Q.P. Code: 16CE101 **R16**

Reg. No: | | | | | | | | | | |

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR

(AUTONOMOUS)

B.Tech. I Year II Semester Supplementary Examinations October-2020

ENGINEERING MECHANICS

(Common to CE, ME & AGRI)

Time: 3 hours Max. Marks: 60

(Answer all Five Units **5 x 12 = 60** Marks)

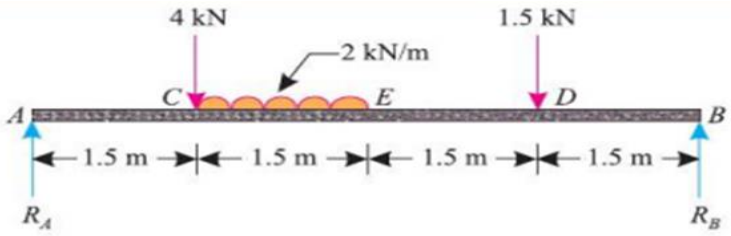
UNIT-I

1 **a** State and prove Varignon's theorem. **6M**

b Explain the term 'free body diagram'. Draw the free body diagram of a ball of weight W, placed on a horizontal surface. **6M**

OR

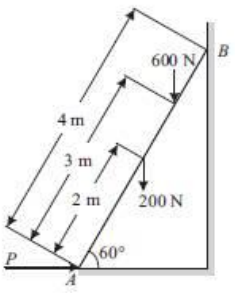
2 **a** A simply supported beam, AB of span 6 m is loaded as shown in figuure. Determine the reactions R_A and R_B of the beam? **6M**



b State and prove the law of triangle of forces. **6M**

UNIT-II

3 **a** A ladder of length 4 m, weighing 200 N is placed against a vertical wall as shown in figure. The coefficient of friction between the wall and the ladder is 0.2 and that between floor and the ladder is 0.3. The ladder, in addition to its own weight, has to support a man weighing 600 N at a distance of 3 m from A. Calculate the minimum horizontal force to be applied at A to prevent slipping? **8M**



b What are the laws of dry friction? **4M**

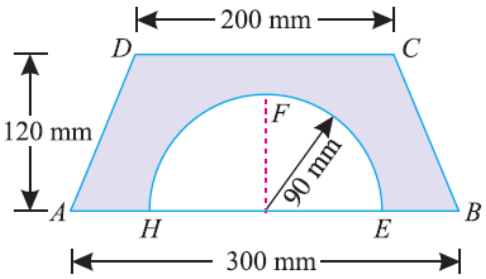
OR

4 **a** Explain briefly about the differential screw jack. **4M**

b A screw jack has square threaded screw of 50mm diameter and 10mm pitch. The coefficient of friction at the screw thread is 0.15. Find the force required at the end of a 700mm long handle to raise a load of 2000N? What is the force required if the screw jack is considered to be an ideal machine? **8M**

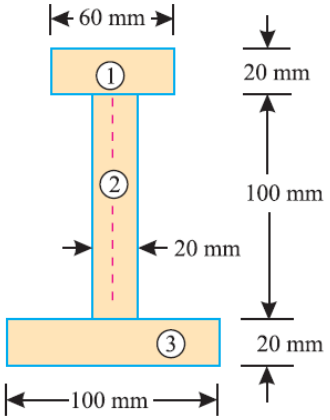
UNIT-III

5 A semicircle of 90 mm radius is cut out from a trapezium as shown in figure. Find the position of the Centre of gravity of the figure? **12M**



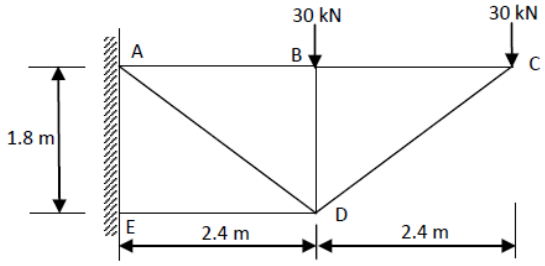
OR

6 An I-section is made up of three rectangles as shown in figure. Find the moment of inertia of the section about the horizontal axis passing through the Centre of gravity of the section? **12M**



UNIT-IV

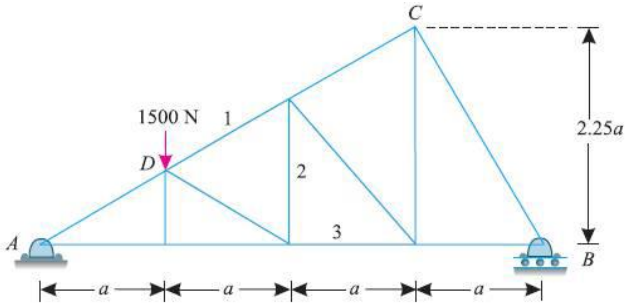
7 **a** Find the forces and their nature in all the members of a truss as shown in figure? **9M**



b State the assumptions made in the analysis of pin jointed trusses. **3M**

OR

8 A plane truss is loaded and supported as shown in figure. Determine the nature and magnitude of the forces in the members' 1,2 and 3? **12M**



UNIT-V

9 The equation of motion of a particle moving in a straight line is given by : **12M**

$s = 18t + 3t^2 - 2t^3$, where (s) is in meters and (t) in seconds. Find

(i) velocity and acceleration at start,

(ii) time, when the particle reaches its maximum velocity, and

(iii) Maximum velocity of the particle?

OR

10 A stone is thrown from the top of building upward at an angle of 40^0 with the horizontal with an initial speed of 30 m/sec. The height of the building above the ground level is 30 m. Determine **12M**

(i) The greatest height reached by the stone above the ground level.

(ii) The horizontal distance from the point of projection to the point where the stone strikes the ground.

(iii) The velocity with which the stone strikes the ground.

(iv) Time of flight.

*** END ***