

Total No. of Questions : 4]

SEAT No. :

P5426

[Total No. of Pages : 2

[6186]-552

**S.E. (Production Engg. and Industrial Engg./ Production Sandwich/
Robotics and Automation) (Insem)**

**STRENGTH OF MATERIALS
(2019 Pattern) (Semester - III) (211082)**

Time : 1 Hour]

[Max. Marks : 30

Instructions to the candidates:

- 1) *Solve Q.1 or Q.2, Q.3 or Q.4.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right side indicate full marks.*
- 4) *Use of Calculator is allowed.*
- 5) *Assume suitable data if necessary.*

Q1) a) Define: [4]

- i) Stress
- ii) Strain
- iii) Poisson's Ratio
- iv) Bulk Modulus

b) A rod of 200 cm long and of diameter 2.5 cm is subjected to an axial pull of 25 KN. If the modulus of elasticity of the rod material is $2 \times 10^5 \text{ N/mm}^2$ [5]

Determine:

- i) Stress
- ii) Strain
- iii) Elongation

c) In a tensile test carried out on 20 mm diameter rod, the elongation measured on 150 mm length was found to be 0.12 mm under a load of 50 KN. The change in diameter was found to be 0.05 mm. Determine Young's Modulus and Poisson's Ratio for rod material. Also find the change in volume of bar. [6]

OR

Q2) a) Explain the concept of 'Thermal Stresses in Composite Bar' and also derive the expression for the same. [5]

b) A Steel bar 4m long is 32 mm in diameter for 1m of length, 28 mm in diameter for 2 m length and 25 mm in diameter for remaining 1m length. The bar is in tension and the stress on the smallest section is 110 N/mm^2 . Find total elongation of the bar. [5]

P.T.O.

- c) A short concrete column section of $400\text{ mm} \times 400\text{ mm}$ section is reinforced axially with four symmetrically placed steel bars each 250 mm^2 in the area. If the applied load $P = 800\text{ kN}$, compute the stresses developed in each material. Assume modulus of elasticity for steel material as 13 times that of concrete. [5]

- Q3)** a) State with neat sketches, different types of beams. [3]
 b) Explain the rules to draw the shear force and bending moment diagram. [4]
 c) Draw the shear force and bending moment diagram for a simply supported beam carrying 20 kN/m run spread over a distance of 3 m from left end. Take the span of beam as 6 m . [8]

OR

- Q4)** a) Draw the shear force and bending moment diagram for a simply supported beam AB of length 8 m having point loads of 4 kN , 10 kN , and 7 kN at 1.5 m , 4 m , and 6 m from end A respectively. [7]
 b) A Steel bar ABCD of uniform cross section 100 mm^2 is subjected to the axial forces as shown in figure. Calculate the change in length of the bar. Consider $E = 2 \times 10^5\text{ MPa}$. [8]

