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**SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR**  
(AUTONOMOUS)

**B.Tech I Year I Semester Supplementary Examinations, November-2020**

**ENGINEERING MECHANICS**

(Common to CE, AGE & ME)

Time: 3 hours

Max. Marks: 60

**PART-A**

(Answer all the Questions 5 x 2 = 10 Marks)

- |   |   |  |    |
|---|---|--|----|
| 1 | a | What do you understand by an action and a reaction?  | 2M |
|   | b | Explain Cone of Friction.  | 2M |
|   | c | State the two theorems of Pappus.  | 2M |
|   | d | Define (i) Mass moment of inertia and (ii) Perpendicular axis theorem                                    | 2M |
|   | e | How the method of joints does differ from the method of sections in the analysis of pin jointed trusses? | 2M |

**PART-B**

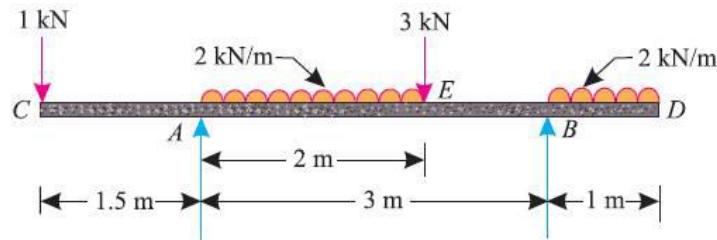
(Answer all Five Units 5 x 10 = 50 Marks)

**UNIT-I**

- |   |   |  |    |
|---|---|--|----|
| 2 | a | State and prove Lami's theorem.                          | 5M |
|   | b | The following forces act at a point.                     | 5M |
|   |   | i) 20N inclined at 30° towards north of East             |    |
|   |   | ii) 25N towards North                                    |    |
|   |   | iii) 30N inclined at 45° towards North of West, and      |    |
|   |   | iv) 35N inclined at 40° towards South of West            |    |
|   |   | Find the magnitude and direction of the resultant force. |    |

**OR**

- |   |  |     |
|---|--|-----|
| 3 | A beam AB of span 3m, overhanging on both sides is loaded as shown in figure. Determine the reactions at the supports A and B. | 10M |
|---|--|-----|

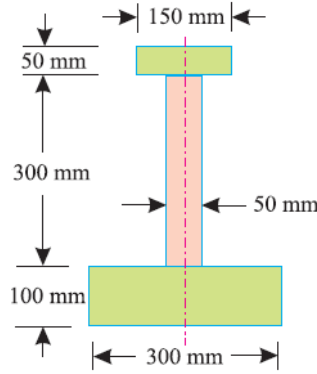
**UNIT-II**

- |           |   |     |
|-----------|---|-----|
| 4         | A ladder 5 meters long rests on a horizontal ground and leans against a smooth vertical wall at an angle 70° with the horizontal. The weight of the ladder is 900 N and acts at its middle. The ladder is at the point of sliding, when a man weighing 750N stands on a rung 1.5 meter from the bottom of the ladder. Calculate the coefficient of friction between the ladder and the floor. | 10M |
| <b>OR</b> |   |     |
| 5         | A screw jack has square threaded screw of 60mm diameter and 15mm pitch. The coefficient of friction at the screw thread is 0.15. Find the force required at the end of a 750mm long handle to raise a load of 2500N. What is the force required if the screw jack is considered to be an ideal machine?   | 10M |

**UNIT-III**

6 Determine mathematically the position of center of gravity of the section.

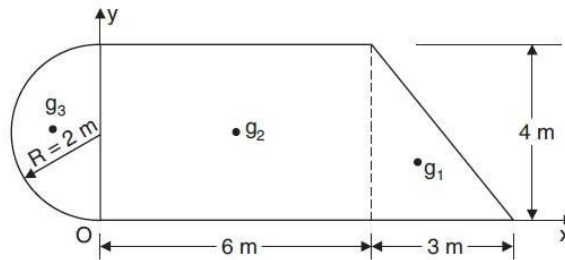
10M



**OR**

7 Determine the centroid of the area shown in figure with respect to the axes shown.

10M



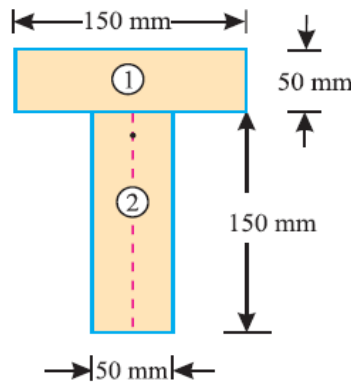
**UNIT-IV**

8 a Prove the parallel axis theorem in the determination of moment of inertia of areas with the help of a neat sketch.

5M

b Find the moment of inertia of a T-section about X-X and Y-Y axes through the center of gravity of the section as shown in figure?

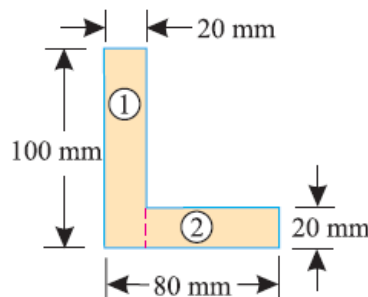
5M



**OR**

9 a Find the moment of inertia about the centroidal axes X-X and Y-Y of the angle section shown in figure.

5M

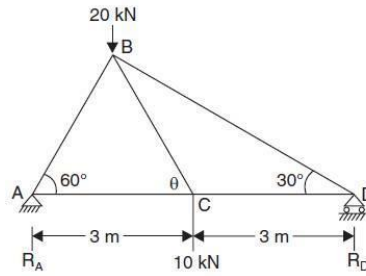


b Describe the method of finding out the moment of inertia of a composite section.

5M

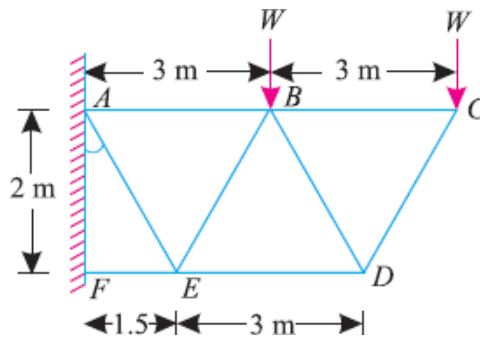
**UNIT-V**

- 10 Determine the forces and their nature in all the members of the truss shown in figure. 10M



**OR**

- 11 A cantilever truss is loaded as shown in figure. Find the value of  $W$ , which would produce a force of magnitude 15 kN in the member AB? 10M



\*\*\*END\*\*\*