

NEET MODEL QUESTION PAPER 3

NATIONAL TESTING AGENCY
Excellence in Assessment



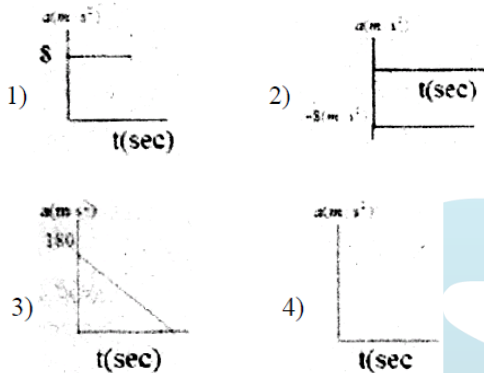


PHYSICS

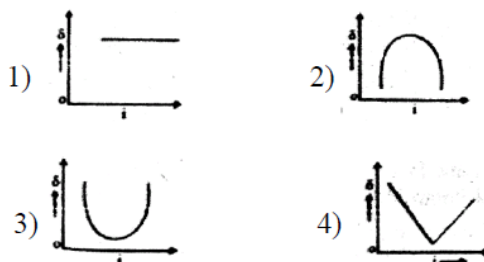
1. If a wire stretched to make is 0.1% longer, its resistance will:

- 1) increase by 0.2%
- 2) decreased by 0.2%
- 3) decrease by 0.05%
- 4) increase by 0.05%

2. The velocity of a particle is given by $V(180 - 16x)^{1/2}$ m/s, then which one of the following is correct to represent acceleration time graph.



3. The graph between angle of deviation (δ) and angle of incidence (i) for a triangular prism is represented by



4. A physical quantity 'x' is calculated with the equation $x = a + b^2$ where $a = (100 \pm 1\%)$ and $b = (5 \pm 2\%)$. Percentage error in the calculation of x will be

- 1) 3%
- 2) 5%
- 3) 4%
- 4) 1.6%

5. A cylindrical tube, open at both ends, has a fundamental frequency, f, in air. The tube is dipped vertically in water so that half of it is in water. The fundamental frequency of the air-column is now:

- 1) f
- 2) $\frac{f}{2}$
- 3) $\frac{3f}{4}$
- 4) $2f$

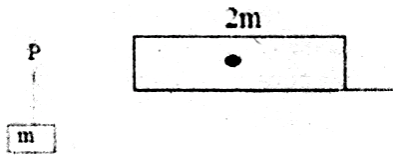
6. A ball projected with a velocity $2\hat{i} + 3\hat{j}$ from the ground. The ball strikes a vertical wall elastically while the moving horizontally in it's path and rebounds. the velocity with the ball strikes the ground is

- 1) $-2\hat{i} + 3\hat{j}$
- 2) $2\hat{i} - 3\hat{j}$
- 3) $-2\hat{i} - 3\hat{j}$
- 4) $2\hat{i} + 3\hat{j}$

7. An object 2.4 m in front of lens forms a sharp image on a film 12 cm behind the lens. A glass plate 1 cm thick, of refractive index 1.50 is interposed between lens and film with its plane faces parallel to film. at what distance (from lens) should object be placed to be in sharp focus of film?

- 1) 7.2m
- 2) 2.4m
- 3) 3.2m
- 4) 5.6m

8. A uniform rope of mass 2m, length l is on a rough horizontal table with coefficient of friction μ . The rope and a block of mass m are connected by a mass less, in extensible string which passes over a mass less pulley as shown in fig. If the system is released freely then the tension at the midpoint of the rope is



- 1) $\frac{(1+2\mu)mg}{3}$
- 2) $\frac{(1-2\mu)mg}{3}$
- 3) $\frac{(\mu+1)mg}{3}$
- 4) $(\mu + 1)mg$

9. A mass m hangs with the help of a string wrapped around a pulley on a frictionless bearing. The pulley has m and Radius R . Assuming pulley to be a perfect uniform circular disc, the acceleration of the mass m , if the string does not slip on the pulley, is:

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

10. Two equal masses are attached to the two ends of a spring of spring constant k . The masses are pulled out symmetrically to stretch the spring by a length x over its natural length. The work done by spring on each mass is

- 1) $\frac{1}{2}kx^2$
- 2) $-\frac{1}{2}kx^2$
- 3) $\frac{1}{4}kx^2$
- 4) $-\frac{1}{4}kx^2$

11. Two boys are standing at two points A and B on ground where $AB=a$. The boy at B starts running in a direction perpendicular to AB with velocity v_1 . The boy at A starts running simultaneously with velocity v and catches the other boy in a time t . Then t is

- 1) $\frac{a}{\sqrt{v^2+v_1^2}}$
- 2) $\frac{a}{(v+v_1)}$
- 3) $\frac{a}{(v-v_1)}$
- 4) $\sqrt{\frac{a^2}{(v^2-v_1^2)}}$

12. A small body is rotating with critical velocity in vertical circle with an inextensible string length $1m$, whose plane coincides with XY plane. The lowest point 'A' of vertical circle just touches X-axis at origin and highest point 'B' is on Y-axis. The string breaks while the body crossing the highest point 'B' of vertical circle. Coordinates of the point 'C' where the body crosses the x-axis

- 1) $(1, 0) m$
- 2) $(2, 0) m$
- 3) $(2\sqrt{5}, 0)m$
- 4) $(2, 2) m$

13. A bob of mass m attached to an inextensible string of length l is suspended from a vertical support. The bob rotates in a horizontal circle with an angular speed ω rad/s about the vertical. About the point of suspension:

- 1) Angular momentum is conserved
- 2) Angular momentum changes in magnitude but not in direction
- 3) Angular momentum changes in direction but not in magnitude.
- 4) Angular momentum changes both in direction and magnitude.

14. A circular ring of radius $10cm$ rotates about its natural axis with constant acceleration of $2 rad/s^2$. The angle between radial and tangential accelerations of a particle on the rim after 4^{th} sec is

- 1) $\theta = \tan^{-1}(32)$



2) $\theta = \tan^{-1} \left(\frac{1}{32} \right)$

3) $\pi \text{ rad}$

4) $\frac{\pi}{2} \text{ rad}$

15. Two coils are placed close to each other. The mutual inductance of the pair of coils depends upon

- 1) the rates at which currents are changing in the two coils
- 2) relative position and orientation of the two coils
- 3) The materials of the wires of the coils
- 4) The current in the two coils

16. The instantaneous angular position of a point on a rotating wheel is given by the equation $\theta(t) = 2t^3 - 6t^2$.

The torque on the wheel becomes zero at

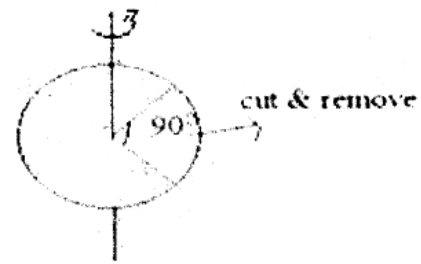
- 1) $t = 2 \text{ sec}$
- 2) $t = 1 \text{ sec}$
- 3) $t = 0.2 \text{ sec}$
- 4) $t = 0.25 \text{ sec}$

17. Two beams, A and B, of plane polarized light with mutually perpendicular planes of polarization are seen through Polaroid. From the position when the beam A has maximum intensity and beam B has zero intensity, a rotation of Polaroid through 30° makes the beams appear equally bright. If the initial intensities of two beams are I_A and I_B respectively, then $\frac{I_A}{I_B}$ equals:

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

18. Radius of gyration of a circular disc of mass M and radius R about a plane perpendicular axis passing through centre is $\frac{R}{\sqrt{2}}$. Now $\frac{1}{4}$ th of the circular disc is cut

and removed as shown in fig. Then the radius of gyration of the remaining portion about the same axis is



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

2) $\frac{R^2}{2}$

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

4) $\frac{R}{2}$

19. Two fixed frictional inclined planes making an angle 30° and 60° with the vertical are shown in the figure. Two blocks A and B are placed on the two planes. What is the relative vertical acceleration of A with respect to B?



- 1) 4.9 ms^{-2} in horizontal direction
- 2) 9.8 ms^{-2} in vertical direction
- 3) Zero
- 4) 4.9 ms^{-2} in vertical direction

20. A tunnel is dug along the diameter of the earth whose escape velocity from its surface V_e . A body of mass m is dropped freely in to that tunnel from the surface of earth. The velocity of with which the body crossing the centre of the earth is

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

2) V_e



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

4) $\sqrt{3}V_e$

21. 10 gm of ice cubes at 0°C are released in a tumbler (water equivalent of tumbler + water = 55g) at 40°C . Assuming that negligible heat is taken from the surroundings, the temperature of water in the tumbler becomes nearly ($L = 80 \text{ cal/g}$)

1) 31°C

2) 22°C

3) 19°C

4) 15°C

22. A spring of negligible mass having force constant K extends by an amount y when a mass m is hung from it. The mass is pulled down a little bit x and released. the system begins to execute S.H.M of a amplitude A and angular frequency ω . The total energy of the mass spring system will be

1) $\frac{1}{2}mA^2\omega^2$

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

3) $\frac{1}{2}mA^2\omega^2 + \frac{1}{2}ky^2$

4) $\frac{1}{2}mA^2\omega^2 + \frac{1}{2}ky^2 + \frac{1}{2}kx^2$

23. 300J work is done in sliding a 2 kg block up an inclined plane of height 10m. Taking $g = 10 \text{ m/s}^2$, work done against friction is

1) 100J

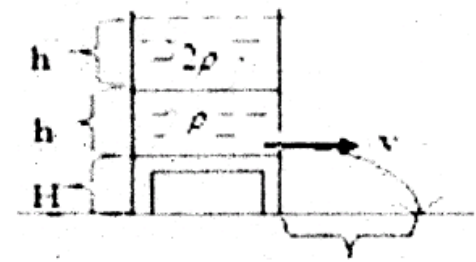
2) Zero

3) 1000J

4) 200J

24. A uniform cylindrical vessel of height $2h$ is kept vertical on a table of height H . The vessel is half filled with a liquid of density 2ρ and remaining half with another liquid of density ρ . A hole is made at the bottom of the vertical wall of

the vessel. If horizontal range 'R' of the liquid from the hole is $4h$ then the value of $\frac{H}{h}$ is



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

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

3) $\frac{8}{3}$

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

25. For a normal eye, the cornea of eye provides a converging power of 40D and the least converging power of the eye lens behind the cornea is 20D. Using this information, the distance between the retina and the eye lens of the eye can be estimated to be

1) 2.5 cm

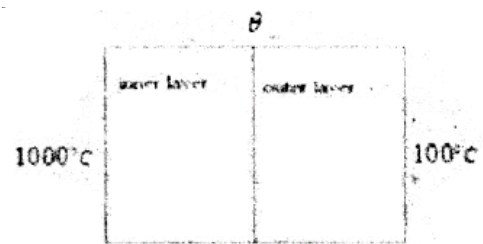
2) 1.67 cm

3) 1.5 cm

4) 5 cm

26. The temperature drop through a two layer furnace wall is 900°C . Each layer is of equal area of cross section.

Which of the following actions will result in lowering the temperature θ of the interface?



1) By increasing thickness of outer layer



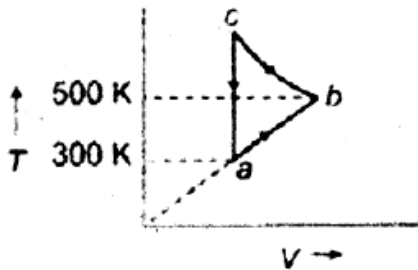
- 2) By decreasing thickness of inner layer
- 3) By increasing the thermal conductivity of outer layer
- 4) By increasing the thermal conductivity of inner layer
- 27.** Work done in increasing the size of a soap bubble from a radius of 3 cm to 5 cm is nearly (surface tension of soap solution = 0.03 Nm^{-1})
- 1) $0.2 \pi \text{ mJ}$
- 2) $2 \pi \text{ mJ}$
- 3) $0.4 \pi \text{ mJ}$
- 4) $4 \pi \text{ mJ}$
- 28.** During an isothermal expansion, a confined ideal gas does -150 J of work against its surrounding. This implies that
- 1) 300 J of heat has been added to the gas
- 2) 150 J of heat has been removed from the gas
- 3) 150 J of heat has been added to the gas
- 4) No heat is transferred because the process is isothermal
- 29.** The electric field part of an electromagnetic wave in a medium is represented by $E_x = 0$;
- $$E_y = 2.5 \frac{N}{C} \cos \left[\left(2\pi \times 10^6 \frac{\text{rad}}{s} \right) t - \left(\pi \times 10^{-2} \frac{\text{rad}}{m} \right) x \right], E_z = 0.$$
- The wave is:
- 1) Moving along x direction with frequency 10^{-6} Hz and wave length 100m.
- 2) Moving along x direction with frequency 10^6 Hz and wavelength 200m
- 3) Moving along x direction with frequency 10^6 Hz and wave length 200m
- 4) Moving along y direction with frequency $2\pi \times 10^6 \text{ Hz}$ and wave length 200m
- 30.** A diatomic ideal gas is used in a carnot engine as the working substance. If during the adiabatic expansion part of the cycle, volume of the gas increases from V to $32V$. The efficiency of the engine is
- 1) 0.5
- 2) 0.75
- 3) 0.99
- 4) 0.25
- 31.** Four particles, each of mass M and equidistant from each other, move along a circle of radius R under the action of their mutual gravitational attraction. The speed of each particle is:
- 1) $\sqrt{\frac{GM}{R}}$
- 2) $\sqrt{\frac{2\sqrt{2}GM}{R}}$
- 3) $\sqrt{\frac{GM}{R}(1 + 2\sqrt{2})}$
- 4) $\frac{1}{2} \sqrt{\frac{GM}{R}(1 + 2\sqrt{2})}$
- 32.** A gas expands from V_0 to $2V_0$ following the process $P = \beta V$ where β is constant. The work done in this process is
- 1) $\frac{\beta V_0}{2}$
- 2) $\frac{2\beta V_0^2}{2}$
- 3) $\frac{3\beta V_0}{2}$
- 4) $\frac{\beta V_0}{2}$
- 33.** Two identical conducting wires AOB and COD are placed at right angles to each other. The wire AOB carries an electric current I_1 and COD carries a current I_2 . The magnetic field on a point lying at a distance d from O, in a direction



perpendicular to the plane of the wires AOB and COD, will be given by

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

34. Consider the cyclic process *abca* performed on a sample of 2.0 mole of an ideal gas. A total of 1000 cal of heat is withdrawn from the sample in the process. Find the work done by the gas during the past *bc*.



- 1) 1800 cal
 - 2) -1800 cal
 - 3) 800 cal
 - 4) 0
35. If θ_1 and θ_2 be the apparent angles of dip observed in two vertical planes at right angles to each other, then the true angles of dip θ is given by :-
- 1) $\tan^2\theta = \tan^2\theta_1 + \tan^2\theta_2$
 - 2) $\cot^2\theta = \cot^2\theta_1 - \cot^2\theta_2$
 - 3) $\tan^2\theta = \tan^2\theta_1 - \tan^2\theta_2$
 - 4) $\cot^2\theta = \cot^2\theta_1 + \cot^2\theta_2$
36. A sample of ideal gas ($\gamma = 1.4$) is heated at constant pressure. If an amount 140J heat is supplied to the gas, find the work done by the gas
- 1) 30 J
 - 2) 40 J
 - 3) 45 J

4) 50 J

37. A carnot engine whose efficiency is 50% has an exhaust temperature of 500K. If the efficiency is to be 60% with the same in take temperature, the exhaust temperature must be (in K)
- 1) 800
 - 2) 200
 - 3) 400
 - 4) 600
38. For a particle executing SHM the kinetic energy E is given by $E = E_0 \cos^2 \omega t$. The maximum value of the potential energy is
- 1) E_0
 - 2) $\frac{E_0}{\sqrt{2}}$
 - 3) $\frac{E_0}{2}$
 - 4) $\frac{E_0}{4}$
39. A solid sphere of radius R is placed on a smooth horizontal surface. A horizontal force F is applied at height h from the lowest point. For the maximum acceleration of the centre of mass.
- 1) $h = R$
 - 2) $h = 2R$
 - 3) $h = 0$
 - 4) The acceleration will be same whatever h may be
40. A square plate of side 'a' has a mass 'm'. The moment of inertia of this plate about an axis perpendicular to it's plane and passing through one of its corner is
- 1) $\frac{ma^2}{12}$
 - 2) $\frac{ma^2}{12}$
 - 3) $\frac{2ma^2}{3}$
 - 4) $\frac{5ma^2}{6}$



41. What is the 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 $2R$?

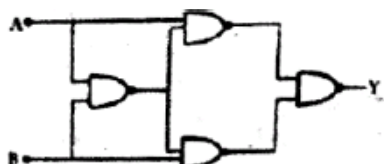
- 1) $\frac{5GmM}{6R}$
- 2) $\frac{2GmM}{3R}$
- 3) $\frac{GmM}{2R}$
- 4) $\frac{GM^2}{2R}$

42. When a capillary tube is dipped into a liquid, the liquid neither rises nor falls in the capillary.

- i) The surface tension of the liquid must be zero
- ii) The contact angle must be 90°
- iii) The surface tension may be zero
- iv) The contact angle may be 90°

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

43. Truth table for system of four NAND gates as shown in figure is:3



1)

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

2)

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

3)

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

4)

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

44. The length of a metal wire is L_1 , when the tension in it is T_1 and L_2 when the

tension is L_2 . The natural length of the wire is

- 1) $\frac{L_1T_1+L_2T_2}{T_1+T_2}$
- 2) $\frac{L_1T_2-L_2T_1}{T_2-T_1}$
- 3) $\sqrt{L_1L_2}$
- 4) $\frac{L_1+L_2}{2}$

45. A mass m is vertically suspended from a spring of negligible mass; oscillates with a frequency n .

What will be the frequency of the system, if a mass $4m$ is suspended from the same spring?

- 1) $\frac{n}{4}$
- 2) $4n$
- 3) $\frac{n}{2} \sqrt{m}$
- 4) $4n$

CHEMISTRY

46. The repeating unit present in nylon-6 is:

- 1) $-[NH(CH_2)_6NHCO(CH_2)_4CO] -$
- 2) $-[CO(CH_2)_6NH] -$
- 3) $-[CO(CH_2)_5NH] -$
- 4) $-[CO(CH_2)_4NH] -$

47. Which of the following solution has maximum freezing point?

- 1) 0.01 M NaCl
- 2) 0.01 M $BaCl_2$
- 3) 0.01 M glucose
- 4) 0.001 M Urea

48. Which of the following acids is a vitamin?

- 1) Aspartic acid
- 2) Ascorbic acid
- 3) Adtpic acid
- 4) Saccharic acid



49. In spinel structure, O^{2-} ions are cubic-closed packed, whereas $1/8^{\text{th}}$ of the tetrahedral holes are occupied by A^{2+} cations and $1/2$ of the octahedral holes are occupied by cations B^{3+} . The general formula of this compound is:

- 1) A_2BO_4
- 2) AB_2O_4
- 3) A_2B_4O
- 4) A_4B_2O

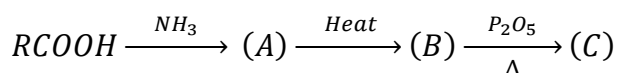
50. Which of the following methods of preparation of amines will not give same number of carbon atoms in the chain of amines as in the reactant?

- 1) Reaction of nitrite with $LiAlH_4$
- 2) Reaction of amide with $LiAlH_4$ followed by treatment with water
- 3) Heating alkylhalide with potassium salt of phthalimide followed by hydrolysis
- 4) Treatment of amide with bromine in aqueous solution of sodium hydroxide

51. The standard reduction potentials of $Cu^{2+}|Cu$ and $Cu^{2+}|Cu^{+}$ are 0.337 and 0.153 V respectively. The standard electrode potential of Cu^{+}/Cu half cell is

- 1) 0.184 V
- 2) 0.827 V
- 3) 0.521 V
- 4) 0.490 V

52. The product (C) in the following reactions is:

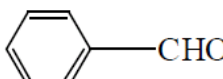


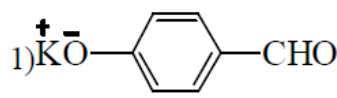
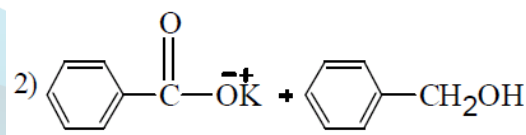
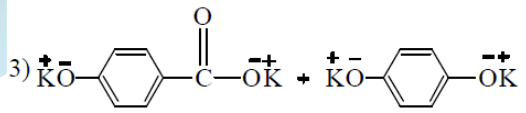
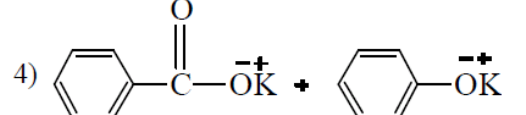
- 1) RNH_2
- 2) RCN
- 3) RNC
- 4) $RCONH_2$

53. An aqueous solution of urea containing 6g per 500 ml (density 1.05 g/ml) will have the molality

- 1) 0.20 m
- 2) 0.10 m
- 3) 0.193 m
- 4) 0.0193 m

54. Which product is formed, when the

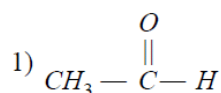
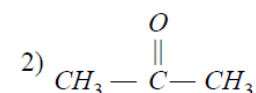
compound  is treated /with concentrated aqueous KOH solution?

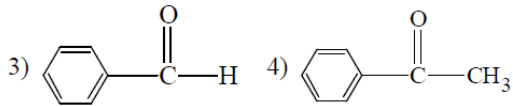
- 1) 
- 2) 
- 3) 
- 4) 

55. Which of the following salt is the most basic in aqueous solution

- 1) CH_3COOK
- 2) $FeCl_3$
- 3) $Pb(CH_3COO)_2$
- 4) $Al(CN)_3$

56. Which of the following compounds is most reactive towards nucleophilic addition reactions?

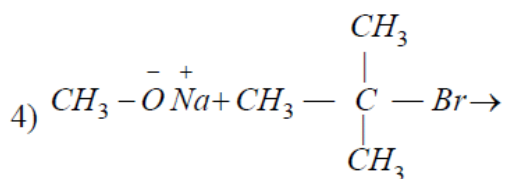
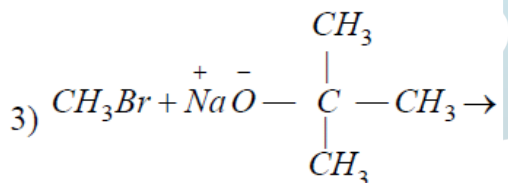
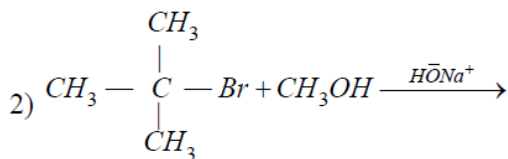
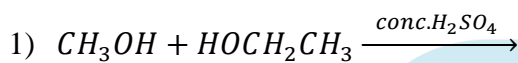
- 1) 
- 2) 



57. A substance with initial concentration A_0 react according to zero order kinetics. The time taken for the completion of the reaction is:

- 1) $\frac{A_0}{k}$
- 2) $\frac{2A_0}{k}$
- 3) $\frac{k}{A_0}$
- 4) $\frac{A_0}{2k}$

58. In which of the following reactions, the product obtained is tert-butyl methyl ether?

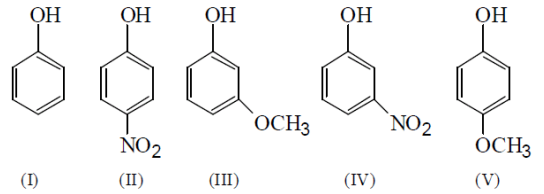


59. The values observed and theoretical molecular masses of an electrolyte AB are 65.4 and 114.45 respectively.

the electrolyte AB in the solution dissociates to the extent of

- 1) 85%
- 2) 25%
- 3) 90%
- 4) 75%

60. Mark the correct order of decreasing acid strength of the following compounds:

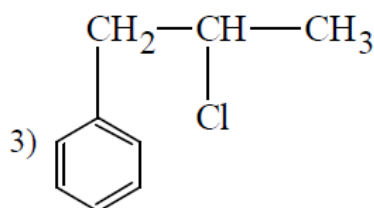
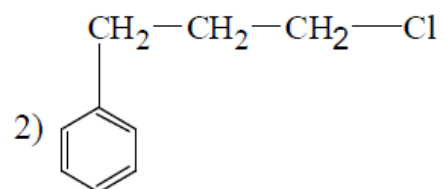
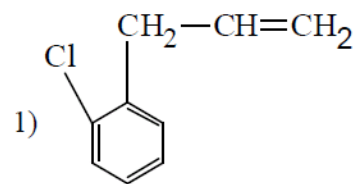
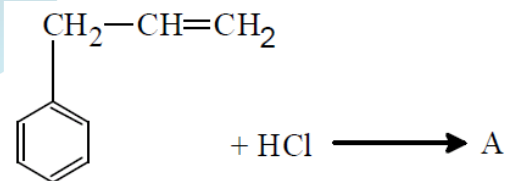


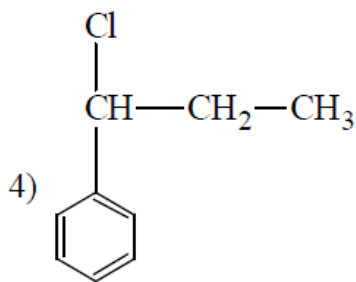
- 1) $V > IV > II > I > III$
- 2) $II > IV > I > III > V$
- 3) $II > IV > III > V > I$
- 4) $V > IV > III > II > I$

61. At low pressure and at high pressure. Freundlich absorption isotherm may be expressed as: (n is whole number)

- 1) KP, K
- 2) $K.P^n, KP^{\frac{1}{n}}$
- 3) KP^0, KP
- 4) KP^0, KP^{-1}

62. What is 'A' in the following reaction?

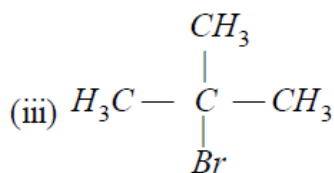
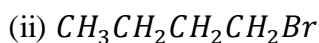
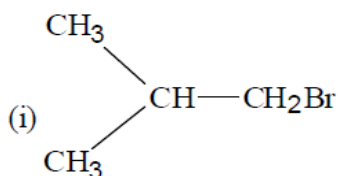




63. The number of ions per mole of the complex $CoCl_3 \cdot 4NH_3$ in aqueous solution will be:

- 1) 3
- 2) 7
- 3) 2
- 4) 4

64. Arrange the following compounds in increasing order of their boiling points:

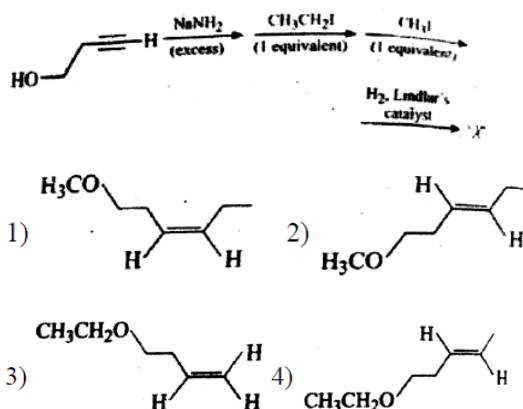


- 1) (ii) < (i) < (iii)
- 2) (i) < (ii) < (iii)
- 3) (iii) < (i) < (ii)
- 4) (iii) < (ii) < (i)

65. Which of the following is strongest base?

- 1) $Sc(OH)_3$
- 2) $La(OH)_3$
- 3) $Ln(OH)_3$
- 4) $Yb(OH)_3$

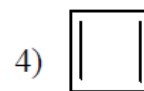
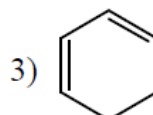
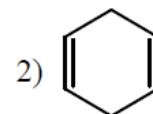
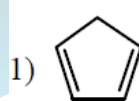
66. In the following sequential transformation, considering only the major products formed in each step, what is the product 'X'?



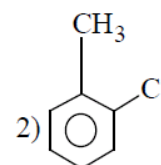
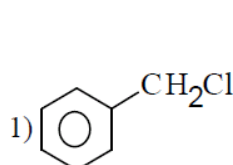
67. Which of the following description of hybridization is not correct?

- 1) $[Fe(CN)_6]^{4-}$: d^2sp^3
- 2) $[Ni(CN)_4]^{2-}$: dsp^2
- 3) $[Cu(NH_3)_4]^{2+}$: sp^3
- 4) $[Ni(CO)_4]$: sp^3

68. Ozonolysis products of an olefin are $OHC - CHO$ and $OHC - CH_2 - CH_2 - CHO$, the olefin is:



69. In which of the following -C-Cl bond is not easily replaced?



- 3) $CH_2 = CHCH_2Cl$
- 4) CH_3CH_2Cl

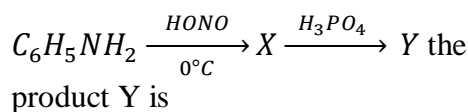
70. The Prussian blue colour obtained in the Lassaigne's test for nitrogen is due to the formation of:

- 1) iron (III) hexacyanoferrate (II)
- 2) iron (III) hexacyanoferrate (III)
- 3) iron (II) hexacyanoferrate (II)



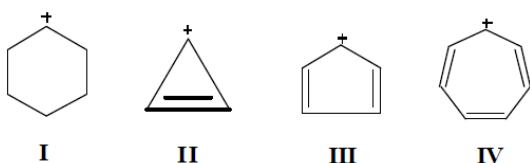
4) iron (II) hexacyanoferrate (III)

71. In the reaction,



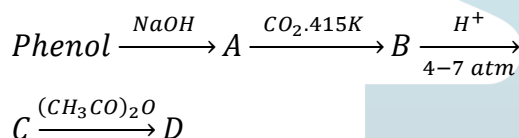
- 1) C_6H_5CHO
- 2) C_6H_5CN
- 3) $C_6H_5NO_2$
- 4) C_6H_6

72. The stability of the following carbocation decreases in the order



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

73. In the reaction.



The product is:

- 1) Salicyl aldehyde
- 2) Aspirin
- 3) Salicylic acid
- 4) Benzoic acid

74. Which of the following orders is not in accordance with the property stated against it?

- 1) $F_2 > Cl_2 > Br_2 > I_2$; electro negativity
- 2) $F_2 > Cl_2 > Br_2 > I_2$; bond dissociation energy
- 3) $F_2 > Cl_2 > Br_2 > I_2$; oxidizing nature
- 4) $HI > HBr > HCl > HF$; acidic property in water

75. The reagent with which both aldehydes and ketones react easily is:

- 1) Fehling solution
- 2) Tollen's reagent
- 3) Grignard reagent
- 4) Schiff's reagent

76. The compounds

$[Cr(H_2O)_6]Cl_3$, $[Cr(H_2O)_5Cl]Cl_2 \cdot H_2O$ and $[Cr(H_2O)_4Cl_2]Cl \cdot 2H_2O$ exhibit:

- 1) linkage isomerism
- 2) geometrical isomerism
- 3) ionization isomerism
- 4) hydrate isomerism

77. A compound which gives positive iodoform test is:

- 1) 1-Pentanol
- 2) 2-Pentanone
- 3) 3-Pentanone
- 4) Pentanal

78. The correct order of magnetic moments (spin values) among the following is:

- 1) $[Fe(CN)_6]^{4-} > [CoCl_4]^{2-} > [MnCl_4]^{2-}$
- 2) $[MnCl_4]^{2-} > [Fe(CN)_6]^{4-} > [CoCl_4]^{2-}$
- 3) $[Fe(CN)_6]^{4-} > [MnCl_4]^{2-} > [CoCl_4]^{2-}$
- 4) $[MnCl_4]^{2-} > [CoCl_4]^{2-} > [Fe(CN)_6]^{4-}$

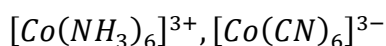
79. The number of optically active isomers of tartaric acid ($HOOC - CH(OH) - CH(OH) - COOH$) are

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

80. The colour of coordination compounds depends on the crystal field splitting.



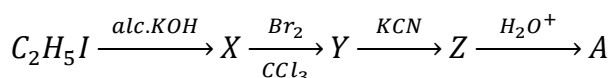
What will be the correct order of absorption of wavelengths of light in the visible region for the complexes,



and $[Co(H_2O)_6]^{3+}$

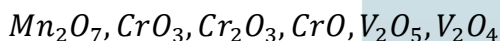
- 1) $[Co(CN)_6]^{3-} > [Co(NH_3)_6]^{3+} > [Co(H_2O)_6]^{3+}$
- 2) $[Co(NH_3)_6]^{3+} > [Co(H_2O)_6]^{3+} > [Co(CN)_6]^{3-}$
- 3) $[Co(H_2O)_6]^{3+} > [Co(NH_3)_6]^{3+} > [Co(CN)_6]^{3-}$
- 4) $[Co(NH_3)_6]^{3+} > [Co(CN)_6]^{3-} > [Co(H_2O)_6]^{3+}$

81. In the following reaction sequence 'A' is:



- 1) Succinic acid
- 2) Oxalic acid
- 3) Malonic acid
- 4) Maleic acid

82. Which of the following are amphoteric oxides?



- 1) Mn_2O_7, CrO_3
- 2) V_2O_5, V_2O_4
- 3) CrO, V_2O_5
- 4) Cr_2O_3, V_2O_5

83. Aromatic primary amines can be distinguished from aliphatic primary amines by:

- 1) Tollen's test
- 2) Carbylamine test
- 3) Azo dye test
- 4) Action on red litmus paper

84. Cyclic trimer structure of SO_3 contains:

- 1) 6S=O and three S-O-S bonds
- 2) 3S=O and six S-O-S bonds

- 3) 6S=O and six S-O-S bonds
- 4) 6S=O and six S-O-S bonds

85. Dettol is a mixture of:

- 1) Chloroxylenol and phenylsalicylate
- 2) Boric acid and chloroxylenol
- 3) Chloroxylenol and terpineol
- 4) Bithuonal and iodoform

86. Which of the following equations is not correctly formulated?

- 1) $3Cu + 8HNO_3(dil.) \rightarrow 3Cu(NO_3)_2 + 2NO + 4H_2O$
- 2) $3Zn + 8HNO_3(v.dil.) \rightarrow 3Zn(NO_3)_2 + 2NO + 4H_2O$
- 3) $4Sn + 10HNO_3(dil.) \rightarrow 4Sn(NO_3)_2 + NH_4NO_3 + 3H_2O$
- 4) $As + 5HNO_3(conc.) \rightarrow H_3AsO_4 + 5NO_2 + H_2O$

87. An aqueous solution contains 0.1 M H_2S and 0.2 M HCl. If K_{a1} and K_{a2} of H_2S are 1×10^{-7} , 1.2×10^{-13} then the concentration of S^{2-} in aqueous solution is

- 1) 5×10^{-8}
- 2) 5×10^{-19}
- 3) 3×10^{-20}
- 4) 6×10^{-21}

88. Among the following molecules:

- (i) XeO_3
- (ii) $XeOF_4$
- (iii) XeF_6

Those having same number of lone pairs on xenon are:

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

89. Which of the following is a step growth polymer?



- 1) Nylon
- 2) Polyisoprene
- 3) Polythene
- 4) Polyacrylonitrile

90. When an inorganic compounds (X) having $3C - 2e$ as well as $2C - 2e$ bonds react with ammonia gas at a certain temperature, gives compounds (Y), isostructural with benzene. Compound (X) with ammonia at a high temperature produces a substance (Z). Which of the following alternative is wrong?

- 1) (X) is diborane (B_2H_6)
- 2) (Y) is $B_3N_3H_3$ (inorganic benzene)
- 3) (Z) is known as inorganic graphite
- 4) (Z) is soft like graphite

BIOLOGY

91. Match the following and choose the correct option

List – I

A) *Proteus anguinus* or blind salamander

B) Rat

C) *Oenothera lamarckiana* or evening primrose

D) Peppered moth

E) *Drosophila*

List – II

I) Germplasm theory

II) Mutations

III) Neo-Lamarckism

IV) T.H. Morgan observed mutations

V) Industrial melanism

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

92. Branch of biology deals with study of diversity of organisms and evolutionary relations among them is called

- 1) Morphology
- 2) Systematics
- 3) Ontogeny
- 4) Taxonomy

93. Types of ovules in angiosperms are

- 1) 6
- 2) 5
- 3) 4
- 4) 3

94. Non flagellated protistans are

- 1) *Gonyaulax*
- 2) *Streptococcus*
- 3) Diatoms
- 4) *Mycoplasma*

95. Match the following and choose the correct option

List – I

1) Junk DNA

2) *Caenorhabditis*

3) Expressed sequence tags (ESTs)

4) Sequence Annotation

List – II

i) Non functional genome

ii) Non-pathogenic nematode

iii) Identifying all the genes that expressed as RNA

iv) Blind sequence of entire genome

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

96. Filamentous green alga with motile gametes

- 1) *Fucus*
- 2) *Ectocarpus*
- 3) *Spirogyra*



4) Cladophora

97. Match the columns and choose the correct combination

Column –I

Column – II

A. Non sense codon

I. UUU

B. Ambiguous codon

II. UGG

C. Codon for tryptophan

III. GUG

D. Phenylalanine codon

IV. UAG

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

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

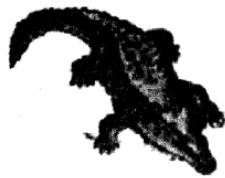
3) A-IV; B-III; C-II; D-I

4) A-IV; B-III; C-I; D-U

98. Identify the animals in the given figures A, B, C and D and choose the correct option.



a



b



c



d

1) a-Hippocampus – air bladder is present

2) b-Chameleon –shed scales as skin cast

3) c-Struthio – digestive track contains crop and gizzard

4) d-Balaenoptera – dry skin without glands

99. Development of breast size in males called gynecomatism and sterility are observed in

1) Klinefelter's syndrome

2) Turner's syndrome

3) Down's syndrome

4) Cri-du-chat syndrome

100. Study the following statements

A) Nereis and earthworms are monoecious

B) Locusta is a gregarious pest

C) In molluscs will have respiratory and excretory functions

D) In echinoderms as excretory system is absent

101. Unwinding of DNA creates tension which is released by enzyme

1) Pyrophosphatase

2) Primase

3) Helicase

4) Topoisomerase

102. Match the following

List – I

List – II

A. Devil fish

I. Placoid scales

B. Jelly fish

II. Four pairs of gills

C. Hag fish

III. Circular mouth

D. Flying fish

IV. Cnidocytes

E. Saw fish

V. Radula

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

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

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

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

103. Contraceptive oral pills help in birth control by

1) Killing of ova

2) Preventing ovulation

3) Killing the sperms



- 4) Forming barrier between sperms and ova

104. Gametophytes of spermatophytes are usually

- 1) Monoecious and heterotrophs
- 2) Dioecious and eterotrophs
- 3) Monoecious and auto trophs
- 4) Dioecious and autotrophs

105. The most common mode of entry of pollen tube into ovule is

- 1) Chalazogamy
- 2) Xenogamy
- 3) Porogamy
- 4) Basignamy

106. Find the correct match

List – I

- A. Stem tuber
B. Rhizome
C. Corm
D. Bulb

List – II

- I. Turmeric
II. Onion
III. Potato
IV. Zaminkand

The correct match is

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

107. Choose the correct sequence of events occur in human reproduction

- 1) Gametogenesis → insemination → fertilization → implantation → gestation → parturition
- 2) Gametogenesis → gestation → insemination → fertilization → implantation → parturition
- 3) Gestation → gametogenesis → insemination → implantation → fertilization → parturition

- 4) Gametogenesis →insemination → gestation → implantation → fertilization → parturition

108. How many of the following plants show epigynous flowers?

- A. Guava
B. Cucumber
C. Sunflower
D. Plum
E. Rose
F. China rose
G. Brinjal
H. Peach
I. Apple

- 1) 3
- 2) 4TM
- 3) 5
- 4) 6

109. Arrange the following terms in the correct development sequence in flowering plants.

- A. Sperms
B. Heart-shaped embryo
C. Syngamy
D. Microspore mother cell
E. Sporic meiosis
F. Globular embryo

- 1) E, D, A, C, F, B
- 2) D, E, A, C, F, B
- 3) D, E, A, C, B, F
- 4) E, D, A, C, B, F

110. In pheretima haemoglobin is

- 1) present in the blood cells produced by blood glands
- 2) intracellular in nature
- 3) intercellular in nature
- 4) a red pigment containing copper



111. Match the following and choose the correct option

- | | |
|---------------------|---|
| (a) Trophoblast | (i) Embedding of blastocyst in the endometrium |
| (b) Cleavage | (ii) Group of cells that would differentiate as embryo |
| (c) Inner cell mass | (iii) Outer layer of blastocyst attached to the endometrium |
| (d) Implantation | (iv) Mitotic division of zygote |

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

112. The sclerite that is common in the genital pouch of both male and female cockroaches

- 1) 7th sterna plate
- 2) 8th sterna plate
- 3) 9th sterna plate
- 4) 9^h tergal plate

113. The number of cells in mature female and male gametophyte in angiosperms is _____ and _____

- 1) 8, 1
- 2) 7, 4
- 3) 7, 3
- 4) 8, 2

114. Recognise the figure and find the correct option



- 1) Unicellular glandular epithelium – salivary glands
- 2) Unicellular glandular epithelium – goblet cells of alimentary canal
- 3) Multi cellular glandular epithelium – salivary glands
- 4) Multi cellular glandular epithelium – goblet cell of alimentary canal

115. Which one of the following hormones though synthesized elsewhere, is stored and released by the master gland?

- 1) Melanocyte stimulating hormone
- 2) Antidiuretic hormone
- 3) Luteinizing hormone
- 4) Prolactin

116. Fleshy fruits developed from monocarpellary gynoecium are found in

- 1) Tomato
- 2) Mango
- 3) Citrus
- 4) Cucumber

117. Archaeobacteria that flourish in temperature above 100°C have special _____ molecules that do not coagulate at high temperatures and remain functional.

- 1) carbohydrate
- 2) ester
- 3) protein
- 4) fat

118. Perennial monocarpic plant is

- 1) Rice plant
- 2) Agave
- 3) Carrot
- 4) Turnip

119. Which of the following hormone is not involved in sugar metabolism?

- 1) Glucagon



- 2) Cortisone
- 3) Aldosterone
- 4) Insuline

120. The sub aerial stem modification 'Terror of Bengal' is

- 1) Sucker
- 2) Stolon
- 3) Offset
- 4) Runner

121. Match the items in column I with those in column II and chose the correct answer

Column I	Column II
A. Small opening of ovule	I. Funicle
B. Stalk of ovule	II. Integuments
C. Protective envelopes of ovule	III. Chalaza
D. Junction part of ovule and stalk	IV. Hilum
E. Basal part of the ovule	V. Micropyle

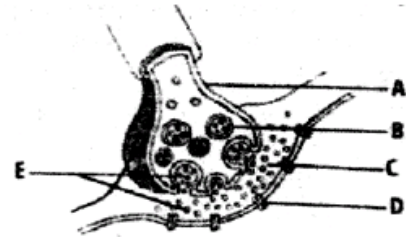
- 1) A-V; B-I; C-II; D-IV; E-III
- 2) A-I; B-III; C-II; D-IV; E-V
- 3) A-III; B-I; C-II; D-IV; E-V
- 4) A-IV; B-I; C-V; D-II; E-III

122. How many among the following statements are true?

- I. A healthy adult man has, on average, 5 to 5.5 billion of RBCs mm^{-3}
- II. Leucocytes are also called white blood cells as they are white in colour
- III. Basophils are the least (2-3 percent) among the total WBCs
- IV. Both B and T lymphocytes are responsible for immune responses of the body

- 1) One only
- 2) Two only
- 3) Three only
- 4) None

123. The given diagram shows axon terminal and synapse. Here A, B, C, D and E respectively represent



	A	B	C	D	E
1	axon terminal	synaptic cleft	synaptic vesicle	neurotran smitters	receptor
2	axon terminal	synaptic vesicle	synaptic cleft	receptors	neurotran smitters
3	synaptic cleft	synaptic vesicle	axon terminal	neurotran smitters	receptors
4	synaptic cleft	axon terminal	synaptic vesicle	neurotran smitters	receptors

124. Oxytocin and antidiuretic hormones reach their target cells through

- 1) lymphatic vessels
- 2) axons
- 3) portal circulation
- 4) blood vessels

125. Number of chromosomes in an angiospermic plant is 14, then the number of chromosomes in synergic cells will be

- 1) 14
- 2) 7
- 3) 28
- 4) 21

126. Given below is the incomplete table about certain hormones. Select the option that correctly fills the blanks A, B and C



Gland /organ	Secretion	Effect on body
A	Estrogen	Maintains secondary sexual characters
α – cell of Islets of Langerhans	B	Raises blood sugar level
Anterior pituitary	C	Over secretion leads to gigantism

	A	B	C
1.	Placenta	Glucagon	Calcitonin
2.	Ovary	Glucagon	Growth hormone
3.	Placenta	Insulin	Vasopressin
4.	Ovary	Insulin	calcitonin

127. The brain size of Neanderthal man is

- 1) 650-800 cc
- 2) 900 cc
- 3) 1000 cc
- 4) 1400 cc

128. Anatroous ovule are commonly seen in this family

- 1) Polygonum family
- 2) Bean family
- 3) Sunflower family
- 4) Lily family

129. Match Column I with Column II and choose the correct option.

Column I

Column II

A. Breeding crops with higher levels of nutrients

I. Totipotency

B. Plant grown from

II. Micropropagation

hybrid protoplast

C. Producing a large number of plant through tissue culture

III. Somaclone

D. Capacity to generate a whole plant from an explants

IV. Somatic hybrid

E. Plants genetically identical to the original plant

V. Bio fortification

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

130. Odd petal is posterior in the flowers of

- 1) Hibiscus
- 2) Crotalaria
- 3) Allium
- 4) 2 and 3

131. Nerve impulse initiates with the movement of

- 1) Na^+
- 2) Ca^{+2}
- 3) K^+
- 4) mg^{+2}

132. The core of the cilium of flagellum is composed of

- 1) 10 pairs of microtubules
- 2) 1 pair of microtubules
- 3) 9 pairs of microtubules
- 4) 11 pairs of microtubules

133. Which of the following are heterosporous pteridophytes?

- I. Lycopodium
- II. Selaginella
- III. Equisetum



IV. Salvinia

- 1) I and II only
- 2) II and III only
- 3) II and IV only
- 4) II and IV only

134. Read the statements given below

I. Aquatic insects are ammonotelic

II. L and snails excrete uric acid

III. All amphibians are ureotelic

IV. In man on average 1100-1200 liters of blood is filtered by the kidneys per minutes.

How many statements are true?

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

135. Study the following about muscle contraction

- A) Binding of Ca^{2+} to Tn-C
- B) Release of acetylcholine
- C) Hydrolysis of ATP
- D) Release of Ca^{2+}
- E) Pulling of thin filaments
- F) Formation of cross bridges

Correct sequence of the above events occurrences is

- 1) B, D, A, C, F, E
- 2) B, A, D, F, C, E
- 3) B, D, A, F, C, E
- 4) B, A, F, D, C, E

136. Unlike in electrical synapses, in chemical synapse

- 1) The membranes of pre synaptic and post synaptic neurons are in close proximity
- 2) Transmission of impulse is faster

- 3) Pre synaptic neuron does not release neurotransmitter
- 4) Synaptic cleft is present

137. Match Column I with Column II and select the correct option

Column I

Column II

A. Ascomycetes

I. Ustilago

B. Phycomycetes

II. Saccharomyces

C. Basidiomycetes

III. Trichoderma

D. Deuteromycetes

IV. Albugo

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

138. What is the anatomical unit of muscle?

- 1) Sacromere
- 2) Muscle fibre
- 3) Myofibril
- 4) Sacrosome

139. Select the true statements

- A) H-zone is present in the middle of I-band
- B) A-band is present in the middle of sarcomere
- C) During contraction of muscle, I-bands get reduced
- D) The light bands contain actin and myosin protein

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

140. Certain unique phenotypic characters to bacteria are conferred by

- 1) Nucleoid



- 2) Chromosomes
- 3) Genomic DNA
- 4) Plasmid DNA

141. One hormone hastens the maturity period in juvenile conifers, a second hormone controls xylem differentiation while the third increases the tolerance of plants to various stresses and they are respectively

- 1) Auxin, Gibberellin and Cytokinin
- 2) Gibberellin, Auxin and Cytokinin
- 3) Gibberellin, Auxin and Ethylene
- 4) Gibberellin, Auxin and ABA

142. Arrange the following in ascending order based on their molecular weight

- A) Viroid
- B) Guanine
- C) Guanosine
- D) Guanylic acid

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

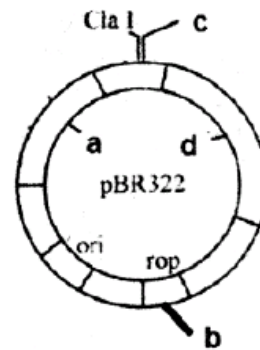
143. Match the following about joints and choose the correct option

Column I	Column II
A) Ball and Socket joint	p) joint between carpals
B) Hinge joint	q) between Femur and Acetabulum
C) Cartilage joint	r) Between adjacent vertebrae
D) Gliding joint	s) Knee joint

- 1) A-q, B-q, C-r, D-s
- 2) A-q, B-t, C-p, D-s
- 3) A-q, B-s, C-r, D-p

- 4) A-q, B-p, C-s, D-r

144.



Identify the a, b, c and d in the vector

	a	b	c	d
1)	amp ^R	Pvu II	Hind II	tet ^R
2)	tet ^R	Pvu I	Hind III	amp ^R
3)	tet ^R	Pvu I	Hind II	amp ^R
4)	amp ^R	Pvu II	Hind III	tet ^R

145. How many given below meristems are examples of lateral meristems?

Cylindrical meristems, Apical meristem, Fascicular meristem, Interfascicular cambium, Intercalary meristem and Cork cambium.

- 1) Three
- 2) Four
- 3) Five
- 4) Six

146. Parturition is induced by a neuroendocrine mechanism. It involves the hormones released from

- 1) Adrenal cortex
- 2) Ovary
- 3) Pituitary
- 4) All

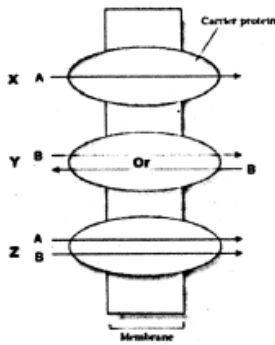
147. In ureotelic animals urea is formed by

- 1) Coriclycle in muscles
- 2) Ornithine cycle in kidney



- 3) Krebs's cycle in kidney
4) Ornithine cycle in liver
- 148.** The release of sperms from the seminiferous tubules is called
- 1) Spermogenesis
 - 2) Spermiation
 - 3) Spermatogenesis
 - 4) Spermatidogenesis
- 149.** Choose odd w.r.t. collenchymas.
- 1) Found in hypodermis of dicot stem
 - 2) Living mechanical tissue
 - 3) Absent in monocots
 - 4) Thickening of walls is due to deposition of cellulose and lignin
- 150.** If for some reason, the rete testis in the human reproductive system get blocked, the gametes will not be transported from
- 1) Seminiferous tubules to vasa efferentia
 - 2) Vasa efferentia to vas deferens
 - 3) Epididymis to vas deferens
 - 4) Vas deferens to epididymis
- 151.** Read the following statements.
- A) Bowman's capsule encloses a tuft of capillaries called glomerulus
 - B) A branch of renal artery called afferent arteriole supplies blood to glomerulus
 - C) Blood from the glomerulus is carried away by an efferent renal arteriole.
 - D) The diameter of efferent arteriole is greater than that of afferent arteriole.
- Which of the above are true?
- 1) B, C and D
 - 2) A, B and C
 - 3) A, C and D
 - 4) A, B and D

- 152.** Endarch and exarch are internal characters of the following respectively
- 1) Root and stem
 - 2) Root and leaf
 - 3) Leaf and stem
 - 4) Stem and root
- 153.** The sticky ends of a fragmented DNA molecule are made of
- 1) calcium salts
 - 2) endonuclease enzyme
 - 3) unpaired bases
 - 4) methyl groups
- 154.** Choose the correct sequence of the following plants in xerarch succession
- A) Forest trees
 - B) Ferns
 - C) Lichens
 - D) Mosses
- 1) ABCD
 - 2) BCAD
 - 3) CDBA
 - 4) CBDA
- 155.** Statement –I :- Adrenal cortex removal can causes death
Statement – II :- Adrenal cortex is vital for survival
- 1) Both statements I & II are correct and statement II explains statement I
 - 2) Both statements I & II are correct but statement II does not explains statement I
 - 3) Statement I is correct but statement II is false
 - 4) Statement I is false but statement II is correct
- 156.** Study the following diagram and identify X, Y and Z



	X	Y	Z
1.	Uniport	Antiport	Symport
2.	Uniport	Uniport	Symport
3.	Uniport	Symport	Antiport
4.	Antiport	Uniport	Symport

157. Micro-injection is a method used to

- 1) produce sticky ends of DNA
- 2) provide protection against pathogen
- 3) purify the DNA
- 4) inject recombinant DNA into the nucleus of an animal cell

158. The number of autosomes in human primary oocyte is

- 1) 22
- 2) 23
- 3) 44
- 4) 46

159. Which statement is false?

- 1) The mammalian heart will continue to beat for some time when it's nerve supply is cut
- 2) In vertebrates, veins can be distinguished from arteries because veins carry oxygenated blood
- 3) Water and small molecules can easily pass through the walls of most capillaries

- 4) Circulation of blood in the coronary arteries is greatest during diastole, when the heart is filling

160. Select the incorrect statement from the following

- 1) MTPs are relatively safe during the first trimester
- 2) All sexually transmitted diseases are completely curable
- 3) Hormone releasing IUDs make the uterus unsuitable for implantation and the cervix hostile to sperms
- 4) Lactational amenorrhea is effective only upto a maximum period of six months.

161. technique used to transfer ssDNA from gel to nitrocellulose membrane is called as **TM**

- 1) Northern blotting
- 2) Western blotting
- 3) Southern blotting
- 4) Gel electrophoresis

162. Function not associated with oral contraceptive pills

- 1) Increase phagocytosis of sperms
- 2) Inhibits ovulation
- 3) Alter quality of cervical mucus to prevent entry of sperms
- 4) Inhibit implantation

163. During the inspiration of breathing in human

- 1) Diaphragm becomes dome shaped, increases volume of thoracic chamber in the antero-posterior axis
- 2) Diaphragm becomes flat, increases volume of thoracic chamber dorso-ventrally
- 3) Diaphragm becomes dome shape, increases volume of thoracic chamber dorso – ventrally



- 4) Diaphragm becomes flat, increases volume of thoracic chamber in the antero-posterior axis

164. Mass movement of sugars through phloem is mainly driven by

- 1) facilitated diffusion
- 2) action uptake
- 3) water potential gradient
- 4) plasmodesmata

165. During bio fortification, breeding for improved nutritional quality is undertaken with objective of improving all, except

- 1) Micro nutrient content
- 2) Protein quality
- 3) Vitamin quality
- 4) Oil quality

166. Synthesis of chlorophyll and cytochrome system are affected by the deficiency of:

- 1) Fe
- 2) N
- 3) P
- 4) B

167. Match the items in Column I with Column II and choose the correct option:

Column I	Column II
A. Tidal volume	1. 2500 to 3000 mL of air
B. Inspiratory reserve volume	2. 1000 to 1100 mL of air
C. Expiratory reserve volume	3. 500 mL of air
D. Residual volume	4. 4000 to 4600 mL of air
E. Vital capacity	5. 1100 to 1200 mL of air

- 1) A=3, B=4, C=2, D=1, E=5

- 2) A=3, B=1, C=4, D=5, E=2

- 3) A=5, B=4, C=2, D=1, E=2

- 4) A=3, B=1, C=2, D=5, E=4

168. First stable product of biological nitrogen fixation

- 1) N_2
- 2) N_2H_2
- 3) NH_3
- 4) NH_4^+

169. Match the protein with its function and choose the right option.

Protein	Function
(A) Collagen	(i) Glucose transport
(B) Trypsin TM	(ii) Hormone
(C) Insulin	(iii) Intercellular ground substance
(D) GLUT-4	(iv) Enzyme

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

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

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

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

170. In ART, zygote or an early embryo (up to 8 blastomers) is transferred into fallopian tube. The technique is X and fertilization in this method is Y

Choose the correct option with regard to 'X' and 'Y'

	X	Y
1)	GIFT	In Vivo
2)	ZIFT	In Vitro
3)	ICSI	In Vivo
4)	IUT	In Vitro

171. Lymph vessels in the villi are called



- 1) Rugae
 - 2) Appendix
 - 3) Lacteals
 - 4) Crypts of Leiberkuhn
- 172.** What is the mechanism of sex determination in a large number of insects?
- 1) XY-type
 - 2) ZO-type
 - 3) XO-type
 - 4) ZZ-type
- 173.** Select the correct matching
- (a) Amyloplasts – store proteins
 - (b) Mitochondrion – ‘powerhouse’ of the cell
 - (c) Stroma – chlorophyll pigment
 - (d) Axoneme -9 + 2 array
- 1) (a) and (c) only
 - 2) (b), (c) and (d) only
 - 3) (c) and (d) only
 - 4) (b) and (d) only
- 174.** Study the following features
- A. Furrowed tongue B. Gynaecomastia
C. Small round head D. Rudimentary ovaries
E. Palm is broad with characteristic palm crease
F. Partially opened mouth
- Which among the above are characteristic of Down’s syndrome
- 1) A, C, E and F only
 - 2) A, B, C and F only
 - 3) B, C, D, E and F only
 - 4) A, B, D, E and F only
- 175.** Gibbson’s capsule is found in which organ of mammals?
- 1) Stomach
 - 2) Kidney
 - 3) Testis
 - 4) Liver
- 176.** Energy transducing membrane in chloroplast is
- 1) Outer unit membrane
 - 2) Inner unit membrane
 - 3) Thylakoid membrane
 - 4) Cristae
- 177.** In dicotyledonous roots, the initiation of lateral roots taken place in
- 1) endodermal cells
 - 2) cortical cells
 - 3) epidermal cells
 - 4) pericycle cells
- 178.** Complex IV of mitochondrial E.T.S contains
- A) Cyata
 - B) Cyt a3
 - C) Two copper centres
 - D) Cyt b6
- 1) A&D only
 - 2) A&C only
 - 3) B&C only
 - 4) A, B, C only
- 179.** Boat shaped sternum in female cockroach is present in this abdominal segment
- 1) 7th
 - 2) 8th
 - 3) 9th
 - 4) 10th
- 180.** Developmental heterophylly is not found in
- 1) Delphinium
 - 2) Coriander
 - 3) Cotton
 - 4) Ranunuculus



PHYSICS

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

CHEMISTRY

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

BIOLOGY

91 - 100	1	2	1	3	1	4	3	1	1	3
101 - 110	4	3	2	2	3	4	1	2	2	3
111 - 120	2	3	3	2	2	2	3	2	3	3
121 - 130	1	1	2	4	2	2	4	3	1	2
131 - 140	1	1	3	3	1	4	3	2	2	4
141 - 150	4	3	3	4	2	4	4	2	4	1
151 - 160	2	4	3	3	1	2	4	3	2	2
161 - 170	3	1	4	3	3	1	4	3	1	2
171 - 180	3	3	4	1	4	3	4	4	1	4

HINTS AND SOLUTIONS

PHYSICS

1. $r \propto l^2 \Rightarrow \frac{\Delta R}{R} = 2 \frac{\Delta l}{l} \Rightarrow \frac{\Delta R}{R} = 2(0.1)\% = 0.2\%$

2. From data

$V^2 - (\sqrt{180})^2 = +2(-8)x$. This is satisfying the equation motion

$$V^2 - u^2 = 2ax$$

\therefore The particle is moving with uniform acceleration of $a = -8 \text{ m/s}^2$

3. Conceptual

4. Let $y = b^2 \Rightarrow y = (5)^2 = 25$

$$\frac{\Delta y}{y} \times 100 = 2 \cdot \frac{\Delta b}{b} \times 100$$

$$\frac{\Delta y}{25} \times 100 = 2(2)$$

$$\Delta y = 1$$

$$\frac{\Delta a}{a} \times 100 = 1$$

$$\frac{\Delta a}{100} \times 100 = 1 \Rightarrow \Delta a = 1$$

Now $x = a + y \Rightarrow \Delta x = \Delta a + \Delta y$

$$\Rightarrow \frac{\Delta x}{x} \times 100 = \frac{\Delta a + \Delta y}{a + y} \times 100$$

$$= \frac{(1 + 1)}{100 + 25} \times 100$$

$$= \frac{8}{5} = 1.6\%$$

5. $f_{open} = \frac{v}{2L_{open}}$ & $f_{closed} = \frac{v}{4L_{closed}}$ but

given $L_{closed} = \frac{L_{open}}{2}$

$$\Rightarrow f_{closed} = \frac{v}{4\left(\frac{L_{open}}{2}\right)} = \frac{v}{2(L_{open})} = f$$

6. At the wall horizontal velocity gets reversed and at the ground vertical velocity gets reserved.

7. The focal length of the lens



$$\frac{1}{f} = \frac{1}{v} - \frac{1}{u} = \frac{1}{12} + \frac{1}{240} = \frac{20+1}{240} = \frac{21}{240}$$

$$f = \frac{240}{21} \text{ cm}$$

$$\text{Shift} = t \left(1 - \frac{1}{\mu} \right) \Rightarrow 1 \left(1 - \frac{1}{\frac{3}{2}} \right) \\ = 1 \times \frac{1}{3}$$

$$\text{Now } v = 12 - \frac{1}{3} = \frac{35}{3} \text{ cm}$$

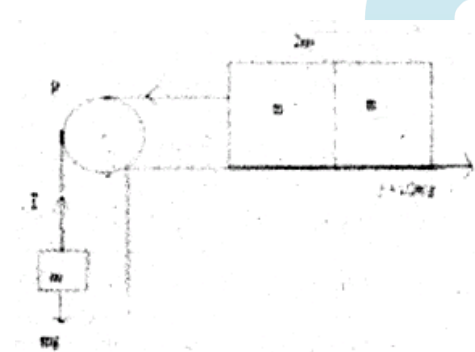
Now the object distance u,

$$\frac{1}{u} = \frac{3}{35} - \frac{21}{240} = \frac{1}{5} \left(\frac{3}{7} - \frac{21}{48} \right)$$

$$\frac{1}{u} = \frac{1}{5} \left[\frac{48 - 49}{7 \times 16} \right]$$

$$u = -7 \times 16 \times 5 = -560 \text{ cm} \\ = -5.6 \text{ m}$$

8.



$$(2m)a = T - \mu(2m)g \quad (1)$$

$$ma = mg - T \quad (2)$$

adding (1) and (2)

$$3ma = mg - 2\mu mg$$

$$\Rightarrow a = \frac{(1 - 2\mu)g}{3}$$

At mid point of the rope

$$T^1 - \mu mg = ma$$

$$T^1 = \mu mg + ma$$

$$= \mu mg + m \left[\frac{(1 - 2\mu)g}{3} \right]$$

$$T^1 = mg \left[\frac{3\mu + 1 - 2\mu}{3} \right] = \frac{mg(\mu + 1)}{3}$$

$$9. T = m(g - a) \dots (1)$$

$$TR = \left(\frac{mR^2}{2} \right) \alpha \dots (2)$$

$$\& a = R\alpha \dots (3)$$

Substitute 3 in 2;

$$TR = \frac{MR^2}{2} \left(\frac{a}{R} \right); \therefore T = \frac{ma}{2}$$

Substitute this in eq 1

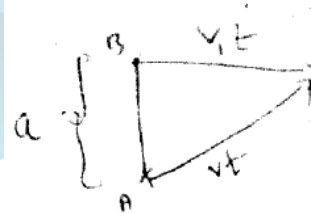
$$\Rightarrow \frac{ma}{2} = m(g - a); \frac{3ma}{2} = mg; \therefore a \\ = \frac{2g}{3}$$

$$10. \Delta U = \frac{1}{2} kx^2$$

Work done by spring on each mass

$$= -\frac{1}{4} kx^2$$

11.



$$(vt)^2 = a^2 + (v_1t)^2$$

$$(v^2 - v_1^2)t^2 = a^2$$

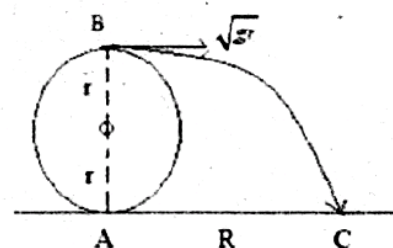
$$t^2 = \frac{a^2}{v^2 - v_1^2}$$

$$t = \sqrt{\frac{a^2}{v^2 - v_1^2}}$$

$$12. R = U \sqrt{\frac{2h}{g}} = \sqrt{gr} \cdot \sqrt{\frac{2(2r)}{g}}$$

$$R = 2r = 2(1) = 2m \text{ on x-axis}$$

here y-coordinate is zero





Coordinates of point c = (2,0)

13. Torque working on the bob of mass 'm' is $\tau mg (L \sin\theta)$

It's direct parallel to the plane of rotation of particle. As $\vec{\tau}$ is perpendicular to \vec{L} , direction of \vec{L} changes but magnitude remains same.

14. a_c and a_t are always at angles of $\frac{\pi}{2}$ rad

15. Conceptual

16. $\theta = 2t^3 - 6t^2$

$$\omega = \frac{d\theta}{dt} = 6t^2 - 12t$$

$$\alpha = \frac{d\omega}{dt} = 12t - 12$$

for $\alpha = 0$

$$12t - 12 = 0$$

$$t = \frac{12}{12} = 1 \text{ sec}$$

17. $I_A \cos^2 30 = I_B \cos^2 60$

$$\Rightarrow \frac{I_A}{I_B} = \frac{\cos^2 60}{\cos^2 30} = \frac{1/4}{3/4} = \frac{1}{3}$$

18. If any portion of the disc is cut perpendicular to axis of rotation radius of gyration does not change

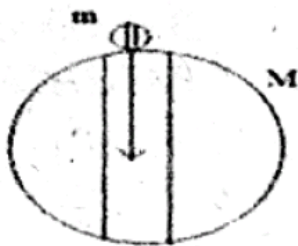
19. $a_{rel} = g(\sin^2 60 - \sin^2 30)$

$$= g \left[\frac{3}{4} - \frac{1}{4} \right] = \frac{g}{2}$$

20. $\frac{1}{2} mV^2 = \frac{3}{2} \frac{GMm}{R} - \frac{GMm}{R}$

$$V^2 = \frac{GM}{R}$$

$$V^2 = \frac{V_e^2}{2} \Rightarrow V = \frac{V_e}{\sqrt{2}}$$



21. $(mL + ms\Delta\theta)_{ice} = (ms)_{tumbler \text{ with water}} (\Delta\theta)_{tumbler \text{ with water}}$
 $\Rightarrow 10(80) + 10(1)(\theta - 0)$
 $= 55(40 - \theta)$

$$\therefore \theta = \frac{1400}{65} = 21.5^\circ C$$

22. Here minimum potential energy

$$U - min = \frac{1}{2} ky^2$$

and $x = A$

\therefore total energy T.E

$$= \frac{1}{2} mA^2\omega^2 + U_{min}$$

$$T.E = \frac{1}{2} mA^2\omega^2 + \frac{1}{2} ky^2$$

23. By work - energy theorem

$$w_c + w_{Nc} + w_{ex} = \Delta k$$

$$\Rightarrow -\Delta U + w_{Nc} + 300 = 0$$

$$w_{Nc} = \Delta U - 300 = 200 - 300 = -100J$$

24. Applying Bernoulli's theorem

$$h\rho g + h(2\rho)V^2$$

$$\Rightarrow V^2 = 3gh$$

$$\text{Range } R = V \sqrt{\frac{2H}{g}}$$

$$4h = \sqrt{3gh} \sqrt{\frac{2H}{g}}$$

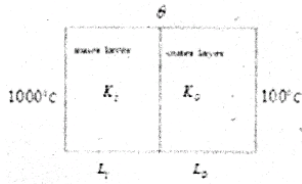
$$16h^2 = 3gh \cdot \frac{2H}{g}$$

$$8h = 3H \Rightarrow \frac{H}{h} = \frac{8}{3}$$

25. $P = P_1 + P_2 \Rightarrow 60 = \frac{1}{v} - \frac{1}{u}; u = -\infty v = \frac{1}{60} m = \frac{100}{60} cm = 1.66 cm$

Where V = Distance between retina & eye lens

- 26.



Rate of heat flow is same

$$\frac{K_1 A (1000 - \theta)}{L_1} = \frac{K_2 A (\theta - 100)}{L_2}$$

$$\Rightarrow \frac{1000 - \theta}{\theta - 100} = \frac{K_2}{K_1} \times \frac{L_1}{L_2}$$

For to lower θ , K_2 , or L_2 should increase other wise K_1 or L_1 should decrease

27. $w = 8\pi T(r_2^2 - r_1^2) = 8\pi(3 \times 10^{-2})[(5 \times 10^{-2})^2 - (3 \times 10^{-2})^2] = 0.384 \pi \text{ mJ}$

28. In isothermal process $dU = 0$

$$\therefore dQ = dW = -150 \text{ J}$$

Negative dQ indicates heat is removed from the gas.

29. Since electric field oscillating along y-axis, propagation constant is a coefficient of '-x' wave propagating along positive x-axis; by comparing given equation with

$$E_y = E_0 \cos(\omega t - kx); \text{ we get } \omega = 2\pi \times 10^6 \text{ rad/s} \text{ \& } k = \pi \times 10^{-2} \text{ rad/m}$$

$$2\pi f = 2\pi \times 10^6; f = 10^6 \text{ Hz}$$

$$\& k = \frac{2\pi}{\lambda} = \pi \times 10^{-2} \text{ rad/m}; \lambda = 200 \text{ m}$$

30. $\frac{T_1}{T_2} = \left(\frac{V_2}{V_1}\right)^{\gamma-1} = \left(\frac{32V}{V}\right)^{\frac{7}{5}-1} = (2^5)^{\frac{2}{5}} = \frac{4}{1}$

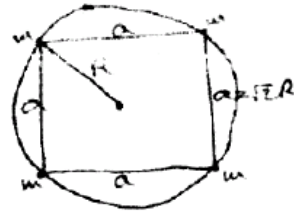
$$\eta = 1 - \frac{T_2}{T_1} = 1 - \frac{1}{4} = \frac{3}{4} = 0.75$$

31. $\sqrt{2} \left(\frac{Gm^2}{2R}\right) + \frac{Gm^2}{(2R)^2} = \frac{mv^2}{R}$

$$\Rightarrow \frac{Gm^2}{\sqrt{2}R^2} + \frac{Gm^2}{4R^2} = \frac{mv^2}{R}$$

$$\Rightarrow \left(\frac{2\sqrt{2} + 1}{4R^2}\right) Gm^2 = \frac{mv^2}{R}$$

$$\therefore V = \frac{1}{2} \sqrt{\frac{(2\sqrt{2} + 1)Gm}{R}}$$



32.

$$W = \int_{V_0}^{2V_0} P dV = \int_{V_0}^{2V_0} (\beta V) dV$$

$$\beta = \left[\frac{V^2}{2}\right]_{V_0}^{2V_0} = \frac{3\beta V_0^2}{2}$$

33. $B_1 = \frac{\mu_0 i_1}{2\pi d}, B_2 = \frac{\mu_0 i_2}{2\pi d}$

$B_{net} = \sqrt{B_1^2 + B_2^2}$; as B_1 & B_2 are mutually perpendicular. i.e.,

$$B_{net} = \frac{\mu_0}{2\pi d} \sqrt{i_1^2 + i_2^2}$$

34. ab : T-V diagram is an inclined line passing through origin i.e., isobaric process

$$\Delta W_{ab} = P\Delta V = nRT = nR(T_b - T_a) = 2 \times 2(500 - 300) = 800 \text{ cal}$$

ca: Volume is constant i.e., $\Delta W_{ca} = 0$

In cyclic process,

$$\Delta Q = \Delta W_{ab} + \Delta W_{bc} + \Delta W_{ca}$$

$$-1000 = 800 + \Delta W_{bc} + 0$$

$$\Delta W_{bc} = -1800 \text{ cal}$$

35. $\tan \theta_1 = \frac{\tan \theta}{\cos \alpha} \Rightarrow \cos \alpha = \frac{\tan \theta}{\tan \theta_1} \dots (1)$

$$\tan \theta_2 = \frac{\tan \theta}{\cos(90 - \alpha)} = \frac{\tan \theta}{\sin \alpha}$$

$$\Rightarrow \cos^2 \alpha + \sin^2 \alpha = \frac{\tan^2 \theta}{\tan^2 \theta_1} + \frac{\tan^2 \theta}{\tan^2 \theta_2}$$

$$\Rightarrow 1 = \tan^2 \theta (\cot^2 \theta_1 + \cot^2 \theta_2)$$

$$\therefore \cot^2 \theta = \cot^2 \theta_1 + \cot^2 \theta_2$$

36. $\gamma = 1.4$, P: constant



$$C_V = \frac{5R}{2}, \quad C_P = \frac{7R}{2}$$

$$(\Delta Q)_P = nC_P \Delta T = 140J$$

$$\Delta W = (\Delta Q)_P - \Delta U = 140 - 100 = 40J$$

37. $\eta = 1 - \frac{T_2}{T_1}$, $T_1 =$ in take temp,

$T_2 =$ exhaust temp

Case 1: $-\eta = 1 - \frac{500}{T_1} = \frac{1}{2}$

$\therefore T_1 = 1000K$

Case II: $-\eta^1 = \frac{3}{5} = 1 - \frac{T_2^1}{1000}$

$\Rightarrow T_2^1 = 400K$

38. $E_0 =$ maximum PE

39. Acceleration = $\frac{\text{net force}}{\text{mass}}$

Where net force is independent of 'h'.

So, acceleration will be same whatever

'h' may be.

40. $I = I_G + Mx^2 = \frac{ma^2}{6} + m\left(\frac{a}{\sqrt{2}}\right)^2$

$$= ma^2 \left[\frac{1}{6} + \frac{1}{2} \right] = ma^2 \left[\frac{1+3}{6} \right]$$

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

41. $E_i = -\frac{GMm}{R}$

$E_f = -\frac{GMm}{2r}$ where $r = 3R$

$$= \frac{-GMm}{6R}$$

\therefore Energy required

$$E = E_f - E_i = \frac{-GMm}{6R} + \frac{GMm}{R}$$

$$= \frac{5GMm}{6R}$$

42. $h = \frac{2T \cos \theta}{rdg} \Rightarrow h = KT \cos \theta$

h becomes zero if $T = 0$ and $\theta \neq 90^\circ$

43. Output of given circuit is

$$R = \frac{\overline{\overline{A.A.B.}} \cdot \overline{\overline{B.A.B.}}}{\overline{\overline{A.A.B.}} + \overline{\overline{B.A.B.}}}$$

$$= A.\overline{\overline{A.B}} + B.\overline{\overline{A.B}}$$

$$= A.(\overline{\overline{A}} + \overline{\overline{B}}) + B.(\overline{\overline{A}} + \overline{\overline{B}})$$

$$= A.\overline{\overline{A}} + A.\overline{\overline{B}} + B.\overline{\overline{A}} + B.\overline{\overline{B}}$$

$$= 0 + A.\overline{\overline{B}} + B.\overline{\overline{A}} + 0$$

$$= A.\overline{\overline{B}} + B.\overline{\overline{A}}$$

44. $Y = \frac{Fl}{A\Delta l} \Rightarrow Y = \frac{T_1 L}{A(L_1 - L)} = \frac{T_2 L}{A(L_2 - L)}$

$$\Rightarrow L = \frac{L_1 T_2 - L_2 T_1}{T_2 - T_1}$$

45. $f = \frac{1}{2\pi} \sqrt{\frac{K}{m}} \Rightarrow f \propto \frac{1}{\sqrt{m}}$

$$\Rightarrow \frac{f^1}{f} = \sqrt{\frac{m}{m^1}} = \sqrt{\frac{m}{4m}}$$

$$\therefore f^1 = \frac{n}{2} [\because f = n]$$

TM

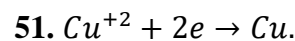
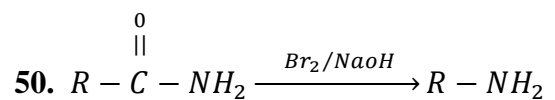
CHEMISTRY

46. Conceptual

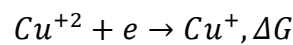
47. Freezing point $\propto \frac{1}{\text{particle concentration}}$

48. Ascorbic acid is vitamin C

49. In CCP, 4 Atoms, 8 T.H. Voids, 4 O.H. voids are present



$$\Delta G = -2F \times 0.337 - (1)$$



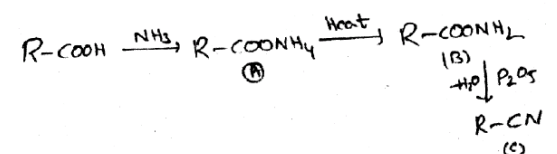
$$= -F \times 0.153 - (2)$$

$$(1) - (2) \Rightarrow Cu^+ + e \rightarrow Cu, \Delta G = -FE$$

$$-0.674F + 0.153 = -FE$$

$$\Rightarrow E = 0.521 V$$

52.



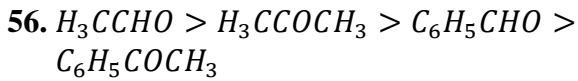
53. $m = \frac{1000M}{(1000.d) - (M \times M_1)}$



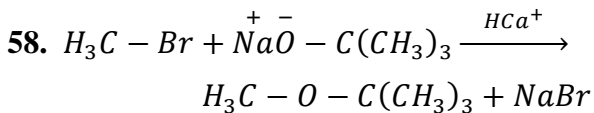
$$\therefore m = \frac{1000 \times 0.2}{(1000 \times 1.05) - (0.2 \times 60)} = 0.193m$$

54. Cannizaro Reaction

55. KOH is a strong base



57. $t_{100\%} = 2 \times t_{50\%}$ for zero order



59. $i = \frac{M_{obs}}{M_{the}}, \alpha = \frac{i-1}{n-1}$

60. According to inductive and mesomeric effect

61. Based on graph

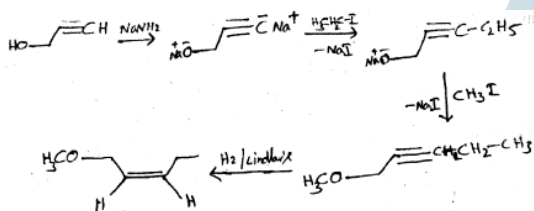
62. In Accordance to Markownikoff's rule



64. Boiling point Increases as the Branching increases

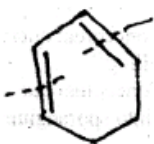
65. La is larger atom

66.

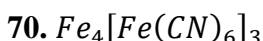


67. Based on VBT

68.



69. C-Cl bond has partial double bond character

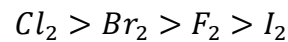


71. X = Benzene diazonium chloride

72. conceptual

73. C= Salicylic acid

74. Bond dissociation Energy order

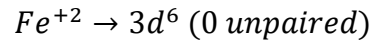
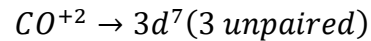


75. Remaining reacts with aldehydes only

76. Concept of Isomerism

77. It has α - methyl group

78. $Mn^{2+} \rightarrow 3d^5$ (5 unpaired)



79. It has plane of symmetry

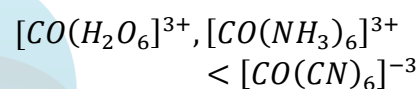
80. The CFSE of the ligands is in the order



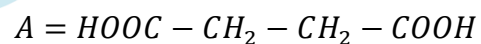
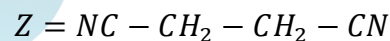
$$E = \frac{hc}{\lambda}$$

$$\therefore E \propto \frac{1}{\lambda}$$

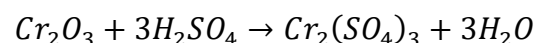
Expiration Energies are in order



81. $X = C_2H_4$ $Y = Br - CH_2 - CH_2 - Br$,



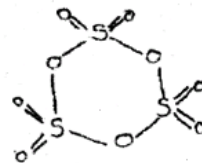
82. $Cr_2O_3 + 2NaOH \rightarrow Na_2Cr_2O_4 + H_2O$



V_2O_5 is also Amphoteric

83. Azo dye test

84.



85. It is the mixture of Chloroxyleneol and terpineol

