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BOARD DIPLOMA EXAMINATION, (C-14)

MARCH/APRIL—2017

DCE—SIXTH SEMESTER EXAMINATION

DESIGN OF STEEL STRUCTURES

Time : 3 hours]

[Total Marks : 80

PART—A

3×10=30

- Instructions :** (1) Answer **all** questions.
(2) Each question carries **three** marks.
(3) Use of IS 800–2007, IS 875 and steel tables are permitted.
(4) Assume data suitably, if necessary.

1. State three merits and three demerits of steel structures.
2. Define the following terms :
 - (a) Size of the weld
 - (b) Throat thickness of fillet weld
3. State any six different shapes of members used as tie members.
4. Differentiate between failure due to yielding and failure due to rupture of tension member.
5. Define battening and mention the objectives of battening.
6. What are the different types of column bases?

7. Define elastic moment of resistance and plastic moment of resistance.
8. State the classification of cross sections.
9. What are the loads to be considered on a roof truss?
10. Determine the live load per square metre of plan area of the pitched roof of slope 26° .

PART—B

10×5=50

Instructions : (1) Answer *any five* questions.
(2) Each question carries **ten** marks.

11. An angle ISA 200mm 150mm 10mm carrying an axial tension of 500 kN is to be connected to a gusset plate through its longer leg using side fillet welds and end fillet welds. Design the joint, if the ultimate shear stress in the weld is 330 MPa. Assume connections are made in the workshop.
12. Design a single-angle tension member for a roof truss to carry a factored tensile force of 300 kN. Check whether the block shear is or not. $f_y = 250 \text{ N/mm}^2$, $f_u = 410 \text{ N/mm}^2$. The length of the weld is 150 mm.
13. Determine the compressive strength of a single I-section ISHB 400 @ 616 N/m when it is used as a column of effective length 3.6 m. The yield stress of steel is 250 MPa.
14. Design a single-angle strut for a roof truss to carry a compressive load of 110 kN. The length of the angle between centre to centre of intersections is 2.2 m. Assume that the end connections is done by the fillet welds. Take $f_y = 250 \text{ MPa}$.

15. Design a slab base for a column consisting of ISHB 350 @ 724 N/m. The column carries an axial load of 520 kN. M20 grade concrete is used for foundation. Assume Fe-410 grade steel used. Also design the welded connection.

16. An ISMB 300 @ 442 N/m is subjected to an UDL of 20 kN/m. If the beam is laterally restrained and effective span of the beam is 5 m, check the adequacies of the beam in flexure, shear and deflection. Take $f_y = 250 \text{ N/mm}^2$ and $E = 210 \text{ kN/mm}^2$.

17. Design a simply supported beam of span 5m carrying an RC floor capable of providing lateral restraint to the top compression flange. The UDL is made up of 20-kN/m imposed load and 15 kN/m dead load. Use E 250 grade steel.

18. (a) Draw a neat sketch of a roof truss and name the component parts. 5

(b) A roof truss shed is to be built in Visakhapatnam for an industry. The size of the shed is 24m x 40m. The height of the building is 12 m at the ends. Determine the design wind speed and design wind pressure. 5
