Reg. No.												

Question Paper Code	12428

B.E. / B.Tech - DEGREE EXAMINATIONS, NOV / DEC 2023

Second Semester

Civil Engineering

(Common to Third Semester - Mechanical Engineering & Mechanical and Automation Engineering)

20ESCE201 - ENGINEERING MECHANICS

(Regulations 2020)

Duration: 3 Hours Max. Marks: 100

PART - A (10 × 2 = 20 Marks)

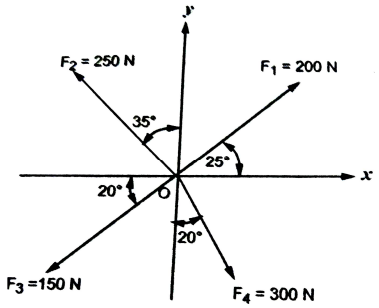
Answer ALL Questions

		Marks, K-Level, CO
1.	Define principle of transmissibility.	*2,K1,CO1*
2.	State the conditions for the two systems of forces to be equivalent.	*2,K1,CO1*
3.	State varignon's theorem.	*2,K1,CO2*
4.	Distinguish between moment and a couple.	*2,K2,CO2*
5.	Define angle of repose.	*2,K1,CO3*
6.	What is rolling resistance?	*2,K1,CO3*
7.	What is meant by centre of gravity?	*2,K1,CO4*
8.	Define radius of gyration.	*2,K1,CO5*
9.	What is time of flight?	*2,K1,CO6*
10.	Define coefficient of restitution.	*2,K1,CO6*

PART - B (5 × 13 = 65 Marks)

Answer ALL Questions

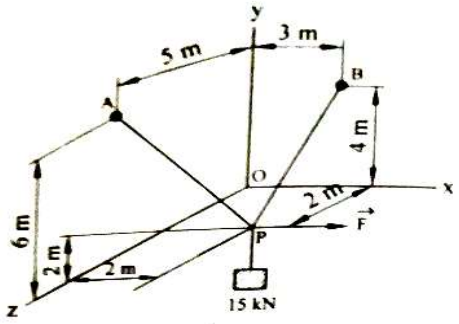
11. a) Four coplanar forces are acting at a point as shown in figure. Determine the resultant and its direction. *13,K3,CO1*



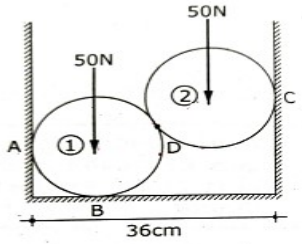
OR

b) A container weighing 15 kN is suspended at P by using two cables PA and PB anchored as shown in figure. A horizontal F keeps the *13,K3,CO1*

container in the current position. Find the magnitude of the force F and the tension in the cable PA and PB.

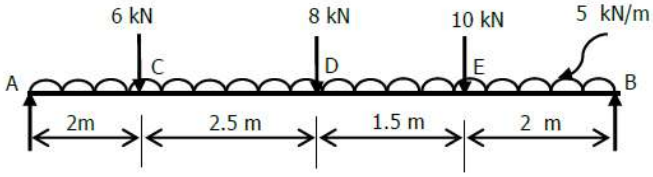


12. a) Two rollers, each of weight 50 N and of radius of 10 cm rest in a horizontal channel of width 36 cm in shown in figure. Find the reaction on the point of contacts of A, B and C. *13,K3,CO2*

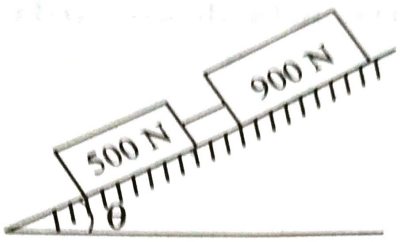


OR

b) Determine the support reactions of the simply supported beam as shown in figure. *13,K3,CO2*



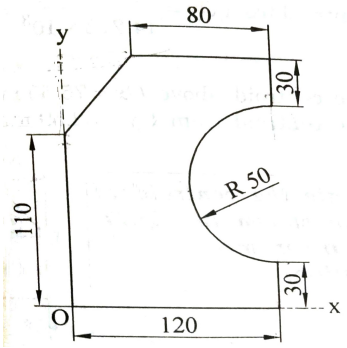
13. a) Two blocks of weight 500 N and 900 N connected by tie rod are kept on an inclined plane as shown in figure. The tie rod is parallel to the plane. The coefficient of friction between 500 N block and the plane is 0.3 and that between 900 N block and the plane is 0.4. Find the inclination of the plane with the horizontal and the tension in the tie rod when the motion down the plane is just about to start. *13,K3,CO3*



OR

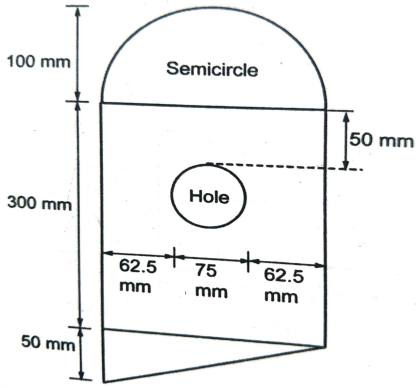
b) A ladder of 5 m length with a weight of 220 N and rest on a horizontal ground and leans against a rough vertical wall. The coefficient of friction between the ladder and the wall is 0.25 and that of ladder and the floor is 0.35. The ladder slips when a weight of 950 N is placed at a distance of 1.5 m along the ladder from the top. Find (i) the reaction at the ground at the wall, (ii) the angle made by the ladder with the wall. *13,K3,CO3*

14. a) Locate the centroid of the plane area shown in the figure. The dimensions are in mm. *13,K2,CO4*

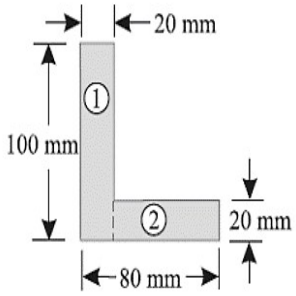


OR

b) For the plane area shown in figure, locate the centroid of the area. *13,K2,CO4*

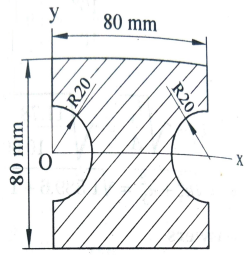


15. a) Find the moment of inertia about the centroidal X-X and Y-Y axes of the angle section shown in figure. *13,K2,CO5*



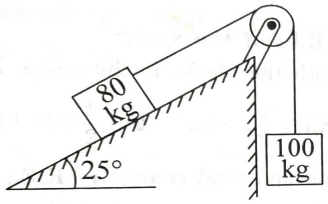
OR

b) Find the moment of inertia of the hatched area shown in figure about O_x and O_y. *13,K2,CO5*



PART - C (1 × 15 = 15 Marks)

16. a) Block P of weight 100 N and Block Q of Weight 50 N are connected by a cord that passes over a smooth pulley as shown in figure. Find the acceleration of the blocks and the tension in the cord when the system is released form rest. Neglect the mass of the pulley. Use the principles of work and energy. *15,K3,CO6*



OR

b) A system of 2 blocks of mass 20 kg and 40 kg are pulled by a force of 200 N as shown in figure. The coefficient of kinetic friction between the blocks and plane is 0.25. Determine the tension in the cord and the velocity of the system after 4 seconds if it starts from rest. Use the principle of impulse and momentum. *15,K3,CO6*