

MODEL QUESTION

MANMOHAN TECHNICAL UNIVERSITY
OFFICE OF THE CONTROLLER OF EXAMINATIONS
2080, Asar

Level: Bachelor
Faculty: School of Engineering
Program: Electrical & Electronics
Subject: APPLIED MECHANICS (EG453ME)

Year/Part: I/I
F.M.: 50
P.M.: 20
Time: 3 Hours

Group A (Attempt ALL Questions:)

[10 × 1 = 10]

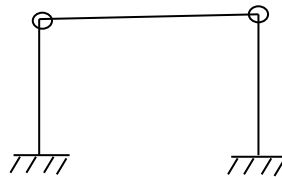
Instructions:

- Choose one answer out of four options.
- Use black ball pen for shading only one circle for correct option of a question in Answer Sheet which you have provided.
- No mark will be awarded for cutting, erasing, over writing and multiple circles shading

1. The following structure is (Figure-1)

- a. statically unstable b. geometrically unstable
c. internally unstable d. stable

Figure -1



2. Which of the following is carried by truss member?

- a. flexural
b. bending load
c. axial load
d. shear load

3. The centroid of a circle lies at

- a. the point where two diagonal intersect each other b. the centre
c. the point where three medians meet each other d. None of these

4. Which option is correct about the wheel of a car moving on the road?

- a. Rolling friction > Static friction > Kinetic friction
b. Static friction > Kinetic friction > Rolling friction
c. Static friction > Rolling friction > Kinetic friction
d. Rolling friction > Kinetic friction > Static friction

5. The number of members in a perfect frame having j number of joints is equal to

- a. $2j - 1$ b. $2j - 2$
c. $2j - 3$ d. $2j - 4$

6. The rate of change of momentum is equal to

- a. Applied force
b. Impulse
c. Pressure
d. Work

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7. Which of the following is a branch of mechanics?

- a. Statics and kinetics
- b. Statics and dynamics
- c. Kinematics and dynamics
- d. Kinematics and kinetics

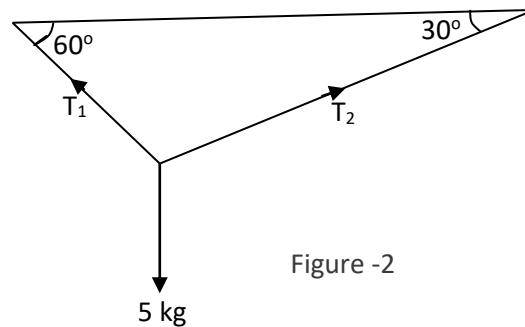
8. Centripetal force is responsible to

- a. keep the body moving along the circular path
- b. fly the object along a straight line
- c. independent motion of object in space
- d. production of wave in Ocean

9. Sweta is doing an experiment in a lab. She suspended 5 kg mass by strings making angles 60° and 30° with horizontal as shown in the following figure. Find the tensions T_1 and T_2 on the strings.

Take $g=10 \text{ m/s}^2$. (Figure-2)

- a. $T_1=25 \text{ N}$, $T_2=25\sqrt{3} \text{ N}$
- b. $T_1=25\sqrt{3} \text{ N}$, $T_2=25 \text{ N}$
- c. $T_1=25 \text{ N}$, $T_2=25 \text{ N}$
- d. $T_1=25\sqrt{3} \text{ N}$, $T_2=25\sqrt{3} \text{ N}$



10. A particle is moving with a constant velocity along a line parallel to positive x-axis. The magnitude of its angular momentum with respect to the origin is

- a. zero
- b. increases with X
- c. decreases with X
- d. remains constant

Group B (Attempt any eight questions)

[8*2=16]

1. What are the equations of Static Equilibrium for 2-D and 3-D analysis of particle and rigid body?
2. Explain how can we assure the condition of overturning or sliding a block.
3. Define rigid body. Explain the transmissibility of force and its limitation.
4. State and prove parallel axis theorem for moment of inertia.
5. Define radial and transverse component of velocity and acceleration.
6. Determine the member forces BC and DG for given truss. (Figure-3)

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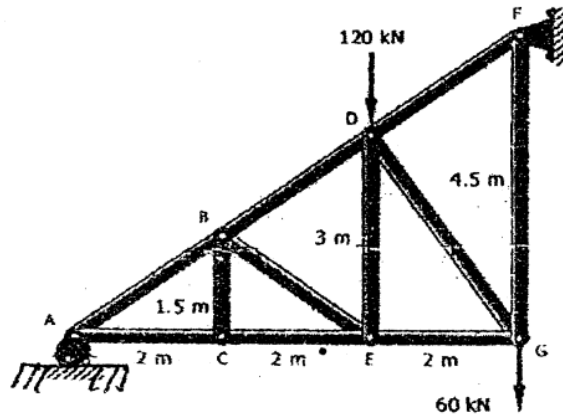


Figure -3

7. Define angle of friction, coefficient of friction. Why coefficient of static friction is greater than coefficient of kinetic friction.
8. Explain free body diagram and its importance.
9. Define the dynamic equilibrium and impulse momentum principle of particle.

Group C (Attempt all questions)

10. Three Guy wires are used to support system for a television transmission tower that is 600m tall (Figure-2). Wire A and B are tightened to a tension of 60kN, Where as wire C has only 30kN of tension. What is the moment of wire force about the base "O" of the tower? The Y-axis is collinear with AO. (Figure-4) [4]

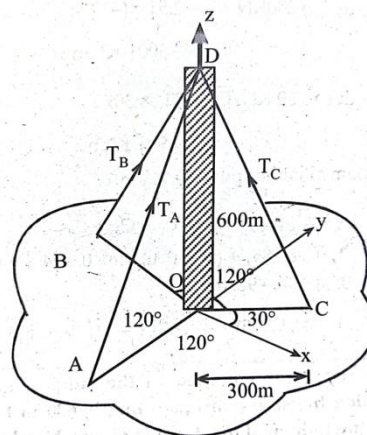


Figure-4

11. Determine the centroid of the hatched area by Direct Integration Method. (Figure-5) [4]

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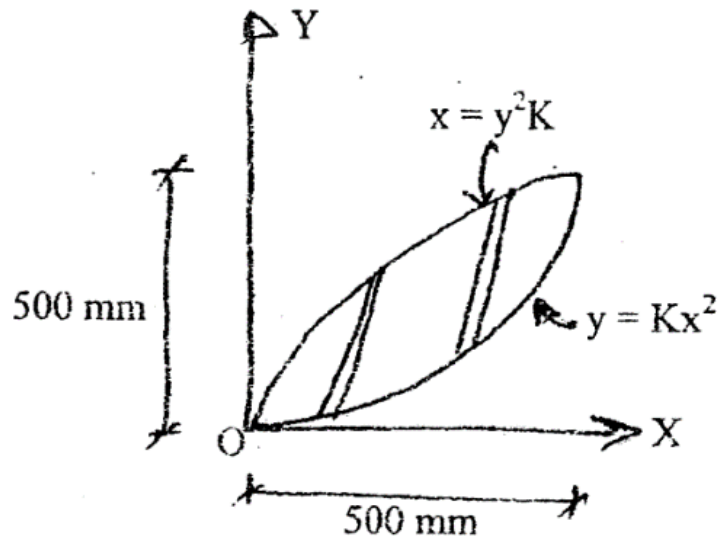


Figure-5

12. a. Draw the axial force, shear force and bending moment diagram of the given frame.
(Figure-6) [8]

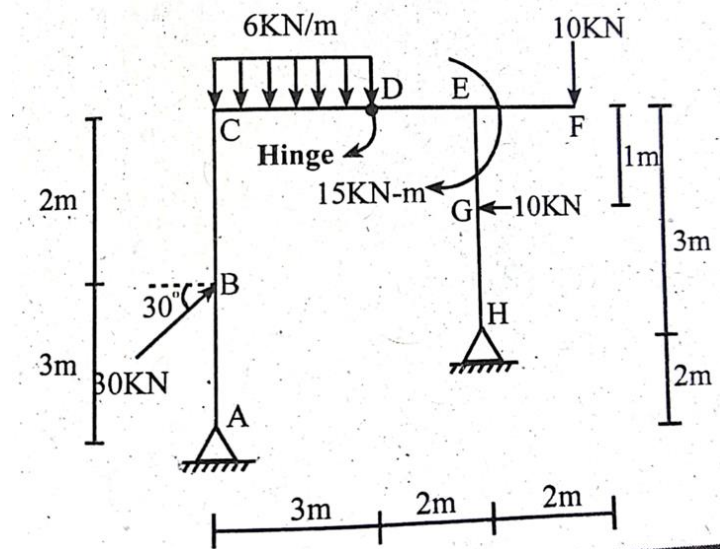


Figure-6

13. The acceleration of a particle is directly proportional to time. At $t=0$, the velocity of the particle $V=16\text{m/sec}$. Knowing that velocity $V=15\text{m/sec}$, position $(x)=20\text{m}$ and time $(t)=1\text{sec}$ determine the velocity, the position and total distance travelled when time $(t)=7\text{sec}$. [4]

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14. Two blocks as shown in figure starts from rest. The horizontal plane and pulley are friction less and the mass of pulley is negligible. Determine the acceleration of each block and the tension in each chord. (Figure-7) [4]

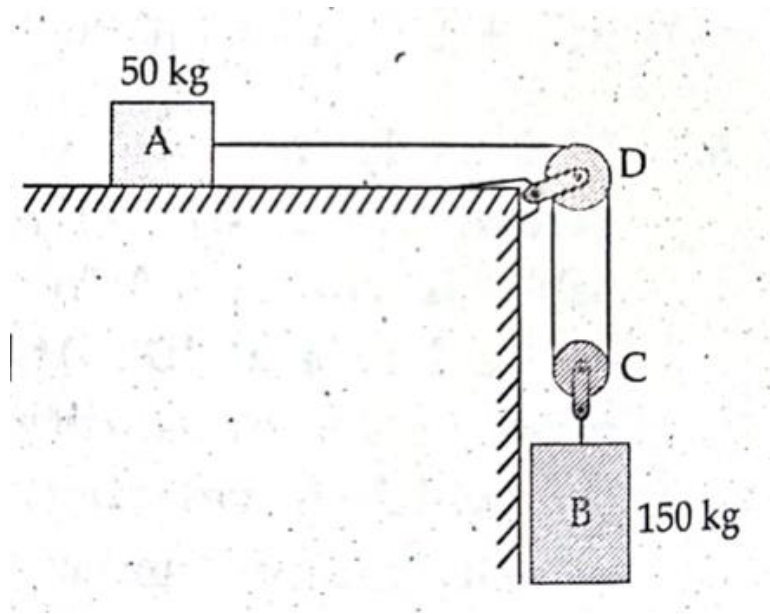


Figure-7

***** All the Best ***