Roll No. _____

5E3153

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B.Tech. V Sem.(Main/Back) Exam Dec. 2012
Civil Engg.
5CE3 Steel Structure-I

Time : 3 Hours | **Maximum Marks : 80** | **Min. Passing Marks : 24**

Instructions to Candidates:

*Attempt any **five question** selecting **one question** from **each unit** . All Questions carry equal marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used / calculated must be stated clearly.*

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. **I.S. 800 - 2007** 2. **Steel Table(ISI Structutal Engg.Hand Book, PartI)**

UNIT - I

Q.1 (a) Briefly discuss merits and demerits of welded connections. 4

(b) Draw cross-sections of a fillet weld and a double V butt weld. 2

(c) Fig 1 shows an eccentrically loaded fillet weld connection. Calculate the maximum factured value of load P that can be safely allowed. 10

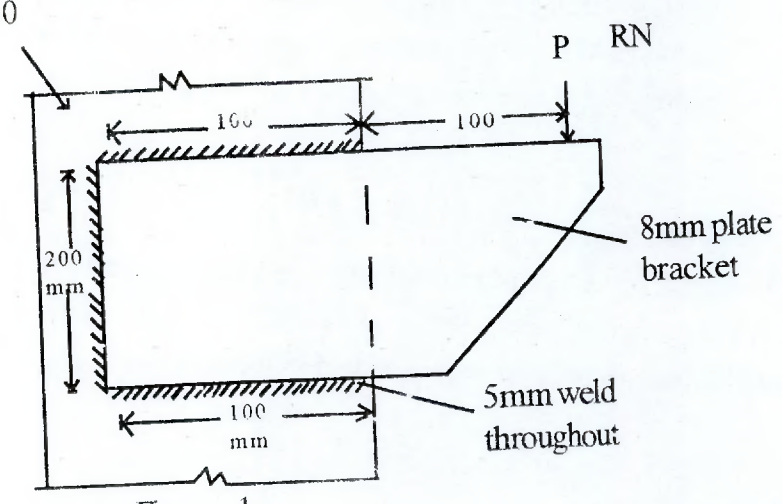

Fig 1

OR

Q.1 (a) Design a lap joint between two plates 80 mm x 16 mm and 80 mm x 12 mm so as to transmit a factored load of 75 kN. Use 16 mm bolts of grade 4.6. 6

(b) Consider a plate bracket 10 mm thick connected to the flange of a column ISHB 200 @ 37.3 kg/m by 6 bolts of grade 4.6 as shown in Fig.2. What should be the minimum size of bolts so that the connection is safe. 10

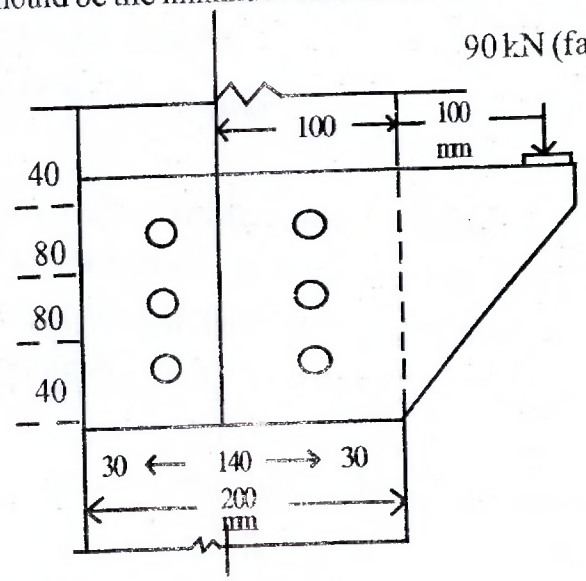

Fig 2

UNIT - II

Q.2 (a) An ISA 125x75x8 mm is used in a steel roof truss as discontinuous strut. Find its compressive strength if it is 2.1 m long between centres of bolted connections. 6

(b) An ISHB 250 @ 51 kg/m is to be used as column in a steel building. It is strengthened by welding a plate 300 mm x 12 mm to each flange symmetri cally. Find the disign factored compressive load for the column if it is 3.2 m long with its ends restrained against position as well as direction. 10

OR

Q.2 Desigen a built up column taking two channel sections to be placed back to back for an axial factored load of 1500 kN. The column height is 4.0 m with top and bottom hinged. Also design a single system of lacings for the column. 16

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UNIT - III

Q.3 (a) What do you understand by "buckling of web" and "crippling of web". Explain with diagrams. 6

(b) A beam of effective span 4.5 m is simply supported at the ends and is subjected to a uniformly distributed load of 30 kN/m over the whole span. Design a suitable I section if its compression flange is laterally supported. Check for deflection also. 10

OR

Q.3 Design a two tier grillage foundation for a column carrying an axial load of 1600 kN. The column rests centrally on a steel base plate 650 mm x 650 mm. The bearing pressure on soil is limited to 180 kN/m^2. 16

UNIT - IV

Q.4 (a) Draw two views of a gusseted base connection, with bolts, for a column and label the components. 6

(b) Design a slab base for a column of section ISH B 300 @ 58.78 kg/m, carrying a factored load of 1000 kN. Bearing capacity of soil may be taken as 300 kN/m^2. Assume Fe 410 grade for steel and M15 for con crete. 10

OR

Q.4 (a) Discuss the steps involved in the design of an eccentrically loaded ten--sion member. 6

(b) A tie member in a bracing system consists of a single unequal angle of size 125x75x8 mm. Its longer leg is connected at the ends to a gusset plate 10 mm thick with 5 bolts of 20 mm diameter at a pitch of 60 mm and end distance 30 mm. Taking edge distance as 50 mm, calculate the tensile capacity of the member. 10

UNIT - V

Q.5 (a) Differentiate between-

(i) a 'plastic hinge' and a 'real hinge'

(ii) a 'structure' and a 'mechanism'

(iii) a 'partial collapse' and a 'complete collapse' 6

(b) Determine the uniform Mp for which the continuons beam shown in Fig.3 should be designed. Take load factor 1.7. Also comment on the type of collapse. 10

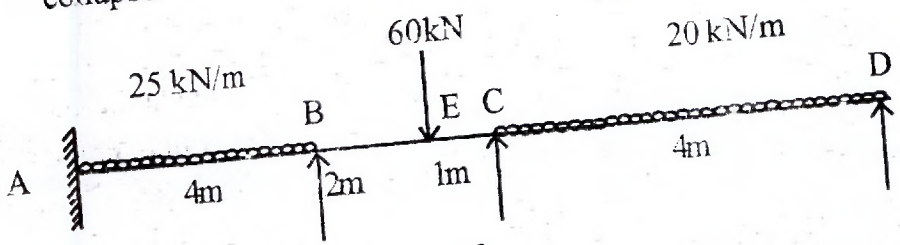

Fig. 3

OR

Q.5 (a) Calculate the collapse load for the beam of uniform Mp, show in Fig 4. 6

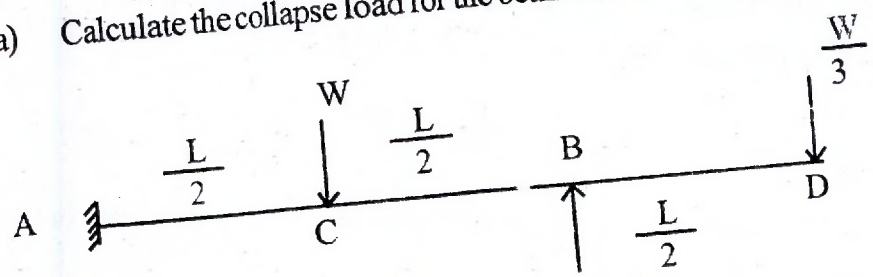

Fig. 4

(b) For the portal frame shown in Fig. 5, Compute the true value of collapse load. 10

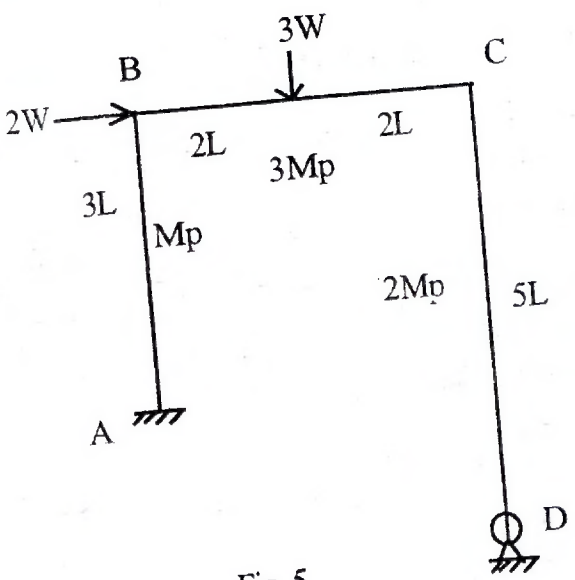

Fig. 5
