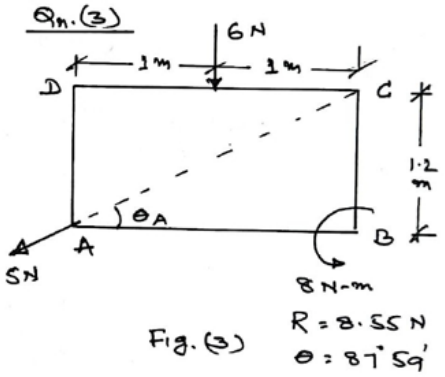
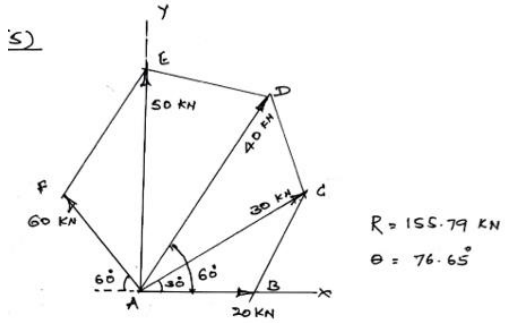
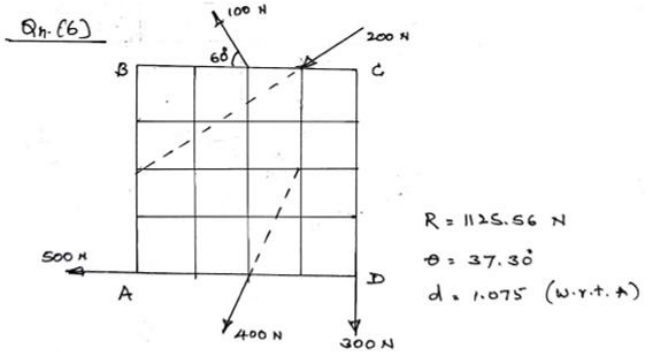
Semester End Examinations (SEE) 2020-21

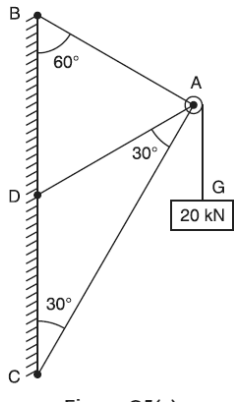
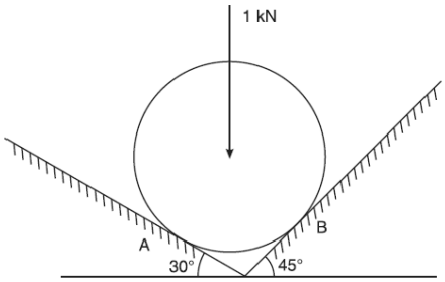
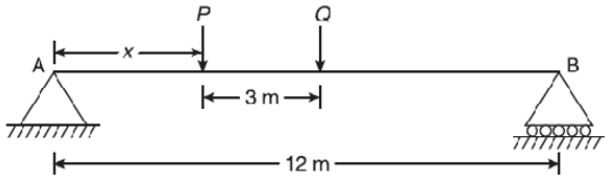
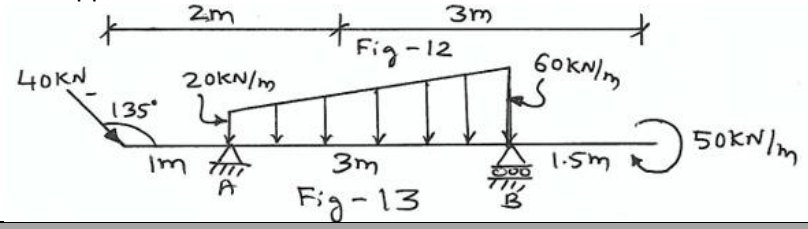
Model Question Paper-2

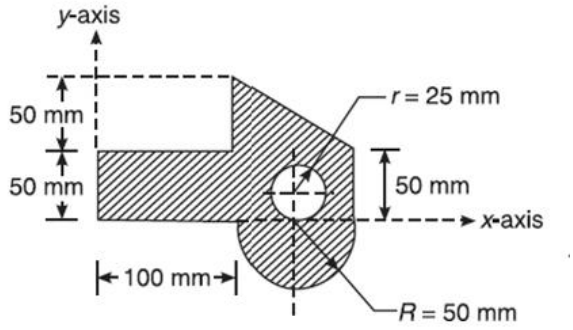
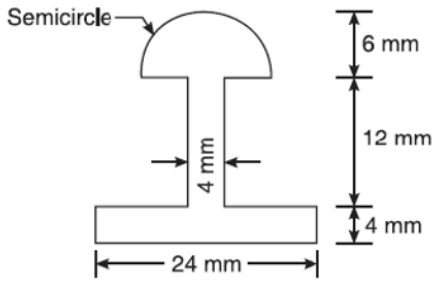
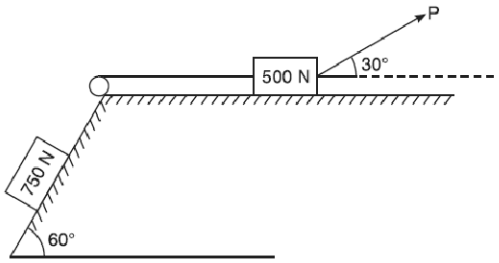
Subject: Engineering Mechanics **Course code: 20CIV14**

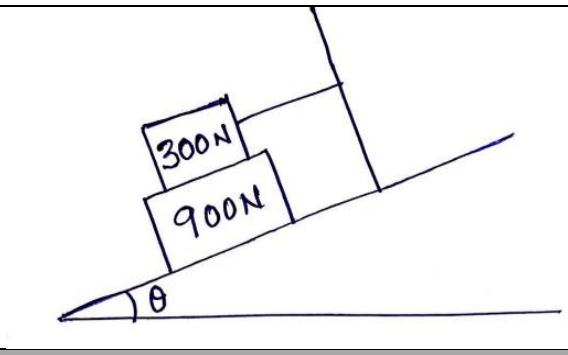
Semester: I **Duration: 3 Hours**

Note: Answer any five full questions selecting at least one from each Module.

Module 1			
1	a	Explain the Following. i) Composition of forces and Resolution of forces ii) Moment of a force and Couple	8
	b	Determine the magnitude, direction and the point of appliction of the resultant force for the given sysem of forces as shown in figure.1.b  Fig.(3)	6
	c	State and prove Varignon's theorem. / How is moment of a resultant equated to moment of forces acting on a system of forces.	6
OR			
2	a	Forces of 20 KN, 30 KN, 40 KN, 50 KN, and 60 KN act from the vertex 'A' of rectangulr hexagon ABCDEF towards other vertices B, C, D, E and F respectively as shown in Fig.2.a. Determine the magniude and direction of reultatant of forces.  	8
	B	A flat plate is subjected to a coplanar system of forces shown in Fig.2.b. Each square of the inscribed grid is having length of 1.0 m.  	8
	c	Explain transmissibility of force.	4

		Module 2	
3	a	The frictionless pulley 'A' shown in Fig.3.a. is supplied by two bars AB and AC which are hinged at 'B' and 'C' to a vertical wall. The flexible cable DG hinged at 'D', goes over the pulley and suports a load of 20 kN at 'G'. The angles between the various members are shown in the figure. Determine the forces in the bars AB and AC. Neglect the size and weight of the pulley.  Fig.3.a	10
	b	Determine the reactions at the point of contact for the sphere shown in Fig. 3.b.  	6
	c	Explain the types of loading on the beams.	4
		OR	
4	a	Determine the distance x of the load P from the support A, if the reaction RA is twice as great as reaction RB. Take P = 2 kN, Q = 1 kN  	8
	b	With neat sketches, explain various types of supports.	6
	c	Find the support reactions RA and RB for the beam loaded as shown in Fig. 4.c.  	6
		Module 3	
5	a	Locate the centroid of a given composite area shown in Fig. 5.a	14

			
	b	Derive the position of centroid of a semi-circular lamina of radius "R".	06
		OR	
6	a	The cross-section of a cast iron beam is shown in Fig. Determine the moment of Inertia about the centroidal axix 	14
	b	Derive an expression for moment of inertia of a semicircle with respect to its diameter line and also w.r.t centroidal axis parallel to diameter line.	06
		Module 4	
7	a	What is the value of 'P' in the system shown in Figure, to cause the motion to impend to the right? Assume the pulley is smooth and coefficient of friction between the other contact surfaces is 0.20. 	10
	b	A ladder 7 m long weighing 300 N is resting against a wall at an angle of 60° to the horizontal ground. A man weighing 700 N climbs the ladder, at what position does he induce slipping. Take μ = 0.25 for all contact surfaces.	10
		OR	
8	a	Explain different types of frictions	4
	b	Define the terms: a. Angle of friction b. Angle of Repose c. Limiting Friction d. Coefficient of friction	8
	c	What should be the value of Θ if Figure Q5 (d) which will make the motion of 900 N block down the plane to impend? The coefficient of friction for all the contact surfaces is 1/3.	8

			
Module 5			
9	a	Explain with neat sketch for projectile motion: i) Range ii) Time of flight iii) Maximum height iv) Angle of projection	10
	b	A stone is dropped into a well and a sound of splash is heard after 4 seconds. Find the depth of well if velocity of sound is 320m/s.	10
OR			
10	a	A burglar's car starts with an acceleration of 2 m/s2. A police vigilant party came after 5seconds and continued to chase the burgler's car with uniform velocity of 20m/s. find the time taken in which the police van will overtake the car.	12
	b	A cricket ball is thrown by a fielder in ground from a height of 3m at an angle of 400 with horizontal. The velocity with which the ball is thrown is 30m/s. the ball hits the wicket at a height of 0.3m from ground. Determine the distance of fielder from the wicket when the ball is thrown.	10