

MODEL QUESTION

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

Level: Bachelor
Faculty: School of Engineering
Program: CIVIL
Subject: ENGINEERING MECHANICS I (EG452CE)

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) Which of the following is a branch of Mechanics?
a. Statics and Kinetics b. Statics and Dynamics c. Kinematics and Dynamics d. Kinetics & Kinematics
- 2) The center of mass of a system of particle does not depend upon
a. Position of Particle b. Relative distance between particles
c. Masses of particle d. force acting on particle
- 3) If $P > Q$ and P and Q are acting along a same straight line, but in opposite direction, the resultant is
a. $P+Q$ b. P/Q c. $P-Q$ d. Q/P
- 4) If no force is applied to a moving object, then it will stop due to.....
a. Tension b. Momentum c. Impulse d. Friction
- 5) DKI (Degree of Kinetic Indeterminacy) of given figure is (Fig:1)
a. 2 b. 6 c. 8 d. 9
- 6) If $m > 2j - r$, Where $m =$ no. of member, $j =$ no. of joint, $r =$ no. of reaction, then truss is
a. Perfect b. Deficient c. Redundant d. Super
- 7) The center of Gravity of Semicircular lamina of radius " r " lies on the central radius at a distance of from base of diameter
a. $r/(2\pi)$ b. $4r/(3\pi)$ c. $3r/(4\pi)$ d. $3r/(8)$
- 8) If we use link support in a structural system, then how many unknowns will we have?
a. 1 b. 2 c. 0 d. 4
- 9) If anybody is tied to three or more ropes, and then is allowed to achieve its equilibrium, then what will the equilibrium be achieved
a. The three axis of body b. The ground c. The rope direction d. The weight direction



Fig:-1

- 10) The moment at A is (Fig:-2)
a. 12 kN-m b. 9 kN-m c. 10 kN-m d. 6 kN-m

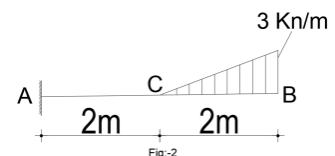


Fig:-2

MODEL QUESTION

Group B (Attempt any eight questions)

[8*2=16]

1. State and Prove Varignon's Theorem.
2. Explain High-tensioned friction grip bolts and its free body Diagram.
3. Define rigid body. Explain the transmissibility of force and its limitation.
4. State and prove parallel axis theorem for moment of inertia.
5. What are the equations of Static Equilibrium for 2-D and 3-d analysis of Particle and Rigid Body?
6. Differentiate between Mechanism and Structure with Sketch.
7. Explain about truss and its types.
8. Explain free body diagram and its importance.
9. Determine Degree of Kinematic Indeterminacy (DKI) of Given Figure-3

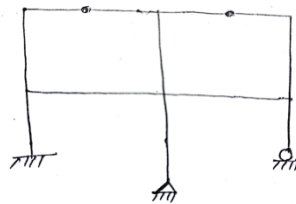


Figure-3

Group C (Attempt all questions)

10. Determine the resultant force and Moment about point O (Figure-4)

[4]

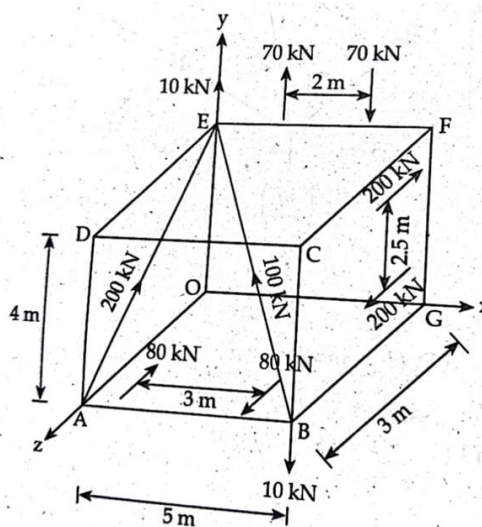


Figure-4

MODEL QUESTION

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

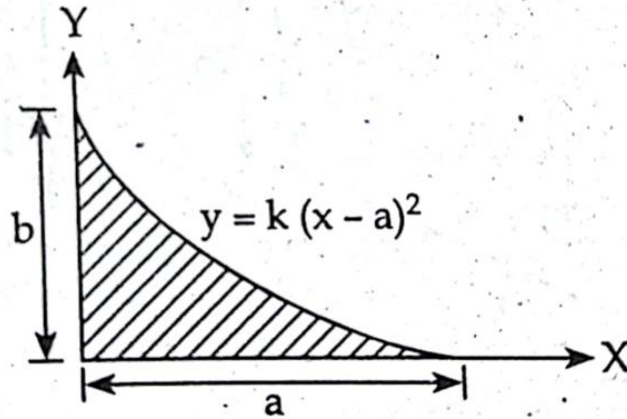


Figure-5

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

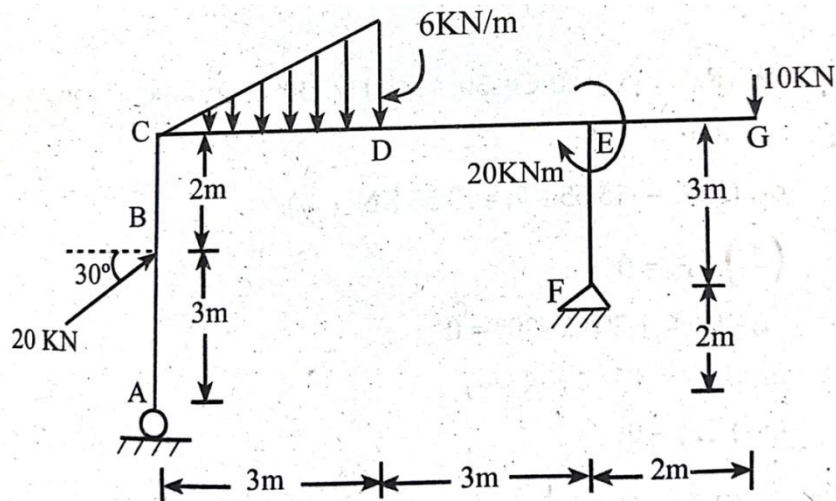


Figure-6

MODEL QUESTION

13. Determine force developed in member force of given truss (Figure-7)

[4]

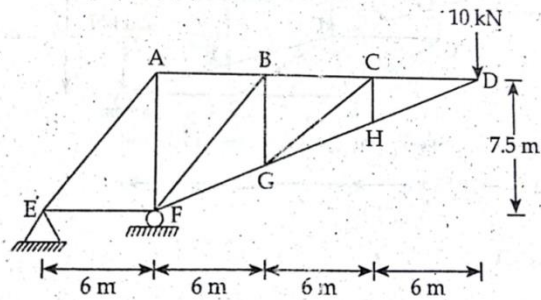


Figure-7

14. Determine the Magnitude, direction and position of resultant force . (Figure-8)

[4]

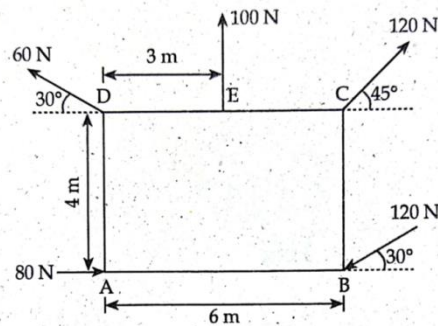


Figure-8

Or

A ladder shown in figure-9 is 4 m long and is supported by a horizontal floor and a vertical wall, the coefficient of friction at wall is 0.3 and floor is 0.45. The weight of ladder is 300N . The ladder supports a vertical load 1000N at c. Determine the reaction at A and B and Compute the least values of θ at which ladder may be placed without slipping to right. [4]

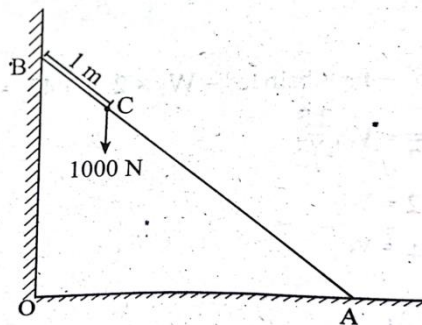


Figure-9

***** All the Best ***