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JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -2 EXAMINATION- OCT- 2018

B.Tech 8TH Sem

COURSE CODE: Solid Mechanics in Structural Engineering MAX. MARKS: 25

COURSE NAME: 12M1WCE211

COURSE CREDITS: 3 MAX. TIME: 1.5HRS

Note: All questions are compulsory. Carrying of mobile phone during examinations will be treated as case of unfair means.

Q1. For a circular rod subjected to a torque as shown in Fig 1. The displacement components at any point (x y z) are obtained as [7,CO2]

$U_x = -\tau yz + ay + bz + c$ $U_y = -\tau xz + -ax + ez + f$ $U_z = -bx - ey + k$

Where a, b,c,e,f and k are constants and τ is the shear stress

i) Select the constants a,b,c,e,f and k such that the end section z= 0 is fixed in the following manner:

a) Point O has no displacement

b) The element Δz of the axis rotates neither in the plane xoz nor in the plane yoz

c) The element Δy of the axis does not rotate in the plane xoy

ii) Determine the strain components

iii) Verify whether these strain components satisfy the compatibility conditions

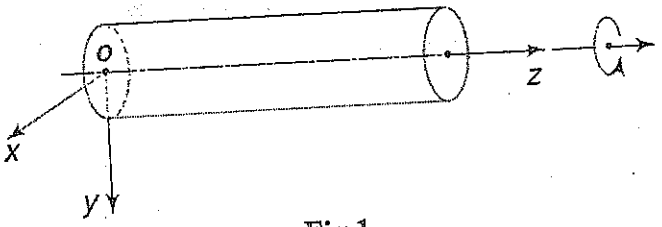

Fig.1

Q2. The framework shown in Fig.2 contains a redundant bar. All the members are of the same section and material. Determine the force in the horizontal redundant member. [7,CO2]

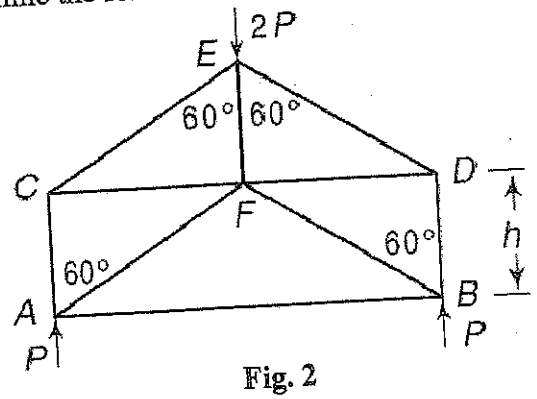

Fig. 2

Q3. Discuss 2nd theorem of Castigliano. [4,CO2]

Q4. Determine the diameter d of a circular shaft subjected to a bending moment M and a torque T, according to the several theories of failure. Use a factor of safety N. [7, CO3]