2106220127

DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/MANAGEMENT/ COMMERCIAL PRACTICE, APRIL - 2024

ENGINEERING MECHANICS

[Maximum marks: 75]   [Time: 3 Hours]

PART A

I. Answer all the following questions in one word or one sentence. Each question carries 1 mark
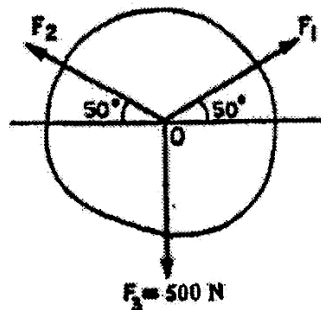
(9 x 1 = 9 Marks)

		Module outcome	Cognitive level
1	A quantity which is completely specified by magnitude and direction is known as ………….	M1.01	R
2	A single force which can replace a number of forces acting on a rigid body, without causing any change in the external effects on the body, is known as ………….	M1.03	R
3	The equations of equilibrium which can be applied to the beams and frames for calculating the reactions at the supports are ………..	M2.02	U
4	When the forces in only a few members of a truss are to be determined then the method used is …………..	M2.04	U
5	The point, at which the total area of a plane figure is assumed to be concentrated, is known as ……………	M3.01	R
6	The position of centroid of a semi-circular lamina from the base is …………	M3.01	R
7	A body which does not deform when subjected to external forces is a ………	M4.01	R
8	The strain at right angles to the direction of applied load is known as ……….	M4.05	R
9	State Hooke's law.	M4.02	R

PART B

II. Answer any eight questions from the following. Each question carries 3 marks.

(8 x 3 = 24 Marks)

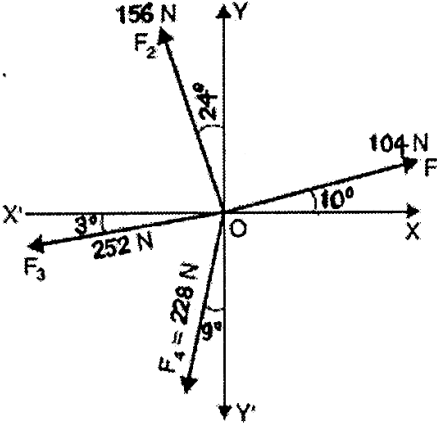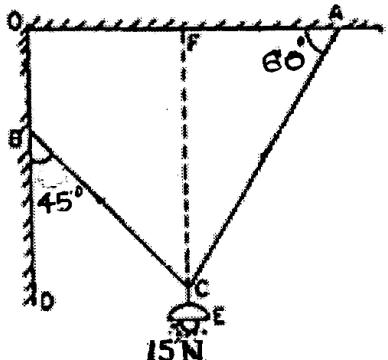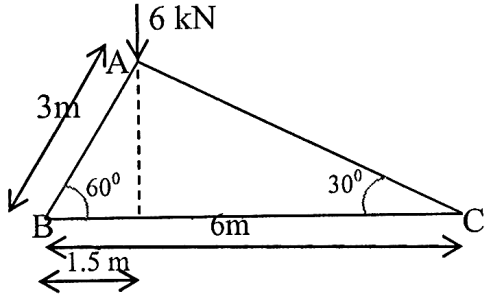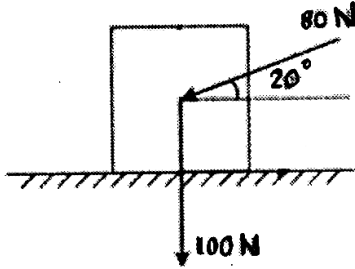|		Module outcome	Cognitive level
1	State the principle of transmissibility of forces.	M1.01	U
2	Determine the magnitude of two equal forces acting at a point with an angle 60° between them, if the resultant is $30\sqrt{3}$N.	M1.03	U
3	Three forces F_1, F_2 and F_3 are acting on a body as shown in figure and the body is in equilibrium. Determine the magnitude of forces F_1 and F_2 by applying Lami's theorem, if $F_3 = 500$N	M1.05	U
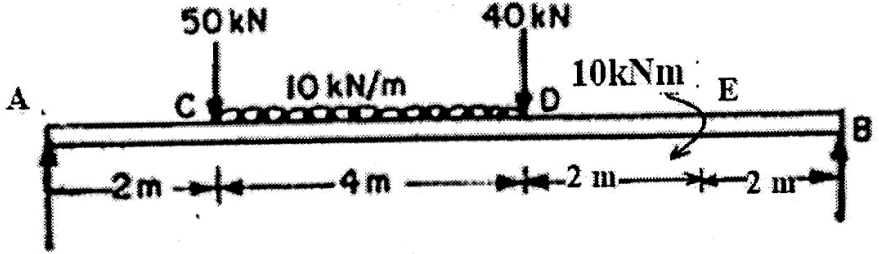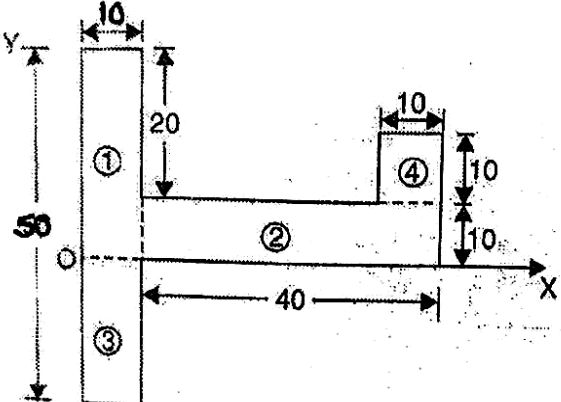
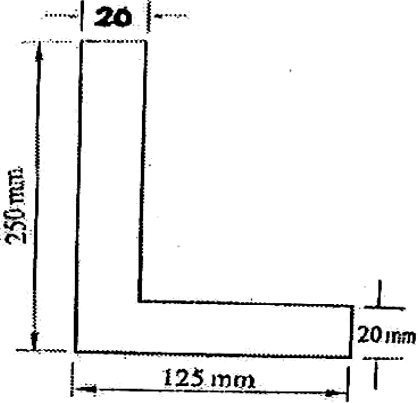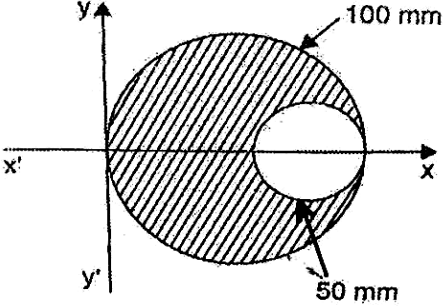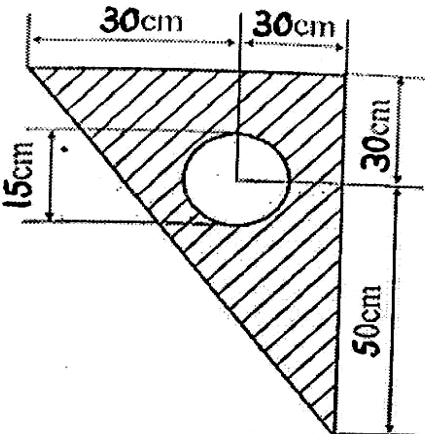| 4	List the assumptions made while finding out the forces in the members of a truss.	M2.03	R
5	A body of weight 500 N is placed on a rough horizontal plane. If the coefficient of friction between the body and the plane is 0.3, determine the horizontal force required to just slide the body on the plane.	M2.05	U

6	Illustrate the centre of gravity of the following.
	    (i) Cone
	    (ii) Trapezoidal section
		M3.01	R

7	State perpendicular axis theorem.	M3.04	R

8	Draw the stress strain curve of mild steel and define the following terms.
	    (i) Elastic limit
	    (ii) Ultimate stress
		M4.02	R

9	Define bulk modulus. Write the relationship between elastic modulus and bulk modulus.	M4.05	R
10	Determine the value of Poisson's ratio of a metallic bar of length 30cm, breadth 4cm and depth 4cm when the bar is subjected to an axial compressive load. The decrease in length is given as 0.075cm and increase in breadth is 0.003cm.	M4.05	U

PART C
Answer all questions. Each question carries seven marks

(6 x 7 = 42 Marks)

		Module outcome	Cognitive level
III	The four coplanar forces are acting at a point as shown in figure. Determine their resultant in magnitude and direction. 	M1.03	U
	OR		
IV	An electric light fixture of weight 15 N hangs from point C by two strings AC and BC as shown in figure. Determine the forces in the strings AC and BC. 	M1.05	U

V	The truss ABC shown in figure has a span of 6 meters. It is carrying a load of 6kN. Find the forces in the members AB, AC and BC	M2.03	A

OR

VI	A body of weight 100 N is placed on a rough horizontal plane. To just move the body on the plane, a horizontal pull of 80N inclined at 20° to the horizontal plane is required. Determine the coefficient of friction.	M2.05	U

VII	Determine the reactions at supports of the beam shown below.	M2.02	U

OR

VIII	Outline the method of sections used for determining member forces of truss.	M2.04	U
IX	Determine the center of gravity of the section shown below with respect to the coordinate axes. All dimensions are in mm.	M3.02	A

3

X	**OR** Determine the moment of inertia of the section shown below. 	M3.04	A
XI	From a circular plate of diameter 100mm, a circular part of diameter 50mm is cut as shown. Find the centroid of the remainder. 	M3.02	A
XII	**OR** Determine the moment of inertia of the shaded area shown below about centroidal axes. 	M3.04	A
XIII	Determine the modulus of elasticity of a brass rod of diameter 25mm and length 250mm which is subjected to a tensile load of 50 kN when the extension of the rod is 0.3mm.	M4.05	U
XIV	**OR** Determine the value of Young's modulus and Poisson's ratio of a metallic bar of length 30cm, breadth 4cm and depth 4cm when the bar is subjected to an axial compressive load of 400 kN. The decrease in length is given as 0.075cm and increase in breadth is 0.003 cm.	M4.05 M4.03	U

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