No. of Printed Pages : 3

ET-508(A)

00623

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

Term-End Examination

December, 2012

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 **calculators** is allowed. The answers shall be in your own language.*

1. Find the moment of resistance of a beam 250 mm by 400 mm deep if it is reinforced with 3 - 16ϕ bars in tension zone at an effective cover of 40 mm as shown in figure -I. Assume M25 and Fe 415 grade steel. Use limit state method of design. 17½

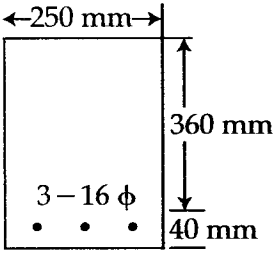

Figure - 1

2. Design a rectangular beam for an effective span of 6m. The super imposed load is 80 KN/m and size of the beam is limited to 300 mm x 700 mm overall. Use M20 mix and Fe 415 grade steel. Assume stress in compression in steel as 353 N/ mm^2. Use limit state method of design. **17½**

3. Design a reinforced concrete beam subjected to a bending moment of 20 KN-m. The permissible stresses in steel and concrete are 140 N/mm^2 and 5N/mm^2 respectively. Take m = 18. Keep the depth of the beam equal to twice the width. Use working stress method of design. **17½**

4. A reinforced concrete beam 250 mm wide and 400 mm effective depth is subjected to a shear force of 95 KN at the supports. The tensile reinforcement at the support is 0.5 percent. Find the spacing of 12 mm diameter 2 - legged stirrups to resist the shearing stress at supports, for M/5 concrete. Take the following values $\sigma st = \sigma sc =$ 140 N/mm^2, fy = 250 N/mm^2 and m = 19. Also design the minimum reinforcement at the mid span. **17½**

5. A reinforce concrete column, 6m long (effective) and 240 mm x 240 mm in section is reinforced with four fans of 20 mm diameter. Find the safe load the column can carry. Take M25 concrete and Fe 415 steel. **17½**

6. Show that for yield line analysis of one way slabs with fixed ends having of equal moment capacities, the collapse load per unit length, **17½**

$$\omega = \frac{24M_o}{\angle 2}$$

where all the terms have their usual meanings.
