BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(END SEMESTER EXAMINATION)

CLASS: BTECH **SEMESTER : III**
BRANCH: CIVIL **SESSION : MO/19**

SUBJECT: CE201 SOLID MECHANICS

TIME: 3 HOURS **FULL MARKS: 50**

INSTRUCTIONS:
1. The question paper contains 5 questions each of 10 marks and total 50 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
***4*. Before attempting the question paper, be sure that you have got the correct question paper.**
5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.

Q.1(a) Draw Engineering stress strain curve for mild steel in tension and show the important points in the plot. [5]

Q.1(b) A wire of radius 0.5 mm and length 3m is stretched by a force of 49N. if the longitudinal strain is 0.0002970. The stress applied is within the limit of proportionality and the stress strain relationship is linear. By the same material if we make a cube for which the poisson's ratio is given as 0.286, Determine Bulk Modulus. [5]

Q.2(a) Draw the Shear Force Diagram and Bending Moment Diagram for the simply supported beam shown in Fig:01. Also mention the location for maximum Shear Force and maximum Bending Moment mentioning their values. [10]

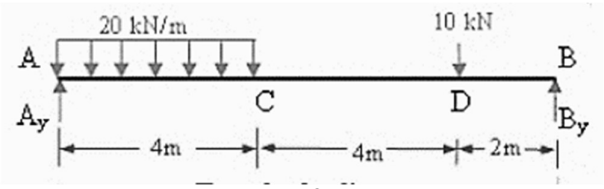

Fig:01

Q.3(a) A solid 4m long steel shaft with circular cross section is stressed with 100 Mpa and twisted through 5 Degrees. If the modulus of rigidity is 100GPA. Determine the following: [10]
(i) Radius of Shaft (ii) Torsional Stiffness (iii) Strength of Shaft

Q.4(a) For a 3 Dimensional body under equilibrium in a 3-d Cartesian co-ordinate system, Derive the general Strain to Stress relationship for general 3 dimensional loading in Matrix form. [5]

Q.4(b) For the following figure (Fig:02), determine the location(s) with maximum Shear Stress component(s) within the body. [5]

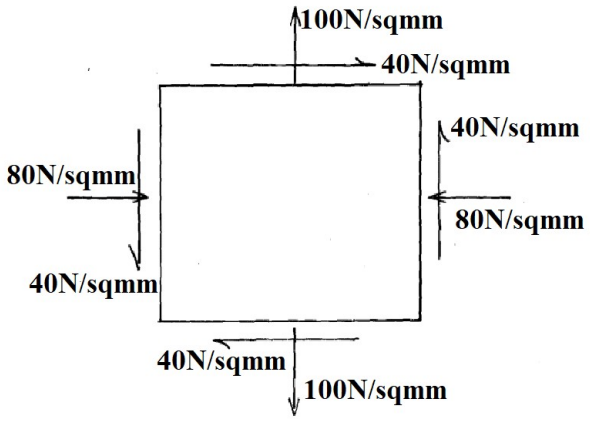

Fig:02

Q.5(a) A 4m long rectangular column of cross section 200mm x 50mm having Young's modulus 200000 N/sqmm is having a fixed support at the lower end and another end is kept free. If we only change the cross section to circular, keeping the cross sectional area same with same length and same support conditions using the same material, what would be the percentage change in Euler's Buckling load? [10]

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