I. Objective type questions :  

Maths

1. The harmonic conjugate of (4,-2) W.r.to (2,-4) and (7,1) is  
   a. (-8, -14)  
   b. 2,3  
   c. (-2,-3)  
   d. (13,-5)  

2. The points (0,-1) (-2,3) (6,7) (8,3) form  
   a. A parallelogram  
   b. a rectangle  
   c. a rhombus  
   d. a square  

3. The orthocenter of the \( \Delta \) formed by A (-1,0) B (-2, \( \frac{3}{4} \) ) C (-3, -7/6)  
   a. (-3,-2)  
   b. (1,3)  
   c. (-1,2)  
   d. none  

4. Co ordinates of the point dividing the line segment joining A (1,-2) B (4,7) internally  
   in the ratio 1:2 are  
   a. (1,2)  
   b. (2,1)  
   c. (4,3)  
   d. (7,2)  

5. The 1st and 2nd points of trisection of the join of (-2, 11) (-5, 2) are  
   a. (-3, 0) (-4,6)  
   b. (-3,9) (-4,5)  
   c. (-3,8) (-4, 5)  
   d. (-3,-4) (8,-5)  

6. Equation of the st line containing the point (1,2) and (3,4)  
   a. X+y+1=0  
   b. x-y +1 =0  
   c.4x+y=1  
   d. x+y=2  

7. The equation of sides of \( \Delta \) are x+y-5 =0, x-y +1=0 and y-1 =0 then the circum centre is  
   a. (2,1)  
   b. (1,7)  
   c. (2,-2)  
   d. (1,-2)  

8. If \( 6x+8y+7-k (2x+4y+5) =0 \) is parallel to y axis then k  
   a. 1  
   b. 3  
   c. 2  
   d. 1  

9. If P, Q are two points on the line 3x+4y+15=0 such that Op = OQ = 9 then the area \( \Delta OPQ \)  
   a. 6\( \sqrt{2} \)  
   b. 9\( \sqrt{2} \)  
   c. 12\( \sqrt{2} \)  
   d. 18\( \sqrt{2} \)  

10. Image of (2,3) W.r.t to (-1,3) is  
    a. (3,-2)  
    b. (1,1)  
    c. (-4, 3)  
    d. (3,7)  

11. \( \sqrt{1-\sin^2 100^0} \) (sec 100^0)  
    a. -1  
    b. 0  
    c. 1  
    d. 2  

12. If tan \( 20^0 \) R then \( \frac{\tan 250^0 + \tan 340^0}{\tan 200^0 - \tan 110^0} = \)  
    a. \( \frac{1+p}{1-p} \)  
    b. \( \frac{1-p}{1+p} \)  
    c. 0  
    d. \( \frac{1-p^2}{1+p^2} \)  

13. Sec\( \theta + \tan^2 \theta =5 \) then sec\( \theta = \)  

14. The value of $\sin^6 \theta \cos^6 \theta + 3 \sin^2 \theta$ is  
   a. 0  
   b. 1  
   c. 2  
   d. 3

15. $a = \sec \theta - \tan \theta$  
   $b = \csc \theta + \cot \theta$  
   Then $a =$  
   a. $\frac{b+1}{b-1}$  
   b. $\frac{1+b}{1-b}$  
   c. $\frac{b-1}{1+b}$  
   d. $\frac{1-b}{1+b}$

16. $A + B = 135^\circ$ then $(1 + \cot A)(1 + \cot B) =$  
   a. 1  
   b. 2  
   c. 3  
   d. 4

17. If $\sqrt{3} \cos \theta - \sin \theta$ is positive then $\theta$ lies b/w  
   a. $\frac{-2\lambda}{3}$ to $\frac{\lambda}{3}$  
   b. $\frac{-\lambda}{3}$ to $\frac{\lambda}{2}$  
   c. $0$ to $\frac{\lambda}{3}$  
   d. $\frac{-\lambda}{2}$ to $\frac{\lambda}{2}$

18. $\sin 10^\circ - \sin 110^\circ - \sin 130^\circ =$  
   a. 0  
   b. -1  
   c. 1  
   d. $\frac{1}{2}$

19. $\tan 55^\circ - \tan 10^\circ - \tan 55^\circ \tan 10^\circ$  
   a. -1  
   b. 1  
   c. $-\sqrt{3}$  
   d. $\frac{1}{2}$

20. If $\sin x \cos y = \frac{1}{4}$ and $3 \tan x = 4 \tan y$ then $\sin (x-y) =$  
   a. $\frac{1}{16}$  
   b. $\frac{7}{16}$  
   c. $\frac{3}{4}$  
   d. $\frac{3}{16}$

21. If the coefficient of friction is $\sqrt{3}$. The angle of friction is  
   a. $30^\circ$  
   b. $60^\circ$  
   c. $45^\circ$  
   d. $37^\circ$

22. The relation between coefficient of static friction $\mu$ and angle of friction is  
   a. $\phi = \cot^{-1}(\mu)$  
   b. $\phi = -\cot^{-1}(\mu)$  
   c. 0  
   d. $\phi = \tan^{-1}(\mu)$

23. A block is sliding on a rough horizontal surface. If the contact force on the block is $T_2$ times the frictional force. The coefficient of friction is  
   a. 0.25  
   b. $\sqrt{2}$  
   c. 1  
   d. $\frac{1}{\sqrt{2}}$

24. A body of mass 400 g slides on a rough horizontal surface. If the frictional force is 3.0 N find the magnitude of the contact force take ($g = 10 \text{ M/s}^2$)  
   a. 0  
   b. $\mu mg$  
   c. $2 \mu mg$  
   d. $\mu mg/2$

25. A block of mass $m$ is kept on a horizontal table. If the static friction coefficient is $\mu$, find the friction force acting on the block.  
   a. 0  
   b. $\mu mg$  
   c. $2 \mu mg$  
   d. $\mu mg/2$
26. A 100 kg box is slides on floor of a truck going at 72 km/h. if the box slides 100m before coming to rest. $\mu$ is ($g = 10 \text{ m/s}^2$)  

\[ \text{a. 0.4} \quad \text{b. 0.2} \quad \text{c. 0.1} \quad \text{d. 0.05} \]

27. In the figure shown find acceleration of block and force of friction on it  

\[ \text{a. } \frac{8}{3} \text{ m/s}^2, 4N \quad \text{b. } 2 \text{ m/s}^2, 4N \quad \text{c. } 2 \text{ m/s}^2, 8N \quad \text{d. } 2 \text{ m/s}^2, 8N \]

28. Pulling force making an angle “$\theta$” to the vertical is applied on a block of weight “W” placed on a horizontal table. If the angle of friction is “$\phi$”. The magnitude of the force required to move the body is equal to  

\[ \text{a. } \frac{W \cos \phi}{\cos (\theta - \phi)} \quad \text{b. } \frac{W \sin \phi}{\sin (\theta + \phi)} \quad \text{c. } \frac{W \tan \phi}{\sin (\theta - \phi)} \quad \text{d. } \frac{W \sin \phi}{g \tan (\theta - \phi)} \]

29. A uniform chain of length $L$ hangs partly from a table which is kept on equilibrium by friction. The maximum length that can stand without slipping is 1 less than coefficient of static friction  

\[ \text{a. } \frac{1}{L + 1} \quad \text{b. } \frac{1}{L} \quad \text{c. } \frac{1}{L - 1} \quad \text{d. } \frac{L}{L - 1} \]

30. A uniform chain of linear density 2kg gm$^{-1}$, lies at rest on a horizontal table of coefficient of friction 0.8 with maximum length 32 cm hanging over the edge of the table total mass of the chain is  

\[ \text{a. 1.44 kg} \quad \text{b. 0.64 kg} \quad \text{c. 0.72 kg} \quad \text{d. 0.52 kg} \]

31. A block of mass 1 kg lies on horizontal surface in the truck, The coefficient of friction between the block and the surface is 0.6. If the acceleration of the truck is 5 m/s$^2$ the frictional force acting on the block is  

\[ \text{a. 2N} \quad \text{b. 5N} \quad \text{c. 3N} \quad \text{d. 6N} \]

32. A object takes 1 second to slide down a rough 45° inclined plane. The time taken to slide down a smooth 30° inclined plane having the same slope length is ($\mu = 0.5$)  

\[ \text{a. } \sqrt{2} \text{ sec} \quad \text{b. } \frac{1}{\sqrt{2}} \text{ sec} \quad \text{c. } \frac{1}{2\sqrt{2}} \quad \text{d. } 2^{-1/4} \text{ sec} \]

33. A body takes n times as much time to slide down a 45° rough incline as it takes to slide down a smooth 45° incline, the coefficient of friction is  

\[ \text{a. } \frac{1}{n^2} \quad \text{b. } n^2 \quad \text{c. } 1 - \frac{1}{n^2} \quad \text{d. } \frac{1}{\sqrt{1-n^2}} \]

34. The angle of friction between two surfaces is 37°. If $\cos 37^\circ = 4/5$, coefficient of static friction between those two surfaces is  

\[ \text{a. } \frac{3}{4} \quad \text{b. } 4/3 \quad \text{c. } 3/5 \quad \text{d. } 5/3 \]

35. A body slipping on a rough horizontal plane move with an acceleration of 4.0 m/s$^2$ what is the coefficient of kinetic friction between the block and the plane?  

\[ \text{a. 0.4} \quad \text{b. 0.5} \quad \text{c. 0.6} \quad \text{d. 0.7} \]
Chemistry

36. Measurable properties of gases from the given are
      a. Only b, c  b. Only b, c, d  c. Only c, d  d. a, b, c, d

37. Volume of a gas at 0°C is doubled at ______ °C temperature keeping pressure constant is
   a. 273 K  b. 2°C  c. 243°C  d. 546°C

38. At constant temperature for a given mass of gas, pressure of the gas of volume “v” becomes three times
   a. P  b. P/4  c. P/3  d. 3P

39. A sample of a given mass of gas at a constant temperature occupies 95 cm³ under a pressure of 9.962 x 10⁴ N m⁻². At the same temperature its volume at a pressure of 10.13 x 10⁴ N m⁻² is
   a. 190 cm³  b. 93.42 cm³  c. 46.5 cm³  d. 47.5 cm³

40. Volume of 1 Litre of a gas is nearly equal to
   a. 10 dm³  b. 1 m³  c. 10³ m³  d. 10³ cm³

41. Ideal gas obeys
   a. Boyle’s Law  b. Charte’s Law  c. Avagadro’s Law  d. All of the above

42. The density of a gas at STP is 2 g L⁻¹. Its molecular weight is
   a. 22.4  b. 56  c. 44.8  d. 30

43. A five litre flask contains 35 gm of N₂, 3g of H₂ and 8g of O₂ at 27°C. The total pressure exerted by the mixture of these gases is
   a. 92.4 atm  b. 0.924 atm  c. 9.24 atm  d. 924 atm

44. The rate of diffusion of Nitrogen gas in a diffusion tube. The molecular weight of X is _____ g mol⁻¹
   a. 63  b. 36  c. 54  d. 45

45. 180ml of Hydrocarbons having the molecular weight 16 diffuses in 1.5 min under similar conditions. The time taken by 120ml of SO₂ to diffuse is
   a. 2 min  b. 1.5 min  c. 1 min  d. 1.75 min

46. Which of the following is independent of temperature of a gas
   a. Density  b. Role of diffusion  c. Vapour density  d. RMS velocity

47. According to Kinetic energy of Gases, The energy per mole of a gas is equal to
   a. RT  b. 3RT  c. 0.5 RT  d. 1.5 RT

48. The kinetic energy of m moles of an ideal gas is given by
   a. \( \frac{3}{2} RT \)  b. \( \frac{3}{2} nRT \)  c. \( \frac{2}{3} RT \)  d. \( \frac{2}{3} nRT \)
49. The K.E of 4 moles of O₂ at 47°C is ______
   a. 1280 Cal   b. 2560 Cal   c. 1920 Cal   d. 3840 Cal

50. Average velocity of a gas is 13,820 cm/sec Then the RMs Velocity is
   a. 14,996 cm/Sec   b. 12,250 cm/Sec   c. 10,250 cm/sec   d. 1225 cm/sec