NEET
MODEL QUESTION PAPER 4

NATIONAL TESTING AGENCY

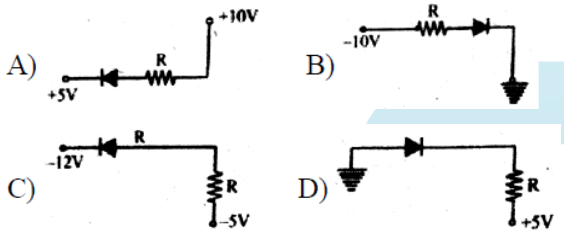
Excellence in Assessment

PHYSICS

1. The horizontal and vertical displacements of a Projectile at any time 't' are given by x = at and $y = bt^2 + ct$ where a, b and c are constants. The magnitude of it's velocity 1 second after it was fired will be

1) $[2a^2 + (2b + c)^2]^{\frac{1}{2}}$
2) $[a^2 + (2b + c)^2]^{\frac{1}{2}}$
3) $[a^2 + (b + 2c)^2]^{\frac{1}{2}}$
4) $[a^2 + (b - 2c)^2]^{\frac{1}{2}}$

2. In the following figure, the diodes which are forward biased, are



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

3. The vibrations of a string fixed at both ends are represented by $y = 16\ sin\frac{\pi x}{15}\ cos\ 96\pi t$ where x and y are in cm and time t at x = 13cm and x =16 cm in radian is

1) $\frac{\pi}{5}$
2) π
3) 0
4) $\frac{2\pi}{5}$

4. In a CE transistor amplifier, the audio signal voltage across the collector resistance of $2k\Omega$ is 2V. If the base resistance is $1k\Omega$ and the current amplification of the transistor is 100, the input signal voltage is:

1) 0.1 V
2) 1.0 V
3) 1 mV
4) 10 mV

5. For a certain organ pipe three successive resonance frequencies are observed at 425, 595 and 765 H_2. The speed of sound in air is 340 m/s. The pipe is

1) Closed pipe of length 1m
2) Closed pipe of length 2m
3) Open pipe of length 1m
4) Open pipe of length 2m

6. A ship A is moving westwards with a speed of 10 kmh^{-1} and a ship B 100 km of A is moving North wards with a speed of 10 kmh^{-1}. The time after which the distance between them becomes shortest, is:

1) 5h
2) $5\sqrt{2}h$
3) $10\sqrt{2}h$
4) $0h$

7. A concavo-convex lens made of glass ($\mu = 1.5$) has surfaces of radii 20 cm and 60cm. Locate the image of an object placed 80cm to the left of the lens along the principal axis.

1) 240 cm
2) 280 cm
3) 480 cm
4) 320 cm

8. If dimensions of critical velocity v_c of a liquid flowing through a tube are expressed $[\eta^x\ \rho^y\ r^z]$, where η , ρ and r are the coefficient of viscosity of liquid, density of liquid and radius of the tube respectively, then the values of x,y, and z are given by:

1) -1, -1, 1

2) -1, -1, -1

3) 1, 1, 1

4) 1, -1, -1

9. A professor requires eye glass with lenses of 2D power to read a book at 25 cm. What is his near point

1) 50 cm

2) 25 cm

3) 12.5 cm

4) 30 cm

10. The surface of metal is illuminated with the light of 400nm. the maximum kinetic energy of the ejected photoelectrons was found to be 1.68 eV. The work function of the metal is : $(hc = 1240\ eV.nm)$

1) 1.42 eV

2) 1.52 eV

3) 1.68 eV 4

4) 3.09 eV

11. In young's double slit experiment intensity at a point is $\frac{1}{4}$th of the maximum intensity. angular position of this point is

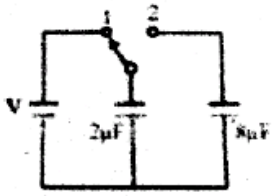
1) $sin^{-1}\left(\frac{\lambda}{d}\right)$

2) $sin^{-1}\left(\frac{\lambda}{2d}\right)$

3) $sin^{-1}\left(\frac{\lambda}{3d}\right)$

4) $sin^{-1}\left(\frac{\lambda}{4d}\right)$

12. A capacitor of $2\mu F$ is charged as shown in the diagram. When the switch S is turned to position 2, the percentage of its stored energy dissipated is:



1) 0%

2) 20%

3) 75%

4) 80%

13. A double-slit apparatus is immersed in a liquid of refractive index 133. It has slit separation of 1mm and distance between the plane of slits and screen 1.33m. The slits are illuminated by a parallel beam of light whose wavelength in air is 630 nm. Calculate the fringe width.

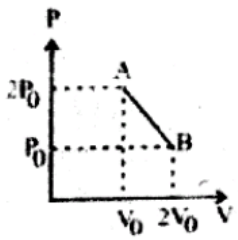
1) $630 \times 10^{-3}m$

2) $630 \times 10^{-4}m$

3) $630 \times 10^{-5}m$

4) $630 \times 10^{-6}m$

14. 'n' moles of an ideal gas undergoes a process $A \rightarrow B$ as shown in the figure. The maximum temperature of the gas during the process will be:



1) $\frac{9P_0V_0}{2nR}$

2) $\frac{9P_0V_0}{nR}$

3) $\frac{9P_0V_0}{4nR}$

4) $\frac{3P_0V_0}{2nR}$

15. Electric field vector if potential V is given by $V = -K(xy + yz + zx)$

1) $k\left[(y+z)\hat{\imath} + (x+z)\hat{\jmath} + (y+x)\hat{k}\right]$

2) $K\left[xy\hat{\imath} + yz\,\hat{\jmath} + zx\hat{k}\right]$

3) $K\left[xy\hat{\imath} + yz\,\hat{\jmath} + z\hat{k}\right]$

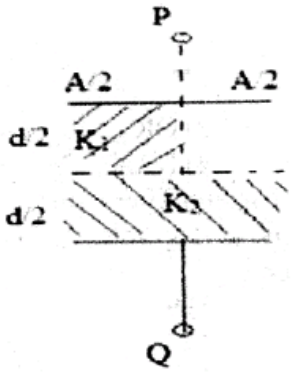
4) $K[y\hat{\imath} + z\hat{\jmath} + x\hat{k}]$

16. In a double slit experiment, the two slits are 1 mm apart and the screen is placed 1 m away. A monochromatic light of wavelength 500 nm is used. What will be

the width of each slit for obtaining ten maxima of double slit

1) 0.1 mm
2) 0.5 mm
3) 0.02 mm
4) 0.2 mm

17. Effective capacity of the capacitor shown in figure is

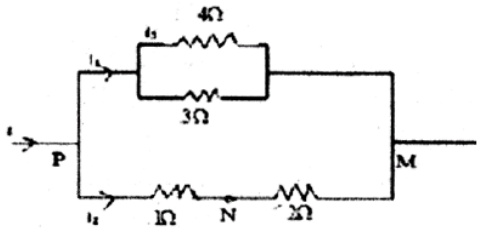


1) $\frac{(K_1+1).2K_2}{(K_1+1+2K_2)} \times \frac{A\varepsilon_0}{d}$
2) $\frac{(K_1+K_2)2}{(K_1+2K_2)} \times \frac{A\varepsilon_0}{d}$
3) $\left(\frac{2K_1K_2}{K_1+K_2}\right) \times \frac{A\varepsilon_0}{d}$
4) $\left(\frac{K_1+K_2}{2}\right)\frac{A\varepsilon_0}{d}$

18. Two particles are oscillating along two close parallel straight lines side by side, with the same frequency and amplitudes. They pass each other, moving in opposite directions when their displacement is half of the amplitude. The mean positions of the two particles lie on a straight line perpendicular to the paths of the two particles. The phase difference is

1) 0
2) $\frac{2\pi}{3}$
3) π
4) $\frac{\pi}{6}$

19.



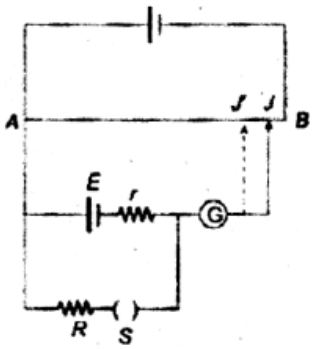
If the power dissipated across 4Ω resistor is 4 watt then the power dissipated across 2Ω resister is

1) 4 watt
2) $\frac{32}{9}$ watt
3) 2 watt
4) 7 watt

20. The largest wavelength in the ultraviolet region of the hydrogen spectrum is 122 nm. The smallest wavelength in the infrared region of the hydrogen spectrum is

1) 802.5 nm
2) 823.5 nm
3) 1882.5 nm
4) 1648.5 nm

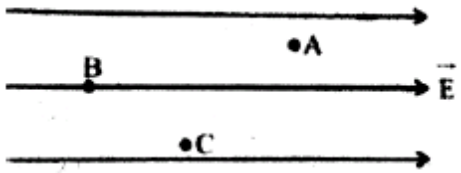
21. Consider the potentiometer circuit for determining the internal resistance of a cell. When switch S is open, the balance point is found to be at 75 cm of the wire. When switch S is closed and value of R is 4Ω , the balance point shifts to 60 cm. Find the internal resistance of cell.



1) 4Ω
2) 2Ω
3) 3Ω

4) 1Ω

22. A, B and C are three points in a uniform electric field. The electric potential is

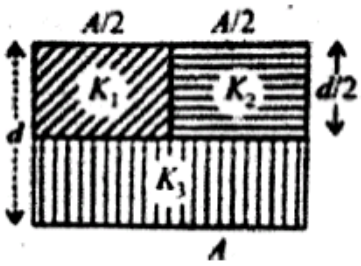


1) Maximum at B
2) Maximum at G
3) Same at all the three points A,B and C
4) Maximum at A

23. A galvanometer having resistance of 50 Ω gives full scale deflection for a current of 0.05 A. The length in meter of a resistance wire of area of cross-section $2.97 \times 10^{-2} cm^2$ that can be used to convert the galvanometer into an ammeter which can read a maximum 5A current is (specific resistance of the wire is $5 \times 10^{-7}\ \Omega m$)

1) 9
2) 6
3) 4
4) 3

24. A parallel plate capacitor of area A, plate separation *d* and capacitance C is filled with three different dielectric materials having dielectric constants k_1, k_2 and k_3 as shown. If a single dielectric material is to be used to have the same capacitance C in this capacitor, then its dielectric constant k is given by



1) $\frac{1}{K} = \frac{1}{K_1} + \frac{1}{K_2} + \frac{1}{2K_3}$
2) $\frac{1}{K} = \frac{1}{K_1+K_2} + \frac{1}{2K_3}$
3) $K = \frac{K_1 K_2}{K_1+K_2} + 2K_3$
4) $K = K_1 + K_2 + 2K_3$

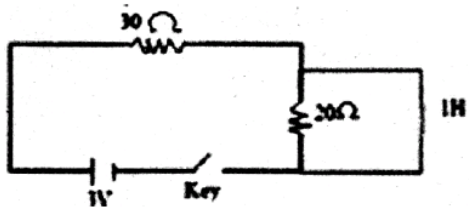
25. The flux linked with a coil is 0.8 wb when a 2A current is flowing through it. If this current begins to increase at the rate of 400 A/s, the induced emf in the coil will be

1) 20 V
2) 40 V
3) 80 V
4) 160 V

26. Two spherical conductors A and B radii 1 mm and 2 mm are separated by a distance of 5 cm and are uniformly charged. If the spheres are connected by a conducting wire then in equilibrium condition, the ratio of the magnitude of the electric fields at the surfaces of spheres A and B is

1) 4:1
2) 1:2
3) 2:1
4) 1:4

27. The current through 30Ω after a long time when the key was closed is



1) 3A
2) 0.1 A
3) 5A
4) 0.5 A

28. The co-ordinates of a moving particle at any time 't' are given by $x = \alpha t^3$ and $y = \beta t^3$. the speed of the particle at time 't' is given by

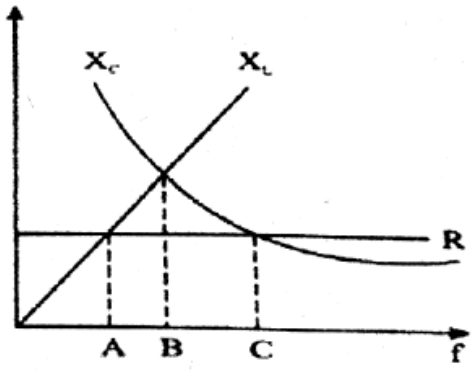
1) $3t\sqrt{\alpha^2+\beta^2}$

2) $3t^2\sqrt{\alpha^2+\beta^2}$

3) $t^2\sqrt{\alpha^2+\alpha^2}$

4) $\sqrt{\alpha^2+\beta^2}$

29. The figure shows variation of R, X_L and X_C with frequency f in a series L,C, R circuit. Then for what frequency point, the circuit is inductive.



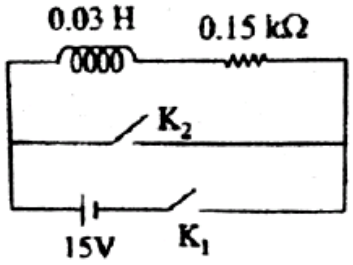
1) A

2) B

3) C

4) At all points

30. An inductor (L=0.03H) and resister (R = 0.15 kΩ) are connected in series to a battery of 15 V, EMF in a circuit shown below. The key K_1 has been kept closed for a long time. Then at t = 0, K_1 is opened and key K_2 is closed simultaneously. At t = 1ms, the current in the circuit will be: $(e^5 \cong 150)$



1) 6.7 mA

2) 0.67 mA

3) 100 mA

4) 67 mA

31. Solenoid having 5000 turns/m carries a current of 2A. An aluminium ring at temperature 300K inside the solenoid provides the core. If the magnetization I is $5 \times 10^{-2}\ A/m$, find the susceptibility of aluminium at 300K

1) 5×10^{-8}

2) 5×10^{-6}

3) 5×10^{-3}

4) 5×10^{-4}

32. A ball of mass 0.25 kg attached to the end of a string of length 1.96 m is moving in a horizontal circle. The string will break if the tension is more than 25N. What is the maximum speed with which the ball can be moved?

1) 14 m/s

2) 3 m/s

3) 5 m/s

4) 3.92 m/s

33. Hydrogen atom in ground state absorbs a photon of energy 14.4 ev, and gets ionized deBroglie wave length of emitted electron is (mass of electron $m = 9 \times 10^{-31}\ kg$)

1) $13.75\overset{o}{A}$

2) $15500\ \overset{o}{A}$

3) $12400\ \overset{o}{A}$

4) $7.2\ \overset{o}{A}$

34. The momentum of a photon of energy 1 MeV in kg m/s will be (nearly)

1) 7×10^{-24}

2) 10^{-22}

3) 5×10^{-22}

4) 0.33×10^{6}

35. Light with energy flux of 25×10^4 watt/m^2 falls on a perfectly reflecting surface at normal incidence. If the

surface area is 15 cm^2, the average force exerted on the surface is

1) $2.5 \times 10^{-6} N$
2) $1.2 \times 10^{-6} N$
3) $3 \times 10^{-6}\ N$
4) $1.25 \times 10^{-6} N$

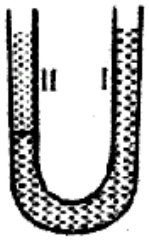
36. A rectangular coil of length 0.12 m and width 0.1 m having 50 turns of wire is suspended vertically in a uniform magnetic field of strength 0.2 weber/m^2. The coil carries a current of 2A. If the plane of the coil is inclined at an angle of 30° with the direction of the field, the torque required to keep the coil in stable equilibrium will be:

1) 0.20 Nm
2) 0.34 Nm
3) 0.12 Nm
4) 0.15 Nm

37. Hydrogen atom in ground state absorbs a photon of wave length λ and jumps to excited state. R is Rydberg constant, and n is excited state principle quantum number. Then n is given by

1) $\sqrt{\frac{\lambda-1}{\lambda-R}}$
2) $\sqrt{\frac{\lambda R}{\lambda R-1}}$
3) $\sqrt{\frac{R}{\lambda R-1}}$
4) $\sqrt{\frac{R\lambda^2}{R-1}}$

38. U-tube of uniform cross section is partially filled with a liquid I. Another liquid II which does not mix with liquid I is poured into one side. It is found that the liquid levels of the two sides of the tube are the same, while the level of the liquid I has risen by 2 cm. If the specific gravity of liquid I is 1.1, the specific gravity of liquid II must be



1) 1.12
2) 1.1
3) 1.05
4) 1.0

39. A sample of radio active material has mass m, decay constant λ and molecular weight M, Avagadro number is N_A. the activi7ty of the sample after a time t will be

1) $\left(\frac{mN_A}{M}\right) e^{-\lambda t}$
2) $\left(\frac{mN_A\lambda}{M}\right) e^{-\lambda t}$
3) $\left(\frac{mN_A}{m\lambda}\right) e^{-\lambda t}$
4) $\frac{m}{\lambda}\ (1 - e^{\lambda t})$

40. Half-lives of two radioactive elements A and B are 20 minutes and 40 minutes, respectively. Initially, the samples have equal number of nuclei. After 80 minutes, the ratio of decayed number of A and B nuclei will be:

1) 1:4
2) 5:4
3) 1:16
4) 4:1

41. The number of hours an electric bulb of 100 watt be kept glowing by fusion of 1 kg of deuterium. Take the fusion reaction

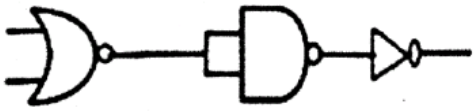
$${}_1^2H + {}_1^2H \rightarrow {}_2^3He + {}_0^1n + 2Mev$$

1) $267 \times 10^7 hours$
2) $2.67 \times 10^8 hours$
3) $2.67 \times 10^3\ hours$
4) $267\ hours$

42. One mole of ideal mono atomic gas $\left(\gamma = \frac{5}{3}\right)$ is mixed with one mole of diatomic gas $\left(\gamma = \frac{7}{5}\right)$. What is γ for the mixture? γ denotes the ratio of specific heat at constant pressure, to that at constant volume

1) $\frac{35}{23}$
2) $\frac{23}{15}$
3) $\frac{3}{2}$
4) $\frac{4}{3}$

43. The circuit is equivalent to



1) NOR gate
2) OR gate
3) AND gate
4) NAND gate

44. A potentiometer circuit has been set up for finding the internal resistance of a given cell. The main battery used across the potentiometer wire, has an emf of 2.0 V and a negligible internal resistance. The potentiometer wire itself is 4m long. When the resister R, connected across the given cell, has values of (a) Infinity (b) 9.5 Ω , the balancing lengths', on the potentiometer wire are found to be 3 and 2.85 m, respectively. The value of internal resistance of the cell is

1) 0.25 Ω
2) 0.95 Ω
3) 0.5 Ω
4) 0.75 Ω

45. The voltage gain of an amplifier with 9% negative feedback is 10. The voltage gain without feedback will be

1) 1.25
2) 100
3) 90
4) 10

CHEMISTRY

46. The ion that cannot precipitated by $HCl + H_2S$ mixture is

1) Ag^+
2) Pb^{2+}
3) Cu^{+2}
4) Sn^{+2}

47. $C \xleftarrow{Strongly\ heated} B \xleftarrow{200^\circ} CaSO_4.2H_2O \xrightarrow[Heat]{120^\circ} A$

A, B and C are respectively:

1) Plaster of Paris, dead burnt plaster, calcium sulphide
2) dead burnt plaster, Plaster of Paris, lime
3) Plaster of Paris, dead burnt plaster, calcium sulphite
4) Plaster of Paris, dead burnt plaster, calcium oxide (lime)

48. The number of P-O-P bonds present in P_4O_{10} and P_4O_6 are

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

49. Which of the following processes involves smelting?

1) $ZnCO_3 \xrightarrow{Heat} ZnO + CO_2$
2) $Fe_2O_3 + CO \xrightarrow{Heat} 2FeO + CO_2$
   $FeO + CO \xrightarrow{Heat} Fe + CO_2$
3) $Al_2O_3O \xrightarrow{Heat} Al_2O_3 + 2H_2O$
4) $2Pbs + 3O_2 \xrightarrow{Heat} 2PbO + 2SO_2$

50. The compound which gives oxygen gas and metal on moderate heating is

1) Al_2O_3
2) CuO
3) ZnO
4) HgO

51. The hybridization of orbitals of N atom in NO_3^-, NO_2^+ and NH_4^+ are respectively

1) sp, sp^2, sp^3
2) $sp^2,\ sp,\ sp^3$
3) $sp,\ sp^3,\ sp^2$
4) $sp^2,\ sp^3,\ sp$

52. The rate of a chemical reaction at 5% and 33% consumption are 1.0 and 0.5 M/Sec. The order of reaction is

1) 0
2) 1
3) 2
4) 3

53. H_2, Li_2, B_2 each has bond order equal to 1, the order of their stability is:

1) $H_2 = Li_2 = B_2$
2) $H_2 > Li_2 > B_2$
3) $H_2 > B_2 > Li_2$
4) $B_2 > Li_2 > H_2$

54. The RNAs which take part in the synthesis of proteins is / are:

1) m – RNA
2) t – RNA
3) r – RNA
4) All the above

55. In which of the following arrangements, the order is not according to the property indicated against it

1) $Al^{3+} < Mg^{2+} < Na^+ < F^-$ increasing ionic size
2) $B < C < N < O$ increasing first ionization enthalpy
3) $I < Br < F < Cl$ increasing electron gain enthalpy (with negative sign)
4) $Li < Na < K < Rb$ increasing metallic radius

56. The aqueous solution of a salt gives white ppt. With lead acetate solution which is insoluble in hot water and nitric acid. The salt contains:

1) Cl^-
2) Ba^{2+}
3) SO_4^{2-}
4) SO_3^{2-}

57. Among the electrolytes $NaSO_4, CaCl_2, Al_2(SO_4)_3$ and NH_4Cl, the most effective coagulating agent for Sb_2S_3, sol is:

1) Na_2SO_4
2) $CaCl_2$
3) $Al_2(SO_4)_3$
4) NH_4Cl

58. 2 grams of impure $KMnO_4$ is added to 100ml of $\frac{N}{2}$ Oxalic acid solution in acidic medium for complete reaction. The percentage purity of $KMnO_4$ sample is

1) 79%
2) 92.2%
3) 98.0%
4) 84%

59. If the solution of the $CuSO_4$in which copper rod is immersed is diluted to 10 times, the electrode potential:

1) increases by 0.030 volt
2) decreases by 0.030 volt
3) increases by 0.059 volt
4) decreases by 0.0059 volt

60. Which of the following is paramagnetic?

1) B_2

2) F_2

3) N_2

4) O_2^{2-}

61. In the redox reaction:

$xKMnO_4 + yNH_3 \rightarrow KNO_3 + MnO_2 + KOH + H_2O$

1) $x = 4,\ y = 6$

2) $x = 3,\ y = 8$

3) $x = 8,\ y = 6$

4) $x = 8,\ y = 3$

62. At critical conditions, Z value of a gas becomes

1) 1.33

2) 2.67

3) 0.375

4) 0.425

63. 2 moles each of liquids A and B are dissolved to form an ideal solution. What will be the mole fraction of B in the vapour phase?

$P°_A = 120\ \ torr;\ \ P°_B = 80\ torr$

1) 1/4

2) 1/2

3) 3/5

4) 2/5

64. For HCl molecule, $\mu = 1.03\ D$ and bond length is 1.27 A. The fraction of charge carried by Cl is:

1) -0.50

2) -0.17

3) -0.82

4) -0.42

65. A 5% solution by mass of cane sugar in water has freezing point of 271 K and freezing point water is 273.15K. The freezing point of a 5% solution (by mass) of, glucose in water is:

1) 271 K

2) 273.15 K

3) 269.07 K

4) 277.23 K

66. What is the $[OH^-]$ in the final solution prepared by mixing 20 ml of 0.050 M HCl with 30.0 mL of 0.10 M $Ba(OH)_2$?

1) 0.40 M

2) 0.0050 M

3) 0.12 M

4) 0.10 M

67. The solution of salt of a weak acid and weak base will have pH:

$(K_b = 1.0 \times 10^{-6}\ and\ K_a = 1.0 \times 10^{-4})$

1) 7.0

2) 8.0

3) 6

4) 4.0

68. The value of K_c for the reaction:

$3O_2(g) \rightleftharpoons 2O_3(g)$ is 2.0×10^{-50} at 25°C. If equilibrium concentration of O_2 in air at 25°Cis 1.6×10^{-2}, the concentration of O_3 is:

1) $2.86 \times 10^{-28} M$

2) $8.192 \times 10^{-56}\ M$

3) $1.43 \times 10^{-14}\ M$

4) $1.6 \times 10^{-2}\ M$

69. For the following three reactions (i), (ii) and (iii) equilibrium constants are given

(i) $CO(g) + H_2O(g) \rightleftharpoons CO_2(g) + H_2(g);\ \ K_1$

(ii) $CH_4(g) + H_2O(g) \rightleftharpoons CO(g) + 3H_2(g); K_2$

(iii) $CH_4(g) + 2H_2O(g) \rightleftharpoons CO_2(g) + 4H_2(g); K_3$

Which of the following relations is correct?

1) $K_3.K_2^3 = K_1^2$

2) $K_1\sqrt{K_2} = K_3$

3) $K_2.K_3 = K_1$

4) $K_3 = K_1.K_2$

70. K_b for NH_4OH is 1.81×10^{-5}. The pH of 0.01 M NH_4Cl solution at 25°C is

1) 4.82

2) 3.93

3) 5.63

4) 4.26

71. For the reaction, $N_2O_2 \rightarrow 2NO_2 + \frac{1}{2}O_2$

$-\frac{d[N_2O_5]}{dt} = k_1[N_2O_5]; \frac{d[NO_2]}{dt} = k_2$

$\frac{d[O_2]}{dt} = k_3[N_2O_5]$

The relation in between k_1, k_2 *and* k_3 *is*:

1) $2k_1 = k_2 = 4k_3$

2) $k_1 = k_2 = k_3$

3) $2k_1 = 4k_2 = k_3$

4) None of these

72. The coefficients x, y and z in the following balanced equation:

$xZn + yNO_3^- \rightarrow zZn^{2+} + NH_4^+$ (in basic medium) are:

1) 4, 1, 4

2) 2, 2, 2

3) 4, 2, 4

4) 4, 4, 4

73. Ozone layer depletion involves following steps:

$O_2 \rightleftharpoons O_2 + [O](fast);$

$O_3 + O_2 \rightarrow 2O_2\ (slow)$

The rate law for the reaction will be:

1) $Rate = k[O][O_3]$

2) $Rate = [O_3]^2[O_2]^{-1}$

3) $Rate = k[O_3]^2$

4) $Rate = k[O_2][O]$

74. Calcium phosphide gets hydrolysed and give

1) $Ca_3(PO_4)_2$

2) PH_3

3) H_3PO_4

4) $(HPO_3)_n$

75. The bond dissociation energies for Cl_2, I_2 and ICl are 242.3, 151 and 211.3 kJ/mol. What is the standard enthalpy of formation of $ICl(g)$?

1) – 211.3 kJ/mol

2) – 14.6 kJ/mol

3) 16.75 kJ/mol

4) 33.5 kJ/mol

76. The stability of the following alkali metal hydrides follows the order:

1) $LiH > KH > NaH > CsH$

2) $CsH > KH > NaH > LiH$

3) $NaH > KH > LiH > CsH$

4) $KH > CsH > NaH > LiH$

77. The entropy change involved in isothermal reversible expansion of 2 moles of an ideal gas from a volume of 10 dm^3 to a volume of 100 dm^3 at 27°C is:

1) $42.3\ J\ mol^{-1}K^{-1}$

2) $38.3\ J\ mol^{-1}K^{-1}$

3) $35.8\ J\ mol^{-1}K^{-1}$

4) $32.3\ J\ mol^{-1}K^{-1}$

78. A element readily forms water soluble sulphate. MSO_4, water insoluble hydroxide $M(OH)_2$ and oxide MO which becomes inert on heating. The hydroxide is soluble in NaOH. The element is:

1) Be

2) Mg

3) Ca

4) Sr

79. Non-stoichiometric compound has formula $Ni_{0.98}O_1, Ni$ is present as Ni^{2+}, and Ni^{3+} in this oxide. Fraction of metal which will exist a Ni^{3+} would be

1) 5.08%

2) 7.01%

3) 4.08%

4) 6.05%

80. A metallic carbide on treatment with water gives a colourless gas which burns readily in air and gives a red precipitate with Cu_2Cl_2 and NH_4OH. The metal carbide is:

1) CaC_2

2) Al_4C_3

3) Sic

4) All

81. The kinetic energy of N molecules of O_2 is x joule at -123°C. Another sample of O_2 at 27°C has a kinetic energy of 2x joule. The latter sample contains:

1) N molecules of O_2

2) 2N molecules of O_2

3) $\frac{N}{2}$ molecules of O_2

4) $\frac{N}{4}$ molecules of O_2

82. The reagent required to convert 1 – butyne to 2 – butanone is:

1) alc, KOH

2) $Hg^{2+}, dil.H_2SO_4$

3) $ZnCl_2 + HCl$

4) $alk.KmnO_4$

83. Ionization energy of hydrogen atom is 13.6 eV, which of the following statement is correct?

1) Ionization energy of $He^+ = 54.5\ eV$

2) Ionization energy of $Li^{2+} = +122.4\ eV$

3) Ionization energy of $Be^{3+} = +217.6\ eV$

4) All options are correct

84. The reaction of toluene with chlorine in the presence of ferric chloride gives predominantly

1) benzyl chloride

2) m-chlorotoluene

3) benzoyl chloride

4) o-and-p-chlorotoluene

85. In any sub shell, the maximum number of electrons having same values of spin quantum number is:

1) $\sqrt{l(l+1)}$

2) $l + 2$

3) $2l + 1$

4) $4l + 2$

86. The maximum number of mono chloro-derivatives possible for 2,6-dimethylhepane is:

1) 4

2) 3

3) 5

4) 6

87. Match column I with column II and select the correct answer:

Column I	Column II
A. 88 g CO_2	(i) 20 mol
B. 22.4L He at STP	(ii) 0.5 mol
C. 14 g N_2	(iii) 1 mol
D. 360 g H_2O	(iv) 2 mol

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

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

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

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

88. 0.2 g of an organic compound containing C, H and O on combustion gave 0.147 g of CO_2 and 0.12 g of water. The percentage content of water. The percentage content of oxygen in the compound is:

1) 73.33
2) 86.36
3) 83.46
4) 74.92

89. In Haber's process of ammonia manufacture:

$N_2(g)+3H_2(g)\rightarrow 2NH_3(g)$

50 k N_2 is mixed with 10 kg H_2 in a container in suitable condition; identify the limiting reactant and give the actual amount of NH_3 that can be formed in this reaction:

1) $N_2; 56.6\ kg\ NH_3$
2) $H_2; 56.6\ kg\ NH_3$
3) $N_2; 20.1\ kg\ NH_3$
4) $H_2; 20.1\ kg\ NH_3$

90. An ideal gas expands in an isothermal reversible process from 1 L to 16 L in a cylinder fitted with movable piston of diameter 20 cm. The distance travelled by piston (in cm) when one – fourth of work has been done during the expansion is

1) $\frac{5}{\pi}$
2) $\frac{10}{\pi}$
3) $\frac{15}{\pi}$
4) $\frac{20}{\pi}$

BIOLOGY

91. The term 'keel' is used for special type of

1) sepals
2) petals
3) stamens
4) carpels

92. Find the incorrect statement

1) Resistant organisms/ cells are appearing in a time scale of months or years and centuries
2) Evolution is a stochastic process based on chance mutation in the organism
3) Evolution is a directed process in the sense of determinism.
4) Man could create new breeds within hundreds of years through intensive breeding programme

93. Simple squamous epithelium is also named as

1) Pavement epithelium
2) Germinal Epithelium
3) Sensory Epithelium
4) Pigmented Epithelium

94. Arrange the following extinct reptiles in ascending order based on the geological time scale

1) Therapsids, Thecodonts, Pelycosaurs, Dynosaurs
2) Thecodonts, Therapsids, Pelycosaurs, Dinosaurs
3) Pelycosaurs, Thecodonts, Therapsids, Dinosaurs
4) Pelycosaurs, Thecodonts, Dinosaurs, Therapsids

95. Which of the following statements regarding cyclic flow of electrons during light reactions is false?

1) This process takes place in the stromal lamella
2) ATP synthesis takes place

3) NADPH + H^+ is synthesized

4) Takes place only when light of wavelength beyond 680 nm is available for excitation

96. Find the correct match / matches from the

	Column –I	Column – II	Column –III
I	Sweet potato and potato	Analogous structures	Convergent evolution
II	Vertebrates hearts	Homologous structures	Divergent evolution
III	Tendrils of Bongainvillea and cucurbita	Homologous structures	Divergent evolution
IV	Flippers of Penguins and Dolphins	Analogous structures	Convergent evolution

1) I, III only

2) I, II and III only

3) II, III and IV only

4) All

97. Find out the odd one

1) Sea urchin

2) Sea cucumber

3) Sea lily

4) Sea hare

98. Find the correct match?

List – I	List – II
I. Auxin	A. Production of new leaves
II. Gibberellin	B. Shape of apple
III. Ethylene	C. Roots from stem cuttings
IV. ABA	D. Sprouting of potatoes
V. Cytokinin	E. Closure of stomata

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

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

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

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

99. A. The vascular bundles are absent in veins

B. The veins vary in thickness in the reticulate venation of the dicot leaves

C. Spongy parenchyma is located on adaxial surface of monocot leaf. Which of the above statement(s) is/are correct?

1) A&C are correct

2) B&C are correct

3) Only C is incorrect

4) Only B is correct

100. According to law of independent assortment ratio of types of gametes produced by a double heterogygous plant is

1) 1:2:2:4

2) 9:3:3:1

3) 1:2:2:1

4) 1:1:1:1

101. Study the following

a) Colloblasts

b) Diploblasticity

c) Only sexual reproduction

d) Both extracellular and intra cellular digestion

e) Combplates

f) Tissue level of organization

g) Indirect development

1) a, b, e and f

2) b, d, f and g

3) a, c, e and f

4) b, c, d and e

102. In a dihybrid cross one gene shows complete dominance and other gene shows incomplete dominance. What would be the probability of getting plants with double dominant Phenotypes in F_2 generation?

1) 9/16
2) 3/16
3) 6/16
4) 1/16

103. Type of venation in cucumber and banana is respectively

1) reticulate and furcated
2) reticulate and parallel
3) parallel and reticulate
4) furcated and parallel

104. Reproduction is synonymous with growth in

1) Cyanobacteria, fungi, hydra
2) Protozoans, bacteria and unicellular algae
3) Algae, Hydra and Mosses
4) Planaria, meandrina, sea anaemones

105. Select the incorrect statement.

1. Cervical cancer is caused by virus.
2. Monoclonal antibodies are used in treatment of certain cancers.
3. Bone marrow test diagnoses Leukemia
4. B-cells can recognize cancerous cells.

106. Which one of the following option gives the correct matching of a disease with its pathogen and mode of infection

Disease	Pathogen	Mode of infection
I. Typhoid	Salmonella typhi	Food and water contamination
II. Common cold	Rhino virus	Droplets resulting from cough and sneezes
III. Elephantiasis	Wuchereria	Female mosquito vectors
IV. Amoebiasis	E. coli	Contaminated food and water

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

107. Which one of the following feature/event in pteridophytes is a precursor to the seed habit that considered an important step in evolution?

1) Steler system
2) Oogamous reproduction
3) Development of cone
4) Heterospory

108. The Indian government organization that make decisions regarding the validity of GM research and the safety of introducing GM – Organisms for public services?

1) ICAR
2) GEAC
3) IUCN
4) Bio safety committee

109. Sports person may abuse certain chemicals to improve athletic performance. They are

1) Narcotic analgesics, Tranquilizers
2) Diuretics, Anabolic steroids
3) Cannabinoids, Morphine

4) Anabolic steroids, Cocaine

110. Phase of the meiosis that explains Law of independent assortment is

1) Anaphase –I
2) Anaphase – II
3) Metaphase – I
4) Metaphase – II

111. Ganga Action Plan was initiated by

1) Ministry of Environment
2) South Asia Co-operative Environment Programme
3) United Nations Environment Programme
4) Environmental Protection Agency (EPA)

112. Mutated DNA template causing sickle cell anaemia is

1) $5'\ CAC\ 3'$
2) $5'\ CTC\ 3'$
3) $3'\ CAC\ 5'$
4) $3'\ CTC\ 5'$

113. Genes with inherited susceptibility to certain cancers can be detected by

1) MRI
2) ELISA
3) CT Scan
4) PCR

114. When a normal DNA is allowed to replicate once in heavy nitrogen medium and later once in normal nitrogen medium, then the ratio of number of light and hybrid DNA molecules is

1) 1 : 1
2) 2 : 1
3) 1 : 2
4) 3 : 1

115. In plant breeding progamme, which of the following process is crucial to the success of the breeding objective and requires careful scientific evaluation of the progeny?

1) Cross hybridization
2) Testing release and commercialization of new cultivars
3) Collection of plants
4) Selection and testing of superior recombinants

116. Reservoir for sedimentary nutrient cycle is located in

1) Atmosphere
2) Hydrosphere
3) Earth's crust
4) All

117. Which of die following is marine fish?

1) Catla
2) Common carp
3) Cat fish
4) Oil Sardine

118. Find the correct statements

A) The number of fungi species is more than the combined total of species of fishes, amphibians, reptiles and mammals

B) Species richness is the function of area of a region

C) Longitudinal range of 23.5°W and 23.5°E harbor more species

D) Quagga is an extinct subspecies of Zebra in South Africa

1) All except A
2) All except B
3) All except C
4) All except D

119. Chimeric DNA is

1) DNA which contains uracil
2) DNA synthesized from RNA

3) Recombinant DNA

4) DNA which contains single strand

120. Statement – I: Mammals can thrive whether they live in Antarctica or in the Sahara desert.

Statement II: Birds and mammals are the only regulators that maintain a constant body temperature.

1) Both statement-I and statement –II are true

2) Statement – I is true but statement – II is false

3) Both Statement – I and Statement – II are false

4) Statement – I is false but Statement – II is true.

121. Continuous inbreeding reduces fertility and even production. which breeding technique must be done to restore the fertility and yield?

1) Line breeding

2) Cross breeding

3) Species hybridization

4) Out crossing

122. Match the following

List – I	List – II
A. GGU	I) Phenyl alanine
B. UUC	II) Argenine
C. UGC	III) Glycine
D. AGC	IV) Serine
	V) Cystein

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

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

3) A-I, B-II, C-II, D-V

4) A-III, BI, C-V, D-V

123. Find the incorrect match w.r.t. protein synthesis.

1) mRNA

2) rRNA – Calalytic role during translation

3) UTR – Only at 3'end

4) tRNA – Transfers amino acids

124. In Prototype Operon the binding sire for RNA polymerase is

1) Operator of RNA

2) Promoter of RNA

3) Operator of RNA

4) Promoter of DNA

125. Select incorrect statement with respect to competition.

1) Carnivores are less adversely affected by competition than other.

2) It occurs even in unlimited resources.

3) In this only one partner is always affected.

4) It occurs among related as well as unrelated species.

126. Vectorless gene transfer in plants can be done by

1) Micro-injection

2) Biolistic method

3) Disarmed pathogens

4) Transformation

127. Fill in the blanks and choose the correct option.

(i) According to most accepted model of asent of sap water column is (i) in xylem.

(ii) Loss of water in liquid phase from leaf tip is known as (ii)

(iii) Water is absorbed along with mineral solutes by the (iii) purely by diffusion.

1) (i) Pulled, (ii) Guttation, (iii) Root hair

2) (ii) Transpiration, (iii) Root nodules, (i) Root hair

3) (i) Pushed, (ii) Transpiration, (iii) Pulled

4) (ii) Guttation, (iii) Root cap, (i) Pushed

128. Identify the correctly matched pairs

i. Tricophyton - Round worm

ii. Primary response – anamnestic response

iii. Sporozoite – a stage of plasmodium not produced in man

iv. Adrenalin – reduce the symptoms of allergy

1) i and iv only

2) ii and iii only

3) i and ii only

4) iii and iv only

129. Biome with highest mean annual precipitation is

1) Temperate forest

2) Tropical forest

3) Coniferous forest

4) Grass land

130. Find the correct statement

1) A given species may not occupy more than one trophic level in the same ecosystem at the same time

2) In terrestrial ecosystem grazing food chain is the major conduit for the energy flow

3) In aquatic ecosystem a large fraction of energy flows through detritus food chain

4) In nature food chains are not 'isolated' always

131. Match the following w.r.t. shape of chromosome at anaphase of mitosis

Column I	Column II
A. Acrocentric	I. I-shaped
B. Sub-metacentric	II. J-shaped
C. Telocentric	III. V-shaped
D. Metacentric	IV. L-shaped

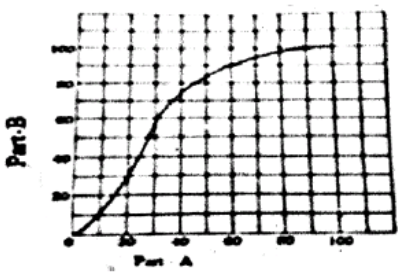
1) A-II; B-I; C-III; D-IV

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

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

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

132. Refer to the given graph of oxygen dissociation curve and select the correct option regarding it



1) Part 'B' represents partial pressure of oxygen (mm Hg)

2) High pO_2, low pCO_2 and lesser H^+ concentration shifts the curve to the left side

3) High H^+ concentration and high temperature favors formation of oxyhaemoglobin

4) Binding of CO_2 with haemoglobing shifts the curve to the left side

133. This question has statement I and statement II. Of the four choices given after the statements, choose the one that best describes the two statements.

Statement – I: Amazon rain forest is called "The lungs of the planet earth".

Statement – II: Amazon rain forest is estimated to produce 20% of the total oxygen in the Earth's atmosphere through photosynthesis.

1) Statement –I and statement-II are true and statement –II the correct explanation of statement-I
2) Statement –I and statement –II are true but statement –II is not the correct explanation of statement –I
3) Statement – I is true but statement –II is false
4) Statement –I is false but statement II is true.

134. t RNA produced by RNA polymerase III

1) 5.8S rRNA
2) 18S rRNA
3) 28S rRNA
4) 5S rRNA

135. Mark the correct statement for monosaccharides.

1) Monosaccharides with 5 carbon atoms are smallest carbohydrates
2) Pentose sugar ribose is rarely found in animal cells
3) All hexoses are aldoses except fructose
4) The most important sugar occurring in animals is cellulose

136. Recombinant colonies with insertional inactivation of β-gal gene show

1) Blue colour
2) Orange bands
3) Red colour
4) No colour

137. Match the animals given in column A with their location in column B

Column –A	Column- B
i) Dodo	a) Africa
ii) Quagga	b) Russia
iii) Thylacine	c) Mauritius
iv) Stellar's sea cow	d) Australia

Choose the correct match from the following

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

138. The power of technique to identify genetic disorders is

1) ELISA
2) PCR technique
3) rDNA technology
4) All the above

139. Iodine is obtained from

1) Laminaria
2) Chlorella
3) Polysiphonia
4) Porphyra

140. Which of the following supports the statement 'invasion of alien species is a potent threat to indigenous species'.

1) Steller's sea cow and passenger pigeon became extinct recently
2) More than 200 species of cichlid fish become extinct in lake Victoria in East Africa
3) When the star fish Pisaster is removed from an enclosed inter tidal area, more than 10 species of invertebrates became extinct within a year
4) Photophagus insects removed nearly 25 percent Acacia and Cactus plants

141. Indian Rhinoceros is the most protected species in this National Park of India:

1) Corbett
2) Kaziranga
3) Bandipur
4) Gir

142. The inter-specific interactions in which both the species benefit and both loose respectively

1) Competition and amensalism
2) Competition and predation
3) Mutualism and competition
4) Mutualism and parasitism

143. In gymnosperms, the pollen chamber represents

1) a cell in the pollen grain in which the sperms are formed
2) a cavity in the ovule in which pollen grains are stored after pollination
3) an opening in the mega gametophyte through which the pollen tube approaches the egg
4) the microsporangium in which pollen grains develop

144. Find the number of correct statements regarding the specific disorder of muscular or skeletal system

A. Tetany – rapid spasms in the muscle due to high ca^{++} in body fluid
B. Gout – inflammation of joints due to accumulation of urea crystals
C. Osteoporosis – decreased bone mass due to decreased level of estrogen in post menopause woman.
D. Myasthenia gravis – Auto immune disorder affecting neuromuscular junction leading to paralysis of skeletal bones.

1) Only one statement is correct
2) Two statements are correct
3) Three statements are correct
4) All statements are correct

145. The percent of area covered by biodiversity hot spots on the earth is

1) 10
2) 3
3) 14
4) 2

146. Arrange the following incorrect sequence

A. Testing, release and commercialization of new cultivars
B. Selection and testing of superior recombinants
C. Cross hybridization among the selected parents
D. Collection of variability

(1) EDBAC
(2) EDBCA
(3) EDCAB
(4) EDCBA

147. Which of the following is not matched correctly?

1) Anabaena – Cyanobacteria
2) Amoeba – Protozoa
3) Gonyaulax – Dino flagellates
4) Albugo - Chrysophytes

148. Which one of the following disease is caused by a prokaryote?

1) Rust of wheat
2) Late blight of potato
3) Black rot of Cauliflower
4) White rust of Brassica

149. Arrange CFCs, CH_4, N_2O and CO_2, in decreasing order according to their contribution in green house effect

1) $CO_2 > N_2O > CFCs > CH_4$

2) $CFCs > CO_2 > CH_4 > N_2O$

3) $CO_2 > CH_4 > CFCs > N_2O$

4) $CH_4 > CFCs > N_2O > CO_2$

150. Choose the correct statement

1) Atlas 66 is a maize variety with high protein content

2) Pusa sadabahar is a chilly variety resistant to leaf curl disease

3) Solid stems of maize lead to non-preference by stem sawfly

4) Pusa sawani is an okra variety resistant to Aphids

151. Smut of sorghum is caused by

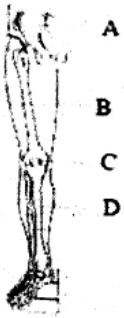
1) Ustilago

2) Tilletia caries

3) Pircularia

4) Colletotrichum falcatum

152. Given below is the figure of right pelvic girdle and lower limb bones – Identify A, B, C, D and select the correct option regarding this.



A. Coxal bone – formed by the union of ileum, ischium and pubis.

B. Thigh bone – its proximal end articulates with glenoid cavity

C. Patella – a cup shaped bone over the knee dorsally

D. Tibia – a long thicker bone supporting the fore leg.

1) A

2) B

3) C

4) D

153. Match the columns and choose the correct combination

Column I	Column II
(i) Mutualism	(p) Beneficial to 'a', no effect for 'b'
(ii) Competition	(q) Beneficial to both 'a' and 'b'
(iii) Parasitism	(r) Beneficial to 'a' and harmful for 'b'
(iv) Predation	(s) Beneficial to 'a' and harmful for 'b'
(v) Commensalism	(t) Harmful to both 'a' and 'b'

1) i-t, ii-s, iii-p, iv-q, v-r

2) i-s, ii-p, iii-t, iv-q, v-r

3) i-q, ii-t, iii-s, iv-r, v-p

4) i-q, ii-s, iii-t, iv-p, v-r

154. Hypertension causes the release of

1) Angiotensin – II

2) ADH

3) Artrial Natriutetic Factor

4) Aldosterone

155. the precursor of eukaryotic mRNA is

1) hnRNA

2) tRNA

3) rRNA

4) snRNA

156. What will happen if the secretion of parietal cells of gastric glands is blocked with an inhibitor?

1) Enterokinase will not be released from duodenal mucosa

2) The enzyme ptyalin will be inactivated

3) Gastric juice will be deficient in rennin

4) Inactive pepsinogen is not converted into pepsin

157. In Drosophila, white eye colour is recessive X-linked trait but red eye colour is dominant. A white eyed female is crossed with red eyed male. The female offspring with red eye colour would be

1) 100%

2) 50%

3) 25%

4) Zero %

158. Effluent from secondary sewage treatment plant is generally released into

1) anaerobic sludge digester

2) rivers and streams

3) aeration tank

4) secondary settling tank

159. DNA replicates semi-conservatively was first shown in

1) Vicia faba

2) E. coli

3) Streptococcus pneumonia

4) Drosophila

160. Parbhani Kranti is a ----- X------variety, resistant to ---- Y ----- X and Y are

1) Mutant Yellow Mosaic Virus

2) Mutant Powdery Mildew

3) Hybrid Powdery Mildew

4) Hybrid Yellow Mosaic Virus

161. Select the option that correctly fills the blanks in given paragraph.

Gonadotropin releasing hormone (GnRH) is secreted by the

(i)__ which stimulates the anterior lobe of the pituitary gland to secrete luteinizing hormone (LH) and follicle simulating hormone (FSH). LH acts on the (ii) __cells and stimulates secretion of

(iii) __ which in turn stimulates the process of (iv) _ FSH acts on the (v)_ cells and stimulates secretion of some factors which help in the process of (vi) _

1) (i) hypothalamus, (ii) Sertoli (iii) testosterone, (iv) spermatogenesis, (v) Leydig's, (vi) spermiogenesis

2) (i) hypothalamus, (ii) Laydig's, (iii) androgens, (iv) spermatogenesis, (v) Sertoli, (vi) spermiogenesis

3) (i) hypothalamus, (ii) Laydig's (iii) testosterone, (iv) spermiogenesis, (v) Sertoli, (vi) spermiogenesis

4) (i) hypothalamus, (ii) Sertoli, (iii) inhibin, (iv) spermatogenesis (v) Leydig's, (vi) spermiogenesis

162. Diploid sexual spores of fungi are

1) Conidia

2) Oospores

3) Ascospores

4) Basidiospores

163. FAD is electron acceptor in the citric acid cycle during the oxidation of

1) Malic acid to oxaloacetic acid

2) Succinic acid to malic acid

3) Citric acid to alpha-ketoglutaric acid

4) Alpha-ketoglutaric acid to succinic acid

164. Absorption of medicines and alcohol takes place in

1) Mouth

2) Stomach

3) Small intestine

4) Large intestine

165. Path taken in the eye ball by light rays is

1) corena →conjunctiva →aqueous humour → lens (through pupil) → vitreous humour → retina

2) conjunctiva → corena → lens (through pupil) → aqueous humour → vitreous humour → retina

3) conjunctiva → corena → vitrous humour → lens (through pupil) → aqueous humour → retina

4) conjunctiva → corena → aqueous humour → lens (through pupil) → vitreous humour → retina

166. Consider the following statements (A – D) regarding mechanism of vision and select the correct options (T) for true statement and (F) for false statement.

A. Light induce dissociation of retinal from opsin resulting in changes in the structure of opsin.

B. Retinal is an aldehyde of vitamin A

C. Optic nerve transmits action potentials to visual cortex area of brain

D. Light rays entering the eye directly stimulates action potential in the ganglionic cells

1) A-T, B-T, C-T, D-T

2) A-T, B-T, C-T, D-F

3) A-T, B-T, C-F, D-F

4) A-T, B-F, C-F. D-F

167. Which of the following secondary metabolites belong to the group drugs?

I. Morphine

II. Curcumin

III. Codeine

IV. Vinblastine

V. Abrin

1) 1 and II only

2) I and V only

3) II and III only

4) II and IV only

168. Find the correct statement from the following

1) Ejection of the contents of the intestine through the mouth is called vomiting

2) Diarrhea results in the loss of water (dehydration) and an increase the absorption of food.

3) Vomiting is a reflex action that is controlled by vomit centre located in pons

4) Specity food, over eating and anxiety leads to a feeling of fullness

169. The human chromosomes with the highest and lowest number of genes

1) Chromosome 21 and Y

2) Chromosome 1 and X

3) Chromosome 1 and Y

4) Chromosome X and Y

170. Pollination type in Lobia is

(1) Anemophilous

(2) Epihydrophilous

(3) Hypohydrophilous

(4) Zoophilous

171. Consider the following statements with respect to angiosperms

i) The male sex organ in a flower is the stamen

ii) The anthers following mitosis produce pollen grains

iii) In an embryosac, the primary endosperm nucleus (PEN) is diploid

iv) After fertilization the ovules develop into seeds and ovaries develop into fruit.

Of the above statements

1) (i) and (iv) are correct

2) (i) and (ii) are correct

3) (i) and (iii) are correct

4) (i) and (iv) are correct

172. Edible part in Strawberry is

1) epicarp
2) mesocarp
3) achene
4) thalamus

173. Match the following and choose the correct option

Column I	Column II
A. Adipose tissue	i) Nose
B. Stratified epithelium	ii) Blood
C. Hyaline cartilage	iii) Skin
D. Fluid connective tissue	iv) Fat storage

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

174. Cells of collenchymas differ from that of parenchyma mainly in

1) having lignified wall thickenings
2) having uneven wall thickenings
3) having chloroplasts
4) being meristematic

175. Select the wrong statement

1) Human insulin is being commercially produced from a transgenic species of Escherichia coli
2) Bt toxin genes Cry 1 Ac control the corn borer
3) Human protein, alpha-1-antitrypsin is used to treat emphysema
4) The first transgenic cow, Rosie, produced alpha lactalbumin, enriched milk

176. Find the correct path of flow of blood in pulmonary circulation.

1) LV → Pulmonary artery → lungs → pulmonary vein → LA
2) RV → Pulmonary artery → Lungs → pulmonary vein → LA
3) LV → Dorsal aorta → body parts → venacava → RA
4) RV → Dorsal aorta → body parts → venacava → RA

177. Fasciola and Taenia are the members of phylum platyhelminthes bearing which of the following characters?

1) They have organ level of organization
2) Flame cells help in osmoregulation and excretion
3) They have dorso-ventrally flattened body
4) All of the above

178. Mechanism of breathing among different groups of animals mainly depends on their

1) Habitat and type of circulation
2) Symmetry and levels of organization
3) Type of circulation and levels of organization
4) Habitats and levels of organization

179. Select the correct statement

1) Phosphorus cycle is an example of gaseous nutrient cycle
2) The pyramid of biomass in sea is generally inverted
3) By the process of humification, soluble inorganic nutrients go down into the soli horizon
4) A given organism may not occupy more than one trophic level simultaneously.

180. Which of the following is not one of the prime health risks associated with UV-B radiation

1) Aging of skin
2) Snow blindness
3) Cataract
4) Altered breathing pattern

PHYSICS

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

CHEMISTRY

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

BIOLOGY

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

HINTS AND SOLUTIONS

PHYSICS

1. $V_x = \frac{dx}{dt} = a$

$V_y = \frac{dy}{dt} = b(2t) + c,$

At t=1 sec, $V_y = 2b + c$

$V = [V_x^2 + V_y^2]^{\frac{1}{2}} = [a^2 + (2b + c)^2]^{\frac{1}{2}}$

2. Always more positive voltage, is positive terminal less positive voltage, is negative terminal

3. $\frac{2\pi}{\lambda} = \frac{\pi}{15} \Rightarrow \lambda = 30\ cm$

x = 13 cm is in first loop & x = 16 cm is in second loop

Therefore phase difference is π radian

4. $V_{\frac{i}{p}} = i_C R_L = 2V;$

$Given\ R_L = 2 \times 10^3 \Omega$

$\therefore i_c = \frac{V_{\frac{i}{p}}}{R} = \frac{2}{2\times10^3} = 10^{-3}A.$ Also given current amplification factor

$[\beta] = \frac{i_C}{i_B} = 100$

$\Rightarrow i_B = \frac{i_C}{100}$

$Also\ given\ i_B = \frac{10^{-3}}{10^2} = 10^{-5}A$

$\therefore V_{\frac{i}{p}} = I_B R_B = 10^{-5}(1000) = 10mV$

5. 425:595:765=5:7:9 odd numbers

Therefore the pipe is closed pipe

For any pipe frequency difference is $\frac{V}{2l}$

$\frac{V}{2l} = 595 - 425 = 170$

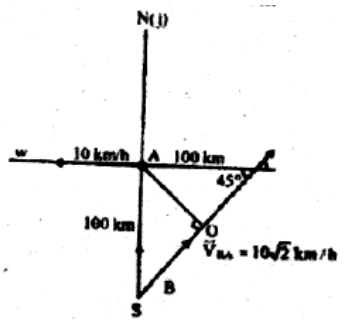
$\frac{340}{2l} = 170 \Rightarrow l = 1m$

6. $\bar{V}_A 10(-\hat{\imath})$

$\bar{V}_B = 10(\hat{\jmath})$

$\bar{V}_{BA} = 10\hat{j} + 10\bar{\imath} = 10\sqrt{2}$ km/h

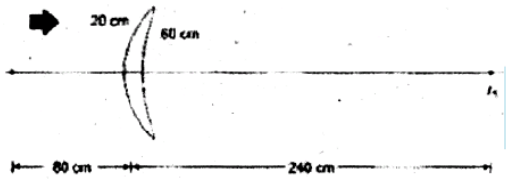
Distance OB = 100 cos 45°=$50\sqrt{2}\ km$



Time taken to reach the shortest distance between

$$A\ and\ B = \frac{OB}{\bar{V}_{BA}} = \frac{50\sqrt{2}}{10\sqrt{2}} = 5h$$

7.



Focal length of lens

$$\frac{1}{f} = \left(\frac{3}{2} - 1\right)\left(\frac{1}{20} - \frac{1}{60}\right) = \left(\frac{1}{2}\right)\left(\frac{1}{30}\right)$$

$$= \frac{1}{60}$$

$$\frac{1}{v} - \frac{1}{-80} = \frac{1}{60}\frac{1}{v} = \frac{1}{60} - \frac{1}{80} = \frac{1}{240}$$

v = 240 cm

8. $[V] = [\eta^x\ \rho^y\ r^z]$

$Where\ [V] = [LT^{-1}]; [\eta] = [ML^{-1}T^{-1}]$

$[\rho] = [ML^{-3}], [r] = [L]$ Apply principle of homogeneity, then

By equating dimensions of like terms

$[LT^{-1}] = [(ML^{-1}T^{-1})^x (ML^{-3})^x (L)^z]$

$[M^0LT^{-1}] = [M^{x+y}.L^{-x-3y+x}.T^{-x}]$

$x + y = 0;\ -x - 3y + z = 1$

$\therefore x = 1; y = -1; z = -1$

9. $\frac{1}{-(N.P)} - \frac{1}{-25} = \frac{1}{50} \Rightarrow N.P = 50\ cm$

10. $\phi = \frac{hc}{\lambda} - KE_{max} = \frac{12400}{4000}ev - 1.68ev$

$= (3.1 - 1.68)ev = 1.42ev$

11. $I = I_0\ cos^2\left(\frac{\phi}{2}\right)$

$\left(\frac{I_0}{4}\right) = I_0\ cos^2\left(\frac{\phi}{2}\right)$

$\Rightarrow cos\frac{\phi}{2} = \frac{1}{2}$

$\frac{\phi}{2} = 60$

$\phi = 120°$

$\frac{2\pi}{\lambda}.(d\ sin\ \theta) = \frac{2\pi}{3}$

$sin\ \theta = \frac{\lambda}{3d}$

$\theta = sin^{-1}\left(\frac{\lambda}{3d}\right)$

12. $\frac{-\Delta U}{U} \times 100 = \left[\frac{\frac{1}{2}\left(\frac{C_1C_2}{C_1+C_2}\right)(V_1-V_2)^2}{\frac{1}{2}C_1V_1^2} \times 100\right]\%$

$= \frac{\frac{1}{2}\left(\frac{2(8)}{2+8}\right)(V-0)^2}{\frac{1}{2}2V^2} \times 100\% = 80\%$

13. $\mu_m = \frac{4}{3}, d = 1\ mm, D = \frac{4}{3}m,$

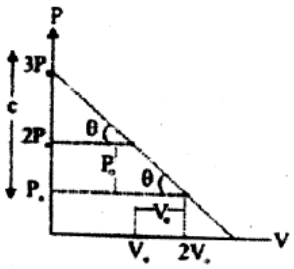
$\lambda = 630\ nm$

$\lambda_m = \frac{\lambda}{\mu_m} = \frac{630}{\frac{4}{3}} = \frac{1890}{4}\ nm$

$\beta = \frac{D\lambda_m}{d} = \frac{\frac{4}{3} \times \frac{1890}{4} \times 10^{-9}}{10^{-3}}$

$= 630 \times 10^{-6}\ m$

14. The equation for the line is



$P = \frac{-P_0}{V_0}V + 3P$

$\left[slope = -\frac{-P_0}{V_0}, c = 3P_0\right]$

$PV_0 + P_0V = 3P_0V_0 \quad \ldots.(i)$

But pv = nRT

$\therefore p = \frac{nRT}{v} \quad \ldots..(ii)$

From (i) & (ii)

$\frac{nRT}{n}V_0 + P_0V = 3P_0V_0$

$\therefore nRTV_0 + P_0V^2 = 3P_0V_0 \quad \ldots..(iii)$

For temperature to be maximum $\frac{dT}{dv} = 0$

Differentiating e.q. (iii) by 'v' we get

$nRV_0\frac{DT}{dv} + P_0(2v) = 3P_0V_0$

$\therefore nRV_0\frac{DT}{dv} = 3P_0V_0 - 2P_0V;$

$\frac{DT}{dv} = \frac{3P_0V_0 - 2P_0V}{nRV_0} = 0$

$V = \frac{3V_0}{2}$

$\therefore p = \frac{3P_0}{2}$

$\therefore T_{max} = \frac{5P_0V_0}{4nR}[From\ (iii)]$

15. $\vec{E} = -\frac{dv}{dx}\hat{\imath} - \frac{dv}{dy}\hat{\jmath} - \frac{dv}{dz}\hat{k}$

$-[-k(y + 0 + z)]\hat{\imath} — k(x + z + 0)\hat{\jmath} — k(0 + y + x)\hat{k}$

$= k[(y + z)\hat{\imath} + (x + z)\hat{\jmath} + (y + x)\hat{k}]$

16. $\frac{2\lambda}{a} = \frac{10\lambda}{d} \Rightarrow a = \frac{d}{5} = \frac{1}{5}mm = 0.2mm$

17. $C_{PQ} = \frac{(C_1+C_3)C_2}{(C_1+C_3)+C_2}$

$= \frac{\left[K_1\frac{\varepsilon_0\left(\frac{A}{2}\right)}{\frac{d}{2}} + \frac{\varepsilon_0\left(\frac{A}{2}\right)}{\frac{d}{2}}\right]K_2 \times \frac{\varepsilon_0 A}{\frac{d}{2}}}{\left[K_1\frac{\varepsilon_0\left(\frac{A}{2}\right)}{\left(\frac{d}{2}\right)} + \frac{\varepsilon_0\left(\frac{A}{2}\right)}{\left(\frac{d}{2}\right)}\right] + K_2\frac{\varepsilon_0 A}{\left(\frac{d}{2}\right)}}$

$= \frac{(K_1 + 1)2K_2A\varepsilon_0}{(K_1 + 1 + 2K_2)d}$

18. $Y_1 = \frac{A}{2} = A\ sin\theta_1 \Rightarrow \theta_1 = \frac{\pi}{6}; Y_2 = \frac{A}{2}$

$= Asin\theta_2 \Rightarrow \theta_2 = \frac{5\pi}{6};$

$\therefore \Delta\theta = \theta_2 - \theta_1 = \frac{2\pi}{3}$

19.

$i_3^2(4) = 4$

$i_3 = 1A$

$i_3 = \frac{i_1(3)}{3+4} \Rightarrow 1 = \frac{i_1(3)}{3+4}$

$i_1 = \frac{7}{3}$

$i_1\left(\frac{4\times 3}{4+3}\right) = i_2(1+2)$

$\frac{7}{3}\left(\frac{4\times 3}{7}\right) = i_2(3)$

$\Rightarrow i_2 = \frac{4}{3}A$

$\therefore P = i_2^2(R)$

$= \left(\frac{4}{3}\right)^2 \times 2 = \frac{32}{9}\ watt$

20. According to bohr's theory

$\frac{1}{\lambda} = R\left(\frac{1}{n_1^2} - \frac{1}{n_2^2}\right)$

For UV, of largest wavelength;

$n_1 = 1; n_2 = 2$

$\frac{1}{\lambda_1} = R\left[\frac{1}{1^2} - \frac{1}{2^2}\right] = \frac{3}{4}R$ &

For IR of least wavelength

$n_2 = \infty; n_1 = 3$

$\frac{1}{\lambda_2} = R\left(\frac{1}{9}\right) \Rightarrow \frac{\lambda_2}{\lambda_1} = \frac{3}{4} \times 9$

$\frac{1}{\lambda_2} = 122 \times \frac{3}{4} \times 7\ [\therefore given\ \lambda_1 = 122]$

$= 823.5$

21. When S is open, balance length $l = 75cm$. When S is closed, balance length $l' = 60cm$

Internal resistance of cell

$$r = R\left(\frac{l}{l'} - 1\right) = 4\left(\frac{75}{60} - 1\right) = 1\Omega$$

22. Electric field is always directed from high potential to low potential. So 'B' is at higher potential.

23. $\frac{ig}{i} = \frac{S}{G+S}$

$$\frac{0.05}{5} = \frac{S}{50+S}$$

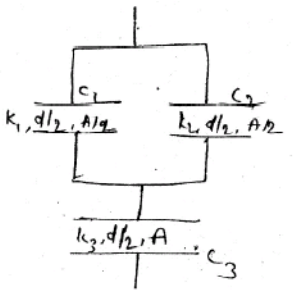
$$S = \frac{50}{99}\Omega$$

$$\frac{\rho l}{A} = \frac{50}{99}$$

$$l = \frac{50A}{99\rho}$$

$$l = \frac{50 \times 2.97 \times 10^{-6}}{99 \times 5 \times 10^{-7}} = 3m$$

24. According to this $C_1 \& C_2$ are in parallel, which is in series with C_3. If effective capacitance is C^1, equivalent circuit is



$$\frac{1}{C^1} = \frac{1}{C_1 + C_2} + \frac{1}{C_3};$$

$$\frac{1}{K_{eff}\left(\frac{\epsilon_0 A}{d}\right)}$$

$$= \frac{1}{(K_1 + K_2)\left(\frac{\epsilon_0 A}{d}\right)} + \frac{1}{2K_3\left(\frac{\epsilon_0 A}{d}\right)}$$

$$\therefore \frac{1}{k_{eff}} = \frac{1}{k_1 + k_2} + \frac{1}{2k_3}$$

25. $\phi = Li$

$$0.8 = L(2) \Rightarrow = 0.4H$$

$$e = L.\frac{di}{dt} = 0.4 \times 400 = 160V$$

26. $v_1 = v_2 \Rightarrow \frac{q}{r} = constant$

$$E = \frac{kq}{r^2} = \left(\frac{Kq}{r}\right)\frac{1}{r}$$

$$\Rightarrow E \propto \frac{1}{r} \Rightarrow \frac{E_1}{E_2} = \frac{r_2}{r_1} = \frac{2}{1}$$

27. $i = \frac{V}{R} = \frac{3}{30} = 0.1A$

28. $\bar{V} = \frac{dx}{dt}\hat{\imath} + \frac{dy}{dx}\hat{\jmath}$

$$\bar{V} = \frac{d}{dt}(at^3\hat{\imath} + \beta t^3\hat{\jmath})$$

$$= \alpha 3t^2\hat{\imath} + \beta 3t^2\hat{\jmath}$$

$$\bar{V} = 3t^2\,(\alpha\hat{\imath} + \beta\hat{\jmath})$$

$$\therefore V = 3t^2\sqrt{\alpha^2 + \beta^2}$$

29. At $A\ X_C > X_L$ at $B\ X_C = X_L$ at C $X_C < X_L$

$\therefore$ At C point circuit is inductive

30. $i = i_0 e^{-\frac{Rt}{L}}; i_0 = \frac{\varepsilon}{R}$

Here $R = 15\Omega; L = 3 \times 10^{-2}H;$

$\varepsilon = 15V$

$$\Rightarrow i_0 = \frac{\varepsilon}{R} = \frac{15}{150} = 10^{-1}$$

$$\therefore i = (10^{-1})e^{\frac{-150}{3\times10^{-2}}(10^{-3})} = \frac{10^{-1}}{e^5}$$

$$= \frac{10^{-1}}{150}$$

$$= 0.66 \times 10^{-3}\ A = 0.67\ mA$$

31. $H = ni = 5000 \times 2 = 10^4$ A/m;

$I = \chi H$

$$\chi = \frac{1}{H} = \frac{5 \times 10^{-2}}{10^4} = 5 \times 10^{-6}$$

32. $T = \frac{mv^2}{L} \Rightarrow 25 = \left(\frac{1}{4}\right)\frac{V_{max}^2}{1.96}$

$$\Rightarrow V_{max} = \sqrt{196} = 14\text{m/s}$$

33. Maximum kinetic energy of emitted electron

$E = 14.4 - 13.6 = 0.8\,ev$

$\lambda = \dfrac{h}{\sqrt{2mE}}$

$= \dfrac{6.6 \times 10^{-34}}{\sqrt{2 \times 9 \times 10^{-31} \times 0.8 \times 1.6 \times 10^{-19}}}$

$= 13.75 \times 10^{-10} m = 13.75\ A^0$

34. $P = \frac{E}{C} = \frac{1.6\times10^{-13}}{3\times10^{8}} = 5.3 \times 10^{-22} \simeq 5 \times 10^{-22}\ Kg\frac{m}{s}$

35. $F = \frac{2IA}{C} = \frac{2\times25\times10^{4}\times15\times10^{-4}}{3\times10^{8}}$

$= 2.5 \times 10^{-6} N$

36. $\tau = BiAN\ sin\ \theta, \theta = 90 - 30 = 60°$

Here B=0.2, i=2A

$A = 12 \times 10^{-3}; N = 50 \& sin\ \theta = \dfrac{\sqrt{3}}{2}$

$\tau = (0.2)(2)(12 \times 10^{-3})(50)\dfrac{\sqrt{3}}{2}$

$= 0.207\ Nm$

$\simeq 0.20\ Nm$

37. $\frac{1}{\lambda} = R\left[\frac{1}{1^2} - \frac{1}{n^2}\right]$

$\dfrac{1}{\lambda R} = 1 - \dfrac{1}{n^2}$

$\dfrac{1}{n^2} = 1 + \dfrac{1}{\lambda R}$

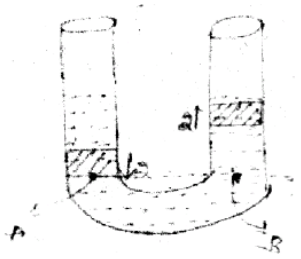
$n^2 = \dfrac{\lambda R}{\lambda R - 1}$

$n = \sqrt{\dfrac{\lambda R}{\lambda R - 1}}$

38. As liquid level of I rises by 2 cm, liquid level of II reduces by 2cm. So liquid II height is 4cm. Equating pressures on both sides at a depth of 4cm.

$P_0 + 4\rho_1 g = P_0 4\rho_2 g$

$\therefore \rho_1 = \rho_2$



39. Activity A = λN

$A = \lambda N_0 e^{-\lambda t}$

$A = \lambda\left[\dfrac{N_A m}{M}\right] e^{-\lambda t}$

40. $N_d = N_0\left(1 - \frac{1}{2^n}\right)$, where n=no. of half lives elapsed

$(N_d)_A = N_0\left[1 - \frac{1}{2^4}\right]; (N_d)_B = N_0\left[1 - \frac{1}{2}^2\right]; \frac{(N_d)_A}{(N_d)_B} = \frac{\frac{15}{16}}{\frac{3}{4}} = \frac{5}{4}$

41. Power $P = \frac{Nxe}{At}$

$\Rightarrow t = \dfrac{Nxe}{P.A}$

$t = \frac{6023\times10^{23}\times1000\times2\times10^{6}\times1.6\times10^{-19}}{100\times2}$

$= 96.4 \times 10^{10}\ sec$

$\Rightarrow t = \dfrac{96.4}{60 \times 60} \times 10^{11} hours$

$= 2.67 \times 10^{8}\ hours$

42. $(C_v)_{mix} = C_{v_1} + C_{v_2}\ where\ C_v = \frac{nR}{\gamma-1}$ $so,$

$\dfrac{n_1 + n_2}{\alpha_{mix} - 1} = \dfrac{n_1}{\gamma_1 - 1} + \dfrac{n_2}{\gamma_{mix} - 1}$

$= \dfrac{1}{\frac{5}{3} - 1} + \dfrac{1}{\frac{7}{5} - 1}$

$\Rightarrow \dfrac{2}{\gamma_{mix} - 1} = \dfrac{3}{2} + \dfrac{5}{2}$

$\therefore \gamma_{mix} = \dfrac{3}{2}$

43. $Y = \overline{A + B}$. It is NOR gate

A	B	Y

0	0	1
0	1	0
1	0	0
1	1	0

44. $\frac{\varepsilon}{v} = \frac{l_1}{l_2} \Rightarrow \frac{i(R+r)}{iR} = \frac{l_1}{l_2}$

$\Rightarrow r = R\left(\frac{l_1}{l_2} - 1\right)$

$\Rightarrow r = 9.5\left[\frac{3}{2.85} - 1\right] = \frac{1}{2} = 0.5\Omega$

45. $A^1 = \frac{A}{1+\beta A}$

$\beta = \frac{9}{100} = 0.09$

$A^1 = 10$

$\therefore 10 = \frac{A}{1 + 0.09A}$

$10 + 0.9A = A$

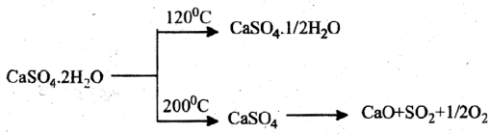
$10 = 0.1\ A$

A = 100

CHEMISTRY

46. Sn^{+2} was not a 2nd group cation in qualitative analysis.

47.



48. See the structure.

49. smelting is a process in which an oxide is reduced either with carbon, coke or CO

50. ΔG is positive for $2Hg + O_2 \rightarrow 2HgO$

51. According to concept of Hybridisation

52. $r_1 = K[A]^n, r_2 = K[A_2]^n$

$\frac{r_1}{r_2} = \left[\frac{0.95}{0.67}\right]^n = \frac{1}{0.5}$

53. According to concept of MOT and size of atoms

54. All are participated

55. Correct order of I.E $B < C < O < N$ due to half filled electric configuration in 'N'.

56. $SO_4^{-2} + (CH_3COO)_2Pb \rightarrow PbSO_4 + CH_3COO^-$

57. SB_2S_3 sol is negative colloid therefore $Al_2(SO_4)_3$ will be most effective coagulating agent (Al^{+3})

58. $\frac{Wt\ of\ KMnO_4}{31.6} = \frac{N \times V}{1000}$ of oxalic acid

59. $Cu^{+2} + 2e^- \rightleftharpoons Cu;\ Q = \frac{1}{[Cu^{+2}]};$

$E = E^0 - \frac{0.059}{2} log \frac{1}{[Cu^{+2}]}$

60. B_2 has 2 unpaired $\bar{e}$ based on MOT

61. $8KMnO_4 + 3NH_3 \rightarrow 8MnO_2 + 3KNO_3 + 5KOH + 2H_2O$

62. $P_C = \frac{a}{27b^2}, V_c = 3b, T_C = \frac{8a}{27\ Rb}$

$Z = \frac{P_C \times V_C}{R \times T_C} = \frac{3}{8}$

63. $P_T = p_A^0 x_A + p_B^0 . x \Rightarrow 100$

$x_B^1 = \frac{p_A^0 . x_A}{P_T} = \frac{40}{100} = \frac{2}{5}$

64. % if Ionic character

$= \frac{1.03}{1.27 \times 4.8} \times 100 = 17\%$

So, charge is also 17%

65. $\Delta T_f = K_f \times \frac{W_A \times 1000}{m_A \times W_B}$

$2.15 = K_f \times \frac{5 \times 1000}{342 \times 95}\ (For\ sucrose)$

$\Delta T_f = K_f \times \frac{5 \times 1000}{180 \times 95}$

$\therefore \Delta T = 4.08K$

$T = T_0 - 4.08$

$= 273.15 - 4.08 = 269.07\ K$

66. Final normality is

$$[OH^-] = \frac{N_b V_b - N_a V_a}{V_a + V_b} = \frac{6-1}{50} = 0.1M$$

67. $p^H = \frac{1}{2}[p^{K_w} + p^{K_a} - p^{K_b}]$

$= \frac{1}{2}[14 + 4 - 6] = 6$

68. $K_C = \frac{[O_3]^2}{[O_2]^3}, [O_3]^2 = 2 \times 10^{-50} \times (1.6 \times 10^{-2})^3$

69. $CO_{(g)} + H_2O_{(g)} \rightleftharpoons CO_{2(g)} + H_{2(g)}\ K_1$

$CH_{4(g)} + H_2O_{(g)} \rightleftharpoons CO_{(g)} + 3H_{2(g)}\ K_2$

$CH_{4(g)} + 2H_2O_{(g)} \rightleftharpoons CO_{2(g)} + 4H_{2(g)}\ K_3$

$\therefore K_3 = K_1 \times K_2$

70. $pH = 7 - \frac{1}{2}p^{Kb} - \frac{1}{2}log\ c$

$pH = 7 - \frac{1}{2}[-log\ (1.8 \times 10^{-5})]$

$-\frac{1}{2}log(0.01) = 5.63$

71. $\frac{d[N_2O_5]}{dt} = \frac{1}{2}\frac{d[NO_2]}{dt} = \frac{2d[O_2]}{dt}$

$K_1[N_2O_5] = \frac{1}{2}K_2[N_2O_5] = 2K_3[N_2O_5]$

$K_2 = 4K_3$

$K_2 = 2K_1$

$\therefore 2K_1 = K_2 = 4K_3$

72. $4Zn + 1NO_3^{-1} \rightarrow 4Zn^{+2} + NH_4^+ + 10OH^-$

73. $o_3 \rightleftharpoons O_2 + [O]\ fast$

$O_3 + [O] \rightarrow 2O_2\ slow$

$Rate = K[O_3][O] \ldots\ldots (i),$

From fats step

$K_{eq} = \frac{[O_2][O]}{[O_3]}$

$[O] = K_{eq}\frac{[O_3]}{[O_2]}$

$\therefore Rate = K^1[O_3]^2[O_2]^{-1}$

74. $Ca_3P_2 + 3H_2O \rightarrow 3Ca(OH)_2 + 2PH_3$

75. $Cl_{2(g)} \rightarrow 2Cl_{(g)}\ \ \Delta H_1 = 242.3\ KJ/mol$

$I_{2(g)} \rightarrow 2I_{(g)}\ \ \Delta H_2 = 151\ KJ/mol$

$ICl_{(g)} \rightarrow I_{(g)} + Cl_{(g)}\ \ \Delta H_3 = 211.3\ KJ/mol$

$I_{2(s)} \rightarrow I_{2(g)}\ \Delta H_4 62.8\ KJ/mol$

Required equation.

$\frac{1}{2}I_{2(s)} + \frac{1}{2}Cl_{2(g)} \rightarrow ICl_{(g)}\ \ \Delta H = ?$

$\Delta H = \frac{\Delta H_4 + \Delta H_2 + \Delta H_1}{2} - \Delta H_3$

$= 16.75\ KJ/mol$

76. Increases from top to bottom

77. $\Delta S = 2.303\ nR\ log\left(\frac{V_2}{V_1}\right)$

78. That is $BeSO_4$

79. Given Compound is $Ni_{0.98}O_1$

Number of Ni^{+3} ions = x

Number of Ni^{+2} ions = 0.98-x

Number of O^{-2} ions =1

$\therefore (+3)x + (-2)(0.98 - x) + (-2)1 = 0$

$x + 1.96 - 2 = 0$

$x = 0.04$

$Ni^{+3} = \frac{0.04}{0.98} \times 100 = 4.08\%$

80. $CaC_2 + H_2O \rightarrow CH \equiv CH \xrightarrow[NH_4OH]{Cu_2Cl_2} CuC \equiv CCu$

81. $KE = \frac{3}{2}nRT$

$KE = \frac{3}{2}\frac{N}{N_A}R \times 150 = x$

$K.E = \frac{3}{2} \times \frac{a}{N_A}R \times 300 = 2x$

$(N = a)$

82. $CH_3 - CH_2 - C \equiv CH + H_2O \rightarrow CH_3 - CH_2 - \overset{\overset{O}{|}}{C} - CH_3$

83. I.E of H-like species $= 13.6 \times Z^2 ev$

84. $-CH_3$ *is* $-O, -P$ directing group

85. Number of electrons with Same spin

$$= \frac{1}{2} \times Total\ no.of\ Electrons$$

$$= \frac{1}{2} \times 2(2l+1) \Rightarrow 2l+1$$

86. Four structures are possible

87. 88 gr $CO_2 \rightarrow 2moles$

22.4 $lit\ \ He\ \ at\ STP \rightarrow 1\ mole$

360 $gr\ H_2O \rightarrow 20\ mole$

14 $gr\ N_2 \rightarrow 0.5\ mole$

88. % of O = 100 – [C% + H%]

$$C\% = \frac{Wt\ of\ CO_2}{Wt\ of\ O.C} \times \frac{12}{44} \times 100$$

$$N\% = \frac{Wt\ of\ H_2O}{Wt\ of\ O.C} \times \frac{2}{18} \times 100$$

89. $\underset{28\ gr}{N_2} + \underset{6\ gr}{3H_2} \rightarrow \underset{34\ gr}{2NH_3}$

Case –I

Let N_2 is completely consumed

28 kg $N_2 = 34\ kg\ NH_3$

$$50\ kg\ N_2 = \frac{34}{28} \times 50\ NH_3$$

$$= 60.71\ kg\ NH_3$$

Case – II

Let H_2 is completely consumed

$6kg\ H_2 = 34\ kg\ NH_3$

$$10kg\ H_2 = \frac{34}{6} \times 10Kg\ NH_3$$

$$= 56.66kg\ NH_3$$

90. Total work,

$$W = 2.303RT\ \ log\left(\frac{16}{1}\right)$$

$$= 4 \times 2.303\ \ RT\ log\ 2$$

At 1/4th work,

$$\frac{W}{4} = \frac{4 \times 2.303\ RT\ log2}{4}$$

$$\Rightarrow log\left(\frac{V_2}{V_1}\right) = \ log\left(\frac{2}{1}\right)$$

Final volume at 1/4th work is 2 Lit

$$\Delta V = area \times height = \pi r^2 h$$

$$1 \times 10^3 cm^3 = \pi(10^2)h$$

$$\therefore h = \frac{10}{\pi}$$