

Roll No.....
Total No. of Questions: [09]

Total No. of Printed Pages: [2]

B. Tech. (ECE) (Semester – 4th)
ENGINEERING MECHANICS
Subject Code: BMECE0001
Paper ID: [18111318]

Time: 03 Hours

Maximum Marks: 60

Instruction for candidates:

1. Section A is compulsory. It consists of 10 parts of two marks each.
2. Section B consist of 5 questions of 5 marks each. The student has to attempt any 4 questions out of it.
3. Section C consist of 3 questions of 10 marks each. The student has to attempt any 2 questions.

Section – A

(2 marks each)

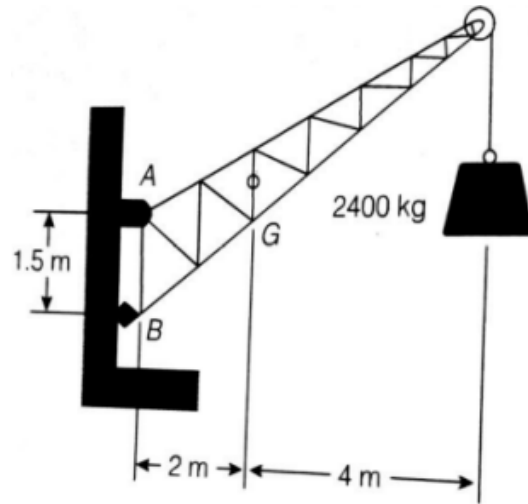
Q1. Attempt the following:

- a) What is free body diagram?
- b) Define rigid body.
- c) Define collinear and concurrent forces.
- d) State the lami's theorem.
- e) Define coulomb's laws of dry friction.
- f) What are the necessary and sufficient conditions of equilibrium of rigid bodies in two dimensions and in three dimensions?
- g) List out the different types of friction. What is coefficient of static friction Enlist the factors affecting working performance in an organization.
- h) Define principle moment of inertia.
- i) State D' Alembert's principal?
- j) What is dynamic equilibrium?

Section – B

(5 marks each)

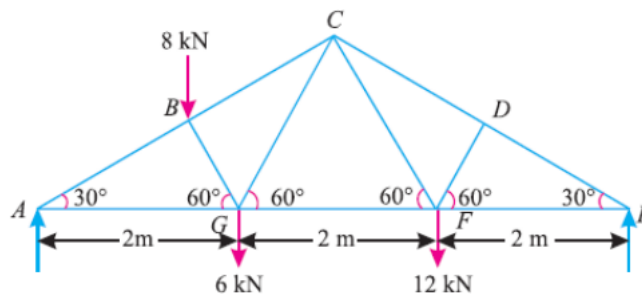
- Q2. State and prove perpendicular axis theorem for area moment of inertia.
- Q3. A block of mass 8 kg is dragged up an inclined plane by a rope inclined at 15° to the plane while the plane is inclined at 30° to the horizontal. Find the velocity of the block after 4 seconds if dragged from rest. Take the coefficient of kinetic friction between the block and the plane as 0.2. Also assume that a force of 100 N is applied through the rope for dragging the block upwards the plane.
- Q4. A simply supported beam of span 5m is loaded with a concentrated load of 4kN at a distance of 1m from right end. The beam is also loaded with a uniformly distributed load of 2kN/m length over a distance of 2m from the left end of the beam. Find the reactions at the supports of the beam using principle of virtual work.
- Q5. Write short note on differential screw jack with neat sketch.
- Q6. A Fixed crane shown in Fig. has a mass of 1000kg and it is used to lift a 2400 kg weight. It is held in a place by a pin at A and a rocker at B. The centre of gravity of the crane is located at G. Determine the components of the reactions at A and B.



Section – C

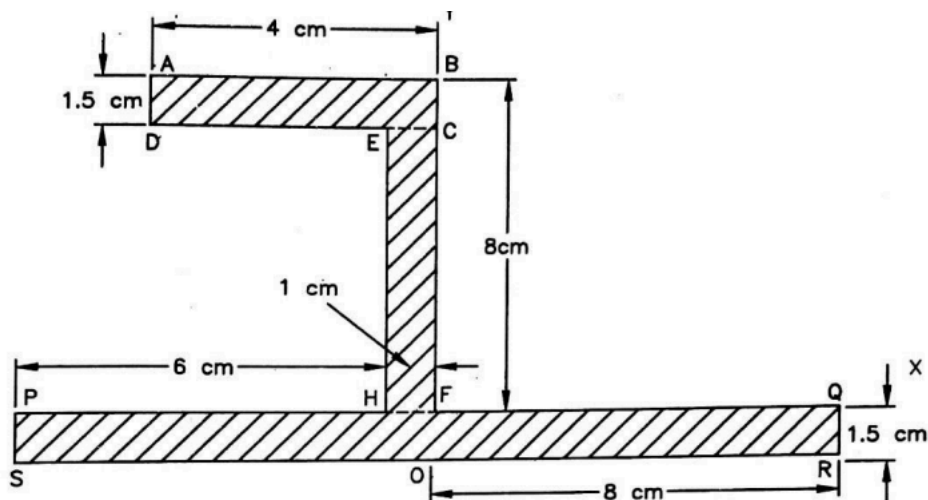
(10 marks each)

Q7. Analyze the members of an inclined truss loaded as shown in fig.



Determine the nature and magnitude of the forces in the members BC, GC and GF of the truss.

Q8. Find the center of gravity of the shaded area shown in below Fig. with reference to X-Y co-ordinate system



Q9. a) Distinguish kinematics & kinetics.
b) Drive expression of the angular momentum of a system of point.