Roll No. _____

3073

B. Tech. 3rd Semester (M. E.)
Examination – December, 2022

ENGINEERING MECHANICS

Paper : ESC-ME-209-G

Time : Three Hours]   *[Maximum Marks : 75*

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt *free* questions in all, selecting *one* question from each Unit. Question No. 1 is **compulsory**. All questions carry equal marks.

1. (i) State the Varignon's principle of moments.

    (ii) State and prove parallelogram law of forces.

    (iii) Obtain, an equation for the trajectory of a projectile and show that it is a parabola.

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9. A beam AB 6 m long rests on two supports 4 m apart, the right hand end is overhanging by 2 m. The beam carries a uniformly distributed load of 1 kN/m over the entire length of the beam. Draw shear force and bending moment diagrams.   15

(iv) Product of inertia.

(v) Parallel axis theorem.

(vi) Assumptions in truss analysis. $2.5 \times 6 = 15$

UNIT – I

2. What are different methods of studying the equilibrium of coplaner forces ? Describe all of them. **15**

3. A smooth circular cylinder of radius 1.5 meter is lying in a triangular groove, one side of which makes 15° angle and the other 40° angle with the horizontal. Find the reactions at the surfaces of contact, if there is no friction and the cylinder weights 100 N. **15**

UNIT – II

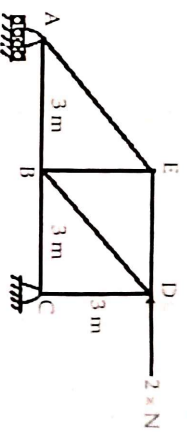**4.** Determine mathematically the position of centre of gravity of an I-section has the following dimensions in mm units :

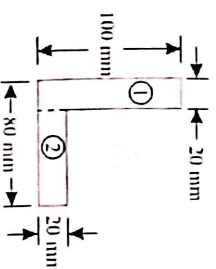Bottom flange = 300 × 100

Top flange = 150 × 50

Web = 300 × 50

15

5. Calculate the force in each member of loaded truss. **15**

UNIT – III

6. Find the moment of inertia about the centroidal X-X and Y-Y axes of the angle section shown in figure. **15**

7. Explain the concept of rigid body. Derive the equations of motion for translation and rotation for a rigid body. **15**

UNIT – IV

8. Find out (a) time of flight (b) range of a projectile, when projected upwards on an inclined plane ? **15**