Roll No. .....

OLE-24048

B. Tech. 3rd Semester (MAE) Examination – April, 2021

ENGINEERING MECHANICS

Paper : ME-205-F

Time : Three Hours] ***[Maximum Marks : 100***

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 ***five*** questions in total selecting at least ***one*** question from each Section. Question No. **1** is ***compulsory***. All questions carry equal marks.

1. (a) Explain Lami's theorem.

(b) Define linear and angular momentum equations.

(c) State work-energy equation.

(d) Describe the phenomenon of combined motion of rotation and translation. Give a few examples.

(e) Define different general equations of equilibrium.

(f) Explain point of inflection with diagram.

(g) Derive a relation for the distance travelled by a body in the nth second.

(h) Explain assumptions made in truss analysis.

(i) What are the various types of loading ?

(j) Distinguish clearly between uniformly distributed load, uniformly varying load and triangular load.

$2 \times 10 = 20$

SECTION – A

2. (a) A square ABCD has forces acting along its sides as shown in fig. 1. Find the values of P and Q, if the system reduces to a couple. Also find the magnitude of the couple, if the side of the square is 1 m.

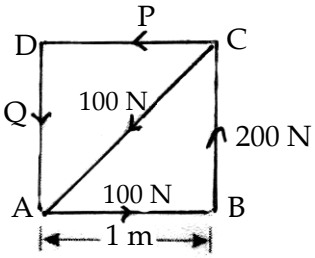

Fig. 1 10

(b) A uniform plank ABC of weight 30 N and 2 m long is supported at one end A and at a point B 1.4 m from A as shown in fig. 2. Find the maximum weight W, that can be placed at C so that the plank does not topple. 10

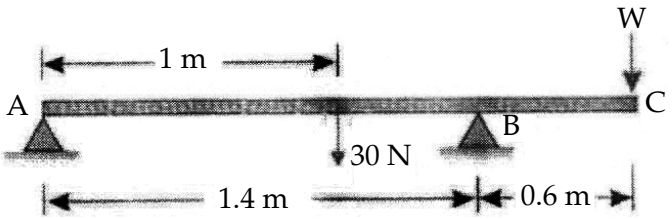

Fig. 2

3. A string ABCD, attached to fixed points A and D has two equal weights of 1000 N attached to it at B and C. The weights rest with the portions AB and CD inclined at angles as shown in fig. 3. Find the tensions in the

portions AB, BC and CD of the string, if the inclination of the portion BC with the vertical is 120°. 20

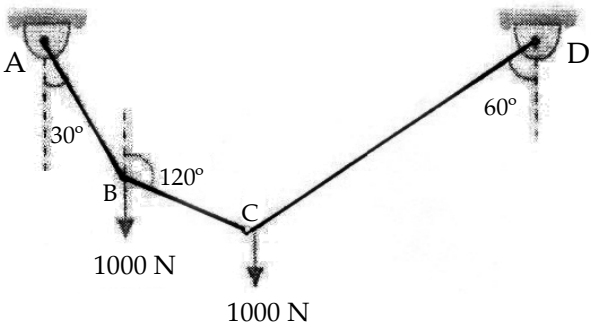

Fig. 3

SECTION – B

4. (a) Explain different types of truss with diagram. 10

(b) Explain method of sections for analysis of truss. 10

5. Find the center of gravity of the channel section shown in fig. 4. 20

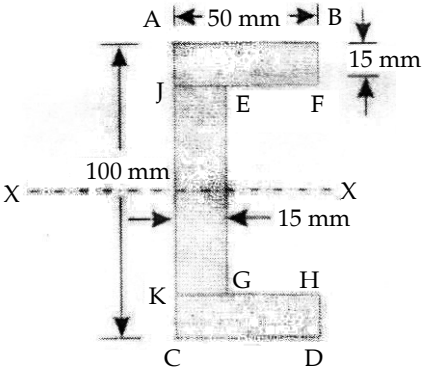

Fig. 4

SECTION – C

6. Determine the moment of inertia of a L section as shown in fig 5 about the horizontal and vertical axis passing through the centre of gravity of the section. 20

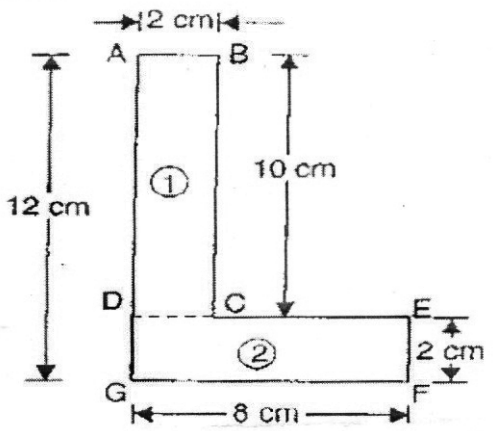

Fig. 5

7. (a) A car takes 10 seconds to cover 30 meters and 12 seconds to cover 42 meters. Find the uniform acceleration of the car and its velocity at the end of 15 seconds. 10

(b) A railway coach having ordinary cross seats, is it traveling at 4m/s. A person at 5m/s on the platform. In what direction he must run so that he may enter the railway coach parallel to the seeds and find the velocity with which he enters the coach. 10

SECTION – D

8. A simply supported beam of length 10m carries the uniformly distributed load and two point loads as shown in fig 6. Draw the shear force and bending moment diagram for the beam. Also calculate the maximum bending moment. 20

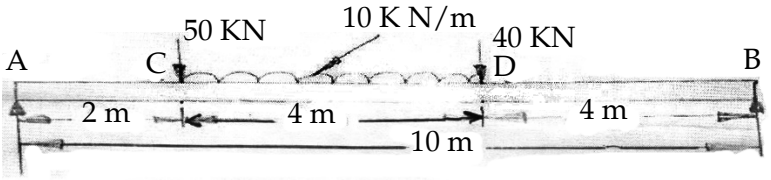

Fig. 6

9. (a) Explain and derive the work energy equation for a rigid body in detail. 10

(b) Derive linear and angular momentum. 10