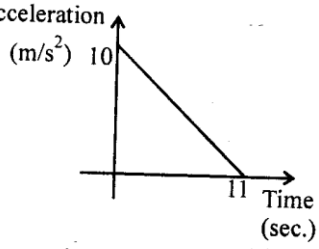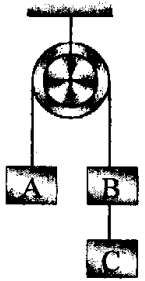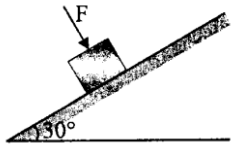## SECTION- I – (PHYSICS)

1. The length of a cylinder is measured with a metre rod having least count 0.1 cm. Its diameter is measured with vernier calipers having least count 0.01 cm. Given that length is 5.0 cm and radius is 2.00 cm. The percentage error in the calculated value of the volume will be
   (a) 11%   (b) 2%
   (c) 3%   (d) 4%

2. Assuming that the mass m of the largest stone that can be moved by a flowing river depends upon the velocity v of the water, its density ρ and the acceleration due to gravity g. Then m is directly proportional to
   (a) V^3 (b) V^4
   (c) V^5 (d) V^6

3. From the top of a building 40 m tall, a boy projects a stone vertically upwards with an initial velocity 10 m/s such that it eventually falls to the ground. After how long will the stone strike the ground? Take g = 10 m/s^2.
   (a) 1s   (b) 2s
   (c) 3s   (d) 4s

4. A person travelling on a straight line moves with a uniform velocity v_1 for some time and with uniform velocity v_2 for the next equal time. The average velocity v is given by –
   (a) $v = \dfrac{v_1 + v_2}{2}$ (b) $v = \sqrt{v_1 v_2}$
   (c) $\dfrac{2}{v} = \dfrac{1}{v_1} + \dfrac{1}{v_2}$ (d) $\dfrac{1}{v} = \dfrac{1}{v_1} + \dfrac{1}{v_2}$

5. A body starts from rest at time t = 0, the acceleration time graph is shown in the figure. The maximum velocity attained by the body will be –

   (a) 110 m/s   (b) 55 m/s
   (c) 650 m/s   (d) 550 m/s

6. A cricketer hits a ball with a velocity 25 m/s at 60^0 above the horizontal. How far above the ground it passed over a fielder 50 m from the bat (assume the ball is struck very close to the ground) -
   (a) 8.2 m   (b) 9.0 m
   (c) 11.6 m   (d) 12.7 m

7. Three equal weights A, B and C each of mass 2 kg are hanging on a string passing over a fixed frictionless pulley as shown in figure. The tension in string connecting B and C is

   (a) 19.6 N   (b) 13 N
   (c) 3.3 N   (d) Zero

8. A block of mass m = 2 kg is resting on a rough inclined plane of inclination 30^0 as shown in figure. The coefficient of friction between the block and the plane is μ = 0.5.

What minimum force F should be applied perpendicular to the plane on the block, so that block does not slip on the plane (g = 10m/s^2)
   (a) Zero   (b) 6.24 N
   (c) 2.68 N   (d) 4.34 N

9. A force of (5+3x) N acting on a body of mass 20 kg along the x-axis displaces it from x = 2m to x = 6m. The work done by the force is –
   (a) 20 J   (b) 48 J
   (c) 68 J   (d) 86 J

10. The potential energy function associated with the force $\vec{F} = 4xy\,\hat{i} + 2x^2\,\hat{j}$ is –
    (a) U = -2x^{2}y   (b) U = -2x^{2}y + constant
    (c) U = 2x^{2}y + constant   (d) Not defined

11. ABC is a right angled triangular plate of uniform thickness. I_1, I_2 and I_3 are moments of inertia about AB, BC, and AC respectively. Then which of the following relation is correct?
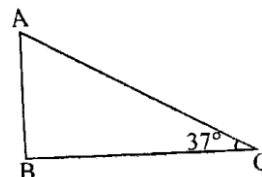
    (a) $I_1 = I_2 = I_3$ (b) $I_2 > I_1 > I_3$
    (c) $I_3 < I_2 < I_1$ (d) $I_3 > I_1 > I_2$

12. A mass m hangs with the help of a string wrapped around a pulley on a frictionless bearing. The pulley has mass m and radius R. Assuming pulley to be a perfect uniform circular disc, the acceleration of the mass m, if the string does not slip on the pulley, is :
    (a) g   (b) $\dfrac{2}{3}g$
    (c) $\dfrac{g}{3}$ (d) $\dfrac{3}{2}g$

13. A simple pendulum has a time period T_1 when on the earth's surface, and T_2 when taken to a height R above the earth's surface, where R is radius of earth. The value of T_2/T_1 is
    (a) 1   (b) $\sqrt{2}$
    (c) 4   (d) 2

14. The escape velocity from the earth is 11 km/s. The escape velocity from a planet having twice the radius and same mean density as that of earth is
    (a) 5.5 km/s   (b) 11 km/s
    (c) 22 km/s   (d) None of these

15. The following four wire (length L and diameter D) are made of the same material. Which of these will have the largest extension when the same tension is applied?
    (a) L = 50cm, D = 0.5mm   (b) L = 100cm, 0
    (c) 4 =200 cm, D = 2mm   (d) L = 300 cm, D = 0.5 mm

16. Statement 1 : The stress-strain graphs for two materials A and B are shown in figure. Young's modulus of A is greater that of B.
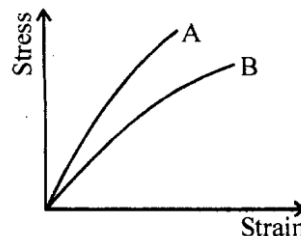

Statement 2 : The young's modulus for small strain is,

$Y = \dfrac{stress}{strain} = $ slope of linear portion of graph; and slope of A is more than slope of that of B.
   (a) Statement -1 is false, Statement-2 is true
    (b) Statement -1 is true, Statement-2 is true; Statement-2 is a correct explanation for Statement-1
    (c) Statement-1 is true, Statement-2 is true; Statement-2 is not a correct explanation for Statement-1

(d) Statement-1 is true, Statement-2 is false

17. A jar is filled with two non-mixing liquids 1 and 2 having densities ρ_1 and, ρ_2 respectively. A solid ball, made of a material of density ρ_3, is dropped in the jar. It comes to equilibrium in the position shown in the figure. Which of the following is true for ρ_1, ρ_2 and ρ_3?
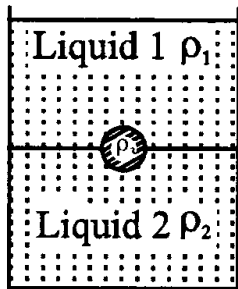
(a) $\rho_3 < \rho_1 < \rho_2$ (b) $\rho_1 > \rho_3 > \rho_2$

(c) $\rho_1 < \rho_2 < \rho_3$ (d) $\rho_1 < \rho_3 < \rho_2$

18. A black body at 227^0C radiates heat at the rate of 7 cal/cm²s. At a temperature of 727^0C, the rate of heat radiated in the same units will be
    (a) 50   (b) 112
    (c) 80   (d) 60

19. One end of a thermally insulated rod is kept at a temperature T_1 and the other at T_2. The rod is composed of two sections of length l_1 and l_2 and thermal conductivities K_1 and K_2 respectively. The temperature at the interface of the two section is
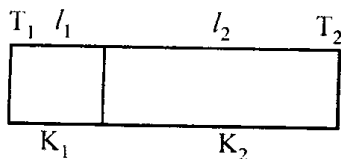
(a) $\dfrac{\left(K_1 l_1 T_1 + K_2 l_2 T_2\right)}{\left(K_1 l_1 + K_2 l_2\right)}$

(b) $\dfrac{\left(K_2 l_2 T_1 + K_1 l_1 T_2\right)}{\left(K_1 l_1 + K_2 l_2\right)}$

(c) $\dfrac{\left(K_2 l_1 T_1 + K_1 l_2 T_2\right)}{\left(K_2 l_1 + K_1 l_2\right)}$

(d) $\dfrac{\left(K_1 l_2 T_1 + K_2 l_1 T_2\right)}{\left(K_1 l_2 + K_2 l_1\right)}$

20. A cyclic process is shown on the V-T diagram. The same process on a P – T diagram is shown by
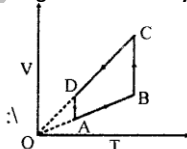
21. At temperature 27⁰C, the r.m.s. speed of the molecules of a diatomic gas is 1920 m/s. The gas is

(a) H₂   (b) F₂
(c) O₂   (d) Cl₂

22. When a wave travels in a medium, the jparticle displacement is given by y = 0.03 $\sin \pi \left(2t - 0.01x\right)$ where y and x are in metres and t in seconds. What is the phase difference, at a given instant of time, between two particles 25 m apart?

(a) $\dfrac{\pi}{8}$ (b) $\dfrac{\pi}{4}$

(c) $\dfrac{\pi}{2}$ (d) π

23. The equation of stationary wave along a stretched string is given by $y = 5 \sin \dfrac{\pi x}{3} \cos 40 \pi t$,where x and y are in cm and t in second . The separation between two adjacent nodes is
    (a) 3.5 cm   (b) 3 cm
    (c) 9 cm   (d) 8 cm

24. A charge of $10\mu C$ is kept at the origin of X-Y coordinate system. The potential difference in volts between two points (a,0) and $\left(a/, \sqrt{2}a/\sqrt{2}\right)$ will be
    (a) Zero   (b) 9×10^4

    (c) $\dfrac{9 \times 10^4}{a}$ (d) $\dfrac{9 \times 10^4}{\sqrt{2}}$

25. Electrical potential 'V' in space as a function of coordinates is given by $V = \dfrac{1}{x} + \dfrac{1}{y} + \dfrac{1}{z}$. Then the electric field intensity at (1, 1, 1) is given by

(a) $-\left(\hat{i} + \hat{j} + \hat{k}\right)$ (b) $\hat{i} + \hat{j} + \hat{k}$

(c) Zero   (d) $\dfrac{1}{\sqrt{3}}\left(\hat{i} + \hat{j} + \hat{k}\right)$

26. In the circuit shown, when the switch is closed, the capacitor charges with a time constant
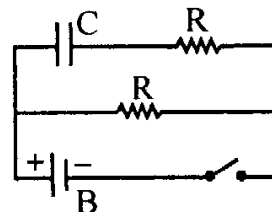
(a) RC   (b) 2RC
(c) (1/2) RC   (d) RC $ln2$

27. The magnetic field at the origin due to the current flowing in the wire is
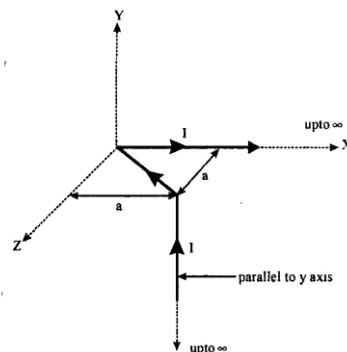
(a) $-\dfrac{\mu_0 I}{8\pi a}\left(\hat{i} + \hat{k}\right)$ (b) $\dfrac{\mu_0 I}{2\pi a}\left(\hat{i} + \hat{k}\right)$

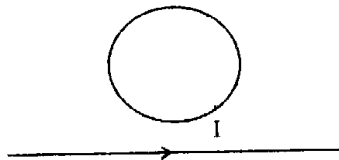(c) $\dfrac{\mu_0 I}{8\pi a}\left(-\hat{i}+\hat{k}\right)$ (d) $\dfrac{\mu_0 I}{4\pi a}\left(\hat{i}-\hat{k}\right)$

28. If r be the distance of a point on the axis of a bar magnet from its centre, the magnetic field at this point is proportional to

(a) $\dfrac{1}{r}$ (b) $\dfrac{1}{r^2}$

(c) $\dfrac{1}{r^3}$ (d) $\dfrac{1}{r^4}$

29. A current –carrying wire is placed below a coil in its plane, with current flowing as shown. If the current increases

(a) No current will be induced in the coil
(b) An anticlockwise current will be induced in the coil
(c) A clockwise current will be induced in the coil.
(d) The current induced in the coil will be first anticlockwise and then clockwise

30. If the readings of V_1 and V_3 are 100 volt each then reading of V_2 is
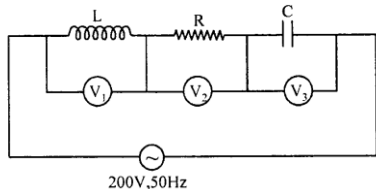
(a) 0 volt (b) 100 volt
(c) 200 volt
(d) Cannot be determined by given information.

31. A telescope has an objective of focal length 100 cm and an eyepiece of focal length 5 cm. What is the magnifying power of the telescope when it is in normal adjustment?

(a) 0.2 (b) 2.0
(c) 20 (d) 200

32. A fish looking up through the water sees the outside world contained in a circular horizon. If the refractive index of water is 4/3 and the fish is 12 cm below the surface, the radius of this circle cm is

(a) $36\sqrt{5}$ (b) $4\sqrt{5}$
(c) $36\sqrt{7}$ (d) $36/\sqrt{7}$

33. The critical angle of light going from medium A to medium B is θ. The speed of light in medium A is v. The speed of light in medium B is

(a) $v\sin\theta$ (b) $\dfrac{v}{\sin\theta}$
(c) $v\cot\theta$ (d) $v\tan\theta$

34. A triangular prism of glass is inside water. A ray, incident normally, on one of the faces, is totally reflected from inclined face. Then the minimum refractive index of glass is

(a) $\dfrac{\sqrt{3}}{2}$ (b) $\dfrac{\sqrt{5}}{3}$
(c) $\dfrac{2\sqrt{2}}{5}$ (d) $\dfrac{4\sqrt{2}}{3}$

35. Prism angle of a prism is 100. Their refractive index for red and violet colour is 1.51 and 1.52 respectively. Then dispersive power will be

(a) 0.5 (b) 0.15
(c) 0.019 (d) 0.032

36. In Young's double slit experiment 10th order maximum is obtained at the point of observation in the interference pattern for $\lambda = 7000 \overset{0}{A}$ If the source is replaced by another one of wavelength $5000 \overset{0}{A}$. then the order of maximum at the same point will be

(a) 12th (b) 14th
(c) 16th (d) 18th

37. If the ratio of the intensity of two coherent source is 4 then the visibility $\dfrac{I_{max} - I_{min}}{I_{max} + I_{min}}$ of the fringes is

(a) 4 (b) 4/5
-(c) 3/5 (d) 9

38. If the stationary proton and α-particle are accelerated through same potential difference, the ratio of de Broglie's wavelength will be

(a) 2 (b) 1
(c) $2\sqrt{2}$ (d) None of these

39. Energy required for the electron excitation in Li^{++} from the first to the third Bohr orbit is :

(a) 36.3 eV (b) 108.8 eV
(c) 122.4 eV (d) 12.1 eV

40. The amount of active substance reduces to 1/64 of its initial value in 15 hours. What is the half life?

(a) 2.5 hour (b) 1.5 hour
(c) 0.5 hour (d) 4.5 hour

41. The binding energy per nucleon for $^{2}_{1}H$ and $^{4}_{2}He$ respectively are 1.1 MeV and 7.1 MeV. The energy released in MeV when two $^{2}_{1}H$ nuclei fuse to form $^{4}_{2}He$ is

(a) 4.4 (b) 8.2
(c) 24 (d) 28.4

42. When a forward bias is applied to a p-n junction, it
(a) Raises the potential barrier.
(b) Reduces the majority carrier current to zero
(c) Lowers the potential barrier.
(d) None of these

43. The diagram of a logic circuit is given below.
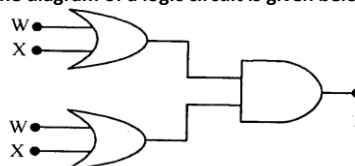
The output F of the circuit is given by
(a) W.(X+Y) (b) W.(X.Y)
(c) W + (X.Y) (d) W+(X+Y)

44. A d.c. battery of V volt is connected to a series combination of a resistor R and an ideal diode D as shown in the figure below. The potential difference across R will be
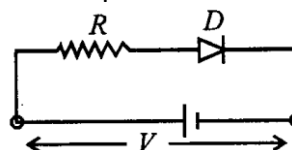
(a) 2V when diode is forward biased
(b) Zero when diode is forward biased
(c) V when diode is reverse biased
(d) V when diode is forward biased

45. The maximum distance upto which TV transmission from a TV tower of height h can be received is proportional to
(a) $h^{1/2}$ (b) h
(c) $h^{3/2}$ (d) h^2

SECTION- II – (CHEMISTRY)

46. Number of d-electrons present in Fe^{2+} [Z = 26] are not equal to –
    (a) No . of p-electrons in Ne [Z = 10]
    (b) No. of s-electrons in Mg [Z = 12]
    (c) No. of d-electrons in Fe
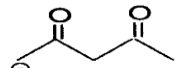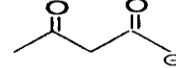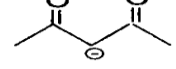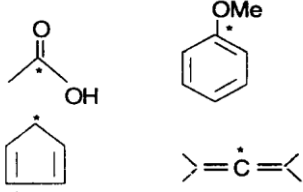   (d) No. of p-electrons in Cl [Z=17]

47. Which of the following statements is incorrect?
    (a) The number of electrons in 1g of hydrogen is 0.5 N_A
    (b) The number of protons in 12g of carbon is 6 N_A
    (c) The number of neutrons in 12 carbon is 6 N_A
    (d) The number of neutrons in 16g of oxygen is 8 N_A

48. Which hydride is the strongest base?
    (a) AsH_3 (b) NH_3
    (c) PH_3 (d) SbH_3

49. Ammonia forms complexes with Ag+ according to the following reactions:
    (I) $[Ag(H_2O)_2]^+ + NH_{3(aq)}$
    $\rightleftharpoons \cdot [Ag(NH_3)(H_2O_{(aq)})]^+ + H_2O_{(l)}$
    (II) $[Ag(NH_3)(H_2O_{(aq)})]^+ + NH_{3(aq)}$
    $\rightleftharpoons [Ag(NH_3)_{2(aq)}]^+ + H_2O_{(l)}$
    The equilibrium constants of equilibrium (I) and (II) are $2.0 \times 10^{+3}$ and $8.3 \times 10^{+3}$ respectively. The equilibrium constant of the following reaction
    $[Ag (H_2O)_{2(aq)}]^+ + 2 NH_{3(aq)}$
    $\rightleftharpoons [Ag (NH_3)_2]_{(aq)}^+ + 2 H_2O_{(l)}$
    (a) 4.15   (b) $2.0 \times 10^+3$
    (c) $8.3 \times 10^+3$ (d) $16.6 \times 10^+6$

50. A reaction mixture has been made by taken equal concentration of two reactants. It takes 40 minute for the completion of 50% of the reaction. For the completion of next 50% of reaction time taken is 80min. What is the order of reaction?
    (a) 2   (b) 0
    (c) 3   (d) 1

51. Calculate the pH of 4×10^{-3} molar solution of M (OH)$_3$. Its first dissociation is 100% whereas second dissociation is 50% and third dissociation is negligible –
    (a) 11.78   (b) 9.9
    (c) 10.2   (d) 2.22

52. Water contains dissolved CO_2,its reaction with water is represented as
    $CO_2 + H_2O \rightleftharpoons H_3O^+ + HCO_3^-$
    K_c for the reaction is 3.8×10^{-7} and pH = 6. What is the value of $\dfrac{[HCO_3^-]}{[CO_2]}$?
    (a) 3.8×10^{-1} (b) 3.8×10^{-13}
    (c) 6.0   (d) 3.8

53. In the titration of $K_2Cr_2O_7$ and ferrous sulphate following data are given, V_1 ml of 1.0 M_1 $K_2Cr_2O_7$ requires V_2 ml of 1.0 M_2 $FeSO_4$. The true relation is –
    (a) $6 V_1N_1 = V_2N_2$ (b) $V_1N_1 = 6 V_2N_2$
    (c) $V_1N_1 = V_2N_2$ (d) None of these

54. Mole fraction of a solvent, for a solution prepared by dissolving non-volatile solute is 0.998. What is the relative lowering of vapour pressure of solution?
    (a) 0.01   (b) 0.998
    (c) 0.499   (d) 0.002

55. The gaseous endothermic reaction; R → P + Q at 27^{0}C takes place spontaneously, because –
    (a) Δ H < 0   Δ S < 0
    (b) Δ H > 0   Δ S > 0
    (c) Δ H < 0   Δ S > 0
    (d) Δ H > 0   Δ S < 0

56. Δn_g for the combustion of one mole of ethanol (l) when both the reactants and products are at 298 K will be –
    (a) -1   (b) 0
    (c) +1   (d) +2

57. Which of the following is the example of zeolite?
    (a) $BaCO_3$ (b) ZSM -5
    (c) Mg (OH)$_2$ (d) Al_2O_3

58. The equivalent conductivity of 1M H_2SO_4 solution would be if specific conductance is 26×10^{-2} ohm^{-1}cm^{-1} (In ohm^{-1} cm^2 eq^{-1})-
    (a) 1.3×10^2 (b) 1.6×10^2
    (c) 2.3×10^2 (d) 2.6×10^2

59. It is essential to heat in hot air to oxidize sulphur form pyrites, the process is called –
    (a) Roasting   (b) Calcination
    (c) Smelting   (d) Electrolysis

60. In Cr^{2+}, Mn^{3+}, Fe^{2+} and Co^{3+} ions number of unpaired electrons and magnetic moment will be –
    (a) 3; 3.87   (b) 4; 4.90
    (c) 3; 2.83   (d) 1;1.73

61. $[Co(NH_3)_5 NO_2]Cl_2$ and $[Co (NH_3)_5 (ONO)] Cl_2$ are related to each other as –
    (a) Geometrical isomers   (b) Optical isomers
    (c) Linkage isomers   (d) Coordination isomers

62. The false statement about di-borane B_2H_6 is –
    (a) It forms borazine called inorganic benzene on reaction with ammonia
    (b) On hydrolysis it gives tri-basic acid
    (c) It has two three centered electron pair bonds
    (d) Four B – H covalent bonds in diborane lie in the same plane

63. In white phosphorous (P_4) molecule which one is not correct?
    (a) Six P –P single bonds are present
    (b) Four P – P single bonds are present
    (c) Four lone pair of electrons are present
    (d) PPP bond angle is 60^0.

64. Amatol an explosive contains –
    (a) 80% NH_4NO_3 +20% TNT
    (b) NH_4NO_3 + Al powder
    (c) 80% NH_4NO_3 + 20% $(NH_4)_2SO_4$
    (d) NH_4NO_3 +Zn powder

65. Which of the following species is not a pseudohalide?
    (a) CNO^- (b) $RCOO^-$
    (c) OCN^- (d) SCN^-

66. In estimation of nitrogen by Dumas method 1.18 g of an organic compound gave 224 ml of N_2 at STP. The percentage of nitrogen in the compound is about-
    (a) 20.0   (b) 11.8
    (c) 47.5   (d) 23.7

67. Compound on removal of proton gives a carbanion. The most stable carbanion should be –
    (A)
    (B)
    (C)
    (D) All the above

68. Correct set of hybridization state of the starred carbon atom respectively is

    (a) sp^2, sp^2, sp^3, sp (b) sp^3, sp^2, sp^2, sp
    (c) sp^3, sp, sp, sp^2 (d) sp^2, sp, sp^2, sp^2

69. $H - C \equiv C - H \xrightarrow[HgSO_4]{DilH_2SO_4} A \ (unstable) \rightarrow B$
    A and B exhibit –
    (a) Position isomerism   (b) Chain isomerism
    (c) Metamerism   (d) Tautomerism

70. Among the following alkenes highest reactivity on addition of hydrohalic acids is shown by –
    (a) $CH_2 = CH_2$ (b) $(CH_3)_2 C = CH_2$
   (c) $CH_3CH = CHCH_3$ (d) All alkenes

71. How many litres of air is needed for complete combustion of 8 litres of acetylene (oxygen in air is 20%)?
(a) 40
(b) 60
(c) 80
(d) 100

72. Which one of the following oxides of nitrogen is blue solid?
(a) N_2O
(b) N_2O_3
(c) NO
(d) N_2O_5

73. On adding KI solution in excess to a solution of $CuSO_4$ we get a ppt. 'P' and a mother liquor 'M' What are P and M respectively?
(a) P is CuI_2 and M is I_2 solution
(b) P is CuI and M is KI_2 solution
(c) P is CuI and M is I_2 solution
(d) P is CuI_2 and M is KI_2 solution

74. The IUPAC name of the compound, $[Ni(NH_3)_6]_3 [Co(NO_2)_6]_2$ is -
(a) Tris-[Nickel Hexammine]–tris-[Hexanitrocobaltate (III)]
(b) Tris-[Hexamminenickel(II)]-bis-[Hexanitrocobaltate (III)]
(c) Both a and b
(d) None of these

75. The colour produced in case of Zn salts in cobalt nitrate test in qualitative analysis is –
(a) Rinman's green
(b) Thenard's blue
(c) Pink
(d) Colourless

76. Which of the following compound is spirocyclic?

(A) [figure]   (B) [figure]

(C) [figure]   (D) [figure]
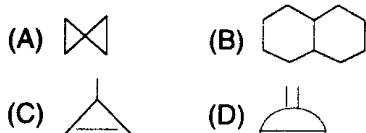
77. When 3-hexanone is oxidized with conc. HNO_3, the product formed is –
(a) Propanoic acid
(b) Butanoic acid
(c) Acetic acid
(d) All of these

78. Lindlar's catalyst is –
(a) Palladium supported over calcium carbonate, partially poisoned by lead acetate
(b) Palladium supported over $BaSO_4$ partially poisoned by quinoline
(c) Both a and b
(d) None of these

79. In S_N1 (substitution, nucleophilic unimolecular) reaction, the racemization takes place. It is due to –
(a) Inversion of configuration
(b) Retention of configuration
(c) Both a and b
(d) None of these

80. What product can be obtained in the following reaction?
$$(CH_3)_3 C-O-CH_3 \xrightarrow[HI/\Delta, ether]{Anhydrous}$$
(a) $CH_3I + (CH_3)_3 COH$
(b) $CH_3OH + (CH_3)_3C$ -I
(c) Both a and b
(d) None of these

**81.** In the following dot structure of N_2O, arrange the decreasing order (most stable first)

[dot structures (i), (ii), (iii)]
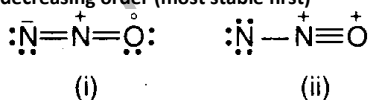
(a) (i) > (ii) > (iii)
(b) (iii) > (ii) > (i)
(c) (ii) > (iii) > (i)
(d) (iii) > (i) > (ii)

82. A compound $C_9H_{12}O$ is oxidized under vigorous conditions to benzoic acid. It reacts with CrO_3 and gives a positive iodoform test and the compound is chiral. What is the compound?
(a) 1-Phenylpropan-1-ol
(b) 1-Phenylpropan-2-ol
(c) 3-Phenylpropan-1-ol
(d) 2-Phenylpropan-1-ol

83. Pyrogallol is –

(A) [structure]

(B) [structure]

(C) [structure]

(D) All of these
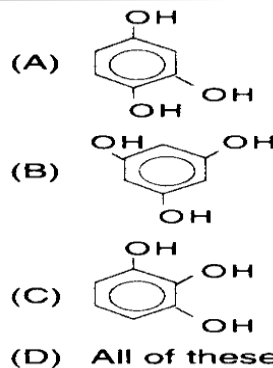
84. The geometry of $[Ni(CN)_4]^{2-}$ and $[NiCl_4]^{2-}$ are –
(a) Both square planar
(b) Both tetrahedral
(c) Tetrahedral and square planar respectively
(d) Square planar and tetrahedral respectively

85. The graph plotting 'rate vs. temperature' obtained is :

[graph: Rate vs Temp.]
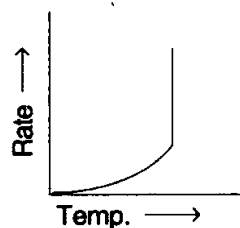
It represents –
(a) Enzyme catalysed reaction
(b) Explosive reaction
(c) Most general reaction
(d) None of these

86. The charge required for the reduction of one mole of $Cr_2O_7^{2-}$ ions to Cr^{3+} is –
(a) 96500 C
(b) 2 X 96500 C
(c) 6 X 96500 C
(d) 4 X 96500 C

87. ΔH neutralization of which pair of acid/base is – 13.7 kcal?
(a) CH_3COOH, NH_4OH
(b) CH_3COOH, NaOH
(c) NaOH, HCl
(d) All of these

88. Which of the following salt will have same value of van't Hoff's factor (i) as that of $K_4[Fe(CN)_6]$?
(a) $Al_2(SO_4)_3$
(b) NaCl
(c) $Al(NO_3)_3$
(d) Na_2SO_4

89. Which of the following has highest osmotic pressure?
(a) 1M NaCl
(b) 1M urea
(c) 1M sucrose
(d) 1M glucose

90. O_2^{2+} Contains ......unpaired electrons.
(a) 1
(b) 2
(c) 0
(d) 3

SECTION- III – (BIOLOGY)

91. A special connective tissue consisting of a fluid matrix, plasma and all the formed elements is
(a) Lymph
(b) Serum
(c) Plasma
(d) Blood

92. How much percentage of blood is constituted by a straw-coloured, viscous fluid i.e. plasma?
(a) 55%
(b) 45%
(c) 90-92%
(d) 65%

93. Which of the following protein is needed for clotting or coagulation of blood?
(a) Globulins
(b) Gamma-globulins
(c) Albumin
(d) Fibrinogen

94. Minimum power of regeneration is found in
(a) Neurons
(b) Osteoblast cells
(c) Epithelial cells
(d) Hepatic cells

95. 'Protoplasm is the physical basis of life' was stated by
(a) Huxley
(b) Haeckel
(c) Robertson
(d) Goldacre

96. 'Suicide bags of cells' are
(a) Golgi bodies
(b) Ribosomes
(c) Lysosomes
(d) Nucleoli

97. Inflammation of joints due to accumulation of uric acid crystals is called:-
   (a) Osteoarthritis
   (b) Gout
   (c) Osteoporosis
   (d) Rheumatoid arthritis

98. Age – related disorder characterised by decreased bone mass and increased chances of fractures, This condition is called:-
   (a) Muscular dystrophy
   (b) Tetany
   (c) Osteoporosis
   (d) Osteoarthritis

99. Which of the following is the, common cause of osteoporosis?
   (a) Spasm of muscles
   (b) Genetic disorder
   (c) Autoimmunity
   (d) Decreased level of oestrogen

100. The process in which light energy is converted into chemical energy is called
   (a) Photorespiration
   (b) Photophosphorylation
   (c) Photosynthesis
   (d) Phototropism

101. The role of chlorophyll during photosynthesis is that of a
   (a) Catalyst to combine CO_2 and H_2O
   (b) Reactant
   (c) Synthesiser of O_2
   (d) Salts

102. Light reaction takes place in the
   (a) Chloroplast envelope
   (b) grana
   (c) stroma
   (d) cytoplasm

103. The phenomenon of true regeneration found in
   (a) *Spirogyra*
   (b) *Plasmodium*
   (c) *Liver fluke*
   (d) *Planaria*

104. The organisms showing fragmentation type of asexual reproduction are
   (a) Fungi
   (b) Filamentous algae
   (c) Protonema of mosses
   (d) All of above

105. The sum total of all the chemical reactions occurring in our body is termed as:
   (a) Growth
   (b) Metabolism
   (c) Reproduction
   (d) Development

106. Roots that grow from any other part of the plant other than the radicle are called
   (a) Tap roots
   (b) Adventitious roots
   (c) Prop roots
   (d) Epiphytic roots

107. A large globular root that tapers sharply at the lower end is called
   (a) Fusiform
   (b) Napiform
   (c) Conical
   (d) Tuberose

108. The roots that have swellings at regular intervals are called
   (a) Nodulose
   (b) Fasciculated
   (c) Moniliform
   (d) Tuberose

109. All the carbon compound that we get from living tissue are called
   (a) Biomolecules
   (b) Inorganic compounds
   (c) Elements
   (d) Compounds

110. Organic compound containing an amino group an acidic group as substituents on the same carbon are
   (a) Fatty acids
   (b) Amino acids
   (c) Polypeptides
   (d) Nucleic acids

111. The amino acid with R-group as a hydrogen is
   (a) Alanine
   (b) Phenylalanine
   (c) Glycine
   (d) Serine

112. A difficulty in breathing causing wheezing due to inflammation of bronchi & bronchioles are symptoms of
   (a) Emphysema
   (b) Asthma
   (c) Cystic fibrosis
   (d) Fibrosis

113. A chronic disorder in which alveolar walls are damaged and respiratory surface is decreased is
   (a) Emphysema
   (b) Asthma
   (c) Pneumonia
   (d) Asbestosis

114. Receptor associated with aortic arch and carotid artery recognise change in :-
   (a) CO_2 & H^+
   (b) H^+ & O_2
   (c) O_2 & CO_2
   (d) O_2 & BPG

115. mRNA is produced by DNA the process is called
   (a) Transfusion
   (b) Transcription
   (c) Transfer
   (d) Transportation

116. Site of protein synthesis in a cell is
   (a) Ribosomes
   (b) Chloroplasts
   (c) Chromosomes
   (d) chromoplasts

117. Cancer cells are more easily damaged by radiation than normal cells because they
   (a) Are different in structure
   (b) Are non dividing
   (c) Are starved by nutrition
   (d) Are undergoing rapid division

118. Match the following:-
Column-I	Column-II
(1) T_4	(p) Hypothalamus
(2) PTH	(q) Thyroid
(3) GnRH	(r) Pituitary
(4) LH	(s) Parathyroid
   (a) 1-p, 2-q, 3-r, 4-s
   (b) 1-q, 2-s, 3-p, 4-r
   (c) 1-q, 2-p,3-r, 4-s
   (d) 1-s, 2-r, 3-p,4-q

119. The hormones which interact with intracellular receptors are:-
   (a) cortisol, estradiol, insulin & FSH
   (b) FSH, Iodothyronines and gastrin
   (c) Iodothyronines, estradiol & Cortisol
   (d) FSH, secretin and CCK

120. Which of the following hormones mostly regulate gene expression by the interaction of hormone-receptor complex with the genome?
   (a) GIP and CCK
   (b) Epinephrine & Nor-epinephrine
   (c) Iodothyronines and steroid hormones
   (d) Glucagon and insulin

121. Fill in the gaps:-
   Ascending limb of Henle's loop is ……A….. to water whereas the descending limb is …………to it.
   (a) A - Permeable, B – Permeable
   (b) A – Pertially permeable, B – Impermeable
   (c) A - Permeable, B – Impermeable
   (d) A – Impermeable, B – Permeable

122. A chordate animal having flame cells as excretory structure is :-
   (a) *Fasciola*
   (b) *Taenia*
   (c) *Balanoglossus*
   (d) *Branchiostoma*

123. Cortical portions projecting between the medullary pyramids in the human kidney are:-
   (a) Duct of Bellini
   (b) Columns of Bertini
   (c) Gradient of osmolarity
   (d) Renal corpuscles

124. The carnivorous plants are heterotrophic because they are
   (a) Totally dependent on animals
   (b) Present in nitrogen deficient soils
   (c) Present in the shady area

(d) Modified to catch insects

125. Which of the following insectivorous plant has leaf blades modified in the form of two hinged lobes to make a trap for the insects
(a) Nepenthes (b) Drosera
(c) Dionaea (d) Utricularia

126. The bladders in the plant Utricularia are modified
(a) Leaves (b) stems
(c) Roots (d) flowers

127. Which part of the embryo give rise to roots?
(a) Plumule (b) Radicle
(c) Cotyledon (d) Micropyle

128. Fibrous root system is present in
(a) Wheat (b) mango
(c) Banyan (d) pinus

129. The main function of root system is:
(a) Anchorage to plant parts
(b) Storage of reserve food material
(c) Synthesis of plant growth regulators
(d) All of these

130. Aqueous humor is present
(a) in front of retina (b) in front of cornea
(c) Behind the conjunctiva (d) in front of lens

131. The pigmented layer of the eye is known as
(a) Sclerotic (b) Choroid
(c) Retina (d) cornea

132. Which of the following vitamin is used for proper vision?
(a) K (b) D
(c) A (d) E

133. The phytohormone that helps in germination of seed, is
(a) ABA (b) auxin
(c) gibberellin (d) cytokinin

134. Auxanometer is used to measure
(a) The growth in length of a plant organ
(b) The growth in breadth of a plant organ
(c) Population of the pests attacking a plant
(d) Both (a) and (b)

135. Bolting may be induced by
(a) Gibberellins (b) ABA
(c) Auxin (d) cytokinin

136. Gross superficial morphological characters used in earliest system of classification are
(a) Habit (b) Colour
(c) Number and shape & leaves (d) all

137. Natural classification systems were based on –
(a) Natural affinities (b) External features
(c) Phytochemistry (d) All of above

138. Which of the following is based on cytological information like chromosome number, structure etc?
(a) Cytotfaxonomy
(b) Chemotaxonomy
(c) Numerical + axonamy (d) Both 'a' and 'b'

139. How much energy is released during complete aerobic oxidation of one molecule of glucose?
(a) 686 k cal. (2868 kj) (b) 586 k cal. (2450 kj)
(c) 786 k cal. (3286 kj) (d) None of the above

140. Most common respiratory substrates in plants are,
(a) Fats (b) Proteins
(c) Carbohydrates (d) Organic acids

141. Combustion differs from respiration because in combustion,
(a) ATPs are not synthesised
(b) Light is produced
(c) Flame is produced (d) All of above

142. In multicellular animals, a group of similar cells along with intercellular substances perform a specific function. Such an organisation is called …..
(a) Organ (b) Tissue
(c) Organ system (d) Epithelium

143. How many basic types of tissues are found in all complex animals?
(a) 4 (b) 5
(c) 6 (d) 7

144. When different types of tissues are organised in specific proportion and pattern, they would form….
(a) Organ system (b) Organ
(c) Epithelium (d) Mucosa

145. Which of the following feature are used as the basis of animal classification?
(a) Body symmetry (b) Coelom
(c) Notochord (d) All of these

146. Though all member of Animalia are multicellular, all of them do not exhibit
(a) Eukaryotic condition
(b) Same pattern of organisation of cells
(c) Same kind of coelomic condition.
(d) Both (b) and (c)

147. In sponges, the cells are arranged as loose cell aggregate, i.e., they exhibit.
(a) Tissue level of organisation
(b) Organ level
(c) Cellular level
(d) Organ system

148. Two kingdom system of classification was proposed by
(a) Carolus Linnaeus (b) R.H.Whittaker
(c) Charles Darwin (d) Robert Hooke

149. The two kingdom system of classification cannot differentiate between
(a) Unicellular and multicellulor
(b) Prokaryotic and eukaryotic organisms
(c) Photosyntbetic and nonphotosynthetic organisms
(d) All of above

150. Five kingdom system of classification was given by
(a) Carolus Linnaeus (b) R.H.Whittaker
(c) Charles Darwin (d) Robert Hooke

151. In which of following, the faeces are retained within the rectum as the bowl movements occurs irregularly
(a) Indigestion (b) Constipation
(c) Diarrhoea (d) Amoebiasis

152. Gastric juice contain :
(a) Trypsin, pepsin & rennin
(b) Trypsin, pepsin & lipase
(c) Trypsin & lipase, pepsin
(d) Pepsin, lipase, &rennin

153. Success entericus is the name given to:-
(a) A junction between ileum & large intestine
(b) Intestinal juice
(c) Swelling in the gut
(d) Appendix

154. Useful water for plants is.
(a) Soil water (b) Run away water
(c) Capillary water (d) Transpired water

155. In a plasmolysed cell.
(a) TP is minimum (b) DPD is equal to TP
(c) DPD is equal to OP (d)OP = TP

156. Solute potential is
(a) Negative (b) Positive
(c) Zero (d) Infinite

157. "The Earth Summit" held in
(a) Johannesburg, South Africa
(b) Morges, Switzerland
(c) Rio de Janeiro (d) Copenhagen

158. The World Summit on sustainable development held in
    (a) Rio de Janeiro (b) Johannesburg
    (c) Copenhagen (d) Geneva, Switzerland

159. Introduction of foreign genes for improving genotype is called:
    (a) Vernalization (b) Tissue Culture
    (c) Biotechnology (d) Genetic Engineering

160. In genetic engineering, recombinant DNA means
    (a) DNA with piece of RNA
    (b) DNA with a piece of foreign DNA
    (c) DNA which takes part in recombination
    (d) DNA not act as biological recombination

161. What is the percentage of photosynthetically active radiation (PAR) in the incident solar radiation?
    (a) 100% (b) 50%
    (c) 1-5% (d) 2-10%

162. Secondary producers are
    (a) Herbivores (b) producers
    (c) Top Carnivores (d) Decomposers

163. Which of the following is a fish – like reptile probably existed about 200 mya?
    (a) Ichthyophis (b) Ichthyosaur
    (c) Archaepteryx (d) Seymouria

164. The biggest dinosaur was –
    (a) Tyrannosaurus rex (b) Ichthyosaur
    (c) Ophiosaurus (d) Dryopithecus

165. Which of the following immunity present in the body by birth?
    (a) Innate immunity (b) Specific immunity
    (c) Acquired immunity (d) Active immunity

166. Lysozyme in saliva is an example of
    (a) Physical barrier (b) Cytokine barrier
    (c) Physiological barrier (d) Cellular barrier

167. Which one of the following is not a biofertilizer?
    (a) Rhizobium (b) Nostoc
    (c) Mycorrhiza (d) Agrobacterium

168. Ethanol is commercially produced through a particular speices of
    (a) Clostridium (b) Trichoderma
    (c) Aspergillus (d) Saccharomyces

169. Peptide synthesis inside a cell takes place in
    (a) Mitochondria (b) chromoplast
    (c) ribosomes (d) chloroplast

170. The reaction, Amino acid + ATP → Aminoacyl AMP + P-P depicts
    (a) Amino acid assimilation
    (b) Amino acid transformation
    (c) Amino acid activation
    (d) Amino acid translocation

171. The father of Ecology in India is
    (a) Lalji Singh (b) R. Mishra
    (c) Hargobind Khorana (d) Birbal Sahni

172. Select the correct sequence
    (a) Population – Organisms – Biomes – Communities
    (b) Organisms – Biomes – Populations – Communities
    (c) Organisms – Populations – Biomes – Communities
    (d) Organisms – Populations – Communities – Biomes

173. How many meiosis are required for formation of 32 zygotes in angiosperms?
    (a) 40 (b) 32
    (c) 48 (d) 64

174. Formation of embryo from unfertilized egg is known as
    (a) Self incompatibility
    (b) parthenocarpy
    (c) Diploid parthenogenesis
    (d) Haploid parthenogenesis

175. Match the following;-

Column I	Column II
(1) Catalytic Converter	(p) Particulate matter
(2) Electrostatic precipitator	(q) CO & NO₂
(3) Earmuffs	(r) High noice level
(4) Landfills	(s) Solid wastes

    (a) 1-r, 2-s, 3-q, 4-p (b) 1-s, 2-r, 3-p, 4-q
    (c) 1-q, 2-p, 3-r, 4-s (d) 1-p, 2-q, 3-r, 4-s

176. Realising the significance of participation by local communities, the Govt. of India in 1980s has introduced the concept of:-
    (a) Chipko movement
    (b) Amrita Devi Bishnoi wildlife protection award.
    (c) Joint Forest management (JFM)
    (d) Jhum cultivation

177. In mammals, failure of testes to descend into the scrotum is known as:
    (a) Castration (b) Impotency
    (c) Cryptorchidism (d) Neoteny

178. During differentiation, the spermatids remain associated with:-
    (a) Leydig cells (b) Sertoli cells
    (c) Interstitial cell (d) Neoteny

179. Barr bodies are found in man and are associated with
    (a) Male sex chromosomes
    (b) Female autosomes
    (c) Male autosomes
    (d) Female sex chromosome

180. The blood group containing anti A and anti B is
    (a) Blood group A (b) Blood group B
    (c) Blood group AB (d) Blood group O