

B.E., DEGREE EXAMINATIONS: MAY/JUNE 2013

Sixth Semester

CIVIL ENGINEERING

CEE119 : Design of Steel Structures

Time: Three Hours

Maximum Marks: 100

Answer all the Questions:-

PART A (10 x 1 = 10 Marks)

1. The design wind speed is V . The design wind pressure will be given as
 - a) $0.4V^2$
 - b) $0.5V^2$
 - c) $0.6V^2$
 - d) $0.8V^2$
2. The partial safety factor for materials governed by buckling is
 - a) 1.0
 - b) 1.10
 - c) 1.15
 - d) 1.25
3. The imperfection factor for welded steel section is
 - a) 0.21
 - b) 0.35
 - c) 0.42
 - d) 0.49
4. The effective length of compression flange of a simply supported beam not restrained against torsion at ends is K times the span, where K is
 - a) 0.70
 - b) 0.85
 - c) 1.00
 - d) 1.20
5. Gantry girder are usually designed
 - a) As laterally supported beams
 - b) As laterally unsupported beams
 - c) for a combination of vertical loads and either of the lateral and longitudinal force
 - d) Both 'b' and 'c'
6. Slope of a truss is equal to its
 - a) Pitch/2
 - b) Pitch
 - c) Two times pitch
 - d) 1.5 times pitch
7. An example of a light moment connection is
 - a) Framed connection
 - b) Unstiffened seat connection
 - c) Clip angle connection
 - d) Slit beam connection
8. The beam column flexible connections are expected to resist and transfer
 - a) Only shear
 - b) Only moment
 - c) Both shear and moment
 - d) 50% of shear and moment

9. The bottom plates of the water tank are generally connected using the following section at the inner side of the tank
- a) T- section
 - b) I- section
 - c) Plates
 - d) Angle sections
10. A self-supporting steel chimney transmits the lateral forces to the foundation by
- a) Propped beam action
 - b) Cantilever action
 - c) Simply supported action
 - d) Fixed beam action

PART B (10 x 2 = 20 Marks)

- 11. What is ductility? Why is it important?
- 12. State main advantages of steel as structural material.
- 13. What is meant by web crippling?
- 14. What are the different modes of failure of plate girder?
- 15. What are the factors to be considered while planning and designing an industrial building?
- 16. List few types of cranes.
- 17. What is the difference between unstiffened and stiffened seated connections?
- 18. What are the main types of moment resistance connections?
- 19. What is meant by stand pipe? Where is it used?
- 20. What are the various accessories of the steel tanks?

PART C (5 x 14 = 70 Marks)

21. a) (i) What are the various steps involved in the design of steel structures? (8)
- (ii) Why are codes of practices necessary and what is the function of codal specifications? (6)

(OR)

- b) Explain the steps involved in steel design and the applicable codes for load estimation and the load combinations for design.

22. a) Design a simply supported beam of 7m span carrying a reinforced concrete floor capable of providing lateral restraint to the top compression flange. The total UDL is made up of 100kN dead load including self weight plus 150kN imposed load. Assume a stiff bearing length of 75mm.

(OR)

- b) Design a welded plate girder for a simply supported bridge deck beam with clear span of 20m, subjected to the following:
- Dead load including self weight: 20kN/m
 - Imposed load: 10kN/m
 - Two moving loads: 150kN each spaced at 2m apart

Assume that the top compression flange of the plate girder is restrained laterally and prevented from rotating.

23. a) Design a Channel section for a purlin on a sloping roof truss with the dead load of 0.15kN/m^2 (cladding and insulation), a live load of 2kN/m^2 and wind load of 0.5kN/m^2 (suction). The purlins are 2m centre to centre and of span 4m, simply supported on a rafter at a slope of 20 degrees.

(OR)

- b) Determine the Design moment and shear force in a simply supported Gantry Girder with the following data assuming lateral support to it:
- C/C distance between gantry girders (Width of the building) : 16m
Longitudinal spacing of columns (Span of gantry girder): 7.5m
Crane capacity : 100kN
Weight of Crane : 40kN
Wheel spacing : 3m
Weight of crab : 10 kN
Minimum approach of crane hook : 1 m

24. a) Design a welded seat angle connection between a beam ISMB 300 and column ISHB 200 for a reaction of beam 100kN, assuming Fe410 grade steel and site welding.

(OR)

- b) Design the flange angle connection using M16 bolts of grade 4.6 to transfer a factored moment of 12kNm and a shear of 150kN from a beam of ISMB 350 to a column of ISHB 300.

25. a) Design an elevated steel tank, rectangular in shape for 2 lakh litres capacity. The tank is supported at a height of 12m above the ground level.

(OR)

- b) A self supporting steel stack is 80m high and its diameter at the top is 3m. Design only the plates for the stack. The joints need not be designed. Adopt the wind force as per IS 875. The location of place is such that the intensity of wind pressure upto 30m height is 1.5kN/m^2 .
