

A 1088

U.P.W.E. Tech. UNIVERSITY EXAMINATION, MAY/JUNE 2006.

Fifth Semester

Civil Engineering

CE 332 --- STRUCTURAL DESIGN - I

Maximum : 100 marks

Time : Three hours

Answer ALL questions.

PART A. --- (10 × 2 = 20 marks)

1. What is meant by Spandrel beam?
2. Write down any two physical properties of mild steel.
3. Name the modes of failures of a riveted joint.
4. List any two disadvantages of bolted connections.
5. Under what circumstances you would go for Built up sections?
6. State any four assumptions made in Euler's Theory.
7. State the forces which cause buckling of web.
8. What is the purpose of a base of a column?
9. How do you classify Indian timbers based on their moduli of elasticity.
10. Draw a line sketch of fishplate joint.

PART B --- (5 × 16 = 80 marks)

11. (i) Discuss in detail about the merits and demerits of construction in structural steel. (12)
- (ii) Write short notes on 'Fully Rigid Design'. (4)
12. (a) Two plates 12 mm and 10 mm thick are joined by a triple riveted lap joint, in which the pitch of the central row of rivets is half of the pitch of rivets in outer rows. Design the joint and find its efficiency. Take $\sigma_{at} = 150 \text{ N/mm}^2$, $\tau_{vf} = 80 \text{ N/mm}^2$ and $\sigma_{pf} = 250 \text{ N/mm}^2$.

Or

(b) A welded plate girder is to be fabricated using web plates 1600 mm deep and 16 mm thick and flange plates 400 mm wide and 30 mm thick. The girder is to be used over a simply supported span of 20 m, carrying a load of 20 kN/m including its own weight. Design suitable welded connection between the web and the flange, taking permissible stress to weld as 110 N/mm².

13. (a) A tie member in a roof truss is 1.75 long and carries an axial load of 150 kN. Design a suitable single unequal angle section if (i) bolt driven rivets are used (ii) fillet weld is used at the joint.

Or

(b) A column consisting of ISFB 300 @ 63 kg/m carries an axial load of 500 kN. Design the splices, assuming that (i) ends of the column are cut by ordinary method and are not milled and (ii) ends of the column are milled and faced for bearing. Take $f_y = 250$ N/mm²

Time : Thr

14. (a) A beam, simply supported over an effective span of 9 m, carries a uniformly distributed load of 60 kN/m, inclusive of its own weight. The depth of the beam is restricted to 500 mm. Design the beam, assuming that the compression flange of the beam is laterally supported by floor construction. Take $f_y = 250$ N/mm² and $E = 2 \times 10^5$ N/mm². Assume width of the support = 200 mm.

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Or

(b) A column, having effective length of 6 m carries an axial load of 300 kN along with end moments of 50 kNm about its major axis and 10 kNm about its minor axis. Taking $C_m = 1.0$ for bending about major axis and 0.8 for bending about minor axis, find suitable H-section for the column.

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15. (a) Floor beams of Group B timber are spaced at 1.2 m centres on a clean span of 3 m, with a bearing of 200 mm at each end. The dead load of roof covering is 2000 N/m² and live load is 1500 N/m². Design the beam for inside location. The timber is of standard grade. Take $E = 11000$ N/mm².

5. F

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Or

(b) A teak wood member, 75 mm × 250 mm carries on axial pull of 60 kN. Design a suitable disc-dowelled joint. Take (i) safe stress in compression parallel to grains for teak = 8.8 N/mm² (ii) Safe stress is compression perpendicular to grain in teak wood = 4 N/mm² and (iii) Safe working stress is shear along the grains for babul = 2.22 N/mm²

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