

**BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI  
(MID SEMESTER EXAMINATION)**

**CLASS: B.ARCH  
BRANCH: ARCHITECTURE**

**SEMESTER: V/ADD  
SESSION : MO/2019**

**SUBJECT : AR5405 CONCRETE STRUCTURES**

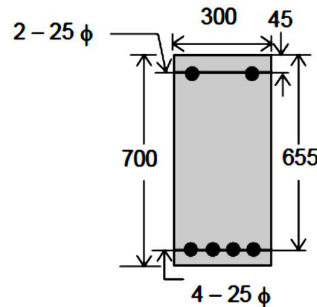
**TIME: 1.5 HOURS**

**FULL MARKS: 25**

**INSTRUCTIONS:**

1. The total marks of the questions are 30.
  2. Candidates may attempt for all 30 marks.
  3. In those cases where the marks obtained exceed 25 marks, the excess will be ignored.
  4. Before attempting the question paper, be sure that you have got the correct question paper.
  5. The missing data, if any, may be assumed suitably.
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- Q1 (a) What do you mean by workability of concrete? [2]  
(b) What is R.C.C? Why do we reinforce plain concrete? [3]
- Q2 Determine the ultimate moment of resistance of doubly reinforced section shown below considering stress in compression steel as 347.4MPa. Use M20 Grade concrete and Fe415 steel. [5]



- Q3 A reinforced concrete beam of rectangular section has a width of 250mm and depth of 500mm. Effective cover provided at tension reinforcement is 50mm. The beam is reinforced with 4 bars of 25mm diameter on the tension side. Two of the tension bars are bent up at 45 degrees near the support section. In addition, the beam is provided with two-legged stirrups of 10mm diameter at 235mm c/c near the supports. Assuming M25 grade concrete and Fe415 steel estimate ultimate shear strength of the support section. [5]
- Q4 A rectangular reinforced concrete beam, located inside a building in a coastal town, is simply supported on two masonry walls 300 mm thick and 5m apart (centre-to-centre). The beam has to carry, in addition to its own weight, a distributed live load of 8 kN/m and a dead load of 4 kN/m. Design the beam section and longitudinal reinforcement for maximum moment at midspan. Assume Fe 415 steel. Assume M25 grade concrete and clear cover 30mm. [5]
- Q5 For the Q4 problem designed, Design shear reinforcement near support. [5]
- Q6 (a) What is shrinkage in concrete? What is its significance? [2]  
(b) Determine whether the section shown in Fig. Q6(b) can withstand a factored applied bending moment of 100kNm. Grade of concrete is M30 and steel is Fe415. Dimensions are in mm. [3]

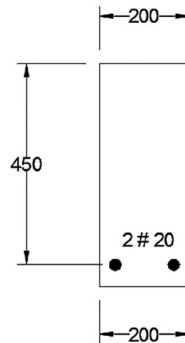


Fig. Q6(b)