

B.Tech I Year II Semester (R15) Supplementary Examinations November 2017

ENGINEERING MECHANICS

(Civil Engineering)

Time: 3 hours

Max. Marks: 70

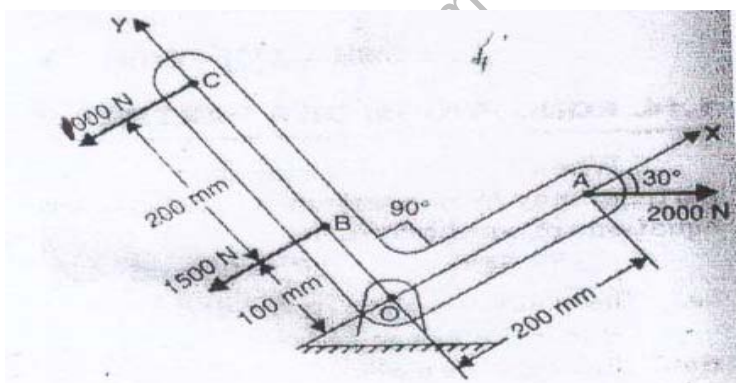
PART – A
(Compulsory Question)

- 1 Answer the following: (10 X 02 = 20 Marks)
 - (a) Write down the equations to be satisfied for a system to ensure equilibrium of a concurrent, non-coplanar forces.
 - (b) Explain different types of supports and its reaction with simple schematic sketches.
 - (c) Explain the meaning of coefficient of friction.
 - (d) Define the term angle of repose.
 - (e) Define center of gravity and center of mass.
 - (f) Justify the statement that all centroidal axes are not axes of symmetry.
 - (g) What is a projectile?
 - (h) What is a curvilinear motion and give an example?
 - (i) What is an Imperfect frame?
 - (j) Is it possible to completely remove the vibrations of a system? Justify your answer.

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

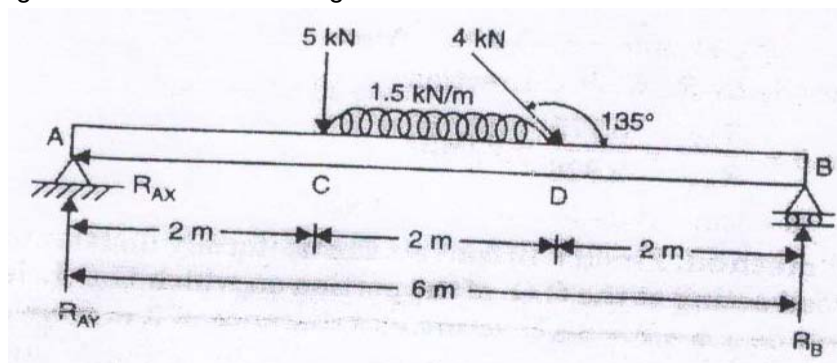
UNIT – I

- 2 Three external forces are acting on a L-shaped body as shown in figure below. Determine the equivalent system through point O.



OR

- 3 A beam AB 6 m long is loaded as shown in figure below. Determine the reactions at A and B.



Contd. in page 2

UNIT – II

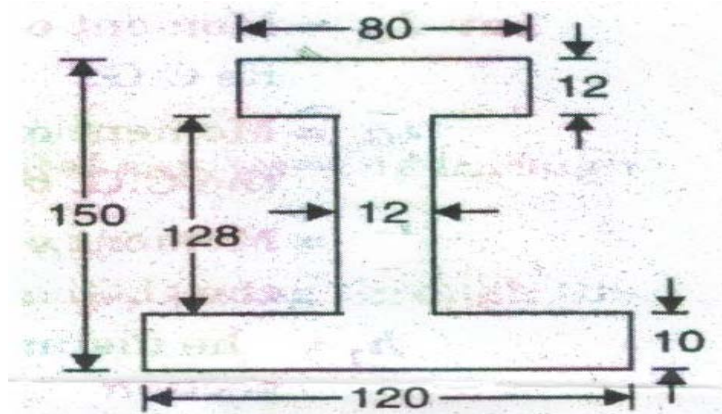
- 4 A body of weight 500 N is pulled up an inclined plane, by a force of 350 N. The inclination of the plane is 30° to the horizontal and the force is applied parallel to the plane. Determine the coefficient of friction.

OR

- 5 In a differential screw jack, the screw threads have pitch of 10 mm and 7 mm. If the efficiency of the machine is 28%, find the effort required at the end of an arm 36 cm long to lift a load of 5 kN.

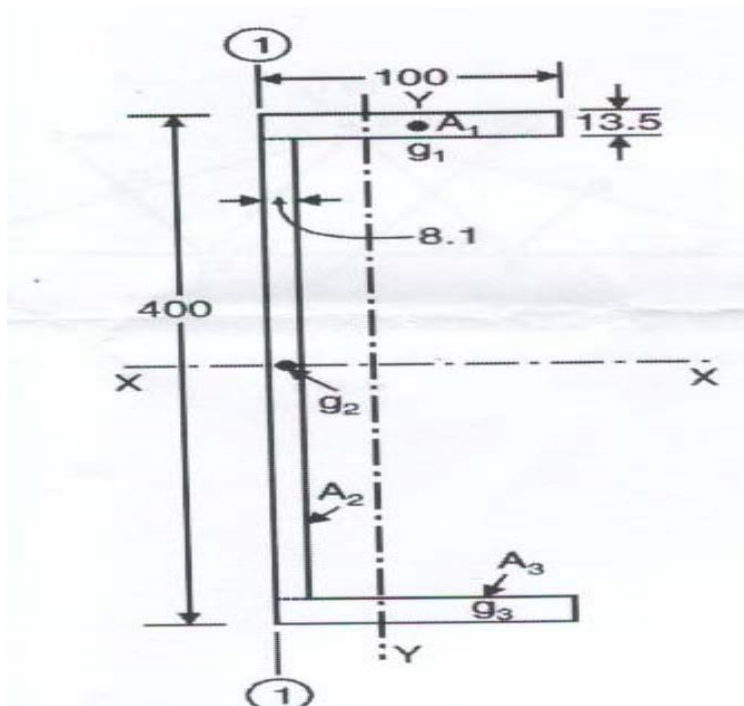
UNIT – III

- 6 Find the centre of gravity of the section given in the figure below.



OR

- 7 Determine the second moment of area of the channel section shown in figure below, about centroidal axis x-x and y-y.



UNIT – IV

- 8 A force of 200 N acts on a body having mass of 300 kg for 90 seconds. If the initial velocity of the body is 20 m/s, determine the final velocity of the body: (i) When the force acts in the direction of motion? (ii) When the force acts in the opposite direction of the motion?

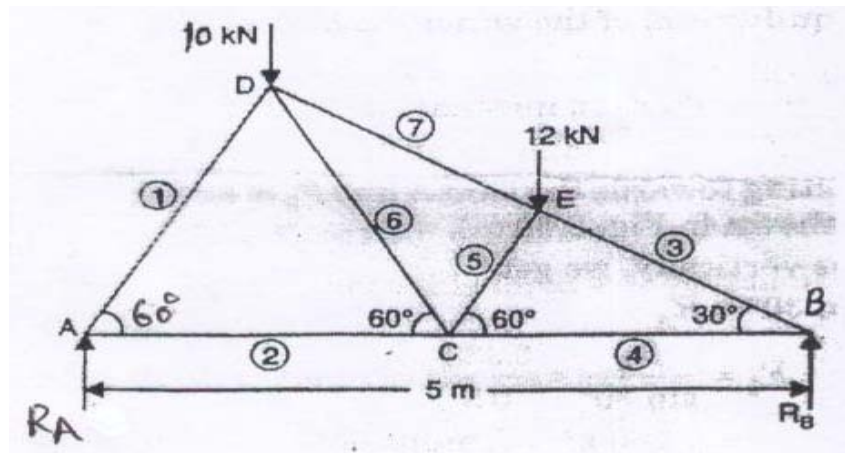
OR

- 9 A train of weight 1960 kN starts from rest and attains a speed of 120 km/hr in 5 minutes. If the frictional resistance of the track is 10 N per kN of the train's weight, find the average pull required. Take $g = 9.8 \text{ m/s}^2$.

Contd. in page 3

UNIT - V

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



OR

- 11 A truss of 12 m span is loaded as shown in figure below. Determine the forces in the members DG, DF and EF using the method of section.

