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ET-508(A)

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

Term-End Examination

June, 2013

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. The answers shall be in your own language.*

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1. A rectangular beam 250 mm by 500 mm deep is reinforced with 2-14 mm diameter bars in compression zone and 4-25 mm bars in tension zone, each at an effective cover 40 mm. Determine the moment of resistance assuming M15 mix and Fe 250 grade steel. The compressive stress in steel may be taken equal to .87 fy. Use limit state method of design. **17½**

2. Design a rectangular beam to resist a bending moment of 30 kNm using M15 mix and Fe 415 grade steel, you can assume b=d/2. Use limit state method of design. **17½**

3. A reinforced concrete beam has section 300mm wide and 600 mm deep. The reinforcement consists of 4 bars of 25 mm diameter with a cover of 50mm from the centre of reinforcement. If it is subjected to a bending moment of 120 kNm, determine the stresses developed in steel and concrete. Use working stress method of design and take m = 15. **17½**

4. A reinforced concrete beam has 300mm width and 500mm effective depth. The shear reinforcement consists of 8mm diameter 4-legged stirrups spaced at 100mm c/c at the supports. If the beam is subjected to a shear force of 120 kN at the ends, calculate the maximum shear stress developed in the shear reinforcement. The beam has 0.5% reinforcement at the ends. Use working stress method of design. **17½**

5. Design a short square column to carry an axial load of 1000 kN. Use M25 mix and Fe 415 steel. **17½**

6. Show that for yield line analysis of two way simply supported square slabs, the collapse load per unit length, $W = \frac{24\,M_0}{L^2}$ **17½**

   Where all the terms have their usual meanings.
