MAKE-UP EXAM

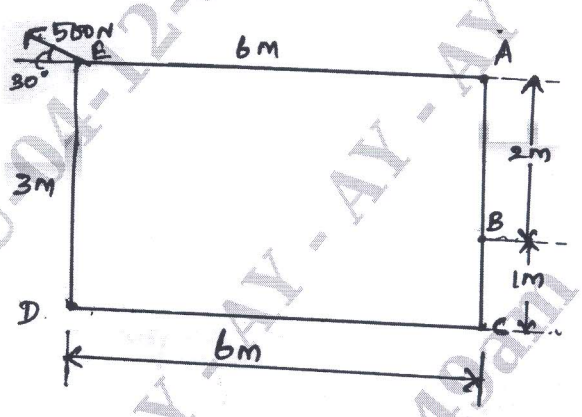
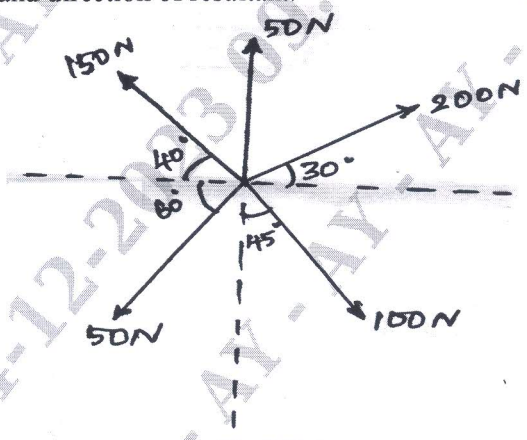
USN | | | | | | | | | | |

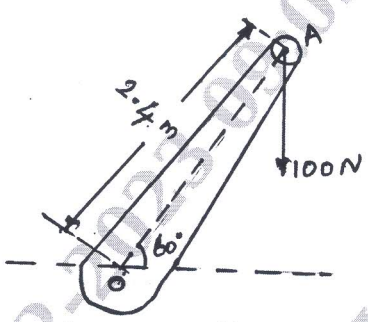
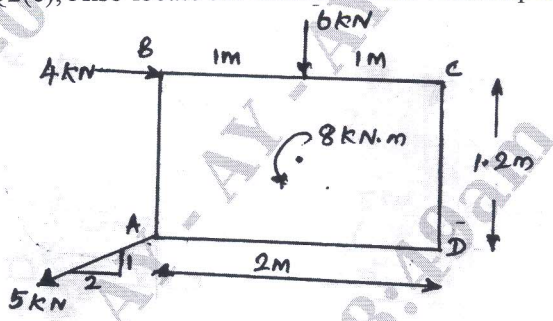
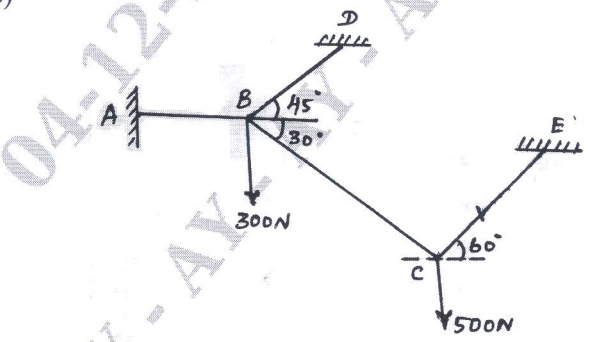
BCIVC103/203

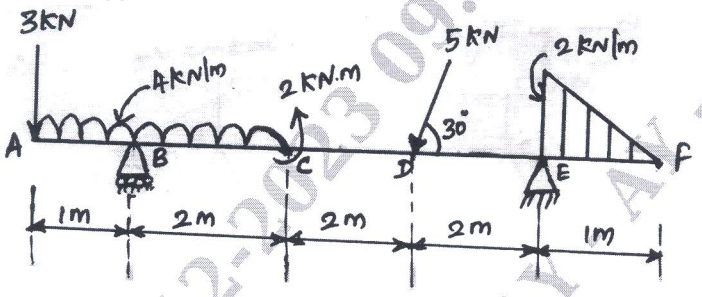
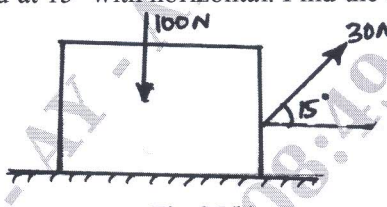
First/Second Semester B.E./B.Tech. Degree Examination, Nov./Dec. 2023
Engineering Mechanics

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.	Explain the following : i) Principles of transmissibility of forces ii) Forces and its characteristics iii) Moment and couple.	8	L2	CO1
	b.	Find the moment of 500N force about the points A, B, C and D as shown in Fig Q1(b).  Fig Q1(b)	6	L3	CO1
	c.	A system of forces are acting on a body as shown in Fig Q1(c). Determine the magnitude and direction of resultant.  Fig Q1(c)	6	L3	CO1
		OR			
Q.2	a.	State and prove Varignons theorem of moments.	6	L3	CO1

	b.	A 100N force is applied to the lower end of a lever which is attached to a shaft as shown in Fig Q2(b), determine : i) the moment of force about '0'. ii) the horizontal force applied at 'A' which creates the same moment about '0'. iii) the smallest force applied at 'A' which creates the same moment about '0'.  Fig Q2(b)	**6**	**L2**	**CO1**
	c.	Determine the magnitude, direction of the resultant force for the system shown in Fig Q2(c), Also locate the resultant force with respect to point D.  Fig Q2(c)	**8**	**L3**	**CO1**
		Module – 2			
Q.3	**a.**	State and prove Lami's theorem.	**4**	**L2**	**CO2**
	b.	Explain conditions for equilibrium of coplanar concurrent force system and non-concurrent force system.	**6**	**L2**	**CO2**
	c.	Compute the tensions in the strings AB, BD, BC and CE shown in Fig Q3(c)  Fig Q3(c)	**10**	**L3**	**CO2**

		OR			
Q.4	**a.**	Explain the different types of supports and loads in the analysis of beam.	**6**	**L2**	**CO2**
	b.	Explain different types of beams with a neat sketch.	**4**	**L2**	**CO2**
	c.	Determine the support reactions of the beam loaded as shown in Fig Q4(c)  Fig Q4(c)	**10**	**L3**	**CO2**
		Module – 3			
Q.5	**a.**	Explain : i) Angle of friction ii) Angle of Repose	**4**	**L2**	**CO3**
	b.	A body weighing 100N is placed on rough horizontal plane is pulled b a force of 30N inclined at 15° with horizontal. Find the coefficient of friction.  Fig Q5(b)	**6**	**L3**	**CO3**
	c.	A ladder of weight 200N of length 4.5m rests on a horizontal ground and leans on a rough vertical wall. The coefficient of friction between ladder and floor is 0.4 and between ladder and wall is 0.2. When a weight of 900N is placed on the ladder at a distance of 1.25m from the tap of the ladder it is at the point of sliding. Find the angle made by the ladder with horizontal of no horizontal load is applied at the foot of the ladder to prevent slip.	**10**	**L3**	**CO3**
		OR			
Q.6	**a.**	Explain different types of trusses.	**4**	**L2**	**CO3**
	b.	List the assumptions made in analysis of trusses.	**4**	**L2**	**CO3**
	c.	Determine the forces in all the members of the truss shown in Fig Q6(c). All inclined members are at 60° to horizontal and length of each member is 2m.	**12**	**L3**	**CO3**

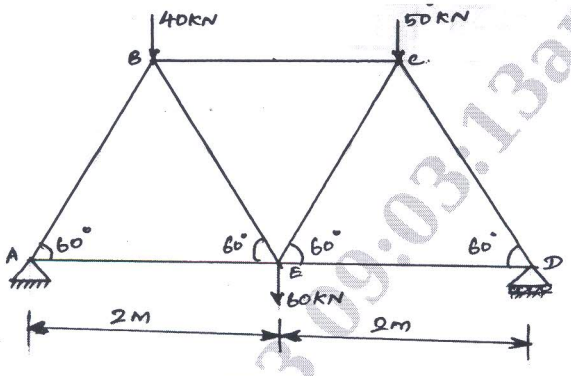


Fig Q6(c)

Module – 4

Q.7	**a.**	Derive an expression for determining centroid of quarter circle radius 'r'.	**8**	**L2**	**CO4**
	b.	Locate the centriod of the shaded area shown in Fig Q7(b).	**12**	**L3**	**CO4**

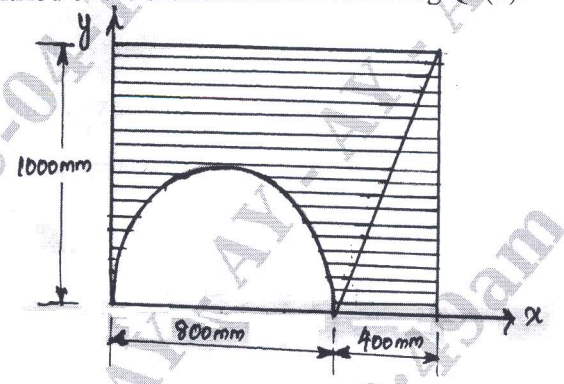


Fig Q7(b)

OR

Q.8	**a.**	State and prove parallel Axis Theorem.	**6**	**L2**	**CO4**
	b.	Find the radius of gyration of the area shown about the horizontal centroidal axis.	**14**	**L3**	**CO4**

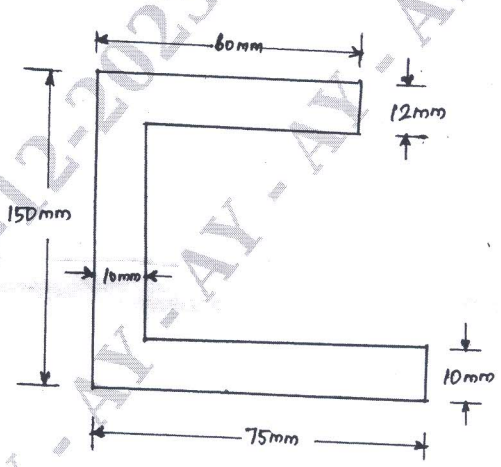


Fig Q8(b)

		Module – 5			
Q.9	a.	Define : i) Velocity ii) Acceleration iii) Speed	6	L1	CO5
	b.	A stone is dropped from the top of the tower 50m high. At the same time another stone is thrown up from the tower with a velocity of 25m/s. At what distance from the top and after how much time the two stones cross each other.	7	L3	CO5
	c.	A particle starts with an initial velocity of 2.5m/s and uniformly accelerates at the rate $0.5m/s^2$. Determine the displacement in 2s, time required to attain the velocity of 7.5m/s and the distance travelled when it attains a velocity of 7.5m/s.	7	L3	CO5
		OR			
Q.10	a.	State D'Alembort's principle. Mention its application in plane motion.	6	L2	CO5
	b.	A particle is projected on air with a velocity of 120m/s at an angle of 30° with the horizontal. Determine: i) Horizontal Range ii) Maximum height attained by the particle iii) Time of flight.	6	L3	CO5
	c.	An elevator cage of mine shaft weighing 8000N when empty is lifted or lowered by means of a wire rope. Once a man weighing 600N entered in it and lowered with uniform acceleration such that when a distance of 187.5m was covered, the velocity of the cage was 25m/s. Determine the tension in the rope and the force exerted by the man on the floor of the cage.	8	L3	CO5

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