

B.E. / B.Tech. Civil Engineering / Mechanical Engineering / Electrical (Electronics & Power)
Engineering (Model Curriculum) Semester - III
002 / ESC-CE302 / ESC202 / 001 / SE101 - Engineering Mechanics

P. Pages : 4

Time : Three Hours

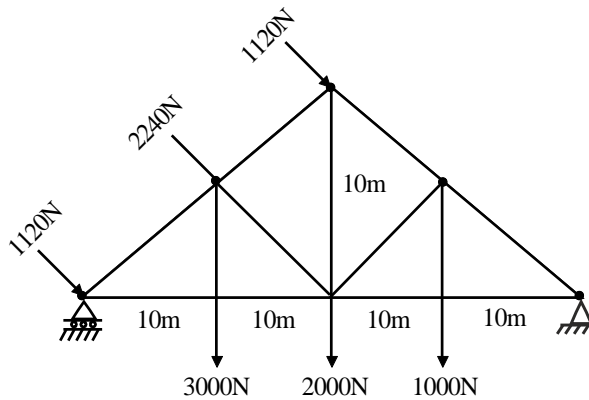


GUG/W/24/13712

Max. Marks : 80

- Notes :
1. All questions carry equal marks.
 2. Due credit will be given to neatness and adequate dimensions.
 3. Assume suitable data wherever necessary.

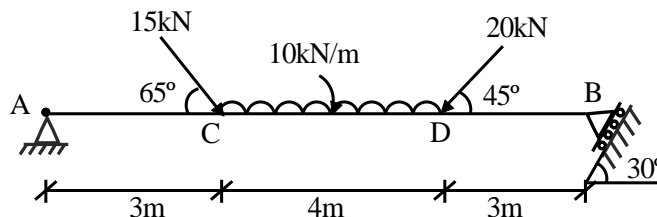
1. a) Write down the types of force system with the help of neat sketch and suitable example. 4
- b) The house of roof truss shown in figure carries the given load. The wind loads are perpendicular to the inclined members. Determine the resultant and its intersection with AB. 12



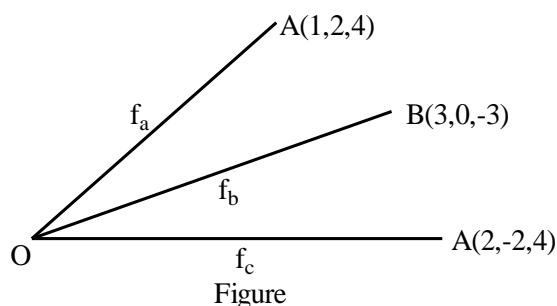
Figure

OR

2. a) For the beam shown in figure determine reaction at support. 6

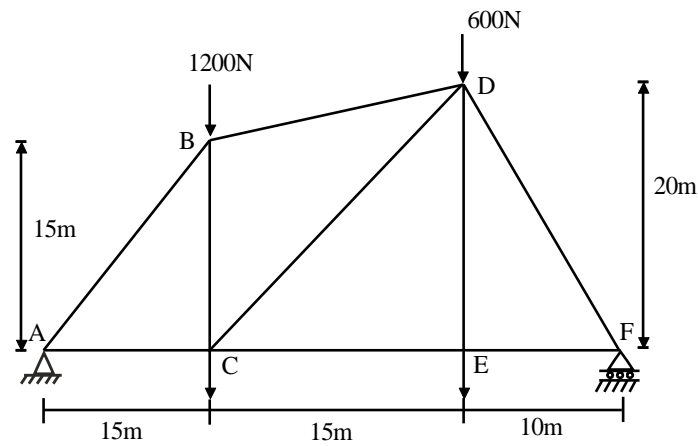


- b) The line of action of three forces concurrent at origin O passes through point A, B & C shown in figure below. The magnitude of the forces are $f_a = 40\text{N}$, $f_b = 10\text{N}$, and $f_c = 30\text{N}$ Find the magnitude and direction of their resultant. 10



Figure

3. a) Determine the forces in members of truss shown in figure. 12

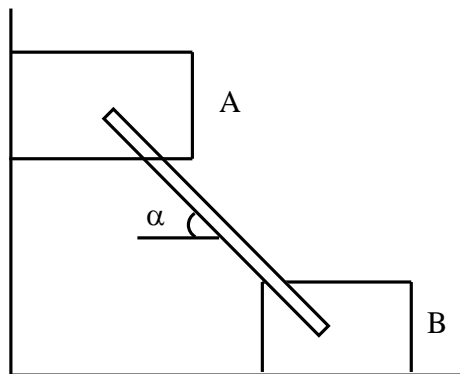


- b) What are assumption made in analysis of truss. 4

OR

4. a) Define limiting friction & derive $\frac{T_2}{T_1} = e^{\mu\theta}$ for coil friction. 6

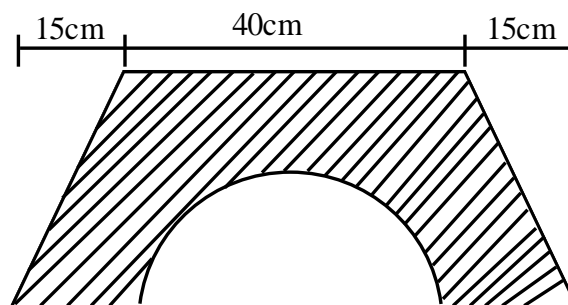
- b) Two identical blocks A and B are connected by rod and rest against vertical and horizontal planes respectively, as shown in figure. If $\alpha = 45^\circ$, determine coefficient of friction assuming that it to be same at both floor and wall. 10



Figure

5. a) Explain the perpendicular axis theorem and parallel axis theorem. 5

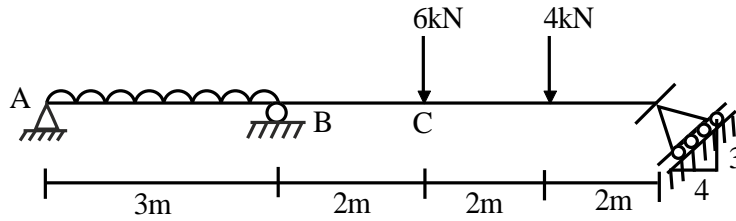
- b) Find the moment of inertia of shaded area about centroidal axis as shown in figure. 11



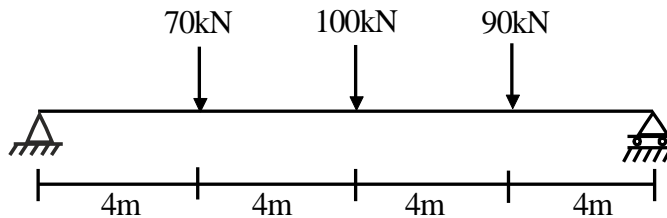
Figure

OR

6. a) Determine the reaction at A, B & E by using principle of virtual work. There is an internal hinge at C. 8



- b) Find the reaction at support A and B of beam shown in figure using virtual work method. 8



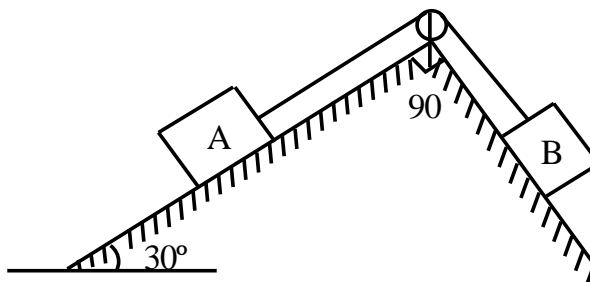
7. a) The A ball is thrown so, that it just clears a 7.5m wall 30m away. If it left the hand 1.5m above the ground and at an angle of 60° to the horizontal. What was the initial velocity of the ball. 8

- b) Define: Rectilinear motion, Curvilinear motion, rotational motion and relative motion. 8

OR

8. A train travelling with a speed of 90 kmph slow down on account of work in progress, at a retardation of 1.8 kmph per second to 36 kmph. with this, it travels 600m there after it gains further speed with 0.9 kmph per second till getting original speed. Find the delay caused. 16

9. a) Block A and B of mass 20 kg and 45 kg respectively are connected by a weight less rope over a frictionless pulley as shown in figure. Assume a co-efficient of friction of 0.2 for all the plans. Determine the velocity of the system 5 seconds after starting from rest. 10



- b) Explain the terms 'Elastic impact' and co-efficient of restitution. 6

OR

- 10.** a) Two particle of masses 10kg and 20 kg are moving along straight line towards each other at velocities of 4 m/s and 1 m/s respectively. If $e = 0.6$. Determine the velocities of particles immediately after their collision. Also find the loss of kinetic energy. **12**
- b) State the D'Alembert's principle. **4**
