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120331/031731

3rd Sem. / Auto, Mech. Mechatronics etc.

Subject : Strength of Materials

Time : 3 Hrs. M.M. : 100

SECTION-A

Note: Very Short Answer type questions. Attempt any 15 parts. (15x2=30)

Q.1 a) Tensile stress.

b) Working stress.

c) Compressive strain.

d) Factor of safety.

e) Shear modulus.

f) Strain energy.

g) Proof Resilience.

h) Moment of Inertia.

i) Cantilever.

j) Possion's ratio.

k) Bending moment.

l) Radius of gyration.

m) Column.

n) Slenderness ratio.

o) Effective length of column.

p) Torsion.

q) Spring.

r) Spring index.

SECTION-B

Note: Short answer type questions. Attempt any ten parts 10x4=40

Q.2 i) Discuss various types of stresses.

ii) Explain Hook's law.

iii) Draw and explain stress strain curve for a ductile material.

iv) Explain theorem of parallel axis.

v) Find the moment of inertia (I_{xx} and I_{yy}) of a rectangular section having size 20mm x 50mm.

vi) Define proof resilience and modulus of resilience.

vii) What are the assumptions in the theory of simple bending?

viii) What are helical springs? Give its types.

ix) Give various types of supports used for beams.

x) What are the functions of springs?

xi) Differentiate between torque and torsion.

xii) Explain Euler's Formula.

xiii) A solid shaft of 40mm diameter is required to transmit torque. Find the torque transmitted, if the shear stress is 30 MPa.

xiv) Explain end conditions of the columns.

xv) Derive an expression for strain energy stored in a body due to suddenly applied load.

SECTION-C

Note: Long answer type questions. Attempt any three questions. 3x10=30

Q.3 A steel rod of 20mm diameter is subjected to an axial pull of 40KN. Determine the tensile stress induced in the rod and elongation if original length is 5m. Take E = 210 GN/m^2.

Q.4 A rectangular column having 60mm width and 80mm thickness is of 5m. length. Calculate the buckling load if one end is fixed and other is free. Take E = 200KN/mm^2.

Q.5 A simply supported beam 5m long is subjected to two point loads of 2KN and 3KN each of distances of 1m and 3m respectively from the left hand support. Draw SFD and BMD.

Q.6 Give a comparision between solid and hollow shaft with regard to their strength and weight.

Q.7 Find the M.O.I of T-section having dimensions 100x100x20 about centroidal axis.