

9. A simply supported beam of length 5m carries a uniformly increasing load of 800N/M run at one end to 1600N/m run at the other end. Draw the S.F. and B.M. diagram for the beam. Also calculate the position & magnitude of maximum bending. 20

Roll No.

24048

**B. Tech. 3rd Semester (MAE)
Examination – February, 2022**

ENGG. 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 : Question No. 1 is compulsory. Attempt one question from each section. All questions carry equal marks.

1. (a) Define free body diagram. 3
- (b) Explain Varignon's principle of moment. 3
- (c) What is Equilibrium ? Explain conditions of Equilibrium and its types. 3
- (d) Write the position of C.O.G. of a semi-circle having radius r from its base. 3
- (e) Define parallel axis theorem. 3

- (f) Define point of Contraflexure. 2
(g) Write the Grubler's equation for a perfect frame. 3

SECTION - A

2. Two forces equal to P and $2P$ respectively act on a particle. When the first force is increased by 120 N and the second is doubled, the direction of the resultant remains the same. Determine the value of force P . 20
3. Forces of $20, 30, 40, 50, 60$ and 70 N act along the side $AB, CB, CD, EF,$ and FA respectively of a angular hexagon $ABCDEF$ whose side measure 10 cm . Make the calculations for the algebraic sum of moments of the forces about the centre of hexagon and one of the vertices. 20

SECTION - B

4. A triangular plate in the form of an isosceles triangle ABC has the base $BC=10\text{ cm}$ and altitude= 12 cm . From this plate, a portion in the shape of an isosceles triangle OBC is removed. If O is the midpoint of the altitude of triangle ABC , then determine the distance of CG of the reminder section from the base 20

24048- (P-4)(Q-9)(22) (2)

5. Explain the steps involved while making an analysis of a simple truss by the method of joint and method of section. Explain with the help of suitable example of truss. 20

SECTION - C

6. (a) State and prove the theorem of parallel axis and perpendicular axis. 10
(b) Derive an expression for the moment of inertia of a quadrant of a Circular plate of radius R . 10
7. A train weighing 5000 kN starts from rest and accelerates uniform to 75 km/hr in 40 seconds. If the frictional resistance is estimates to 3 kN per 1000 kN of the weight of Trains, work out the maximum power required and the power required to maintain the speed of 75 km/hr . 20

SECTION - D

8. A Flywheel of 1200 kg and 0.9 m radius of gyration is rotating at 190 rev/min . Determine its (a) kinematic energy (b) torque and average power-required to give the wheel speed of 180 rev/min in 75 revolutions. 20

24048- (P-4)(Q-9)(22) (3)

P. T. O.