NTA NEET MOCK TEST - 4
PHYSICS

1. If a ball is thrown vertically upwards with a speed u, the distance covered by it during the last t seconds of its ascent is

1) ut 2) $\frac{1}{2}gt^2$ 3) $ut-\frac{1}{2}gt^2$ 4) $(ut-gt)t$

2. An ideal gas at 27^0C is compressed adiabatically to $\frac{8}{27}$ of its original volume. If $\gamma=\frac{5}{3}$,then the rise in temperature is

1) 450 K 2) 375 K 3) 675 K 4) 405 K

3. An earthen pitcher loses 1 kg of water per minute due to evaporation. If the water equivalent of the pitcher is 0.5 kg and the pitcher contains 9.5 kg of water, then calculate the time required for the water in pitcher to cool to 28^0 C from its original temperature of 30^0 C. Neglect the effect of radiation. Latent heat of vaporization of water in this range of temperature is 580 cal / g and specific heat of water is 1 cal / g / ^0C

1) 30.5 min 2) 41.2 min 3) 38.6 min 4) 34.5 min

4. The displacement x of a particle varies with time t as $x=ae^{-\alpha t}+be^{\beta t}$, where a, b, α and β are positive constants. The velocity of the particle will

1) be independent of β 2) drop to zero, when $\alpha=\beta$

3) decrease with time 4) increase with time

5. A cylindrical capacitor has charge Q and length L. If both the charge and the length of the capacitor are doubled by keeping the other parameters fixed, then the energy stored in the capacitor

1) remains same 2) increase two times

3) decrease two times 4) increase four times

6. The reflectance and emittance of a perfectly black body are respectively

1) 0, 1 2) 1, 0 3) 0.5, 0.5 4) 0, 0

7. If a diamagnetic substance is brought near the north or the south pole of a bar magnet, it is

1) attracted by both poles 2) repelled by both poles

3) repelled by north pole but attracted towards south pole

4) attracted by north pole but repelled by south pole

8. A ball is projected from the bottom of an inclined plane of inclination 30^0, with a velocity of 30 ms^{-1}, at an angle of 30^0 with the inclined plane. If g = 10 ms^{-2}, then the range of the ball on given inclined plane is

1) 12 m 2) 60 m 3) 120 m 4) 600 m

9. The ratio of the acceleration due to gravity on two planets P_1 and P_2 is K_1. The ratio of their respective radii is K_2. The ratio of their respective escape velocities is

1) $\sqrt{K_1K_2}$ 2) $\sqrt{2K_1K_2}$ 3) $\sqrt{\frac{K_1}{K_2}}$ 4) $\sqrt{\frac{K_2}{K_1}}$

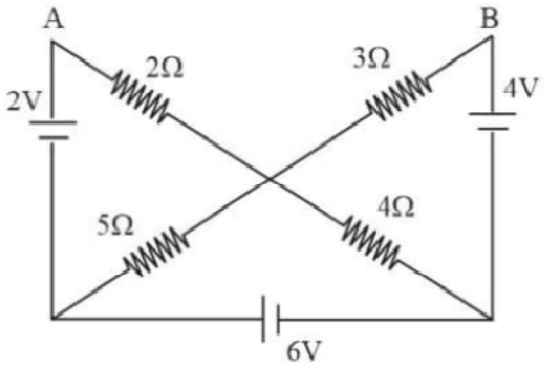
10. A body has equal amount of rotational kinetic energy and translation kinetic energy while rolling without slipping on a horizontal surface. Given body is an example of

1) disc 2) sphere 3) ring 4) cylinder

11. Path difference between two wavefronts emitted from coherent sources is 2.1 μm. Phase difference between the wavefronts at that point is 7.692 π. Wavelength of light emitted by source will be

1) 5385 A^0 2) 5600 A^0 3) 5460 A^0 4) 5892 A^0

12. Potential difference between point A and B (i.e., $V_A - V_B$) is

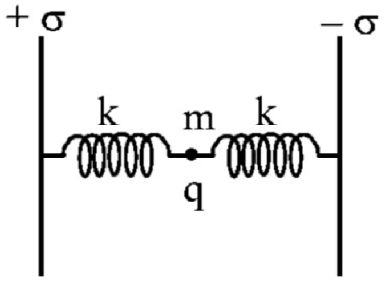


1) 2V 2) 4V 3) 6V 4) 8V

13. Given that $\vec{A}+\vec{B}+\vec{C}=0$. Out of three vectors, two are equal in magnitude and the magnitude of third vector is $\sqrt{2}$ times that of either of the two having equal magnitude. Then the angle between vectors are given by

1) $45^0, 45^0, 90^0$ 2) $90^0, 135^0, 135^0$ 3) $30^0, 60^0, 90^0$ 4) $45^0, 60^0, 90^0$

14. Two large insulating plates having surface charge densities $+\sigma \; and \; -\sigma$ are fixed at a distance d from each other. A small test charge q of mass m is attached to two identical springs as shown in the figure. The charge q is now released from rest with springs in natural length. Then q will (neglect gravity)



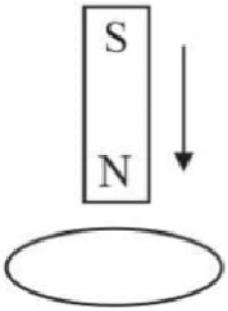
1) perform SHM with angular frequency $\sqrt{\frac{k}{m}}$

2) perform SHM with amplitude $\frac{\sigma q}{2k\varepsilon_0}$

3) not perform SHM but will have a periodic motion

4) remain stationary

15. The north pole of a magnet is falling on a metallic ring as shown in the figure. The direction of induced current, if looked from upside in the ring will be



1) anti-clockwise 2) clockwise
3) clockwise or anti-clockwise depending on radius of the ring
4) no induced current

16. There are two forces each having same magnitude 10N. One is inclined at an angle of 30^0 and other is inclined at an angle of 135^0 to the positive direction of x-axis. The x and y components of the resultant are

1) 1.59 N $\hat{i}$ and 12.07 N $\hat{j}$ 2) 10N $\hat{i}$ and 10 N $\hat{j}$
3) 1.59 N $\hat{i}$ and 10 N $\hat{j}$ 4) 1.59 N $\hat{i}$ and 2 N $\hat{j}$

17. Argon gas is adiabatically compressed to half of its volume. If P, V and T represent the pressure, volume and temperature of the gaseous system respectively, then the correct equation representing the process is

1) $TV^{2/5}$ = constant 2) $VP^{5/3}$ = constant 3) $TP^{-2/5}$ = constant 4) $PT^{2/5}$ = constant

18. A circular coil of radius 20 cm and 20 turns, is mounted vertically with its plane in the magnetic meridian. A small magnetic needle (free to rotate about vertical axis) is placed at the centre of the coil. It is deflected through 45^0 when a current passes through the coil and is in equilibrium (Horizontal component of earth's field is $B_H = 0.34\times10^{-4}T$). The current in the coil is

1) $\frac{17}{10\pi}A$ 2) 6A 3) $6\times10^{-3}A$ 4) $\frac{3}{50}A$

19. One litre of oxygen at a pressure of 1 atm and two litres of nitrogen at a pressure of 0.5 atm, are introduced into a vessel of volume 1 L. If there is no change in temperature, the final pressure of the mixture of gas (in atm) is

1) 1.5 2) 1 3) 2 4) 4

20. The coil of a moving coil galvanometer is wound over a metal frame in order to

1) reduce hysteresis 2) provide electromagnetic damping
3) increase the moment of inertia 4) increase the sensitivity

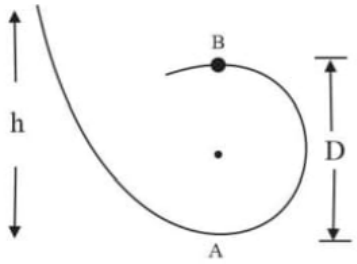
21. According to Newton's law of cooling, the rate of cooling of a body is proportional to $(\Delta\theta)^n$, where $\Delta\theta$ is the difference in temperature of the body and its surroundings. Value of n is

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

22. In Young's double slit experiment, the intensities at two points P_1 and P_2 on the screen are I_1 and I_2 respectively. If P_1 is located at the central bright fringe and P_2 is located at a distance equal to a quarter of fringe width from P_1, then $\frac{I_1}{I_2}$ is;

1) 2 2) $\frac{1}{2}$ 3) 4 4) 16

23. A body slides down on a frictionless track which ends in a circular loop of diameter D. The minimum height h in terms of D so that the body may just complete the circular loop, is



1) $h=\frac{5}{2}D$ 2) $h=\frac{3}{2}D$ 3) $h=\frac{5}{4}D$ 4) $h=2D$

24. Let N_β be the number of β particle emitted by 1 gram of Na^{24} radioactive nuclei having a half life of 15 h. In 7.5 h, the number N_β is close to [$N_A=6.023\times10^{23}mole^{-1}$]

1) 1.75×10^{22} 2) 6.2×10^{21} 3) 7.5×10^{21} 4) 1.25×10^{22}

25. The binding energy of deuteron is 2.2 MeV and that of ${}_2^4He$ is 28 MeV. If two deuterons are fused to form one ${}_2^4He$,then the energy released is

1) 30.2 MeV 2) 25.8 MeV 3) 23.6 MeV 4) 19.2 MeV

26. A long straight wire of radius R carries a current i. The magnetic field inside the wire at distance $r(r<R)$, from its centre is expressed as

1) $\left(\frac{\mu_0 i}{\pi R^2}\right).r$ 2) $\left(\frac{2\mu_0 i}{\pi R^2}\right).r$ 3) $\left(\frac{\mu_0 i}{2\pi R^2}\right).r$ 4) $\left(\frac{\mu_0 i}{2\pi R}\right).r$

27. Water rises upto a height h in a capillary tube of certain diameter. This capillary tube is replaced by a similar tube of half the diameter. Now water will rise to a height of

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

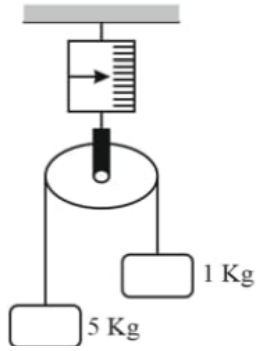
28. The tolerance level of a resistor with the colour code red, blue, orange, gold is

1) $\pm5\%$ 2) $\pm10\%$ 3) $\pm20\%$ 4) $\pm40\%$

29. An athletic coach told his team that muscle multiplied with speed equal to power. What dimensions does he view for muscle?

1) MLT^{-2} 2) ML^2T^{-2} 3) MLT^{-2} 4) L

30. In the figure, a smooth pulley of negligible weight is suspended by a spring balance. Masses of 1kg and 5 kg are attached to the opposite ends of a string passing over the pulley and move with some acceleration. During their motion, the spring balance reads a weight of



1) 6 kg
2) Less than 6 kg
3) More than 6 kg
4) May be more or less than 6 kg

31. Assuming that the potential energy of spring is zero when it is stretched by x_0, then its potential energy when it is compressed by $\frac{x_0}{2}$ is

1) $\frac{3}{8}kx_0^2$
2) $-\frac{3}{4}kx_0^2$
3) $-\frac{3}{8}kx_0^2$
4) $\frac{1}{8}kx_0^2$

32. The engine of a car produces an acceleration of 6 ms^{-2} in the car. If this car pulls another car of the same mass, then the acceleration would be

1) 6 ms^{-2}
2) 12 ms^{-2}
3) 3 ms^{-2}
4) 1.5 ms^{-2}

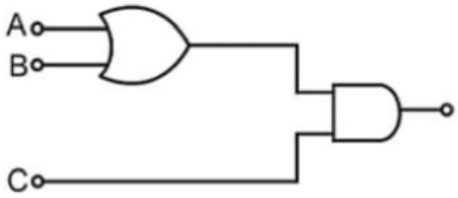
33. A body of mass $m = 10^{-2}$ kg is moving in a medium and experiences a frictional force $F = -kv^2$. Its initial speed is $v_0 = 10ms^{-1}$. After 10s, its kinetic energy is $\frac{1}{8}mv_0^2$, then value of k will be:-

1) $10^{-1}\,kg\,m^{-1}\,s^{-1}$
2) $10^{-3}\,kg\,m^{-1}$
3) $10^{-3}\,kg\,s^{-1}$
4) $10^{-4}\,kg\,m^{-1}$

34. An electron is accelerated under a potential difference of 64V, the de-Broglie wavelength associated with electron is $[e = -1.6\times10^{-19}C, m_e = 9.1\times10^{-31}kg, h = 6.623\times10^{-34}Js]$

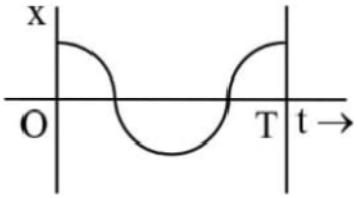
1) 1.53 A^0
2) 2.53 A^0
3) 3.35 A^0
4) 4.54 A^0

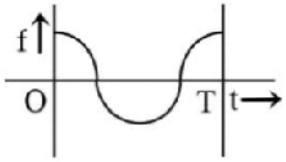
35. To get an output 1 from the circuit shown in the figure, the input must be

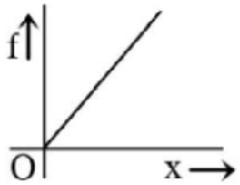


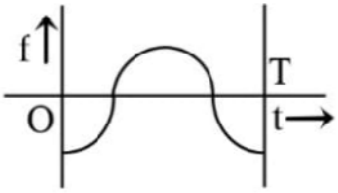
1) A = 0, B = 1, C = 0
2) A = 1, B = 0, C = 0
3) A = 1, B = 0, C = 1
4) A = 1, B = 1, C = 0

36. A body is performing simple harmonic motion of amplitude A and time period T. The figure shows position-time graph of the body. At any time t, acceleration of the body if f, then which of the following graphs is/are appropriate?



1) 

2) 

3) 

4) 

37. It is desired to make a converging achromatic combination of mean focal length 50cm by using two lenses of materials A and B. If the dispersive power of A and B are in the ratio 1 : 2, the focal lengths of the convex and the concave lenses are respectively

1) 25 cm and 50 cm
2) 50 cm and 25 cm
3) 50 cm and 100 cm
4)100 cm and 50 cm

38. Two factories are sounding their sirens at 800 Hz. A man goes from one factory to other at a speed of 2m/s. The velocity of sound is 320 m/s. The number of beats heard by the person in one second will be

1) 10 2) 4 3) 2 4) 8

39. Photons of energy of 6 eV are incident on a metal surface whose work function is 4 eV. The maximum kinetic energy of the emitted photoelectrons is

1) Zero 2) 1 eV 3) 2 eV 4) 10 eV

40. An electromagnetic wave of frequency $1\times10^{14}\,Hz$ is propagating along z-axis. The amplitude of the electric field is 4V/m. If $\varepsilon_0 = 8.8\times10^{-12}\,C^2/N-m^2$, then the average energy density of electric field will be

1) $35.2\times10^{-12}\,J/m^3$ 2) $35.2\times10^{-10}\,J/m^3$ 3) $35.2\times10^{-11}\,J/m^3$ 4) $35.2\times10^{-13}\,J/m^3$

41. A ball is dropped from height H on to a horizontal surface. If the coefficient of restitution is e then the total time after which it comes to rest is

1) $\sqrt{\frac{2H}{g}}\left(\frac{1-e}{1+e}\right)$ 2) $\sqrt{\frac{2H}{g}}\left(\frac{1+e}{1-e}\right)$ 3) $\sqrt{\frac{2H}{g}}\left(\frac{1+e^2}{1-e^2}\right)$ 4) $\sqrt{\frac{2H}{g}}\left(\frac{1-e^2}{1+e^2}\right)$

42. The resistance of a straight conductor does not depend on its

1) length
2) temperature
3) material
4) shape of cross section

43. A projectile is thrown with velocity $u = 20\,m/s \pm 5\%$ at an angle 60^0. If the projectile comes back on the ground at the same level which of the following cannot be a possible answer for range. Consider g = $10\,m/s^2$

1) 34.6 m 2) 37.5 m 3) 32.0 m 4) 39.0 m

44. A converging lens having magnitude of focal length as f_1 is kept coaxially in contact with a diverging lens having magnitude of focal length as f_2. The focal length of the combination would be:

1) $\frac{f_1 f_2}{f_1 - f_2}$ 2) $\frac{f_1 + f_2}{f_1 f_2}$ 3) $\frac{f_1 - f_2}{f_1 f_2}$ 4) $\frac{f_1 f_2}{f_1 + f_2}$

45. Which of the following pair have same dimensional formula?

1) Angular momentum, Torque 2) Torque, work

3) Planck constant, Boltzmann constant 4) Gas constant, Pressure

CHEMISTRY

46. pK_a of a weak acid (HA) and pK_b of weak base (BOH) are 3.2 and 3.4 respectively. The pH of their salt (AB) solution at 25^0 C is

1) 6.9 2) 7.0 3) 1.0 4) 7.2

47. $CH_3Br \xrightarrow{KCN} A \xrightarrow[LiAlH_4]{4[H]} CH_3CH_2NH_2$

IUPAC name of A is

1) Methyl cyanide 2) Methyl isonitrile 3) Acetonitrile 4) Ethane nitrile

48. Which of the following exhibits greater coagulation power towards a negative colloid?

1) $ZnSO_4$ 2) Na_3PO_4 3) $AlCl_3$ 4) $K_4[Fe(CN)_6]$

49. Two half cells have reduction potentials -0.76 V and -0.13 V respectively. A galvanic cell is made from these two half cells. Which of the following statements is correct?

1) Electrode of half-cell potential -0.76 V acts as cathode

2) Electrode of half-cell potential -0.76 V acts as anode

3) Electrode of half-cell potential -0.13 V acts as anode

4) Electrode of half-cell potential -0.76 V acts as positive electrode and -0.13 V as negative electrode

50. What will happen when a block of copper metal is dropped into a beaker containing a solution of 1 M $ZnSO_4$?

1) The copper metal will dissolve with evolution of oxygen gas

2) The copper metal will dissolve with evolution of hydrogen gas

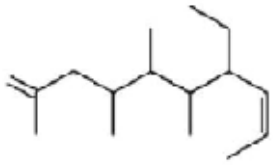
3) No reaction will occur

4) The copper metal will dissolve and zinc metal will be deposited

51. Electrometallurgical process is used to extract

1) Fe 2)Pb 3) Na 4) Ni

52. The correct IUPAC name of the following compound is



1) 7-Ethyl-2, 4, 5, 6 – tetramethyldeca-1, 8 – diene
2) 4-Ethyl-5,6,7,9-tetramethyldeca-2,9-diene
3) 2, 4, 5, 6 – tetramethyl-7-ethyldeca-1, 7-diene
4) None of these

53. Which of the following sulphates has the highest solubility?

1) $BeSO_4$ 2) $MgSO_4$ 3) $BaSO_4$ 4) $CaSO_4$

54. In Clemmensen's reduction, the catalyst used is

1) Zn – Hg + Conc. HCl 2) $NH_2NH_2 + C_2H_5ONa$
3) $PdCl_2 / H_2O$ 4) $(C_6H_5)_3P + C_2H_5ONa$

55. The functional group which is formed when Phenol is made to react with Chloroform in the presence of dilute Sodium hydroxide

1) $-CH_2Cl$ 2) $-COOH$ 3) $-CHCl_2$ 4) –CHO

56. The compound formed when Ethyl bromide is heated with dry Silver oxide is

1)dimethylether 2)diethylether 3)Methylalcohol 4)ethylalcohol

57. One mole of Ethylamine when reacts with nitrous acid will produce dinitrogen gas (at 0^0 C and 1 atmospheric pressure) equal to

1) 22.4 L 2) 1L 3) 11.2 L 4) 24.8 L

58. The correct statement about Orthoboric acid is

1) It is a strong monobasic acid
2) It is not a proton donor, but a weak Lewis acid
3) It is a tribasic acid 4) It is harmful for eyes

59. The energy required to remove an electron from the surface of sodium metal is 2.3 eV. What Is the longest wavelength of radiation with which it can show photoelectric effect?

1) $5.4\times10^{-17}m$ 2) $5.4\times10^{-8}m$ 3) $5.4\times10^{-7}m$ 4) $5.4\times10^{-9}m$

60. If the dipole moment of Toluene and Nitro-benzene are 0.43D and 3.93D respectively, then what is the expected dipole moment of p-Nitrotoluene?

1)3.50 D 2) 2.18 D 3) 4.36 D 4) 5.30 D

61. Methanoic acid is heated with conc. H_2SO_4 to form

1) CO 2) CO_2 3) CH_4 4) $(COOH)_2$

62. Glucose when treated with conc. HNO_3 gives

1) Acetic acid 2)Saccharic acid 3)Gluconic acid 4) Sorbitol

63. Phenol associated in Benzene to a certain extent to form dimer. A solution containing $2.0\times10^{-2}kg$ of Phenol in 1.0 kg of benzene has its freezing point decreased by 0.69 K. The percentage of association of Phenol is (K_f for benzene = 5.12 K kg mol^{-1})

1) 73.4 2) 50.1 3) 42.3 4) 25.1

64. The increasing order of the first ionization enthalpies of the elements B, P, S and F is

1) B < S < P < F 2) F < S < P < B 3) P < S < B < F 4) B < P < S < F

65. When a NaCl is heated with sulphuric acid in the presence of MnO_2 a greenish-yellow gas liberated. The gas is

1) Cl_2 2) NH_3 3) N_2 4) H_2

66. $C_5H_{10}O$ is a carbonyl compound. The number of structural isomers possible for this molecular formula are

1) 5 2) 8 3) 6 4) 7

67. In the reaction $4A+2B+3C \rightarrow A_4B_2C_3$, what will be the number moles of product formed, starting from one mole of A, 0.6 moles of B and 0.72 moles of C?

1) 0.25 2) 0.3 3) 0.24 4) 2.32

68. The solubility of AgCl(s) with solubility product 1.6×10^{-10} in 0.1 M NaCl solution would be

1) $1.26\times10^{-5}M$ 2) $1.6\times10^{-9}M$ 3) $1.6\times10^{-11}M$ 4) $1.26\times10^{-15}M$

69. A non-stoichiometric compound $Cu_{1.8}S$ is formed due to the incorporation of Cu^{2+} ions in the lattice. What is the mole percentage of Cu^{2+} present in the compound?

1) 88.88 2) 89.8 3) 63.5% 4) 11.11

70. At low pressure and high temperature, the Van der Waals equation is finally reduced (simplified) to

1) $\left(p+\frac{a}{V_m^2}\right)(V_m-b)=RT$ 2) $p(V_m-b)=RT$

3) $\left(p+\frac{a}{V_m^2}\right)V_m=RT$ 4) $pV_m=RT$

71. Zinc and hydrochloric acid react according to the following reaction:

$Zn(s)+2HCl(aq.) \rightarrow ZnCl_2(aq.)+H_2(g)$

If 0.30 mole of Zn is added to 0.52 mole HCl, how many moles of H_2 is produced?

1) 0.2 2) 0.62 3) 0.6 4) 0.26

72. In a reaction, $Cr_2O_7^{2-}$ is reduced to Cr^{3+}. What will be concentration of 0.1 M $K_2Cr_2O_7$ in equivalent per litre?

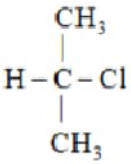
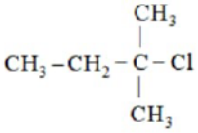
$Cr_2O_7^{2-}+14H^++6e^- \rightarrow 2Cr^{3+}+7H_2O$

1) 0.9 N 2) 0.6 N 3) 0.3 N 4) 0.2 N

73. A gaseous mixture of 2 moles of A, 3 moles of B, 5 moles of C and 10 moles of D is contained in a vessel. Assuming that gases are ideal and the partial pressure of C is 1.5 atm, total pressure is

1) 3 atm 2) 6 atm 3) 9 atm 4) 15 atm

74. In which of the following options chlorine will act as the best leaving group

1) CH_3-Cl 2) CH_3-CH_2-Cl 3)  4) 

75. A compound of variation chloride has spin only magnetic moment of 1.73 Bm. Its formula is

1) VCl_2 2) VCl_5 3) VCl_4 4) VCl_3

76. The following equilibrium constants are given;

$N_2 + 3H_2 \rightleftarrows 2NH_3; K_1$

$N_2 + O_2 \rightleftarrows 2NO; K_2$

$H_2 + \frac{1}{2}O_2 \rightleftarrows H_2O; K_3$

The equilibrium constant for the oxidation of 2 mole NH_3 by oxygen to give NO is

1) $\frac{K_2K_3^2}{K_1}$ 2) $\frac{K_2^2K_3}{K_3}$ 3) $\frac{K_1K_2}{K_3}$ 4) $\frac{K_2K_3^3}{K_1}$

77. Which of the following will not show geometrical isomerism?

1) $[Co(ox)_3]^{3-}$ 2) $[Co(en)_2Cl_2]Cl$

3) $[Cr(NH_3)_4Cl_2]Cl$ 4)both $[Co(en)_2Cl_2]Cl$ and $[Cr(NH_3)_4Cl_2]Cl$

78. For a reaction in which all reactants and products are liquids, which one of the following equations is most applicable?

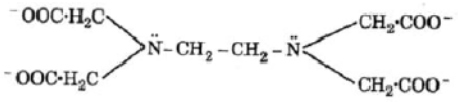
1) $\Delta H < \Delta E$ 2) $\Delta H = \Delta S$ 3) $\Delta H \approx \Delta E$ 4) Total W = 0

79. The void space in a primitive unit cell is:

1) 48% void space 2) 24% void space 3) 96% void space 4) 50% void space

80. In chelate therapy, lead toxicity is removed by using the ligand

1) CH_3COO^- 2) $\begin{matrix} COO^- \\ | \\ COO^- \end{matrix}$

3) AsO_4^{3-} 4) 

81. The oxidation of SO_2 to SO_3 is an exothermic reaction. The yield of SO_3 will be maximum if:

1) Temperature is increased and pressure is kept constant

2) Temperature is reduced and pressure is increased

3)Both temperature and pressure are increased

4) Both temperature and pressure are reduced

82. Aqueous solution of 0.004 M Na_2SO_4 and 0.01 M glucose are isotonic. The percentage degree of dissociation of Na_2SO_4 is

1) 85% 2) 75% 3) 60% 4) 25%

83. Which of the following statements regarding Nitrogen pentoxide is not correct?

1) Nitrogen pentoxide is a colourless, deliquescent liquid

2) Nitrogen pentoxide is the anhydride of nitric acid

3) Solid N_2O_5 is a covalent molecule

4) The molecule of N_2O_5 in planar

84. Two different electrolytic cells filled with molten $Cu(NO_3)_2$ and molten $Al(NO_3)_3$ respectively are connected in series. When electricity is passed 2.7 g Al is deposited on electrode. Calculate the weight of Cu deposited on cathode.

$[Cu = 63.5; Al = 27.0\, g\, mol^{-1}]$

1) 190.5 g 2) 9.525 g 3) 63.5 g 4) 31.75 g

85. Phenyl magnesium bromide reacts with Methanol to give
1) A mixture of anisole and Mg (OH) Br
2) A mixture of benzene and Mg(OMe)Br
3) A mixture of toluene and Mg(OH)Br
4) A mixture of phenol and Mg(Me)Br

86. If ΔH_f^0 for H_2O_2 and H_2O are -188 kJ/mol and -286 kJ/mol, What will be the enthalpy change of the reaction

$2H_2O_2(l) \rightarrow 2H_2O(l) + O_2(g)$

1) -196 kJ 2) -494 kJ 3) 146 kJ 4) -98 kJ

87. Which of the following statements is/are correct?
i. Melting point of alkane increases with increase in number of C atoms and with increase in branching.
ii. Boiling point of alkane increases with increase in number of C atoms but with decrease in branching.
iii. Cycloalkanes have lower boiling point than normal alkane with same number of C atoms.
iv. Alkenes have lower boiling point than same number of C atoms in alkanes.
1) (I), (II) 2) (I), (II), (III) 3) (III), (IV) 4) (IV)

88. The binding energy of an element is 64 MeV. If Binding energy/nucleon is 6.4, then the number of nucleons are
1) 10 2) 64 3) 16 4) 6

89. Consider the following reaction in aqueous solution

$5Br^-(aq) + BrO_3^-(aq) + 6H^+(aq) \rightarrow 3Br_2(aq) + 3H_2O(l)$

If the rate of appearance of Br_2 at a particular time during the reaction is 0.025 $M\,\text{sec}^{-1}$, what is the rate of disappearance (in $M\,\text{sec}^{-1}$) of Br^- at that time?
1) 0.025 $M\,\text{sec}^{-1}$ 2) 0.042 $M\,\text{sec}^{-1}$ 3) 0.075 $M\,\text{sec}^{-1}$ 4) 0.125 $M\,\text{sec}^{-1}$

90. The rate constant (k') of one reaction is double the rate constant (k'') of another reaction. Then the relationship between the corresponding activation energies of the two reactions $(E_a' \text{ and } E_b'')$ will be-

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(Assume the pre-exponential factor & temperature to be same)
1) $E_a' > E_a''$ 2) $E_a' = E_a''$ 3) $E_a' < E_a''$ 4) $E_a' < 4E_a''$

BIOLOGY

91. The plasma resembles in its composition to the filtrate produced by the glomerulus expect for the presence of
1) Glucose 2) Chloride 3) Amino acids 4) Protiens

92. Which of the following has the maximum water potential?
1) Pure water 2) 2% sucrose solution
3) 4% glucose solution 4) 10% sodium chloride solution

93. Introduction of food plants developed by genetic engineering is not desirable because
1) Economy of developing countries may suffer
2) These products are less tasty as compared to the already existing products
3) This method is costly
4) Transgenic food may cause toxicity and allergy in human beings, and the bacteria present in the alimentary canal may become resistant to antibiotics by taking up the antibiotic-resistant gene that is present in the GM food.

94. An institution where valuable plant material likely to become irretrievably lost in the wild or cultivation is preserved in a viable condition is known as
1) Genome 2) Herbarium 3) Gene library 4) Gene bank

95. Certain species of wasps are seen to frequently visit flowering fig trees. The interaction between them is:
1) Brood parasitism 2) Mutualism
3) Commensalism 4) Parasitism

96. Identify the INCORRECT statement from the following with reference to lac operon.
1) It is a unit of gene expression and regulation for lactose sugar metabolism in E coil.
2) Lactose sugar enters the cell due to the activity of enzyme permease.
3) Operators are present between promoters and structural genes.
4) The structural gene 'Z' code for b- galactosidase, 'Y' for transacetylase, and ;A' for permease.

97. A sugary solution is changed to vinegar by the action of
1) Azotobacter 2) Acetobacter aceti 3) Bacillus subtilis 4) Mycoderma aceti

98. Which one engulfs pathogens rapidly?
1) Acidophils 2) Erythrocytes 3) Basophils 4) Neutrophils

99. The first event in photosynthesis is
1) Synthesis of ATP
2) Photoexcitation of chlorophyll and ejection of electron
3) Photolysis of water
4) Release of oxygen

100. Choose the correct statement from the following.
1) Dioecious (hermaphrodite) organisms are seen only in animals.
2) Dioecious organisms are seen only in plants.
3) Dioecious organisms are seen in both plants and animals.
4) Dioecious organisms are seen only in vertebrates.

101. Antibodies are synthesized by
1) Eosinophil 2) Lymphocyte 3) Monocyte 4) Neutrophil

102. Myelinated nerve fibres are white coloured because of
1) Chromidial substance 2) Neurolemma
3) Myelin 4) None of these

103. The capacity of an environment to pull on a limited number of individuals is known as
1) Bearing capacity 2) Limited capacity
3) Environmental resistance 4) Carrying capacity

104. Anabolism is a/an
1) Endergonic process 2) Exergonic process
3) Bidireactional process 4) Destructive process

105. Seminal plasma in human males is rich in
1) Glucose and calcium 2) DNA and testosterone
3) Ribose and potassium 4) Fructose and calcium

106. What is correct about the mechanism of hormone action in humans?
1) Glucagon is secreted by b- cells of islets of Langerhans and stimulates glycogenolysis
2) Secretion of thymosin is stimulated with ageing
3) In females FSH first blinds with specific receptors on follicular cell membrane
4) FSH stimulates the secretion of estrogen and progesterone

107. Which one of the following is NOT plant-like protest?
1) Desmid 2) Dinoflagellate 3) Diatom 4) Slime mould

108. In order to obtain virus-free plants through tissue culture, the best method is
1) Embryo rescue 2) Anther culture 3) Meristem culture 4) Protoplast culture

109. The characteristics features that can be exclusively seen in angiosperms is
1) Seeds 2) Fruits 3) Endosperm 4) Syngamy

110. Eustachian canal connects
1) Middle ear with external ear 2) Middle ear with internal ear
3) external ear with internal ear 4) Middle ear with the pharynx

111. The ratio between 2-carbon and 3-carbon intermediates having $-NH_2$ group formed in photosynthetic oxidation cycle is
1) 1 : 1 2) 2 : 1 3) 3 : 2 4) 3 : 4

112. Some common marine fishes are
1) Hilsa 2) Mackerel 3) Pomfrets 4) All of these

113. Smooth muscles are
1) Involuntary, fusiform, non-striated 2) Voluntary, multinucleate, cylindrical
3) Involuntary, cylindrical, striated 4) Voluntary, spindle-shaped, uninucleate

114. Enzymes that catalyse the transfer of molecules except H, O and electron are called as
1) Ligases 2) Isomerases 3) Lyases 4) Transferases

115. Parbhani kranti is a new variety of Abelanoschus esculentus having the resistance to:-
1) Shoot and fruit borer 2) Bacterial blight
3) Yellow mosaic virus 4) Tobacco mosaic virus

116. Study the mRNA segment given above, which is to be completely translated into a polypeptide chain. The codons for 'a' and 'b' are:

1) a-UAA b-UGA 2) a-AUG b-UUU
3) a-AUG b-UAG 4) a-UAG b-UGA

117. Result(s) of light reaction is/are
1) Only ATP 2) Only $NADPH_2$
3) ATP and $NADPH_2$ 4) Only FAD

118. An extra-chromosomal, self-replicating part of the cell that has proven to be a boon to biotechnology is:
1) Virus 2) Mitochondria 3) Nucleus 4) Plasmid

119. The theory of Natural selection that explains the appearance of new forms of life on earth was given by:
1) Oparin and Haldane 2) Hardy-Weinberg
3) Mendel 4) Darwin

120. Anxiety and eating spicy food together in an otherwise normal human may lead to
1) Indigestion 2) Jaundice 3) Diarrhoea 4) Vomiting

121. The action of the vaginal diaphragm is
1) To prevent the ova to come in the uterus
2) To prevent the sperm to come in contact with ova
3) Spermicidal
4) Anti-implantational

122. A colour-blind girl is rare because she will be born only when
1) Her mother and maternal grand father were colour blind
2) Her father and maternal grand father were colour blind
3) Her mother is colour blind and father has normal vision
4) Parents have normal vision but grand parents were colour blind

123. Bacillus thuringiensis is a good
1) Biofertilizer 2) Biopesticide 3) Biofuel 4) Single cell protein

124. The reason for the population explosion in the world is
1) Increase in birth rate 2) Decrease in death rate
3) Both (A) and (B) 4) None of them

125. Which one of the following cell organelles are enclosed by a single membrane?
1) Mitochondria 2) Chloroplasts 3) Lysosomes 4) Nuclei

126. Which of the following cells is round and biconcave in shape?
1) WBCs 2) RBCs 3) Epithelial Cells 4) Nerve cells

127. Diabetes insipidus is caused due to deficiency of
1) Aldosterone 2) ADH 3) ACTH 4) TSH

128. Chipko movement was launched for the protection of
1) Forests 2) Livestock 3) Wetlands 4) Grasslands

129. All are features of entomophilous flowers except
1) Flower with aroma
2) Versatile stamens
3) Pollen grain with sticky surface
4) Flowers provide reward to pollinators in the form of nectar and pollen grains

130. Secondary sewage treatment is mainly a
1) Physical process 2) Mechanical process 3) Chemical process 4) Biological process

131. In which contraceptive method, the semen will be without sperms?
1) Condoms 2) Withdrawal coitus 3) Foams 4) Vasectomy

132. The total number of teeth which comes only once in a life span
1) 20 2) 8 3) 32 4) 12

133. When synapsis is complete all along the chromosome, the cell is said to have entered a stage called
1) Zygotene 2) Pachytene 3) Diplotene 4) Diakinesis

134. Which structure of the lungs is directly involved in O_2 / CO_2 exchange between air and blood capillary?
1) Bronchi 2) Trachea 3) Alveoil 4) Secondary bronchi

135. The correct sequence of cytochromes in ETC is
1) Cyt a, b, c, a_3 2) Cyt b, c_1, c , a , a_3 3)Cyt b, a, a_3, c 4) Cyt b, c, a_3, a

136. Match column-I- with column-II-and choose the correct option.

	Column-I		Column-II
A.	Phaeophyceae	I.	*Funaria, Polytrichum, Sphagnum*
B.	Rhodophyceae	II.	*Equisetum, Psilotum, Pteris*
C.	Mosses	III	*Ectocarpus, Dictyota, Laminaria*
D.	Pteridophytes	IV.	*Polysiphonia, Porphyra, Gracilaria*

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

137. In the TCA cycle, $FADH_2$ is formed during

1) Conversion of succinyl Co-A to succinate
2) Conversion of citrate to cis-aconitate
3) Conversion of succinate to fumarate
4) Conversion of fumarate to malate

138. Select the correct answer regarding the phase of meiosis and their respective events using the lists given below:

	List I (Phase of meiosis)	List II (Event over occurs)
(1)	Prophase I	Crossing over occurs
(2)	Metaphase II	Sister chromatids migrate to opposite
(3)	Anaphase I	Homologous line up at equator in part

1) 1,2 and 3 are correct 2) 1 and 2 are correct, 3 is false
3) 1 is correct, 2 and 3 are false 4) 1 and 3 are correct, 2 is false

139. Bryophytes differ from pteridophytes in
1) Swimming antherozoids 2) An independent gametophyte
3) Archegonia 4) Lack of vascular tissue

140. For the enzyme enolase, the substrate is
1) Succinic acid 2) 2- PGA 3) PEP 4) Fumaric acid

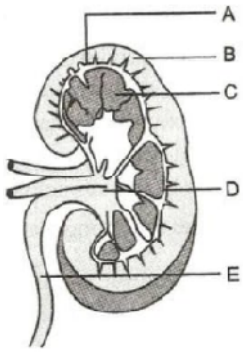
141. Which of the following statements is incorrect?
1) Shoot apices those modify themselves into flowering apices, cannot perceive photoperiods.
2) Sugarbeet, cabbage and carrots are monocarpic plants
3) To initiate flowering, LDP must be exposed to light for a period less than critical duration
4) Ethephon causes thinning of cotton, cheery & walnut

142. When a neuron is in resting state i.e., not conducting any impulse, the axonal membrane is
1) Comparatively more permeable to Na^+ ions and nearly impermeable to K^+ ions
2) Equally permeable to both Na^+ and K^+ ions
3) Impermeable to both Na^+ and K^+ ions
4) Comparatively more permeable to K^+ ions and nearly impermeable to Na^+ ions

143. In gymnosperms like Pinus and Cycas, the endosperm is
1) Triploid 2) Haploid 3) Diploid 4) Tetraploid

144. Which of the following two out of four statements are incorrect?
(a) The first transgenic buffalo, Rosie produced milk which was human alpha-lactalbumin enriched
(b) Restriction enzymes are used in isolation of DNA from other macromolecules
(c) Downstream processing is one of the steps of rDNA technology
(d) Disarmed pathogen vectors are also used in the transfer of rDNA into the host.
1) Statement (a) and (c) 2) Statement (b) and (c)
3) Statement (c) and (d) 4) Statement (a) and (b)

145. Refer the following diagram and identify the labelled pairs of kidney as indicated.



1) A-cortex, B-nephron, C-Renal pelvis, D-medulla, E-ureter
2) A-cortex, B-medulla, C-nephron, D-Renal pelvis, E-ureter
3) A-nephron, B-cortex, C-medulla, D-ureter, E-Renal pelvis
4) A-nephron, B-cortex, C-medulla, D-Renal pelvis E-ureter

146. Which of the following is a naturally occurring growth inhibitor?
1) IAA 2) ABA 3) NAA 4) GA

147. Gel electrophoresis is used for
1) Cutting of DNA into fragments
2) Separation of DNA fragments according to their size
3) Construction of recombinant DNA by joining with cloning vectors
4) Isolation of DNA molecule

148. An ecosystem which can be easily damaged but can recover after some time if damaging effect stops will be having
1) Low stability and high resilience 2) High stability and low resilience
3) Low stability and low resilience 4) High stability and high resilience

149. In bioluminescence stored changes into
1) Light energy 2) Radiant energy
3) Chemical energy 4) Mechanical energy

150. During isolation of DNA, addition of which of the following causes precipitation of purified DNA?
1) Chilled ethanol 2) Ribonuclease enzyme 3) DNA polymerase 4) Proteases

151. Protistan genome has
1) Nucleoprotein in direct contact with cell substance
2) Gene containing nucleoproteins condensed together in loose mass
3) Free nucleic acid aggregates
4) Membrane-bound nucleoproteins embedded in cytoplasm

152. Which of the following ecological pyramids can be inverted?
A. Pyramid of energy
B. Pyramid of number
C. Pyramid of biomass

1) Only (a) and (b) 2) Only (b) 3) Only (b) and (c) 4) All (a), (b) and (c)

153. During oxygen transport, the oxyhaemoglobin at the tissue level liberates oxygen to the cells because
1) O_2 concentration is high and CO_2 is low 2) O_2 concentration is low and CO_2 is high
3) O_2 tension is low and CO_2 tension is high 4) O_2 tension is high and CO_2 tension is low

154. In rainy season, door gets swelled due to
1) Imbibition 2) Diffusion 3) Transpiration 4) Respiration

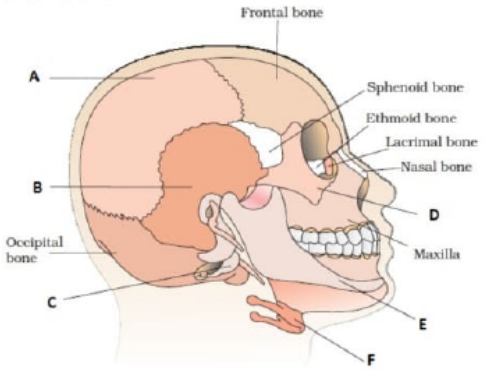
155. The function of companion cells is to
1) Provide energy to sieve elements for active transport
2) Provide water to phloem
3) Load sucrose into sieve elements by passive transport
4) Load sucrose into sieve elements by active transport

156. A plant leaf is found to have bundle sheath cells having large-sized chloroplasts full of starch granules. Which of the following characteristics can be observed in this plant?
I. Stomata open at night
II. Presence of PEP carboxylase in mesophylls.
III. Presence of RubisCo in bundle sheath cells
IV. High photorespiration rate in hot summer days
V. Light reaction and carbon fixation as carbohydrates occur in different cell types
VI. The carbon assimilation rate is saturated in the early morning on summer days
1) Only I, III 2) Only II, IV 3) Only II, IV, V 4) Only II, III, V

157. Which of the following is not caused by the deficiency of minerals?
1) Chlorosis 2) Etiolation
3) Shortening of internodes 4) Necrosis

158. Genetic dwarfness in plants can be resolved by
1) Lower ABA contents 2) Higher endogenous auxin contents
3) Higher endogenous gibberellins contents 4) High ethylene content

159. Select the option with the correct identification of the structures labeled by alphabets (A-F) in the given diagram of the human skull



1) A-Temporal bone, B-Parietal bond, C-Occipital condyle
2) C-Occipital condyle, D-Zygomatic bone, E-Mandible
3) A-Parietal bone, D-Vomer bone, F-Mandible
4) B-Temporal bone, C-Hyoid bone, E-Mandible

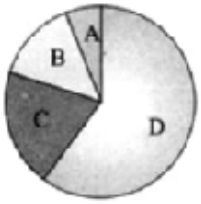
160. Concanavalin A is
1) Alkaloids 2) Chlorophyll 3) Terpenoids 4) Lectins

161. Which of the following is pollinated by water?
1) Viola 2) Yucca 3) Oxalis 4) Zostera

162. Which of the following tissue is absent in vascular bundles of monocot stem?
1) Cambium 2) Xylem 3) Phloem 4) All of these

163. In humans, placenta is derived from
1) Yolk sac 2) Amnion 3) Allantois 4) Chorion

164. Select the correct option for A, B, C and D given in the figure with respect to the relative contribution of various greenhouse gases to global warming



1) (A-CO_2), (B-CFCs), (C-CH_4), (D-NO_2)
2) (A-NO_2), (B-CFCs), (C-CH_4), (D-CO_2)
3) (A-NO_2), (B-CH_4), (C-CFCs), (D-CO_2)
4) (A-CH_4), (B-CFCs), (C-NO_2), (D-CO_2)

165. Which one of the following is the correct match of events occurring during the menstrual cycle?
1) Menstruation: Breakdown of myometrium & ovum not fertilized
2) Proliferative phase: Rapid generation of myometrium & maturation of Graffian follicle
3) Development of corpus luteum: Secretory phase & increased secretion of progesterone
4) Ovulation: LH and FSH attain peak level & sharp fall in the secretion of progesterone

166. You are given tissue with its potential for differentiation in artificial culture. Which of the following pairs of hormones would you add to the medium to secure shoots as well as roots?
1) IAA and gibberellin
2) Auxin and cytokinin
3) Auxin and abscisic acid
4) Gibberellin and abscisic acid

167. Germpore is the region where the exine is
1) Thick
2) Uniform
3) Thick and uniform
4) Absent

168. Pentamerous actinomorphic flowers, bicarpellary ovary with oblique septa, and fruit capsule or berry are characteristic features of family
1) Liliaceae
2) Asteraceae
3) Brassicaceae
4) Solanaceae

169. Out of 64 codons, 61 codons code for 20 types of amino acid. This characteristic is known as
1) Degeneracy of genetic code
2) Overlapping of gene
3) Wobbling of codon
4) Universality of codons

170. How many types of gametes will be produced by a plant having the genotype AABbCC?
1) Four
2) Nine
3) Two
4) Three

171. Smoking addiction is harmful because it produces polycylic aromatic hydrocarbons, which cause
1) Reduction in oxygen transport
2) Decrease in blood pressure
3) Cancer
4) Enhancement of growth of the foetus

172. The percentage of all gymnosperm species facing extinction is
1) 12
2) 23
3) 32
4) 31

173. Interspecific hybridization is the mating of
1) Animals within same breed without having common ancestors
2)Two different related species
3) Superior males and females of different breeds
4) More closely related individuals within same breed for 4-6 generations

174. Variety of cowpea resistance to bacteria blight is
1) Pusa swarnim
2) Pusa Shubhra
3) Pusa Sadabahar
4) Pusa Komal

175. Which ion helps in opening and closing of stomata?
1) Mn^{+}
2) Mg^{2+}
3) Ca^{2+}
4) K^{+}

176. Tobacco Mosaic Virus (TMV) genes are
1) Double stranded RNA
2) Single stranded RNA
3) Polyribonucleotides
4) Proteinaceous

177. Which of the following is not the application of PCR?
1) Detection of very low concentration of bacteria or virus
2) Detection of mutations in genes in suspected cancer patients
3) Amplification of desired DNA segment
4) Detection of antibodies synthesized against pathogens

178. Pneumatic bones are expected to be found in
1) Pigeon 2) House lizard 3) Frog's tadpole 4) Flying fish

179. The tendency of the body to manifest a characteristic and unpleasant withdrawal syndrome if a regular dose of drugs/alcohol is abruptly discontinued is called as
1) Habituation 2) Dependence 3) Psychotherapy 4) Tolerance

180. Which among the following can be seen in the ultrastructure of both eukaryotic and prokaryotic cell?
1) Ribosome 2) Nucleoproteins 3) Chloroplast 4) Leucoplast

NTA NEET MOCK TEST – 4

PHYSICS KEY

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

CHEMISTRY KEY

46-55	1	4	3	2	3	3	1	1	1	4
56-65	2	1	2	3	3	1	2	1	1	1
66-75	4	3	2	4	4	4	2	2	4	3
76-85	4	1	3	1	4	2	2	3	2	2
86-90	1	1	1	2	3					

BIOLOGY KEY

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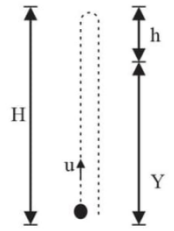
91-100	4	1	4	4	2	4	2	4	2	3
101-110	2	3	4	1	4	3	4	3	2	4
111-120	2	4	1	4	3	3	3	4	4	1
121-130	2	2	2	3	3	2	2	1	2	4
131-140	4	4	2	3	2	1	3	3	4	2
141-150	3	4	2	4	1	2	2	1	1	1
151-160	4	3	3	1	4	4	2	3	2	4
161-170	4	1	4	2	3	2	4	4	1	3
171-180	1 & 3	4	2	4	4	2	4	1	2	1

PHYSICS SOLUTIONS

1. Let the total height = H

Total time of ascent = T

So, $H = ut - \frac{1}{2}gT^2$



Distance covered by ball in time (t-t)sec is $y = u(t-t) - \frac{1}{2}g(T-t)^2$

So, distance covered by ball in test t sec

$h = H - y = [uT - \frac{1}{2}gT^2] - [u(T-t) - \frac{1}{2}g(T-t)^2]$

By solving and putting $T = \frac{u}{g}$ we will get, $h = \frac{1}{2}gt^2$

2. $TV^{\gamma-1} = \text{constant}$

$(300)V^{\frac{5}{3}-1} = T_2\left(\frac{8V}{27}\right)^{\frac{5}{3}-1}$

$300 = T_2\left(\frac{8}{27}\right)^{\frac{2}{3}}$

$300 = T_2\left(\frac{4}{9}\right)$

$\Rightarrow T_2 = 675K$

Rise in temperature = (675-300)K = 375 K

3. Heat lost by (Water + Pitcher)

$Q_1 = (m+M)\times s\times \Delta T$

$=)9.5+0.5)\times 10^3\times(30-28)$

$=20\times 10^3 cal$

Heat gained for the water to evaporate: (let t be time in min)

$Q_2 = m\times L$

$=\left(\frac{dm}{dt}\times t\right)L = (1\times t)\times 580 = 580t\,cal$

So, $Q_1 = Q_2$

$580t = 20\times 10^3$

$t = \frac{20000}{580} = 34.5\min$

4. $x = ae^{-\alpha t} + be^{\beta t}$

$\frac{dx}{dt} = -a\alpha e^{-\alpha t} + b\beta e^{\beta t}$

$\Rightarrow v = b\beta^{\beta t} - a\alpha e^{-\alpha t}$

As t increases, $e^{-\alpha t}$ decreases and $e^{\beta t}$ increases. So v will increase with time.

5. Energy of a charged capacitor, $E = \frac{1}{2}\frac{Q^2}{C}$

For a cylindrical capacitor, $V = \frac{2\pi\varepsilon_0 L}{\log_e\left(\frac{b}{a}\right)}$

$E = \frac{1}{2}\frac{Q^2}{2\pi\varepsilon_0 L}\log_e\left(\frac{b}{a}\right).....(i)$

Where L = length of the cylinder a and b = radii of two concentric cylinder.

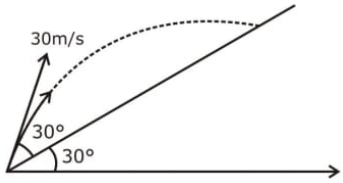
$C' = \frac{2\pi\varepsilon_0(2L)}{\log_e\left(\frac{b}{a}\right)}$

$=\frac{1}{2}\frac{(2Q)^2}{2\pi\varepsilon_0(2L)}\log_e\left(\frac{b}{a}\right).....(ii)$

From equations (i) and (ii), we get $E' = 2E$

6. According to Kirchhoff's law ideal black body absorb all the heat at low temperature and emits it all at high temperature a = e = 1 and r = 0.

7. Diamagnetic substance creates and induced magnetic field which is opposite to the applied magnetic field and thus there is repulsion on both north and south pole.

8. 

Range of incline plane,

$$R=\frac{2u^2\sin(\alpha-\beta)\cos\alpha}{g\cos^2\beta}$$

Here, $\beta=30^0$ *and* $\alpha=30^0+30^0=60^0$

$$R=\frac{2(30)^2\sin(30^0)\cos(60^0)}{10\cos^2(30^0)}=\frac{2(30)^2\left(\frac{1}{2}\right)\left(\frac{1}{2}\right)}{10\left(\frac{3}{4}\right)}=60m$$

9. Since escape velocity from the surface of a planet can be written as

$v_c=\sqrt{2gR}$

Ratio $\frac{v_{ep_1}}{v_{ep_2}}=\sqrt{\frac{2g_{p_1}R_{p_1}}{2_{gp_2}R_{p_2}}}=\sqrt{K_1K_2}$

10. Translation kinetic energy = $\frac{1}{2}mv^2$

Rotational kinetic energy = $\frac{1}{2}Iw^2$ AAJ KA TOPPER

Translation kinetic energy = Rotational kinetic energy

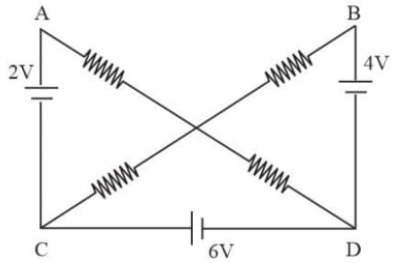
$\frac{1}{2}mv^2=\frac{1}{2}Iw^2$

Put $v=rw$, you will gwt

$I=MR^2$ which is inertia of ring.

11. Phase difference, $\phi=\frac{2\pi x}{\lambda}$ *or* $\lambda=\frac{2\pi x}{\phi}$

$=2\times\pi\times\frac{2.1\times10^{-6}}{7.629\pi}=5460\times10^{-10}m$

12. 

Apply Kirchhoff's Voltage law,

Along wire ACDB

$V_A-2-6+4=V_B$

$V_A-V_B=4V$

13. Let, $|\vec{A}|=|\vec{B}|=x$

Then $|\vec{C}| = \sqrt{2}x$.

Now, $\vec{A} + \vec{B} = -\vec{C}$

$(\vec{A} + \vec{B}).(\vec{A} + \vec{B}) = (-\vec{C}).(-\vec{C})$

$2(A.B) + A^2 + B^2 = C^2$

$2AB\cos\theta + x^2 + x^2 = 2x^2$

$\cos\theta = 0$

$\theta = 90^0$

$\Rightarrow Angle\, between\, A\, and\, B\, is\, 90^0$

$Again\, \vec{A} + = -\vec{B}$

$(\vec{A} + \vec{C}).(\vec{A} + \vec{C}) = (-\vec{B})(-\vec{B})$

$A^2 + C^2 + 2A\cos\theta = B^2$

$3x^2 + 2.x\sqrt{2}x\cos\theta = x^2$

$\cos\theta = \frac{-2}{2\sqrt{2}} = \frac{-1}{\sqrt{2}}$

$\theta = 135^0$

i.e, angle between A and C is 135^0

Similarly, angel between B and C is θ_2

$\vec{B} + \vec{C} = -\vec{A}$

$Bh2 + C^2 + 2B\cos\theta = A^2$

$\cos\theta = \frac{-2}{2\sqrt{2}} = \left(\frac{-1}{\sqrt{2}}\right)$

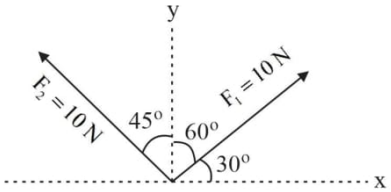
$\theta_2 = 135^0$

14. Electric field between plates is uniform hence electrostatic force due to the field constant. Angular frequency does not change by constant force equilibrium position will be at the point where

$2kx_0 = q \times \frac{\sigma}{\epsilon_0}; x_0 = \frac{\sigma q}{2k\epsilon_0}$ AAJ KA TOPPER

x_0 is also the amplitude of oscillation.

15. As north pole approaches the ring, flux through ring increases. From Lenz's law magnetic field produced by ring should oppose this change. This happens when current in flows anti-clockwise direction.

16. 

After resolving forces in xy – direction,

We get

Along x direction, net force;

$F_x = 10[\cos 30^0 + (-\cos 45^0)]$

$= 10\left(\frac{\sqrt{3}}{2} - \frac{1}{\sqrt{2}}\right) = 1.59N$

Along y direction, net force;

$F_y = 10(\sin 30^0 + 10\sin 45^0)$

$F_y = 10\left(\frac{1}{2} + \frac{1}{\sqrt{2}}\right) = 12.07N$

Thus force in x and y direction are 1.59 N and 12.07 N respectively.

17. For an adiabatic process, PV^{γ} =constant

$TV^{\gamma-1}$ =constant

And $T^{\gamma}P^{1-\gamma}$ =constant

Putting, $\gamma = 5/3$, (Argon is a monoatomic gas).

Now equation becomes;

$PV^{5/3} = cons\tan t$

$TV^{-2/3} = cons\tan t$

$T^{5/3}P^{-2/3} = cons\tan t$

$\Rightarrow TP^{-2/5} = cons\tan t$

18. We know magnetic field due to coil $= \frac{\mu_0 Ni}{2r}$

$B_H \tan\theta = \frac{\mu_0 Ni}{2r}$

$i = \frac{0.34\times10^{-4}\times2\times0.2}{4\pi\times10^{-7}\times20} = \frac{17}{10\pi}A$

19. Ideal gas equation is given by PV = nRT…(i)

For oxygen, P = 1 atm, V = 1 L, n = n_{O_2}

Therefore, Eq. (i) becomes

$\therefore 1\times1 = n_{O_2}RT$

$n_{O_2} = \frac{1}{RT}$

For nitrogen P=0.5 atm, V = 2L, n = n_{N_2}

$\therefore 0.5\times2 = n_{N_2}RT$

$\Rightarrow n_{N_2} = \frac{1}{RT}$

For mixture of gas $P_{mix}V_{mix} = n_{mix}RT$

Here, $n_{mix} = n_{O_2} + n_{N_2}$

$\therefore \frac{P_{mix}V_{mix}}{RT} = \frac{1}{RT} + \frac{1}{RT}$

$P_{mix}V_{mix} = 2(V_{mix} = 1)$

20. The coil of a moving coil galvanometer is wound over a metal frame in order to provide electromagnetic damping by which the galvanometer becomes dead beat.

21. According to Newton's law of cooling, rate of cooling is

$\frac{\Delta\theta}{\Delta t} = k(\theta_o - \theta)$

Now from equation,

$\therefore (\Delta\theta)^n = (\Delta\theta) or\, n = 1$

22. P_1 is at central maxima so $I_1 = 4I_0$

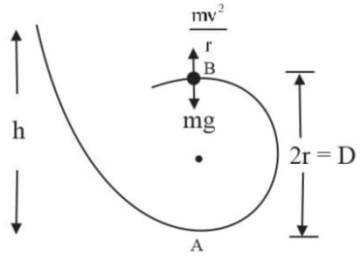
For P_2,

$$\phi = \left(\frac{2\pi}{\beta}\right)\left(\frac{\beta}{4}\right) = \frac{\pi}{2}$$

$$I_2 = I_0 + I_0 + 2\sqrt{I_0 I_0}\cos\left(\frac{\pi}{2}\right) = 2I_0$$

$$\frac{I_1}{I_2} = 2$$

23.



By conservation of energy, $\frac{1}{2}mv^2 = mgh$

$$v = \sqrt{2gh}....(i)$$

For looping the loop, the lower velocity must be greater than $\sqrt{5gr}$

$$v_{\min} = \sqrt{5gr} = \sqrt{\frac{5gD}{2}}....(ii)$$

From equation (i) and (ii),

$$2gh = \frac{5gD}{2}$$

$$h = \frac{5D}{4}$$

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

N = no. of un-decayed nuclei

N_0 =initial no. of nuclei

Also $t = n \times T_{1/2}$

$$\Rightarrow N = N_0\left(\frac{1}{2}\right)^{\frac{7.5}{15}}$$

$$\Rightarrow N = N_0\left(\frac{1}{2}\right)^{\frac{1}{2}} \Rightarrow N = \frac{N_0}{\sqrt{2}}$$

$\therefore$ No. of nuclei decayed

$$= \left(N_0 - \frac{N_0}{\sqrt{2}}\right) = N_0\left(\frac{\sqrt{2}-1}{\sqrt{2}}\right)$$

$$= \frac{0.414}{1.414}N_0$$

$$= 0.29N_0$$

$\Rightarrow$ No. of nuclei decayed

$$= 0.29 \times \frac{1}{24} \times 6.023 \times 10^{23} = 0.0727 \times 10^{23} = 7.5 \times 10^{21}$$

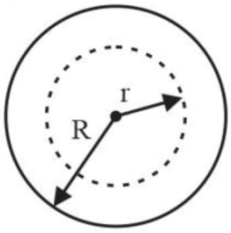
25. ${}_1^2H + {}_1^2H \rightarrow {}_2^4He + energy$

Energy released = B.E. of ${}_2^4He - 2(B.E.of\ {}_1^2H)$

$= 28 - 2(2.2) = 28 - 4.4 = 23.6MeV$

26. Using Ampere's law , we have

$\oint \vec{B}.\vec{dl} = \mu_0 i_{in}$



$or\ B \times 2\pi r = \mu_0 \frac{i}{\pi R^2}\pi r^2$

$\therefore B = \frac{\mu_0}{2\pi}.\frac{ir}{R^2}$

27. From capillary tube experiment, we know that

$h = \frac{2S\cos\theta}{r\rho g} i.e, h\alpha\frac{1}{r}$

$\therefore \frac{h'}{h} = \frac{r}{r/2} = 2\ or\ h' = 2h$

28. The tolerance level of resistance is given by 4th colour

Gold represent $\pm 5\%$ tolerance.

29. According to the question

$Muscle \times Speed = Power$

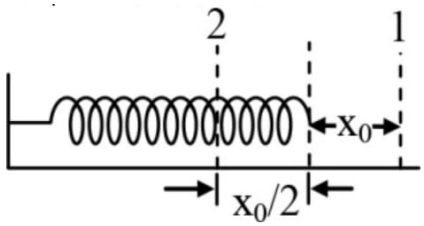
$Muscle = \frac{Power}{Speed} = MLT^{-2}$

30. Spring balancing reading is equal to 2T. Tension in the string

$= \frac{2m_1m_2}{m_1+m_2} = \frac{2\times5\times1}{6} = \frac{5}{3}Kgf$

Reading of spring balance = $2T = 2\times\frac{5}{3} = \frac{10}{3}Kgf$

31. Change in potential energy is independent of reference



$\therefore U_2 - U_1 = \frac{1}{2}k\left(\frac{x_0}{2}\right)^2 - \frac{1}{2}kx_0^2 = -\frac{3}{8}kx_0^2$

32. Let, mass of car = m

Force applied by engine = 6m

When two cars are pulled, (m+m)a=6m

Or 2ma=6m or a = 3 ms^{-2}

33. After 10 sec, $\frac{1}{2}mv^2 = \frac{1}{8}mv_0^2$

$\Rightarrow v = \frac{v_0}{2} = 5m/\sec$

$a = -\frac{kv^2}{m}$

$\Rightarrow \frac{dv}{dt} = -\frac{kv^2}{m}$

$\Rightarrow \int_{10}^{5} \frac{dv}{v^2} = -\frac{k}{m}\int_0^{10} dt$

$-\frac{1}{5} + \frac{1}{10} = \frac{-k}{10^{-2}} \times 10$

$k = 10^{-4} kgm^{-1}$

34. Modified equation of de-Broglie wavelength $\lambda = \frac{h}{\sqrt{2meV}}$

$\lambda = \frac{12.27A^0}{\sqrt{V}} = \frac{12.27}{\sqrt{64}} = 1.534A^0$

35. The Boolean expression for the given combination is output Y = (A+B).C
Hence, A = 1, B = 0, C = 1
Or other combination can be A = 1, B =1, C = 1

36. Since initial phase is $\frac{\pi}{2}$ as per the given graph.
Using the equation of position of SHM

$x = A\sin(\omega t + \frac{\pi}{2})$ AAJ KA TOPPER

$\Rightarrow c = A\cos\omega t$

$\Rightarrow$ acceleration

$f = \frac{d^2x}{dt^2} = -A\omega^2 \cos\omega t$

Which is represented in option third.

37. $\frac{w_1}{w_2} - \frac{1}{2}$

Now, $\frac{f_1}{f_2} = -\frac{w_1}{w_2} = -\frac{1}{2}$

Or $f_2 = 2f_1$

$Now, \frac{1}{F} = \frac{1}{f_1} + \frac{1}{f_2}$

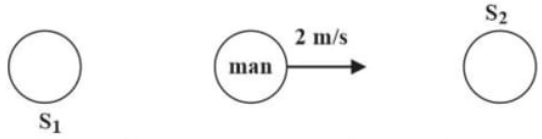
$\frac{1}{50} = \frac{1}{f_1} + \frac{1}{-2f_1}$

Or $50f = \frac{-2+1}{-2f_1} = \frac{1}{2f_1}$

Or $2f_1 = 50 or\ f_1 = 25cm$

Again $f_2 = -2 \times 25cm$

$f_2 = -50cm$



38. $n_1 = n_0\left\{\frac{v-v_0}{v-v_s}\right\} = 800\left\{\frac{320-2}{320}\right\}$

$= \frac{800\times318}{320}$ Hz

$n_2 = n_0\left\{\frac{v-v_0}{v-v_s}\right\} = 800\left\{\frac{320+2}{320}\right\}$

$= \frac{800\times322}{320} Hz$

$\therefore$ Beat frequency = $n_2 - n_1$

$= \frac{800(322-318)}{320} = \frac{800\times4}{320} = 10Hz$

39. $\frac{1}{2}mv^2 = hf - \phi_0 = hf - hf_0$

The kinetic energy of the emitted photoelectrons is distributed from zero to the maximum value.

Minimum kinetic energy of emitted photoelectron is zero.

40. $f = 10^{14} HZ$ AAJ KA TOPPER

$E_0 = 4V/m$

$\in_0 = 8.8\times10^{-12}\frac{C^2}{N-m^2}$

Energy density of electric field

$= \frac{1}{2}$ (Total energy density)

$= \frac{1}{2}.\frac{1}{2}\in_0 E^2$

$= \frac{1}{2}.\frac{1}{2}\left\{8.8\times10^{-12}\times4^2\right\}$

$= \frac{1}{2}.\frac{1}{2}\times16\times8.8\times10^{-12} J/m^3$

$= 35.2\times10^{-12} J/m^3$

41. $t = \sqrt{\frac{2H}{g}} + 2\sqrt{\frac{2H_1}{g}} + 2\sqrt{\frac{2H_2}{g}} + ...\infty$

$t = \sqrt{\frac{2H}{g}}(1+2e+2e^2+.....\infty)$

$t = \sqrt{\frac{2H}{g}}\left(\frac{1+e}{1-e}\right)$

42. Resistance of a conductor $R = \frac{\rho l}{A}$.....(i)

As ρ depends on the material,

So R depends on the material,

According to the given formula in Eq. (i). It depends on the length. Moreover resistance α temperature.

If R_0 =resistance of conductor at 0^0 C.

R_t =resistance of conductor at t^0C

And a, β temperature coefficient of resistance, then

$R_t = R_0(1+\alpha t+\beta t^2)$

The resistance of a straight conductor does not depend on shape or cross section.

43. Range of projectile $R=\frac{u^2\sin 2\theta}{g}$

For $\theta = 60^0, R=\frac{20^2\sin 120^0}{g}=20\sqrt{3}=34.64m$

For % error $\frac{\Delta R}{R}=\frac{2\Delta u}{u}$

$\Delta R=\frac{2\times 5}{100}\times 20\sqrt{3}=2\sqrt{3}=3.464m$

So, range R = 34.64 $\pm$3.46m

$R_{\min}=31.1m \text{ and } R_{\max}=38.1m$

44. WE have to consider sign convention as only magnitude of focal length is given. If f_1 is focal length of convex (converging) lens and f_2 is focal length of concave (diverging) lens. Then their equivalent focal length F would be

$\frac{1}{F}=\frac{1}{f_1}+\frac{1}{-f_2}$

$=\frac{f_2-f_1}{f_1 f_2}\left[\because \frac{1}{F}=\frac{1}{f_1}+\frac{1}{f_2}\right]$

$\therefore F=\frac{f_1 f_2}{f_2-f_1}$

45. Torque and work have same dimensional formula = ML^2T^{-2}

CHEMISTRY SOLUTIONS

46. Hydrolysis of salt of weak acid and weak base

$pH=\frac{1}{2}(pK_w+pK_a-pK_b)$

$=\frac{1}{2}(14+3.2-3.4)=6.9$

47. $\underset{}{CH_3Br} \xrightarrow{KCN} \underset{\text{Acetonitrile}}{CH_3CN} \xrightarrow[LiAlH_4]{4[H]} \underset{\text{Ethylamine}}{CH_3CH_2NH_2}$

IUPAC name of acetonitrile is Ethanenitrile.

48. Negative colloid is coagulated by positive ion or vice-versa. Greater the valency of coagulating ion, greater will be coagulating power according to Hardy-Schulze rule.

(a) $ZnSO_4 \rightarrow Zn^{2+}+SO_4^{2-}$

(b) $Na_3PO_4 \rightarrow 3Na^{+}+PO_4^{3-}$

(c) $AlCl_3 \rightarrow Al^{3+}+3Cl^{-}$

(d) $K_4[Fe(CN)_6] \rightarrow 4K^{+}$
$+[Fe(CN)_6]^{4-}$

Since, in $AlCl_3$, the valency of positive ion (coagulation ion) is highest, it is the most powerful coagulating agent among the given to coagulate the negative colloid.

49. According to the electrochemical series, the electrode with high reduction potential will act as a cathode, and the electrode with more negative reduction potential acts as the anode.

50. Zn is above Cu in electrochemical series. So, Zn will reduce $Cu^{2+}\ to\ Cu$.

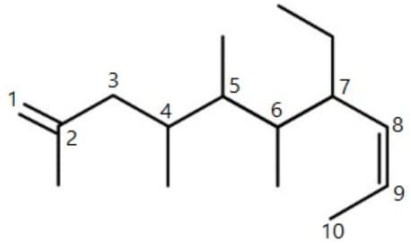
$Cu + Zn^{2+} \rightarrow$ No reaction

Displacement reaction which is feasible is

$Cu^{2+} + Zn \rightarrow Zn^{2+} + Cu \downarrow$

51. Because Na is very reactive and cannot be extracted by means of the reduction by C, CO. etc. So, it is extracted by electrolysis of molten NaCl .

52. Longest chain of 10 – C including both double bonds.



7-Ethyl-2,4,5,6-tetramethydeca-1,8-diene

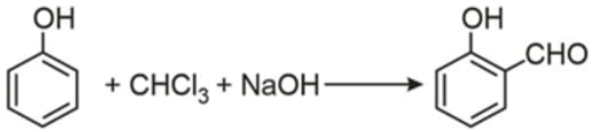
53. $BeSO_4$ is most soluble because hydration energy is more than lattice energy.

$BeSO_4 > MgSO_4 > CaSO_4 > SrSO_4 > BaSO_4$

Hydration energy decreases, hence solubility decreases.

54. Zinc amalgam (Zn-Hg) and conc. HCl is used as a catalyst for Clemmensen's reduction. This reagent coverts > C = O group to > CH_2 group.

55. Reimer Tieman reaction



56. $2C_2H_5Br + Ag_2O \xrightarrow[Dry]{} C_2H_5 - O - C_2H_5 + 2AgBr$

If we take moist Ag_2O then alcohol is formed

$Ag_2O + H_2O \rightarrow 2AgOH$

$C_2H_5Br + AgOH \rightarrow C_2H_5OH + AgBr$

57. $\underset{\text{1 mole}}{C_2H_5NH_2} + HONO \longrightarrow C_2H_5OH + \underset{\text{1 mole}}{N_2} + H_2O$

(22.4 L at STP)

58. Orthoboric acid is a weak mono basic acid with $K_a = 1.0 \times 10^{-9}$. It does not act as protic acid (i.e., proton donor) but behaves as Lewis acid by accepting a pair of electrons from OH^- ion.

$B(OH)_3 + 2H - O - H \rightarrow [B(OH)_4]^- + H_2O^+$

59. Energy required to show photo emission = 2.3 eV

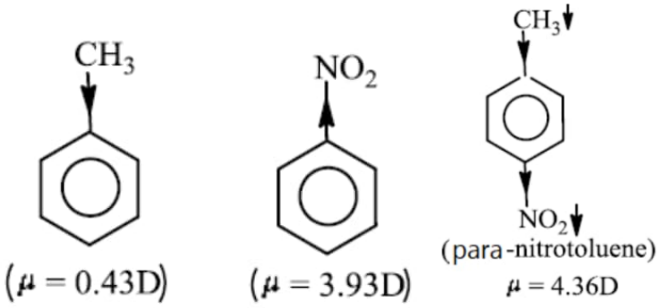
$= 2.3 \times 1.6 \times 10^{-10}\ J$

Thus $E = \frac{hc}{\lambda}\ or\ \lambda = \frac{hc}{E} = \frac{6.626 \times 10^{-34} \times 3 \times 10^8}{2.3 \times 1.6 \times 10^{-19}} = 5.4 \times 10^{-7}\ m$

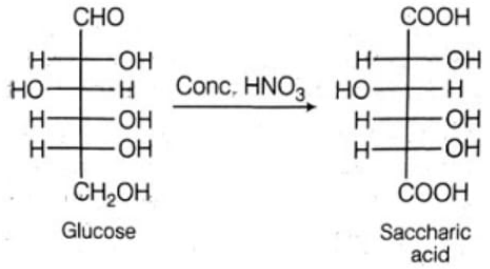
Thus, longest wavelength to show photoelectric effect = $5.4 \times 10^{-7}\ m$

60. Methyl group has +I effect and $-NO_2$ group has –I effect. Therefore, in p-nitro toluene the dipole moments of $-CH_3$ and $-NO_2$ groups acts in the same direction. So, the resultant dipole moment is additive.

i.e, 3.93+0.43 = 4.36 debye



61. $HCOOH \xrightarrow{conc.H_2SO_4, heat} CO + H_2O$

62. 

63. Weight of phenol

$(W_A) = 2.0 \times 10^{-2} kg = 20g$

Weight of Benzene (W_B)=1.0 kg

$\Delta T_i = 0.69K \quad K_f$ AAJ KA TOPPER

=5.12 K kg mol^{-1}

$\Delta T_f = iK_f m$

$$i = \frac{\Delta T_f}{K_f m} = \frac{0.69}{5.12 \times \frac{20}{94}} = \frac{0.69 \times 94}{5.12 \times 20}, i = 0.63$$

$2A \rightleftharpoons (A)_2$

$1-x \quad x/2$

Particle after association

$i = 1 - x + x/2 = 1 - x/2$

$i = 1 - x/2$

$0.63 = 1 - \frac{x}{2} \quad x \Rightarrow 0.734 i.e. 73.4\%$

64. In general:

(i) First ionization energy (IE_1) or enthalpy, increases along the period from left to right, but due to half-field configuration of P-atom, it has higher IE_1 than of S-atom.

(ii) IE_1 decreases as we move down the group from top to bottom.

(iii) More be the size of atom, less be the IE_1.

Hence, correct order of IE_1 is B < S < P < F.

IE_1 for (in kJ mol^{-1})

B = 800, S = 999.4, P = 1012, F = 1680.8

65. Yellowish-green gas of chlorine is evolved when the sodium chloride is heated with concentrated H_2SO_4 in presence of MnO_2.

$NaCl + H_2SO_4 \rightarrow NaHSO_4 + HCl$

$MnO_2 + 4HCl \rightarrow MnCl_2 + 2H_2O + Cl_2$

66.

(1) $CH_3CH_2CH_2-CH_2-CHO$

(2) $CH_3-CH_2-\underset{\displaystyle CH_3}{\underset{|}{CH}}-CHO$

(3) $CH_3-\underset{\displaystyle CH_3}{\underset{|}{CH}}-CH_2-CHO$

(4) $CH_3-\underset{\displaystyle CH_3}{\overset{\displaystyle CH_3}{\overset{|}{\underset{|}{C}}}}-CHO$

(5) $CH_3CH_2COCH_2CH_3$

(6) $CH_3COCH_2CH_2CH_3$

(7) $CH_3-CO-\underset{\displaystyle CH_3}{\underset{|}{CH}}-CH_3$

67. Stoiciometric mole ratio

$A \quad B \quad C$

$= \frac{1}{4}, \frac{0.6}{2}, \frac{0.72}{3}$

$= 0.25, 0.30, 0.24$

C is Limiting Reagent

So, according to Stoichiometry of reaction

3 mol C gives = 1 mol $A_4B_2C_3$.

$\therefore 0.72$ mol of C gives = $\frac{1}{2} \times 0.72 = 0.24$

68.

$$\underset{S}{AgCl(s)} \rightleftharpoons \underset{S}{Ag^{(+)}(aq)} + \underset{S}{Cl^{(-)}(aq)}$$

$$\underset{}{NaCl} \rightleftharpoons \underset{0.1\ M}{Na^{(+)}(aq)} + \underset{0.1\ M}{Cl^{(-)}(aq)}$$

$\therefore K_{sp}(AgCl) = S(S + 0.1)$

$\therefore S << 0.1$

$\therefore S + 0.1 \approx 0.1$

$\therefore 1.6 \times 10^{-10} = S \times 0.1$

$\therefore S = 1.6 \times 10^{-9} M$

69. In one mole, Let there be $Cu^{+2} = x\,moles$

$\therefore Cu^{+} = 1.8 - x\ \ moles$

$\because 2x+(1.8-x)1=+2$

$x=0.2$

$\%Cu^{2+}=\frac{0.2}{1.8}\times 100=11.11\%$

70. At low pressure and high temperature, real gases behave like ideal gases. According, Van der Waals equation is modified as:

$pV_m=RT$ (for 1 mole)

$\therefore$ At low pressure and high temperature, the terms $\frac{a}{V^2}$ and b becomes very small as compared to p and V.

71.

	$Zn(s)+2HCl(aq)\rightarrow ZnCl_2(aq)+H_2(g)$			
Initial moles	0.30	0.52	0	0
Final moles	0.04	0	0	0.26

$\because$ Mole ratio of Zn :HCl : H_2 is 1 : 2 : 1

2 mole HCl gives = $\frac{1\times 0.52}{2}$ = 0.26 mole

Note that HCl is used completely and thus it is limiting reagent.

72. $N=M\times Valence\ factor$

$\because N=0.1\times 6(2Cr^{6+}+6e^-\rightarrow 2Cr^{3+})$

$K_2Cr_2O_7=0.6N$

73. Partial pressure = $\frac{no.of\ moles\ of\ gas\times p_{total}}{total\ no.of\ moles}$

$1.5=\frac{5\times p_{total}}{2+3+5+10}$ AAJ KA TOPPER

$\frac{1.5\times 20}{5}=p_{total}$

$p_{total}=6atm$

74. The chlorine atom that leaves to give us the most stable carbocation will act as the best leaving group. Among the given options, the Cl attached to a 3^o carbon will act as the best leaving group as this would give a stable 3^o carbocation (Stable due to highest extent of hyperconjucation)

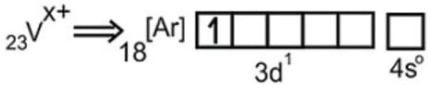
75. Spin only Magnetic moment

$\mu=\sqrt{n(n+2)}BM=1.73=\sqrt{3}$

$\therefore n=1(unpaired\ e^-)$

Electronic configuration of

$V=1s^2\,2s^2\,2p^6\,3s^2\,3p^6\,3d^4\,4s^2$



To get 1 unpaired electron V has to lose 4 electron to form V^{4+}.

So, formula of chloride is VCl_4

76. $N_2+3H_2\rightleftharpoons 2NH_3$

$K_1=\frac{[NH_3]^2}{[N_2][H_2]^3}.....(i)$

$N_2 + O_2 \rightleftharpoons 2NO; K_2$

$= \frac{[NO]^2}{[N_2][O_2]}$.....(ii)

$H_2 + 1/2O_2 \rightleftharpoons H_2O; K_3$

$= \frac{[H_2O]}{[H_2][O_2]^{1/2}}$.....(iii)

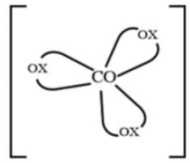
For the reaction,

$2NH_3 + \frac{5}{2}O_2 \rightleftharpoons 2NO + 3H_2O$

$K = \frac{[NO]^2[H_2O]^3}{[NH_3]^2[O_2]^{5/2}}$

$= \frac{[NO]^2}{[N_2][O_2]} \times \frac{[H_2O]^3}{[H_2]^3[O_2]^{3/2}} \times \frac{[N_2][H_2]^3}{[NH_3]^2} = \frac{K_2 \times K_3^3}{K_1}$

77. $[Co(ox)_3]^{3-}$ does not show geometrical isomerism.



As all three symmetrical bidentate ligands bonded to central CO^{3+} cation.

78. As all reactant and product are liquid

$\Delta n_{(g)} = 0$

$\Delta H = \Delta E - \Delta n_g RT$

$\Delta H = \Delta E (\because \Delta n_g = 0)$

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79. a = 2r

Volume of the cube = $a^3 = (2r)^3 = 8r^3$

Packing fraction = $\frac{Volume\,of\ one\,atom}{Volume\,of\ the\,cube}$

$= \frac{\left(\frac{4}{3}\pi r^3\right)}{8r^3} = \frac{\pi}{6} = 0.52$

Void fraction = 1-0.52 = 0.48

Void space = 48%

80. The toxic effect of Pb in the body is removed by forming its complex (chelate) with EDTA

81. $SO_2 + \frac{1}{2}O_2 \rightleftarrows SO_3; \Delta H = -ve;$

Apply Le Chatelier principle.

82. For two solutions to be isotonic

$i \times \pi Na_2SO_4 = \pi_{Glucose}$

$(1+2\alpha)C_1RT = C_2RT$

$(1+2\alpha) \times 0.004 = 0.01$

$\alpha = 0.75 or 75\%$

83. Solid N_2O_2 exist as $[NO_2]^+[NO_3]^-$

84. $\frac{wt.of\ Al\ deposited}{wt.of\ Cu\ deposited} = \frac{eq.wt.of\ Al}{eq.wt.of\ Cu}$

$\frac{2.7}{wt.of\ Cu} = \frac{27/3}{63.5/2}$

Wt. of Cu = 9.525 g

85. PhMgBr can be protonated by any of the protic solvent e.g., CH_3OH

$PhMgBr + CH_3OH \rightarrow PhH + Mg(OCH_3)Br$

86. Given reaction is $2H_2O_2(l) \rightarrow 2H_2O(l) + O_2(g)$

$\Delta H^o_{\text{Reaction}} = \Delta H^o_f(\text{Products}) - \Delta H^o_f(\text{Reactants})$

Enthalpy change $= 2\times(-286) - (2\times -188) = -196kJ$

87. Higher the intermolecular forces higher is the melting point and boiling point. The melting point order is alkynes >trans – alkene >cis – akene> cycloalkane > branched – chain hydrocarbon > straight – chain hydrocarbon.

88. Binding energy = 64 MeV

Binding energy / nucleon = 6.4

$\therefore$ Number of nucleon = $\frac{64}{6.4} = 10$

89. The two rates are related as

$-\frac{1}{5}\frac{d[Br^-]}{dt} = \frac{1}{3}\frac{d[Br_2]}{dt}$

$-\frac{d[Br^-]}{dt} = \frac{5}{3}\frac{d[Br_2]}{dt} = \frac{5}{3}\times 0.025 = 0.042M\ \text{sec}^{-1}$ AAJ KA TOPPER

90. When activation energy decreases, rate constant increases. As $k' > k''$ $hence$ $E_a' < E_a''$

BIOLOGY SOLUTIONS

91. Due to large size, protein can't be filtered through the filtration slits. So they are absent in glomerular filtrate.

92. Water potential is the difference in free energy or chemical potential per unit molal volume of water in a system and that of pure water at the same temperature and pressure. The water potential of pure water is zero and it decreases on the addition of solutes.

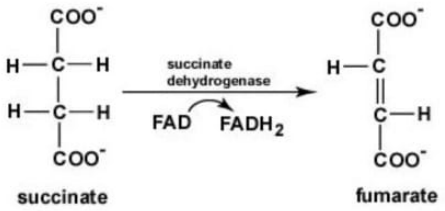
93. GM food may cause toxicity or produce allergies. The enzyme produced by the antibiotic resistance gene can cause allergies, as it is a foreign protein. The antibiotic resistance gene present in the GM food can be taken up by the bacteria present in the alimentary canal and thus the bacteria can become resistant to the concerned antibiotic.

94. An institution where valuable plant material likely to become irretrievably lost in the wild or cultivation is preserved in a viable condition is known as gene bank.

95. Mutualism is the way two organism of different species exist in a relationship in which each individual benefits. Similar interactions with a species are known as co-operation. The associations between tree roots and certain fungi Mycorrhiza is usually of mutual benefit (symbiotic): a delicate balance between the host plant and symbiont relations results in enhanced nutritional support for each member.

96. Y – codes for permease and A – codes for transacetylase.

97. During the production of vinegar, sugar is first fermented to alcohol and the alcohol is fermented further to acetic acid. Acetobacter aceti is used for the preparation of vinegar from the fermented sugar solution.
98. Neutrophils rapidly engulf pathogens.
99. Photo excitation of chlorophyll and ejection of the electron is the pilot event of the photosynthetic process. When a photon of light energy falls on a chlorophyll molecule, one of the electron pairs from the ground or singlet state passes into a higher energy level called excited singlet state.
100. Having the male and female reproductive organs in separate individuals are called dioecious. Dioecious organisms are seen in both plants (like papaya) and animals (like a cockroach)
101. Antibodies are produced by B-lymphocytes.
102. Myclinated nerve fibres are white in colour due to the presence of Fat Myolin.
103. Carrying capacity refers to the size of population that can be maintained indefinitely. Carrying capacity is the maximum number of individuals of a given species that an area's resources can sustain indefinitely without significantly depleting or degrading those resources.
104. Anabolism or biosynthesis are endergonic reactions in which the product has more energy than the reactants. Thus, they require an input of energy.
105. Seminal plasma in human is rich with Fructose and Calcium.
106. FSH hormone has follicular cells as target cells and hence, first bind with the receptors.
107. Desmid, Dinoflagellate and Diatom are the plant like protists. Slime mould is a fungi-like protist.
108. Meristem culture is done for the development of virus-free plants. Meristematic tissue can be taken either from a shoot or root tip.
109. Fruit formation is the characteristic feature of angiosperms. There is no fruit formation in gymnosperms because there is no ovary.
110. Eustachian canal connect Middle ear with Niso-pharynx.
111. During photorespiration in Perioxisome, two molecules of glycine $(2H_2NCH_2 - CO_2)$ are transferred into mitochondrion where they are converted into one molecule of serine $(HOCH_2 - H_2NCH - CO_2)$. Thus, the ratio between 2C and 3C intermediates having $-NH_2$ group is 2:1.
112. Hilsa, Mercenarl, pornfrets, all these are marine fishes.
113. Smooth muscles re involuntary, smooth fusiform without striations.
114. Enzymes that catalyse the transfer of HNOR oxidoreductases.
115. Parbhani kranti is made by hybridization.
116. AUG is a start codon and UAG is a stop codon.
117. During light reaction, energy from sunlight is absorbed and converted to chemical energy which is stored in ATP and NADPH + H^+.
118. Plasmids are a boon in biotechnology because they are used as vectos.
119. Natural selection theory was proposed by Charles Darwin.
120. Anxiety, eating spicy food cause indigestion.
121. Diaphragms cover cervix and prevent the entry of sperms in to Vagina.

122. A colourblind girl is born rarely because it is possible only when her father is colourlind and her mother should be either colourblind or carrier.
123. Bacillus thuringinesis is a Gram-positive, soil bacterium commonly used as a biopesticide. The bacteria produce a proteinaceous toxin called thurioside, which is insecticidal in nature. The bacterial spores are sprayed to control insect pests flies, moths, mosquitoes, etc.
124. Population explosion in the world in due to increase in birth rate and decrease in death rate.
125. Lysosomes are the unit membrane bound vesicular structures formed by the process of packaging in the Golgi apparatus rich in hydrolytic enzymes like hydrolases, lipases, proteases and carbohydrases, which are optimally active at the acidic pH. These enzymes are capable of digesting carbohydrates, proteins, lipids and nucleic acids.
126. RBCs are Round Biconcave in shape.
127. Diabetes insepidus is caused due to the deficiency of ADH hormone.
128. Chipko movement is launched for the protection of forests.
129. Versatile stamens is a characteristic feature of anaemophily. Wind pollinated flowers are usually well above the ground, the stamens are exserted and often with versatile anthers so that pollen is effectively dispersed.
130. Secondary treatment of effluent is a biological process where the primary effluent is passed into large aeration tanks and allowed for the vigorous growth of useful aerobic microbes like bacteria and fungi to form flocs.
131. Semen will be without sperms in the Vasectamised person.
132. The number of teeth in human formed only are 12.
133. Synapsis is the pairing of homologous chromosomes during the zygotene stage of meiosis. Each pair is called bivalent.
134. Through Alveoli of lungs, gases takes place between the lungs and blood.
135. Cytochromes are proteins with characteristic strong absorption of visible light due to their iron-containing heme prosthetic groups.
136. Examples of mosses are funaria, polytrichum and sphagnum.
137. 

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138. Crossing over is the exchange of genetic material between homologous chromosomes, which occurs during prophase I of meiosis and is called synapsis. The homologous chromosomes line at equator in pairs during metaphase I and the sister chromatids migrate towards opposite poles during anaphase I.
139. In bryophytes, the vascular tissues (xylem and phloem) are absent. Water and nutrients enter the cell by diffusion, whereas in pteridophytes, the vascular tissue is present consisting of xylem (without true vessels) and phloem (without companion cells).
140. 2-PGA in the presence of enzyme enolase releases a molecule of water and from PEP.

141. Long Day plants (LDP) requires exposure to light for a period exceeding critical duration to induce flowering. Ethephon hastens fruit ripening in tomatoes and apples and accelerates abscission in flowers and fruits (thinning of cotton, cherry, walnut).
142. In a resting neuron, axonal membrane is relatively more permeable to K^+ ions than Na^+ ions.
143. In gymnosperms like cycas / Pinus, endosperms of female gametophyte are haploid and are formed before fertilization. In angiosperms, the endosperm is triploid and develops after fertilization.
144. Transgenic animal Rosie is actually a cow and restriction enzymes cut the DNA at specific sites.
145. Diagram as per NCERT.
146. Abscisic acid (ABA) is a growth inhibitor and are produced in plants during abdcission. IAA, NAA and GA are growth promoters inducing cell division.
147. Gel eelctrophoresis is a technique for separation of DNA fragments according to their size. DNA is negatively charged so in gel tank when electric current is passed, DNA move towards positive electrode. Larger the size of the fragment lesser the separation and vice-versa.
148. En Ecosystem which is easily damaged and recovered fast is less stable, but more resilient.
149. Bioluminescence is the emission of light by an organism through the biochemical system, like the glow of bacteria on decaying meat, the shimmering radiance of protozoans in tropical seas, or the flickering signals of fireflies.
150. DNA is obtained by treating the bacterial cells / plant or animal tissue with enzymes such as lysozyme (bacterial), cellulase (plant cells), chitinase (fungus).
151. Protistans are eukaryotes with true nucleus and genetic material is embedded inside the nucleus. DNA is not naked and is found to be associated with histone protein.
152. The Ecological pyramids that may be upright or inverted are number and Bio-mass pyramids.
153. At the tissues, oxy-haemoglobin liberates oxygen due to low PO_2 and high PCO_2.
154. In rainy season, door gets swelled due to the phenomenon of imbibition. It is the process of absorption of water without forming a solution.
155. Companion cells move sugar and amino acids into and out of the sieve elements. In “source” tissue such as the leaf, companion cells use transmembrane proteins to take sugar and amino acids by active transport.
156. C_4 plant has bundles sheet cell with large chloroplast. In C_4 plants carbon fixation occur twice i.e., first in mesophyll cell with the help of enzyme PEP carboxylase and second in bundle sheet with the help of enzyme RUBNISCO. Bundle sheath cell has all the enzymes for the Calvin cycle.
157. Etiolation is the symptom developed in plants when grown the dark.
158. One of the most striking effects of gibberellins is the elongation of genetic dwarf (mutant) varieties of plants like corn and pea.
159. Diagram as per NCERT.
160. Concanavalin A is a lectin (carbohydrate-binding protein) originally extracted from the jack-bean, Canavalia ensiformis. It is a member of the legume lectin family.
161. Viola and oxalis have cristogamy where as Yucca is pollinated by insects.

162.

Monocot stems have most their vascular bundles near the outside edge of the stem. The bundles are surrounded by large parenchyma in the cortex region. There is no pith region in monocots. In dicot stems, bundles are present in a ring surrounding parenchyma cells in a pith region.

163. In human, placenta is derived from Chorion and then attention fuses with it .

164. Diagram as per NCERT.

165. Corpus luteum is formed during the secretary phase and progesterone hormone level increases.

166. Auxins and cytokinins are used in the development of root and shoot in a culture medium (respectively).

167. A germ pole is a small pore in the outer wall of a fungal spore through which the germ tube exits upon germination. It can be apical or eccentric in its location, and , on light microscopy, may be visualized as a lighter colored area on the cell wall.

168. A pentamerous actinomorphic flower is one where the floral parts are in multiples of five and the flower can be divided into two equal halves in more than one plane.

169. Out of 64 codons, only 3 signify stop codons. There is more than one codon for most of the amino acids, the genetic code is non-over lapping. Three successive nucleotides or bases code for only one amino acid wobbling refers to the third base degeneracy.

170. It would make only two types of gametes, which are ABC & AbC.

171 Polycylcic hydrocarbons released during smoking cause cancer.

172. More than 15, 500 species worldwide are facing the threat of extinction.

173. Interspecific hybridization, occur between two different related species.

174.

Crop	Variety	Resistant to diseases
Brassica	Pusa swarnim (Karan rai)	White rust
Cauliflower	Pusa Shubhra	Black rot and curl blight black rot
Chilli	Pusa Sadabahar	Chilly mosaic virus, Tobacco mosaic virus and leaf curl
Cowpea	Pusa Komal	Bacterial blight

175. According to active K^+ theory of Levitt, opening of stomata occurs due to influx of K^+ into guard cells. The source of K^+ ions are nearby subsidiary and epidermal cells.
176. All viruses are nucleoprotein (Nucleic acid + protein) in the structure. The nucleic acid (DNA and RNA) is the genetic material. In a particular virus either DNA or RNA is genetic material; never both are present in a virus.
177. Polymerase chain reaction, is an efficient and cost-effective way to copy or amplify small segments of DNA. PCR tests to detect cancer cells PCR is not used for detection of antibodies synthesized against pathogens.
178. Pneumatic bones exist in birds. Eg. Pigeon.
179. The tendency of the body manifest withdrawal system is Dependency.
180. The ribosomes are the smallest known electron microscopic without membrane, ribonuceloprotein particles attached either on RER or floating freely in the cytoplasm and are the sites of protein synthesis. Presence of ribosomes (size 23 nm in diameter) is revealed with the help of an electron microscope.