

Bachelor of Civil Engg

1st year 1st semester examination, 2018

Subject : Engineering Mechanics

Full Marks 100

Time 3 Hrs

Answer any five questions.

1. (a) Refer to Fig A and find out the moment of the force about point O and OC axis.
(b) Refer to Fig B and replace the system of forces and moments with a single force and moment to be applied at O. 10+10

2. (a) Refer to Fig C and find out the support reactions and force developed at point C.
(b) Refer to Fig D and find out the tensions in the two cables. 10+10

3. (a) Refer to fig E and find out the minimum value of coefficient of friction that would ensure stability.
(d) Refer to Fig F and find out the support reactions. 10+10

- 4 (a) Refer to Fig G and find out the volume generated by revolving the area by one complete revolution about the Y axis.
(b) Refer to Fig H and find out the area moment of inertia about XX and YY axis. 10+10

- 5 (a) Refer to Fig I and find out the distance covered by the projectile along the slope.
(b) Deduce the expressions for radial and transverse components of acceleration of a particle moving along a curved path. 10+10

6 (a) The motion of a particle moving along a straight line is given by the expression

$$x(t) = \left[\frac{t^3}{3} - (3t^2) + 8t \right] \text{ m where } t \text{ is in seconds.}$$

Find out the time required to attain zero velocity and the distance when acceleration is zero.

(b) Position vector of a particle moving in a curved path is given by $\mathbf{R} = [(2t^3)\mathbf{i} + (1.7t^2)\mathbf{j}] \text{ m}$ where \mathbf{i} and \mathbf{j} are unit vectors along X and Y axes respectively. Find out the tangential and normal components of acceleration and radius of curvature at $t=2\text{s}$. 10+10

7. Write short notes on any four :

4 X 5=20

- (a) Pappus -Guldinus theorem
- (b) Idealisations in Mechanics
- (c) Free body Diagram
- (d) Two force and three force member
- (e) Product moment of inertia
- (f) Coulomb's laws of friction.

