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PART – B

(5×13=65 Marks)

11. a) Find the dimensions of a doubly bolted lap joint for plates 16 mm thick to carry its full load. Take permissible axial tension in plate 150 N/mm^2 .

(OR)

- b) Find the safe load and efficiency of a double cover butt joint. The main plates are 12 mm thick connected by 18 mm diameter bolts at a pitch of 100 mm. Design the cover plate also. What is the percentage reduction in the efficiency of the joint if the plates are lap jointed ?

12. a) A double angle ISA $75 \text{ mm} \times 75 \text{ mm} \times 8 \text{ mm}$ back to back welded to one side of a 12 mm gusset have allowable stress 150 MPa. Predict the allowable tensile load on the members, and weld length and overlap length of gusset plate.

(OR)

- b) Design a tension member to carry a factored force of 340 KN. Use 20 mm diameter black bolts and a gusset plate of 8 mm thick.

13. a) Find the suitable design for a built-up column consisting of two channels connected by batten to carry an axial load of 800 KN; the effective length of the column is 6 m.

(OR)

- b) Find the suitable design for a rolled steel beam section column to carry an axial load 1100 KN. The column is 4 m long and adequately in position but not in direction at both ends.

14. a) Find the suitable design for a simply supported steel joist with a 4.0 m effective span carries a udl of 40 kN/m over its span inclusive of self-weight. The beam is laterally unsupported. Take $f_y = 250 \text{ N/mm}^2$.

(OR)

- b) Design a simply supported beam of effective span 1.5 m carrying a factored concentrated load of 360 KN at mid span.



15. a) Design a purlin for a roof truss having the following data : Span of the truss = 6.0 m, Spacing of truss = 3 m c/c, Inclination of roof = 30° spacing of Purlin = 2 m c/c, Wind pressure = 1.5 kN/m^2 , Roof coverage = A.C Sheetting weighing 200 N/m^2 , Provide a channel section Purlin.

(OR)

- b) Calculate the dead load, live load and wind load on a 'Fink' type truss for the following data and mark the loads on the nodes of the truss. Span = 12 m, Pitch = $\frac{1}{4}$ of span, Height at eaves level = 10 m from the ground Spacing of truss = 5 m c/c.

PART - C

(1×15=15 Marks)

16. a) Design a suitable slab base for a column section ISHB 400@ 822 N/m. Supporting an axial load 500 KN. The base plate is to rest on a concrete pedestal of M20 grade concrete.

(OR)

- b) A plate girder of span 15 m is made-up of web plates of $1600 \text{ mm} \times 8 \text{ mm}$ flange angles $150 \text{ mm} \times 115 \text{ mm} \times 10 \text{ mm}$ and two flange plates $480 \text{ mm} \times 10 \text{ mm}$ it carries a uniformly distributed load of 100 kN/m including its own weight. Identify the suitable design and sketch the web splices at 5 m from one end.