B.Tech. Civil (Construction Management) / B.Tech. Civil (Water Resources Engineering)

Term-End Examination

December, 2010

01084

ET-508(A) : STRUCTURAL DESIGN-I

Time : 3 hours   *Maximum Marks : 70*

Note :   *Attempt **any four** questions. All questions carry **equal** marks. Use of code of practice IS-456 and calculator is allowed. Any missing data may be suitably assumed.*

1. Determine the moment of resistance of a 17½ rectangular section 250mm wide and 400mm deep if it is reinforced with 3-16mm diameter Fe 250 grade steel bars. Assume M20 concrete. Effective cover to reinforcement is 40mm. Use limit state method of design.

2. A simply supported rectangular R.C. beam of 6m 17½ effective span has a cross section of 300×630mm and loaded with a UDL of 80kN/m intensity excluding its self weight. Determine longitudinal reinforcement for the beam taking M 15 and Fe 415 steel. Use limit state method of design.

3. A RCC beam, 300mm wide and 600mm deep, has 17½ 4 bars of 20mm diameter as tension reinforcement, the centre of the bars being 50mm from the bottom of the beam. Determine the uniformly distributed load (inclusive of its own weight) the beam can carry over an effective span of 6m. Take the permissible stresses in concrete & steel as 5.2 N/mm^2 & 126 N/mm^2 respectively and m as 18. The beam is simply supported at the ends. Use working stress method of design.

4. Design shear reinforcement in the form of vertical 17½ stirrups for a beam having a cross-section of 250 × 500mm. The beam is reinforced with 4-20mm diameter bars at an effective cover of 40mm. The shear force at the cross-section is 85kN. Use M 15 concrete and Fe 415 steel. Use limit state method of design.

5. A reinforced concrete column, 2.8m long 17½ (effective) and 240mm × 240mm in section, is reinforced with 4-20mm diameter bars. Find the safe load the column can carry.

Assume $\sigma_{cc} = 4N/mm^2$ and $\sigma_{sc} = 130N/mm^2$.

6. Show that for yield line analysis of simply $17\frac{1}{2}$
    supported one way slabs

    $$W = \frac{8M_o}{L^2}$$

    where all the terms have their usual meanings.

7. Design a square footing for a super imposed load $17\frac{1}{2}$
    of 800 kN. The safe bearing capacity for soil is
    $200 kN/m^2$. Use M 20 concrete and F 250 steel.
    Take size of column as $500 \times 500mm$.

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