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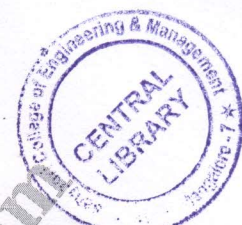
10CV72

Seventh Semester B.E. Degree Examination, Dec.2019/Jan.2020
Design of Steel Structures

Time: 3 hrs.   Max. Marks:100

Note: 1. *Answer any FIVE full questions, selecting*
at least TWO questions from each part.
2. *Use of IS:800-2007 and steel tables is permitted.*
3. *Assume missing data suitably.*

PART – A

1 a. Distinguish between working stress design and limit state design of steel structures.**(10 Marks)**
   b. Mention any five advantages and disadvantages of steel structures.   **(10 Marks)**

2 a. Mention types of failure of bolted connection, with sketches.   **(08 Marks)**
   b. Determine the safe load 'P' carried by the joint shown in Fig.Q2(b). The thickness of the flange of I section is 9.1 mm and of bracket plate thickness is 10 mm. Use M20 bolts of grade 4.6.
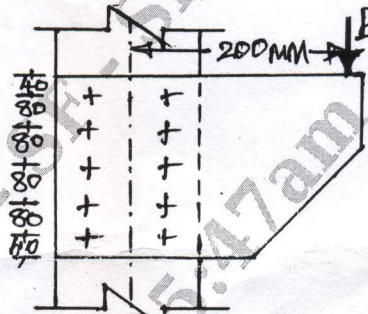

Fig.Q2(b)   **(12 Marks)**

3 a. What are advantages of welded connections over bolted connections?   **(06 Marks)**
   b. Design welded connection for 2ISA 100 × 75 × 8 mm connected to longer leg with 10 mm thick gusset plate. Design the weld for full strength of the member. Use 6 mm thick fillet weld in shop.   **(14 Marks)**

4 a. A hallow box section of outer dimensions 300 mm wide and 600 mm depth is made up of 12 mm thick plates throughout. Determine its shape factor and plastic moment capacity.
                                                                                              (08 Marks)
   b. Determine the value of fully plastic moment for the two span continuous beam shown in Fig.Q4(b). Adopt a load factor 1.5. Draw BMD.
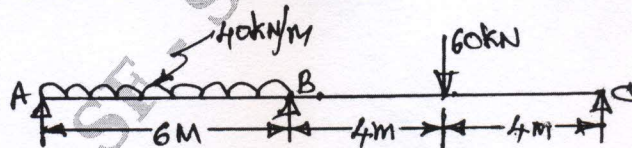

Fig.Q4(b)   **(12 Marks)**

PART – B

5 Design a suitable equal angle section to carry a factored tensile force of 210 kN assuming a single row of M20 bolts. The yield strength and ultimate strength of the material is 250 MPa and 410 MPa respectively. The length of the member is 3m.   **(20 Marks)**

6 Design a compression member made up of two channel sections placed back to back to carry a factored load of 750 kN over a length of 10m. The ends of the compression member are retrained against displacement only. Design single lacing system with 18 mm dia bolts for connection. **(20 Marks)**

7 Design a bolted gusseted base on a concrete pedestal for a column ISHB400@759N/m with two flange plates 400×12 mm carrying a factored load of 4000 kN. The column is to be supported on concrete pedestal to be built with M20 concrete. Take SBC of soil 250 kN/m². Use M20 bolts of grade 4.6. The gusset plate thickness is 16 mm and gusset angles available are ISA $150 \times 115 \times 15$ mm. **(20 Marks)**

8 Design a beam for supporting reinforced concrete floor slab. The effective span of the beam is 6.23 m. The centre to centre spacing of beams is 3.5 m. The total service load acting on the RCC slab is 9 kN/m². The top flange of the beam is encased in the concrete slab. Design should satisfy all the necessary checks. Sketch the design details. **(20 Marks)**

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