MELUHA INTERNATIONAL SCHOOL

HYDERABAD

SR MPC | **BITSAT TOT GT– 1** | **Date: 15-05-2020**

Time: 3 Hours | **Max. Marks: 450 M**

PHYSICS

1. The vector sum of the forces of 10N and 6N can be

1) 2N 2) 8N 3) 18N 4) 20N

2. A ball is dropped from a height 'h' on the floor with coefficient of restitution 'e'. The total distance covered by the ball just before the second hit is

1) $h\left(1-2e^2\right)$ 2) $h\left(1+2e^2\right)$ 3) $h\left(1+e^2\right)$ 4) he^2

3. The moment of inertia of a thin circular disc about an axis passing through its centre and perpendicular to its plane is I. Then the moment of inertia of the disc about an axis parallel to the diameter and touching the edge of the rim is

1) I 2) $2I$ 3) $\frac{3I}{2}$ 4) $\frac{5I}{2}$

4. Eight equal drops of water are falling through air with a terminal velocity of $10\,m/\sec$ **. If the drops combine to form a single big drop, then the terminal velocity of big drop is**

1) $80\,m/\sec$ 2) $30\,m/\sec$ 3) $10\,m/\sec$ 4) $40\,m/\sec$

5. A bubble is at the bottom of the lake of depth 'h' . As the bubble comes to sea level, its radius becomes three times. If the atmospheric pressure is equal to 'H' of water column, then 'h' is equal to

1) 26H 2) H 3) 25H 4) 27H

6. The temperature of two bodies A and B are 727^0C **and** 327^0C **respectively. The ratio of heat energies radiated by them is**

1) $727:327$ 2) $5:3$ 3) $25:9$ 4) $625:81$

7. During the adiabatic process the pressure of the gas is found to be proportional to cube of the absolute temperature. The ratio of $\frac{C_P}{C_V}$ **for the gas is**

1) $\frac{4}{3}$ 2) 2 3) $\frac{5}{3}$ 4) $\frac{3}{2}$

8. The length of an astronomical telescope is $110cm$**. Its magnitude is 10. The focal length of objective lens is**

1) $10cm$ 2) $110cm$ 3) $100cm$ 4) $50cm$

9. A radar has a power of 1KW and is operating and a frequency of 10GHz. It is located on a mountain of height 500m. The maximum distance upto which it can detect object located on the surface of the earth. $\left[R=6.4\times10^6 m\right]$

1) 80Km 2) 16Km 3) 40Km 4) 64Km

10. The ratio of magnetic dipole moment to that of the angular momentum of electron of mass 'm' and charge 'e' in Bohr's orbit of hydrogen atom is

1) $\frac{e}{2m}$ 2) $\frac{e}{m}$ 3) $\frac{2e}{m}$ 4) $\frac{2m}{e}$

11. When a light of wavelength $300nm$ **falls on photoelectric emitter photo electrons are liberated. For another emitter however light of** $600nm$ **wavelength is sufficient to emit photo emission. The ratio of work functions of the two emitters is**

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

12. A long solenoid of length 'L' and cross-section "A" having N_1 **turns has wound about its centre a small coil of** N_2 **turns. Then, the mutual inductance of the two circuits is**

1) $\frac{\mu_0 N_1 N_2}{AL}$ 2) $\frac{\mu_0 A N_1 N_2}{L}$ 3) $\mu_0 A N_1 N_2 L$ 4) $\frac{\mu_0 N_1 N_2}{AL}$

13. If the intensities of two waves causing interference is 9:4. Then the ratio of the resultant maximum and minimum intensities will be

1) 9:4 2) 3:2 3) 25:1 4) 5:1

14. Two cars are approaching each other with a velocity equal to half of the velocity of sound. Then the ratio between apparent frequency and actual frequency is

1) 2:1 2) 4:1 3) 3:1 4) 8:1

15. A convex lens of focal length 30cm produces 5times magnified real image of an object. The object distance is

1) 36cm 2) 25cm 3) 30cm 4) 150cm

16. When a current of 2.5 ± 0.5 ampere flows through a wire, it develops a potential difference of 20 ± 1 volt. Find the resistance of the wire

1) 6 ± 3 2) 7 ± 2 3) 8 ± 2 4) 9 ± 3

17. In a car race car A takes 't_0' seconds less than that of car B and passes the finishing point with a velocity 'v_0' more than that of B. Assuming that the cars starts from rest and travel with accelerations a_1 and a_2 respectively then the ratio of 'v_0' to't_0' is square root of

1) a_1 / a_2 2) a_2 / a_1 3) $a_1 a_2$ 4) $a_2^2 + a_1^2$

18. The co-ordinates of a moving particle at any time t are given by $x = ct^2$ and $y = bt^2$. The speed of the particle is given by-

1) 2t (c + 2) 2) $2t\sqrt{c^2 - b^2}$ 3) $t\sqrt{c^2 + b^2}$ 4) $2t\sqrt{c^2 + b^2}$

19. The maxwell's equation : $\oint \vec{B}.\vec{dl} = \mu_0\left(i + \varepsilon_0 . \frac{d\phi_E}{dt}\right)$ is a statement of

1) Faraday's law of induction 2) Modified Ampere's law
3) Gauss's law of electricity 4) Gauss's law of magnetism

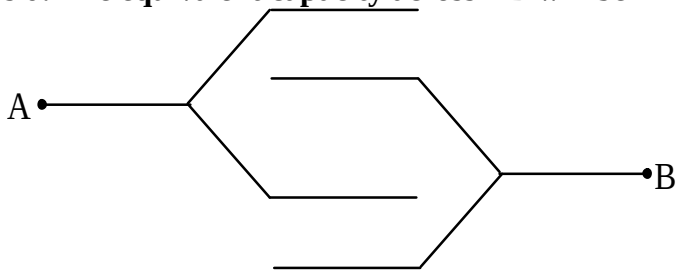
20. A particle of mass 3 kg is moving under the action of a central force whose potential energy is given by $U(r) = 10\ r^3$ joule. For what energy and angular momentum will the orbit be a circle of radius 10 m-

1) 2.5×10^4 J, 3000 kgm^2/sec 2) 3.5×10^4 J, 2000 kgm^2/sec
3) 2.5×10^3 J, 300 kgm^2/sec 4) 3.5×10^3 J, 300 kgm^2/sec

21. If two soap bubbles of different radii are in communication with each other, then

1) Air flows from the larger bubble into the smaller one until their sizes become equal
2) The sizes of the bubbles remain unchanged
3) Air flows from the smaller bubbles into the larger one and the larger bubble grows at the expense of the smaller one
4) Air flows from the larger into the smaller bubble until their radii interchange

22. Four plates of the same area A of cross-section are joined as shown in the figure. The distance between each plate is d. The equivalent capacity across AB will be-

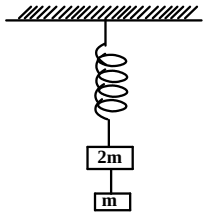


1) $\frac{2\varepsilon_0 A}{d}$ 2) $\frac{3\varepsilon_0 A}{d}$ 3) $\frac{3\varepsilon_0 A}{2d}$ 4) $\frac{\varepsilon_0 A}{d}$

23. A bar magnet of magnetic moment 1.5 JT^{-1} lies aligned with the direction of a uniform magnetic field of 0.22. What is the amount of work required to turn the magnet so as to align is magnetic moment opposite to the field direction (nearly)?

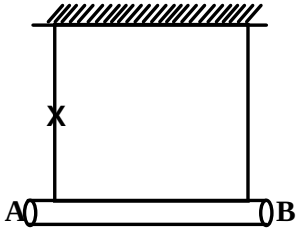
1) 6.6J 2) 0.66J 3) 0.066J 4) 66.0J

24. The system shown in the figure is in equilibrium and rest. The spring and string are massless. When the string is cut, the accelerations of mass '2m' and 'm' just after the string is cut will be



1) $\frac{g}{2}$ upward, $\frac{g}{2}$ downward
2) $\frac{g}{2}$ upward, g downward
3) g upward, g downward
4) 2g upward, g downward

25. A uniform rod of mass 'm' and length 'l' is suspended by means of two light string as shown. Tension in one string immediately after the other string is cut is



1) mg
2) mg/2
3) mg/3
4) mg/4

26. On a large tray of mass 'M' an ice cube of mass 'm' and edge L is kept. If the ice melts completely, the centre of mass of the system come down by

1) $\frac{mL}{2(M+m)}$
2) $\frac{(M-n)L}{2(M+m)}$
3) $\frac{(M+2m)L}{2(M+m)}$
4) $\frac{2ML}{M+m}$

27. A constant power 'P' is supplied to an object of mass 'm' which is at rest. The distance travelled by the particle in the time 't' is

1) $\sqrt{\frac{8pt^3}{9m}}$
2) $\sqrt{\frac{2pt^3}{m}}$
3) $\sqrt{\frac{4pt^3}{m}}$
4) $\sqrt{\frac{8pt^3}{7m}}$

28. An object is projected from surface of earth with escape velocity. Then the time taken to reach a height 'h' is

1) $\sqrt{\frac{2}{9gR^2}}\left[(R+h)^{\frac{3}{2}}-(R)^{\frac{3}{2}}\right]$
2) $\sqrt{\frac{2}{9gR^2}}\left[(R+h)^{\frac{1}{2}}-(R)^{\frac{1}{2}}\right]$
3) $\sqrt{\frac{2}{9gR^2}}\left[(R+h)^{\frac{5}{2}}-(R)^{\frac{5}{2}}\right]$
4) $\sqrt{\frac{2}{9R^2}}\left[(R+h)^{\frac{3}{2}}-(R)^{\frac{3}{2}}\right]$

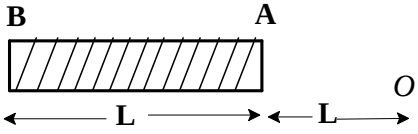
29. 10 g of ice at -10^0C is mixed with 20 g of water at $+20^0C$. If there is no loss of heat with surroundings. The mass of water in mixture

1) 23.375 g
2) 24.375g
3) 25.375g
4)22.375g

30. A particle moving along +X –direction from origin with a velocity $v=\propto\sqrt{x}$. The displacement of particle varies with time

1) $\sqrt{t}$
2) t
3) $\frac{1}{t}$
4) t^2

31. A charge 'Q' is uniformly distributed over along rod 'AB' of length 'L' as shown in figure. The electric potential at the point 'O' at a distance 'L' from end A is



1) $\frac{Q}{8\pi\in_0 L}$
2) $\frac{3Q}{4\pi\in_0 L}$
3) $\frac{Q}{4\pi\in_0 L\ln 2}$
4) $\frac{Q\ln 2}{4\pi\in_0 L}$

32. On interchanging the resistances in left and right gaps in a meter bridge, balancing point shifts 60 cm towards left. If the sum of two resistors is 25 then find resistors in left and right gaps

1) $5\Omega, 20\Omega$ 2) $20\Omega, 5\Omega$ 3) $10\Omega,\ 30\Omega$ 4) $30\Omega,\ 10\Omega$

33. Full scale deflection of a galvanometer of resistance 50Ω is 1 mA. What is the series resistance required to convert it into a voltmeter of 1 V

1) 900Ω 2) 950Ω 3) 980Ω 4) 1000Ω

34. The intensity of central bright fringe in YDSE is I_0. If one of the slits is closed then the intensity at the same point is

1) $\frac{I_0}{2}$ 2) $\frac{I_0}{4}$ 3) $4I_0$ 4) I_0

35. A hut has a flat roof just placed over the walls. It is made of a thin metal sheet of 20kg and of dimensions 4mx3m. What is the maximum uniform speed of wind that can blow over the roof horizontally so that it can remain intact. (g=10ms^{-2}, density of air $\frac{4}{3}kg/m^3$)

1)5ms^{-1} 2) 6ms^{-1} 3)7ms^{-1} 4) 8ms^{-1}

36. An equi-convex lens of refractive index $\frac{3}{2}$ and focal length 10cm is held with its axis vertical and its lower surface immersed in water$\left(\mu = \frac{4}{3}\right)$, the upper surfaces being in air. What is the focal length of the lens for the parallel rays coming from air?

1)20cm 2) 10cm 3) $\frac{20}{3}cm$ 4) 30cm

37. A gas is undergoing an adiabatic process. At certain stage, Volume and Pressure are V_0 and T_0. The magnitude of slope of V-T graph at that stage is $\frac{dV}{dT} = m$ .Then molar heat capacity of the gas at constant volume (C_V) is equal to ----(R is universal gas constant)

1) mRT_0 2) $R\left(1+\frac{mT_0}{V_0}\right)$ 3) $R\left(1+\frac{mV_0}{T_0}\right)$ 4) $\frac{mRT_0}{V_0}$

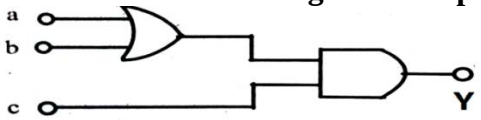
38. The decay constant λ of a radioactive material is the probability of decay of an atom in unit time .Then

1) λ decreases as age of material increases
2) λ increases as age of material increases
3) λ is independent of age of material
4) λ is unpredictable and depends on quantity of material

39. A $5K\Omega$ resistor is connected in series with a Zener diode $(V_z = 50V)$ and across the combination a potential difference of 120 V is applied. A $10K\Omega$ load resistance is connected parallel to Zener diode; current through the load is----

1) 5 mA 2) 7mA 3) 14 mA 4) 9 mA

40. To get an output of 1 from the circuit shown in figure the input must be:



1)a=b,b=0,c=1 2)a=1,b=0, c=0 3)a=1, b=0, c=1 4)a=0, b=1,c=0

CHEMISTRY

41. **A gaseous mixture contains O_2 and N_2 in the ratio of $1:4$ by weight. The ratio of their number of molecules is**

1) 1:4 2) $1:8$ 3) $7:32$ 4) 3:16

42. **Given $a)\, n=5, m_1=+1$ $b)\, n=2, l=1, m=+1, m_s=\frac{-1}{2}$. The maximum number of electrons in an atom that can have the quantum numbers as given in a) and b) are respectively.**

1) 25, 1 2) 8 and 1 3) 2 and 4 4) 4 and 1

43. **The minimum angular momentum of an electron with the magnetic quantum numbers -1, 0, +1.**

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

44. **An aqueous solution of HCl is $10^{-9}M$ HCl . The pH of the solution should be**

1) 9 2) Between 6 and 7 3) 7 4) Unpredictable

45. **Among $LiCl, BeCl_2, BCl_3$ and CCl_4 the covalent bond character varies as**

1) $LiCl < BeCl_2 > BCl_3 > CCl_4$ 2) $LiCl > BeCl_2 < BCl_3 < CCl_4$

3) $LiCl < BeCl_2 < BCl_3 < CCl_4$ 4) $LiCl > BeCl_2 > BCl_3 > CCl_4$

46. **Nascent hydrogen consists of**

1) Hydrogen ions in the excited state 2) hydrogen molecules with excess energy

3) Solvated protons 4) Hydrogen atoms with excess energy

47. $ZnCl_2 + NaHCO_3 \xrightarrow{Heat} (A) \xrightarrow{Heat} (B) + (C) + H_2O(B) + NaOH \rightarrow (D)$

Identify the compound (D) present in the solution

1) $ZnCO_3$ 2) $Zn(OH)_2$ 3) ZnO 4) Na_2ZnO_2

48. **The RMS velocity of two gases at the same temperature are u_1 and u_2 their masses are m_1 and m_2 respectively. Which of the following expression is correct?**

1) $\frac{m_2}{u_1}=\frac{m_2}{u_2}$ 2) $m_1u_1=m_2u_2$ 3) $\frac{m_1}{u_1}=\frac{m_2}{u_2}$ 4) $m_1u_1^2=m_2u_1^2$

49. **In the reaction $2X + B_2H_6 \rightarrow [BH_2X_2]^{\oplus}[BH_4]^{\ominus}$ the amine (s) X is not**

1) NH_3 2) CH_3NH_2 3) $(CH_3)_2NH$ 4) $(CH_3)_3N$

50. **The correct order of increasing C- O bond length of CO, CO_2 and CO_3^{2-} is**

1) $CO_3^{2-} < CO_2 < CO$ 2) $CO_2 < CO_3^{2} < CO$

3) $CO < CO_3^{2-} < CO_2$ 4) $CO < CO_2 < CO_3^{2-}$

51. **A sample of water has CO_3^{-2} concentration 15ppm. The molarity of CO_3^{-2} in the sample is**

1) $15\times10^{-6}\, mole/lit$ 2) $\frac{10^{-6}}{4}\, mole/lit$ 3) $\frac{10^{-3}}{4}\, mole/lit$ 4) $15\times10^{-5}\, mole/lit$

52. **Most stable among the following is**

1) Li_2CO_3 2) Na_2CO_3 3) K_2CO_3 4) Cs_2CO_3

53. **K_1, K_2 and K_3 are the equilibrium constants of the following reactions (I), (II), (III) respectively**

I) $N_2 + 2O_2 \rightleftharpoons 2NO_2$ **II)** $2NO_2 \rightleftharpoons N_2 + 2O_2$ **III)** $NO_2 \rightleftharpoons \frac{1}{2}N_2 + O_2$

The correct relation from the following is:

1) $K_1=\frac{1}{K_2}=K_3$ 2) $K_1=\sqrt{K_2}=K_3$ 3) $K_1=\frac{1}{K_2}=\frac{1}{(K_3)^2}$ 4) $K_1=\frac{1}{K_2}=\frac{1}{K_3}$

54. **Let the solubility of an aqueous solution of $Mg(OH)_2$ is 'X' then its K_{SP} is**

1) $4x^3$ 2) $108x^5$ 3) $27x^4$ 4) $9x$

55. Which one of the following is not a state function?

1) Internal energy 2) Work 3) Entropy 4) Free energy

56. Which of the following is not a Borane?

1) B_5H_9 2) B_5H_{10} 3) B_5H_{11} 4) B_6H_{10}

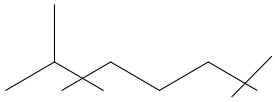
57. Formula of agate is:

1) Na_2SiO_3 2) $K_2O.SiO_2.Al_2O_3$ 3) SiO_2 4) C_9F_2

58. The relative adsorption of each component of the mixture is expressed in terms of

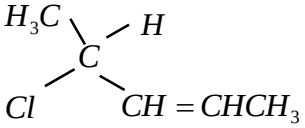
1) Adsorption factor 2) Retention factor 3) Co-factor 4) Sorption factor

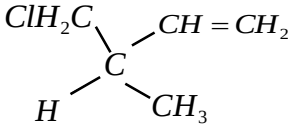
59. The IUPAC name of the following alkane is

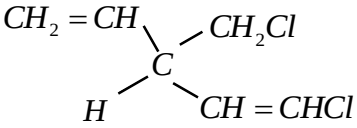


1) 2-Isopropyl-2, 6, 6-tri methyl heptane
2) 5- ter-butyl-2-Iso propyl-2-methyl heptane
3) 2, 3,3,7,7- Penta methyl octane
4) 2, 2, 6, 6, 7 – Penta methyl octane

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

1) 

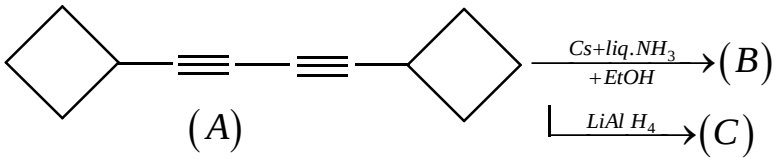
2) 

3) 

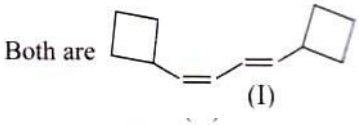
4) $CH_3CH=CHCH_2CH_3$

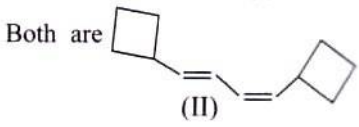
61. Which of the following species is most stable?

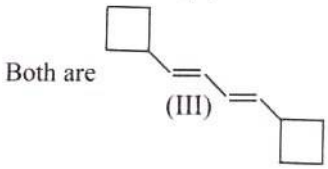
1) $CH_2=\dot{C}H$ 2) $Ph\dot{C}H_2$ 3) $Me_3\dot{C}$ 4) $Me_2\dot{C}H$

62. 

Compounds (B) and (C) are

1) 

2) 

3) 

4) B is (I) and C is (II)

63. The $\frac{r^+}{r^-}$ ratio of KF is 0.98. The type of structure in KF is

1) $NaCl$ 2) ZnS 3) graphite 4) $CsCl$

64. As lead storage battery is charged

1) lead dioxide dissolves
2) $2PbSO_4+2H_2O \rightarrow Pb+PbO_2+2H_2SO_4$
3) lead electrode becomes coated with lead nitrate.
4) The concentration of sulphuric acid decreases

65. How many coulombs of electricity is required for the oxidation of 1 mole of H_2O_2 toO_2?

1) 93000 C 2) $1.93\times10^5 C$ 3) $9.65\times10^4 C$ 4) $19.3\times10^2 C$

66. For the non-stoichiometric reaction $2A+B \rightarrow C+D$, The following Kinetic data were obtained in three separate experiments, all at 298 K.

Initial Concentration (1)	Initial Concentration (2)	Initial rate of formation of C $(mol\ L^{-}S^{-})$
0.1 M	**0.1 M**	1.2×10^{-3}
0.1 M	**0.2 M**	1.2×10^{-3}
0.2 M	**0.1 M**	2.4×10^{-3}

The rate law for the formation of C is

1) $\frac{dc}{dt}=k[A][B]$ 2) $\frac{dc}{dt}=k[A]^2[B]$ 3) $\frac{dc}{dt}=k[A]\ [B]^2$ 4) $\frac{dc}{dt}=k[A]$

67. The statement regarding hydrides of VIA group elements are

i) The order of volatility

$H_2O < H_2Te < H_2Se < H_2S$

ii) The order of B.P

$H_2O > H_2Te > H_2Se > H_2S$

iii) The order of bond angles

$H_2O > H_2S > H_2Se > H_2Te$

The correct combination is

1) All are correct 2) Only (i)is correct 3) ii & iii are correct 4) i & iii are correct

68. Hybridisation of chlorine atom in $ClO^{-}, ClO_2^{-}, ClO_3^{-}$ and ClO_4^{-} respectively

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

69. The number of $S-S$ bonds in $SO_3, S_2O_3^{-2}, S_2O_6^{-2}$ and $S_2O_8^{-2}$ respectively are

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

70. In which pair both ions are coloured in aqueous medium

1) Sc^{+3}, Zn^{+2} 2) Cu^{+2}, Ti^{+4} 3) Ti^{+3}, Co^{+3} 4) Cd^{+2}, Mn^{+2}

71. Which of the following Xenon-Oxo compounds may not be obtained by hydrolysis of Xenon fluorides?

1) XeO_2F_2 2) $XeOF_4$ 3) XeO_3 4) XeO_4

72. Which doesnot obey EAN rule

1) $\left[Fe(CO)_5\right]$ 2) $K_4\left[Fe(CN)_6\right]$ 3) $\left[Cu(NH_3)_4\right]SO_4$ 4) $\left[Co(NH_3)_6\right]Cl_3$

73. Both geometrical and optical isomerism are shown by

1) $\left[Co(en)_2\ Cl_2\right]^{+}$ 2) $\left[Co(NH_3)_5\ Cl\right]^{2+}$ 3) $\left[Co(NH_3)_4\ Cl_2\right]^{+}$ 4) $\left[Cr(ox)_3\right]^{3-}$

74. $C_2H_4 \xrightarrow[AlCl_3]{HCl} A \xrightarrow{KOH(aq)} B \xrightarrow[170^0C]{Conc.H_2SO_4} C$ **. What is C?**

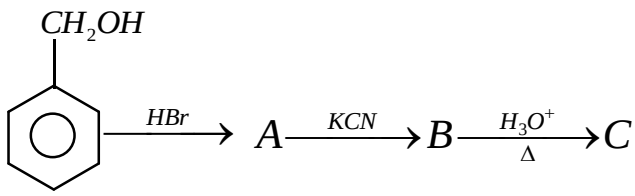
1) C_2H_4

2) $C_2H_5-O-SO_3H$

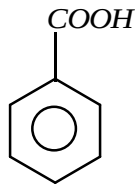
3) C_2H_5OH

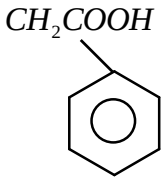
4) $C_2H_5-O-C_2H_5$

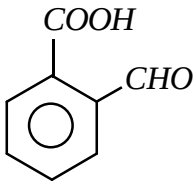
75.

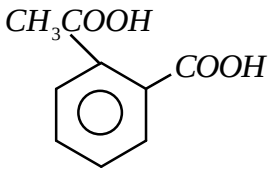


What is 'C'

1) 

2) 

3) 

4) 

76. The correct order of increasing basic nature for the bases NH_3, CH_3NH_2 and $(CH_3)_2NH$ is

1) $(CH_3)_2NH < NH_3 < CH_3NH_2$ 2) $NH_3 < CH_3NH_2 < (CH_3)_2NH$

3) $CH_3NH_2 < (CH_3)_2NH_2 < NH_3$ 4) $CH_3NH_2 < NH_3 < (CH_3)_2NH$

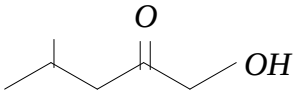
77. Plexiglass (PMMA) is a polymer of

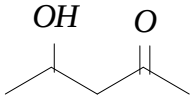
1) Acrylic acid 2) Methyl acrylate 3) Methyl methacrylate 4) Adipic acid

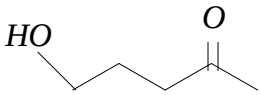
78. Deficiency of vitamin A causes

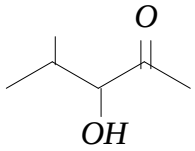
1) Night blindness 2) Loss of fertility 3) Scurvy 4) Impaired clotting

79. Which of the following is the product of aldol condensation?

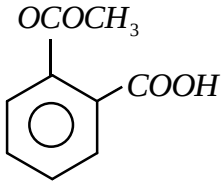
1) 

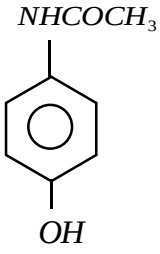
2) 

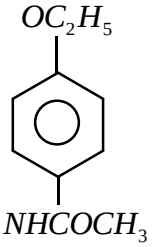
3) 

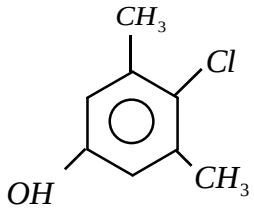
4) 

80. The structure of paracetamol is

1) 

2) 

3) 

4) 

ENGLISH PROFICIENCY & LOGICAL REASONING

I. In each of the following question idioms & phrasal verbs in four alternatives are given. Choose the one which best expresses the meaning of the given phrase.

81. A man of straw

1) A man of worth 2) A man of strength

3) A powerful man 4) A man of no substance

82. Came to a head

1) Came to nothing 2) Came to something

3) Came to an end 4) reached to crisis

83. Beside the mark

1) upto the pound 2) not to the point 3) above the point 4) equal to the point

84. A hard nut to crack

1) Light problem to solve 2) Easy problem to solve

3) Difficult problem to solve 4) no problem at all

85. All the rage

1) Extremely popular 2) Extremely unpopular

3) Extremely cheep 4) Extremely costly

86. made my flesh creep.

1) excited me 2) Angered me 3) horrified me 4) elated me

87. Storm in a teacup.

1) upset about unimportant things
2) feeling happy
3) raining heavily
4) heavy wind

88. For loaves and fishes

1) For spiritual benefits
2) For eternal benefits
3) For material benefits
4) For ciordial relations

89. Made a pile

1) Made a misfortune
2) Made a fortune
3) Made a ship
4) Made a doll

90. Stick to colours

1) Pasting colours
2) Painting colours
3) Refuse to yield
4) faithful to the causes

Correction of errors

Read each sentence to find if there is any grammatical error in it. If there is any error, it will be only in one part of the sentence. The number of that part is your answer. Do not worry about the punctuation mark.

91. I Congratulated him for passing the exam

(1) (2) (3) (4) (5)

92. The police stopped everyone on leaving the building

(1) (2) (3) (4) (5)

93. They warned us for buying the car

(1) (2) (3) (4) (5)

Add a question to these statements.

94. She does the work_____?

1) hasn't she
2) haven't she
3) haven't I
4) doesn't she

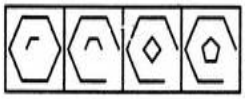
95. I am a professional _____?

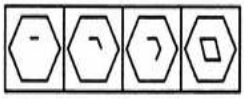
1) amn't I
2) aren't they
3) haven't I
4) aren't I

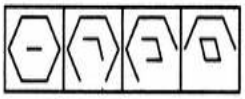
LOGICAL REASONING

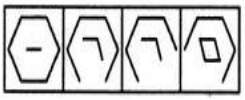
96. Choose the set of figures which follows the given rule.

Rule: Closed figures losing their sides and open figures gaining their sides.

(1) 

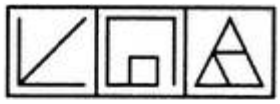
(2) 

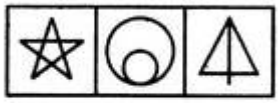
(3) 

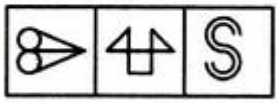
(4) 

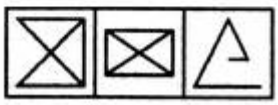
97. Choose the set of figures which follows the given rule.

Rule: Any figure can be traced by a single unbroken line without retracting.

(1) 

(2) 

(3) 

(4) 

98. **In a certain language, CAT=12, MAT=17, then what is the value of JAM?**
1) 15 2) 16 3) 17 4) 12

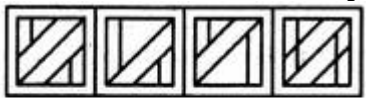
99. **At what time, between 4 and 5 o'clock, will the hands of a clock make an angle of 100^0?**
1) 4 hr 40 min 2) 4 hr 45 min 3) 4 hr 30 min 4) 4 hr 25 min

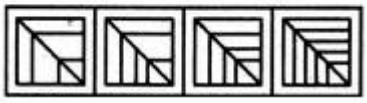
100. **Choose the word which can be formed from the letters of the word given VENTURESOME**
1) ROSTRUM 2) SERMON 3) TRAVERSER 4) SEVENTEEN

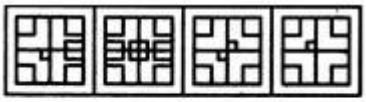
101. **'Umpire' is related to 'Match' in the same way as 'Judge' is related to**
1) Bar council 2) Lawyer 3) Judgement 4) Lawsuit

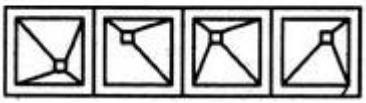
102. **Find the odd one from the following options**
1) 9.49 2) 13.121 3) 10.61 4) 7.2598

103. Choose the set of figures which follows the given rule.
Rule: The series becomes complex as it proceeds.

(1) 

(2) 

(3) 

(4) 

104. **In a cricket team. Dhoni is taller than Virat but not as tall as Raina. Rohit is shorter than Dhoni but taller than Shikhar. Who among them is the shortest?**
1) Dhoni 2) Virat
3) Shikhar 4) Cannot be determined

105. **Choose the missing term out of given alternatives. JE, LH, OL, SQ, ……..**
1) WV 2) XW 3) VW 4) VX

MATHEMATICS

106. **The roots of $x^4-8x^3+14x^2+8x-15=0$ are in A.P then the roots are**
1) $-1,2,5,8$ 2) $-1,1,3,5$ 3) $1,2,3,4$ 4) $1,3,5,7$

107. **If a and b are respective coefficients of x^m and x^n in the expansion of $(1+x)^{m+n}$ then**
1) $a+b=m+n$ 2) $a=2b$ 3) $a=b$ 4) $b=2a$

108. **If $A=\{x\in c:x^2=1\}$ and $B=\{x\in c:x^4=1\}$, then $A\Delta B$ is equal to**
1) $\{-1,1\}$ 2) $\{-1,1,i,-i\}$ 3) $\{-i,i\}$ 4) $\{-1,i\}$

109. **In $\Delta ABC, (b-c)^2+4bc\sin^2\frac{A}{2}=$**
1) a^2 2) b^2 3) c^2 4) s^2

110. $2\sin^2\left(8\frac{1}{2}^0\right)+4\cos 16^0\sin\left(7\frac{1}{2}^0\right)\sin\left(8\frac{1}{2}^0\right)+\cos 32^0=$

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

111. **If** $81^{\sin^2 x}+81^{\cos^2 x}=30$ **and** $0\le x\le\frac{\pi}{2}$ **then** $x=$

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

112. **If the probabilities of two dogs A and B dying within 10years are respectively p and q, then the probability that at least one of them will be alive at the end of 10years is**

1) $p+q$ 2) $1-pq$ 3) $p+q-pq$ 4) pq

113. **If the total numbers of combinations of n different things taken one or more at a time is 127 then n=**

1) 6 2) 7 3) 8 4) 9

114. **In an A.P** $S_p=q$ **,** $S_q=p$ **and** S_r **denotes the sum of the first r terms, then** $S_{p+q}=$

1) 0 2) $-(p+q)$ 3) $p+q$ 4) pq

115. **If** $z=(5+t)+i\sqrt{25-t^2}$ $(t\in R)$ **then locus of** z **is**

1) Straight line 2) circle 3) ellipse 4) hyperbola

116. **The coefficient of** $x^2y^3z^4$ **in** $(ax-by+cz)^9$ **is**

1) $1260a^2b^3c^4$ 2) $-1220a^2b^3c^4$ 3) $-1260a^2b^3c^4$ 4) $1220a^2b^3c^4$

117. **The value of** $\sum_{k=1}^{10}\left[\left(\sin\left(\frac{2k\pi}{11}\right)+i\cos\left(\frac{2k\pi}{11}\right)\right)\right]$ **is**

1) i 2) 1 3) -1 4) –i

118. **If** $\sin 2\theta=k$ **then the value of** $\frac{\tan^3\theta}{1+\tan^2\theta}+\frac{\cot^3\theta}{1+\cot^2\theta}=$

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

119. **If** $f(x)=4^x-2^{x+1}+5$ **then the range of f is**

1) $[4,\infty)$ 2) $(4,\infty)$ 3) $(5,\infty)$ 4) R

120. **The sum of the series** $1+\frac{2}{3}+\frac{6}{3^2}+\frac{10}{3^3}+\frac{14}{3^4}+---$ **is**

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

121. **If** $0\le x\le 2\pi$ **then the number of real values of x, which satisfy the equation** $\cos x+\cos 2x+\cos 3x+\cos 4x=0$ **is**

1) 9 2) 3 3) 5 4) 7

122. **Let** $\bar{a}$ **,** $\bar{b}$ **and** $\bar{c}$ **be non zero vectors such that** $(\bar{a}\times\bar{b})\times\bar{c}=\frac{1}{3}|\bar{b}||\bar{c}|\bar{a}$ **If** θ **is the acute angle between the vectors** $\bar{b}$ **&** $\bar{c}$ **then** $\sin\theta$ **equals**

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

123. **If the sum of the first n terms of the series** $\sqrt{3}+\sqrt{75}+\sqrt{243}+\sqrt{507}+....$is $435\sqrt{3}$, **then n equal to**

1) 29 2) 18 3) 15 4) 13

124. **If (27)^{999} is divided by 7, then the remainder is**

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

125. If all the words, with or without meaning, are written using the letters of the word QUEEN and are arranged in the dictionary order , then the position of the word QUEEN is

1) 47th 2) 44th 3) 45th 4) 46th

126. The number of real values of λ for which the system of linear equations

$2x + 4y - \lambda z = 0$

$4x + \lambda y + 2z = 0$

$\lambda x + 2y + 2z = 0$

has infinitely many solutions,

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

127. Let A be any 3 × 3 invertible matrix. Then which one of the following is not always true?

1) adj (adj (A)) = |A|.(adj(A))$^{-1}$ 2) adj (adj(A)) = |A|^2.(adj(A))$^{-1}$

3) adj (A) = |A|.A^{-1} 4) adj (adj(A)) = |A|.A

128. A variable line through the point $\left(\frac{1}{5},\frac{1}{5}\right)$ cuts the coordinate axes in the points A and B. If the point P divides AB internally in the ratio $3:1$, then the locus of P is

1) $3y+x=20xy$ 2) $y+3x=20xy$ 3) $x+y=20xy$ 4) $3x+3y=20xy$

129. The lines $(a+2b)x+(a-3b)y=a-b$ for different values of a and b pass through the fixed point whose coordinate are

1) $\left(\frac{2}{5},\frac{2}{5}\right)$ 2) $\left(\frac{3}{5},\frac{3}{5}\right)$ 3) $\left(\frac{2}{5},\frac{3}{5}\right)$ 4) $\left(\frac{3}{5},\frac{2}{5}\right)$

130. The two circles $x^2+y^2-2x+22y+5=0$ and $x^2+y^2+14x+6y+k=0$ intersect orthogonally provided k is equal to

1) 47 2) -47 3) 49 4) -49

131. The number of normal drawn to the parabola $y^2=4x$ from the point $(1,0)$ is

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

132. The function $f(x)=\begin{cases}\frac{\tan x}{x} & ,x\neq 0\\ 1 & ,x=0\end{cases}$ is

1) Continuous but not differentiable at $x=0$
2) Discontinuous at $x=0$
3) Continuous and differentiable at $x=0$
4) Not defined at $x=0$

133. The minimum value of $2x+3y$, when $xy=6$ is

1) 9 2) 12 3) 8 4) 6

134. $\int_{-1}^{1}\frac{17x^5-x^4+29x^3-31x+1}{x^2+1}dx$ is

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

135. An integrating factor of the differential equation $(1+y+x^2y)dx+(x+x^3)dy=0$

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

136. If a vertex of a triangle is $(1,1)$ and midpoints of two sides through the vertex are $(-1,2)$ and $(3,2)$ then the centroid of the triangle is

1) $\left(1,\frac{7}{3}\right)$ 2) $\left(\frac{1}{3},\frac{7}{3}\right)$ 3) $\left(-\frac{1}{3},\frac{7}{3}\right)$ 4) $\left(-1,\frac{7}{3}\right)$

137. ABC is a variable triangle such that A is (1,2) and B and C lie on the line $y = x + \lambda\left(\lambda\, is\, a\, \text{var}\, iable\right)$. Then the locus of the orthocentre of ΔABC is

1) $x + y = 0$ 2) $x - y = 0$ 3) $x^2 + y^2 = 4$ 4) $x + y = 3$

138. The line $2x - y + 1 = 0$ is tangent to the circle at the point (2,5) and the center of the circle lies on $x - 2y = 4$. The radius of the circle is

1) $3\sqrt{5}$ 2) $5\sqrt{3}$ 3) $2\sqrt{5}$ 4) $5\sqrt{2}$

139. The coordinates of the point on the hyperbola $\frac{x^2}{24} - \frac{y^2}{18} = 1$ which is nearest to the line $3x + 2y + 1 = 0$ are

1) $(6,3)$ 2) $(-6,-3)$ 3) $(6,-3)$ 4) $(-6,3)$

140. The maximum slope of the curve $y = -x^3 + 3x^2 + 9x - 27$ is

1) 0 2) 12 3) 16 4) 32

141. For $x \in R$ and a continuous function f, let $I_1 = \int_{\sin^2 t}^{1+\cos^2 t} xf\{x(2-x)\}dx$ and $I_2 = \int_{\sin^2 t}^{1+\cos^2 t} f\{x(2-x)\}dx$. Then $\frac{I_1}{I_2}$ is

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

142. Value of λ such that the line $\frac{x-1}{2} = \frac{y-1}{3} = \frac{z-1}{\lambda}$ is $\perp$ to normal to the plane $\vec{r}.\left(2\vec{i} + 3\vec{j} + 4\vec{k}\right) = 0$ is

1) $-\frac{13}{4}$ 2) $-\frac{17}{4}$ 3) 4 4) $\frac{11}{4}$

143. The tangent at the point (2, -2) to the curve, $x^2y^2 - 2x = 4(1 - y)$ does not pass through the point

1) (–2, –7) 2) (–4, –9) 3) $\left(4,\frac{1}{3}\right)$ 4) (8, 5)

144. The integral $\int \sqrt{1 + 2\cot x(\text{cosec}\, x + \cot x)}dx \left(0 < x < \frac{\pi}{2}\right)$ is equal to (where C is a constant of integration)

1) $2\log\left(\sin\frac{x}{2}\right) + C$ 2) $2\log\left(\cos\frac{x}{2}\right) + C$ 3) $4\log\left(\cos\frac{x}{2}\right) + C$ 4) $4\log\left(\sin\frac{x}{2}\right) + C$

145. The coordinates of the foot of the perpendicular from the point (1, –2, 1) on the plane containing the lines, $\frac{x+1}{6} = \frac{y-1}{7} = \frac{z-3}{8}$ and $\frac{x-1}{3} = \frac{y-2}{5} = \frac{z-3}{7}$ is

1) (0, 0, 0) 2) (2, –4, 2) 3) (-1, 2, -1) 4) (1, 1, 1)

146. The curve satisfying the differential equation, $ydx - (x + 3y^2)\, dy = 0$ and passing through the point (1, 1) also passes through the point

1) $\left(\frac{1}{4},\frac{1}{2}\right)$ 2) $\left(\frac{1}{4},-\frac{1}{2}\right)$ 3) $\left(\frac{1}{3},-\frac{1}{3}\right)$ 4) $\left(-\frac{1}{3},\frac{1}{3}\right)$

147. The area (in sq. units) of the smaller portion enclosed between the curves, $x^2 + y^2 = 4$ and

$y^2 = 3x$, is

1) $\frac{1}{2\sqrt{3}}+\frac{\pi}{3}$ 2) $\frac{1}{2\sqrt{3}}+\frac{2\pi}{3}$ 3) $\frac{1}{\sqrt{3}}+\frac{2\pi}{3}$ 4) $\frac{1}{\sqrt{3}}+\frac{4\pi}{3}$

148. If a point P has co-ordinates (0, -2) and Q is any point on the circle, $x^2 + y^2 - 5x - y + 5 = 0$, then the maximum value of $(PQ)^2$ is

1) $\frac{25+\sqrt{6}}{2}$ 2) $8+5\sqrt{3}$ 3) $14+5\sqrt{3}$ 4) $\frac{47+10\sqrt{6}}{2}$

149. $\lim_{x\to 3}\frac{\sqrt{3x}-3}{\sqrt{2x-4}-\sqrt{2}}$ **is equal to**

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

150. The locus of the point of intersection of the straight lines, $tx - 2y - 3t = 0$, $x - 2ty + 3 = 0$ ($t \in R$) is

1) a hyperbola with the length of conjugate axis 3

2) an ellipse with eccentricity $\frac{2}{\sqrt{5}}$

3) an ellipse with the length of major axis 6

4) a hyperbola with eccentricity $\sqrt{5}$

MELUHA INTERNATIONAL SCHOOL

HYDERABAD

SR MPC | **BITSAT TOT GT– 1** | **Date: 15-05-2020**

Time: 3 Hours | **Max. Marks: 450 M**

KEY-SHEET

PHYSICS

1) **2**	2) **2**	3) **4**	4) **4**	5) **1**	6) **4**	7) **4**	8) **3**	9) **1**	10) **1**
11) **3**	12) **2**	13) **3**	14) **3**	15) **1**	16) **3**	17) **3**	18) **4**	19) **2**	20) **1**
21) **3**	22) **2**	23) **2**	24) **2**	25) **4**	26) **1**	27) **1**	28) **1**	29) **2**	30) **4**
31) **4**	32) **2**	33) **2**	34) **2**	35) **1**	36) **1**	37) **4**	38) **3**	39) **1**	40) **3**

CHEMISTRY

41) **3**	42) **2**	43) **3**	44) **2**	45) **3**	46) **4**	47) **4**	48) **4**	49) **4**	50) **4**
51) **3**	52) **4**	53) **3**	54) **1**	55) **2**	56) **2**	57) **3**	58) **2**	59) **4**	60) **2**
61) **2**	62) **3**	63) **4**	64) **2**	65) **2**	66) **4**	67) **1**	68) **3**	69) **3**	70) **3**
71) **4**	72) **3**	73) **1**	74) **1**	75) **2**	76) **2**	77) **3**	78) **1**	79) **2**	80) **2**

ENGLISH & LOGICAL REASONING

81) **4**	82) **4**	83) **2**	84) **3**	85) **1**	86) **3**	87) **1**	88) **3**	89) **2**	90) **3**
91) **3**	92) **4**	93) **3**	94) **4**	95) **4**	96) **3**	97) **2**	98) **4**	99) **1**	100) **2**
101) **4**	102) **3**	103) **2**	104) **4**	105) **2**					

MATHEMATICS

106) **2**	107) **3**	108) **3**	109) **1**	110) **2**	111) **1**	112) **2**	113) **2**	114) **2**	115) **2**
116) **3**	117) **4**	118) **4**	119) **1**	120) **2**	121) **4**	122) **4**	123) **3**	124) **1**	125) **4**
126) **2**	127) **1**	128) **2**	129) **3**	130) **1**	131) **2**	132) **3**	133) **2**	134) **1**	135) **2**
136) **1**	137) **4**	138) **1**	139) **4**	140) **2**	141) **2**	142) **1**	143) **1**	144) **1**	145) **1**
146) **4**	147) **4**	148) **3**	149) **4**	150) **1**					

HINTS & SOLUTIONS

PHYSICS

1. R should be lies between $(a+b)$ and $(a-b)$

2. $H = h + 2h_1$
   $= h + 2e^2 h$
   $= h\left(1+2e^2\right)$

3. $I = \dfrac{MR^2}{2} \Rightarrow MR^2 = 2I$
   $I^1 = \dfrac{5}{4}MR^2$

$$= \frac{5}{4} \times 2I$$

$$= \frac{5I}{2}$$

4. $R^3 = nr^3$

$$R = n^{1/3} r \Rightarrow \frac{R}{r} = n^{1/3}$$

$$= (8)^{1/3} = 2$$

$$\frac{\vartheta_R}{\vartheta_r} = \left(\frac{R}{r}\right)^2$$

$$\frac{\vartheta_R}{10} = 2^2 = 4$$

$$\vartheta_R = 40\, m/\sec$$

5. $(h+H)\frac{4}{3}\pi r^3 = H.\frac{4}{3}\pi R^3$

$$(h+H)r^3 = H(3r)^3$$

$$h + H = 27H$$

$$h = 27H - H = 26H$$

6. $E \propto T^4$

$$\frac{E_1}{E_2} = \left(\frac{727+273}{327+273}\right)^4$$

$$= \left(\frac{1000}{600}\right)^4 = \left(\frac{5}{3}\right)^4$$

$$= \frac{625}{81}$$

7. $P \propto T^3 \Rightarrow T \propto P^{1/3}$

$$T^r P^{1-r} = cons\tan t$$

$$T \propto \frac{1}{P\left(\frac{1-\gamma}{\gamma}\right)}$$

$$-\left(\frac{1-\gamma}{\gamma}\right) = \frac{1}{3}$$

$$\frac{\gamma - 1}{\gamma} = \frac{1}{3}$$

$$3\gamma - 3 = \gamma$$

$$2\gamma = 3$$

$$\gamma = 3/2$$

8. $m = \frac{f_0}{f_e}$

$$L = f_0 + f_e$$

9. $d = \sqrt{2Rh}$

$$= \sqrt{2 \times 6.4 \times 10^6 \times 500}$$

$$= 80\, km$$

10. $M = iA = \frac{e}{T}\left(\pi r^2\right)$

$= \frac{e\pi r^2}{2\pi/\omega} = \frac{er^2\omega}{2}$

$L = m\vartheta r = mr^2\omega$

$\frac{M}{L} = \frac{er^2\omega}{2} \times \frac{1}{mr^2\omega} = \frac{e}{2m}$

11. $\frac{w_1}{w_2} = \frac{hc/\lambda_1}{hc/\lambda_2} = \frac{\lambda_2}{\lambda_1} = \frac{600}{300}$

12. Conceptual

13. $\frac{I_{\max}}{I_{\min}} = \left(\frac{\sqrt{I_1}+\sqrt{I_2}}{\sqrt{I_1}-\sqrt{I_2}}\right)^2$

14. $n^1 = \left(\frac{v+v_0}{v-v_s}\right)n$

$\frac{n^1}{n} = \frac{v+v_0}{v-v_s} = \frac{3v/2}{v/2} = \frac{3}{1}$

15. $m = \frac{v}{u} = -5$

$v = -5u$

$\frac{1}{\vartheta} - \frac{1}{u} = \frac{1}{f}$

$\frac{1}{-5u} - \frac{1}{u} = \frac{1}{30}$

$\frac{-6u}{5} = \frac{1}{30}$

$u = -36\,cm$

16. $R = \frac{V}{I} = \frac{20}{2.5} = 8$

the error in the measurement is

$\frac{\Delta R}{R} = \frac{\Delta V}{V} + \frac{\Delta I}{I} = \frac{1}{20} + \frac{0.5}{2.5} = 0.05 + 0.2 = 0.25$

$\Delta R = 0.25\ R = 0.25 \times 8 = 2$

Thus the resistance of the wire with the error is = 8 ± 2 ohm.

Hence correct answer is (3)

17. Let s be the distance travelled by each car

$v_A = \sqrt{2a_1 s}$ *Also* $v_B = \sqrt{2a_2 s}$

$t_1 = \sqrt{\frac{2s}{a_1}}\ \ t_2 = \sqrt{\frac{2s}{a_2}}$

$\sqrt{2a_1 s} - \sqrt{2a_2 s} = v_0$ and $\sqrt{\frac{2s}{a_2}} - \sqrt{\frac{2s}{a_1}} = t_0$

$$\frac{v_0}{t_0} = \frac{\sqrt{a_1} - \sqrt{a_2}}{\frac{1}{\sqrt{a_2}} - \frac{1}{\sqrt{a_1}}} = \sqrt{a_1 a_2}$$

18. $v_X = dx/dt = 2ct$, $v_y = dy/dt = 2bt$

$\therefore v = \sqrt{v_x^2 + v_y^2} = 2t\sqrt{c^2 + b^2}$

Hence correct answer is (4)

19. Option 2

20. Given that $U(r) = 10r^3$

So the force F acting on the particle is given by,

$F = -\frac{\partial U}{\partial r} = -\frac{\partial}{\partial r}(10\, r^3)$

$= -10 \times 3\, r^2 = -30\, r^2$

For circular motion of the particle,

$F = \frac{mv^2}{r} = 30\, r^2$

Substituting the given values, we have,

$\frac{3 \times v^2}{10} = 30 \times (10)^2$ or v = 100 m/s

The total energy in circular motion

$E = K.E. + P.E. = \frac{1}{2} mv^2 + U(r)$

$= \frac{1}{2} \times 3 \times (100)^2 + 10 \text{ X } (10)^3$

$= 2.5 \times 10^4$ joule

Angular momentum

$= mvr = 3 \times 100 \times 10 = 3000$ kg–m^2/sec

Hence correct answer is (1)

21. Conceptual

22. The arrangement shown in the figure is equivalent to three capacitors in parallel hence resultant capacitance = $\frac{3\varepsilon_0 A}{d}$

23. Work done to turn the magnet to align its magnetic dipole moment opposite to the field direction.

$W_{0-180} = U_{180} - U_0 = MB - (-MB)$

$= 2\, MB = 2 \times 0.33 = 0.66$ J

24. When string is cut decrease in spring force 'mg' acts upward

$\therefore a_{2m} = \frac{mg}{2m} = \frac{g}{2}$ upward

$a_m = g$ downward

25. $\tau = I\alpha$

$mg\frac{l}{2} = \frac{ml^2}{3}\alpha$

$\alpha = \frac{3g}{2l}$

$a = r\,\alpha = \frac{l}{2}\alpha \Rightarrow a = \frac{3g}{4}$

$mg - T = ma \Rightarrow T = \frac{mg}{4}$

26. $x_S = \dfrac{m_2 d}{m_1 + m_2} = \dfrac{m\left(\dfrac{L}{2}\right)}{M+m} = \dfrac{mL}{2(M+m)}$

27. $P = FV = m\dfrac{dv}{dt}.V$

$v = \sqrt{\dfrac{2pt}{m}}$

$P = mv^2 \dfrac{dV}{dS}$

$V = \left(\dfrac{3PS}{m}\right)^{\frac{1}{3}}$

By solving these two $S = \left(\dfrac{8Pt^3}{9m}\right)^{\frac{1}{2}}$

28. $-\dfrac{GMm}{R} + \dfrac{1}{2}mv_e^2 = -\dfrac{GMm}{r} + \dfrac{1}{2}mv^2$

$v^2 = \dfrac{2GM}{r} \Rightarrow v = \sqrt{\dfrac{2GM}{r}}$

$\dfrac{dx}{dt} = \sqrt{\dfrac{2GM}{r}}$

$\int_0^t dt = \dfrac{1}{\sqrt{2GM}} \int_R^r r^{\frac{1}{2}}\, dx$

$t = \dfrac{1}{\sqrt{2GM}} \times \dfrac{2}{3}\left(r^{\frac{3}{2}} - R^{\frac{3}{2}}\right)$

$= \dfrac{2}{3}\dfrac{1}{\sqrt{2gR^2}}\left((R+h)^{\frac{3}{2}} - R^{\frac{3}{2}}\right)$

$= \sqrt{\dfrac{2}{9gR^2}}\left((R+h)^{\frac{3}{2}} - (R)^{\frac{3}{2}}\right)$

29. Heat lost by water

$Q_1 = 20 \times 1 \times (20) = 400\, Cal$

Heat required for Ice to reach $0^0 C$

$Q_2 = 10 \times \dfrac{1}{2} \times (10) = 50\, Cal$

$\Delta Q = 400 - 50 = 350\, Cal$

$m^1 = \dfrac{350}{80} = 4.375 g$ (mass of ice melted)

$\therefore$ mass of water = 24.375 g

30. $\dfrac{dx}{dt} = \alpha\sqrt{x} \Rightarrow \int \dfrac{dx}{\sqrt{x}} = \int \alpha dt \;\; 2\sqrt{x} = \alpha t \Rightarrow 4x = \alpha t^2$

31. Potential due to small element

$dv = \dfrac{1}{4\pi \in_0} \dfrac{\lambda dx}{x} = \dfrac{Q}{4\pi \in_0 L}\dfrac{dx}{x}$

$V = \dfrac{Q}{4\pi \in_0 L} \int_L^{2L} \dfrac{dx}{x}$

$\boxed{V = \dfrac{Q\ln 2}{4\pi \in_0 L}}$

32. $\frac{x}{y}=\frac{l}{100-l}$

$\frac{y}{x}=\frac{l-60}{160-l}$

$\frac{l}{100-l}=\frac{160-l}{l-60}$

$l^2-60l=16000-260l+l^2$

$200l=16000$

$l=80\,cm$

$x=20\,\Omega\,;\ y=5\,\Omega$

33. $R=\frac{V}{I_g}-G=\frac{1}{10^{-3}}-50=950\,\Omega$

34. The intensity of central maximum = $I_0=4I$

$\frac{I^1}{I_0}=\frac{1}{4}\Rightarrow\boxed{I^1=\frac{I_0}{4}}$

35. using be Bernoulli's theorem for horizontal flow , the upward force acting on the roof F=(p_1-p_2)A

or F= $\frac{1}{2}\rho\left(v_2^2-v_1^2\right)A$

for roof to be intact mg≥F.

=> mg≥$\frac{1}{2}\rho\left(v_2^2-v_1^2\right)A$

v_1=air below the roof=0

v_2=air above the roof

A=12m^2;m=20kg;ρ=$\frac{4}{3}kg/m^3$ => $200\geq\frac{1}{2}\times\frac{4}{3}\times v_2^2\times12$

$\Rightarrow v_2^2\leq\frac{200\times2\times3}{4\times12}=\frac{400}{16}\Rightarrow v_2\leq5m/s$

36. For the given convex lens $\frac{1}{f}=\left(\frac{\mu_g}{\mu_a}-1\right)\left(\frac{1}{R_1}-\frac{1}{R_2}\right)$

$\Rightarrow\frac{1}{10}\left(\frac{3}{2}-1\right)\left(\frac{1}{R}+\frac{1}{R}\right)\Rightarrow R=10cm$

For first surface using lens formula for refraction $\frac{\mu_2}{v_1}-\frac{\mu_1}{u}=\left(\frac{\mu_2-\mu_1}{R}\right)$

$\frac{3}{2v_1}-\frac{1}{\infty}=\frac{3/2-1}{10}\Rightarrow v_1=30cm$

For 2nd surface $\frac{4/3}{v}-\frac{3/2}{30}=\frac{1}{60}\Rightarrow v\frac{\frac{4}{3}-\frac{3}{2}}{-10}\Rightarrow\frac{4}{3v}-\frac{1}{30}=\frac{1}{60}$

$\Rightarrow\frac{4}{3v}=\frac{1}{60}+\frac{1}{30}\Rightarrow v=20cm$

So parallel lines get focused at f=20cm

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

$\Rightarrow\log T+(\gamma-1)\log V=$ Constant

$\Rightarrow\frac{dT}{T}+\left(\frac{\gamma-1}{V}\right)dV=0$

$$\Rightarrow \left|\frac{dV}{dT}\right| = \frac{V}{T}\left(\frac{1}{\gamma - 1}\right) \text{ at } (V_0, T_0)$$

$$\Rightarrow \frac{V_0}{T_0}\left(\frac{1}{\gamma - 1}\right) = m(given)$$

$$(\gamma - 1) = \frac{V_0}{mT_0}$$

$$C_V = \frac{R}{\gamma - 1} = \frac{RmT_0}{V_0}$$

38. $\lambda = \frac{0.693}{T_{½}}$ and is a constant for a given material

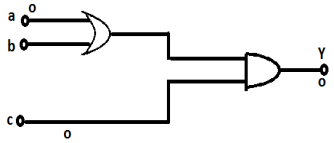
39. load is parallel to Zener so

$V_z = V_L = 50V$

$R_L = 10K\Omega$

$$i_L = \frac{V_L}{R_L} = 5mA$$

40.



Checking options one by one
We must note that c=1
And out of OR gate must also be 1

CHEMISTRY

41. $Molecules\, of\, O_2 : N_2 = \frac{1}{32} : \frac{4}{28} = 7 : 32$

42. for n=5 l=0,1,2,3,4 5s,5p,5d,5f,5g out of them m=+1 is present in 5p,5d,5f,5g hence 4x2=8 electrons, while that in n=2, l=1 m=+1 m=-1/2 only one electron is possible. Therefore 8 and 1

43. The given magnetic quantum number values indicate $P-$ subshell for which minimum 'n' value is 2.

$$\therefore mvr = \frac{2h}{2\pi} = \frac{h}{\pi}$$

44. Acid pH is less than 7 $[H]^+$ $1.0x10^{-7} + 1x10^{-9} = 1x10^{-7} + 0.01x10^{-9} = 1.01x10^{-7}$ $pH = -\log [H^+] = -\log 1.01x10^{-7} = 7 - \log 1.01 = 7 - 0.0043253 = 6.999567$.

45. Higher the oxidation state more is the covalent nature.

46. just born hydrogen is nascent hydrogen it is represented as [H]

47. $ZnCl_2 + 2NaHCO_3 \longrightarrow Zn(HCO_3)_2 + 2NaCl$

$Zn(HCO_3)_2 \xrightarrow{\Delta} ZnCO_3 + H_2O$

$ZnCO_3 + 2NaOH \longrightarrow Na_2ZnO_2 + H_2O$

48. $u_1 = \sqrt{\frac{3RT}{m_1}}$ $u_2 = \sqrt{\frac{3RT}{m_2}}$

$u_1^2 = \frac{1}{m_1}$ $u_2^2 = \frac{1}{m_2}$

$\frac{u_1^2}{u_2^2} = \frac{m_2}{m_1}$ $m_1u_1^2 = m_2u_2^2$

49. It should not be tertiary amine

50. Based on bond order.
51. 10^6 *parts contains* $\rightarrow 15$ *parts* co_3^{-2}

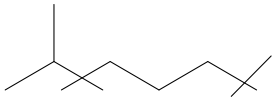
    10 *part contains* $\rightarrow ?$

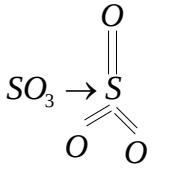
    $\frac{10^3 \times 15}{10^6} = 15 \times 10^{-3}$ *parts*

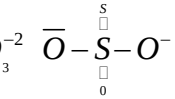
    $= \frac{15 \times 10^{-3}}{60} = \frac{10^{-3}}{4} mole/lit$
52. Down the group carbonate stability increases based on Fajan's rules.
53. $K_1 = \frac{1}{K_2}; K_3 = \sqrt{K_2}; K_3^2 = K_2$

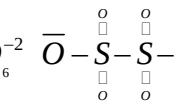
    $K_1 = \frac{1}{K_3^2}$

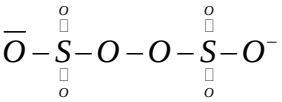
    $\therefore K_1 = \frac{1}{K_2} = \frac{1}{K_3^2}$
54. $Mg(OH)_2$ $\square$ $Mg^{+2} + 2OH^-$

    $K_{sp} = x.(2x)^2 = 4x^3$
55. work is path function as it depends upon the path followed.
56. Conceptual it has to follow B_nH_{n+4} or B_nH_{n+6}
57. amorphous form of silica , It has formula SiO_2
58. retention factor= distance moved by the particle of interest / distance moved by the solvent.
59.  4) 2, 2, 6, 6, 7 – Penta methyl octane
60. doublé bonded carbón should posssess two dfferent groups.
61. resonance stabilized.
62. anti addition.
63. $\frac{r^+}{r^-} > 0.732$ Hence CO.NO is 8
64. $2PbSO_4 + 2H_2O \rightarrow Pb + PbO_2 + 2H_2SO_4$
65. $H_2O_2 \rightarrow O_2 + 2H^{\oplus} 2e^-$

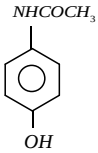
    $1 mole\ H_2O_2\ requires \rightarrow 2 moles\ of\ e^- = 2F = 1.93 \times 10^5 C$
66. $\frac{dc}{dt} = k[A]$
67. All are experimental facts.
68. All the acids are SP^3 Hybridisation.
69.  "0"

    $S_2O_3^{-2}$  "1"

    $S_2O_6^{-2}$  "1"

$S_2O_8^{-2}$ 

70. thee should be unpaired electrons to exhibit color
71. $XeF_6+H_2O \rightarrow 2HF + XeOF_4$
72. $[Cu(NH_3)_4]SO_4$ EAN= 29-2+4x2= 35
73. $[Co(en)_2Cl_2]^+$
74. $A = C_2H_5Cl$, $B = C_2H_5OH$
    $C = C_2H_4$
75. $-CH_2Cl$,- CH_2CN, $-CH_2COOH$
76. higher number of + I groups.
77. $CH_2=C(CH_3)-COOCH_3$ methylmethacrylate
78. Vitamin A deficiency results in night blindness.
79. $\beta-$ hydroxy aldehydes (aldols) & $\beta-$ hydroxyl ketones (ketols) are aldol condensation products.

80. phenol on nitration gives nitrophenol. Nitophenol on treatment wih Sn+HCl (reduction) and finally with acetic acid or acetic anhydride gives paracetamol. 

MATHEMATICS

106. Verification
    $\Rightarrow S_1 = -1+1+3+5 = 8$
    $S_4 = (-1)(1)(3)(5) = -15$
107. ${}^{m+n}C_m = {}^{m+n}C_n \Rightarrow a = b$
108. $x^2 = 1 \Rightarrow x = -1,1 \because A = \{-1,1\}$
    $x^4 = 1 \Rightarrow x^2 = -1,1$
    $\Rightarrow x = -i,i,-1,1 \because B = \{-i,i,-1,1\}$
    $A\Delta B = (A-B)\cup(B-A) = \varnothing \cup \{-i,i\} = \{-i,i\}$
109. $(b-c)^2 + 4bc.\dfrac{(s-b)(s-c)}{bc}$
    $= (b-c)^2 + (c+a-b)(a+b-c)$
    $= (b-c)^2 + a^2 - (b-c)^2$
    $= a^2$
110. $1-\cos 17^0 + 2\cos 16^0\left(2\sin 7\frac{1}{2}^0 \sin 8\frac{1}{2}^0\right) + \cos 32^0$
    $= 1-\cos 17^0 + 2\cos 16^0(\cos 1^0 - \cos 16^0) + 2\cos^2 16^0 - 1 = 1-\cos 17^0 - 2\cos^2 16^0 + 2\cos 16^0 \cos 1^0 + 2\cos^2 16^0 - 1$
    $= -\cos 17^0 + \cos 17^0 + \cos 15^0$
    $= \dfrac{\sqrt{3}+1}{2\sqrt{2}}$
111. $81^{\sin^2 x} + 81^{\cos^2 x} = 30$, $0 \le x \le \dfrac{\pi}{2}$

On verification $\frac{\pi}{6},\frac{\pi}{3}$ satisfies

112. $A, B \rightarrow$ events that dogA and dogB will alive.

$P(\bar{A}) = p, P(\bar{B}) = q$

Required probability= $P(A \cup B) = 1 - P\left(\overline{A \cup B}\right)$

$1 - P(\bar{A} \cap \bar{B}) = 1 - P(\bar{A})\, p(\bar{B})$

$= 1 - pq$

113. $2^n - 1 = 127$

114. $p\left[2a + (p-1)d\right] = 2a$ and $q\left[2a + (q-1)d\right]$

Subtracting above equations, we get

$2(q-p)$ or $2a + d(p+q-1) = -2$

$S_{p+q} = -(p+q)$

115. $x + iy = (5+t) + i\sqrt{25-t^2}$

$x = 5+t, y^2 = 25 - t^2 \Rightarrow (x-5)^2 + y^2 = 25$

$\therefore x^2 + y^2 - 10x = 0$

Represent a circle.

116. The coefficient of $x^p y^q z^q$ in $(ax+by+cz)^n = \frac{n!}{p!q!r!} a^p b^q c^r$

117. $= \sum_{k=1}^{10}\left[\left(\sin\left(\frac{2k\pi}{11}\right) + i\cos\left(\frac{2k\pi}{11}\right)\right)\right]$

$= i\sum_{k=1}^{10}\left[\left(\cos\left(\frac{2k\pi}{11}\right) + i\sin\left(\frac{2k\pi}{11}\right)\right)\right]$

$= i\left[\frac{1}{\alpha} + \frac{1}{\alpha^2} + ------ + \frac{1}{\alpha^{10}}\right]$

where α is the complex 11 the root of unity

$= i\left(\alpha^{10} + \alpha^9 + -----+\alpha\right) = (-1)i = -i$

118. $\frac{\sin^3\theta}{\cos\theta} + \frac{\cos^3\theta}{\sin\theta} = \frac{\sin^4\theta + \cos^4\theta}{\sin\theta\cos\theta}$

$= \frac{1 - 2\sin^2\theta\cos^2\theta}{\sin\theta\cos\theta} = \frac{1 - \frac{k^2}{2}}{\frac{k}{2}} = \frac{2-k^2}{k}$

119. $4^x - 2^{x+1} + 5 = \left(2^x\right)^2 - 2.2^x + 1 + 4$

$= \left(2^x - 1\right)^2 + 4 \geq 4$

120. $Let\, S = 1 + \frac{2}{3} + \frac{6}{3^2} + \frac{10}{3^3} + \frac{14}{3^4} + ----(1)$

$$\frac{1}{3}S=\frac{1}{3}+\frac{2}{3^2}+\frac{6}{3^3}+\frac{10}{3^4}+----(2)$$

Sub. (2) from (1)

$$S\left(1-\frac{1}{3}\right)=\frac{2}{3}S=\frac{4}{3}+\frac{4}{3^2}\left(\frac{1}{1-\frac{1}{3}}\right)$$

$$S=3$$

121. $\theta \le x \le 2\pi$

$$\cos x+\cos 2x+\cos 3x+\cos 4x=0$$

$$2\frac{\cos 5x}{2}.\cos\frac{3x}{2}+2\frac{\cos 5x}{2}.\cos\frac{x}{2}=0$$

$$\frac{\cos 5x}{2}=0(or)2\cos x.\cos\frac{x}{2}=0$$

$$\frac{\cos 5x}{2}=0(or)\cos x=0(or)\cos\frac{x}{2}=0$$

$$x=(2n+1)\frac{\pi}{5}(or)(2n+1)\frac{\pi}{2}(or)(2n+1)\pi$$

No of solutions =7

122. $(\bar{a}\times\bar{b})\times\bar{c}=\frac{1}{3}|\bar{b}||\bar{c}|\bar{a}$

$$(\bar{a}.\bar{c})\bar{b}-(\bar{b}.\bar{c})\bar{a}=\frac{1}{3}|\bar{b}||\bar{c}|\bar{a}$$

$$(\bar{a}.\bar{c})\bar{b}=\left[\frac{1}{3}|\bar{b}||\bar{c}|+(\bar{b}.\bar{c})\right]\bar{a}$$

$\bar{a}.\bar{c}=0$ and $\frac{1}{3}|\bar{b}||\bar{c}|+(\bar{b}.\bar{c})=0$

$$|\bar{b}||\bar{c}|\left[\frac{1}{3}+\cos\theta\right]=0$$

$$\cos\theta=-\frac{1}{3},\ \sin\theta=\frac{2\sqrt{2}}{3}$$

123. $\sqrt{3}[\,1+\sqrt{25}+\sqrt{81}+\sqrt{69}\,.....\,]=435\sqrt{3}$

$\sqrt{3}\,[\,1+5+9+13+.....T_n\,]=435\sqrt{3}$

$\Rightarrow \sqrt{3}\times\frac{n}{2}[2+(n-1)4]=435\sqrt{3}$

$\Rightarrow 2n+4n^2-4n=870$

$\Rightarrow 4n^2-2n-870=0$

$\Rightarrow 2n^2-n-435=0$

$n=\frac{1\pm\sqrt{1+4\times2\times435}}{4}$

$$=\frac{1\pm59}{4}=\frac{1+59}{4}=15\,;\frac{1-59}{4}$$

124. $\frac{(28-1)^{999}}{7}=\frac{28\lambda-1}{7}\Rightarrow\frac{28\lambda-7+7-1}{7}=\frac{7(4\lambda-1)+6}{7}$

$\therefore$ *rem* = 6

125. E,E, N, Q,U

(i) E..... = 24

(ii) N ..... = $\frac{4!}{2} = 12$

(iii) Q E..... = 3! = 6

(iv) Q N .....= $\frac{3!}{2!} = 3$

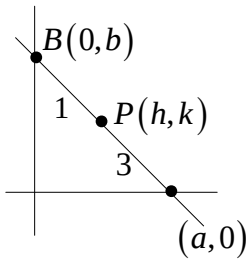
(v) Q U E E N = 1

126. $\Delta=0$

$$\begin{vmatrix} 2 & 4 & -\lambda \\ 4 & \lambda & 2 \\ \lambda & 2 & 2 \end{vmatrix} = 0 \Rightarrow \lambda^3 + 4\lambda - 40 = 0$$

127. $adj\left(adjA\right) = \left|A\right|^{n-2} A$

128. Let $P\left(h,k\right)$ divides AB in the ratio $3:1$ then $P\left(h,k\right) = \left(\frac{a}{4}, \frac{3b}{4}\right)$



$\Rightarrow a = 4h \ , b = \frac{4k}{3}$

$\frac{x}{a} + \frac{y}{b} = 1$ pass $\left(\frac{1}{5}, \frac{1}{5}\right)$

$\Rightarrow a + b = 5ab$

$\Rightarrow 3h + k = 20hk \Rightarrow 3x + y = 20xy$

129. $\left(a+2b\right)x + \left(a-3b\right)y = a-b$

$a\left(x+y-1\right) + b\left(2x-3y+1\right) = 0$

Solving $x + y - 1 = 0, 2x - 3y + 1 = 0$

$\left(x,y\right) = \left(\frac{2}{5}, \frac{3}{5}\right)$

130. Use $2gg^1 + 2ff^1 = c + c^1$

$\Rightarrow k = 47$

131. $y = mx - 2am - am^3$ is pass $\left(1,0\right)$

$\Rightarrow 0 = m - 2m - m^3$

$\Rightarrow m^3 + m = 0 \Rightarrow m = 0$ or $m^2 + 1 = 0$

Is not possible

$\therefore$ number of normal=1

132. Continuity at $x = 0$

$$LHL = \underset{x\to 0^-}{Lt}\frac{\tan x}{x} = \underset{h\to 0}{Lt}\frac{-\tanh}{-h} = 1$$

$$RHL = \underset{x\to 0^+}{Lt}\frac{\tan x}{x} = \underset{h\to 0}{Lt}\frac{-\tanh}{h} = 1$$

$$LHL = RHL = f(0) = 1$$

f is continuous at $x = 0$

Differentiable at $x = 0$

$LHD = \underset{h\to 0}{Lt}\frac{f(0-h)-f(0)}{-h} = \underset{h\to 0}{Lt}\frac{\tanh -h}{-h^2} = \underset{h\to 0}{Lt}\frac{\sec h^2 x - 1}{-2h} = 0$ $RHD = 0$ $\therefore f(x)$ is differentiable at $x = 0$

133. $A.M \geq G.M$

$$\Rightarrow \frac{2x+3y}{2} \geq \sqrt{2x.3y}$$

$$\geq \sqrt{6(6)} \geq 6$$

$$2x + 3y \geq 12$$

134. $\int_{-1}^{1}\frac{17x^5 - x^4 + 29x^3 - 31x + 1}{x^2+1}dx = \int_{-1}^{1}\frac{17x^5 + 29x^3 - 31x}{x^2+1} - \int_{-1}^{1}\frac{x^4-1}{x^2+1}dx = 0 - 2\int_0^1 \frac{(x^2+1)(x^2-1)}{(x^2+1)}dx$

$$= -2\left(\frac{x^3}{3} - x\right)_0^1 = \frac{4}{3}$$

135. $\frac{dy}{dx} + \frac{y(1+x^2)}{x(1+x^2)} = \frac{-1}{x(1+x^2)}$

$$\frac{dy}{dx} + \frac{y}{x} = \frac{-1}{x(1+x^2)}$$

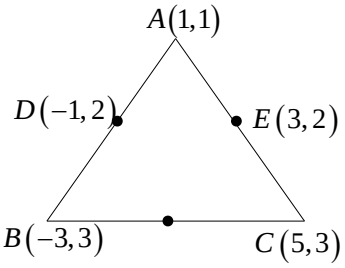
$I.F = e^{\int \frac{1}{x}dx} = e^{\log x} = x$

136. Let D,E midpoints of AB and AC so, coordinates of B and C are $(-3,3)$ and $(5,3)$

Centroid of triangle

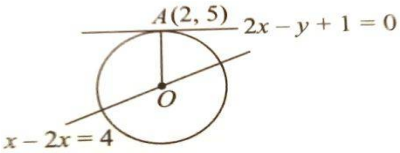
$$= \left(\frac{1-3+5}{3}, \frac{1+3+3}{3}\right)$$

$$= \left(1, \frac{7}{3}\right)$$



137. As the attitude from A is fixed and the orthocentre lies on the attitude $x + y = 3$ is the required locus.

138.



$2x-y+1=0$ is a tangent .

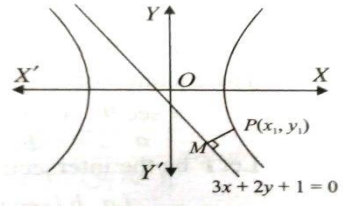
Slope of line $OA=-\frac{1}{2}$

The equation of OA is $(y-5)=-\frac{1}{2}(x-2)$

Therefore intersection with $x-2y=4$ will give the coordinates of center as (8,2). Hence

$r=OA=\sqrt{(8-2)^2+(2-5)^2}=3\sqrt{5}$

139.



Point P is nearest to the given line if the tangent at P is parallel to the given line

Now the slope of tangent at $P(x_1,y_1)$ is

$\left(\frac{dy}{dx}\right)_{(x_1,y_1)}=\frac{18y_1}{24x_1}=\frac{3}{4}\frac{x_1}{y_1}$ which must be equal to -3/2 . Therefore $\frac{3}{4}\frac{y_1}{x_1}=-\frac{3}{2}$, $y_1=-2x_1$

Also (x_1,y_1) lies on the curve

Hence $\frac{x_1^2}{24}-\frac{y_1^2}{18}=1.....(ii)$

Solving (i) and (ii) we get two points (6,-3) and (-6,3) of which (6,-3) is the nearest.

140. $y=-x^3+3x^2+9x-27$

$\frac{dy}{dx}=-3x^2+6x+9$

Let the slope of tangent to the curve at any point be m(say). Then

$m=-3x^2+6x+9$

$\frac{d^2m}{dx^2}=-6<0$ for all x

Therefore m is maximum or minimum when $\frac{dm}{dx}=0$, i.e when x=1

Therefore maximum slope=-3+6+9=12

141. $I_1=\int_{\sin^2 t}^{1+\cos^2 t} xf\left(x(2-x)\right)dx$

$=\int_{\sin^2 t}^{1+\cos^2 t}(2-x)\,f\left(x\right)(2-x)dx=2I_2-I_1=\frac{I_1}{I_2}=1$

142. Since line is parallel to the plane vector $2\vec{i}+3\vec{j}+\lambda\vec{k}$ is perpendicular to the normal to the plane

$2\vec{i}+3\vec{j}+4\vec{k}$

$2\times2+3\times3+4\lambda=0$

$\lambda=-\frac{13}{4}$

143. x^2y^2 -2x = 4 - 4y

$2xy^2 + 2y.x^2.\frac{dy}{dx} - 2 = -4.\frac{dy}{dx}$

$\frac{dy}{dx}(2y.x^2 + 4) = 2 - 2x.y^2$

$$\left(\frac{dy}{dx}\right)_{(2,-2)} = \left|\frac{2-2\times2\times4}{2(-2)\times4+4}\right| = \frac{+14}{+12} = \frac{7}{6}$$

$(y + 2) = \frac{7}{6}(x - 2) \Rightarrow 7x - 6y = 26$

144. $= \int \sqrt{\cos ec^2 x - \cot^2 x + 2\cos ecx \cot x + 2\cot^2 x}\, dx$

$= \int \cot x/2\, dx = 2\log \sin x/2 + c$

145. $\overline{n} = \overline{n_1} \times \overline{n_2}$

$$= \begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ 6 & 7 & 8 \\ 3 & 5 & 7 \end{vmatrix} = (9, -18, 9) = (1, -2, 1)$$

$1(x+1) - 2(y-1) + (z-3) = 0$

$= x - 2y + z = 0$

foot to z

$$\frac{x-1}{1} = \frac{y+2}{-2} = \frac{z-1}{1} = -\frac{[1+4+1]}{6}$$

$x = 0, y = 0, z = 0$

146.

1) $\left(\frac{1}{4}, -\frac{1}{2}\right) = \frac{1}{4} = \frac{3}{4} + 1$

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

147. $x^2 + 3x - 4 = 0$

$(x + 4)(x - 1) = 0$

$x = -4, x = 1$

$$\text{area} = 2\left[\int_0^1 \sqrt{3}.\sqrt{x}\,dx + \int_1^2 \sqrt{4-x^2}\,dx\right]$$

$$= \left(\sqrt{3}\left(\frac{2}{3}\right) + \left\{2.\frac{\pi}{2} - \left(\frac{\sqrt{3}}{2} + \frac{\pi}{3}\right)\right\}\right) \times 2$$

$$\left(\frac{2}{\sqrt{3}} - \frac{\sqrt{3}}{2} + \frac{2\pi}{3}\right) \times 2 = \left(\frac{1}{2\sqrt{3}} + \frac{2\pi}{3}\right) \times 2 = \frac{1}{\sqrt{3}} + \frac{4\pi}{3}$$

148. $\left(x - \frac{5}{2}\right)^2 - \frac{25}{4} + \left(y - \frac{1}{2}\right)^2 - \frac{1}{4} + 5 = 0$

$= (x - 5/2)^2 + (y - 1/2)^2 = 3/2$

$= 14 + 5\sqrt{3/2}(\cos\theta + \sin\theta)$

Maximum value of $PQ^2 = 14 + 5\sqrt{3/2}(\sqrt{2})$

$= 14 + 5\sqrt{3}$

149. $\lim_{x\to 3}\dfrac{\sqrt{3x}-3}{\sqrt{2x-4}-\sqrt{2}}$

retionlize

$\lim_{x\to 3}\dfrac{(3x-9)\times\left(\sqrt{2x-4}+\sqrt{2}\right)}{\{(2x-4)-2\}\times\left(\sqrt{3x}+3\right)}$

$\lim_{x\to 3}\dfrac{(3x-9)}{(2x-6)}\times\dfrac{\left(\sqrt{2x-4}+\sqrt{2}\right)}{\left(\sqrt{3x}+3\right)}$

$\dfrac{3}{2}\times\dfrac{2\sqrt{2}}{6}=\dfrac{1}{\sqrt{2}}$

150. $x-3=\dfrac{2}{t}y,\ x+3=2ty$

$(x+3)(x-3)=\dfrac{2}{t}y.2ty$

$x^2-9=4y^2,\ x^2-4y^2=9$

$\dfrac{x^2}{9}-\dfrac{y^2}{9/4}=1$

$a^2=9\ \ b^2=9/4$

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