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**MVSE-301(C)****M.E./M.Tech., III Semester**

Examination, June 2017

**Design of Steel Structures**

(Elective - I)

Time : Three Hours

Maximum Marks : 70

**Note:** i) Answer any five questions.

ii) All questions carry equal marks.

iii) Assume missing data suitably.

iv) Use of codes and steel tables is permitted.

1. a) How can the structural integrity of steel buildings be established?  
b) Discuss in detail classifications and their concept of sections.
2. a) Discuss how the residual stress affect the column strength?  
b) What are multiple column curves? Why are several curves necessary to determine the strength of compression member?
3. a) Discuss St. Venant torsion and Warping torsion.  
b) Design a continuous beam of span 5.0m, 6.0m and 5.0m carrying a total UDL of 40 kN/m and laterally unrestrained with a bearing length of 100mm.

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4. A non-sway column in a building frame with flexible joints is 4m high and subjected to the following load and moment.  
Factored axial load = 500 kN  
Factored moment  $M_x$  at top of Column = 25.0 kN-m at bottom of Column = 45.0 kN-m.  
Design a suitable beam-column assuming  $f_y = 250$  MPa.  
Take the effective length as 0.8L along both axes.
5. A proposed cantilever beam is built into a concrete wall and free at its end. It supports DL of 18 kN/m and a LL of 12 kN/m. The length of the beam is 5.0m. Select an available section with necessary checks. Assume bearing length = 100mm.
6. a) Discuss Robertson's design curve.  
b) Discuss design of columns using Robertson approach with example.
7. Discuss the design of beams subjected to torsion and bending with example. Assume suitable data.
8. Write notes on any two of the following:
  - a) Torsional and Torsion flexural buckling of columns
  - b) Web buckling and Web crippling
  - c) Design methods for lateral torsional buckling of beams.

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