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 b Classify friction c State Pappus theorem d Define radius of gyration e Mention the importance of methods of sections PART-B (Answer all Five Units 5 x 10 = 50 Marks) UNIT-I 2 a State and prove Varignon's theorem. b A system of forces are acting at the corners of a rectangular block as shown in Fig.1. 5N Determine the magnitude and direction of the resultant force.	Reg. N	0:			(ba	2/32 10	इत केल	12-11-34	NCS 12	hand	asib/	est b		
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Fig.1

OR

3 a State and prove Lami's theorem.

> 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

35 kN

**5M** 

**5M** 



- a Explain Cone of Friction with a neat sketch. 4
  - **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

#### Q.P. Code: 18CE0101

5

- a Write short note on differential screw jack with neat sketch.
- 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

OR

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

-125 mm Fig. 11

5 mm + 50 mm

25 25 mm 25 mm

50 mm

50 mm



# Fig. 13

All dimensions in mm



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

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



b

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

Bottom flange =  $300 \times 100$  Top flange =  $150 \times 50$  Web =  $300 \times 50$ 

Determine mathematically the position of center of gravity of the section

**5**M

**6M** 

4M



**5M** 

### Q.P. Code: 18CE0101





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



9	a	Define the following terms	<b>5M</b>				
		(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					

#### Q.P. Code: 18CE0101





a Explain the procedure to find forces in members of truss by using method of joints
 b Find the forces in the members of a truss as shown in fig.28
 5M



a Explain the procedure to find forces in members of truss by using method of sections
b A plane is loaded & supported as shown in fig.30. Determine the nature and 5M

of the forces in the members' 1,2 and 3

magnitude



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