

JK LAKSHMIPAT UNIVERSITY, JAIPUR

INSTITUTE OF ENGINEERING AND TECHNOLOGY

End Term Examination (Regular/Backlog), Nov 2017
B. Tech in CSE, CSE - BDA, CSE - Redhat, EE, ECE, ECE Redhat, Semester I

Roll No.....

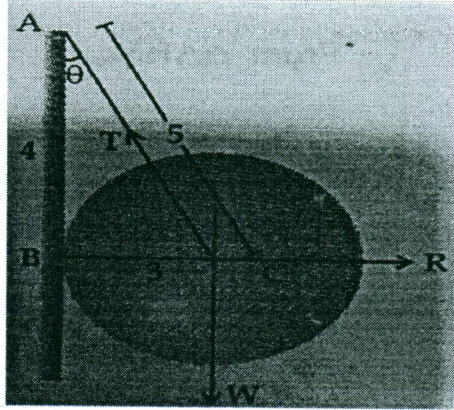
ME 201: Engineering Mechanics

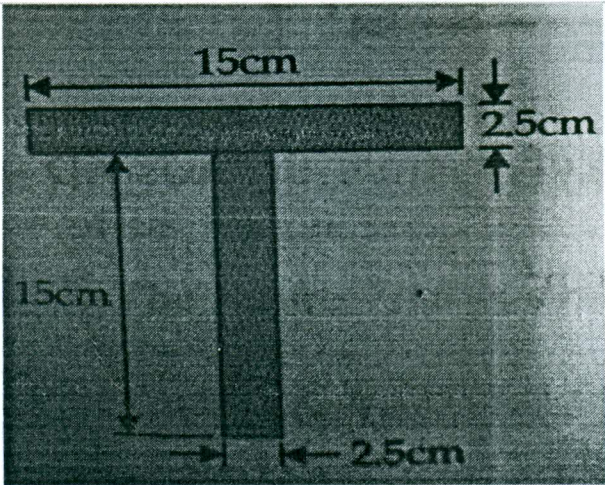
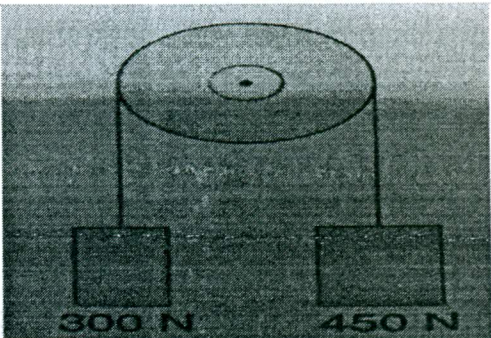
Time: 3 hours

Max. Marks: 100

Instructions to students:

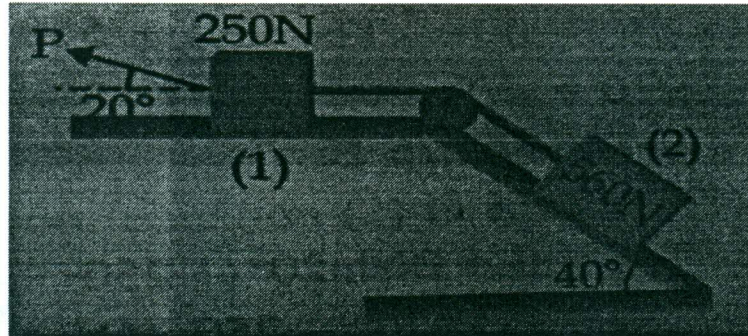
1. Do not write anything other than your roll number on question paper.
2. Assume suitable data wherever required and mention it clearly.
3. Writing appropriate units, nomenclature, and drawing neat sketches/schematics/ flow chart wherever, required are an integral part of the answer.

Q.1A	Explain	10
i.	Principle of work energy.	
ii.	Principle of conservation of momentum.	
iii.	Newton's third law of motion.	
iv.	Law of moments.	
v.	Characteristics of a force.	
vi.	A perfect frame.	
vii.	Radius of gyration.	
viii.	Polar moment of inertia.	
ix.	Impulse.	
x.	Angle of repose.	
Q.2	Short answer type questions (4 questions @ 2.5 marks)	10
i.	Derive Lami's theorem.	
ii.	Find the expression for angle of friction.	
iii.	Prove parallel axis theorem.	
iv.	What is coulomb friction?	
Q.3A	Find the components of a force of 10N, making angles of 45° and 60° with it.	05
Q.3B	A sphere of weight W and radius 3 cm is supported against a smooth vertical wall with the help of a string of length 5cm. find the tension in the string and the reaction of the wall. 	05
Q.4A	Find the center of gravity of the T section shown in fig.	05

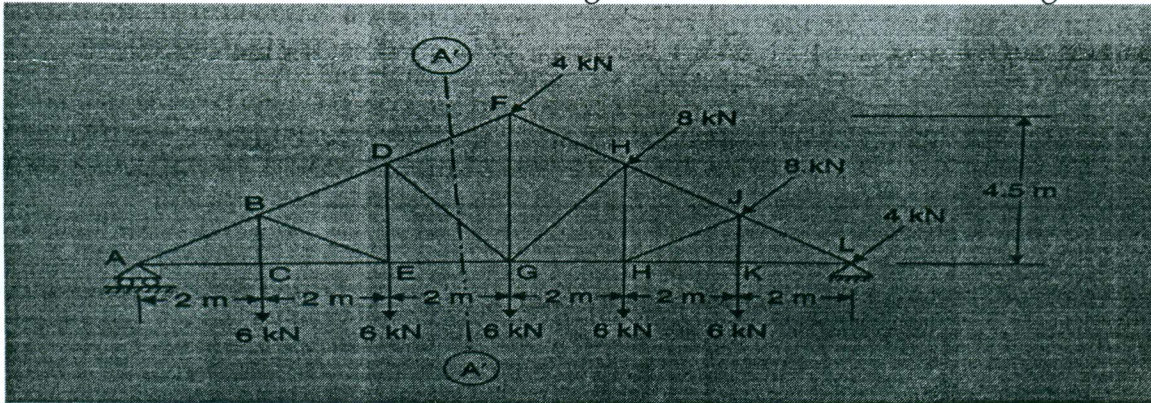
		
Q.4B	A body starts from rest with a constant acceleration of 0.5 m/s^2 . After what time its velocity be 2.5 m/sec and how much distance this will travel during this time?	05
Q.5A	A body covers 72 meters in third second and 100m in sixth second of its motion. Calculate the acceleration and distance travelled in 20 th second.	05
Q.5B	Derive the equation of trajectory of a projectile.	05
Q.6A	A man of mass 65kg jumps in a swimming pool from a tower of height 19.6m. He was found to go down in water by 2m and then started rising. Find the average resistance of the water.	05
Q.6B	The power of the machine is 10kW. Find the time taken to lift a body of mass 1000kg to a height of 20mts.	05
	OR	
Q.6B	Two bodies weighing 300N and 450N are hung to the ends of a rope passing over an ideal pulley. How much distance the blocks will move in increasing the velocity of system from 2m/s to 4m/s ? How much is the tension in the string? Use work energy principle.	05
		
Q.7A	A glass marble whose weight is 0.2 N , falls from a height of 10m and rebounds to a height of 8 mts. Find the impulse and the average force between the marble and the floor, if the time during which they are in contact is $1/10$ of a second.	05
Q.7B	A 1N ball is bowled to a batsman. The velocity of the ball was 20m/s horizontally just before batsman hit it. After hitting it went away with a velocity of 48m/s at an inclination of 30° to horizontal. Find the average force exerted on the ball if the impact lasts for 0.02 sec.	05
	OR	
Q.7B	A block weighing 130N is on an incline, whose slope is $\tan^{-1}(5/12)$. Its initial velocity down the incline is 2.4m/s . what will be its velocity in 5sec later? Take $\mu=0.3$	05

Q.8A	A projectile is aimed at a target on the horizontal plane and falls 12m short when the angle of projection is 15° , while it overshoots by 24m when the angle is 45° . Find the angle of projection to hit the target.	10
------	--	----

Q.9A	Determine the <u>values</u> of P to keep the system in equilibrium. Coefficient of friction for all the surfaces is 0.2.	10
------	--	----

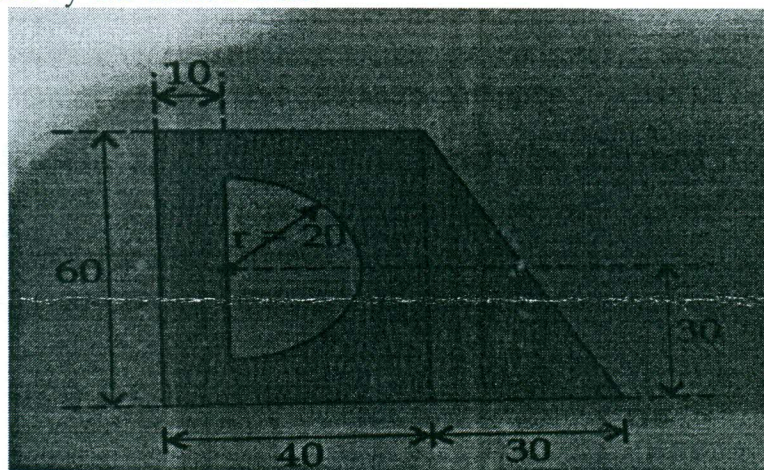


Q.9B	Find the force in the member FG of triangular Howe truss as shown in figure.	10
------	--	----



OR

Q.9B	Find the MoI of the shaded area about the axes X and Y. Taking the co-ordinate system denoted by the dotted lines.	10
------	--	----



Best of luck ☺