Ref. No. Ex/ARCH/CE/T/113/2025

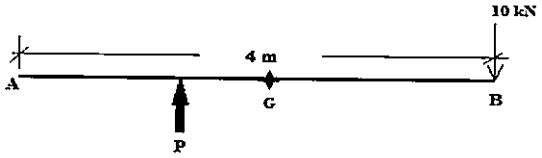
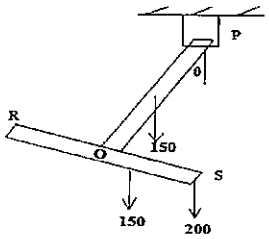
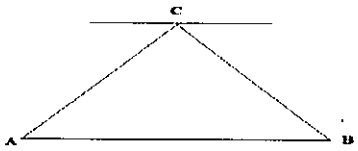
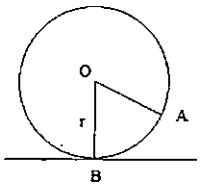
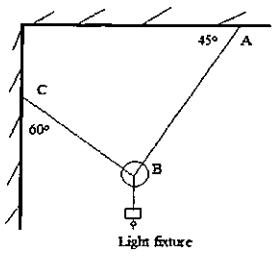
~~Form~~ A: Paper –Setting Blank

B.Arch. 1ST YEAR 1ST SEMESTER EXAM 2025

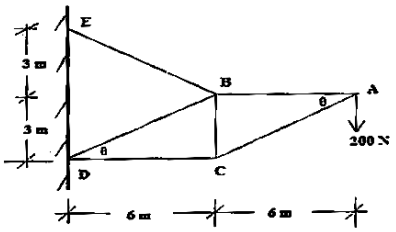
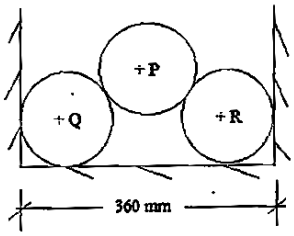
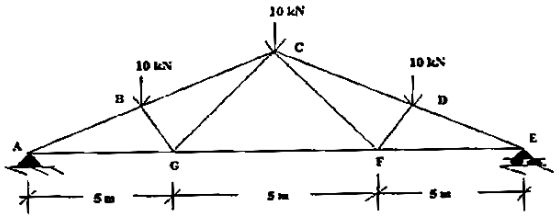
SUBJECT: Structural Mechanics-I

Full Marks 100

Time: Three hours

No. of Question	PART – I (Answer any four)	No.
1.	A uniform bar of weight 30 N and length 4 m passes over a prop and is supported in a horizontal position by a force of 10 kN acting vertically downwards at the other end. Find the distance of the prop from the center of the bar. 	10
2.	The identical prismatic bars PQ and RS, each weighing 150 N are welded to form a Tee, and are suspended in a vertical plane as shown in the figure below. Calculate the value of the angle 'θ' that the bar PQ will make with the vertical when a vertical load of 200 N is applied at 'S'. 	10
3.	Two equal uniform rods AC and CB are freely jointed at C and rest in a vertical plane with ends A and B in contact with a rough horizontal plane. If the equilibrium be limiting and μ is the co-efficient of friction, then show that Sin ACB = $4\mu/(1+4\mu^2)$. 	10
4.	How high a particle can rest inside a hollow sphere of radius 'r' if the co-efficient of friction be $1/\sqrt{3}$? 	10
5.	An electric light fixture of weight 200 N is supported as shown below. Determine the tensile forces in the wires BA and BC. 	10

[Turn over

No. of Question	PART – II (Answer any three)	No.
1.	Use method of section, determine forces in all the members of the cantilever truss as shown: 	20
2.	Three cylinders weighing 400 N each and of 160 mm diameter are placed in a channel of 360 mm width as shown: Determine: i) The pressure exerted by the top cylinder P on the left hand cylinder Q. ii) The pressure exerted by the cylinder Q on the horizontal floor, and iii) The pressure exerted by the cylinder Q on the vertical wall. 	20
3.	Use method of joints, determine forces in all members as shown below: 	20
4.	Two like parallel forces P and Q act on a rigid body at A and B respectively: i) If Q be changed to P^2/Q, show that the line of action of the resultant is the same as it would be if the forces were simply interchanged. ii) If P and Q be interchanged in position, show that the point of application of the resultant will be displaced along AB through a distance 'd', where $d = \frac{P-Q}{P+Q} . AB.$	20