

May, 2018,

Batch: 2015 onwards

Regular / Reappear

11 + 2 = 13.

SHAHEED BHAGAT SINGH STATE TECHNICAL CAMPUS, FEROZEPUR

ROLL No:

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Total number of pages:[2]

Total number of questions:06

B.Tech. || CHE || 4TH Sem

STRENGTH OF MATERIALS

Subject Code:BTCH-404A

Time allowed: 3 Hrs

Max Marks: 60

Important Instructions:

- All questions are compulsory
- Assume any missing data

PART A (2×10)

Q. 1. Short-Answer Questions:

All COs

- What is modulus of elasticity and modulus of rigidity?
- Draw stress strain diagram for a ductile material
- What is poisson's ratio? What is the approximate value of poisson's ratio?
- What is the difference between elastic limit and limit of proportionality.
- What are Principal Planes and angle of obliquity?
- Name the most common method to find the values of slope and deflection.
- What is the significance of 'Theories of failure'?
- Write Rankine Gordon's empirical formula as applied to columns.
- What are flexural rigidity and torsional rigidity?
- Write the relation for circumferential and hoop stresses as applicable to spherical vessels.

PART B (8×5)

- Q.2. A load of 800kN is applied to a reinforced concrete column of CO2 560mm diameter which has 4 steel rods of 36mm diameter embedded in it. Determine the stress in the concrete and the steel. Take E for steel =210GPa and E for concrete =15 GPa.

OR

A solid steel shaft transmits 100kW at 150 rpm. Determine the suitable diameter of the shaft if the maximum torque transmitted exceeds the mean by 20% in each revolution. The shear stress is not to exceed 60 MPa. Also find the maximum angle of twist in a length of 4m of the shaft. $G=80$ GPa.

- Q. 3. A simply supported beam of 8m length carries two point loads of 64kN and 48kN at 1m and 4m respectively from the left hand end. Find the deflection under each load and the maximum deflection. Value of $E=210\text{GPa}$ and $I=180 \times 10^6 \text{ mm}^4$. CO3

OR

Derive the formula for maximum slope and deflection in case of simply supported beam of length 'L' with a point load 'W' at the centre.

- Q. 4. Determine the shortest length for a pin jointed steel column of cross section 75mm*48mm using Euler's formula. Take critical stress value as 220 MPa and $E=205 \text{ GPa}$. CO5

OR

Derive the relation for critical load for a strut fixed at both ends stating assumptions for Euler's theory.

- Q.5 A shaft is subjected to a maximum torque of 14kNm and a maximum bending moment of 10kNm at a particular section. Determine the diameter of the shaft according to maximum shear stress theory if the elastic limit in simple tension is 180 MPa. CO4

OR

What are the four main theories of failure? Explain their relative use.

- Q. 6. The Principal stresses at a point in the bar are 50 MPa tensile and 30MPa compressive. Calculate the normal stress, shear stress and the resultant stress on a plane inclined at 50° to the axis of major principal stress. Also, find the maximum shear stress at the point. CO1

OR

Deduce expressions for longitudinal and hoop stresses in case of thin cylinders with internal diameter 'd' and thickness 't' subjected to an internal pressure of 'p'.