Reg. No.										

INTERNATIONAL CENTRE FOR APPLIED SCIENCES

(Manipal University)

IV SEMESTER B.S. DEGREE EXAMINATION - OCT. / NOV. 2017

SUBJECT: BASIC CONCRETE DESIGN (CE 243)

(BRANCH: CIVIL)

Tuesday, 07 November 2017

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

- ✓ **Answer ANY FIVE 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. What is the difference between singly reinforced and doubly reinforced beam sections?

1B. What is a balanced section design?

1C. What is development length?

1D. How is the effective span of simply supported beam or slab is determined?

1E. How is the modular ratio defined?

(4×5)

2A. Find the moment of resistance of the beam of section 230mm width and 575mm 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 300mm 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)

3A. A rectangular beam 230mm wide X 400mm effective depth is subjected to a moment of 50kNm. 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 16mm diameter bars at top at an effective cover of 40mm and 3 nos. of 16mm diameter bars at bottom. Find out the moment of resistance of section. The materials are M20 grade concrete and mild steel reinforcement.

(10+10)

4A. A rectangular beam 230mm wide and 520mm effective depth is reinforced with 4 no. 16mm diameter bars. Find out the depth of neutral axis and specify the type of beam. The materials are M20 grade concrete and HYSD reinforcement of grade Fe 415. Also find out the depth of neutral axis if the reinforcement is increased to 4 no. 20mm diameter bars.

4B. A singly reinforced rectangular beam is subjected to a bending moment of 36 kNm at working loads. The width of the beam is 200mm. find the depth and steel area for balanced design. The materials are M20 grade concrete and mild steel reinforcement.

(10+10)

5A. Find the factored moment of resistance of a beam section 230mm wide X 460 mm effective depth reinforced with 2-16 mm diameter bars as compression reinforcement at an effective cover of 40 mm and 4-20 mm diameter bars as tension reinforcement. The materials are M20 grade concrete and mild steel reinforcement.

5B. A Tee Beam of effective flange width 1200mm, thickness of slab 100mm, 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)

6. Design a simply supported one – way RCC slab for a building having clear span 3.0m with 350mm wall as support on either sides. 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.

(20)

7A. Explain the criterion of minimum reinforcement in the columns?

7B. A Short RCC column is to carry a factored load of 1900kN. If the column is to be square, design the column. Assume $e_{min} < 0.05D$. The materials are M20 grade concrete and mild steel.

(5+15)

8. Calculate the anchorage length in tension and compression for beams

(a) A single mild steel bar of diameter 20mm in concrete of grade M20.

(b) An HYSD bar of grade Fe415 of diameter 20mm in concrete of grade M20.

(20)