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**3rd Sem. / Auto,Mech,Prod.,MT,**

**GE,CNC,Plastic,CAD/CAM**

**Subject : STRENGTH OF MATERIALS**

Time : 3 Hrs.

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M.M. : 100

**SECTION-A**

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

- Q.1
- a) Define Hooks law.
  - b) Define Poisson's ratio.
  - c) Enlist various loading modes.
  - d) Define point of contra flexure.
  - e) What is factor of safety?
  - f) What is strain energy?
  - g) Define radius of gyration.
  - h) Write torque equation for circular shaft.
  - i) What is slenderness ratio?
  - j) Enlist causes of failure of columns.
  - k) Explain crippling load.

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- l) Define proof resilience.
- m) What are springs?
- n) Define neutral axis.
- o) How are Helical springs classified?
- p) Write an equation to find out instantaneous stress produced due to impact loading.
- q) Differentiate between Cantilever and simply supported beam.
- r) Define buckling load.

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**SECTION-B**

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

- Q.2
- i) Draw S.F. and B.M. diagrams of a cantilever of length 6m and point load of 5KN is applied at free end.
  - ii) Differentiate between long column and short column.
  - iii) Define neutral axis in beam and state from where it passes.

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- iv) What is laminated spring? State where it is used.
- v) Define theorem of perpendicular axis.
- vi) Explain volumetric strain and lateral strain.
- vii) Write equations for maximum stress induced in body if load is applied gradually.
- viii) Explain various types of Beams.
- ix) Differentiate between point load and uniformly distributed load.
- x) Draw S.F. and B.M. diagrams for cantilever of length  $L$  carrying point load  $W$  at the free end. HSBTEonline.com
- xi) Define point of inflection and where it occurs in over hanging beam?
- xii) A rectangular section is of breadth 12.5cm and depth 25cm. Find section modulus?
- xiii) Find maximum torque transmitted by solid shaft if its diameter is 150mm and maximum shear stress is  $45\text{N/mm}^2$ .

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- xiv) Enlist various factors effecting strength of column? HSBTEonline.com
- xv) Explain various loading modes.

### SECTION-C

**Note:** Long answer type questions. Attempt any three questions.  $3 \times 10 = 30$

- Q.3 Explain the terms elasticity, elastic limit, limit of proportionality.
- Q.4 Find the diameter of the steel wire if given load is 4000N and stress is  $95\text{MN/m}^2$ .
- Q.5 An axial pull of 50KN is suddenly applied to a steel rod 2m long and 1000mm in cross section, calculate the strain energy that can be stored if  $E = 200 \times 10^3 \text{N/mm}^2$
- Q.6 A leaf spring carries central load of 3000N. Determine the length of spring if leaf spring is made of 10 steel plates 5cm wide and 6mm thick, given bending stress  $150\text{N/mm}^2$ .
- Q.7 Find the moment of inertia of T section with flange  $25\text{cm} \times 2.5\text{cm}$  and web  $15\text{cm} \times 2.5\text{cm}$  about an axis passing the C.G. of the section and parallel to XX axis.

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