BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(END SEMESTER EXAMINATION)

CLASS: B.ARCH **SEMESTER : V/ADD**
BRANCH: ARCHITECTURE **SESSION : MO/19**

SUBJECT: AR5405 CONCRETE STRUCTURE

TIME: 3 HOURS **FULL MARKS: 60**

INSTRUCTIONS:
1. The question paper contains 7 questions each of 12 marks and total 84 marks.
2. Candidates may attempt any 5 questions maximum of 60 marks.
3. The missing data, if any, may be assumed suitably.
***4*. Before attempting the question paper, be sure that you have got the correct question paper.**
5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.

Q.1 Design an isolated R.C.C. footing for a short square column 500mm X 500mm supporting an axial service load of 1600kN. The safe bearing capacity of the soil at site is 200 kN/m^2. Use M-25 concrete and Fe-500 steel. Sketch the reinforcement details. [12]

Q.2(a) What is the purpose of providing lateral ties in column? [3]
Q.2(b) For Q1. Design the reinforcement of column. Sketch reinforcement details [9]

Q.3 The slab of a residential building of size 5 m x 6.5 m is simply supported on all the four sides on 230 mm walls. Assuming an imposed load of 3 kN/m^2 and load due to finishes of 1.0 kN/m^2, design the floor slab. Use M 30 concrete and Fe 500 steel. Assume mild exposure. Sketch reinforcement details. [12]

Q.4(A rectangular beam of section 300 mm width by 500 mm effective depth is reinforced with four 20 mm bars, out of which two bars are bent at the ends of the beam at 45°. Determine the additional shear reinforcement required, if the factored shear force at the critical section is 320 kN. Consider concrete of grade M25 and steel of grade Fe 415. [12]

Q.5(a) Design a T-beam with 1600 mm width of flange, 110 mm depth of flange, 250 mm width of web, and 500 mm effective depth to carry a factored bending moment of 620 kNm. Assume M20 concrete and Fe 415 steel. [12]

Q.6(a) A rectangular concrete beam of cross-section 30 cm deep and 20 cm wide is prestressed by means of 15 wires of 5 mm diameter located 6.5 cm from the bottom of the beam and 3 wires of diameter of 5 mm, 2.5 cm from the top. Assuming the prestress in the steel as 840 N/mm^2, calculate the stresses at the extreme fibres of the mid-span section when the beam is supporting its own weight over a span of 6 m. If a uniformly distributed live load of 6 kN/m is imposed, evaluate the maximum working stress in concrete. The density of concrete is 24 kN/m^3. [12]

Q.7(a) Discuss the shapes of aggregates that is considered best for making concrete? [6]
Q.7(b) What is creep in concrete? What is its significance? [6]

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