ID No. _____

Birla Vishvakarma Mahavidyalaya (Engineering College)
(An Autonomous Institution)
First Year M. Tech. - End Semester Examination - Summer 2016

Subject Code: SE504 **Subject Name: Advanced Design of Steel Structures**

Date: 25.05.2016 **Time: 2:30 pm to 5 pm** **Maximum Marks: 70**

Instructions:

- Each section must be written in a separate answer books.
- Numbers to the right indicate maximum marks.
- Use of IS 800: 2007,IS 801: 1975,IS 875 part 3, Proposed draft of IS 875, IS 1893: 2002 & steel table or SP 6 is permitted.
- Assume addition data if required and mention the same.

Section – I

Q. 1 Attempt any two of following questions

(a) Do the fatigue assessment of gantry girder of ISMB 350 where two wheel base of 120 kN operated 5 times per hour 10 per day and 275 day per year has span of 6m. Also calculated expected life cycle of fatigue. (7)

(b) Determine gust factor for multi stories steel structures having size of 15x30x120 The building oriented with small dimension facing sea front and about 500m inside the sea front take typical story height of structure as 4m and spacing between frame as 5m using proposed IS 875 (Part 3) or IS 875 part 3 (7)

(c) A four storey one bay steel moment resisting frame having 3 m storey height is located in Bhuj (Seismic Zone V).The Soil conditions are medium and the damping is 5%. Determine the seismic load as per IS1893-2002 on the frame. Take lumped mass on roof =1500 KN and lumped mass on all other floors = 3000 KN. This frame is to be used as office building with plan dimensions as 7m x 5m (7)

Q. 2 (a) Explain the earthquake load calculation for multi storey building as per IS1893. Discuss advanced structural forms for earthquake resisting multi storey buildings larger than 60storeys. (7)

(b) Design a suitable beam-column assuming fy=250 N/mm_2 and effective length of column
as 0.8L along both the axes for
(i) a factored axial load = 400 kN
(ii) a factored bending moment =1200 kN m
(iii) a factored shear force = 500 kN. (14)

Section – II

Q. 3 Attempt any two of following questions

(a) Design a welded unstiffened seat angle connection between a beam ISMB350 and flange of column ISHB250 for a reaction of beam 150kN, assuming Fe410 (a) grade steel (fy=250Mpa) and site welding. (10)

(b) Determine the safe axial load in compression of the cold formed channel (C) section as shown in figure 1. The effective length of the member is 3 m. yield strength of steel is 250 MPa. Take thickness t= 4 mm, A= 1060 mm2, rz=55.8 mm, ry=18.2 mm, z0=42.7 mm, J=0.552cm4, Cw=1750cm6, x=16.3mm, G= 80 x 103 N/mm2, E= 2 x 105 N/mm2. (10)

(c) The Two span Continuous beam is shown in figure 2 with loading. Select suitable I-section in Fe410 grade steel using (a) Elastic Design and (b) Plastic Design and Differentiate Elastic Design and plastic Design. (10)

Q. 4 Find the Collapse load for the frame of uniform cross section shown in figure 3 under applied factored loads. Also, find the minimum section required to resist the applied loads. (15)

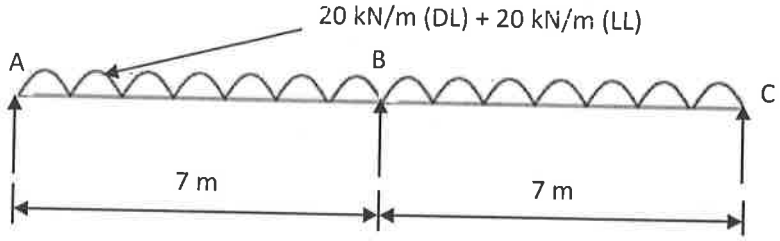

Figure 2

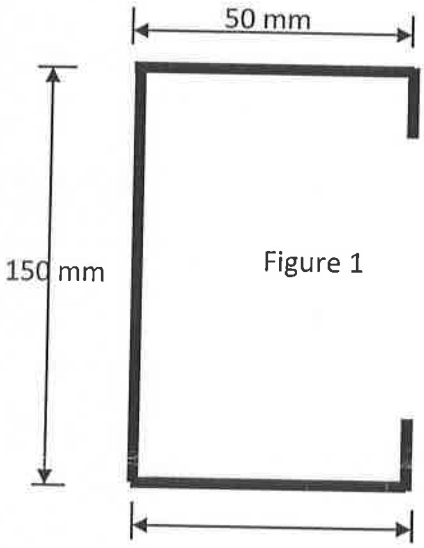

Figure 1

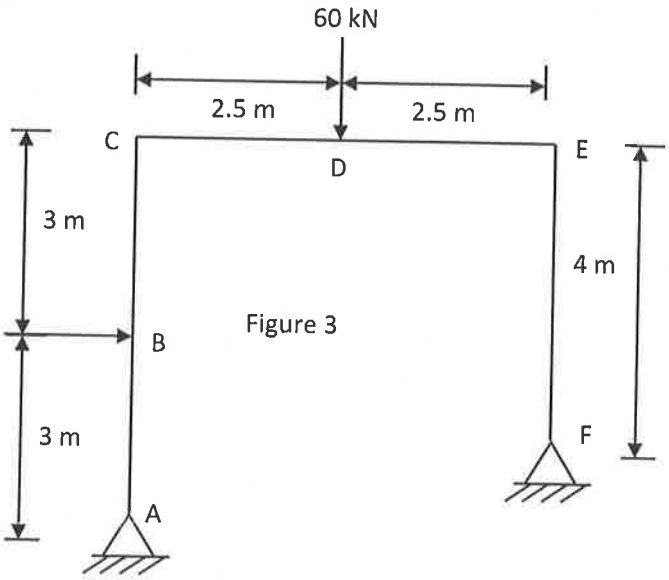

Figure 3

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