CBCS SCHEME

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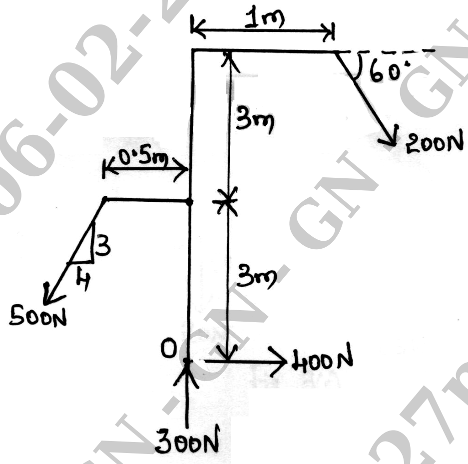
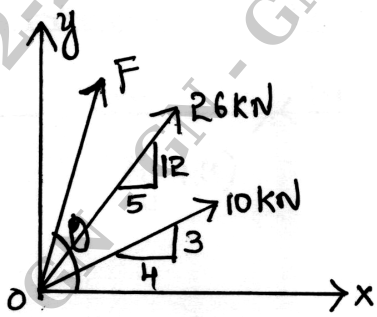
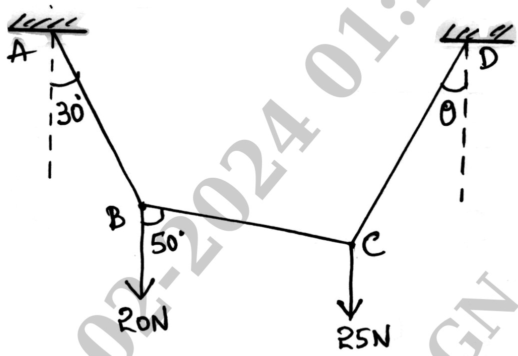
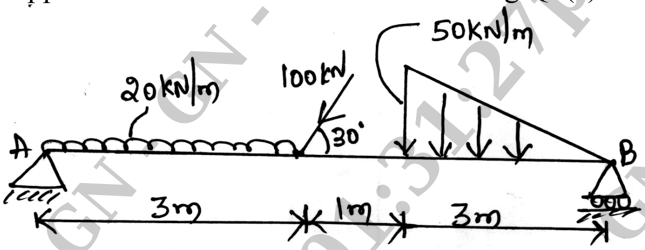
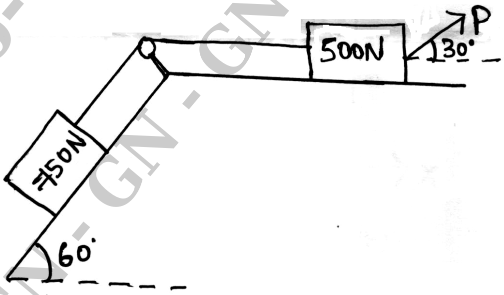
BCIVC103/203

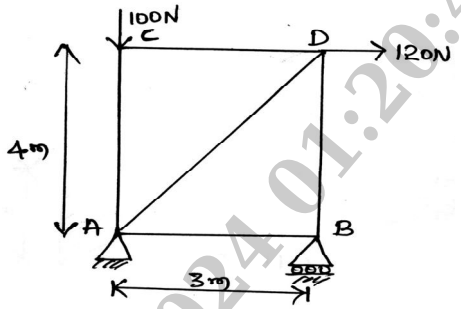
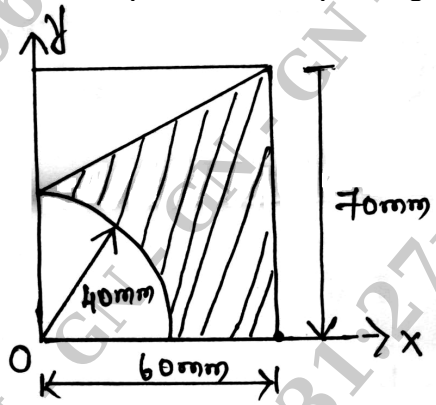
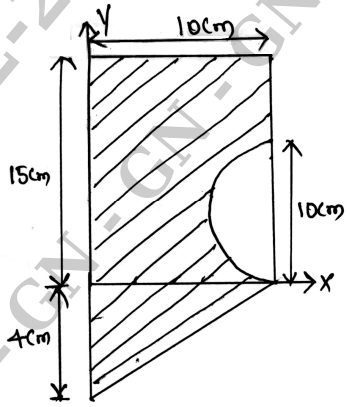
First/Second Semester B.E./B.Tech. Degree Examination, Dec.2023/Jan.2024
Engineering Mechanics

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.	What are the basic idealization of engineering mechanics, explain each	7	L2	CO1
	b.	Determine magnitude, direction and position of Resultant for the force system shown in Fig Q1(b) with respect to point 'O'.  Fig Q1(b)	10	L3	CO2
	c.	State the principle of transmissibility of forces.	3	L2	CO1
		OR			
Q.2	a.	State and prove Varignon's theorem of moments.	7	L2	CO1
	b.	Define couple. What are the characteristics of couple?	3	L2	CO2
	c.	The 26kN force is the resultant of two forces, one of which is shown in Fig. 2(c). Determine other force.  Fig Q2(c)	10	L3	CO1

		Module – 2			
Q.3	**a.**	What are the different types of supports? Explain with the help of neat sketch.	**6**	**L2**	**CO2**
	b.	What are the conditions for equilibrium of concurrent force system? Also explain equilibrant force.	**4**	**L2**	**CO2**
	c.	Calculate tension in the strings. Also calculate angle θ in Fig 3(c)  Fig Q3(c)	**10**	**L3**	**CO2**
		OR			
Q.4	**a.**	State and prove Lami's theorem.	**6**	**L2**	**CO2**
	b.	Differentiate statically determinate and indeterminate beams.	**4**	**L3**	**CO2**
	c.	Determine support reaction for the beam shown in Fig Q4(c)  Fig Q4 (c)	**10**	**L3**	**CO2**
		Module – 3			
Q.5	**a.**	Describe the assumptions made in analysis of truss, by mentioning the types of trusses.	**8**	**L2**	**CO3**
	b.	What is the value of P in the system shown in Fig Q5(b) to cause the motion to impend? Assume the pulley is smooth and coefficient of friction between contact surfaces is 0.2.  Fig Q5(b)	**12**	**L3**	**CO3**

		OR			
Q.6	**a.**	Give step by step procedure need to be followed in method of joints.	**8**	**L2**	**CO3**
	b.	Find the support reactions and member forces for pin jointed plane truss shown in Fig Q6(b)  Fig. Q6(b)	**12**	**L3**	**CO3**
		Module – 4			
Q.7	**a.**	Derive moment of Inertia of semicircle about its base and centroidal axis.	**10**	**L2**	**CO4**
	b.	Determine centroid of shaded portion with respect to given axis Fig Q7(b)  Fig Q7(b)	**10**	**L3**	**CO3**
		OR			
Q.8	**a.**	Derive the centroid of a quadrant from first principle.	**8**	**L2**	**CO4**
	b.	Determine the centroid of shaded portion with respect to given axis. Ref Fig Q8(b)  Fig Q8(b)	**12**	**L3**	**CO2**

Module – 5					
Q.9	**a.**	Derive all the three basic equations of motion in Kinematics.	**6**	**L2**	**CO4**
	b.	Explain the following with the help of sketch for projectile motion. i) Horizontal range ii) Time of flight iii) Maximum height iv) Angle of projection.	**6**	**L2**	**CO2**
	c.	A body moves in a straight line as equation of motion is given by $S = 2t^3 - 4t + 10$. Determine : i) Time required for body to gain velocity 68 m/s from rest. ii) Acceleration of the body when velocity is 32m/s	**8**	**L3**	**CO3**
OR					
Q.10	**a.**	Defend the necessity of providing super elevation. How is it provided in the field?	**5**	**L2**	**CO4**
	b.	Define displacement, velocity, Distance travelled, speed and acceleration.	**5**	**L2**	**CO2**
	c.	A projectile is fired from the top of cliff 150m height with an initial velocity of 180m/s at an angle of inclination of 30º to horizontal. Determine: i) The greatest elevation above the cliff ii) The great elevation above the ground reached by particle iii) The horizontal distance from the point of projection to the point where projectile strikes the grounds.	**10**	**L3**	**CO3**

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