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An Autonomous Institution Affiliated to Visvesvaraya Technological University (VTU) Belagavi

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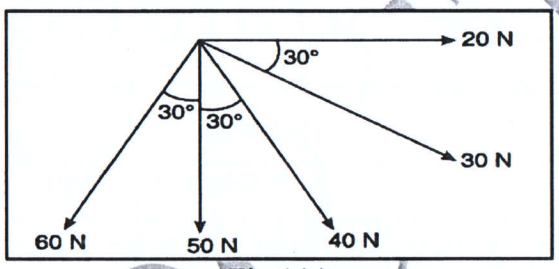
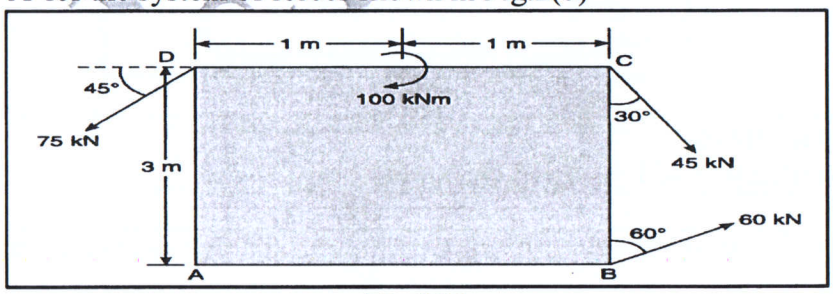
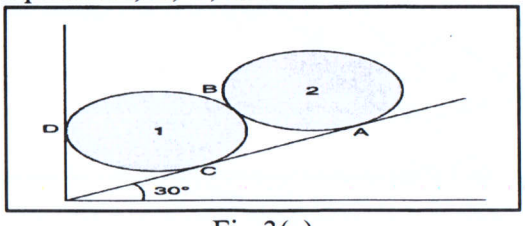
EPEMC203

Second Semester B.E. Degree Examination, May 2026
ENGINEERING MECHANICS

TIME:3 hrs. Max.Marks:100

Note: 1. Answer any FIVE full questions, choosing ONE question from each MODULE
2. M: Marks, L: Bloom's level, C: Course outcomes.

		Module-1	M	L	C
Q.1	a	Write a note on i)Coplanar force system ii)Non coplanar force system	10	L1	CO1
	b	Determine the resultant of the four forces acting on a particle as shown in Fig.1(a)  Fig.1(a)	10	L2	CO1
		OR			
Q.2	a	State and prove Varignon's theorem	10	L1	CO1
	b	Find the magnitude and direction and distance of the resultant from the point 'A' for the system of forces shown in Fig.2(b)  Fig.2(b)	10	L2	CO1
		Module–2			
Q.3	a	Two identical rollers, each weighing 400 N, are placed in a trench as shown in Fig.3(a). Assuming that all contact surfaces are smooth, determine the reactions at contact points A, B, C, and D.  Fig.3(a)	10	L2	CO2

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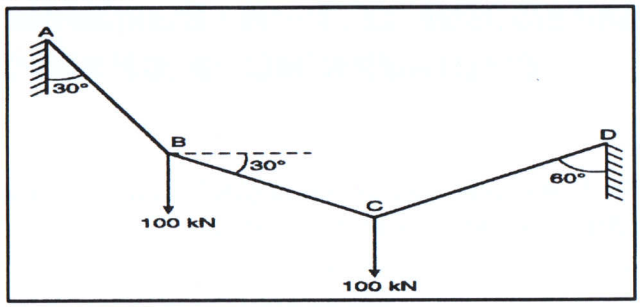
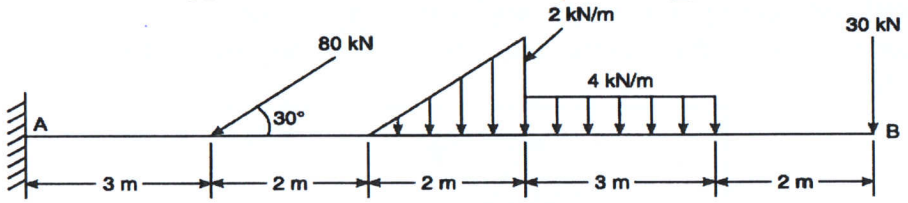
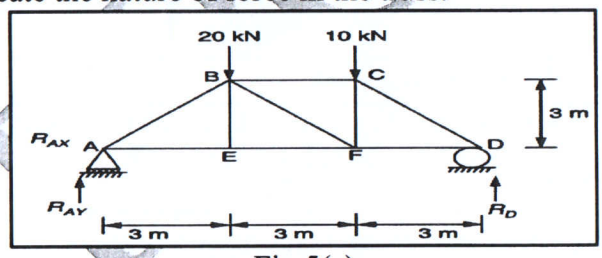
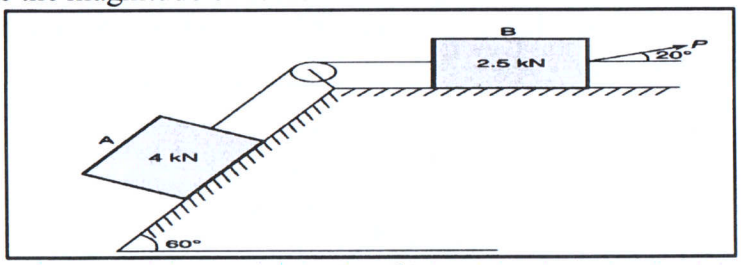
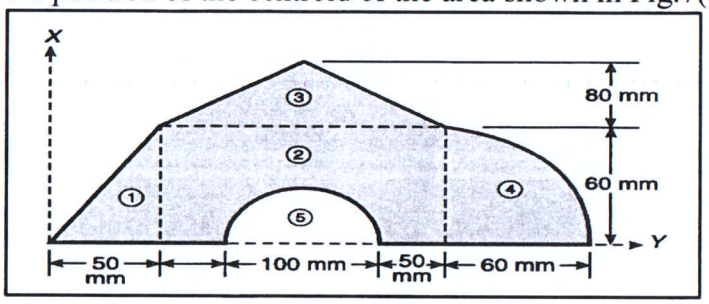
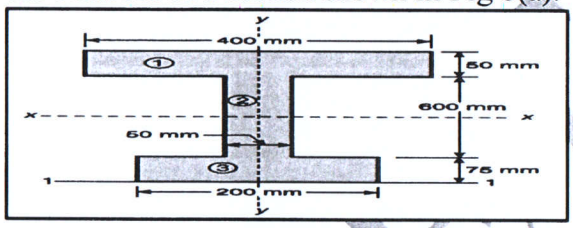
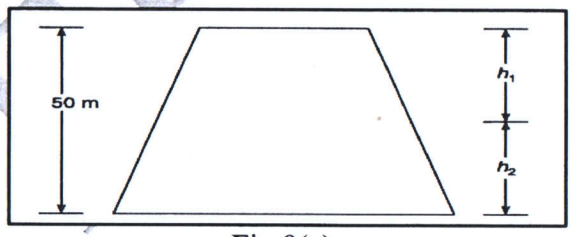
	b	Write a note on i)Types of Beams ii)Types of Supports iii)Types of Loading	10	L1	CO2
		OR			
Q.4	a	A chain ABCD attached to two fixed points A and D has two equal weights of 100KN, attached to B and C as shown in Fig.4(a). Find the tension in the chains AB, BC and CD.  Fig.4(a)	10	L2	CO2
	b	Calculate the support reactions for the cantilever beam shown in Fig.4(b)  Fig.4(b)	10	L2	CO2
		Module–3			
Q.5	a	Analyse the truss shown in Fig.5(a) by the method of joints. Tabulate the result and indicate the nature of force in the truss.  Fig.5(a)	10	L2	CO3
	b	Write a note on i)Classification of Trussesii)Laws of Friction	10	L1	CO3
		OR			
Q.6	a	Define Angle of Friction and Angle of Repose and find relation between them.	10	L2	CO3
	b	Two blocks A and B weighing 4 kN and 2.5 kN, respectively, are connected by a wire passing over a smooth frictionless pulley as shown in Fig.6(b). Determine the magnitude of force P.  Fig.6(b)	10	L2	CO3

		Module–4			
Q.7	**a**	Determine the position of the centroid of the area shown in Fig.7(a)  Fig.7(a)	**12**	**L2**	**CO4**
	b	Derive centroid of Rectangle.	**8**	**L1**	**CO4**
		OR			
Q.8	**a**	Find the moment of inertia along the horizontal axis and vertical axis passing through the centroid of a section shown in Fig 8(a).  Fig 8(a).	**12**	**L2**	**CO4**
	b	Derive Moment of Inertia of Triangle.	**8**	**L2**	**CO4**
		Module–5			
Q.9	**a**	A stone is dropped from the top of the tower 50 m high. At the same time another stone is thrown up from the foot of the tower with a velocity of 25 m/s. At what distance from the top and after how much time the two stones cross each other.  Fig 9(a).	**8**	**L2**	**CO5**
	b	A Burglar's car starts an acceleration of 2 m/s2. A police vigilant party came after 5s and continued to chase the Burglar's car with a uniform velocity of 20 m/s. Find the time taken in which the police van will overtake the car.	**8**	**L2**	**CO5**
	c	Define the following i)Newtons Laws of Motion ii)Kinetics and Kinematics	**4**	**L1**	**CO5**
		OR			
Q.10	**a**	Define the following i)Time of Flight ii)Horizontal Range iii)Vertical Height iv)Angle of Projectionv)Velocity of Projection	**10**	**L1**	**CO5**
	b	A particle is projected in air with a velocity of 100 m/s at an angle of 30° with horizontal. Find the horizontal range, maximum height attained and time of flight.	**10**	**L2**	**CO5**

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