



PART C — (1 × 15 = 15 marks)

12. (a) Calculate the strength of a 16 mm diameter bolt of grade 4.6 for a lap joint. The main plates to be joined are 12 mm thick of FE410 grade. Assume pitch and end distance of a bolt is 40 mm and 30 mm respectively and thread of a bolt is intercepting the shear plane.

Or

- (b) Discuss about connection failures with neat sketch.
13. (a) Design a tensile splice to connect two plates of size 350 × 12 mm and 350 mm × 20 mm using bolt connections. The factored axial tension is 750 kN.

Or

- (b) (i) Discuss shear lag in tension member. (6)  
(ii) Discuss the provisions does the lug angle provide in tension member. (7)
14. (a) (i) Classify the modes of failure in compression member. (6)  
(ii) Discuss the common types of column base with neat sketch. (7)

Or

- (b) Describe the laced column and explain its significant and design aspects with neat sketch.
15. (a) (i) Evaluate the economical depth of a plate girder. (7)  
(ii) Construct the failure mode of laterally unsupported beams. (6)

Or

- (b) Design a purlin for a roof truss having the following data:

Span of the truss = 6.0 m

Spacing of truss = 3m c/c.

Inclination of roof = 30°

Spacing of Purlin = 2m c/c

Wind pressure = 1.5 kN/m<sup>2</sup>

Roof coverage = A.C Sheetting weighing 200 N/m<sup>2</sup>

Provide a channel section Purlin.

16. (a) Discuss the critical factors to be considered when designing eccentrically loaded bolted bracket connections. How does the location of the applied load affect the design of such connections? What measures are to be taken to ensure their structural integrity?

Or

- (b) Find the moment capacity of the laterally unsupported beam ISMN 300 of the effective span of 5 m.