

B.Tech I Year II Semester (R15) Regular & Supplementary Examinations May 2018

ENGINEERING MECHANICS

(Civil Engineering)

Time: 3 hours

Max. Marks: 70

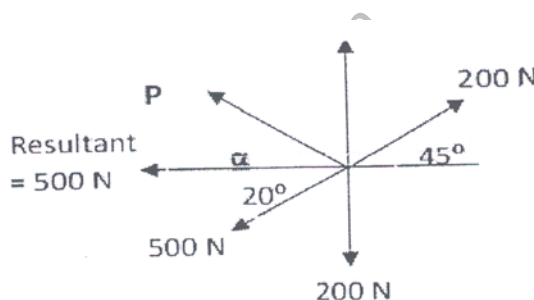
PART – A
(Compulsory Question)

- 1 Answer the following: (10 X 02 = 20 Marks)
 - (a) Explain the various systems of forces with suitable examples.
 - (b) What is equilibrium?
 - (c) What is a self-locking screw jack?
 - (d) Define coefficient of static friction.
 - (e) State perpendicular axis theorem.
 - (f) Differentiate between area moment of inertia and mass moment of inertia.
 - (g) What is curvilinear motion give an example?
 - (h) What is fixed axis rotation?
 - (i) What is the difference between truss and frame?
 - (j) What is resonance?

PART – B
(Answer all five units, 5 X 10 = 50 Marks)

UNIT – I

- 2 The four coplanar forces are acting at a point as shown in the figure below. One force is unknown (P). The resultant is 500 N and acting along X axis. Determine the unknown force (P) and its inclination (α) with X axis.

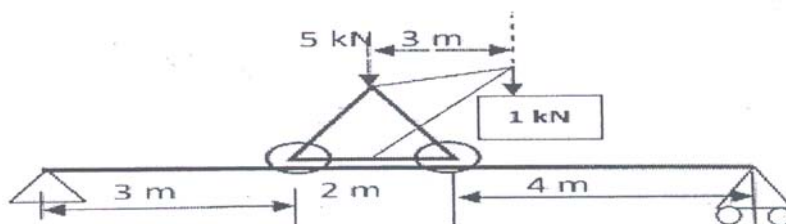


OR

- 3 The forces P, Q, R and S act on a particle at O in the plane of the coordinate axis OX and OY making angles p, q, r, s respectively with OX in the anti-clockwise direction. Determine the resultant and the angle it makes with OX when P = 3 kN, Q = 3 kN, R = 5 kN, S = 5 kN and p = 10°, q = 70°, r = 100°, s = 300° respectively.

UNIT – II

- 4 A ladder 12 m length and 500 N weight is resting against a smooth wall. Find the coefficient of friction between floor and ladder if ladder starts slipping when the angle between ladder and floor is $\leq 50^\circ$. Find the reactions at support for the following beam.



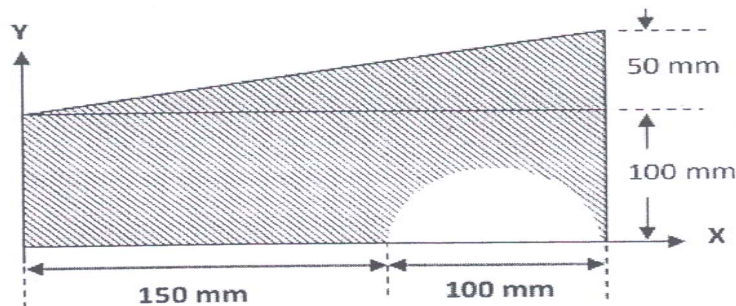
OR

- 5 A Screw Jack has square threads of mean of 10 cm and a pitch of 1.25 cm. Determine the force that must be applied to the end of 50 cm lever to raise a weight 50 kN. And the efficiency of the jack.

Contd. in page 2

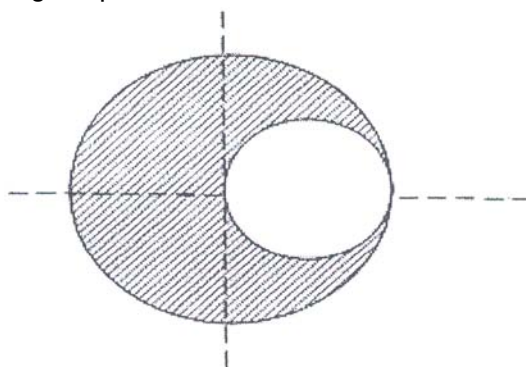
UNIT – III

- 6 Determine the centroid of the shaded area of above lamina.



OR

- 7 A circle is cut from a circle of diameter 450 mm as shown in the figure below. Calculate the polar moment of inertia of the remaining shape.



UNIT – IV

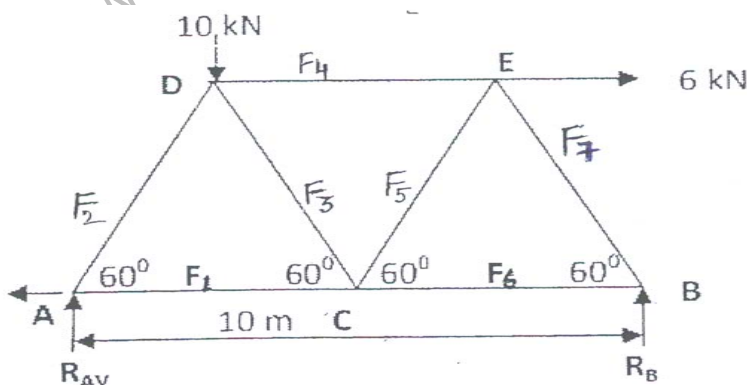
- 8 A particle is projected with a velocity of 10 m/sec at an angle of elevation of 60° . (i) Find the equation of the path of motion. (ii) Time required to cover the range. (ii) The length of range.

OR

- 9 A train starts from rest and moves along a curved track of radius 800 m with uniform acceleration until it attains a velocity of 72 km/h at the end of 3 minute. Determine the tangential, normal and total acceleration in m/s^2 of the train at the end of second minute.

UNIT – V

- 10 Find the forces in the members of the following truss. The truss is hinged supported at left end and roller supported at right end.



OR

- 11 A weight of 50 N suspended from a spring vibrating vertically with an amplitude of 7.5 cm and a frequency of 1 oscillation/sec. Find: (i) The stiffness of the spring. (ii) The maximum tension induced in the spring (iii) The maximum velocity of the weight.
