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**SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR**  
(AUTONOMOUS)

**B.Tech II Year II Semester Supplementary Examinations July-2021**

**STRENGTH OF MATERIALS-II**

(Civil Engineering)

Time: 3 hours

Max. Marks: 60

(Answer all Five Units 5 x 12 = 60 Marks)

**UNIT-I**

- 1 The principle tensile stresses at a point across two perpendicular planes are 80 N/mm<sup>2</sup> and 40 N/mm<sup>2</sup>. Find 12M
- i) The normal and shear stress and the resultant stress and its obliquity on a plane at 20° with the major principal plane.
- ii) The intensity of stress which acting alone can produce the same maximum strain. Take Poisson's ratio=0.25.

**OR**

- 2 a Explain maximum strain energy theory. 6M
- b Explain maximum principal strain theory 6M

**UNIT-II**

- 3 Derive an expression for wire winding of thin cylinder 12M

**OR**

- 4 A thick spherical shell of 200 mm internal diameter is subjected to an internal fluid pressure of 7 N/mm<sup>2</sup>. If the permissible tensile stress in the shell material is 8 N/mm<sup>2</sup>, find thickness of the shell. 12M

**UNIT-III**

- 5 A masonry dam of rectangular section, 20 m high and 10 m wide, has water upto a height of 16 m on its one side finds: 12M
- i) Pressure force due to water on one meter length of the dam
- ii) Position of centre of pressure
- iii) The position at which the resultant cuts the base and
- iv) Maximum and minimum intensities at the base of the dam. Take weight density of masonry is 19.62 kN/m<sup>3</sup> and of water 9.81 kN/m<sup>3</sup>

**OR**

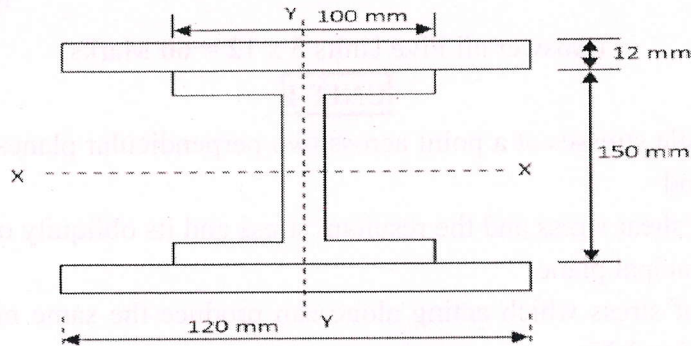
- 6 a Derive expression for maximum bending stress and central deflection for laminated spring. 6M
- b A leaf spring carries a central load of 3000 N. The leaf spring is to be made of 10 steel plates 5 cm width and 6 mm thick. If the bending stress is limited to 150 N/mm<sup>2</sup> determine length of the spring and deflection at centre of the spring. Take  $E = 2 \times 10^5$  N/mm<sup>2</sup>. 6M

**UNIT-IV**

- 7 Drive the equation for the Euler's crippling load for a both ends are fixed. 12M

OR

- 8 A Built-Up column consisting of 150 mm × 100 mm R.S.J with 20 mm × 12 mm riveted in each plane as shown in figure given below. Calculate the safe load of the column carry of 4 m long having one end fixed and the other hinged with a factor of safety 3.5. Take the properties of the joist: area = 2167 mm<sup>2</sup>, I<sub>XX</sub> = 8.39 × 10<sup>6</sup> mm<sup>4</sup>, I<sub>YY</sub> = 0.945 × 10<sup>6</sup> mm<sup>4</sup>. Assume the yield stress as 315 MPa and Rankine's constant ( $\alpha$ ) = 1/7500 12M



UNIT-V

- 9 a What is unsymmetrical bending? 6M  
 b Determine the principal moments of inertia for an unequal angle section 200 x 150 x 10 mm. 6M

OR

- 10 A curved beam is in the form of full continuous circle in plane with a radius of 4 m and is supported continuously on six supports. The beam carrying a uniformly distributed load of 2 kN/m length inclusive of its own weight. Determine the bending moment and twisting moment at salient locations. The coefficients C<sub>1</sub>, C<sub>2</sub> and C<sub>3</sub> are 0.089, 0.045 and 0.009 respectively. Plot the bending moment and twisting moment diagram. 12M

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