PVP 23

Code: 23CE3201, 23ME3201

I B.Tech - II Semester – Supplementary Examinations
DECEMBER 2024

ENGINEERING MECHANICS

(Common for CE, ME)

Duration: 3 hours Max. Marks: 70

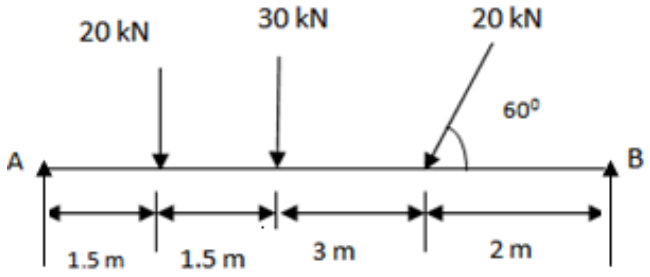
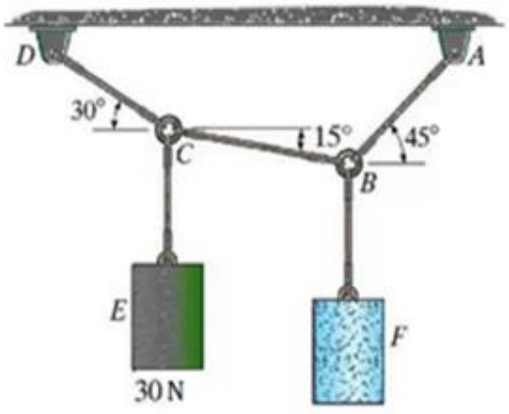
Note: 1. This question paper contains two Parts A and B.
2. Part-A contains 10 short answer questions. Each Question carries 2 Marks.
3. Part-B contains 5 essay questions with an internal choice from each unit. Each Question carries 10 marks.
4. All parts of Question paper must be answered in one place.

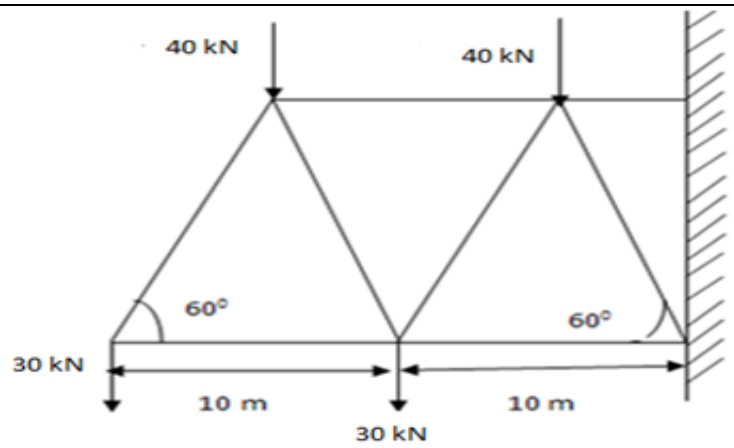
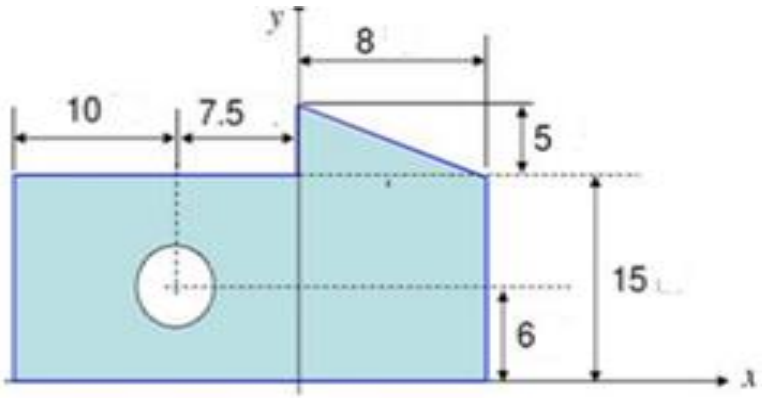
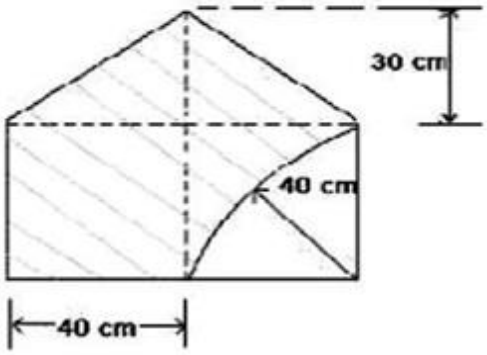
PART – A

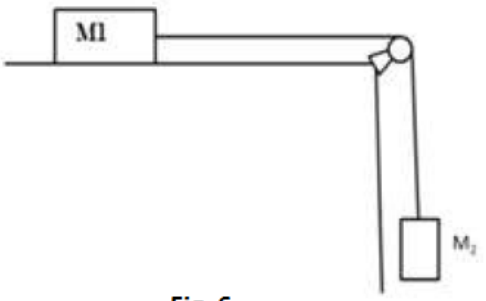
1.a)	Recall couple. Give two examples.
1.b)	Define parallelogram law of forces.
1.c)	What is meant by wedge and write its purpose.
1.d)	Write at least two assumptions of analysis of truss.
1.e)	State and prove perpendicular axis theorem.
1.f)	With the help of a sketch, show where does the centroid of a semicircle and triangle lie from base.
1.g)	State and prove work energy principle.
1.h)	What are the tangential and normal components of acceleration curvilinear motion.
1.i)	What is the difference between linear and angular acceleration.
1.j)	What is rigid body motion write an example.

PART – B

					Max. Marks

	UNIT-I	
2	A system of loads acting on a beam as shown in **Fig. 1.** Determine the resultant force and position of resultant force.  **Fig. 1**	10 M
	OR	
3	Two loads of 30 N and W_F are hung by a set of wire ropes as shown in **Fig. 2**. Calculate the tensions in the wire ropes AB, BC, CD and also the unknown weights W_F hung at the point B.  **Fig. 2**	10 M
	UNIT-II	
4	A block weighing 100N is resting on a rough plane inclined 20^0 to the horizontal. It is acted upon by a force of 50N directed upward at angle of 14^0 above the plane. Determine the frictional force. If the block is about to move up the plane, determine the co-efficient of friction.	10 M
	OR	
5	Determine the forces in each member of the cantilever truss loaded as shown in **Fig. 3.**	10 M

	 **Fig. 3**	
	UNIT-III	
6	Calculate the positions of centroid of the **Fig. 4,** where the circle of 5 cm diameter is removed. All dimensions are in cm.  **Fig. 4**	10 M
	OR	
7	Find the moment of inertia about the horizontal centroidal axis of shaded portion as shown in **Fig. 5.**  **Fig. 5**	10 M

	UNIT-IV	
8	Two trains P and Q leave the same station on parallel lines. Train P starts at rest with uniform acceleration of 0.2 rad/s^2 attains a speed of 10 m/s. Further the speed is kept constant. Train Q leaves 30 seconds later with uniform acceleration of 0.5 m/s^2 from rest and attains a maximum speed of 20 m/s, when will train Q overtake train P.	10 M
	OR	
9	Two blocks of masses M1 and M2 are connected by a string as shown in **Fig. 6**. below Assuming the coefficient of friction between block M1 and the horizontal surface to be μ if the system is released from rest, find velocity of the block A after it has moved a distance of 1m Assume M1=100kg and M2=150kg and μ =0.20.  Fig. 6	10 M
	UNIT-V	
10	A wheel has an initial clock wise angular velocity of 8 rad/s and a constant angular acceleration of 2 rad/s^2. Determine the number of revolutions the wheel must undergo to acquire a clockwise angular velocity of 15 rad/s. What is the time required?	10 M
	OR	
11	A flywheel of 15kg mass and 20cm radius of gyration is directly coupled to an electric motor which can develop 10KW power when rotating at a speed of 1200rpm. Determine the driving torque to maintain this speed. If the power is switched off and the flywheel comes to rest in 20 seconds determine the uniform retarding torque on the flywheel.	10 M