Reg. No: ☐☐☐☐☐☐☐☐☐☐☐☐

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR
(AUTONOMOUS)
B.Tech I Year I Semester Supplementary Examinations December-2021
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	Differentiate concurrent and non concurrent forces	2M
	b	Classify friction	2M
	c	State Pappus theorem	2M
	d	Define radius of gyration	2M
	e	Mention the importance of methods of sections	2M

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

UNIT-I

2   a   State and prove Varignon's theorem.   5M

b   A system of forces are acting at the corners of a rectangular block as shown in Fig.1.   5M
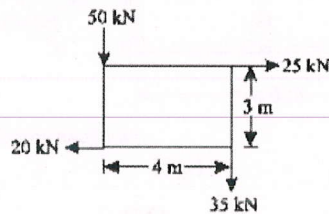Determine the magnitude and direction of the resultant force.

Fig.1

OR

3   a   State and prove Lami's theorem.   5M

b   A beam ABCDE hinged at A and supported on rollers at D, is loaded as shown in   5M
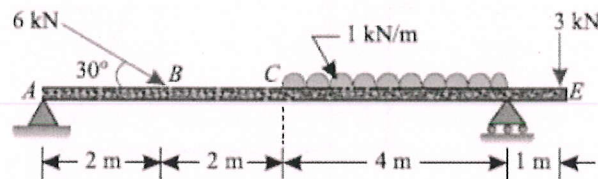Fig.4. Find the reactions at A and D

Fig.4

UNIT-II

4   a   Explain Cone of Friction with a neat sketch.   5M

b   A body, resting on a rough horizontal plane, required a pull of 180 N inclined at 30°   5M
to the plane just to move it. It was found that a push of 220 N inclined at 30° to the
plane just moved the body. Determine the weight of the body and the coefficient of
friction

OR

5   a   Write short note on differential screw jack with neat sketch.   **5M**

    b   A screw jack raises a load of 40 KN. The screw is square threaded having three   **5M**
        threads per 20 mm length and 40 mm in diameter. Calculate the force required at the
        end of a lever 400 mm long measured from the axis of the screw, if the coefficient
        of friction between screw and nut is 0.12.

UNIT-III

6   a   A uniform lamina shown in Fig. 11 consists of a rectangle, a circle and a triangle.   **5M**
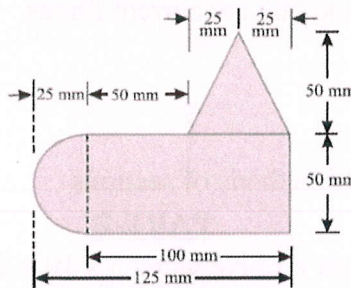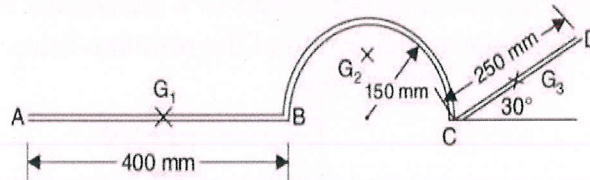   Determine the center of gravity of the lamina. All dimensions are in mm

Fig. 11

    b   Locate the centroid of the uniform wire bent as shown in Fig.13   **5M**

All dimensions in mm

Fig.13

OR

7   a   Find the centroid of the section of a masonry dam as shown in the Fig.16   **6M**

Fig.16

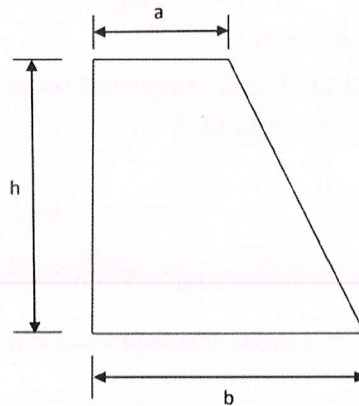   b   **4M**
        An I-section as shown in Fig.19 has the following dimensions in mm units:

        Bottom flange = 300 × 100 Top flange = 150 × 50 Web = 300 × 50

        Determine mathematically the position of center of gravity of the section
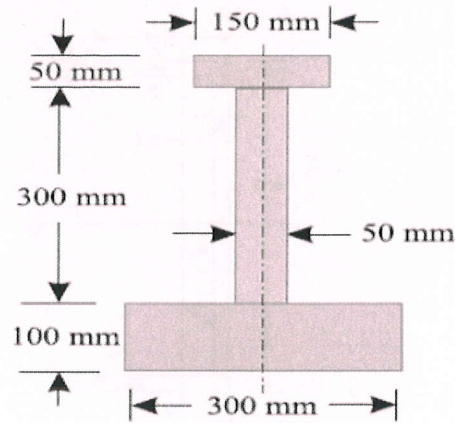
Fig.19

UNIT-IV

8 **a** Prove the parallel axis theorem in the determination of moment of inertia of areas   **6M**
with
the help of a neat sketch

b Find the moment of inertia of a T-section with flange as 150 mm × 50 mm and web as   **4M**
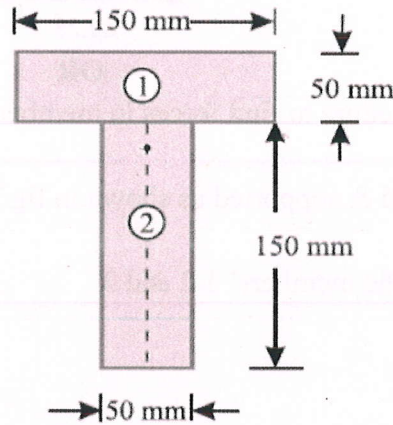mm × 50 mm about X-X and Y-Y axes through the center of gravity of the section as
shown in fig..22

Fig.22

OR

9 **a** Define the following terms   **5M**
(i) Parallel Axis Theorem (ii) Perpendicular Axis Theorem (iii) Moment of Inertia
(iv) Polar Moment of Inertia

b Compute the second moment of area of the channel section shown in Fig. 27 about   **5M**
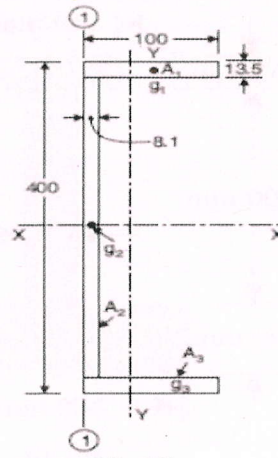centroidal axis x-x and y-y

Fig.27

UNIT-V

10 **a** Explain the procedure to find forces in members of truss by using method of joints   **5M**

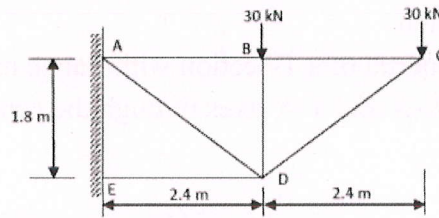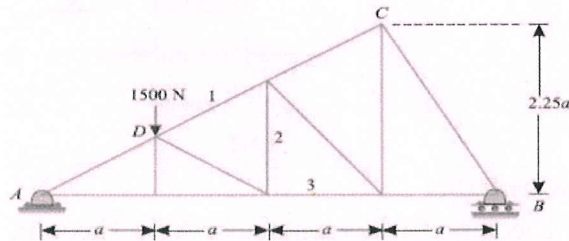 **b** Find the forces in the members of a truss as shown in fig.28   **5M**

fig.28

OR

11 **a** Explain the procedure to find forces in members of truss by using method of sections   **5M**

  b A plane is loaded & supported as shown in fig.30. Determine the nature and magnitude

of the forces in the members' 1,2 and 3   **5M**

END