XI PHYSICS TEST ON MATHEMATICAL TOOLS

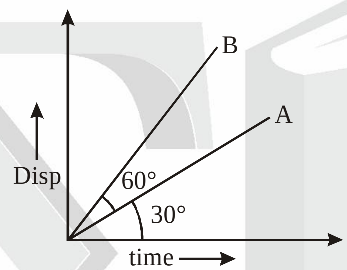
TIME : 1½ HR. **M.M : 50**

1. A particle moves along a straight line such that its displacement 's' at any time 't' is given $S = t^3 - 6t^2 + 3t + 4$ meters. Find the velocity, when the acceleration is zero. **1**

2. Displacement of a particle is given by $x = 2.5t + 6t^2$, find its initial velocity. **1**

3. If $b = \dfrac{Zke^2\,(\cot\theta/2)}{\frac{1}{2}mu^2}$ them how will 'b' be: (i) on increasing 'u'. (ii) on decreasing 'θ'. **2**

4. 2 straight lines drawn on the same s-t graph makes angle 30° and 60°, with time axis as shown in figure. Which line represents greatest velocity? What is the ratio of the two velocities? **3**



5. Plot a curve, $y = x^2 + 4$ and find its slope at x = 7 and 2. Also find the area bounded by this curve and x-axis from x = 0 to x = 5. **3**

6. A conical heap of mud having radius 7cm and height 10 cm. Mud is poured at a rate of 220 cm^3/s over it. Find the rate of change of its of height if radius is increasing at a rate of 0.2 cm/s. **4**

7. Differentiate the following w.r.t 'x'. **6**

(i) $y = 2\sin^3 t$ (ii) $y = \log(\sec x) + z^2$ (iii) $y = \sin\sqrt{x}$

8. Find $\dfrac{dy}{dx}$: (i) $y = \sin 2x \,.\, \log 2x$ (ii) $y = \dfrac{x^2+4x+1}{x^3+x^4}$ (iii) $y = e^x \,.\, \sin x$ **6**

9. Integrate to find 'y': **8**

(i) $\dfrac{dy}{dx} = (3x+9)$ (ii) $\dfrac{dy}{dx} = \dfrac{1}{9x+2}$ (iii) $\dfrac{dy}{dx} = \sqrt{2x+1}$ (iv) $\dfrac{dy}{dx} = \sin(5x+7)$

10. Integrate the following: **8**

(i) $\displaystyle\int_{\pi/8}^{\pi/4} \sin(2x)\,.\,dx$ (ii) $\displaystyle\int_{e}^{e^2} \frac{1}{2x}\,dx$ (iii) $\displaystyle\int_{0}^{5} (x^2+4x+1)\,dx$ (iv) $\displaystyle\int_{\log 2}^{\log 10} e^{4x}\,.\,dx$

11. Plot the following curves. Also tell what does their **slope and area depict.** **8**

(i) $eV_0 = hv - hv_0$ between 'V_0' and 'v'. (ii) $S = 1/2\, at^2$ between 's' and 't'.

(iii) v = u + at between 'v' and 't'. (iv) $T = 2\pi\sqrt{\dfrac{l}{g}}$ between 'T' and 'l'.