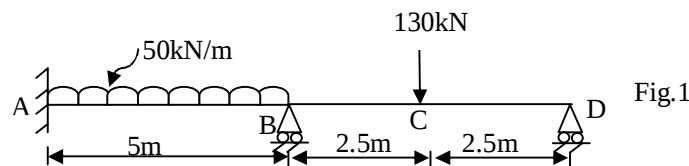


GUJARAT TECHNOLOGICAL UNIVERSITY**M. E. - SEMESTER – II • EXAMINATION – SUMMER • 2013****Subject code: 1722007****Date: 05-06-2013****Subject Name: Advanced Steel Structures****Time: 10.30 am – 01.00 pm****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
4. Use of IS:800;2007, IS:875-III, IS:1893(Part I); 2002, SP-6(1)/steel tables is permitted.
5. Take $f_y=250\text{N/mm}^2$ unless it is specified.

- Q.1 (a)** Write short notes on : **07**
- Moment resisting frames
 - Braced frames
 - Framed tube
- (b)** Explain earthquake loads and seismic design philosophy adopted as per IS:1893. How is the seismic philosophy different from the design for other loads such as wind and live loads? **07**
- Q.2 (a)** An ISMB350 is connected to the flange of a column ISHB300 @ 63 kg/m. The end reaction transmitted by the beam is 110kN. Design an unstiffened seated connection using ISA 150x75x12 as a seat angle and M16 black bolts. **07**
- (b)** Two plates, one 20mm thick and another 16mm thick are connected by M16 bolts (grade 4.6) in the form of a lap joint. Determine efficiency of a lap joint if plates are 200mm wide and 6 bolts are arranged in two rows in the form of chain bolting. **07**
- OR**
- (b)** Name various types of bridges and draw neat sketch of cable suspended bridge explaining important components of it. **07**
- Q.3** Design a section for the continuous beam ABCD loaded and supported as shown in fig.1. Assume beam to be laterally supported. Plastic moment of resistance of the beam is uniform. Check the section for Moment and shear only. **14**

**OR**

- Q.3 (a)** A column in a building is subjected to factored axial load of 800kN. It is of 5m height, hinged at both ends and braced at mid-height for restraint against buckling about weaker axis. Design the column section using ISMB. **07**
- (b)** An ISMB500 beam is connected by two coped beams (flushed at top) of size ISMB400 and ISMB250 using web cleat connection by grade 4.6 bolts of 20mm diameter. The ISMB400 carries 250kN factored reaction and ISMB250 carries 60kN factored reaction. Design the connection of any one beam with ISMB500. **07**

- Q.4 (a)** A suspension bridge is of 60m span with a 18m wide roadway. It is subjected to a load of 20kN/m^2 including dead loads. The bridge is suspended by a pair of cables having a central dip of 4.5m. Find the cross sectional area of the cable necessary if the maximum permissible stress in the cable material is not to exceed 600N/mm^2 . **07**
- (b)** Design a stiffened seat angle connection for a reaction of 175kN from a beam of ISMB350 using M20 bolts of grade 4.6. The beam is connected to the flange of column ISHB350. Assume Fe410 grade material ($f_y = 250\text{MPa}$). Draw necessary sketches and views. **07**
- OR**
- Q.4 (a)** Design a bolted cover plate splice for an ISHB250 column connected to an ISHB250, to transfer a factored axial load of 400kN, both columns are of grade Fe410 steel. The ends are not machined for full contact in bearing. **07**
- (b)** Design a welded seat angle connection between a beam ISMB200 and flange of column ISHB250 for a reaction of beam 80kN, assuming Fe410 grade steel ($f_y=250\text{Mpa}$) and site welding. **07**
- Q.5 (a)** Determine the collapse load using plastic analysis for a frame ABCD of the following data:- $\bar{A}\bar{B}$ & $\bar{C}\bar{D}$ are vertical members with lengths 4m and 6m respectively, $\bar{A}$ is fixed & $\bar{D}$ is hinged supports. BC is a horizontal member with 6m length. The frame carries a horizontal rightward force $\bar{W}$ at point B & a central vertical concentrated load $\bar{W}$ on member BC. The frame has uniform plastic moment M_p . **07**
- (b)** Explain the methods of approximate analysis for lateral load resisting frames. **07**
- OR**
- Q.5 (a)** A Pratt truss girder through bridge is provided for single broad gauge track. The effective span of bridge is 60m (12panels @5m). The main girders are provided at spacing of 7.5 m and cross-girders are spaced 5m apart. The height of the truss is 6m. If the total dead load carried by one girder is 14kN/m (inclusive of all). Take CDA = 0.295 and EUDLL = 4500kN. Draw influence line diagram for the following members and find design forces in them. **08**
- i) Central Top Chord Member
ii) Central Bottom Chord Member
iii) Central Diagonal Member
- (b)** A building is proposed to be built at Surat on a hillock. The height of the hill is 200m and the slope is 1 in 2.5. The building is proposed at a distance of 150m from the base of the hill. Find the design wind pressure. The height of the building is 30m. **06**
