Code No: R201203

R20

SET - 1

I B. Tech II Semester Supplementary Examinations, March- 2022
ENGINEERING MECHANICS
(Only for CE))

Time: 3 hours Max. Marks: 70

Answer any five Questions one Question from Each Unit
All Questions Carry Equal Marks

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UNIT-I

1 A bar AB hinged to the foundation at A and supported by a strut CD is subjected to a horizontal 50 kN load at B, as shown in Figure. Determine the nature and magnitude of the force in the strut and also the reaction at A. (14M)

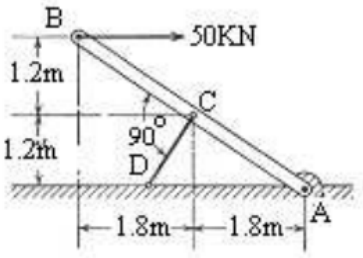

Figure:

Or

2 a) What is a couple? Explain with neat diagram. (4M)

b) Determine the resultant of the four forces and one couple that act on the plate as shown in the figure. (10M)

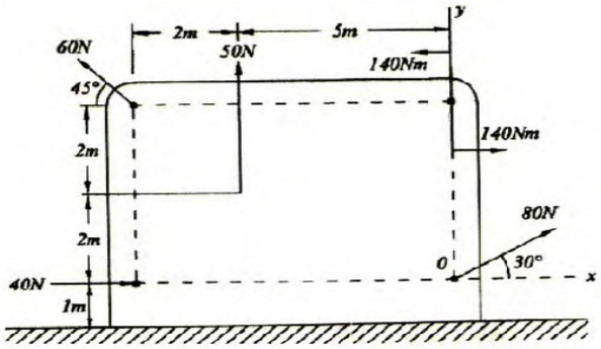

Figure:

UNIT-II

3 **A load of 60kN is to be resisted by means of a shear leg arrangement as shown in Figure . Determine forces in legs AB, AC and rope AD.** (14M)

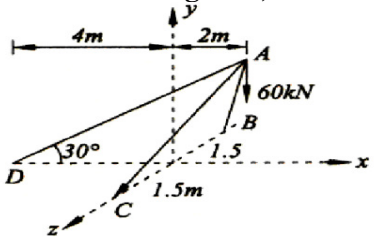

Figure:

|'''|'|'|''|''||'|||
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Or

4 Three bars lying in one plane hinged at their ends are shown in figure. They are subjected to force P and Q applied at B and C. If P = 100 N, determine the value of force a necessary to keep the system of bars in equilibrium. (14M)

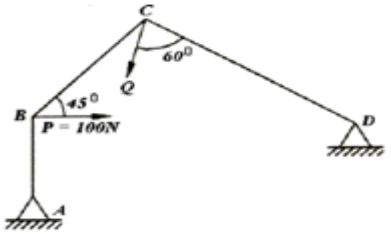


Figure:

UNIT-III

5 a) Determine the centroid of the parabolic spandrel as shown in figure. (10M)

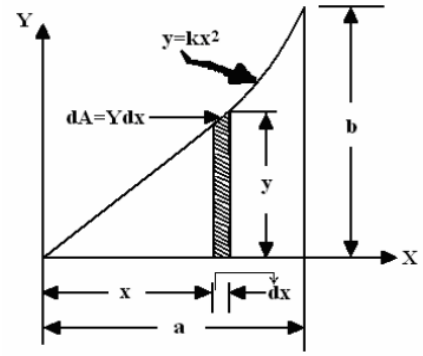
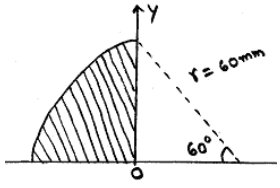


Figure:

b) Explain dynamic friction with examples. (4M)

Or

6 a) Determine the centroid of the shaded area, which is bounded by straight lines and a circular arc as shown in Figure . (7M)



Figure

b) From first principles deduce an expression to determine the centroid of a triangle of base ‘b’ and height ‘h’. (7M)

UNIT-IV

7 a) Derive the expression for the moment of inertia of a homogeneous sphere of radius ‘r’ and mass density ‘w’ with reference to its diameter. (7M)

b) Define mass moment of inertia and explain Transfer formula for mass moments of inertia. (7M)

Or

8 a) From the first principles determine product of inertia for right angle triangle of base 'b' and altitude 'h'. (7M)

b) Prove that the mass moment of inertia of a right circular cone of base radius R and height h, with respect to a diameter of the base is M $(3R^2 + 2h^2)/20$ where M is the mass of the cone. (7M)

UNIT-V

9 By using impulse – momentum method, determine the velocity of blocks shown in figure, after 10 seconds if the blocks are starting from rest. (14M)

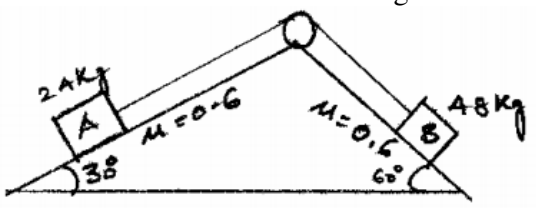


Figure:

Or

10 a) A right circular cylinder of radius 'r' and weight 'W' is suspended by a cord that is wound around its surface as sown in figure. If the cylinder is allowed to fall, prove that the centre of gravity 'C' will follow a vertical rectilinear path and find the acceleration 'a_c' along this path. Determine also the tensile force 'S' in the cord. (8M)

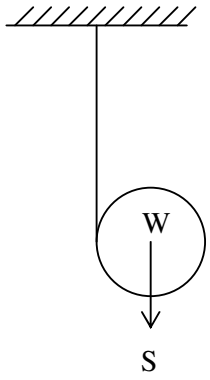


Figure:

b) Analyze principle of work energy and impulse momentum methods with examples? (6M)