INTERNATIONAL CENTRE FOR APPLIED SCIENCES

(Manipal University)

IV SEMESTER B.S. DEGREE EXAMINATION –MAY 2016
SUBJECT: BASIC CONCRETE DESIGN (CE 243)
(BRANCH: CIVIL)
23RD MAY, 2016

Time: 3 Hours   **Max. Marks: 100**

- ✓ **Answer ANY FIVE full Questions.**
- ✓ **Additional data if required may be assumed suitably and indicated.**
- ✓ **Reference to IS-456 : 2000 and SP – 16 is permitted.**
- ✓ **Solve questions 2 and 3 by working stress method and remaining questions by Limit state Method**

1A. Differentiate between working stress method and limit state method.

1B. Why is the over –reinforced design not preferred?

1C. Why is limit state method considered more desirable than working stress method?

1D. How is the modular ratio defined?

1E. What is a balanced section design?

(4marks x5 = 20marks)

2A. Find the moment of resistance of the beam of section 230mm width and 560mm effective depth, reinforced with 3 bars of 20mm diameter. Also state whether the beam is under reinforced or over reinforced. The materials used are M20 grade concrete and Fe 415 grade HYSD reinforcement.

2B. A simply supported beam of size 230mm X 600mm overall depth is reinforced with 3 no. 16 mm diameter bars. Find the safe uniformly distributed load on the beam in addition to its self-weight on a span of 4m. The materials are M20 grade concrete and HYSD reinforcement of grade Fe 415.

(10+10 = 20marks)

3A. A rectangular beam 230mm wide X 400mm effective depth is subjected to a moment of 45kNm. The effective cover of compressive reinforcement is 40mm. find out the reinforcing steel. The materials are M20 grade concrete and HYSD reinforcement of grade Fe 415.

3B. A doubly reinforced rectangular beam 230mm wide and 450mm effective depth is reinforced with 2no of 20mm diameter bars at top at an effective cover of 40mm and 3 nos. of 20mm diameter bars at bottom. Find out the moment of resistance of section. The materials are M20 grade concrete and HYSD reinforcement of grade Fe415.

(10+10 = 20marks)

4A. Calculate the ultimate moment of resistance of a singly reinforced beam of size 230mm x 500mm effective depth, reinforced with 3 bars of 16mm diameter. Use M20 concrete and Fe 415 steel.

4B. A rectangular cantilever beam of size 230mm width x 550 mm effective depth subjected to a bending moment of 90kNm at working loads. Find the steel area required. The materials are M20 grade concrete and HYSD reinforcement of grade Fe415.

(10+10 = 20marks)

5A. A rectangular beam of size 230mm wide X 500mm effective depth is subjected to a factored moment of 220kNm. Find the reinforcement for flexure. The materials are M20 grade concrete and HYSD reinforcement of grade Fe 415. Take d'=50mm.

5B. A Tee Beam of effective flange width 1800mm, thickness of slab 120mm, width of rib 300mm and effective depth of 560mm is reinforced with 4 No. 25mm diameter bars. Calculate the factored moment of resistance. The materials are M20 grade concrete and HYSD reinforcement of Fe415.

(10+10= 20marks)

6. Design a simply supported RCC slab for a building having clear dimensions 3.0m by 9.0m with 350mm wall all- round. Adopt M20 grade concrete and Fe 415 steel. Take live load as 2kN/m^2 and floor finish 1kN/m^2. Exposure condition is mild.

(20marks)

7A. Explain briefly Short & Long columns?

7B. A Short RCC column is to carry a factored load of 2400kN. If the column is to be square, design the column. Assume $e_{min} < 0.05D$. The materials are M25 grade concrete and HYSD reinforcement of grade Fe415.

(5+15 = 20marks)

8. Calculate the anchorage length in tension and compression for beams
      (a) A single mild steel bar of diameter 16mm in concrete of grade M20.
      (b) An HYSD bar of grade Fe415 of diameter 16mm in concrete of grade M20.

(20marks)

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