CBCS SCHEME

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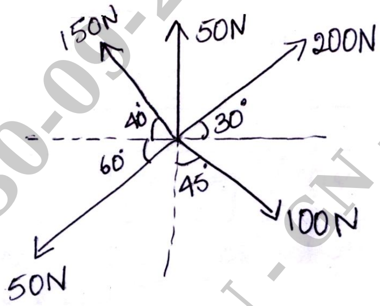
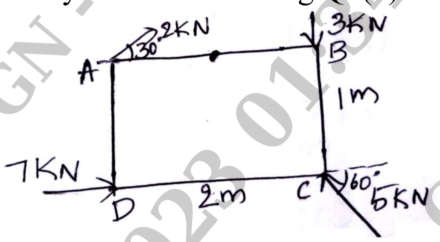
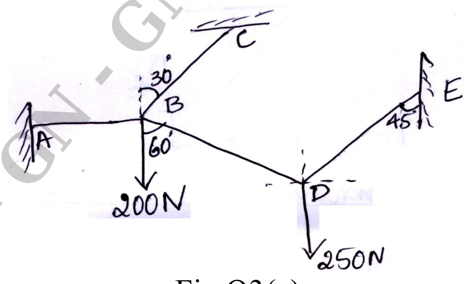
BCIVC103/203

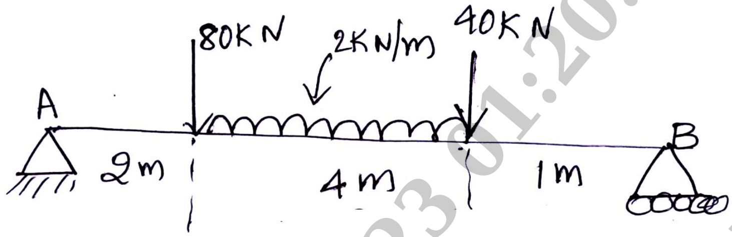
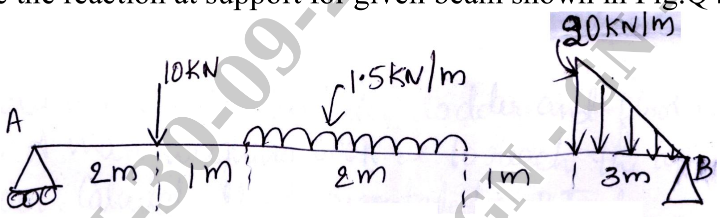
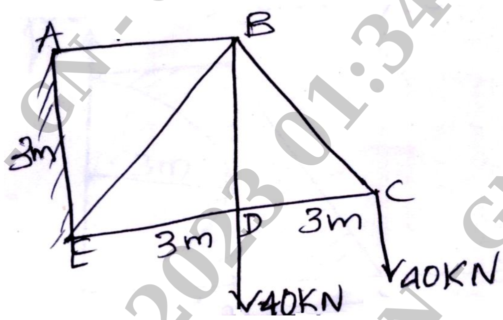
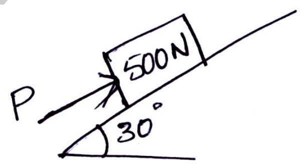
First/Second Semester B.E./B.Tech. Degree Examination, June/July 2023

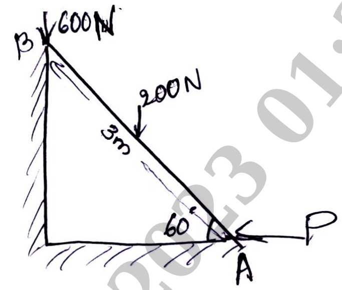
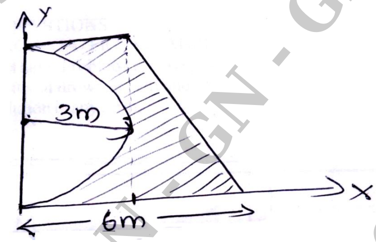
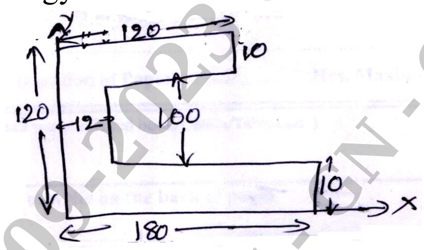
Engineering Mechanics

Time: 3 hrs. Max. Marks: 100

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

		Module – 1	**M**	**L**	**C**
Q.1	**a.**	Define Couple. Explain characteristics of Couple.	**5**	**L2**	**CO1**
	b.	Determine the magnitude and direction of resultant for given concurrent force system as shown in Fig.Q1(b).  Fig.Q1(b)	**7**	**L3**	**CO1**
	c.	Explain classification of force system with neat diagram.	**8**	**L2**	**CO1**
		OR			
Q.2	**a.**	State and prove Varignon's theorem.	**7**	**L2**	**CO1**
	b.	Find the magnitude, direction and position of the resultant with respect to the point A for the force system shown in Fig.Q2(b).  Fig.Q2(b)	**10**	**L3**	**CO1**
	c.	Explain principle of transmissibility of force.	**3**	**L2**	**CO1**
		Module – 2			
Q.3	**a.**	State and prove Lamis theorem.	**6**	**L2**	**CO1**
	b.	Explain the condition of equilibrium of coplanar concurrent and non concurrent force system.	**5**	**L2**	**CO1**
	c.	The system of connected flexible cable as shown in Fig.Q3(c) two vertical forces 200 N and 250 N at B and D. Determine the forces in various segments of the cable.  Fig.Q3(c)	**9**	**L3**	**CO1**

		OR			
Q.4	**a.**	Explain different types of beam with neat sketch.	**6**	**L2**	**CO1**
	b.	A beam carries load as shown in Fig.Q4(b). Determine reaction at the supports.  Fig.Q4(b)	**7**	**L3**	**CO1**
	c.	Determine the reaction at support for given beam shown in Fig.Q4(c).  Fig.Q4(b)	**7**	**L3**	**CO1**
		Module – 3			
Q.5	**a.**	Explain different type of truss with sketch.	**5**	**L2**	**CO2**
	b.	Write short notes on method of sections.	**4**	**L2**	**CO2**
	c.	Find forces in all the members of the truss shown in Fig.Q5(c). Tabulate the results and indicate the magnitude and nature of forces on the diagram of truss.  Fig.Q5(c)	**11**	**L3**	**CO2**
		OR			
Q.6	**a.**	Explain : (i) Angle of friction (ii) Angle of Repose (iii) Laws of friction (iv) Co-efficient of friction.	**8**	**L2**	**CO3**
	b.	For the block shown in Fig.Q6(b), determine force P required to push the block up the plane take $\mu = 0.25$ for all contact surface refer Fig.Q6(b).  Fig.Q6(b)	**6**	**L3**	**CO3**

	c.	A ladder of 3m length and weighing 200 N is placed on wall at an inclination of 60° which is as shown in Fig.Q6(c) and coefficient of friction between ladder and wall is 0.28 and between ladder and floor is 0.34. A man weighing 600 N is to reach the top of ladder. Calculate the horizontal force P to be applied to the ladder at floor level to prevent ladder from slipping.  Fig.Q6(c)	**6**	**L3**	**CO3**
		Module – 4			
Q.7	**a.**	Locate centroid of triangle with base B and height h by the method of integration.	**8**	**L2**	**CO4**
	b.	Locate the centroid for the shaded part with respect to reference x and y axis Fig.Q7(b).  Fig.Q7(b)	**12**	**L3**	**CO4**
		OR			
Q.8	**a.**	Explain perpendicular axis theorem.	**5**	**L2**	**CO4**
	b.	Locate moment of inertia of rectangle about its horizontal centroidal axis by method of integration.	**7**	**L2**	**CO4**
	c.	Calculate least radius of gyration for the section shown in Fig.Q8(c).  Fig.Q8(c) All dimensions are in mm	**8**	**L3**	**CO4**
		Module – 5			
Q.9	**a.**	Define: (i) Displacement (ii) Speed (iii) Velocity (iv) Acceleration	**8**	**L2**	**CO5**
	b.	Derive all three basic equation of motion.	**6**	**L2**	**CO5**
	c.	A car starts from rest and accelerates uniformly to a speed of 75 kmph over a distance of 1000 m. Find acceleration of car and time taken to attain this speed.	**6**	**L3**	**CO5**
		OR			
Q.10	**a.**	Explain D′Alembert's principle of equilibrium.	**6**	**L2**	**CO5**
	b.	Explain: (i) Angle of projection (ii) Time of flight (iii) Vertical height	**6**	**L2**	**CO5**
	c.	A projectile is projected from a point at an angle of elevation of 30° with a velocity of 600 m/sec, find the velocity and direction of motion of particle at the end of (i) 25 seconds (ii) 40 seconds	**8**	**L3**	**CO5**

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