Seat No.: ________ Enrolment No.

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–IV (OLD) EXAMINATION – WINTER 2018

Subject Code:140605 **Date: 17/11/2018**

Subject Name: Advanced Strength Of Materials

Time: 02:30 PM TO 05:00 PM **Total Marks: 70**

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1 **(a)** Explain the Castigilano's second theory and max well reciprocal deflections theory **07**

(b) A bar 54 mm in diameter is 4 m long. An axial load of 180 kN is suddenly applied on it. Find (i) The maximum instantaneous stress. (ii) the maximum instantaneous elongation, Take E = 2 x 10^5. **07**

Q.2 **(a)** Explain maximum principal stress theory of failure for three dimensional stress system. **07**

(b) Determine reaction at prop cantilever beam using Castigilano's second theorem, as shown in fig. 1. **07**

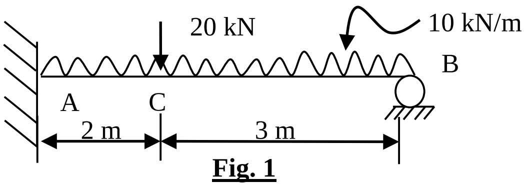

Fig. 1

OR

(b) A steel bolt is subjected to a direct to pull of 20 kN and transvers shear force of 10 kN. Calculate the diameter of bolt using (i) Maximum Principal stress theory (ii) Maximum principal strain theory (iii) Total strain energy. **07**

Q.3 **(a)** Distinguish between semi-elliptic and quarter elliptical spring. **07**

(b) A laminated carriage spring is 800 mm long and is made of twelve leaves of the same thickness and 40 mm wide. Find the thickness of leaves if the bending stress is to be limited to 200 N/mm^2. When the spring is subjected to a point load 6000 N at the center. Find also the center deflection. Take E = 2 x 10^5 N/mm^2. **07**

OR

Q.3 **(a)** Derive Lamie's equation for a thick cylinder subjected to internal and external pressure. State clearly various assumptions made. **07**

(b) A CI cylinder of 600 mm external diameter and 400 mm internal diameter is subjected to an external pressure of 30 Mpa. Calculate the decrease in the external diameter of cylinder. Take E = 200 Gpa and μ = 0.3. **07**

Q.4 **(a)** Determine the "m" factor for rectangular section in bending of curved beam. **Q**

(b) A compound tube is composed of a tube 250 mm internal diameter and 25 mm thick. The radial pressure at junction is 8 MPa. The compound tube is subjected to an internal fluid pressure 85 Mpa. Find the variation of the hoop stress over the wall of compound tube. **07**

OR

Q.4 **(a)** Write theory on beam with large initial curvature. **07**

(b) A curved beam of circular section of 40 mm diameter is subjected to pure bending moment 400 N.m. The mean radious of curvature is 50 mm. calculate maximum tensile stress and compressive stresses. Also fine position of Neutral Axis. **07**

Q.5 **(a)** Draw the shear stress distribution diagram of section (1) Rectangular, (2) Square (3) T-section (4) circular (5) Triangular (6) I Section (7) H Section **07**

(b) A two wooden pieces of section 100 mm x 100 mm are glued to gather to from a beam cross section 100 mm wide and 200 mm deep if the allowable stress at glued joint 0.3 N/mm^2. Hat is the shear force the section can carry? **07**

OR

Q.5 **(a)** Derive an expression for the hoop stress developed in a thin ring due to rotation **07**

(b) A rotor of a turbine is to be designed so that the stresses throughout are uniform and not to exceed 200 Mpa. The maximum speed at which the rotor has to run is at 10,000 r.p.m. if the thickness of rotar at the center is 50 mm and outside diameter is 500 mm, calculate thickness at the outer edge δ = 7900 kg/m^3 . **07**

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