

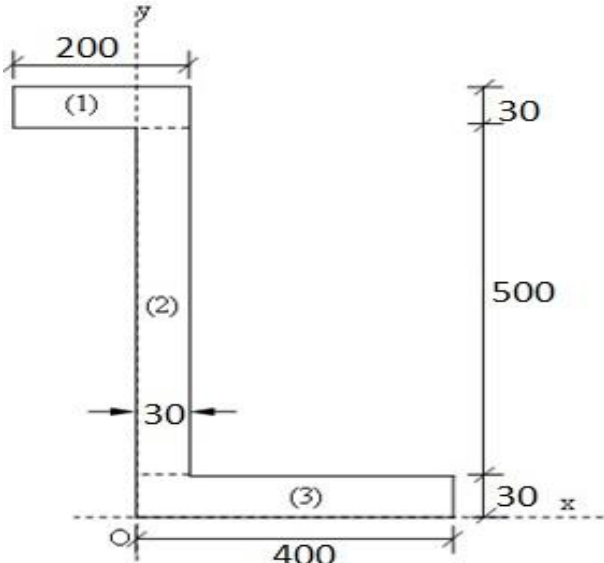
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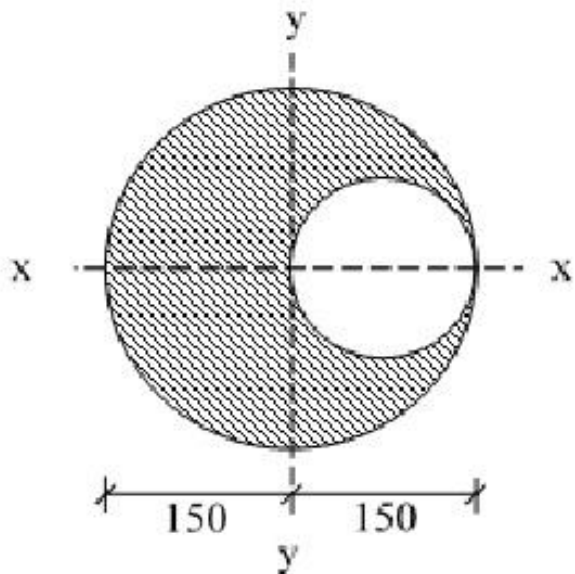
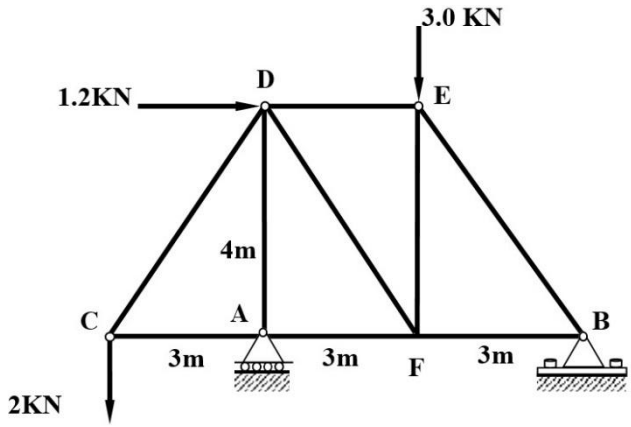
I B. Tech I Semester (R19) Regular Examinations
ENGINEERING MECHANICS
Civil Engineering
MODEL QUESTION PAPER

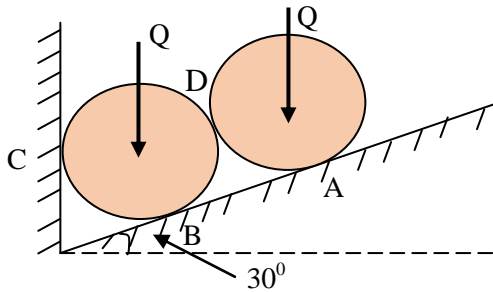
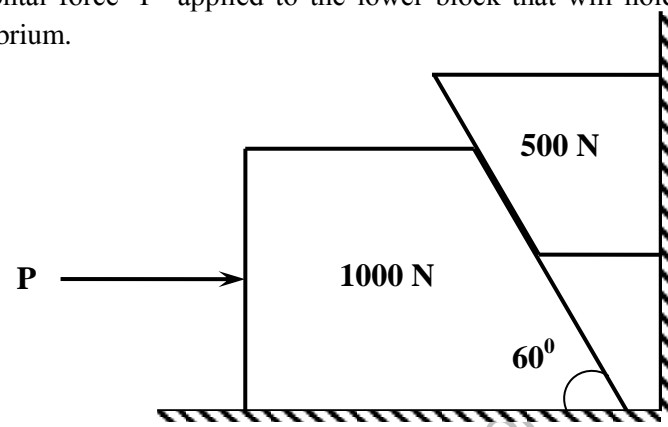
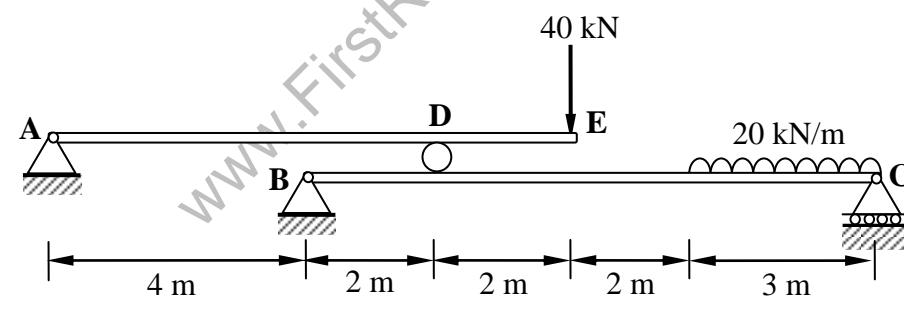
TIME: 3Hrs.

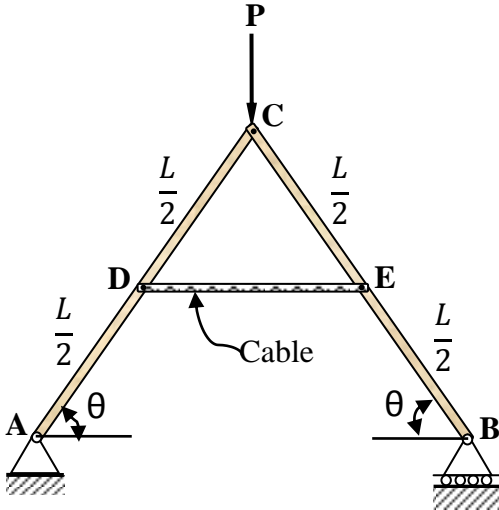
Max. Marks: 75 M

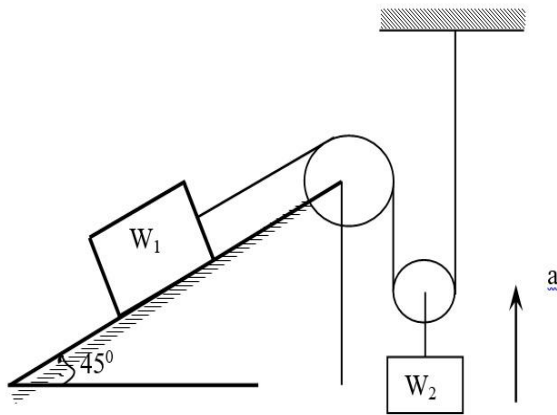
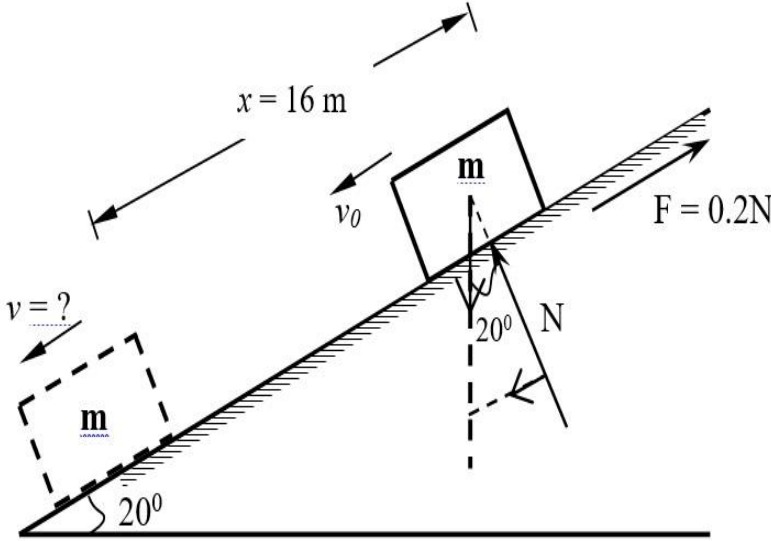
Answer **ONE Question** from **EACH UNIT**.
 All questions carry equal marks.

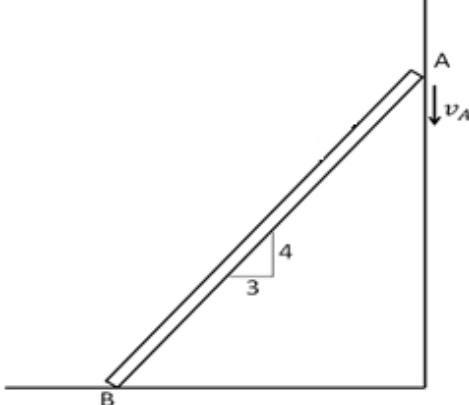
			CO	KL	M
		UNIT-I			
1.	a).	The following are the fr forces acting at a point on a body. Find the resultant and its position. i. 500N at N 45° E ii. 100N at N 80° E iii. 300N at S 30° E iv. 600N at N 20° W	1	K2	8
	b).	Find the centroid of Z – section shown in fig. (All units are in mm) 	1	K3	7
		OR			
2.	a).	State and prove Parallel axis theorem.	1	K2	8
	b).	Determine moment of inertia for shaded region shown in fig.(All units are in mm)	1	K3	7

					
		UNIT-II			
3.		<p>Solve for the Forces in all the members of the truss supported on roller at A and hinge at B.</p> 	2	K3	15
		OR			
4.	a).	<p>Two identical rollers, each of weight $Q = 100 \text{ kg}$ are supported by an inclined plane and a vertical wall as shown in Fig. Applying conditions of equilibrium, determine the reactions at points of support A, B and C. assume the surfaces are smooth.</p>	2	K3	8

					
	b).	<p>Referring to the figure, the coefficients of friction are as follows: 0.25 at floor, 0.3 at the wall and 0.2 between the blocks. Determine the minimum value of a horizontal force 'P' applied to the lower block that will hold the system in equilibrium.</p> 	2	K3	7
		UNIT-III			
5.		<p>Determine the reactions at supports A, B and C for the loaded beam shown in Figure below. Use virtual work method only.</p> 	3	K3	15
		OR			

6.		Use virtual work method to determine the tension in the cable in terms of θ for the arrangement shown below.	3	K3	15
					
UNIT-IV					
7.	a).	A particle moves along a straight line. Its motion is represented by the equation $S = 16t + 4t^2 - 3t^3$ where, S is in meters and t is in Seconds, Determine a. Displacement, velocity and acceleration 2 seconds after start: b. Displacement and acceleration when velocity is zero and c. Displacement and velocity when acceleration is zero	4	K3	8
	b).	A stone dropped into a well is heard to strike the water after 4 seconds. Find the depth of the well, if the velocity of sound is 350 m/sec.	4	K3	7
OR					
8.	a).	Find the height of the tower from top of which an object falls freely and during the last second of its motion, the object travels a distance is equal to $\frac{2}{3}$ of height of the tower. $g = 9.81 \text{ m/sec}^2$	4	K3	8
	b).	A gun is fired from the top of a hill 100m above the sea level. Ten seconds later the bullet is found to hit the warship 1000m away from the position of the gun. Determine the velocity and angle of projection of the bullet. With what velocity bullet strikes the ship?	4	K3	7
UNIT-V					
9.	a).	Find the tension S in the string during the motion of the system shown in fig. If $W_1 = 200 \text{ N}$ and $W_2 = 100 \text{ N}$, the system is in the vertical plane and coefficient of friction between the inclined plane and block W_1 is $\mu = 0.2$. Assume the pulley is weightless and frictionless.	5	K3	8

					
	b).	Two bodies, one of which is 400 N with a velocity of 8 m/sec and the other of 250 N with a velocity of 12 m/sec, move towards each other along a straight line and collide centrally. Find the velocity of each body after impact if the coefficient of restitution is 0.8. Also find the loss in Kinetic Energy?	5	K3	7
		OR			
10.	a).	Calculate the velocity ' v ' of a block weighing 40 N, when it travels down the 20° incline for 16 m at B (Fig 4); if it is given an initial velocity of 3 m/sec at A. The coefficient of friction between the block and the inclined plane is 0.2.	5	K3	8
					

	<p>b). A 5 m long ladder shown in Fig. begins to slip down the wall at A at a rate of 1 m/sec. Find the location of the instantanes centre of rotation of the ladder. Also, find the velocity of point B at the base of the ladder using instantanes centre method.</p> 	5	K3	7
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