U.S.N.										

B.M.S. College of Engineering, Bengaluru-560019

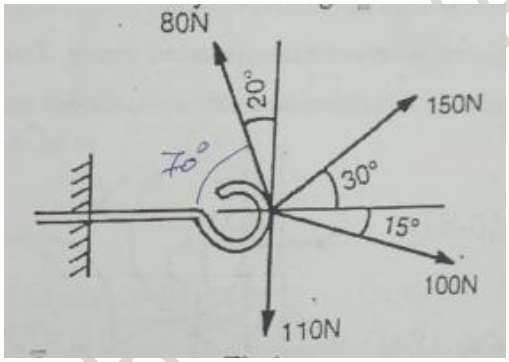
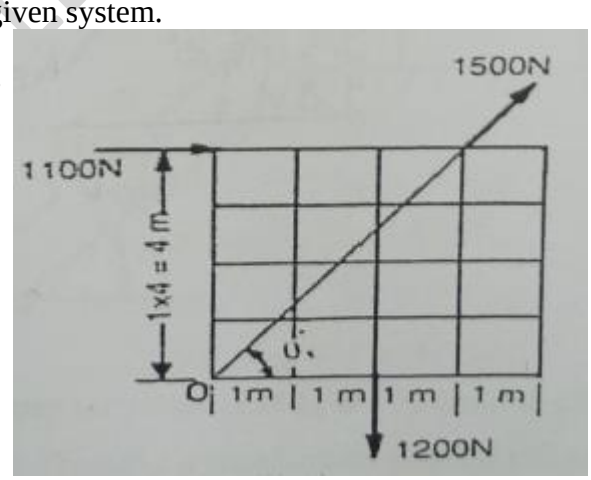
Autonomous Institute Affiliated to VTU

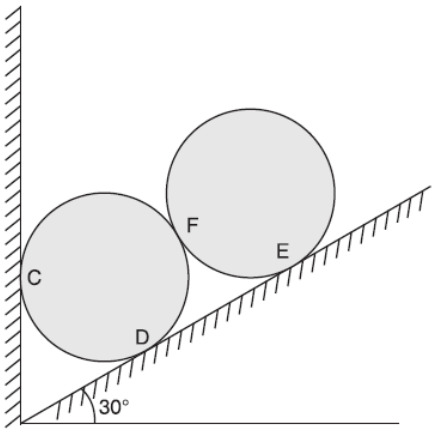
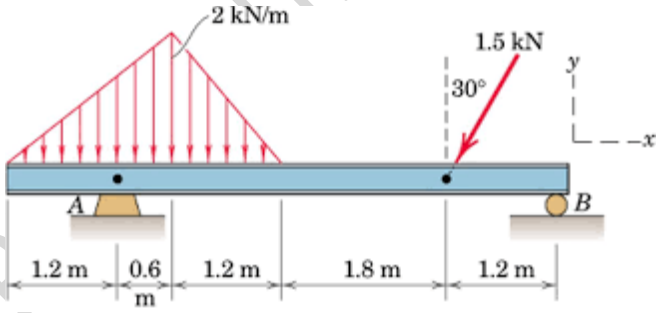
September / October 2024 Supplementary Examinations

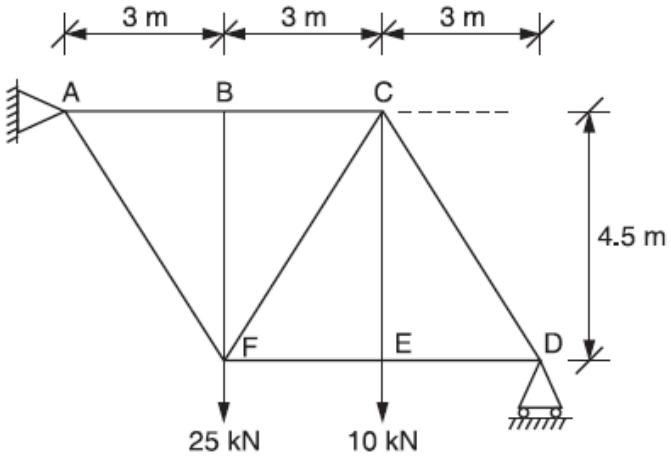
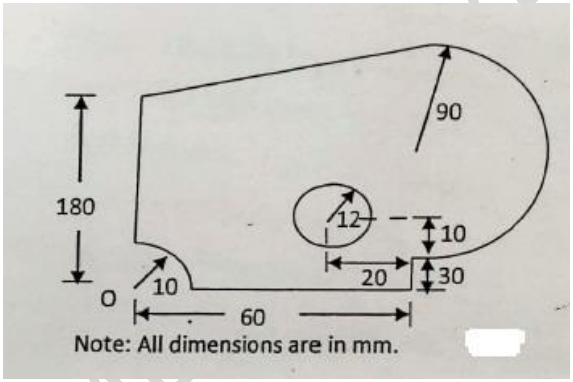
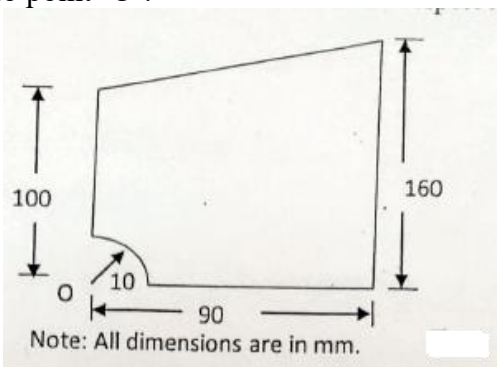
Programme: B.E. **Semester: I / II**
Branch: Common to all Branches **Duration: 3 hrs.**
Course Code: 21CV1ESECM / 21CV2ESECM **Max Marks: 100**
Course: Elements of Civil Engineering and Engineering Mechanics

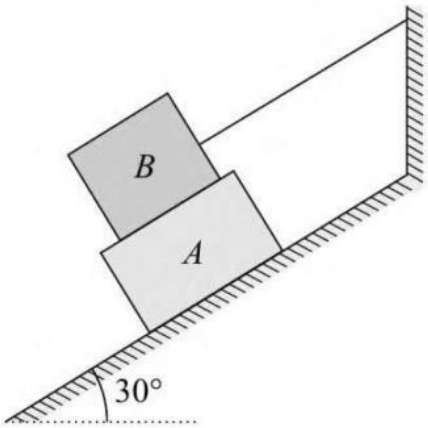
Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

Important Note: Completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. Revealing of identification, appeal to evaluator will be treated as malpractice.

		UNIT - I	*CO*	*PO*	Marks
1	a)	State and explain the principle of transmissibility of a force and principle of physical independence.	CO1	*PO1*	**04**
	b)	Find the resultant of force system acting on the hook shown in FIG.1  FIG 1	CO1	*PO1* PO2	**06**
	c	Resultant of four forces of which 3 are shown in fig. 2, is only a couple of moment 4800Nm of clockwise direction. If each square is one meter on a side, determine fourth force completely. Locate it in the given system.  FIG.2	CO1	*PO1* PO2	**10**
		OR			

	2	a)	Two identical rollers each of weight 700 N are supported by an inclined plane and vertical wall as shown in FIG 3. Determine the reaction exerted by the wall and the inclined plane at C, D. Assume all contact surfaces to be smooth.  **FIG.3**	CO1	*PO1* PO2	**10**
		b)	A 100 kg box is shifted by two persons, one pulling it by exerting a force of 200 N at an angle of 20^0 to the horizontal and another pushing it from behind by exerting a force of 150 N inclined at 10^0 to the horizontal. Determine the resultant force acting on the box.	CO1	*PO1* PO2	**06**
		c)	State and prove Varignon's theorem.	CO1	*PO1* PO2	**04**
			UNIT-II			
	3	a)	Determine the support reactions of the overhanging beam shown in FIG.4.  **FIG.4**	CO2	*PO1* PO2	**10**

		b)	Determine the forces in all members of the truss shown in FIG.5 by method of joints.  FIG.5	CO2	*PO1* PO2	**10**
			UNIT - III			
	4	a)	For the plane section shown in FIG.6, determine the moment of inertia about vertical and horizontal axes passing through centroid..  FIG 6	CO1	*PO1*	**12**
		b)	State and prove Parallel Axes and Perpendicular Axis theorem.	CO2	*PO1*	**08**
			OR			
	5	a)	For the plane section shown in FIG. 7, determine the centroid with respect to point 'O'.  FIG 7	CO1	*PO1*	**10**

		b)	Derive the expression for the centroid of a quadrant of a circle by using a method of integration.	CO1	*PO1*	**10**
			UNIT-IV			
	6	a)	In the system of blocks shown, FIG 8 the block A is on the verge of sliding downwards. Determine the coefficient of static friction assuming it the same at all contact surfaces. Mass of block A and block B are 100 kg and 50 kg respectively. Note that the block B is held by a string attached to the wall such that it is parallel to the incline. Also compute the tension in the string.  FIG-8	CO2	*PO1* *PO2*	**10**
		b)	A uniform ladder of length 6 m weighs 500 N. The coefficient of friction between the wall and the ladder is 0.25 and that between the ground and the ladder is 0.35. Compute the minimum inclination of the ladder with the wall, so that it does not slip with the man of weight 2000 N at the top.	CO2	*PO1* *PO2*	**10**
			UNIT - V			
	7	a)	Explain i) Structural Engineering ii)Geotechnical Engineering.	CO3	*PO7*	**10**
		b)	Briefly explain the role of civil engineers in development of nation.	CO3	*PO7*	**10**

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