MODEL QUESTIONS – B.Tech

Part 1. - Physics

1. Which of the following pairs DOES NOT have the same dimensions?

   a) frequency and angular frequency
   b) angular velocity and velocity gradient
   c) velocity gradient and angular frequency
   d) angular frequency and potential energy gradient

2. The velocity of a particle depends upon t as $V = A + Bt + ct^2$. If velocity is in *m/s*, the unit of A will be

   a)*m/s* b)m/s^2 c) *m.s* d) m^2/s

3. Which of the following four statements is false?

   a) A body can have zero velocity and still be accelerated
   b) A body can have a constant velocity and still have a varying speed
   c) A body can have a constant speed and still have a varying velocity
   d) The direction of the velocity of a body can change when its acceleration is constant

4. The displacement x of a body in motion is given by $x = a \sin(\omega t + \theta)$. The time at which the displacement is maximum is:

   a) $\frac{\theta}{\omega}$ b) $\left(\frac{\pi}{2\omega} - \frac{\theta}{\omega}\right)$ c) $\left(\frac{\pi}{2\omega}\right)$ d) $\left(\frac{2\pi}{\omega} - \frac{\theta}{\omega}\right)$

5. The position of a particle moving along x – axis is given by $x = 3t - 4t^2 + t^3$, where x is in metre and t in seconds. The average velocity of the particle in the time interval from t = 2 seconds to t = 4 seconds is

   a) 7*m/s* b) 1*m/s* c) 13*m/s* d) None of these

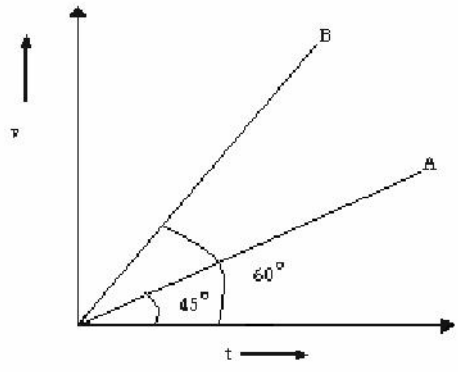
6. An object A of mass 2 kg is moving with a velocity of 3 ms^{-1} and collides head on with an object B of mass 1 kg moving in the opposite direction with a velocity of 4 ms^{-1}. After collision both objects coalesce so that they move with a common velocity v equal to

   a) $\frac{2}{3}$ ms^{-1} b) 1 ms^{-1} c) 2 ms^{-1} d) 3 ms^{-1}

7. The motion of planets in the solar system is an example of conservation of

   a) mass
   b) momentum
   c) angular momentum
   d) kinetic energy

8. The velocity time graphs of two bodies A and B are shown in figure. The ratio of their acceleration is:



a) $1 : \sqrt{3}$ b) $1 : 3$ c) $\sqrt{3} : 1$ d) $\sqrt{3} : \sqrt{2}$

9. For a satellite, escape velocity is 11 km/s. If the satellite is launched at an angle of 60^0 with the vertical, then escape velocity will be

a) 11 *km/s* b) $11\sqrt{3}$ *km/s* c) $\frac{11}{\sqrt{3}}$ *km/s* d) 33 *km/s*

10. There are two bodies of masses 100 kg and 10,000 kg separated by a distance of 1m. At what distance from the smaller body, the intensity of gravitational field will be zero.

a) $1/9$ m b) $1/10$ m c) $1/11$ m d) $10/11$ m

11. A liquid will not wet the surface of a solid if its angle of contact is

a) zero
b) less than 90^0
c) more than 90^0
d) 90^0

12. In a simple harmonic moti on (SHM), which of the following does not hold?

a) The force on the particle is maximum at the ends.
b) The acceleration is minimum at the mean position
c) The potential energy is maximum at the mean position
d) The kinetic energy is maximum at the mean position

13. What will be the wave velocity, if the radar gives 54 waves per minute and wavelength of the given wave is 10m?

a) 4 *m/s* b) 6 *m/s* c) 9 *m/s* d) 5 *m/s*

14. A bomb explodes on the moon. How long will it take far the sound to reach the earth?

a) 10 s b) 1000 s c) 1 light year d) None of these

15. Two gases are at absolute temperatures of 300k and 350 k respectively. Ratio of average kinetic energy of their molecules is

a) 7 : 6 b) 6 : 7 c) 36 : 49 d) 49 : 36

16. Two identical samples of a gas are allowed to expand a) isothermally b) adiabatically Work done is

a) more in the isothermal process
b) more in the adiabatic process
c) neither of them
d) equal in both processes

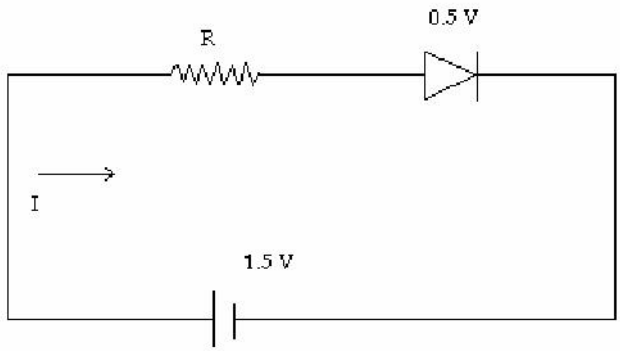
17. An ideal heat engine exhausting heat at 77^0C is to have 30% efficiency. It must take heat at

a) 127^0 c b) 227^0 c c) 327^0 c d) 673^0 c

18. In a p – n junction having depletion layer of thickness 10^{-6} m the potential across it is 0.1 V. The electric field is ----------Vm^{-1}

a) 10^7 b) 10^{-6} c) 10^5 d) 10^{-5}

19. The diode used in the circuit shown in the figure has a constant voltage drop of 0.5V at all currents and a maximum power rating of 100 milliwatts. What should be the value of the resistor R, connected in series with the diode, for obtaining maximum current?



a) 1.5 Ω b) 5 Ω c) 6.67 Ω d) 200 Ω

20. The mass number of Helium is 4 and that for sulphur is 32. The radius of sulphur nucleus is larger than that of Helium, by

a) $\sqrt{8}$ times b) 4 times c) 2 times d) 8 times

21. In Nuclear Fission 0.1% mass is converted in to energy. The energy released by the fission of 1 kg mass will be

a) 9×10^{16} J b) 9×10^{19} J c) 9×10^{13} J d) 9×10^{17} J

22. Half life of a radioactive substance is 140 days. Initially there is 16g of the substance. Calculate the time for this substance when it reduces in to 1g.

a) 140 days b) 280 days c) 420 days d) 560 days

23. The ratio of the long wavelength limits of the Lyman and Balmer series of hydrogen is

a) 27 : 5 b) 5 : 27 c) 4 : 1 d) 1 : 4

24. Light of wavelength 5000 Å falls on a sensitive plate with photoelectric work function of 1.9 eV. The kinetic energy of the photoelectron emitted will be

a) 0.58 eV b) 2.48 eV c) 1.24 eV d) 1.16 eV

25. The population inversion necessary for laser action used in solid state lasers is

a) electrical discharge
b) inelastic atom – atom collision
c) direct conversion
d) optical pumping

26. A magnet of moment 2 Am^2 is placed in a uniform magnetic field of 5 Wb/m^2. If the magnet experiences a torque of 5 Nm, then the angle between the direction of magnetic field and magnet is

a) $\frac{\pi}{6}$ b) $\frac{\pi}{4}$ c) $\frac{\pi}{3}$ d) $\frac{\pi}{2}$

27. The reduction factor of a tangent galvanometer is K. If the number of turns and area of cross section of the coil are doubled, then the reduction factor becomes

a) $\frac{K}{2}$ b) $2K$ c) $\frac{K}{\sqrt{2}}$ d) $\sqrt{2}$ K

28. The Focal length of a convex lens will be maximum for

a) blue light b) yellow light c) green light d) red light

29. In the Young's double slit experiment using sodium light ($\lambda = 5898$ Å), 92 fringes are seen. If the green colour ($\lambda = 5461$Å is used, how many fringes will be seen

a) 62 b) 67 c) 75 d) 99

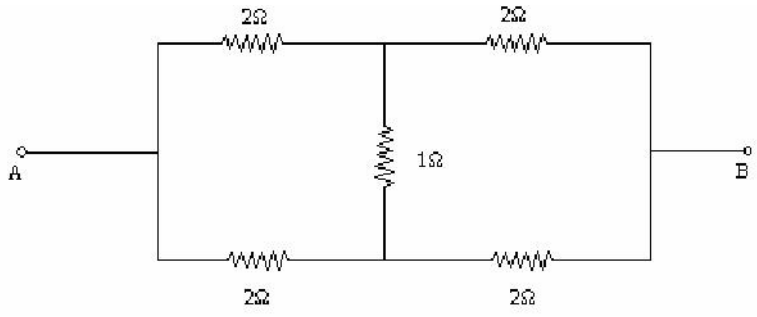
30. In the figure distance of the point from A where the electric field is zero is

a) 20 cm b) 10 cm c) 33 cm d) None of these

31. A parallel plate capacitor is first charged and then a dielectric slab is introduced between the plates. The quantity that remains unchanged is

a) charge Q b) Potential V c) Capacity C d) Energy U

32. The equivalent resistance between A & B of the circuit shown in the given figure is



a) 9 Ω b) 4 Ω c) 2 Ω d) 1 Ω

33. As the temperature of hot junction increases, the thermo emf

a) always increases
b) always decreases
c) may increase and decrease
d) always remains constant

34. A moving charge will produce

a) only a magnetic field
b) only a electric field
c) both electric and magnetic field
d) none of these

35. The energy stored in a coil of self inductance 40 mH carrying a steady current of 2A is

a) 0.08 J b) 0.8 J c) 80 J d) 8 J

Part 2. – Chemistry

36. In which of the following pairs (of molecules / ions) the central atom has the same hybridisation?

a) XeF_4 & ClO_4^- b) $BeCl_2$ & SO_2

c) BH_3 & ClF_3 c) NH_3 & NH_4^+

37. Dissociation constant of a weak acid is 1×10^{-6} at 25°C. Find the p^{OH} of 0.01 *M* of its aqueous solution.

(a) 4 (b) 3 (c) 10 (d) 12

38. Assertion (A): Molar mass of acetic acid found by the depression of freezing point method, separately in the solvents water and benzene are different.
Reason (R): Water helps in ionization but benzene brings association of acetic acid. Identify the correct option.

(a) Both A and R are correct; R is the correct explanation for 'A'
(b) Both A and R are correct; but R is not the correct explanation for 'A'
(c) A is true but R is false
(d) A is false but R is true

39. 2,4,6-Tribromophenol is formed when the organic compound '*X*' reacts with '*Y*' in the presence of *Z*. What are *X, Y* and *Z*?

a) $C_6H_5OH\ ; Br_2; CS_2$ b) $C_6H_5OH\ ; Br_2; H_2O$

c) $C_6H_5CHO; Br_2; FeBr_3$ d) $C_6H_6; Br_2; H_2O$

40. Enthalpy of formation of $C_2H_4(g) CO_2(g)$ and $H_2O(l)$ at 25^0C and I atm pressure are 52, -394 and -286 KJ/mol respectively. Enthalpy of combustion of $C_2H_4(g)$ *is*

a) *+1412 KJ/mol* b) *-1412 KJ/mol*
c) *+141.25 KJ/mol* d) *-141.2 KJ/mol*

41. Identify the formula which is applicable to the conversion of 20% of the initial concentration of the reactant to the product in a first order reaction. (Rate constant = *K*)

a) $t_{20\%} = \frac{2.303}{5}\log\frac{100}{20}$ b) $t_{20\%} = \frac{2.303}{20}\log\frac{100}{K}$

c) $t_{20\%} = \frac{2.303}{K}\log\frac{5}{4}$ d) $t_{20\%} = \frac{2.303}{100}\log\frac{K}{80}$

42. Chloroform and alcoholic *KOH* can be used to differentiate -

(a) CH_3CHO & CH_3COCH_3 (b) $HCOOH$ & CH_3COOH
(c) CH_3NH_2 & $(CH_3)_2NH$ (d) C_2H_5OH & CH_3OCH_3

43. Strongest and the weakest bases among the hydroxides of Lanthanides are respectively –

a) $Lu(OH)_3$ & $La(OH)_3$ b) $La(OH)_3$ & $Lu(OH)_3$

c) $La(OH)_3$ & $Ce(OH)_3$ d) $Pm(OH)_3$ & $Nd(OH)_3$

44. In a cubic unit cell, the following atom / ion occupy the positions as mentioned below.
Na ... In the centre of the cube

W ... (Tungston) At the corners of the cube
O ... (Oxygen) At the centre of the edges.
(Formula of the compound is -)
(a) $NaWO_2$ (b) $NaWO_3$ (c) Na_2WO_3 (d) $NaWO_4$

45. In which of the following aspects both physical adsorption and chemical adsorption, resemble? Both are .....
(a) exothermic (b) multimolecular layered
(c) reversible (d) found more at high temperature

46. Among the following ions, which has the highest spin magnetic moment?
(At . No: $Ti = 22$; $Mn = 25$; $Ni = 28$; Cu = 29).

(a) Cu^{2+} (b) Ti^{3+} (c) Ni^{2+} (d) Mn^{2+}

47. $SO_2Cl_2 \overset{\Delta}{\rightleftharpoons} SO_2 + Cl_2$
(g) (g) (g)
At equilibrium volume of the reaction vessel is increased. As a result the amount of -
(a) SO_2 will decrease (b) SO_2Cl_2 will increase
(c) Cl_2 will increase (d) Cl_2 will remain unchanged

48. Which of the following reagents can convert acetone to acetic acid?
(a) $AgNO_3$; NH_4OH (b) $LiAlH_4$
(c) Conc. HCl (d) I_2, $NaOH$; dilute HCl

49. A large increase from the first to the second ionisation energy of an element 'A' can be seen if its electronic configuration is -
(a) $1S^2\,2S^2\,2P^6\,3S^1$ (b) $1S^2\,2S^2\,2P^6\,3S^2$
(c) $1S^2\,2S^2\,2P^5$ (d) $1S^2\,2S^2\,2P^6\,3S^2\,3P^2$

50. $K_2Cr_2O_7 + x\,KCl + 6\,H_2SO_4 \rightarrow y\,CrO_2Cl_2 + 6\,KHSO_4 + z\,H_2O$, x, y and z are respectively
(a) 4, 2, 3 (b) 6, 2, 6
(c) 8, 2, 4 (d) 4, 1, 6

51. Which of the following reactants combine to produce C_6H_6, N_2 and HCl?
(a) $C_6H_5N_2Cl$, Hot H_2O (b) $C_5H_5N_2Cl$, C_6H_5OH
(c) $C_6H_5N_2Cl$, HCl, Cu_2Cl_2 (d) $C_6H_5N_2Cl$, H_3PO_2 , H_2O

52. In the nuclear transformation of X to Y ${}_jX^i \rightarrow {}_lY^h + m_2He^4 + n\ {}_{-1}\beta^\circ$ the number of beta particles 'n' is equal to

a) $(i-K)\frac{1}{4}$ b) $(l-j)+2m$

c) $(l-j)\frac{1}{2}$ d) $(K-l)-2m$

53. At a certain temperature vapour pressure of pure water is 3000 Nm^{-2}. To 100 gms of water, 5 gms of non-electrolyte and non- volatile solute is added. Vapour pressure of the solution is 2985 Nm^{-2}. Assume that it is a dilute solution, find the molar mass of the solute.
(a) 90 (b) 180 (c) 200 (d) 270

54. Which of the following in pairs is wrongly matched?

I	II
(a) Terylene	$OH-CH_2-CH_2OH$
(b) Nylon 6,6	$NH_2CH_2(CH_2)_4CH_2NH_2$
(c) Buna-S-Rubber	$C_6H_5\,CH=CH_2$
(d) Bakelite	C_2H_5OH

55. In the aqueous medium, which of the following ion is colourless ?
(At. No. of *Sc* = 21 ; *Ti* = 22 ; *V* = 23 & *Fe* = 26).
(a) Sc^{3+} (b) Ti^{3+} (c) V^{3+} (d) Fe^{3+}

56. Among the following the most stable free radical is –
a) $CH_3\dot{C}H_2$.
b) $CH_3\dot{C}H \quad CH_3$
c) $CH_3\dot{C}H \quad C_6H_5$
d) $C_6H_5CH_2\dot{C}H_2$.

57. X-rays of wave-length 1.14 A in the first order reflection from a crystal, were reflected at an angle of 30^o.
The inter planar distance in the crystal is (sin 30^o is 0.5)

a) $3.8A^\circ$ b) $1.14A^\circ$
c) $0.342A^\circ$ d) $2.28A^\circ$

58. One litre of an aqueous solution has 3.65 gms of HCl. It is desired to increase the *pH* of the solution to 2.
Then H_3O^+ ion concentration present initially should be
a) Also doubled b) Reduced to half
c) Increased by 10 times d) Reduced by 10 times

59. Which among the following is a Polyamide Polymer?
(a) Terylene (b) Buna-S-rubber
(c) Polystyrene (d) Nylon 6,6

60. Which among the following is used as antacid?
(a) Aspirin (b) Phenacetin
(c) $Al(OH)_3$ + $Mg(OH)_2$ (d) *P*-Hydroxy azo benzene.

61. Find the correct statement about crystal defects.
a) schottky defect makes a crystal electrically charged.
b) frenkel defect alters the density of the crystal.
c) metal excess defect gives colour to the crystal
d) metal deficiency defect can be found in the halides of alkali metals.

62. Which of the following conversions involves gain of 5 electrons per ion?
a) $MnO_4^- \rightarrow Mn^{2+}$ b) $CrO_4^{2-} \rightarrow Cr^{3+}$
c) $MnO_4^{2-} \rightarrow MnO_2$ d) $Cr_2O_7^{2-} \rightarrow 2Cr^{3+}$

63. Sodium reacts with water to give H_2 gas and the solution contains substance 'A' zinc metal reacts solution 'A' to give the same H_2 gas. Compound 'A' is
a) Na_2O b) $NaOH$ c) Na_2CO_3 d) $NaHCO_3$

64. Meso form can be obtained in-
a) 1,2 – Dichlorobutane b) 1,4 – Dichlorobutane
c) 2,3 – Dichlorobutane d) 1,3 – Dichlorobutane

65. Decomposition of ozone can be caused by
a) atomic helium b) water vapour c) dust particles d) atomic chlorine

66. Normality of 0.25 M phosphorus acid H_3PO_3 is

a) 0.125 b) 0.75 c) 0.50 d) 0.25

67. Which of the following sets contains oxides in the sequence of basic, amphoteric and acidic in nature respectively?

a) CaO, SiO_2, Al_2O_3 b) Al_2O_3, CO_2, SiO_2

c) CO, SO_2, P_2O_5 d) BaO, Al_2O_3, SiO_2

68. Among $LiCl, RbCl, BeCl_2$ and $MgCl_2$ compounds with maximum and minimum ionic character are respectively.

a) $LiCl; RbCl$ b) $RbCl; BeCl_2$ c) $RbCl; MgCl_2$ d) $MgCl_2; BeCl_2$

69. Between actinides and lanthanides, the complex formation tendency is more for

a) lanthanides because of high chemical reactivity
b) lanthanides due to greater stability.
c) actinides as they have variable oxidation states.
d) actinides due to high charge to size ratio

70. A solid mixture has benzoic acid and naphthalene. From this naphthalene can be separated by using

a) aqueous $NaOH$ b) cold water c) benzene d) diethylether

Maths – Part 3

71. If $\begin{vmatrix} a & b & \alpha d & -d \\ b & c & b\alpha & -c \\ 2 & 1 & 0 & \end{vmatrix} = 0$ and $\propto$? $\frac{1}{2}$, then a, b, c are in

a) A.P b) G.P c) H.P d) none of the above

72. If sin x + cosec x = 2, then $\sin^n x + \text{cosec}^n x$ is equal to

a) 2^n b) 2 c) 2^{n-1} d) 2^n-1

73. The value of $\tan\left[\cos^{-1}(\frac{4}{5})+\tan^{-1}(\frac{2}{3})\right]$ is

a) $\frac{1}{16}$ b) $\frac{7}{16}$ c) $\frac{16}{7}$ d) none

74. If a, b, c are in G.P, x, y are the A.M of a, b and b, c, respectively, then $\frac{a}{x}+\frac{c}{y}=$ ____

1) 3 b) 1 c) 2 d) 5

75. The equation of the plane containing the line $\frac{x+1}{-3}=\frac{y-3}{2}=\frac{z+2}{1}$ and the point (0, 7, -7) is

a) x+y+z = 1 b) x+y+z=2 c) x+y+z=0 d) None of these

76. Foot of the perpendicular from the point (2, 2, 2) in the plane x+y+z = 9 is

a) (1, 1, 1) b) (3, 3, 3) c) (9, 0, 0) d) (2, 6, 1)

77. The solution of the equation $9^x+78 = 3^{2x+3}$ is

a) 2 b) 3 c) 1/3 d) ½

78. The area of the quadrilateral formed by the tangents at the end points of latus rectum to the ellipse $\frac{x^2}{9}+\frac{y^2}{5}=1$ is

a) $\frac{27}{4}$ sq units b) 9 sq units

c) $\frac{27}{2}$ sq units d) None of the above

79. If $\cos^{-1}\left[\frac{x^2-y^2}{x^2+y^2}\right]=\log a$, then $\frac{dy}{dx}$ is equal to:

a) $\frac{y}{x}$ b) $\frac{x}{y}$ c) $\frac{x^2}{y^2}$ d) $\frac{y^2}{x^2}$

80. The image of the point (1, 6, 3) on the line $\frac{x}{1}=\frac{y-1}{2}=\frac{z-2}{3}$ is

a) $(1,6,7)$ b) $(1,-6,-7)$

c) $(1,0,7)$ d) $(-1,1,-7)$

81. $\int\frac{\sin x-\cos x}{\sqrt{1-\sin 2x}}e^{\sin x}\cos x\,dx=$

a) $e^{\sin x}+c$ b) $e^{\sin x-\cos x}$

c) $e^{\sin x+\cos x}+c$ d) $e^{\cos x-\sin x}+c$

82. If A = If $A=\begin{bmatrix}\cos q & -\sin q & 0\\ \sin q & \cos q & 0\\ 0 & 0 & 0\end{bmatrix}$, then A^3 will be a null matrix if and only if

a) $\theta=(2K+1)\frac{\pi}{2}(k\in 1)$

b) $\theta=(4K-1)\frac{\pi}{3}(k\in 1)$

c) $\theta=(3K-1)\frac{\pi}{4}(k\in 1)$

d) none of these

83. If $\bar{x}$ is the mean of n observations $x_1, x_2 \ldots\ldots x_n$, then the mean of $\frac{x_1}{a},\frac{x_2}{a},\ldots\frac{x_n}{a}$ is

a) $\frac{\bar{x}}{a}$ b) $\bar{x}+a$

c) $a\bar{x}$ d) $a^2\bar{x}$

84. The value of sin 10° + sin 20° + sin 30° + ……. + sin 360° is

a) 1 b) 0 c) -1 d) 2

85. The degree and order of the differential equation $y = px + \sqrt{a^2p^2 + b^2}$ where $p = \frac{dy}{dx}$ is

a) (2, 1) b) (2, 2) c) (1, 2) d) (1, 1)

86. The coefficient of the term independent of x in the expansion of $(1 + x + 2x^3)\left[\frac{3}{2}x^2 - \frac{1}{3x}\right]^9$ is

a) $\frac{17}{54}$ b) $\frac{1}{3}$ c) $\frac{19}{54}$ d) $\frac{1}{4}$

87. A pack of playing cards was found to contain only 51 cards, if the first 13 cards which are examined are all red, then the probability that the missing card is black

a) $\frac{1}{3}$ b) $\frac{1}{2}$ c) $\frac{25C_{13}}{51C_{13}}$ d) $\frac{2}{3}$

88. $\int \frac{x + \sin x}{1 + \cos x} dx =$

a) $x\tan(\frac{x}{2}) + C$ b) $\cot(\frac{x}{2}) + C$ c) $\log(1 + \cos x) + C$ d) $\log(x + \sin x) + C$

89. If the focus of the parabola is at (0, -3), and its directrix direction is y=3, then its equation is _____

a) $x^2 = -12y$ b) $x^2 = 12y$ c) $y^2 = -12x$ d) $y^2=12x$

90. If $\frac{1}{a - ib} = \frac{x - iy}{x + iy}$, then a^2+b^2 is

a) x^2+y^2 b) 1

c) 0 d) 5

91. The equation of the curve through the point (1, 0) and whose slope is $\frac{y-1}{x^2 + x}$ is

a) $(y-1)(x+1) + 2x = 0$ b) $2x(y-1) + x + 1 = 0$

c) $x(y-1)(x+1) + 2 = 0$ d) $y(x+1) - x = 0$

92. 930 Deepawali greeting cards are exchanged amongst the students of a class. If every student sends a card to every other student, then what is the number of students in the class?

a) 31 b) 29

c) 43 d) 24

93. If $f(x) = \begin{vmatrix} 1 & x & x+1 \\ 2x & x(x-1) & (x+1)x \\ 3x(x-1) & x(x-1)(x-2) & (x-1)x(x-1) \end{vmatrix}$ then $f(100) =$

a) 0 b) 1 c) 100 d) -100

94. The altitude fo a right circular cone of minimum volume circumscribed about a sphere of radius r is

a) 2r b) 3r c)5r d) 4r

95. If $|z+4| \le 3$, then the greatest and the least values of $|z+1|$ are

a) 3, 0 b) 6, 0

c) 4, 3 d) none of the above

96. If α is one root of the equation $4x^2 + 2x - 1 = 0$, then the other root may be

a) $4\alpha^3 - 3\alpha$ b) $4\alpha^3 + 3\alpha$

c) $3\alpha^3 - 4\alpha$ d) $3\alpha^2 + 4\alpha$

97. If $\lim_{x \to 1} \frac{x + x^2 + x^2 + \ldots\ldots\ldots\ldots + x^n - n}{x - 1} = 5050$, then n equals

a) 10 b) 100 c) 150 d) 200

98. If a coin is tossed n times the probability that head will appear an odd no of times is

a) $\frac{1}{2^n}$ b) $\frac{1}{2^{n-1}}$ c) $\frac{1}{2}$ d) $\frac{2}{5}$

99. The number of solutions of $\sqrt{3x^2 + 6x + 7} + \sqrt{5x^2 + 10x + 14} = 4 - 2x - x^2$ is

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

100. $nc_1 + 2^nc_2 + 3^nc_3 + \ldots\ldots + n^nc_n =$

a) $n2^{n-1}$ b) $(n+1)2^{n+1}$ c) $n2^n$ d) $(n-1)2^{n+1}$

101. If A + B + C = ?, then $\frac{\sin A + \sin B - \sin C}{\sin A + \sin B + \sin C}$ is equal to

a) $\tan\frac{B}{2} \cdot \tan\frac{C}{2}$ b) $\tan\frac{A}{2} \cdot \tan\frac{B}{2}$

c) $\tan\frac{A}{2} \cdot \tan\frac{B}{2} \cdot \tan\frac{C}{2}$ d) $\tan(A + B) - \tan C$

102. If $g(f(x)) = |\sin x|$ and $f(g(x)) = (\sin\sqrt{x})^2$. Then

a) $f(x) = \sin^2 x, g(x) = \sqrt{x}$

b) $f(x) = \sin x, g(x) = |x|$

c) $f(x) = x^2, g(x) = \sin\sqrt{x}$

d) $f(x), g(x)$ cannot be determined.

103. There are 9999 tickets bearing numbers 0001, 0002, 0003, ……. 9999. If one ticket is selected from these tickets at random, the probability that the number on the ticket will consist of all different digits, is:

a) $\frac{5040}{9999}$ b) $\frac{5000}{9999}$

c) $\frac{5030}{9999}$ d) none of the above

104. The area of the region bounded by the two parabolas $y=x^2$; $y^2=x$ is

a) $\frac{1}{3}$ b) $\frac{2}{3}$ c) 1 d) $\frac{4}{3}$

105. Two non-negative integers x and y are chosen at random with replacement. The probability that $x^2 + y^2$ is divisible by 10 is

a) $\frac{3}{50}$ b) $\frac{4}{25}$ c) $\frac{9}{50}$ d) $\frac{7}{50}$

Biology – Part 4

71. Bracteoles are 5 to 8 in

a) Pavonia odorata *b) Hibiscus rosasinensis*
c) Malva sylvestris *d) Abutilon indicum*

72. The blood pressure is decreased by

a) Insulin b) Interferon
c) Interleukin d) Renin inhibitor

73. Casparian thickening is absent in _____ cells of the root

a) radial walls of endodermis b) metaxylem element
c) opposie to protoxylem d) transverse wall of endodermis

74. The shape of the metacentric chromosome is _____

a) V–shaped b) L–shaped c) Rod shaped d) C-shaped

75. Match the following

1. Medulla a) sleep wake cycle
2. cerebellum b) swallowing and vomiting
3. pons c) balance and maintenance
4. hypothalamus d) sleep and respiratory centers

a) 1 – d	2 – a	3 – c	4 – b
b) 1 – b	2 – c	3 – d	4 – a
c) 1 – a	2 – b	3 – d	4 – c
d) 1 – c	2 – d	3 – a	4 – b

76. which is not an autoimmune disease

a) Rhematoid arthritis b) SCID
c) Multiple sclerosis d) Insulin dependent diabetes

77. African sleeping sickness is caused by _____

a) Trypanosoma gambiens
b) Leishmania donavani
c) Leishmaria tropica
d) Giardia intestinatis

78. 1) Allergies results from an inappropriate and excessive immune response to common autrigens in the disease called hypersensitivity

2) When the immune system attacks and destroys 'self' cells and molecules the disease is called autoimmune disease.

3) Graft between allogenic individuals are called heterograft.

4) In distal convoluted tubules the urine becomes hypertonic.

a) 1 and 2 are true but 3 and 4 are false.
b) 1 and 3 are true but 4 and 2 are false.
c) 2 and 3 are true but 1 and 4 are false.
d) 3 and 4 are true but 1 and 2 are false.

79. Photosynthesis is an oxidation – reduction reaction between _____

a) Water and ATP b) Water and carbondioxide
c) Carbondioxide and NADP d) Water and NADP

80. Ephedrine is used to cure

a) Pneumonia b) Cough c) Tuberculosis d) Skin infection

81. Match the following

1) Biosystematics	a) Heteromerae
2) Carolus Linnaeus	b) Camp and Gily
3) Biochemical mutation	c) Sweden scientist
4) More than two carpels	d) Neurospora

a) 1 – a	2 – b	3 – c	4 – d
b) 1 – c	2 – d	3 – b	4 – a
c) 1 – b	2 – c	3 – d	4 – a
d) 1 – d	2 – b	3 – a	4 – c

82. Which of the following sentence is / are true

1. Meristematic cells are self perpetuating
2. Uneven thickned cell wall is the characteristic features of scelerenchyma
3. Macre-scleroids are present in the seed coat of pisum
4. Sclerenchyma are shorter whereas fibres are longer

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

83. Urea is synthesized by

a) Kidney b) Pancrease c)Liver d) Gall bladder

84. Find the wrong match / matches

1. Flat fish	-	Naakkumeen
2. Sardines	-	Parameen
3. Grey Mullets	-	Madavai
4. Tilapia	-	Jilabi kendai

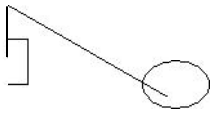
a) 1 and 2 b) 2 only c) 3 only d) 3 and 4

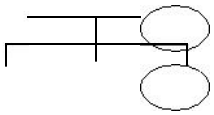
85. A functional idea to understand. The population genetics was provided in the form of law by _____

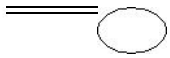
a) H.J Muller and Ernst Mayr
b) G.H. Hardy and W. Weinberg
c) R.A. Fisher and Sewall Wright
d) G.L. Stebbins and August Weismann

86. Match the following

1. 

2. 

3. 

4. 

a) Parent and children
b) Dizygous twins
c) Monozygous twins
d) Consanguine marriage

a) 1 – a	2 – b	3 – c	4 – d
b) 1 – d	2 – a	3 – c	4 – b
c) 1 – b	2 – d	3 – a	4 – c
d) 1 – c	2 – b	3 – a	4 – d

87. Which one of the following is non-degradable waste

a) Mining waste
b) Fibre and paper
c) Leather
d) Waste from food processing

88. The percentage of recombination can be determined by _____

a) $\frac{\text{Crossing over frequency}}{\text{Linkage frequency}}$
b) $\frac{\text{Linkage frequency}}{\text{Total offsprings}}$
c) $\frac{\text{No of recombinant offspring}}{\text{Total number of offspring}}$
d) $\frac{\text{No of total frequency}}{\text{Total number of offspring}}$

89. Ketosis occur due to

a) The low level of calcitonin
b) The low level of insulin
c) The high level of insulin
d) The low level of parathormone

90. The fracture in which haematoma does not communicate with the outside is _____

a) Green stick fracture
b) Stress fracture
c) Pathological fracture
d) Closed fracture

91. The largest of all viruses is _____

a) Pox viruses b) Poloma virus
c) Adeno virus d) Rous sarcoma virus

92. Lack of rumination and dull appearance of cattle are the symptoms for _____ disease

a) Anthrax b) Cowpox
c) Constipation d) Milk fever

93. The botanical name of ashwagantha is _____

a) Withania somnifera
b) Solalum trilobatum
c) Cestrym divernum
d) Pelunia hybrida

94. Phloem fibres are also called as

a) Wood fibres b) Libriform fibres
c) Bast fibres d) Supporting cells

95. The electron carriers in the electron transport system are arranged in

a) Three complexes b) Two complexes
c) Four complexes d) Five complexes

96. Pick out the correct statements

a) C3 plants are more photosynthetically efficient than C4 plants
b) C4 plants are more photosynthetically efficient than C2 plants
c) C3 plants are more photosynthetically efficient than C2 plants
d) C4 plants are more photosynthetically efficient thanC3 plants

97. From pericycle _____root arises

a) Primary root b) Lateral root
c) Secondary root d) Tertiary root

98. Albinism is due to _____

a) absense of melanin b) absense of vitamins
c) presence of melanin d) absense of hormone

99. Match the following

sources of energy	disadvantages
1. Solar cells	a. affect the ecosystem
2. Thermal power	b. Co2, acid rain
3. Hydel power	c. Co2, fly ash

4. Fossil fuel d. Carcinogen

a) 1 – d	2 – c	3 – a	4 – b
b) 1 – c	2 – d	3 – b	4 – a
c) 1 – a	2 – b	3 – d	4 – c
d) 1 – b	2 – d	3 – c	4 – a

100. Bio-degradable products produced through gene modification of soyabean is _____

a) Paints b) Fibres
c) Industrial lubricants d) Plastics

101. Which of the following sentence is / are false

1) During kidney failure dialysis is done to filter the waste
2) Blood cells and proteins are not filtered by the machine
3) The blood leaves usually from a vein in the medulla and return to a near by artery after dialysis
4) Adrenalin act as anti inflammatory agent

a) 1 and 2 b) 3 only c) 4 only d) 3 and 4

102. The ovary is obliquely placed in the members of

a) Solanaceae b) Malvaceae
c) Euphorbiaceae d) Musaceae

103. Which of the following sentences is / are not false ?

1) The primary site of infection is urethra in males in the disease gonorrhoea.
2) Pencillin was discovered by Alexander Flemming in the year 1929
3) Western Blot is a sensitive test used to detect HIV
4) The viruses integrated themselves with the bacterial genome is called lysogenic cycle

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

104. 5800 genes are present in the genome of

a) Drosophila b) Chimpanzee
c) Yeast d) Arabidopis thaliana

105. The inherent potential of any living plant probagule to develop into entire organism is called

a) Totipotency b) Organogenesis
c) Morphogenesis d) Differenciation

106. Which of the following is / are secondary lymphoid organ/s ?
1) Bursa of fabricius 2) Spleen
3) Bone marrow 4) Mucosa

a) 1 and 2 b) 2 and 4 c) 1 and 3 d) 3 and 4

107. In hexose phase _____ ATP molecules are consumed

a) One b) Two c) Three d) No ATP

108. Which of the following sentences is / are not false ?

1) The slow initial phase is called lag phase
2) Gibberellin promote dormancy in potatotubers
3) The term vernalisation was first introduced by German scientist called T.D Lysenko
4) The enzyme phosphofructokinase convert fructose 1,6 bisphosphate into glycerol dehyde 3 phosphate

a) 1 and 3 b) 3 only c) 1 only d) 3 and 4

109. Name the insect which plays a vital role in tropical forests by pollinating trees

a) grasshopper b) Honeybee
c) Bumble bee d) Orchid bee

110. Match the inflorescence with the flower

1. Catkin	a) Pavonia odorata
2. Helicoid cyme	b) Withania somnifera
3. Axillary cyme	c) Acalypha indica
4. Umbellate cyme	d) Solanum tuberosum

a) 1 – c	2 – a	3 – a	4 – b
b) 1 – a	2 – d	3 – d	4 – c
c) 1 – a	2 – b	3 – c	4 – d
d) 1 – b	2 – c	3 – d	4 – a

111. Arrange the following in the correct route for a complete reflex are

1) Sense organ 2) Effector neuron
3) Effector 4) Grey matter of spinal cord
5) Intermediate neuron 6) Affector neuron

a) $1 \rightarrow 6 \rightarrow 4 \rightarrow 5 \rightarrow 2 \rightarrow 3$
b) $5 \rightarrow 2 \rightarrow 3 \rightarrow 6 \rightarrow 4 \rightarrow 1$
c) $1 \rightarrow 6 \rightarrow 5 \rightarrow 2 \rightarrow 3 \rightarrow 4$
d) $2 \rightarrow 5 \rightarrow 6 \rightarrow 3 \rightarrow 4 \rightarrow 1$

112. Find the incorrect match

a) Timber yielding	-	Tectora grandis
b) Cotton	-	Gossypium hisatum
c) Oil yielding	-	Arachis hypogea
d) Medicine	-	Colo nitida

113. The air breathing fish among the following is

a) Mrigal b) Rohu c) Catfish d) Mullet

114. The genotype of carriers of sickle cell anaemia

a) Hb^S Hb^S b) Hb^A Hb^A
c) Hb^A Hb^S d) Hb^N Hb^N

115. A normal ECG composed of five waves designated from left to right with the letters

a) PRTS and Q b) PQRS and T
c) QPRS and T d) PTRQ and S

116. Super coils are released by

a) DNA polymerase b) Primase
c) Topoisomerase d) DNA polymerase I, II and III

117. In kreb's cycle dehydration occurs during the formation of

a) Succinic acid b) Malic acid
c) Cis-aconitic acid d) Ketoglutaric acid

118. The major aspects of plant breeding are

1) Selection of better crop
2) Conducting experiments to assess the quality of crops
3) Release of a variety
4) Creation of useful variation

Arrange them in correct order

a) 4, 3, 2, and 1 b) 4, 1, 2, and 3
c) 1, 3, 2, and 4 d) 2, 1, 3, and 4

119. Which is the correct sequence of Natural selection theory by Darwin ?

1) over production 2) variation
3) survival of the fittest 4) struggle for existence
5) Natural selection

a) 1, 4, 2, 3, and 5 b) 1, 3, 4, 2, and 5
c) 1, 5, 2, 3, and 4 d) 1, 2, 3, 5, and 4

120. Gibberella fusarium can break down _____ and reduce it to a nontoxic form

a) cyanide b) Mercury
c) Cadmium d) Chromium

ANSWER

1	d	Physics	36	d	Chemistry	71	b	Maths	71	b	Biology	111	a
2	a		37	c		72	b		72	d		112	d
3	b		38	a		73	d		73	c		113	c
4	b		39	b		74	c		74	a		114	c
5	a		40	b		75	c		75	b		115	b
6	a		41	c		76	b		76	b		116	c
7	c		42	c		77	d		77	a		117	c
8	a		43	b		78	d		78	a		118	b
9	a		44	b		79	a		79	b		119	a
10	c		45	a		80	c		80	b		120	a
11	c		46	d		81	a		81	c			
12	c		47	c		82	d		82	d			
13	c		48	d		83	a		83	c			
14	d		49	a		84	b		84	b			
15	b		50	a		85	a		85	b			
16	a		51	d		86	a		86	d			
17	b		52	b		87	d		87	a			
18	c		53	b		88	a		88	c			
19	b		54	d		89	a		89	b			
20	c		55	a		90	b		90	d			
21	c		56	c		91	a		91	a			
22	d		57	b		92	a		92	c			
23	b		58	d		93	a		93	a			
24	a		59	d		94	d		94	c			
25	d		60	c		95	b		95	c			
26	a		61	c		96	a		96	d			
27	c		62	a		97	d		97	b			
28	d		63	b		98	c		98	a			
29	d		64	c		99	a		99	a			
30	c		65	d		100	a		100	c			
31	a		66	c		101	b		101	b			
32	c		67	d		102	a		102	a			
33	c		68	b		103	a		103	d			
34	c		69	d		104	a		104	c			
35	a		70	a		105	c		105	a			
									106	b			
									107	b			
									108	c			
									109	d			
									110	a			