

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER-VIII(NEW) EXAMINATION – SUMMER 2019

Subject Code:2180610

Date:17/05/2019

Subject Name:Design of Steel Structures

Time:10:30 AM TO 01:30 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, IS: 875 and Steel Tables is permitted.
5. Consider $f_y = 250 \text{ N/mm}^2$ and $f_u = 410 \text{ N/mm}^2$ if not mention

- Q.1**
- (a) What are the points at which a plastic hinge is likely to form? **03**
 - (b) State the factors to be considered for the planning and site selection of an industrial building. **04**
 - (c) Design a suitable section for a two span continuous beam, each having a span of 5 m and supporting a dead load of 18 kN/m and live load of 21 kN/m by plastic design approach. **07**
- Q.2**
- (a) What is the difference between beam and plate girder. **03**
 - (b) Determine the plastic moment capacity of ISMB 500 with top plate 300 mm x 20 mm **04**
 - (c) Determine plastic moment capacity for given frame as shown in fig-1 **07**
- OR**
- (c) Design a bolted framed connection to connect an ISLB 350 transmitting an end reaction of 450 kN to the web of ISMB 550 **07**
- Q.3**
- (a) Explain concept of Plastic design method. Give advantages of plastic design method. **03**
 - (b) What are the various types of stiffeners as stipulated by IS 800:2007 and their functions. **04**
 - (c) Derive the collapse load for propped cantilever beam of length L, subjected to concentrated load W at center. **07**
- OR**
- Q.3**
- (a) Differentiate between Limit State Method and Working Stress Method of Design. **03**
 - (b) What are external and internal wind pressure co-efficient. Give codal provision for internal wind pressure co-efficient for a building. **04**
 - (c) Design a unstiffened seat connection for a factored beam end reaction of 150 kN. The beam section is ISMB 200 connected to the flange of column section ISHB 250 using bolted connections. Steel is of grade Fe 410 and bolts of grade 4.6 **07**
- Q.4**
- A gantry girder of 6.2 m span is to be designed for crane capacity of 260 kN. The effective span of crane girder is 18 m. Weight of crane girder excluding crab is 210 kN and weight of crab is 65 kN. Take clearance as 1.2 m and wheel base as 3.0 m. Choose suitable section and check the bending stresses and deflection. **14**
- OR**
- Q.4**
- Fix the configuration of a howe type roof truss for an industrial building with 25 m span and 120 m length. The roofing is galvanized iron sheeting the basic wind speed is 50 m /s and terrain is open industrial area and building is class A. The clear height of building at the eaves level is 9 m. Design the purlin and rafter. **14**

Q.5

A simply supported welded plate girder of 22 m span is subjected to UDL of 40 kN/m, inclusive its self-weight. It is also subjected to two moving loads 220 kN & 350 kN and the distance between two loads is '2.4 m'. Design the thin web girder with vertical intermediate stiffeners without using tension field method, which can satisfy stress and deflection criteria. Connections design and design of end bearing stiffener are not required.

14

OR

Q.5

A foot over bridge is of span 18 m and pedestrian load of 3 kN/m². The clear distance between two trusses is 3.0 m and truss height is 2.0 m. Take dead weight of truss is 1.2 kN/m. Assume Self weight of flooring 480 N/m², Self weight of cross beam 300 N, Weight of one truss 400 N/m. Select type of truss and Design a) cross beams (b) most heavily loaded top chord member (c) Vertical member.

14

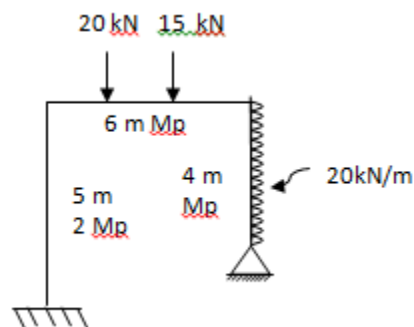


Fig.1

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