PVP 20

Code: 20BS1305

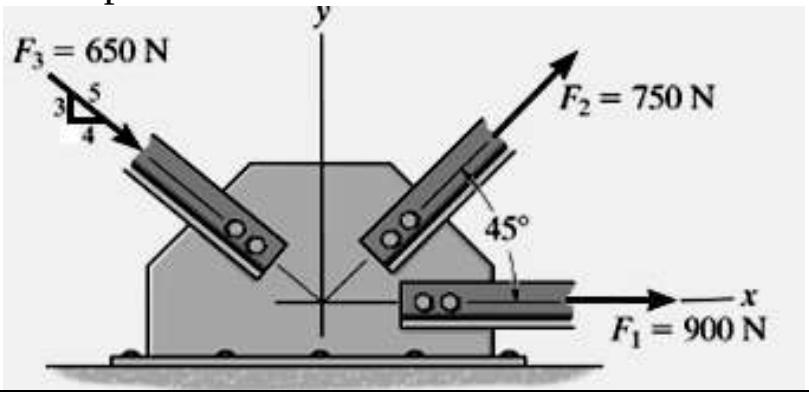
II B.Tech - I Semester –Regular / Supplementary Examinations
DECEMBER 2022

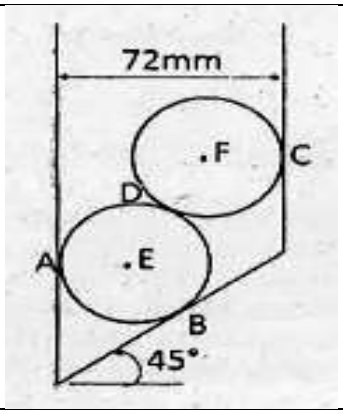
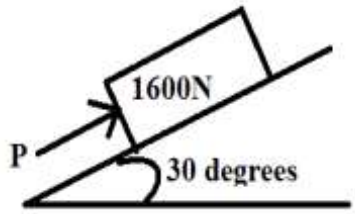
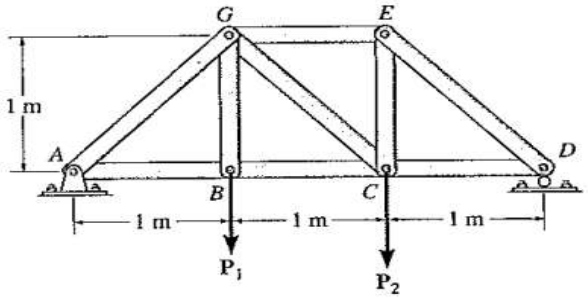
MECHANICS
(MECHANICAL ENGINEERING)

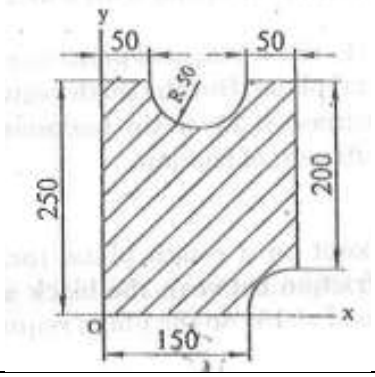
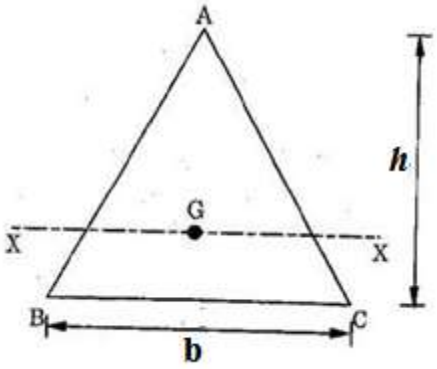
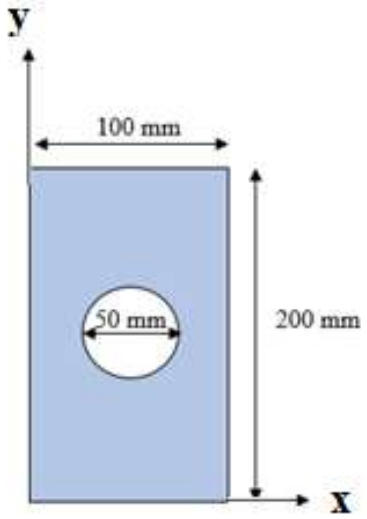
Duration: 3 hours Max. Marks: 70

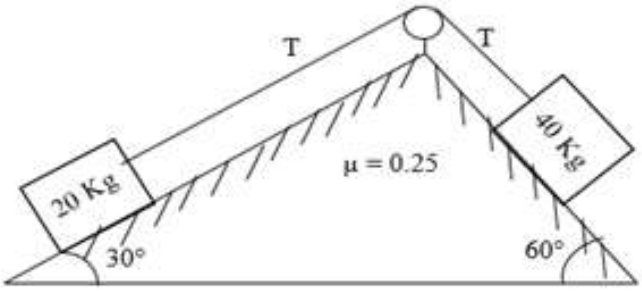
Note: 1. This paper contains questions from 5 units of Syllabus. Each unit carries 14 marks and have an internal choice of Questions.
2. All parts of Question must be answered in one place.

BL – Blooms Level CO – Course Outcome

			BL	CO	Max. Marks
		UNIT-I			
1	a)	Explain Lami' s Theorem of equilibrium of 3 forces.	L2	CO1	4 M
	b)	Determine the Resultant of the forces acting on the bracket joint as shown in Fig. and also represent the direction (angle) of resultant force with respect to X axis with a neat sketch. 	L3	CO2	10 M
		OR			
2	a)	Illustrate the following: coplanar, Non- coplanar forces, Concurrent and Non concurrent forces.	L2	CO1	4 M
	b)	Two cylinders E, F of diameter 60mm and 30mm weighing 160N and 40N respectively are placed as shown in Fig. Assuming all the contact surfaces to be smooth, find the reactions at A, B, and C.	L3	CO2	10 M

					
UNIT-II					
3	a)	Explain friction and what are the factors affecting friction.	L2	CO1	4 M
	b)	A block of weight 1600N is in contact with a plane incline 30° to the horizontal. A force "**P**" parallel to the plane and acting up the plane. Take μ = 0.2. Find the following i) The value of **P** to just cause the motion ii) The value of **P** to prevent the motion iii) The magnitude and direction of Frictional force 	L3	CO2	10 M
OR					
4	a)	Briefly explain about the assumptions used in the analysis of trusses.	L2	CO1	4 M
	b)	Determine the force in each member of truss and state if the members are in Tension or compression. Take P_1=100 N and P_2=100 N. 	L3	CO2	10 M
UNIT-III					
5	a)	What are the differences between the centre of gravity and the centroid?	L2	CO1	4 M

	b)	Locate the Centroid of the shaded area as shown in Fig. All the dimensions are in "mm". 	L3	CO3	10 M
		OR			
6	a)	Give the equation for the following Moment of inertia of a triangular section about an axis (XX) passing through its centroid. 	L2	CO1	4 M
	b)	Determine the moment of inertia I_{XX} & I_{YY} of the shaded rectangular area with hole at center as shown in Fig. with respect to centroidal axis. 	L3	CO3	10 M
		UNIT-IV			
7	a)	Discuss about the kinematics equation of motion for a particle rotating about a fixed axis.	L2	CO1	4 M

	b)	The rectilinear motion of a particle is defined by the displacement time equation $X = t^4 - 3t^3 + 2t^2 - 8$. Find the i) initial velocity and acceleration ii) velocity and acceleration after 2 seconds.	L4	CO4	10 M
OR					
8	a)	Distinguish between Rectilinear motion and curvilinear motion.	L2	CO1	4 M
	b)	A flywheel 0.5m in radius accelerates uniformly from rest to 360 rpm in 12 seconds. Determine the velocity and acceleration of a point on the rim of the flywheel, 0.1 second after it has started from rest.	L4	CO4	10 M
UNIT-V					
9	a)	How will you apply the D'Alembert's principle for the problems of a rigid body rotate about a fixed axis under the action of constant moment.	L2	CO1	4 M
	b)	Two blocks of mass 20 kg and 40 kg are connected by rope passing over a frictionless pulley as shown in Fig. Assuming coefficient of friction 0.25 for all the contact surfaces, find the tension in spring, acceleration of the system. Also compute the velocity of the system after 4 seconds starting from the rest.  	L4	CO4	10 M
OR					
10	a)	State the principle of Work and Energy.	L2	CO1	4 M
	b)	A body weighing 600 N lies on a smooth inclined plane. The plane is inclined at an angle of 45° with the horizontal. The body is pulled up the plane for a distance of 5m. Calculate the work done in pulling the body.	L4	CO4	10 M