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 Δ formed by A (-1,0) B (-2, ¾ ) 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)  b. (-3,9)  c. (-3,8)  d. (-3,-4)

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 Δ 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 ΔOPQ  
   a. 6 √2  b. 9 √2  c. 12 √2  d. 18 √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.$\left(\sqrt{1-\sin^2 100^0}\right)$ (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.Secθ + tan^2θ =5 then secθ =  
    a. 3  b. 2  c. -3  d. b and c
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. $\frac{b-1}{b+1}$    d. $\frac{1-b}{1+b}$

16. $A+B = 135^0$ 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. $\frac{-2\theta}{3}$ to $\frac{\theta}{3}$    b. $\frac{-\theta}{3}$ to $\frac{\theta}{2}$    c. $0$ to $\frac{\theta}{3}$    d. $-\frac{\theta}{2}$ to $\frac{\theta}{2}$

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

19. $\tan 55^0 - \tan 10^0 - \tan 55^0 \tan 10^0 =$ [ ]
   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. $\frac{1}{4}$    d. $\frac{3}{16}$

**Physics**

21. A body is thrown with velocity $(4i+3j)$ m/s its maximum height is $(g=10m/s^2)$[ ]
   a. 2.5m    b. 0.8m    c. 0.9m    d. 0.45m

22. For a projectile the ratio of maximum height reached to square of flight time is [ ]
   a. 5:4    b. 5:2    c. 5:1    d. 10:1

23. A body projected with velocity $30m/s$ reaches its maximum height in 15 sec. its range is $(g=10m/s^2)$ [ ]
   a. 45m    b. 108m    c. $45 \sqrt{3}$    d. 54m

24. A hose pipe lying on the ground shoots a stream of water upwards at an angle $60^0$ to the horizontal at a speed of $20m/s$. the water strikes a wall 20m away at a height of $(g=10m/s^2)$ [ ]
   a. 14.64 m    b. 7.32m    c. 29.28m    d. none of these

25. A person throws a bottle into a dustbin at the same height as he is 2m away at an angle of $45^0$. The velocity of thrown is [ ]
   a. $g$    b. $\sqrt{g}$    c. 2g    d. $\sqrt{2} g$

26. A body is projected horizontally from the tap of tower with a velocity of $30m/s$. the velocity of the body 4 sec after projection is $(g=10m/s^2)$ [ ]
27. The height and width of each step of a staircase are 20 cm and a ball rolls off the top of a stair with horizontal velocity \( V \) and hits the fifth step. The magnitude of \( V \) is \( g = 10 \text{ m/s}^2 \). 
\[ \text{g} = 10 \text{ m/s}^2 \]
\[ \begin{align*}
a. & \ 1.5 \sqrt{5} \text{ m/s} \\
b. & \ 3 \sqrt{5} \text{ m/s} \\
c. & \ 7.5 \text{ m/s} \\
d. & \ 1.5 \text{ m/s} \\
\end{align*} \]

28. Find the time of flight and range of the projectile along the inclined plane as shown in figure. 
\[ \text{Figure} \]
\[ \begin{align*}
a. & \ 1.69 \text{ s}, 39 \text{ m} \\
b. & \ 0.69 \text{ s}, 49 \text{ m} \\
c. & \ 69 \text{ s}, 49 \text{ m} \\
d. & \ 2.99 \text{ s}, 29 \text{ m} \\
\end{align*} \]

29. The relation between coefficient of static friction as a angle of friction is 
\[ \begin{align*}
a. & \ \phi = \cot^{-1} (m) \\
b. & \ \phi = \tan^{-1} \left( \frac{m}{1+m^2} \right) \\
c. & \ \phi = \cos^{-1} (m) \\
d. & \ \phi = \sin^{-1} \left( \frac{m}{\sqrt{1+m^2}} \right) \\
\end{align*} \]

30. A vehicle of mass \( m \) is moving on a rough horizontal road with momentum \( P \). If the coefficient of friction between the tyres and the road be \( m \) u. then the stopping distance is 
\[ \begin{align*}
a. & \ \frac{P}{2\mu mg} \\
b. & \ \frac{P^2}{2\mu mg} \\
c. & \ \frac{P^2}{2\mu m^2 g} \\
d. & \ \frac{P}{2\mu m^2 g} \\
\end{align*} \]

31. In the figure shown find acceleration of block and force of friction \( F = 20\sqrt{2} \text{ N} \). 
\[ \begin{align*}
a. & \ 1.2 \text{ m/s}^2, 4 \text{ N} \\
b. & \ 2 \text{ m/s}^2, 4 \text{ N} \\
c. & \ 2/3 \text{ m/s}^2, 8 \text{ N} \\
d. & \ 1.5 \text{ m/s}^2, 8 \text{ N} \\
\end{align*} \]

32. A wooden box is placed on the floor of lorry moving with an acceleration of \( 6 \text{ m/s}^2 \). If \( u = 0.6 \). the acceleration of the box relative to lorry is \( g = 9.8 \text{ m/s}^2 \). 
\[ \begin{align*}
a. & \ 1 \text{ m/s}^2 \\
b. & \ 1.1 \text{ m/s}^2 \\
c. & \ 1.2 \text{ m/s}^2 \\
d. \ 0 \\
\end{align*} \]

33. A block of weight 5N is pressed against a vertical wall with a horizontal force of 12N. If \( u = 0.6 \). the frictional force acting on the body is 
\[ \begin{align*}
a. & \ 8 \text{ N} \\
b. & \ 5 \text{ N} \\
c. & \ 7.2 \text{ N} \\
d. & \ 10 \text{ N} \\
\end{align*} \]

34. A brick of mass 2kg just begins to slide down an inclined plane at an angle of \( 45^0 \) with horizontal. The force of friction is 
\[ \begin{align*}
a. & \ 19.6 \cos 45^0 \\
b. & \ 9.8 \sin 45^0 \\
c. & \ 19.6 \sin 45^0 \\
d. & \ 9.78 \cos 45^0 \\
\end{align*} \]
35. A block slides down a rough inclined plane of inclination 45°. If coefficient of kinetic friction is 0.5 then acceleration of the sliding block is [ ]
   a. \( \frac{4.9}{\sqrt{2}} \) m/s²   b. \( \frac{9.8}{\sqrt{2}} \) m/s²   c. \( \frac{2.45}{\sqrt{2}} \) m/s²   d. 4.9 m/s²

Chemistry

36. Torr is a unit of [ ]
   a. Mass   b. volume   c. pressure   d. density

37. 20 litres of hydrogen gas at NTP weight about [ ]
   a. 12.2g   b. 44.8g   c. 1.8g   d. 20g

38. At constant temperature for a given mass of gas, pressure of the gas if volume ‘v’ becomes three times [ ]
   a. P   b. p/4   c. p/3   d. 3p

39. An open vessel at 27°C is heated until three fourth mass of the air in it has been expelled neglecting the expansion of the vessel, the temperature to which the vessel has to be heated is [ ]
   a. 927°C   b. 108°C   c. 1000°C   d. 477°C

40. What percentage of volume of air will be expelled from a vessel containing 600 ml at 27° when it is heated to 37°C at the same pressure [ ]
   a. 3.33%   b. 20%   c. 67%   d. 66%

41. Gas deviate from ideal behavior at [ ]
   a. Low T and high ‘P’   b. high T and low P
   c. high T and high P   d. high T and low P

42. The density of a gas at STP is 2g/l. its molecular weight is [ ]
   a. 22.4   b. 56   c. 44.8   d. 30

43. The mass of 2.46 lit of CH₄ at 1.5 atm and 27°C is [ ]
   a. 1.6g   b. 2.4g   c. 22.4g   d. 3.0g

44. The vapour density of a gas is 11.2. the volume occupied by 10g of the gas at stp is [ ]
   a.10L   b. 1L   c. 11.2L   d. 5.6L

45. the number of oxygen molecule present in 1 lit flask at a pressure of 101.325 X10⁻¹² KPa and temperature 101.325k is [ ]
   a. 7.243 X 10¹⁰   b. 7.243 X 10¹¹   c. 7.243 X 10¹²   d. 7.243 X 10¹³

46. mixing of two gases by diffusion is [ ]
   a. reversible   b. irreversible   c. exothermic   d. endothermic

47. the rate of diffusion of gas A is double the rate of gas B. the ratio of their molecular weight is [ ]
   a. 1:2   b. 1:4   c. 2:1   d. 4:1
48. Dalton’s law of partial pressures is applicable to [   ]
a. NO + O₂       b. H₂ + Cl₂      c. NH₃ + HCl     d. Co₂ + O₂

49. kinetic energy of 1 mole of oxygen gas in calories [   ]
a. 2T       b. 3T      c. 1.5T     d. 0.5T

50. the root mean square velocity of an ideal gas at constant pressure varies with density (d) as [   ]
a. d²       b. d      c. √d     d. 1/√d