

Code: 13A01101

B.Tech I Year (R13) Supplementary Examinations June 2016
ENGINEERING MECHANICS
(Common to CE and ME)

Time: 3 hours

Max. Marks: 70

PART – A
(Compulsory Question)

- 1 Answer the following: (10 X 02 = 20 Marks)
- (a) Two forces of magnitude 10 N and 8 N are acting at a point. If the angle between the two forces is 60 degrees, determine the magnitude of the resultant force.
 - (b) Explain Newton's third law of motion, representation of action and reaction forces and Free body diagram.
 - (c) Explain about cone of friction.
 - (d) Explain any four laws of solid friction.
 - (e) Explain about centre of gravity of plane figures by Integration method.
 - (f) Explain about radius of gyration.
 - (g) Define Velocity and Acceleration.
 - (h) A body is moving with a velocity of 2 m/sec. After 4 seconds the velocity of the body becomes 5 m/sec. find the acceleration of the body.
 - (i) Explain method of joints.
 - (j) Explain about different types of frames.

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

UNIT - I

- 2 (a) State and prove the Lami's theorem.
(b) The resultant of four forces which are acting at a point O along y axis. The magnitude of forces F_1 , F_3 and F_4 are 10 kN, 20 kN and 40 kN respectively. The angle made by 10 kN, 20 kN and 40 kN with x-axis are 30 degrees, 90 degrees and 120 degrees respectively. Find the magnitude and direction of force F_2 if resultant is 72 kN.

OR

- 3 (a) Explain about different types of supports
(b) A simply supported beam of length 5 m carries a uniformly increasing load of 800 N/m at one end, 1600 N/m at the other end. Calculate the reactions at both ends

UNIT - II

- 4 A pull of 20 N, inclined at 25 degrees to the horizontal plane, is required just to have a body placed on a rough horizontal plane. But the push required to move the body is 25 N. If the push is inclined at 25 degrees to the horizontal, find the weight of the body and co-efficient of friction.

OR

- 5 An effort of 200 N is required just to move a certain body up on an inclined plane of angle 15 degrees, the force acting parallel to the plane. If the angle of inclination of the plane is made 20 degrees, the effort required again applied parallel to the plane is found to be 230 N. Find the weight of the body and co-efficient of friction.

UNIT - III

- 6 Derive the centre of gravity of quadrant of arc of a circle of radius R and circular sector of radius R and central angle α .

OR

- 7 Determination of moment of inertia of rectangular section about the x-x axis and about the y-y axis passing through the C.G of the section. Also determine moment of inertia of a circular section.

UNIT - IV

8 Derive the following equations of motion of a body moving in a straight line with uniform acceleration:

(i) $v = u + at$

(ii) $s = ut + \frac{1}{2} at^2$

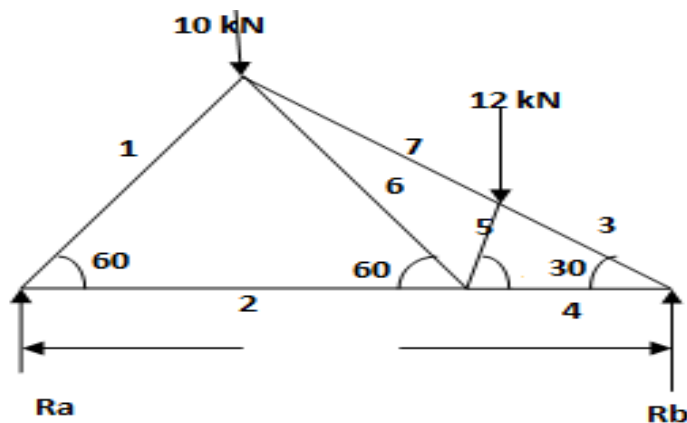
(iii) $v^2 - u^2 = 2as$

OR

- 9 (a) Explain about D'Alembert's principle and dynamic equilibrium.
 (b) Determine the moment of inertia of a circular section and solid cylinder.

UNIT - V

10 A truss of span 5 m is loaded as shown in figure. Find the reactions and forces in the members of the truss:



OR

11 Determine the forces in all the members of a cantilever truss shown in figure below.

