CE-505 **Roll No.** | | | | | | | | | | |

B.Tech.
(SEM- V) ODD SEMESTER EXAMINATION, 2015-16
DESIGN OF CONCRETE STRUCTURES - I

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) Write the difference between Limit state design method and working stress method
(b) Calculate moment of resistant constant for M25 & Fe415 using Working stress method.
(c) Calculate percentage of steel required for balanced section for limit state design if M30 and Fe500 used.
(d) Discuss the relationship between characteristic strength and characteristic load.
(e) Discuss idealized stress – strain curve for concrete used in Limit state method.

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

(a) A reinforced concrete beam 300 mm wide and 600 mm total depth has a span of 5.0 m. Determine the necessary reinforcement at the mid span, to enable the beam to carry a load of 20 KN/m, if beam is simply supported. Use M20 grade concrete & Fe415. Use Limit state method.
(b) A RCC beam 300x450 mm effective depth is reinforced with 3 # 20 mm Fe415 steel bars, subjected to bending moment of 175 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.

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

(a) A T-beam has a flange of effective width 2500 mm and depth 120 mm. The web below is 250 mm x 450 mm. Determine the areas tension steel needed for the cross-section if it is to carry a factored bending moment of 500 kNm. Assume M25 grade concrete and Fe 415 grade steel.
(b) Determine area of reinforcement required for a beam 250x550 mm subjected to a load of 35 KN/m. Use M25 and Fe415 steel. Take d' = 50 mm and L = 6 m
(c) A R. C. beam 250 x 450 mm overall is reinforced with 3 Nos. of 20 mm dia bars of grade Fe415, on the tension side with an effective cover of 50 mm . If the shear reinforcement of 2 legged 8 mm stirrups at a spacing of 200 mm c/c is provided at a section. Determine the total design shear force at that section it can carry. Assume M25 grade concrete.

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

(a) An interior panel of a slab of size 3.5 m x 5.0 m. slab is supported on 250 mm wide beam all around. Live load = 3.0 KN/m^2 Finish = 1.0 KN/m^2, Determine the main reinforcement required at mid span and at support section of the slab. Use M20 & 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 1250 KN. Using helical reinforcement. Show the reinforcement details.

(b) Design a column if one side is 300 mm, it carries an axial load of 800 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= 100 KNm , SF = 150 KN and Torsional moment = 25 KNm.