

Roll No.

Total No. of Pages : 02

Total No. of Questions : 09

**B.Tech.(CE) (2011 onwards) (Sem.-4)**  
**DESIGN OF CONCRETE STRUCTURES-I**  
Subject Code : BTCE-403  
Paper ID : [A1173]

Time : 3 Hrs.

Max. Marks : 60

**INSTRUCTION TO CANDIDATES :**

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.
4. Assume any data suitably. Use of IS 456:2000 is allowed.

**SECTION-A**

**Q1. Answer briefly :**

- a) What are the components responsible for setting of cement?
- b) Define bulking of sand and its importance.
- c) What are Gap graded aggregates?
- d) Differentiate between segregation and Bleeding of concrete.
- e) What is reinforced concrete? Give its advantages over plain cement concrete.
- f) Define limit state of serviceability.
- g) Why compaction of concrete is required?
- h) Briefly write the terms 'Balanced', 'Over Reinforced' and 'Under Reinforced' sections in : bending.
- i) What do you understand by durability of concrete?
- j) Distinguish between one way and two way slabs?

### SECTION-B

- Q2. List various test conducted on cement. Briefly explain consistency of cement.
- Q3. Discuss how aggregate shape and texture affects strength of concrete.
- Q4. Explain various steps to design concrete mix by BIS method.
- Q5. A reinforced concrete beam has a support section with a width of 250 mm and effective depth of 500 mm. The support section is reinforced with 3 bars of 20 mm diameter on the tension side. 8 mm diameter 2 legged stirrups are provided at a spacing of 200 mm centers. Using M-20 grade concrete and Fe-415 HYSD bars, calculate the shear strength of the support section
- Q6. Design a floor slab of size 4.5 m × 5.2 m simply supported on all the four edges by brick walls of width 230mm, subjected to a live load of 2.5 kN/m<sup>2</sup>. M-20 concrete and Fe-415 grade steel are used.

### SECTION-C

- Q7. a) Differentiate between Limit state and working stress method philosophy. (5)
- b) Explain creep and shrinkage of concrete. (5)
- Q8. A singly reinforced concrete beam is of width 400 mm and effective depth 615 mm. It is reinforced with 8 Nos. 20 mm mild steel bars. Assuming M-25 concrete, and Fe-250 grade of steel. Determine its moment of resistance according to the working stress method. Calculate also the stress in steel when the beam is subjected to the above moment. (10)
- Q9. a) A tee beam has an effective flange width of 2500 mm and depth of flange is 150 mm, width of rib: 300 mm, effective depth: 800 mm. Using M-20 grade concrete and Fe-415 HYSD bars, estimate the area of tension reinforcement required if the section has to resist a design ultimate moment of 1200 kN/m. (7)
- b) What is limit state of collapse? (3)