NEET
MODEL QUESTION PAPER 2

NATIONAL TESTING AGENCY

Excellence in Assessment

PHYSICS

1. What minimum energy required to launch a satellite of mass m from the surface of a planet of mass M and radius R in a circular orbit at an altitude of 2R?

1) $\frac{5GmM}{6R}$

2) $\frac{2GmM}{3R}$

3) $\frac{GmM}{2R}$

4) $\frac{GmM}{3R}$

2. Two moles of oxygen is mixed with eight moles of helium. The effective specific heat of the mixture at constant volume is:

1) 1.3R 2) 1.4R

3) 1.7R 4) 1.9R

3. The fundamental frequency of a closed organ pipe of length 20 cm is equal to the second overtone of an organ pipe open at both the ends. The length of organ pipe open at both the ends is

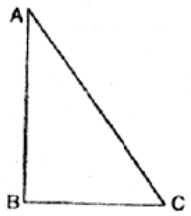
1) 140 cm

2) 80 cm

3) 100 cm

4) 120 cm

4. Three rods of identical cross-sectional area and made from the same metal form the sides of an isosceles triangle ABC right angled at B. The points A and B are maintained at temperatures T and $\sqrt{2}T$ respectively in the steady state. Assuming that only heat conduction takes place, temperature of point C will be:



1) $\frac{3T}{\sqrt{2}+1}$

2) $\frac{T}{\sqrt{2}+1}$

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

4) $\frac{T}{\sqrt{2}-1}$

5. If two rods of length L and 2L having coefficient of linear expansion α and 2α respectively are connected so that total length becomes 3L, the average coefficient of linear expansion of the composition rod equals.

1) $\frac{3}{2}\alpha$

2) $\frac{5}{2}\alpha$

3) $\frac{5}{3}\alpha$

4) $\frac{7}{3}\alpha$

6. A bullet of mass $10 \times 10^{-3} kg$ moving with a speed of 20 ms^{-1} hits an ice block (0° C) of 900 g kept at rest on a frictionless floor and gets embedded in it. If ice takes 50% of KE lost by the bullet, the amount of ice melted (in grams) approximately is: (J=4.2 J/Cal; latent heat of ice = 80 cal/g)

1) 6 2) 3

3) 6×10^{-3} 4) 3×10^{-3}

7. The coefficient of performance of a refrigerator is 5. If the temperature inside is -20°C, the temperature of the surroundings to which it rejects heat is

1) 21°C

2) 31°C

3) 41°C

4) 41°C

8. A circular hole is made in a steel square plate. The plate is now heated and allowed to expand. Which of the following statements is correct?

1) Radius of the hole starts to decrease.

2) Radius of the hole starts to increase.

3) Radius of the hole will remain constant.

4) Nothing can be said about change in radius of the hole because ratio of initial radius of hole to initial dimension of the plate is not known.

9. A cylinder of radius r and of thermal conductivity K_1 is surrounded by a

cylindrical shell of inner radius r and outer radius 2r made of a material of thermal conductivity K_2. The effective thermal conductivity of the system is

1) $\frac{1}{3}(K_1 + 2K_2)$

2) $\frac{1}{2}(2K_1 + 3K_2)$

3) $\frac{1}{3}(3K_2 + 2K_1)$

4) $\frac{1}{4}(K_1 + 3K_2)$

10. Two absolute scales (of temperature) A and B have freezing points of water defined to be 200 A and 350 B. What is the relation between T_A and T_B?

1) $T_A = \frac{2}{7}T_B$

2) $T_A = \frac{4}{7}T_B$

3) $T_A = \frac{5}{7}T_B$

4) $T_A = \frac{6}{7}T_B$

11. In a Young's double slit experiment the intensity at a point where the path difference is $\frac{\lambda}{6}$ (λ being the wavelength of the light used) is I. If I_0 denotes the maximum intensity, then I/I_0, is

1) $\frac{1}{\sqrt{2}}$

2) $\frac{\sqrt{3}}{2}$

3) $\frac{1}{2}$

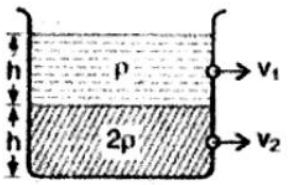
4) $\frac{3}{4}$

12. Equal volumes of two immiscible liquids of densities ρ and 2ρ are filled in a vessel as shown in figure. Two small holes are punched at depth h/2 and 3h/2 from the surface of lighter liquid. If v_1 and v_2 are the velocities of efflux at these two holes, then v_1/v_2 is:

1) $\frac{1}{2\sqrt{2}}$

2) $\frac{1}{2}$

3) $\frac{1}{4}$



4) $\frac{1}{\sqrt{2}}$

13. A far sighted man cannot focus distinctly on objects closer than 1 m. The power of the lens that will permit him to read from a distance of 40 cm is

1) 3.5 D

2) 2.5 D

3) 1.5 D

4) 0.5 D

14. A cube made of material having a density of $0.9 \times 10^3 kg/m^3$ just floats in water and liquid of density is $0.7 \times 10^3\ kg/m^3$ which is immiscible with water. What part of the cube is immersed in water?

1) $\frac{1}{3}$ 2) $\frac{2}{3}$

3) $\frac{3}{4}$ 4) $\frac{3}{7}$

15. An AND gate is followed by a NOT gate in series with two inputs A and B, the Boolean expression for the output Y will be

1) $A.B$

2) $A + B$

3) $\overline{A + B}$

4) $\overline{A.B}$

16. Two separate air bubbles of radii 0.002 m and 0.004 m are formed of the same liquid of surface tension $0.07\ Nm^{-1}$ come together to form a double bubble. The radius and the tense of the curvature of internal film surface, common to both the bubbles is:

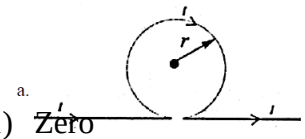
1) 0.002 m concave towards smaller bubble

2) 0.003 m concave towards smaller bubble

3) 0.004 m concave towards smaller bubble

4) 0.005 m concave towards smaller bubble

17. An infinite long wire is bent into the shape as shown in the fig. If it carries a current I ampere and the radius of circular loop is r metre. Then the magnetic induction B at the centre of the circle is



1) Zero
2) Infinity
3) $\frac{\mu_0}{4\pi}\frac{2I}{r}[\pi+1]$
4) $\frac{\mu_0}{4\pi}\frac{2I}{r}[\pi-1]$

18. A drop of water volume V is pressed between the two glass plates so as to spread to an area A. If T is the surface tension, the normal force required to separate the glass plates is:

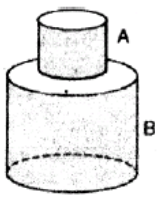
1) $\frac{TA^2}{V}$
2) $\frac{2TA^2}{V}$
3) $\frac{4TA^2}{V}$
4) $\frac{TA^2}{2V}$

19. A proton, a deuteron and α – particle with the same KE enter in a region of uniform magnetic field, moving at right angles to B. What is the ration of the radii of their circular paths?

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

20. Two cylinders A and B of the same material have same length, their radii being in the ratio of 1:2 respectively. The two are joined end to end as shown in the adjoining figure. The upper end of A is rigidly fixed. The lower end of B is twisted through an angle θ, the angle of twist of the cylinder A is:

1) $\frac{15}{16}\theta$
2) $\frac{16}{15}\theta$



3) $\frac{16}{17}\theta$
4) $\frac{17}{16}\theta$

21. The power of a biconvex lens is 10 dioptre and the radius of curvature of each surface is 10 cm. Then refractive index of the material of the lens is

1) $\frac{3}{2}$
2) $\frac{4}{3}$
3) $\frac{9}{8}$
4) $\frac{5}{3}$

22. A solid sphere of mass M and radius R has a spherical cavity of radius $\frac{R}{2}$ such that centre of cavity is at a distance $R/2$ from the centre of the sphere. A point mass m is placed inside the cavity at a distance R/4 from the centre of the sphere. The gravitational pull between the sphere and the point mass m is:

1) $11\ GMm/R^2$
2) $14\ GMm/R^2$
3) $GMm/2R^2$
4) GMm/R^2

23. A fully charged capacitor C with initial charge q_0 is connected to a coil of self inductance L at $t = 0$. The time at which the energy is stored equally between the electric and magnetic field is :-

1) $\frac{\pi}{4}\sqrt{LC}$
2) $2\pi\sqrt{LC}$
3) $\sqrt{LC}$
4) $\pi\sqrt{LC}$

24. A solid iron sphere A rolls down an inclined plane, while an identical hollow sphere B of same mass slides down the plane in a frictionless manner. At the bottom of the inclined plane, the total kinetic energy of sphere A is

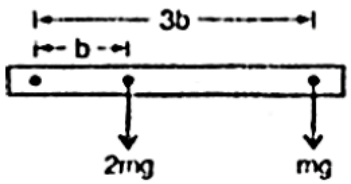
1) Less than that of B
2) Sometimes more and sometimes less
3) More than that of B
4) Equal to that of B

25. In L-R circuit, the A.C. source has voltage 220 V. If potential difference across inductance is 176 V, the potential difference across the resistance will be

1) 86 V
2) 110 V
3) 132 V
4) 220 V

26. A rod of negligible mass is pivoted at one end so that it can swing freely as a pendulum. Two masses 2m and m are attached to it at distances b and 3b respectively, from the pivot. Initially the rod is held horizontal and then released at the free end. Then the angular acceleration of the rod at the instant it is released is:

1) $\frac{2g}{11b}$
2) $\frac{4g}{17b}$
3) $\frac{5g}{11b}$
4) $\frac{5g}{12b}$



27. Two short bar magnets with magnetic moment $8Am^2$ are placed 35 cm apart along their common axial line with their like poles facing each other. The neutral point is

1) Midway between them
2) 21 cm from weaker magnet
3) 14 cm from weaker magnet
4) 27 cm from weaker magnet

28. A proton is kept at rest. A positively charged particle is released from rest at a distance *d* in its field. Consider two experiments one in which the charged particle is a proton and in another the charged particle is a positron.

In the same time t, the work done on the two moving charged particles is:

1) Same as the same force law is involved in the two experiments
2) Less for the case of a positron, as the positron moves away more rapidly and the force on it weakens
3) More for the case of a positron, as the positron moves away a larger distance
4) Same as the work done by charged particle on the stationary proton

29. Magnitude of electric field at far away distance 'r' on the axis of a dipole is E_0. What is the electric field at a distance 2r on perpendicular bisector?

1) $E_0/16$
2) $E_0/32$
3) $E_0/8$
4) $E_0/4$

30. A vertical spring with force constant K is fixed on a table. A ball of mass *m* at a height *h* above the free upper end of the spring falls vertically on the spring, so that the spring is compressed by a distance *d*. The net work done in the process is

1) $mg(h+d)+\frac{1}{2}kd^2$
2) $mg(h+d)-\frac{1}{2}kd^2$
3) $mg(h-d)-\frac{1}{2}kd^2$
4) $mg(h-d)+\frac{1}{2}kd^2$

31. A wire of resistance 4Ω is stretched to twice its original length. In the process of stretching, its area of cross section gets halved. Now, the resistance of the wire is

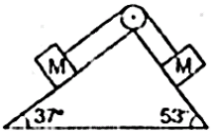
1) 8Ω
2) 16Ω
3) 1Ω

4) 4Ω

32. The acceleration of system of two bodies over the wedge as shown in the figure is

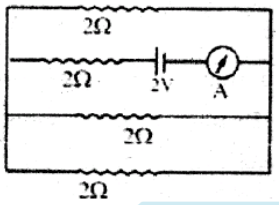
$$g = \frac{10m}{sec^2}\left(sin\,37° = \frac{3}{5}, sin\,53° = \frac{4}{5}\right)$$

1) $1\ ms^{-2}$
2) $2\ ms^{-2}$
3) $0.5\ ms^{-2}$
4) $10\ ms^{-2}$



33. The reading of the ammeter as per figure shown is

1) $\frac{1}{8}A$
2) $\frac{3}{4}A$
3) $\frac{1}{2}A$
4) $2A$



34. A uniform chain of length l and m is hanging vertically from its end A and B which are suspended close together. At a given instant the end B is released. What is the tension at A when B has fallen a distance $x(x < l)$?

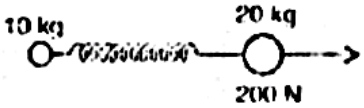
1) $\frac{mg}{2}\left[1 + \frac{3x}{l}\right]$
2) $mg\left[1 + \frac{2x}{l}\right]$
3) $\frac{mg}{2}\left[1 + \frac{x}{l}\right]$
4) $\frac{mg}{2}\left[1 + \frac{4x}{l}\right]$

35. Two identical long conducting wires AOB and COD are placed at right angle to each other, with one above other such that O is their common point for the two. The wires carry I_1 and I_2 currents respectively. Point P is lying at distance d from O along a direction perpendicular to the plane containing the wires. The magnetic field at the point P will be

1) $\frac{\mu_0}{2\pi d}\left(\frac{I_1}{I_2}\right)$
2) $\frac{\mu_0}{2\pi d}(I_1 + I_2)$
3) $\frac{\mu_0}{2\pi d}(I_1^2 - I_2^2)$
4) $\frac{\mu_0}{2\pi d}(I_1^2 + I_2^2)^{1/2}$

36. Two masses of 10 kg and 20 kg respectively are connected by a massless spring as shown in figure. A force of 200 N acts on the 20 kg mass. At the instant when the 10 kg mass has an acceleration of 12 ms^{-2}, the acceleration of the 20 kg mass is:

1) $2\ ms^{-2}$
2) $4\ ms^{-2}$
3) $10\ ms^{-2}$
4) $20\ ms^{-2}$

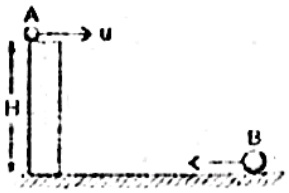


37. A particle of charge q and mass m performs uniform circular motion. If L and M are its angular momentum and magnetic moment respectively then L/M is :

1) $\frac{q}{2m}$
2) $\frac{2m}{q}$
3) $\frac{m}{q}$
4) $\frac{q}{m}$

38. The two particles A and B are placed as shown in the figure. The particle A on the top of tower, is projected horizontally with a velocity u and the particle B is projected along the surface towards the tower simultaneously. If the two particles meet at a point on the ground, then the speed of projection of particle B is : [Ignore friction]

1) $d\sqrt{\frac{g}{2H}} - u$
2) $d\sqrt{\frac{g}{2H}}$
3) $d\sqrt{\frac{g}{2H}} + u$
4) u



39. The half life of the radioactive isotope X is 20 years. It decays to another

element 'Y' which is stable. The two elements X and Y were found to be in the ratio 1 : 7 in a sample of a given rock. The age of the rock estimated to be _____ years

1) 40
2) 60
3) 80
4) 100

40. If vectors $\vec{A} = cos\, w\hat{i} + sin\, w\hat{j}$ and $\vec{B} = cos\frac{wt}{2}\,\hat{i} + sin\frac{wt}{2}\,\hat{j}$ are functions of time, then the value of t at which they are orthogonal to each other is

1) $t = \frac{\pi}{\omega}$
2) $t = \frac{\pi}{4\omega}$
3) $t = \frac{\pi}{2\omega}$
4) $t = 0$

41. The current gain in the common emitter mode of a transistor is 10. The input impedance is and load of resistance is 100 $K\Omega$. The power gain is

1) 300
2) 500
3) 200
4) 100

42. A self-propelled vehicle of mass m whose engine delivers constant power p has an acceleration, $a = (p/mv)$ [assume that there is no friction]. In order to increase its velocity from v_1 to v_2, the distance it has to travel will be:

1) $\frac{m}{3p}(v_2^3 - v_1^3)$
2) $\frac{3p}{m}(v_2^2 - v_1^2)$
3) $\frac{m}{3p}(v_2^2 - v_1^2)$
4) $\frac{m}{3p}(v_2 - v_1)$

43. The amplitude of a damped oscillator becomes $\left(\frac{1}{3}\right)$ times of original amplitude in 2 seconds. If its amplitude after 6 seconds is $\frac{1}{n}$ times the original amplitude, the value of n is

1) 3^2
2) 3^3
3) $\sqrt[3]{3}$
4) 2^3

44. A physical quantity $P = \frac{\sqrt{abc^2}}{d^3e^{1/3}}$ is determined by measuring a, b, c, d and e separately with the percentage error of 2%, 3%, 2%, 1% and 6% respectively. Minimum amount of error is contributed by the measurement of:

1) b
2) a
3) d
4) e

45. A parallel plate air capacity C distance of separation between plates is d and potential difference V is applied between the plates force of attraction between the plates of the parallel plate air capacitor is

1) $\frac{C^2V^2}{2d^2}$
2) $\frac{C^2V^2}{2d}$
3) $\frac{CV^2}{2d}$
4) $\frac{CV^2}{d}$

CHEMISTRY

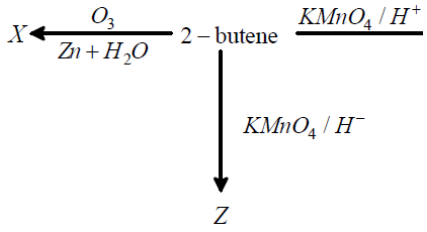
46. Which of the following is lighter Radio active Isotope?

1) ${}_1H^2$
2) $2He^4$
3) ${}_1H^1$
4) ${}_1H^3$

47. Which of the following is herbicide

1) 2, 4-D
2) $NaClO_3$
3) Na_3AsO_3

4) all



48.

Correct statement is

1) "X" is acetaldehyde
2) "Y" is acetic acid
3) "Z" is butane 2,3-diol
4) all are correct

49. IUPAC name of $K_2[Cr(CO)(CN)_5]$ is

1) potassium penta cyanocarbonyl chromate (III)
2) di potassium carbonyl pentacynochromium (III)
3) potassium carbonyl pentacyane chromium complex
4) potassium carbonyl penta cyanochromate (III)

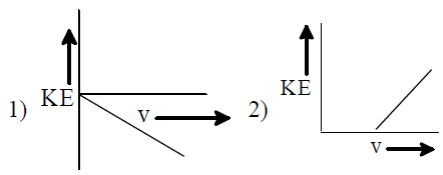
50. Which of the following has more Osmotic pressure?

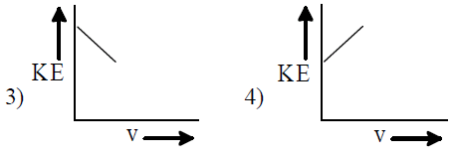
1) NaCl
2) $MgCl_2$
3) Na_2SO_4
4) $Al_2(SO_4)_3$

51. Calcium phosphate is a sparingly soluble salt. The solubility of it in aqueous solution

1) increases at higher p^H
2) increases with increase in p^H
3) decreases at lower p^H
4) increases at lower p^H

52. Which of the following graph represents photoelectric effect



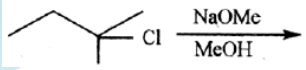


53. Which of the following is incorrect against its property

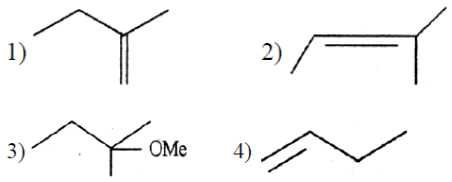
1) $XeO_3 < XeO_4$ increase in bond angle
2) $ClF_3 < SO_2 < LiF$ increase in ionic character
3) $NO < NO^+$ increase in bond order
4) $NH_3 < NH^+$

54. The rate of reaction doubles when its temperature changes from 300k to 310K. Activation energy of such a reaction will be ($R = 8.314\ jk^{-1}$ and $log2 = 0.301$)

1) 53.6 $kJ\ mol^{-1}$
2) 48.6 $kJ\ mol^{-1}$
3) 58.5 $kJ\ mol^{-1}$
4) 60.5 $kJ\ mol^{-1}$

55. 

The product formed is



56. The wave number of electromagnetic radiation emitted during the transition between two energy levels of Li^{2+} ion whose principal quantum numbers sum is 4 and difference is 2, is

1) 3.5 R_H
2) 4 R_H
3) 8 R_H
4) $\frac{8}{9}R_H$

57. Assuming that 'l' value is equal to 'n' value then the number of elements that can be placed in second period are

1) 8

2) 18

3) 32

4) 10

58. CFC's are effective scavengers for ozone due to

1) Photolytic reaction of O_2 producing O_2

2) Photolytic reaction of O_3 producing O_2

3) Photolytic reaction of CFC's producing chorine radicals

4) Photolytic reaction of water vapour

59. $C_2H_5NH_2 + CS_2 \xrightarrow{Warm} A \xrightarrow{HgCl_2} B + HCl + HgS$. In the above sequence 'B' is

1) $C_2H_5 - CNS$

2) C_2H_5CN

3) C_2H_5SCN

4) C_2H_5NCS

60. KO_2 exhibits paramagnetic behavior. This is de to the paramagnetic nature of

1) KO^-

2) KO^+

3) O_2

4) O_2^-

61. 3.9 g of benzoic acid is dissolved in 49g of benzene shows a depression in freezing point of 1.62k. if K_f for benzene is 4.9 k kg mol^{-1} and molar mass of benzoic acid is 122 g mol^{-1} then

1) benzoic acid dimerises by 98.6% in the solution

2) benzoic acid dimerises by 50.7% in the solution

3) benzoic acid is dissociated by 98.6% in the solution

4) benzoic acid is dissociated by 50.7% in the solution

62. INCORRECT statement among the following is

1) Specific conductance decreases with dilution

2) Molar conductance increases with dilution

3) Λ_0 of a weak electrolyte cannot be calculated by extrapolation of the graph between Λ and $\sqrt{e}$

4) Molar conductance of a strong electrolyte increases with dilution due to increased ionization of electrolyte with dilution

63. Which types of defect is produced when $NaCl$ crystal is doped with $SrCl_2$

1) Cation vacancy defect

2) Non-stoichiometric defect

3) impurity defect

4) all

64. Assertion (A): Net dipolemoment of NH_3 is more than that of NF_3

Reason (A) : The direction of orbital dipole of lone pair in NH_3 is opposite to that of in NF_3

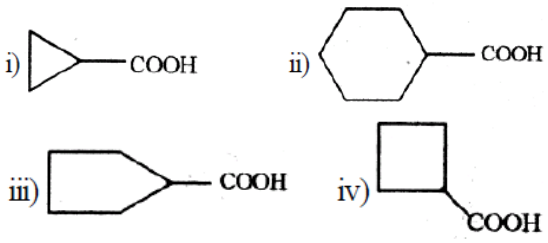
1) Bothe A and R are correct. R is the correct explanation of A.

2) Both A and R are correct. R is not the correct explanation of A

3) A is true but R is false

4) A is false but R is true

65. Arrange the following in the increasing order of their p^H values.



1) $i < ii < iii < iv$

2) $i < iv < iii < ii$

3) $i < iii < iv < ii$

4) $ii < iii < iv < i$

66. INCORRECT order along the following relation is

1) Acidic character: $H_2O > H_2S > H_2Se > H_2Te$

2) Bond dissociation enthalpy: $H_2O > H_2S > H_2Se > H_2Te$

3) Reducing property: $H_2Te > H_2Se > H_2S$

4) Boiling point: $H_2O > H_2Te > H_2Se > H_2S$

67. Which of the following monomers are unsuitable for condensation polymerization

1) propanoic acid and ethanol

2) butane – dioic acid and glycol

3) diamines and dicarboxylic acid

4) hydroxyl acids

68. A process is spontaneous at all temperatures when

1) $\Delta H = -ve, \Delta S = -ve$

2) $\Delta S = +ve, \Delta H = -ve$

3) $\Delta H = +ve, \Delta S = +ve$

4) All

69. Which of the following acts as a powerful oxidizing agent in the aqueous solution

1) Al^{3+}

2) Ga^{3+}

3) Tl^{3+}

4) In^{3+}

70. The moisture present in ammonia may be removed by using

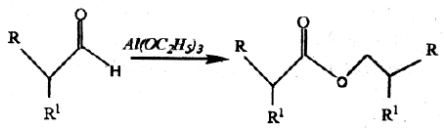
1) Milk of lime

2) Quick lime

3) $P_4O + O_{10}$

4) $anhydrous\ CaCl_2$

71.



This reaction is known as

1) Tischchenko reaction

2) Cannizzaro reaction

3) Aldol condensation

4) Oppenauer oxidation

72. For the reaction $2N_{2O_5} \rightarrow 4NO_2 + O_2$, the unit of rate of reaction is

1) $mol^{-1}\ lit^{-1}$

2) s^{-1}

3) $mol^{-1}\ lit^{-2}\ s^{-1}$

4) $mol\ lit^{-1}\ s^{-1}$

73. The ratio of r.m.s velocity of CH_4 at 27°C to most probable velocity of SO_2 at 327°C is

1) 1 : 1

2) $1:\sqrt{3}$

3) $\sqrt{3} : 1$

4) $\sqrt{2}:1$

74. The catalyst used in the preparation of high density polythene is

1) Ziegler-Natta catalyst

2) V_2O_5

3) Pd

4) Ni

75. Solid soda lime combines with the following at high temperatures

1) CaO

2) N_2O

3) BaO

4) P_4O_{10}

76. The order of decreasing stability of the given carb anions is

I) $(CH_3)_3C^-$ II) $(CH_3)_2CH^-$
III) $CH_3CH_2^-$ IV) $C_6H_5CH_2^-$

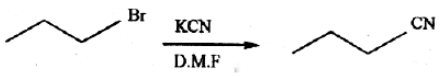
1) I > II > III > IV

2) IV > III > II > I

3) IV > I > II > III

4) I > II > IV > III

77.



In this reaction, the concentration of KCN is increased by two folds then what will be it's effect on rate of formation of alkyl cyanide.

1) increases by the two times
2) No change takes place
3) increases by four times
4) decreases by two times

78. The correct match is

	Ion	Colour	Magnetic moment
1)		Blue	3.73 BM
2)	$Ni^{+2}_{(aq)}$	Green	4.9 BM
3)	$Ti^{+2}_{(aq)}$	Colourless	1.73 BM
4)	$Mn^{+2}_{(aq)}$	Pink	5.92 BM

79. $E^0_{MnO_4^{2-}/MnO_2} = 2.26\ V$ and $E^0_{MnO_4^{-}/MnO_4^{2-}} = +05V$;then which of the following reaction is spontaneous.

1) $MnO_4^{2-} \rightarrow MnO_4^{-1}$
2) $MnO_4^{-1} \rightarrow MnO_2 + MnO_4^{2-}$
3) $MnO_2 \rightarrow MnO_4^{2-}$
4) All reactions are spontaneous

80. The electronic configuration of an elemetnt 'M' is $[Rn]7s^2\ 6d^2$ belongs to

1) s-block
2) p-block
3) d-block
4) f-block

81. Branched polymer(s) of glucose

1) Glycogen
2) amylopectin
3) Cellulose
4) both 1 and 2

82. The percentage by volume of C_3H_8 in a gaseous mixture of C_3H_8, CH_4 and CO is 20. When 100 mL of the mixture is burnt in excess of O_2, the volume of CO_2 produced is:

1) 90 mL
2) 160 mL
3) 140 mL
4) none of these

83. The formation of following species involve 2s-2p mixing

1) N_2
2) O_2
3) B_2
4) both 1 and 3

84. The angular momentum of electron of H-atom is proportional to : (r= radius of orbit)

1) r^2
2) $\frac{1}{r}$
3) $\sqrt{r}$
4) $\frac{1}{\sqrt{r}}$

85. $\frac{N_0}{2}$ atoms of $X_{(g)}$ are converted into $X^+_{(g)}$ by enthalpy change ΔH_1. If $\frac{N_0}{2}$ atoms of $X_{(g)}$ are converted into $X^-_{(g)}$ by enthalpy change ΔH_2. The value of ionization enthalpy of X is

1) $\frac{2(\Delta H_2 - \Delta H_1)}{N_0}\ atom^{-1}$
2) $\frac{2\Delta H_1}{N_0}\ atom^{-1}$
3) $\frac{N_0}{2\Delta H_1}\ atom^{-1}$
4) $\frac{2N_0}{\Delta H_1}\ atom^{-1}$

86. 1 mole of each of x_1, x_2, x_3 with van der Waals constants 'a' (in aim $L^3\ mol^{-2}$) 1.0,3.8, 2.1 respectively is kept separately in three different vessels of equal volume at identical temperature. Their pressures are observed to P_1, P_2 and P_3 respectively. On the basis of this data alone, select the correct option is (neglect the effect of 'b')

1) $P_1 < P_2 < P_3$

2) $P_2 < P_1 < P_3$

3) $P_2 < P_3 < P_1$

4) $P_1 = P_2 = P_3$

87. Which of the following does not give chromyl chloride test

1) $CaCl_2$

2) $NaCl$

3) Hg_2Cl_2

4) $MgCl_2$

88. Determine the enthalpy of formation of $B_2H_6(g)$; *in kJ/mol* of the following reaction

$B_2H_6(g) + 3O_2(g) \rightarrow B_2O_3(g) + 3H_2O(g)$

Given: $\Delta_r H^0 = -1941$ kJ/mol

$\Delta H_f^0(B_2O_3, s) = -1273$ kJ/mol

$\Delta H_f^0(H_2O, g) = -241.8$ kJ /mol

1) -75.6

2) +75.6

3) -57.4

4) -28.4

89. Crystal field stabilization energy for high spin d^4 octahedral complex is

1) $-1.2\ \Delta_0$

2) $-0.6\ \Delta_0$

3) $-0.8\ \Delta_0$

4) $-1.6\Delta_0 + P$

90. In a system $A(s) \rightleftharpoons 2B(g) + 3C(g)$, if the concentration of C at equilibrium is increased by a factor of 2, it will cause the equilibrium concentration of B to change to:

1) two times the original value

2) one half of its original value

3) $2\sqrt{2}$ times to the original value

4) $\frac{1}{2\sqrt{2}}$ times the original value

BOTANY

91. Arrange the following in correct descending order based on their number.

I) Anionic microelements

II) Mineral Macroelements

III)Cationic macroelements

IV) Micro Elements

1) IV, II, III, I

2) I, III, II, IV

3) IV, II, I, III

4) IV, I

92. Which of the following techniques is most widely employed to check the progress of restriction enzyme digestion?

1) Agarose gel electrophoresis

2) Centrifugation

3) Polyacrylamide gel electrophoresis

4) Polymerase chain reaction

93. The amount of reducing power requited in biological N_2 fixation for the formation of 50 H_2 along with Ammonia is

1) $200\ H^+;\ 200e, 400\ ATP$

2) $400\ H^+;\ 400e, 200\ ATP$

3) $400\ H^+; 400e, 400\ ATP$

4) $400\ H^+;\ 400e, 800\ ATP$

94. Identify the set of characteristics related to plants belonging to Family Solanaceae from the following

1) Papilionaceous corolla, axile placentation and leguminous fruit

2) actinomorphic flower, syncarpour ovary and marginal placentation.

3) Vexillary aestivation of corolla, diadelphous stamens and monocarpellary, unilocular ovary.

4) Persistent calyx, epipetalous stamens, oblique septum and swollen placenta.

95. Assertion (A) Photosynthesis is a photochemical and redox process.

Reason (R) : Photosynthesis is an anabolic and endergoing process.

1) A and R are true and R is the correct explanation of A
2) A and R are true and R is not the correct explanation of A
3) A is true, R is false.
4) A is false, R is true.

96. Select the correct match.

(A) SPhase – DNA replication

(B) Zygotene – Synapsis

(C) Diplotene – Crossing over

(D) meiosis – Both haploid and diploid cells

1) A and B
2) C and D
3) C and E
4) A,C and E

97. Match the following.

List – I	**List –II**
A) OEC transport	I) Reductant of PA in non – cyclic e^-
B) Quinone cycle	II) Photolysis of H_2O which increases H^+ Concentration in Lumen
C) Reduction of $NADP^+$	III) Reductant of $NADP^+$ in Non-cyclic e^- transport
D) Ferredoxin (Fd) which	IV) Proton pump Increases proton Gradient across the thylakoid membrane
	V) Reduce the proton concentration in stroma

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

98. Which one of the following cannot be explained on the basis of Mendel's Law of Dominance?

1) the discrete unit controlling a particular character is called a factor
2) out of one pair of factors one is dominant, and the other recessive
3) alleles do not show any blending and both the characters recover as such in F_2 generation.
4) factors occur in pairs

99. Identify the correct statements

I) Blue green algae – RuBisCO is found in cytosol.

II) Mesophyll of C_3 plant- Photosynthetically similar cells with RuBisCO enzyme.

III) Leaf of C_4 plant – Photosynthetically two types of cells, as bundle sheath cells with RuBisCO and mesophyll cells with PEP case.

IV) Mesophyll of CAM plant – Photosynthetically one type cells, each with both RuBisCO and PEP case.

1) I and II
2) III only
3) III and IV
4) All are correct

100. The correct sequence of serai stages in hydrosere is

1) plankton, submerged, floating, reed swamp, sedge meadow, woodland
2) plankton, floating, submerged, reed swamp, sedge meadow, woodland
3) plankton, submerged, floating, sedge meadow, reed swamp, woodland
4) plankton, submerged, floating, sedge meadow, woodland reed swamp

101. Photorespiration is a wasteful process, involving the release of CO_2 and utilizing ATP that occurs in

1) Photosynthetic cells only
2) All types of photosynthetic cells
3) CAM plants during night
4) Mesophyll cells of C_4 plants

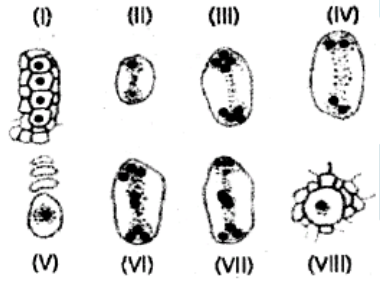
102. The correct floral formula of Tephrosia is

1) $\% \Diamond^{\uparrow} K_{(5)} C_{1+(2)+2} A_{(9)+1} \underline{G}_1$
2) $\% \Diamond^{\uparrow} K_5 C_{1+(2)+2} A_{(9)+1} \underline{G}_1$
3) $\% \Diamond^{\uparrow} K_{(5)} C_{1+2+(2)} A_{(9)+1} \underline{G}_1$
4) $\% \Diamond^{\uparrow} K_{(5)} C_{1+2+(2)} A_{1+(9)} \underline{G}_2$

103. Net gain of ATP molecule per hexose during respiration is

1) 12
2) 18
3) 30
4) 36

104. In angiosperms, female gametophyte is called as embryo sac. Given figures represent different stages of embryo sac development in angiosperms, arrange them in correct order and select the correct option.



1) V → I → IV → II → III → VII → VI → VIII
2) VIII→V→II→IV→III→VII→VI→I
3) I→II→IV→V→VIII→III→VII→VI
4) VIII→I→V→II→IV→III→VI→VII

105. The final electron acceptors of alcoholic fermentation and aerobic respiration respectively are

1) Pyruvic acid and Oxygen
2) Acetyl Co. A and Oxygen
3) Acetaldehyde and Cyt $-a_3$
4) Acetaldehyde and Oxygen

106. An immature male gametophyte differs from a mature male gametophyte in that it

1) has not yet left the pollen sac
2) has not yet germinated and its generative cell has not divided into two male gametes
3) is a microspore that has not yet divided by mitosis
4) still consists of microsporocyte.

107. The number of divisions, the number of times of divisions and the number of planes of divisions that occur in the formation of Sarcina from a Diplococcus respectively are

1) 6, 2, 3
2) 6, 3, 3
3) 7, 3, 2
4) 6, 2, 2

108. If a plant produces flowers when exposed to light duration over critical day length, then the plant should be a

1) short-long day plant
2) short day plant
3) day neutral plant
4) long day plant.

109. Match the following

List – I	List –II
A) Beggiotoa	I) Diploid sexual Hybrid
B) Aphids	II) Non-pigmented Autotroph
C) HIV	Tetraploid somatic Hybrid
D) Pomato	Insect pests
	V) Ribonucleic proteinaceous Infectious agen

1) A-II, B-IV, C-V, D-I

2) A-II, B-IV, C-V, D-III

3) A-II, B-III, C-IV, D-V

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

110. Arrange the steps of catalytic action of an enzyme in order and choose the right option.

i) The enzyme releases the products of the reaction and the enzyme is free to bind to another substrate

ii) The active site of enzyme is in close proximity of the substrate and breaks the chemical bonds of the substrate

iii) The blinding of substrate induces the enzyme to alter its shape fitting more tightly around the substrate

iv) The substrate blinds to the active site of the enzyme fitting into the active site.

1) IV, III, II, I

2) III, II, I, IV

3) IV, II, I, III

4) II, I IV, III

111. Stratification (or) pre-chilling treatment is a method of breaking dormancy given to

1) Dry seeds under anaerobic conditions

2) Dry seeds under aerobic conditions

3) Moist seeds under anaerobic conditions

4) Moist seeds under aerobic conditions

112. What is common in all the three Funaria, Dryopteris and Ginkgo

1) Presence of achegonia

2) well developed Vascular tissue

3) Independent sporophyte

4) Independent gametophyte

113. How many of the following diseases are caused by fingal pathogen

A) Crown gall of apple

B) Yellow mosaic of bhendi

C) Red rot of sugarcane

D) Blight of rice

E) Brown rust of wheat

F) Yellowing of peach

G) Late blight of potato

H) Swollen shoot of cocoa

1) 2

2) 3

3) 4

4) 5

114. Which of the following events takes place after double fertilization?

1) Central cell with PEN develops into endosperm

2) Pollen germinates on the stigma

3) Male gametes are discharged into the embryosac

4) Pollen tube enters embryosac

115. Match the column – I with Column – II and select the correct answer:-

Column – I	Column – II
A) Monohybrid cross	I) TtRr
B) Test cross	II) Tt × TT
C) Back cross	III) Tt × tt
D) Truedihybrid	IV) Tt × Tt

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

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

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

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

116. Select the correct option which correctly arranges the given organisms in increasing order of their life span

1) Parrot < Crow < Butterfly < Banyan tree

2) Butterfly < Crow < Parrot < Crocodile

3) Fruitfly < Crocodile < Parrot < Banyoan tree

4) Parrot < Tortoise < Dog < Crow

117. Genetic maps are

1) Made based on the number of linkage groups in an organisms
2) Extensively used for sequencing proteins
3) Used for identifying deletions (or) additions of codons due to frame-shift mutations
4) Extensively used as starting point for sequencing genomes

118. The plants face wilting due to use of excessive fertilizers because of

1) Deplasmolysis
2) Exosmosis
3) Imbibition
4) Endosmosis

119. Assertion (A) : DNA replication is semi-conservative

Reason (R): Each replica of DNA contains one parental strand and another newly synthesized strand, following the complementarity principle with the pairing of one purine with, any pyrimidine.

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

120. Which of the following characteristics is undesirable in cloning vectors used in R DNA technology

1) Small size
2) High copy number
3) Control own replication
4) Presence of many restriction sites to a restriction enzyme

121. Lac operon,

A) Lac-operon is only seen in prokaryotes

B) It would be expressed continuously so long lactose is available from environment and glucose is not available in the cell

C) Consists of three structural genes

D) Has the +Ve regulation also

1) A, B only are correct
2) C, D only are correct
3) A, C, D only are correct
4) A, B, C, D are correct

122. Nuclear DNA exists as a complex of proteins called

1) chromosomes, chromatin
2) chromatids, chromosomes
3) chromophores, chromatin
4) chromatin, chromosomes

123. p^{BR322}, which is frequently used as a vector for cloning gene in E.coli is a/an:

1) Original bacterial plasmid
2) Viral genome
3) Artificial Restructural bacterial plasmid
4) Transposon

124. Which one does not differ between a C_3 and a C_4 plant?

i) Initial CO_2 acceptor

ii) Extent of photorespiration

iii) Leaf anatomy

iv) Presence of Calvin cycle

1) I and II
2) Only IV
3) II and III
4) Only II

125. Match the following

List – I	List – II
A) Spooling	I) DNA staining Substance

B) Cosmid purified	II) Extaction of DNA
C) Selectable marker substance	III) Gel staining
D) Ethidium bromide vector	IV) Recombinant
	V) Gene used for selecting Transformed cells from non-transformed

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

126. In biological taxonomy a ____ is a comprehensive treatment of a taxon

1) Flora
2) manuals
3) monograph
4) monogram

127. Dried plant specimens are preserved in

1) Botanical garden
2) Herbarium
3) Museum
4) Both 2 and 3

128. Identify the factors which affect the rate of diffusion.

i) Gradient of concentration
ii) Permeability of the membrane
iii) Temperature
iv) Pressure
v) Size of diffusing material

1) i, ii, iv
2) I and v
3) Only v is correct
4) All of those

129. Moneran with blue green photosynthetic pigment

1) Chlorobium
2) Euglena
3) Spirulina
4) Chlamydomonas

130. Which of the following statements is/are true?

i) Uneven thickening of cell wall is characteristic of sclerenchyma
ii) Periblem forms the cortex of the root
iii) Tracheids are the chief water transporting elements in gymnosperms
iv) Companion cells is devoid of nucleus at maturity
v) The commercial cork is obtained from Quercus suber.

1) i and iv
2) ii and v
3) iii and iv
4) ii, iii and v

131. Adult sporophyte retained on gametophyte in

1) Heterosporous pteridophytes
2) Gymnosperms
3) Bryophytes
4) More than one option is correct

132. Plant cells that are photosythetically active are found in the ___ of leaf and are _____ cells

1) epidermis, parenchymatous
2) mesophyll, parenchymatous
3) mesophyll, sclerenchymatous
4) aerenchyma, collenchymatous

133. Epidermis is absent in

1) Root hair zone
2) maturation zone
3) Elongation zone

4) more than one option

134. Which option is correctly matched with the diagrams?

1) A- Valvate, B-Twisted, C-Imbricate, D-Vexillary
2) A-Vexillary, B-Valvate, C-Twisted, D-Imbricate
3) A- Imbricate, B-Vexillary, C-Valate, D-Twisted
4) A-Twisted, B-Imbricate, C-Vexillary, D-Valvate

135. Terminal electron acceptor in lactic acid fermentation is

1) Lactic acid
2) O_2
3) Acetaldehyde
4) Pyruvic acid

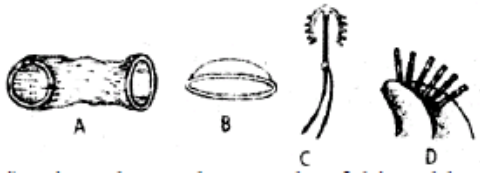
ZOOLOGY

136. Arrange the following sheaths of a nerve in correct sequence from epineurium to axoplasm

A) Neurilemma
B) Myelin layer
C) Axolemma
D) Perineurium
E) Endoneurium

1) D→E→A→B→C
2) E→D→A→B→C
3) D→E→B→A→C
4) D→E→B→C→A

137. Select the correct statements for the given figures at



i) A is male condom made of thin rubber latex used to cover the testis and penis during coitus
ii) B is diaphragm that covers entrance of the uterus and prevents a sperm from reaching an egg
iii) C is multiload, an intrauterine device which suppresses motility and fertilizing capacity of sperms
iv) D is Depo- Provera, a progesterone derivative IUD which releases hormone slowly and prevents ovulation

1) i and iii
2) ii, iii, and iv
3) I, ii and iii
4) ii and iii

138. For sequencing the total human DNA, what is the latest method of sequencing even for longer DNA fragments

1) Maxam-anger sequencing method
2) Shot gun sequencing method
3) Coulson-Filbert sequencing method
4) Gene gun sequencing method

139. Match the following

Column –I	Column – II
A. ICSI	In-vivo fertilisation
B. GIFT	Zygote or early embryo is transferred
C. ZIFT	Oligospermia
D. AI	In-vitro fertilisation

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

140. The volume of blood pumped out each ventricle, for each heart beat is known as

1) Cardiac cycle
2) Stroke volume
3) Cardiac output
4) Ventricular systole

141. Consider the statements given below regarding contraception and answer as directed there after

1) Medical termination of pregnancy (MTP) diring first trimester is generally safe

2) Generally chances of conception are nil until mother breast – feeds the infant upto two years

3) Intrauterine device like copper – T are effective contraceptives.

4) Contraception pills may be taken upto one month after coitus to prevent conception

Which two of the above statements are correct?

1) 3, 4
2) 1, 2
3) 2, 3
4) 1, 3

142. Matching the following:

List –I	List - II
A) Radially symmetrical animals	II) Spiral determinate cleavage
B) Schizocoelomates	II) Solid body plan
C) Bilaterally symmetrical animals	III) Sessile of slow moving animals
D) Enterocoelomates	IV) Radial and indeterminate cleavage
E) Acoelomates	V) Cephaliztion

The correct match is

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

143. Identify the correct sequence of evolution of horse.

1) Eohippus → Merychippus → Mesohippus → Pliohippus → Equus
2) Mesohippus → Merychippus → Pliohippus → Equus → Eohippus
3) Pliohippus → Equus → Merychippus → Eohippus → Mesohippus
4) Eohippus → Mesohippus Merychippus → Pliohippus →Equus

144. Match the following in relation to contraceptive methods:

List –I	List –II
A) Vasectomy	I) Barrier method
B) Condom	II) Fallopian tube
C) tubectomy	III) Vaginal rings
D) Coitus interruptus	IV) Natural method
	V) Vas deferens

The correct match is

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

145. According to de Vries mutations

1) small and directional
2) random and small
3) random and directional
4) random and directionless

146. Study the following:

I) Isogamy-Fusion of similar gametes – Trichonympha

II) Anisogamy – Fusion of dissimilar gametes-Plasmodium

III) Hologamy-Fusion of two mature organisms –Monocystis

In the above

1) All are correct
2) I and II are correct
3) I and III are wrong
4) II is wrong

147. The most accepted line of descent in human evolution is

1) Austalopithecus → Ramapithecus → Homo erectus → Homo habilis → Homo sapiens
2) Ramapithecus → Homo habilis → homo sapiens
3) Australopithecus → Ramapithecus → Homo sapiens → Homo habilis
4) Homo erectus → Homo habilis → Homo sapiens

148. Match the following:

List –I	List -II
A) Toxoid vaccine	I) Measles
B) Attenuated whole agent vaccine	II) Malaria
C) E.coli	III) Bubonic plague
D) Inactivated whole agent vaccine	IV) Tetanus
	V) Human insulin

The correct match is

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

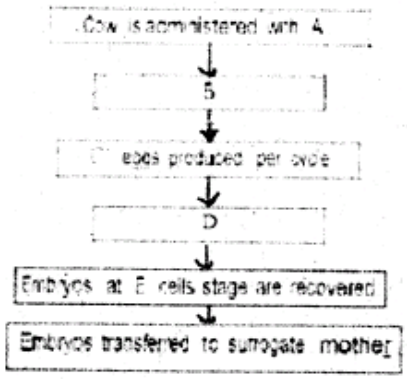
149. For the MN-blood group system, the frequencies of M and N alleles are 0.7 and 0.3, respectively. The expected frequency of MN-blood group bearing organisms is likely to be

1) 58%
2) 9%
3) 49%
4) 42%

150. Which of the following were appeared first time in the Amphibians?

1) Tympanum, lateral-line sensory system and nictitating membrane
2) Hyomandibula, harderian glands and meninx primitive
3) Lacrimal gland, sternum and three semicircular canals
4) Tympanum, lacrimal and harderian glands

151. Study the given flow chart representing events of MOET and select the option that correctly fill in the blanks.



1) A-Luteinising hormone, B-Follicualar maturation, C-2-8, D-Cross breeding, E-1632 and super ovulation.
2) A-Follicle stimulating hormone, B-Follicular maturation and superovulation, C-6-8, D-Artificial insemination E-8-32
3) A-Interstitial cell stimulating hormone, B-Superovulation, C-5-10, D-Cross breeding, E-12-24

4) A-Gonadotropin releasing hormone, B-Gamate formation, C-4-8, D-Artificial insemination, E-7-14

152. The stapes in ear ossicles is attached with

1) round window
2) oval window
3) ear drum
4) organ of corti

153. Select the correct statement.

1) Out crossing is the mating of superior males of one breed with superior females of another breed.
2) Crossbreeding is the mating of male and female animals of two different species
3) Inbreeding is the breeding between animals of the same breed for 4-6 generations.
4) Outbreeding is the breeding between the unrelated animals that have common ancestors.

154. Match the following:

List – I	List – II
A) Disruptive selection	I) Studies on weights of new born babies in England
B) Ramapithecus	II) More ape-like
C) Stabilising selection	III) Sunflower polulations in California
D) Dryopithecus	IV) Long necked giraffes
E) Directional selection	V) More man-like

The correct match is

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

155. Which of the following statements regarding barriers of innate immunity is incorrect?

1) Skin is physical barrier which prevents the entry of bacteria and viruses inside the body.
2) Leucocytes, macrophages, NK cells and the complement system acts as physiological barrier.
3) Urine, cerumen, tears, saliva and sebum (Sweat) prevent the growth of microbes and constitute the chemical barriers
4) Polymorphonuclear leucocytes are highly motile phagocytic killer cells which act as cellular barriers.

156. Read the following statements about antigens and antibodies, pickout the correct statements.

I) Class –I MHC molecules are found on the surface of almost all nucleated cells of the body and they present the antigents to Tc cells.

II) The part of an antibody that recognizes an antigen is called the epitope

III) Class-II MHC molecules are found on the surface of altered self cells and they present the antigens to T_H cells.

IV) Antibody is a Y shaped molecule with four polupeptide chains and it is represented as H_2L_2.

1) II & III
2) I & III
3) II & IV
4) I & IV

157. The correct order of stages in the life cycle of Plasmodium is

1) Sporozoiter (Human blood) → Liver → Gametocytes (RBC) → Ookinete (In mosquito stomach) →Sporozoites (Salivary gland)

2) Liver → Gametocytes (RBC) → Sporozoites (Salivary gland) → Ookinete (In mosquito stomach) → Sporozoites (human blood)

3) Sporozoiter (human blood) → Liver → Ookinete (In mosquito stomach) → Gametocytes (RBC) → Sporozoites (Salivary gland)

4) Sporozoites (Salivary gland) → Gametocytes (RBC) → Liver → Ookinete (In mosquito stomach) → sporozoites (Human blood).

158. Cancers of epithelial tissues/cells are called

1) Carcinomas
2) Sarcomas
3) Lymphomas
4) Leukemias

159. Which one of the following ecosystem tyepes has the highest annual net primary productivity?

1) Tropical deciduous forest
2) Temperate evergreen forest
3) Tropical rain forest.
4) Temperate deciduous forest

160. Choose the correct statement with reference to mutation theory:

1) Mutations are not subjected to Natural selection.
2) There are some intermediate forms in the course of evolution.
3) Mutations are discontinuous and are not accumulated over generations.
4) Mutations are non heritable changes occur in selective organisms.

161. Productivity is the rate of production of biomass expressed in terms of

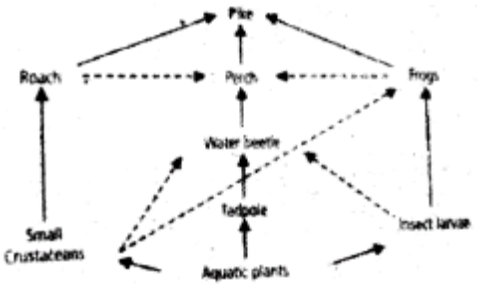
i) (kcal m-3)yr-1
ii) g-2yr-1
iii) g-lyr-1
iv) (kcal m-2)yr-1

1) ii
2) iii
3) I and iii
4) ii and iv

162. Which of the following hormones regulate the amount of salts in human urine

1) Epinephrine and Nor-epinephrine
2) Aldosterone and Angiotensin II
3) Antidiuretic hormone and Angiotensin I
4) Renin and Adrenalin

163. Refer to the given food web



What will be the consequences of decrease in population of water beetle on different food chains?

1) Population of tadpole will decrease
2) Population of perch will increase
3) Population of fish roach will decrease
4) There will be no effect on the population of pike

164. In ECG a tall T-wave indicates

1) Hyperkalemia
2) Myocardial infraction
3) Tachycardia
4) Enlarged atria

165. Which of the following equations correctly represents the exponential population growth curve?

1) $\frac{dN}{dt} = rN - 1$
2) $\frac{dN}{dt} = rN$
3) $Nt = N0ert$
4) $\frac{dN}{dt} = rN\left(\frac{K-N}{K}\right)$

166. Statement (S): In human female, though, several sperms penetrate through the zona pellucid into the perivitalline spsce, only one spem enters the ovum.

Reason (R) : Corona radiate disappears after fertilization in human beings. The correct answer is

1) Both (S) and (R) are true, and (R) is not a correct explanation to (S)
2) (S) is correct, but (R) is not correct
3) (S) is not correct, but (R) is correct
4) Both (S) and (R) are true, and (R) is correct explanation to (S)

167. Which of the following relations is correct regarding the GPP and NPP of an ecosystem?

1) NPP=GPP-Animal consumption
2) NPP=GPP+Plant respiration
3) NPP=GPP+Animal consumption
4) NPP=GPP-Plant respitation

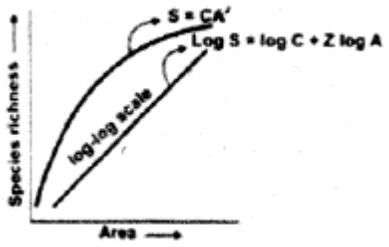
168. Statement (S): In grasshoppers the sex of the offspring depends on the type of sperm that fertilizes the ovum

Reason (R): Male grasshopper is homogametic and the karyotype of it is AAXO.

The correct answer is

1) Both (S) and (R) are true, and (R) is not a correct explanation to (S)
2) (S) is correct, but (R) is not correct
3) (S) is not correct, but (R) is correct
4) Both (S) and (R) are true, and (R) is correct explanation (S)

169. Which of the following is correct



1) S + Exponential growth, C = Y intercept, Z = Unknown factor, A = Area
2) S = Species richness, C = Y intercept, Z = regression coefficient, A = Area
3) S = Semi arid species, C = Y intercept, Z = regression coefficient, A = Area
4) S = Logistic growth, C = Carrying capacity, Z = Environmental resistance, A = Area

170. Abingdon tortoise in Galapagos islands became extinct within a decade after goats were introduced on the island, this is an example for

1) Parasitism
2) Coexistence
3) Competitive exclusion
4) Commensalism

171. Montreal protocol aims at

1) control of CO_2 emission
2) control of water pollution
3) biodiversity conservation
4) reduction of ozone depleting substances

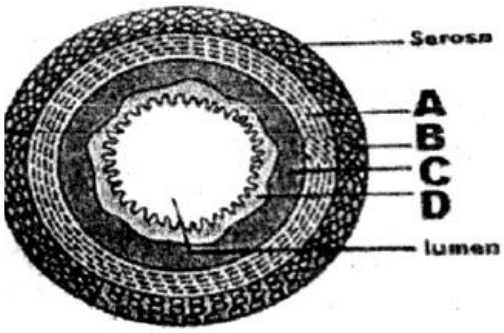
172. Propolis manufactured by worker bees is used in the treatment of

1) Rheumatoid arthritis
2) Cardio vascular disorders
3) Renal failures
4) Inflammation and superficial burns

173. Which of the following is the correctly matched pair of an endangered animal and a National Park

1) Lion : Corbett National Park
2) Rhinoceros : Kaziranga National Park
3) Wild Ass : Dudhwa National Park
4) Great Indian Bustard : Keoladeo National Park

174. The below given diagrams is transverse section of gut, identify A, B, C and D in that figure.



1) A-longitudinal muscles, B-circular muscles, C-submucosa, D-mucosa
2) A-circular muscles, B-longitudinal muscles, C-mucosa, D-sub mucosa
3) A-circular muscles, B-longitudinal muscles, C-submucosa, D-mucosa
4) A-longitudinal muscles, B- circular muscles, C-mucosa, D-submucosa

175. Gas released during Bhopal gas tragedy was

1) methyl isocyanate
2) potassium isothiocyanate
3) sodium isothiocyanate
4) ethyl isothiocyanate

176. Identify the correct sequence of stages in the life cycle of Entamoeba hisolytica.

A) Precystic stage
B) Metacystic-trophozoites
C) Metacyst
D) Tetranucleated cyst
E) Binary fussion of trophozoite

1) A→E→D→B→C
2) E→A→D→C→B
3) E→D→A→C→B
4) A→E→D→B→C

177. Biosphere reserves differ from National parks and wildlife sanctuaries because in the former

1) people are an integral part of the system
2) human beings are not allowed to enter
3) plants are paid greater attention than the animals
4) living organisms are brought from all over the world and preserved for prosperity

178. What is the phenotype of the offspring born to a woman with normal vision (homozygous) and a colour blind man?

1) All the sons are colour blind and the daughters are with normal vision
2) All the sons and the daughters are colour blind
3) All the sons are with normal vision and the daughters are colour blind
4) All the sons and the daughters are with normal vision

179. The full form of GEAC is

1) Genetic engineering approval committee
2) Geo environmental approval committee
3) Genetic engineering association committee
4) Government approval committee

180. Match the following

List –I	List – II
A) Ernst Haeckel	I) Historia Generalis Plantarum
B) John Ray	II) The origin of species
C) Bateson	III) Natural History
D) Bnffon	IV) Representing phylogeny by trees
	V) Genetics

Identify the correct match

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

PHYSICS

1 – 10	1	3	4	1	3	4	2	2	4	2
11 – 20	4	4	3	2	4	3	4	2	1	3
21 – 30	1	2	1	4	3	3	3	3	1	2
31 – 40	2	1	2	1	4	2	2	1	2	1
41 – 45	2	1	2	2	3					

CHEMISTRY

46 - 50						4	4	4	4	4
51 - 60	4	2	4	1	2	4	2	3	4	4
61 - 70	1	4	4	3	2	1	1	1	3	2
71 - 80	1	4	3	1	4	2	1	4	2	4
81 - 90	4	3	4	3	2	3	3	3	2	4

BOTANY

91 - 100	1	1	4	4	2	1	2	3	4	1
101 - 110	1	3	4	4	4	2	4	4	2	1
111 - 120	4	1	2	1	1	3	4	2	1	4
121 - 130	4	4	3	2	1	3	4	4	3	4
131 - 135	3	2	3	1	4					

ZOOLOGY

136 - 140						1	4	2	2	2
141 - 150	4	3	4	2	4	3	2	3	4	4
151 - 160	2	2	3	1	2	4	1	1	3	3
161 - 170	4	2	4	1	2	3	4	2	2	3
171 - 180	4	4	2	3	1	2	1	4	1	3

HINTS AND SOLUTIONS

PHYSICS

1. $E_i = -\frac{GMm}{R}$ $E_f = \frac{-GMm}{2(3R)}$

$W = E_f - E_i.$ $W = \frac{5GMm}{6R}$

2. For mixture of gases, let specific heat be C_1

$$C_v = \frac{n_1(C_v)_1 + n_2(C_v)_2}{n_1 + n_2}$$

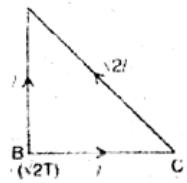
where

$$(C_v)_1 = \frac{5R}{2}, (C_v)_2 = \frac{3R}{2}$$

$$\therefore C_v = \frac{2 \times \frac{5R}{2} + 8 \times \frac{3R}{2}}{2 + 8} = \frac{17R}{10} = 1.7R$$

3. $\frac{V}{4L_c} = \frac{3V}{2L_0} \rightarrow L_0 = 6L_C = 6 \times 20 = 120cm$

4.



As $T_B > T_A$, heat flows from B to A through both paths BA and BCA.

Rate of heat flow in BC = Rate of heat flow in CA

$$\frac{KA(\sqrt{2}T - T_c)}{l} = \frac{KA(T_c - T)}{\sqrt{2}l}$$

Solving this, we get;

$$T_c = \frac{3T}{\sqrt{2} + 1}$$

5. Effective linear coefficient

$$\alpha = \frac{L_1\alpha_1 + L_2\alpha_2}{L_1 + L_2} = \frac{5\alpha}{3}$$

6. $\frac{1}{2}\left[\frac{1}{2}m_n v^2\right] = J\,(m_{ice}L)$ here

$(f = 4.2J/4.2J = 1)$

$or \quad m_{ice} = 3 \times 10^{-3}\ gm$

7. $\beta = \frac{T_2}{T_1 - T_2} \rightarrow T_1 = \frac{T_2}{\beta} + T_2$

$$T_1 = \frac{253}{5} + 253 = 303.6K$$

$$T_1 = 31°C$$

8. When the plate is heated, it expands. During heating, in fact, interatomic separation increases. Hence, due to heating, radius of the circular hole also increases. Therefore, option (b) alone is correct.

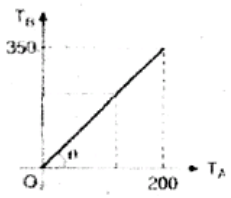
9. $K = \frac{K_1A_1 + K_2A_2}{A_1 + A_2}$

$$A_2 = 3A_1$$

$$K = \frac{K_1A_1 + K_2 \times 3A_1}{A_1 + 3A_1}$$

$$K = \frac{K_1 + 3K_2}{4}$$

10.



$$tan\theta = \frac{350}{200} = \frac{T_B}{T_A}$$

$$\therefore T_A = \frac{200}{350}\, T_B$$

$$= \frac{4}{7} T_B$$

Observing at $T_B = 350\ B$

We get : $T_A = \frac{4}{7} \times 350 = 200A$

As we know, freezing point of water is 273.16 K. It has a value 200 A on scale a and 350 B on scale B.

i.e., 200A=350B=273.16K

$$or \quad 1A = \frac{273.16}{200} K$$

$$and\ 1B = \frac{273.16}{350} K$$

If T_A and T_B represent the triple point of water on two scales A and B respectively, then

$$\frac{273.16}{200} T_A = \frac{273.16}{350} T_B$$

$$or \quad \frac{T_A}{T_B} = \frac{200}{350} = \frac{4}{7}$$

$$\therefore \quad T_A = \frac{4}{7} T_B$$

11. Phase difference $\phi = \frac{2\pi}{\lambda} \times \frac{\lambda}{6} = \frac{\pi}{3}$

$$I = I_0\, cos^2\left(\frac{\phi}{2}\right) = I_0 cos^2\left(\frac{\pi}{6}\right)$$

$$= I_0 \times \frac{3}{4} \Rightarrow \frac{I}{I_0} = \frac{3}{4}$$

12. $v_1 = \sqrt{2g\left(\frac{h}{2}\right)} = \sqrt{gh}$

From Bernoulli's theorem,

$$\rho gh + 2\rho\left(\frac{h}{2}\right) = \frac{1}{2}(2\rho)v_2^2$$

$$\therefore \quad v_2 = \sqrt{2gh}$$

$$\therefore \quad \frac{v_1}{v_2} = \frac{1}{\sqrt{2}}$$

13. $u = -40cm \quad v = -100cm$

$$\frac{1}{f} = \frac{1}{v} - \frac{1}{u} \Rightarrow \frac{1}{f} = -\frac{1}{100} + \frac{1}{40} = \frac{6}{400}$$

$$\Rightarrow f = \frac{400}{6}\ cm$$

14. Suppose, l = side of the cube x = side of the cubeimmersed in water $l - x$ = side of cube immersed in liquid

According to law of floatation,

$$l^3 \square \times 0.9 \times 10^3 \times g$$

$$= (l^2 \times x) \times 1000g$$

$$+ l^2(l - x) \times 0.7 \times 10^3 g$$

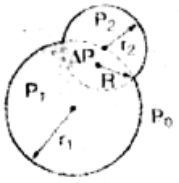
$$l \times 0.9 = x + (l - x) \times 0.7 \quad or$$

$$0.3x = 0.2l$$

$$or \quad \frac{x}{l} = \frac{2}{3}$$

15. A.B is for AND gate $\overline{A.B}$ for NOT AND ie. NAND gate

16.



$$p_1 = p_0 + \frac{4T}{r_1}$$

$$p_2 = p_0 + \frac{4T}{r_2}$$

$$\Delta P = P_1 - P_2$$

$$= 4T\left[\frac{1}{r_1} - \frac{1}{r_2}\right] [r_1 < r_2 \; sp \; P_1 > P_2]$$

Hence, sense of curvature is concave towards smaller bubble. If radius of common face is R, then

$$\Delta P = \frac{4T}{R} = 4T\left[\frac{1}{r_1} - \frac{1}{r_2}\right]$$

$$\therefore \quad \mathrm{R} = \frac{\mathrm{r_1 r_2}}{\mathrm{r_2 - r_2}} = \frac{0.002 \times 0.4}{0.004 - 0.002}$$

= 0.004m

17. B due to long wire at a distance

$$B_1 = \frac{\mu_0 i}{2\pi r}$$

B due to circular coil at the centre

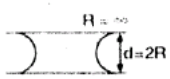
$$B_2 = \frac{\mu_0 i}{2r}$$

Both are in opposite directions

$$\therefore B = B_2 - B_1 = \frac{\mu_0 i}{2r} - \frac{\mu_0 i}{2\pi r} = \frac{\mu_0 i}{2r}\left[1 - \frac{1}{\pi}\right]$$

$$\therefore B = \frac{\mu_0}{2r\pi}[\pi - 1] \Rightarrow B = \frac{\mu_0}{4\pi}.\frac{2i}{r}[\pi - 1]$$

18.



Express pressure,

$$p = T\left(\frac{1}{R} - \frac{1}{\infty}\right) = \frac{T}{R}$$

$$= \frac{T}{d/2} = \frac{2T}{d}$$

$$Volume, \qquad V = Ad \; and \; p = \frac{2TA}{V}$$

$$F = force = pA = \frac{2TA^2}{V}$$

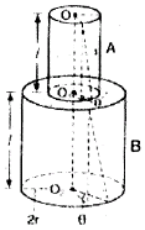
19. $Bqv = \frac{mv^2}{R} \Rightarrow R = \frac{mv}{Bq} = \frac{\sqrt{2mE}}{Bq}$

$$\therefore R \propto \frac{\sqrt{m}}{q}$$

$$R_p : R_d : R_\alpha = \frac{\sqrt{1}}{1} : \frac{\sqrt{2}}{1} : \frac{\sqrt{4}}{2}$$

$$R_p : R :_d : R_\alpha = 1 : \sqrt{2} : 1$$

20.



For cylinder A:

$$\tau = \frac{\pi\eta r^2}{2l}\theta'$$

For cylinder B:

$$\tau = \frac{\pi\eta(2r)^4(\theta - \theta')}{2l}$$

$$\therefore \quad \frac{\pi\eta r^4}{2l}\theta = \pi\eta\frac{16r^4}{2l}(\theta - \theta')$$

$$\theta' = 16\theta - 16\theta'$$

$$\therefore \theta' = \frac{16}{17}\theta$$

21. Power of lens, P (in diopter)

$$= \frac{100}{focal \; length \; f \; (in \; cm)}$$

$$\therefore f = \frac{100}{10} = 10 \; cm$$

By lens maker's formula,

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

for bioconvex lens,

$R_1 = +R, and \; R_2 = -R$

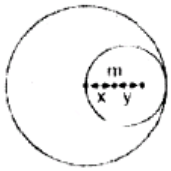
$$\therefore \frac{1}{f} - (\mu - 1)\left(\frac{1}{R} + \frac{1}{R}\right)$$

$$\frac{1}{f} = (\mu - 1)\left(\frac{2}{R}\right)$$

$$\frac{1}{10} = (\mu - 1)\left(\frac{2}{10}\right)$$

$$(\mu - 1) = \frac{1}{2} \ or \ \mu = \frac{1}{2} + 1 = \frac{3}{2}$$

22.



To calculate the force of attraction on the point m, we should calculate the force due to the solid sphere and subtract from this the force which the mass of the hollowed sphere would have exerted on m. Thus,

$$F = \frac{GmM}{x^2} - \frac{GmM}{y^2}$$

$$\left[x = \frac{R}{4}, x + y = \frac{R}{2}\right]$$

$$M = \left(\frac{4}{3}\right)\pi R^3 \rho$$

$$and \ M = \frac{4}{3}\pi\left(\frac{R}{2}\right)^3 \rho = \frac{M}{8}$$

$$F = \frac{GMm}{\left(\frac{R}{4}\right)^2} - \frac{Gmm\left(\frac{M}{8}\right)}{\left(\frac{R}{4}\right)^2}$$

23. In L.C. oscillation energy is transferred from c to L (or) from L to C

Maximum energy in $C = \frac{q_0^2}{2C}$

Maximum energy in $L = \frac{1}{2}Li_0^2$

If energy is stored equally between electric and magnetic fields then

$$\frac{1}{2}LI^2 = \frac{1}{2\left[\frac{1}{2Li_0^2}\right]}$$

$$i = \frac{i_0}{\sqrt{2}}$$

$$i_0 sin\ \omega t = \frac{1}{\sqrt{2}}\ i_0$$

$$\omega t = \frac{\pi}{4} \Rightarrow t = \frac{T}{8} = \frac{2\pi\sqrt{LC}}{8}$$

$$\therefore t = \frac{\pi}{4}\sqrt{LC}$$

24. In both the cases, the loss of gravitational potential energy and the resulting gain total kinetic energy is same

25. $V_R = \sqrt{V^2} - V_L^2 = \sqrt{220^2 - 176^2 = 132}\ volt$

26. Torque about the pivot

$$\tau = 2mg \times b + mg \times 3b$$

$$= 5mgb$$

and moment of inertia of the rod

$$I = 2m(b)^2 + m(3b)^2 = 11mb^2$$

[Remember, it is given that mass of rod is negligible]

Now, $\tau = I\alpha$

$$or \ \alpha = \frac{\tau}{I} = \frac{5mgb}{11mb^2} = \frac{5g}{11b}$$

27. From weaker pole

$$x = \frac{d}{\left(\frac{M_2}{M_1}\right)^{\frac{1}{3}} + 1} = \frac{35}{\left(\frac{27}{8}\right)^{\frac{1}{3}} + 1} = 14\ cm$$

28. Force between two protons = force between a proton and a position. As positron is much lighter than proton, it moves away a large distance compared to proton.

As work done = force × distance

Therefore, in the same time t, work done in case of positron is more than that in case of proton.

29. $E_0 = \frac{1}{4\pi\epsilon_0}\left(\frac{2p}{r^3}\right), E_r = \frac{1}{4\pi\epsilon_0}\frac{p}{(2r)^3} = \frac{1}{16}\left[\frac{1}{4\pi\epsilon_0}\frac{2P}{r^3}\right]$

$$E_r = \frac{E_0}{16}$$

30. Net work done in the process is

w = potential energy stored in the spring + loss of potential energy of mass

$= mg(h+d) - \frac{1}{2}kd^2$

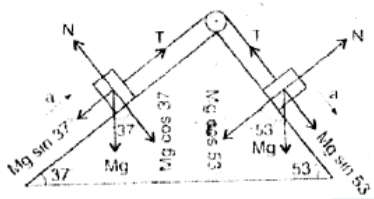
31. $R = \rho\frac{l}{A},\ R_1 = 4\Omega, l_1 = L, A_1 = A, R_2 = ?$

$l_2 = 2l, A_2 = \frac{A}{2},$

$\frac{R_1}{R_2} = \frac{l_1}{l_2} \times \frac{A_2}{A_1} \Rightarrow \frac{A}{R_2} = \frac{l}{2l} \times \frac{A}{2A}$

$\Rightarrow \frac{4}{R_2} = \frac{1}{4} \Rightarrow R_2 16\Omega$

32. Let T be the tension in the string. Let a be acceleration of the system.



The equations of motion are

$Ma = Mg\ sin53° - T$ and

$Ma = T - Mg\ sin37°$

Adding eqns, (i) and (ii), we get;

$a = \frac{Mg(sin\ 53° - sin37°)}{2M}$

$= gcos\ 45° sin8°$

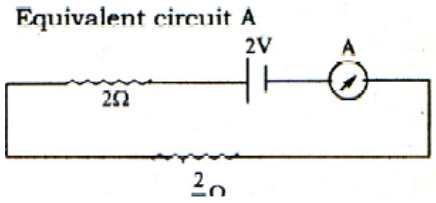
$\left[\therefore sinA - sinB\right.$

$\left. = 2cos\left(\frac{A+B}{2}\right) sin\left(\frac{A-B}{2}\right)\right]$

$= 10 \times \frac{1}{\sqrt{2}} \times 0.139$

$= 0.98\ ms^{-2} \approx 1ms^{-2}$

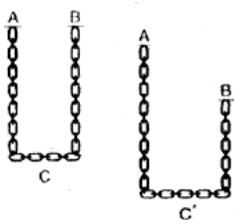
33. Equivalent circuit A



$R_{eff} = 2 + \frac{2}{3} = \frac{8}{3}\Omega$

$i = \frac{V}{R} = \frac{2}{\frac{8}{3}} = \frac{3}{4}A$

34.



Suppose C be the mid-point of the chain. so $AC = BC = \frac{l}{2}$. Let C be the bend when B has gone down by x.

Then $BC = \frac{1}{2} - \frac{x}{2}$

The velocity of the bend

$= \sqrt{2g\frac{x}{2}} = \sqrt{gx}$

as the bend has fallen through $\frac{x}{2}$. An element of length dx at C has the same velocity before it is transferred to the left side. Immediately after its velocity becomes zero. Hence, change of momentum of element

$= 0 - \left(\frac{m}{l}dx\right)v = \frac{m}{l}\ dxv(downward)$

$= \frac{m}{l}dxv\ \ (upward)$

The change takes place in time dt.

∴ Rate of change of momentum

$\frac{m}{l}\ v.\frac{dx}{dt} = \frac{m}{l}v^2 = \frac{m}{l}gx$

∴ Force on left part $= \frac{mgx}{l}$

(downward)

The tension at A is the sum of this force and the weight of the left hanging part.

$T_4 = \left(\frac{l}{2} + \frac{x}{2}\right)\frac{m}{l}g + \frac{mgx}{l}$

$= \frac{mg}{2} + \frac{3mgx}{2l}$

$= \frac{mg}{2}\left[1 + \frac{3x}{l}\right]$

35. Net magnetic field, $B = \sqrt{B_1^2 + B_2^2}$

$= \sqrt{\left(\frac{\mu_0 I_1}{2\pi d}\right) + \left(\frac{\mu_0 I_2}{2\pi d}\right)^2}$

$\therefore B_1 = \frac{\mu_0 I_1}{2\pi d}\ and\ B_2 = \frac{\mu_0 I_2}{2\pi d}$

$= \frac{\mu_0}{2\pi d}\sqrt{I_1^2 + I_2^2}$

36.

It follows from the figure that the equations of motion are:

$200 - f = 20a_1$ and $f = 10a_2$

where a_1 and a_2 are the acceleration for 20kg and 10kg respectively.

But $a_2 = 12\ ms^{-2}$

$\therefore f = 10 \times 12 = 120N$

$\therefore a_1 = \frac{200 - 120}{20} = \frac{80}{20} = 4ms^{-1}$

37. $i = \frac{qvr}{2}, m = i \times A = \frac{qvr}{2\pi r}\pi r^2 = \frac{qvr}{2}$

$\frac{L}{m} = \frac{mvr \times 2}{qvr} = \frac{2m}{q}$

38. Suppose the speed of the particle B is v which is constant. In the horizontal direction, $u_r = u + v$ suppose the tie at which particles meet each other is t.

Then,

$u + v)t = d, \qquad i.e., t = \frac{d}{u + v}$

In the same time, for the motion of the particle A in vertical direction,

$H = \frac{1}{2}gt^2\ \ or\ \ t = \sqrt{\frac{2H}{g}}$

Hence, from eqns. (i) and (ii), we have

$\frac{d}{u + v} = \sqrt{\frac{2H}{g}}$

$or\ \ u + v = d\sqrt{\frac{g}{2H}} \qquad or$

$v = d\sqrt{\frac{g}{2H}} - u$

39. $\frac{N}{N_0} = \left(\frac{1}{2}\right)^n$

$\frac{1}{8} = \frac{1}{2^n} \Rightarrow n = 3$

Number of half lives = 3

T = 20 years; age of rock = 20×30=60 years

40. $\vec{A}.\vec{B} - cos\ wt.cos\frac{wt}{2} + sin\ wt.sin\frac{wt}{2} = 0$

$cos\left(wt - \frac{wt}{2}\right) = 0 \quad t = \frac{\pi}{w}$

41. The power gain in case of CE amplifier,

Power gain =β^2× Resistance gain

$= \beta^2 \times \frac{R_0}{R_i} = (10)^2 \times 5 = 500$

42. $a = \frac{P}{mv} \quad or \frac{dv}{dt} = \frac{P}{mv} \quad or \frac{dv}{ds}\left(\frac{ds}{dt}\right) = \frac{P}{mv}$

$or, v\frac{dv}{ds} = \frac{P}{mv}\ or\ v^2 dv = \frac{p}{m}ds$

$Hence, \int_{v_1}^{v_2} v^2 dv = \frac{p}{m}\int_0^s ds$

$or, \frac{v^3}{3}|_{v_1}^{v_2} = \frac{p}{m}s$

$\therefore s = \frac{m}{3p}(v_2^3 - v_1^3)$

43. Amplitude of a damped oscillator at any instant t is given by

$A = A_e e^{-\frac{bt}{2m}}$

Where A_0 is the original amplitude from question

When t = 2s, $A = \frac{A_0}{3}$

$Or, \frac{1}{3} = e^{-\frac{b}{m}}$

$When\ t = 6s, A = \frac{A_0}{n}$

$\therefore \frac{A_0}{n} = A_0 e^{-\frac{6b}{2m}}$

$Or, \frac{1}{n} = e^{-\frac{3b}{2m}}$

$Or, \frac{1}{n} = \left(\frac{1}{3}\right)^3\ (Using\ eq.(i))$

$\therefore n = 3^3$

44. $P = \frac{\sqrt{abc^2}}{d^3 e^{\frac{1}{3}}}$

$\frac{\Delta p}{p} \times 100 = \left[\frac{1}{2} \times \frac{\Delta a}{a} + \frac{1}{2} \times \frac{\Delta b}{b} + \frac{\Delta c}{c} + 3 \times \frac{\Delta d}{d} + \frac{1}{3} \times \frac{\Delta e}{e}\right] \times 100$

$= \left[\frac{1}{2} \times 2\% + \frac{1}{2} \times 3\% + 2\% + 3 \times 1\% + \frac{1}{3} \times 6\%\right]$

$= [1\% + 1.5\% + 2\% + 3\% + 2\%]$

The minimum amount of error is contributed by the measurement of a.

45. $F = \frac{Q^2}{2\varepsilon_0 A}$

$\therefore Q = CV\ and\ C = \frac{\varepsilon_0 A}{d} \Rightarrow \varepsilon_0 A = Cd$

$So\ F = \frac{C^2V^2}{2} = \frac{CV^2}{2d}$

$2Cd$

CHEMISTRY

46. ${}_1H^3\ (Tritium)$

47. 2, (4-dischlorphenoxy acetic acid (2,4-D) is the first herbicide produced. $NaClO_3$ & Na_3AsO_3 are also herbicides.

48. $X - CH_3CHO$

$Y - CH_3COOH$

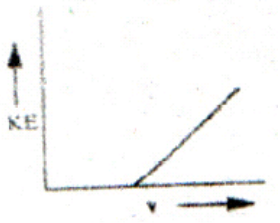
$Z - CH_3 - \underset{OH}{\overset{|}{C}}H - \underset{OH}{\overset{|}{C}}H - CH_3$

49. Ligands must be written in alphabetical order.

50. Osmotic pressure α No. of ions formed in ionisation

51. $Ca_3(PO_4)_2 \rightleftharpoons 3Ca^{2+} + 2PO_4^{3-}; PO_4^{3-}$ ions are strong conjugate base character. At lower pH they convert into unionized HPO_4^{2-} ions and there by equilibrium shifts to right side, increasing the solubility of $Ca_3(PO_4)_2$.

52.



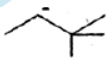
53. In the 4th option all bonds are N-H bonds only

54. $lag\frac{K_2}{K_1} = \frac{-Ea}{2.303R}\left[\frac{T_2 - T_1}{T_1 T_2}\right]$

$0.3010 = \frac{-Ea}{2.303 \times 8.314}\left[\frac{310 - 300}{310 \times 300}\right]$

$= 53.5\ kilo\ joules$

55.



$\xrightarrow[MeOH]{NaOMe}$ is as elimination which follows E_1 mechanism to give saytzeffs product

56. $n_1 + n_2 = 4$

$n_2 - n_1 = 2$

$\therefore n_1 = 1, n_2 = 3$

$V = \left(\frac{1}{1^2} - \frac{1}{3^2}\right)R^2$

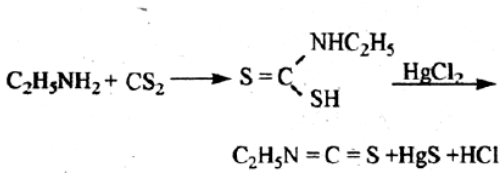
$= \frac{8R}{9}$

57. When n=2 from the given data $l = 0, 1, 2\ i.e\ 2s, 2p, 2d$ orbitals are possible

$\therefore$ The number of elements that can be present are 18

58. $CFCl_3 \xrightarrow{light} \dot{C}FCl_2 + \dot{C}l$

59.



$C_2H_5N = C = S + HgS + HCl$

60. O_2^- in KO_2 is with odd No. of 17 electrons

61. $\Delta T_f = iK_f m$

$$1.62 = i \times 4.9 \times \frac{3.9}{122} \times \frac{1000}{49} \Rightarrow t \simeq 0.507$$

62. Dissociation of strong electrolyte is independent of $Conc.$

63. When $SrCl_2$ is doped, cationic vacancy is formed and crystal becomes impure as well as non-stoichiometric

64. $N - H$ Bond dipole moments supports the dipole moment caused by lone pair of electrons in NH_3

65. As the number of carbon atom is alkyl group increases, +I effect increases, so acidic nature decreases.

66. From $H_2O \rightarrow H_2Te$ stabilities decreases $\therefore$ acidic strength increases

67. Propanoic acid and ethanol both are mono functional monomers which are not suitable for a poly condensation reaction to take place.

68. $\Delta H = -ve, \Delta S = -ve$

69. Tl^{+1} is more stable than Tl^{3+} and $E_1^0 Tl^{3+}/Tl^{+1}$ is +ve

70. Quick lime is basic in nature like NH_3

71. Aldehydes in presence of trialkoxide aluminium to give esters is known as Tischenko reaction

72. Units of rate of reaction is same irrespective of order

73. $u_{r.m.s} = \sqrt{\frac{3RT}{M}}$; $u_{m.p} = \sqrt{\frac{2RT}{M}}$

$$\frac{u_{r.m.s\ of\ CH_4}}{u_{m.p\ of\ SO_2}} = \sqrt{\frac{3T_{CH_4} M_{SO_2}}{M_{CH_4} 2T_{SO_2}}} = \sqrt{\frac{3 \times 300 \times 64}{16 \times 2 \times 600}} = \sqrt{3}$$

74. Ziegler-Natta catalyst

75. Solid soda lime acts as a basic flux which combine with acidic oxides

76. +I effect of methyl groups

77. The reaction follows SN^2 mechanism so the rate equation i

$r = K[RX][\bar{CN}]$.

If KCN concentration is increased by two folds then the rate increases by two times.

78. $Mn^{+2} \rightarrow n = 5$ unpaired electrons

$\therefore$ 5.92 BM

79. To be spontaneous, ΔG must be –ve. So corresponding E^0 must be +ve.

80. $Rn \rightarrow 86 + S^2 + d^2 = 90$ elements from 90 → 103 are actinides (f-block)

81. In both Glycogen (animal starch), amylopectin branch is present.

82. 100 mL gaseous mixture contain

20 mL C_3H_8 So, volume of CH_4 and

CO = (100-20) = mL

$C_3H_8 + 5O_2 \rightarrow 3CO_2 + 4H_2O$

$CH_4 + 2O_2 \rightarrow CO_2 + 2H_2O;$

$CO + \frac{1}{2}O_2 \rightarrow CO_2$

80 mL $(CH_4 and\ CO)$ will produce

80 mL $CO_2; C_3H_8$ will produce

= 3×20 = 60 mL

Total CO_2 produce = 80+ 60 ⇒ 140

83. Below O_2, the energy difference between 2s and 2p is very less, so 2s-2p mixing takes place.

84. $mvr = \frac{nh}{2\pi}$

$r = 0.529\, n^2 A$

$n^2 = \frac{r}{0.529A}$

$n \propto \sqrt{r}\frac{h}{2\pi}$

$mvr \propto \sqrt{r}$

85. For $\frac{N_0}{2}$ atom to convrt $X^+_{(g)}$, the energy required is ΔH,

$\therefore$ Ionisation enthalpy $= \frac{2\Delta H_1}{N_0} atom^{-1}$

86. $a \propto \frac{1}{pressure}$

87. Covalent compounds like Hg_2Cl_2 does not respond chromyl chloride test.

88. $-1941 = -1273 + 3(-241.8) - (\Delta_f H)B_2H_6$

$(\Delta_f H)_{B_2H_6} = -1273 - 725.4 + 1941$

$= -57.4$

89. For high spin complex d^4 configuaration is $t_{2g}^3\, eg^1$

$\therefore C.F.S.E\ is - 3 \times \frac{2}{5}\Delta_0 + \times \frac{3}{5}\Delta_0$

$= -0.6\ \Delta_0$

90. $K_C = [B]^2[C]^3$

$K_C = \left(\frac{B}{2\sqrt{2}}\right)^2 (2C)^3$

$= [B]^2[C]^3$