Reg. No. : ☐☐☐☐☐☐☐☐☐☐☐

Z 6482

M.E. DEGREE EXAMINATION, MAY/JUNE 2008.

Second Semester

Structural Engineering

ST 1653 — STEEL STRUCTURES

(Regulation 2005)

Time : Three hours

Maximum : 100 marks

Assume suitable data if necessary

Use of IS : 800, IS : 875, IS : 801, IS : 811 and steel tables are permitted.

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What is the function of a bracing system?

2. What is a bent?

3. Differentiate between rigid connection and semi- rigid connection.

4. A beam has to be joined with a column flange. Sketch the arrangement of an unstiffened seat connection.

5. What is meant by effective design width of cold formed light gauge sections?

6. What is the purpose of introducing form factor in the design of compression members?

7. State the advantages of pressed steel tank.

8. What is the purpose of providing brick lining in a steel chimney?

9. Define plastic hinge.

10. What is serviceability limit state?

11. (a) The trusses for a factory building are spaced at 4 m center to center and the purlins are spaced at 1.6 m center to center. The pitch of the roof truss is $\frac{1}{4}$ and the span of the roof truss is 10 m. The vertical load from the roof sheets etc. are equal to 180N/m² while the wind load on the roof surface normal to roof is equal to 1500N/m².Design a channel section purlin.

Or

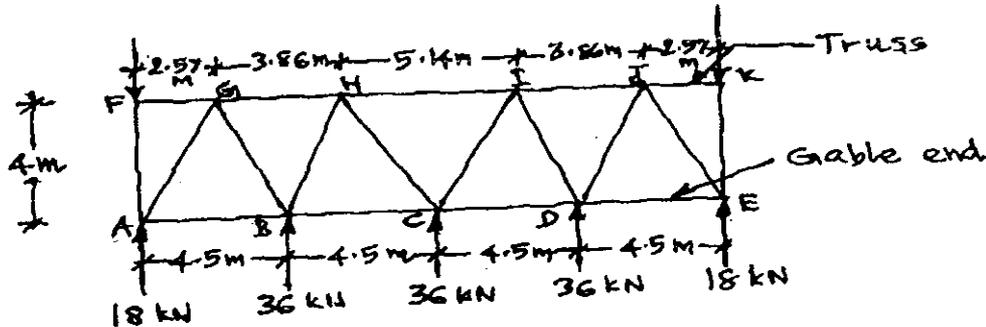(b) For the gable wind girder shown in fig. 1 find the forces in the member AG and GB. Design the members also.

Fig. 1

12. (a) A beam ISWB 600 @ 1.337 kN/m transmits an end reaction of 280 kN to the web of a stanchion ISHB 250 @ 0.547 kN/m. Design a stiffened seat connection with bolt using double angle stiffeners.

Or

(b) A beam ISMB 450 @ 0.724 kN/m transmits an end reaction of 120 kN and an end moment of 110 kN/m to the flange of a column ISHB 400 @ 0.822 kN/m. Design the welded connection.

13. (a) A Cold formed steel hat section 100 mm × 80 mm × 30 mm × 5 mm is to be used as a concentrically loaded column of 3.2 m effective length. Determine the allowable load.

Or

(b) Design a Z- shaped purlin for a span of 4 m carrying a uniformly distributed load of 1 kN/m.

Z 6482

14. (a) A cylindrical tank with hemispherical bottom is required to store 1.45 lakh litres of water. Determine the size of the tank and design the cylindrical plates, hemispherical bottom and the necessary joints. Staging need not be designed.

Or

(b) Design a self supporting steel chimney of height 40m above foundation with diameter of cylindrical portion equal to 1.5 m. It has a 75 mm thick lining inside. Take a uniform wind pressure of 1.5kN/m^2.

15. (a) A portal frame shown in fig 2 is loaded upto collapse. Find the value of fully plastic moment of the frame, if it is of uniform section throughout.
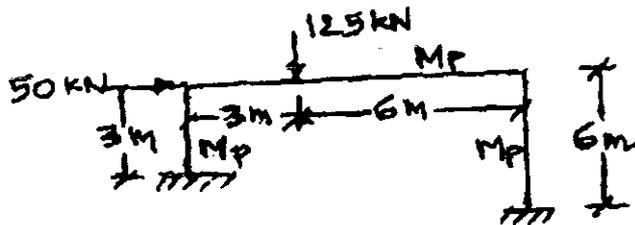

Fig. 2 Qn. 15 (a)

Or

(b) A beam of span 6 meter carries a uniformly distributed load of 35 kN/m over the whole length. Design the beam using limit state method.

3

Z 6482