



B.Tech I Year I Semester Supplementary Examinations, April 2023
Engineering Mechanics

(Common to CE,EEE,ME,ECE,CSE & IT)

Maximum Marks: 70

Date:15.04.2023 Duration: 3 hours

- Note:**
- 1.This question paper contains two parts A and B.
 2. Part A is compulsory which carries 20 marks. Answer all questions in Part A.
 3. Part B consists of 5 Units. Answer any one full question from each unit.
 4. Each question carries 10 marks and may have a, b, c, d as sub questions.

Part-A

All the following questions carry equal marks

(10x2M=20 Marks)

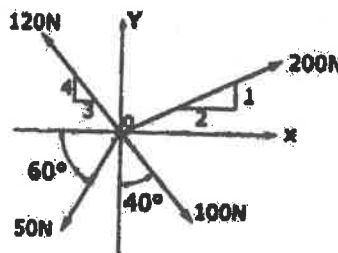
- 1 What is law of transmissibility?
- 2 Find the moment about x, y, z axes for the vector $F = (20i + 30j + 50k)$ kN.
- 3 State the laws of dry friction.
- 4 Compare centroid and center of gravity.
- 5 Define polar moment of inertia.
- 6 Indicate the radius of gyration of a body in terms of its mass moment of inertia.
- 7 State the work-energy principle used in dynamics.
- 8 Define Kinetics.
- 9 Give a few examples for simple harmonic motion.
- 10 Where do you apply the concept of virtual work?

Part-B

Answer All the following questions.

(5x10M=50Marks)

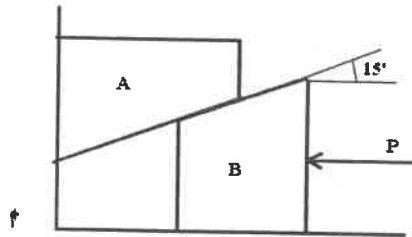
- 11 A system of four forces acting on a body is shown in figure below. Determine the resultant force and its direction. [10M]



OR

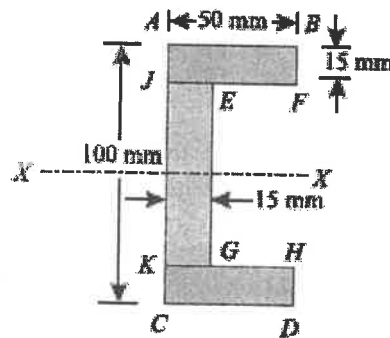
- 12 Explain the Lami's theorem and system of forces. [10M]

- 13 Block A weighing 1500 N is to be raised by means of 15° wedge shown in figure. Assume coefficient of friction between all contact surfaces as 0.2. Weight of the block B is 500 N. Determine the minimum force required to move the block A upwards. [10M]

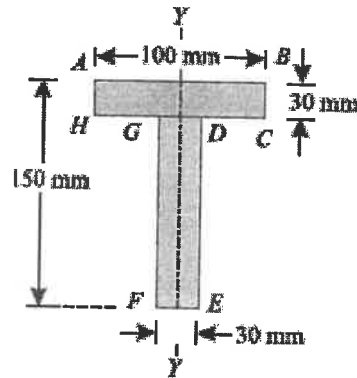


OR

- 14 Find the centroid of channel section shown in figure (dimension- 100 mm × 50 mm × 15 mm). [10M]



- 15 Find the moment of inertia for given T-section with dimension: 100 mm × 150 mm × 30 mm.



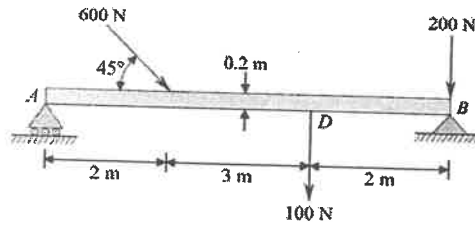
OR

- 16 Derive the expression for moment of inertia of a semicircular section. [10M]
- 17 a) Determine a centroid for triangular lamina, having a base 'b' and height 'h'. [5M]
 b) A steel cylinder of diameter 200mm and height of 300 mm rests centrally over a concrete rectangle of 1000X800X600 mm size. Determine the center of gravity of the system, taking weight of concrete 28500 N/m² and that of steel 81000 N/m². [5M]

OR
18 Explain the work energy theorem with examples. [10M]

19 a) What is the energy of motion for a rigid body rotating about a fixed axis. [5M]
b) With respect to the plane motion of rigid bodies, explain 1) Instantaneous center of rotation and 2) centroid. [5M]

OR
20 Using the method of Virtual work, find the support reactions for the beam AB loaded as



shown in figure. [10M]

