Paper Code: CE505	Roll No.										

B. Tech.
DESIGN OF CONCRETE STRUCTURES - I
(SEMESTER- V) EXAMINATION, 2016-17

[Time: 3 Hours]   [Total Marks: 100]

Note: **(i)** Attempt ALL questions.
(ii) Marks are indicated against each question.
(iii) Assume any data suitably, if required.
(iv) **IS 456: 2000** is permitted.

1. Attempt any **FOUR** parts of the following:-   (5x4=20)

   (a) What is meant by modular ratio? Why is it considered to be an unreliable quantity?
   (b) Is the limit state method in any way a better method of design of concrete structures than the working stress design?
   (c) Calculate percentage of steel required for balanced section for limit state design if M25 and Fe415 is used.
   (d) What is meant by limit state of durability? Name the factors that affect durability of reinforced concrete.
   (e) What is limiting depth of neutral axis? Calculate x_u/d for Fe415 and Fe500.

2. Attempt any **TWO** parts of the following:-   (10x2=20)

   (a) Design a beam to carry a factored load of 175 kNm. Use M25 grade concrete & Fe415.
   (b) A RCC beam 250x450 mm effective depth is reinforced with 3 # 16 mm Fe415 steel bars, subjected to bending moment of 125 kNm. Find the stresses developed in top fiber of concrete and tension steel if M20 grade concrete is used. Adopt working stress method.
   (c) Write the steps to design a doubly reinforced beam by Limit State Method.

3. Attempt any **TWO** parts of the following:-   (10x2=20)

   (a) Determine the limiting moment of resistance of the T beam: bf = 450 mm, Df = 150 mm, bw = 300 mm, d = 440 mm, Ast = 2100 mm^2 . Assume M25 grade concrete and Fe 415 grade steel.
   (b) A concrete column of a multistoried building has 32 mm bar for the longitudinal steel. Assuming M20 & Fe415, Calculate the lap length required.
   (c) A R. C. beam 350 x 600 mm overall is reinforced with 4 Nos. of 32 mm dia bars of grade Fe415 extended into the support. A factored shear of 400 KN calculated at critical section near support. Design vertical stirrups for the section. Used M25 grade concrete.

4. Attempt any **TWO** parts of the following:-   (10x2=20)

   (a) An interior panel of a slab of size 3.0 m x 5.5 m. slab is supported on 250 mm wide beam all around. Live load = 3.0 KN/m^2 Finish = 1.5 KN/m^2, Determine the main reinforcement required at mid span and distribution steel at mid section of the slab. Use M25 & Fe415.

(b) A corridor slab is to be designed for LL = 5 KN/sqm. Span = 3.5 m. determine the main and distribution steel required at mid span of the section. Assume thickness of slab = 125 mm.

(c) Derive the expression for development length and calculate the L_d for M20 grade concrete and 25 mm dia Fe500 steel bars.

5. Attempt any **TWO** parts of the following   **10x2=20**

(a) Design a short circular column to carry a load of 1000 kN. Using helical reinforcement. Calculate the longitudinal reinforcement and pitch of the helix.

(b) Determine the longitudinal bars of a short column of size 300x450 mm, it carries an axial load of 1200 kN. Assume grade of materials suitably.

(c) Calculate the equivalent bending moment and shear force for a section of beam 300x600 mm. if it is subjected to BM= 215 kNm , SF = 150 kN and Torsional moment = 105 kNm.