SHAHEED BHAGAT SINGH STATE TECHNICAL CAMPUS, FEROZEPUR

ROLL No: | | | | | | | | | | | | |

Total number of pages:[ ]

Total number of questions:09

B.Tech. || MECH || 3rd Sem

Strength of Materials I

N/17 (RP)

Subject Code:ME 202

Paper ID: 2010 (for office use)

Time allowed: 3 Hrs **Max Marks: 60**

Important Instructions:

- **Section A is compulsory.**
- **Attempt any four questions from section B**
- **Attempt any two questions from section C**
- **Assume any missing data**

PART A (2marks ×10)

Q1.

a. Define normal stress & strain.
b. Explain the principal stresses and principal planes.
c. Why temperature stresses are induced.
d. What are the assumptions made in theory of bending.
e. What is slenderness ratio.
f. What is poision ratio.
g. What is simple bending.
h. In a cantilever having simply supported load over its whole length, what will be the maximum bending moment & where it will occur.
i. What is point of contraflexion.
j. What are the assumptions made in Eulers theory.

PART B (5marks ×4)

Q2. A Reinforced concrete column of section .400mm X 200mm is having 8 steel bars of dia 20mm. The column carries load of 300KN . find the stresses in steel bars and concrete.Take Es = 2.0×10^5 N/mm^2 & Econcrete = 0.12×10^5 N/mm^2

Q3. Draw a SF & BM diagram for a cantilever beam carrying uniformly distributed load along its whole length.

Q4. A body is subjected to tensile stress of 70 N/mm^2 & 50 N/mm^2 in a direction perpendicular to the previous one. Find the stresses on a plane which make an angle of 40 degrees with the 70 N/mm^2 stress.

PTO

Q5. A cylindrical bar having diameter 20 cm & length 2 metre is simply supported on two ends .It is having a uniformly distributed load 8 KN/meter acting on its entire length. Find the maximum bending stress in the bar.

Q6. A cylindrical column with both end fixed is supporting a axial load of 500 KN. If the column is 4 meter long .Find the diameter of column using Eulers theory.. Take $E = 2 \times 10^5$ N/mm^2

PART C (10marks ×2)

Q7. A shaft is to be designed for transmitting 300 KW at 120 rpm. The allowable shear stress is 70 N/mm^2 . Calculate the following

i. Diameter of solid shaft

ii. Percentage saving in material if hollow shaft is used instead of solid shaft. Take internal diameter of hollow shaft as 2/3 of outside diameter.

Q8. Derive the expression $\frac{M}{I} = \frac{E}{R} = \frac{\sigma}{y}$

Q9. Derive an expression for Maximum deflection and slope of a simply supported beam carrying a point load W at its centre.