



**P.E.S. College of Engineering, Mandya - 571 401**

*(An Autonomous Institution affiliated to VTU, Belagavi)*

**Second Semester, M. Tech - Civil Engineering (MCAD)**

**Semester End Examination; June - 2017**

**Advanced Design of Steel Structures**

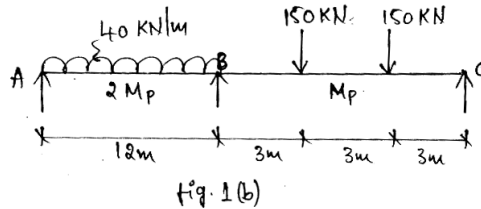
Time: 3 hrs

Max. Marks: 100

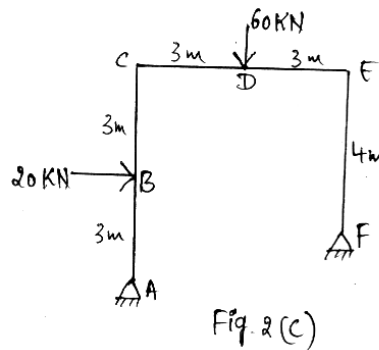
- Note:** i) Answer **FIVE** full questions, selecting **ONE** full question from each unit.  
 ii) Use of IS 800, IS 801, IS 811 and steel table are permitted.  
 iii) Missing data may be assumed suitably.

**UNIT - I**

- 1 a. State and explain the theorems in plastic analysis. Also explain how plastic analysis is carried out by static and Kinematic methods. 10
- b. Analyze the continuous beam shown in Fig. 1(b) by plastic analysis.



- 2 a. Explain the effect of axial force on the plastic moment capacity of a beam. 4
- b. Explain the various mechanisms involved in the analysis of a portal frame. 4
- c. Find the collapse load for the frame of uniform cross section shown Fig. 2(c) under the applied factored loads. 12



**UNIT - II**

- 3 a. Explain the phenomenon of lateral torsional buckling. List the factors affecting the lateral stability of beams and explain the influence of type of cross section on the lateral stability of beam. 10
- b. A simply supported beam of effective length 6 m is subjected to a bending moment of 60 kNm (clockwise) and 40 kNm (anticlockwise) at the two ends. The beam is made up of ISMB 450 and is laterally unsupported. Find the critical moment ( $M_{cr}$ ) for lateral torsional buckling considering the effect of moment gradient. Assume both ends to be unrestrained for torsion and warping. 10
- 4 a. Write a brief note on lateral torsional buckling of non-uniform beam and its design consideration. 6
- b. A simply supported beam of effective span 6 m is loaded in such a way that the design bending moment and shear force are 80 kNm and 50 kN respectively. The beam is laterally unsupported with a bearing at support of 200 mm. Design the beam and apply necessary checks. 14

