}{E} = L^{-1}T$$

17. \therefore Inductors are connected in parallel

$$\therefore V_1 = V_2$$

$$L_1 \frac{di_1}{dt} = L_2 \frac{di_2}{dt}$$

Integrating we get $L_1 i_1 = L_2 i_2$

$$\therefore \frac{i_1}{i_2} = \frac{L_2}{L_1}$$

19. For the circular loop to tip over torque due to magnetic field = torque due to gravity

$$\therefore Bi\pi r^2 = mgr$$

$$i = \frac{mg}{\pi r B}$$

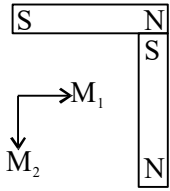
20. $\eta = \frac{\text{output power}}{\text{input power}} \times 100\% = \frac{11 \times 90}{220 \times 5} \times 100 = 90\%$

22. $W = \text{change in P.E.}$

$$= MB(1 - \cos \pi) = 2MB$$

$$= 2 \times 50 \times 2 \times \pi \times (4 \times 10^{-2})^2 \times 0.1 = 0.1 \text{ J}$$

$$23. \quad M = \sqrt{M_1^2 + M_2^2} = \sqrt{2} m \ell$$



24. As per ques

$$\frac{1}{8} \frac{\mu_0 I}{2R} = \frac{\mu_0 I R^2}{2(R^2 + x^2)^{3/2}}$$

Solving we get $x = \sqrt{3}R$

$$25. \quad B_y = 2 \sin 30 = 1 \text{ mT}$$

$$\text{Induced e.m.f.} = B \ell v = 10^{-3} \times 350 \times \frac{5}{18} \times 30 = 2.9 \text{ V}$$

$$27. \quad L = \frac{X_L}{\omega} = \frac{X_L}{2\pi f} = \frac{50}{2\pi \times 50} = 0.16 \text{ H}$$

$$28. \quad S = \frac{i_g R_g}{i - \ell_g}$$

$$i = 100 \text{ mA}$$

$$i_g = \frac{800}{40} \text{ mA} = 20 \text{ mA}$$

$$29. \quad \tan \phi = \frac{X_L - X_C}{R} = \sqrt{3}$$

$$\therefore \phi = 60^\circ$$

$$30. \quad \overline{DA} = -\sqrt{3}\hat{i} - \hat{k}$$

$$\overline{AB} = 2\hat{j}$$

$$\therefore \vec{M} = i(\overline{DA} \times \overline{AB}) = (\hat{i} - \sqrt{3}\hat{k}) \text{ Am}^2$$

$$31. \quad \xi = B \ell V_{\perp} = 2 \times 4 \times 1 \times \sin 30^\circ = 4 \text{ V}$$

$$\text{Force is } \vec{F} = q\vec{v} \times \vec{B}$$

Hence electron will drift towards right

$$32. \quad i_{rms} = \sqrt{\frac{1}{T} \int_0^T i^2 dt} = \sqrt{\int_0^1 9t^2 dt} = \sqrt{3} \text{ A}$$

$$34. \quad i = \frac{20 - L \frac{di}{dt}}{5}$$

As resistance increases so current decreases.

$$\therefore \frac{di}{dt} = \text{negative}$$

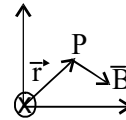
Hence numerator is greater than 20V. So current is greater than 4 A.

$$36. \quad i = i_0 e^{-t/t_0}$$

$$-\frac{di}{dt} = \frac{i_0}{t_0} e^{-t/t_0} \quad -\frac{di}{dt} = \frac{i_0}{t_0} = r$$

$$\therefore \text{required time} = \frac{i_0}{r} = t_0$$

38. The direction of \vec{B} is \perp_r to \vec{r}



$$40. \quad V = L \frac{di}{dt}$$

$$4t = \frac{di}{dt}$$

$$i = \int_0^4 4t dt = 32 \text{ A}$$

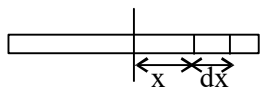
$$\therefore \text{energy stored} = \frac{1}{2} Li^2 = \frac{1}{2} \times 1 \times 32^2 = 512 \text{ J}$$

$$41. \quad V(t) = \left(\frac{4V_0}{T} \right) t; 0 \leq t \leq \frac{T}{4}$$

$$V_{rms} = \sqrt{\frac{\int_0^{T/4} \frac{16V_0^2}{T^2} t^2 dt}{T/4}} = \frac{v_0}{\sqrt{3}}$$

$$43. \quad \vec{F}_m = q\vec{v} \times \vec{B} = 4q\hat{k} - 6q\hat{j}$$

$$44. \quad |\xi| = \int_{-\ell}^{\ell} B \omega x dx = 0$$



$$45. \frac{1}{2} CV^2 = \frac{1}{2} \left(\frac{1}{2} CV^2 \right) \text{ or } \frac{q^2}{2C} = \frac{1}{2} \frac{Q^2}{2C}$$

$$\therefore q = \frac{Q}{\sqrt{2}}$$

47. Input in primary is dc hence no mutual induction.

$$48. L \propto n^2 r \quad n_1 \times 2\pi r_1 = n_2 \times 2\pi r_2$$

$$\therefore \frac{r_1}{r_2} = \frac{n_2}{n_1} = 3$$

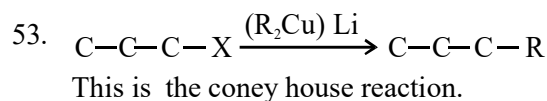
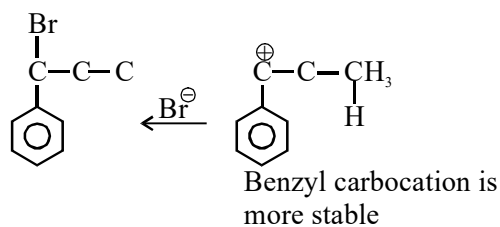
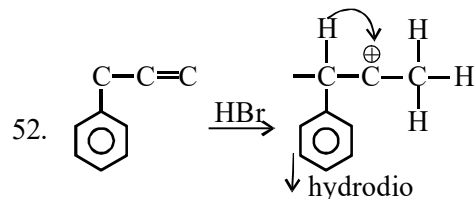
$$\therefore \frac{L_1}{L_2} = \left(\frac{n_1}{n_2} \right)^2 \times \frac{r_1}{r_2} = \frac{1}{9} \times 3 = \frac{1}{3}$$

$$50. i = \frac{Q\omega}{2\pi} \quad M = iA = \frac{Q\omega}{2\pi} \cdot \pi R^2 = \frac{Q\omega R^2}{2}$$

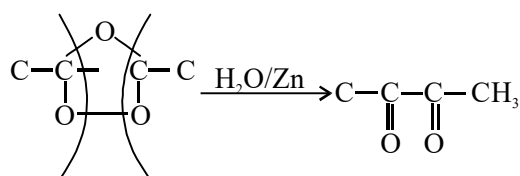
CHEMISTRY

51. Aromatic character is defined by

(i) $(4n+2)\pi$ electron (ii) Planar



54. Ozonolysis causes breaking of double bond

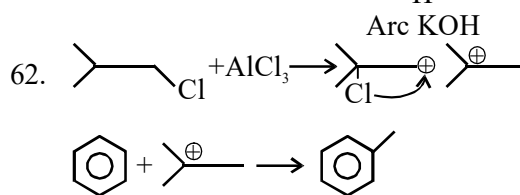
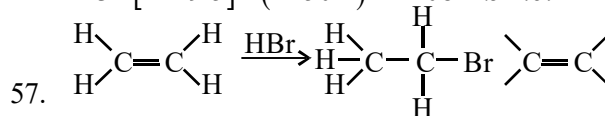


55. Enthalpy of hydrogenation of benzene

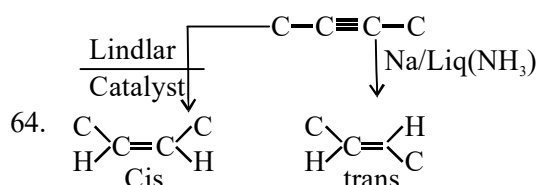
= $3 \times$ Enthalpy of hydrogenation of cyclohexene

Resonance energy of Benzene

$$= 3 \times [-119.5] - (-150.4) = -208.1 \text{ kJ mol}^{-1}$$



63. Na dissolves in $NH_3(l)$ and hence this reaction is an example of homogeneous catalysis.



77. Quinoid form does show tautomerism.

78. None +I or +R group

None will be its stability.

80. Carbanion is stabilized by presence of EWG Groups

81. +R $\rightarrow OCH_3$ (shows)

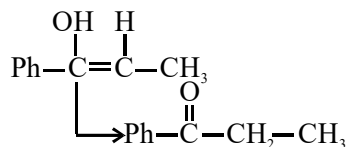
$CH_3 \rightarrow$ undergoes (Hyperconjugation)

$CF_3 \rightarrow$ EWG

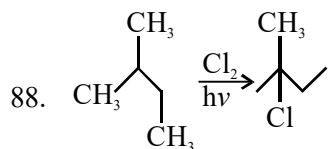
So, order is III > I > II > IV

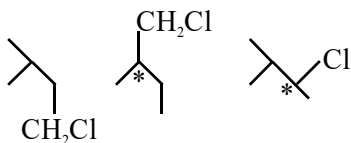
82. It follows Markovnikov Addition Benzyle
Formation of & Stable

carbocation



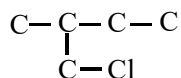
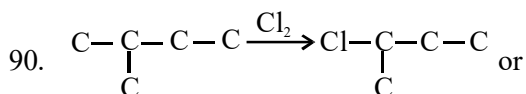
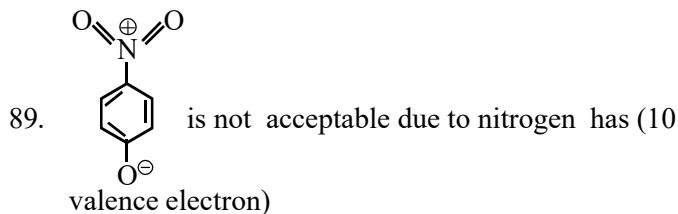
84. Electron donating ($NHCOCH_3$) ortho para directing



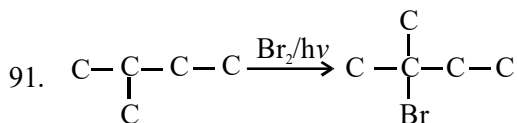


Total 6-isomers out of which only 4 isomers will be obtained on fractional distillation as (d + 1) mixture will not be separated by distillation.

Methods used for separation of optically active compounds are /Chromatography, Mechanical separation, Biochemical separation, Chemical separation.



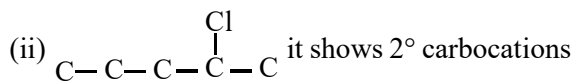
It will exist as enantiomeric pairs



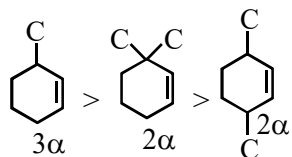
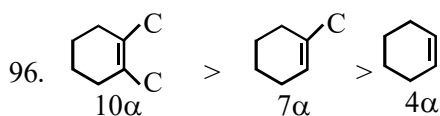
Presence of sunlight subtraction of H- atoms $3^\circ\text{H} > 2^\circ\text{H} > 1^\circ\text{H}$

92. Anti Markovnikov Addition occurs

35. (i) $\text{CH}_2 = \text{CH} - \text{CH}(\text{Cl})\text{CH}_3$ Allylic form shows Resonance stabilised carbocation

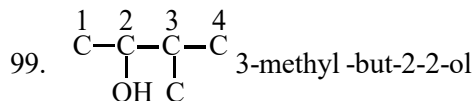
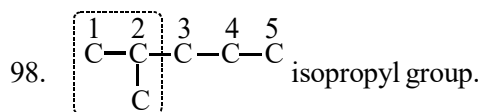


(iii) $\text{C}-\text{C}-\text{C}-\text{Cl}$ it is 1°



97. Reactivity depends on stability of carbocation. Due to this E.W.G. - stability decreases

Reactivity \propto electron donating ability
 $(\text{NH}_2 > \text{OH} > \text{CH}_3)$



100. OCH_3

It shows +M effect & resonance stabilised para & ortho form.

Ortho feels steric hindrance.

BOTANY

101. d - fusion of reproductive cells during sexual reproduction is Amphimixis.

105. Non succulents are true xerophytes which do not store water.

106. Potamogeton is a submerged hydrophyte.

119. Because they convert the plant material into animal material.

123. It is Gause's principle of competitive exclusion.

129. Nudation is the first step in the primary succession, which is creation of bare area through any natural agency.

ZOOLOGY

151. Origin of amphibians occurred during Devonian period.

Carboniferous period is characterised by the origin of reptiles.

153. According to Hardy - Weinberg law

$$(p + q)^2 = p^2 + 2pq + q^2$$

p^2 = Frequency Homozygous dominant

$2pq$ = Frequency of Heterozygous

q^2 = frequency of homozygous recessive

$$\therefore 2pq = 2(0.7 \times 0.3)$$

$$= 2(0.21) = 0.42$$

175. Botulism is caused by *Clostridium botulinum*