

**University of Mumbai**  
**Examination: First Half 2022 (May-June 2022)**

Program: **Civil Engineering**  
Curriculum Scheme: **R2016 (CBCS)**  
Examination: **BE Semester: VIII**

Course Code: **CEC801** Course Name: **Design & Drawing of Reinforced Concrete Structures**  
Time: **2 Hours 30 minutes** Max. Marks: **80**

- N. B.** 1) Question No. 1 is compulsory.  
2) Attempt any one sub question from question No. 2 and 3.  
3) Attempt any two sub questions from question No. 4.  
4) Use of relevant IS 456: 2000 and IS 3370: 2009 Code is permitted.  
5) Assume suitable data if required and state it clearly

Q1.	<b>Choose the correct option for the following questions. All the Questions are compulsory and each question carries two marks</b>
1.	If thickness of slab is 170 mm, then its dead load is
Option A:	4500 N/m <sup>2</sup>
Option B:	4250 N/m <sup>2</sup>
Option C:	4100 N/m <sup>2</sup>
Option D:	4850 N/m <sup>2</sup>
2.	In case of singly reinforced beam if $x_u / d$ is equal to the limiting value $X_{u\max} / d$ then the section is
Option A:	Over reinforced section
Option B:	Under reinforced section
Option C:	Balanced section
Option D:	Neutral section
3.	The vertical distance between the horizontal surfaces of two consecutive stair steps is called
Option A:	Rise
Option B:	Nosing
Option C:	waist slab
Option D:	winder
4.	If number of risers used in stair case are 12 in each flight, then number of treads in each flight are equal to
Option A:	13
Option B:	09
Option C:	10
Option D:	11
5.	Toe slab is a part of
Option A:	Retaining wall
Option B:	Water tank
Option C:	Stair case
Option D:	Flat slab
6.	What is the area of vertical distribution steel of a circular tank by IS code method if thickness of wall is 170 mm.

Option A:	763 mm <sup>2</sup>
Option B:	620 mm <sup>2</sup>
Option C:	510 mm <sup>2</sup>
Option D:	850 mm <sup>2</sup>
7.	A method of prestressing concrete in which the tendons are tensioned before the concrete is placed is called
Option A:	Posttensioning
Option B:	Tendon
Option C:	Debonding
Option D:	Pretensioning
8.	Loss of stress due to friction depends upon
Option A:	Coefficient of friction
Option B:	Modulus of elasticity of concrete
Option C:	Relaxation of steel
Option D:	Anchorage slip
9.	Lap splices shall not be provided at
Option A:	At mid span
Option B:	With in a joint
Option C:	Long span
Option D:	With in a distance of 5d from the face of joint
10.	Now india is divided into ----- seismic zones.
Option A:	5
Option B:	3
Option C:	<b>4</b>
Option D:	6

<b>Q. 2</b>	Solve <i>any one Question</i> out of the two.	<b>20 marks</b>
<b>A</b>	Design a 4.5 m x 6.5 m interior panel of a two-way continuous slab for a live load of 3000 N/m <sup>2</sup> . Use M20 concrete and Fe415 steel.	
<b>B</b>	Design a reinforced concrete cantilever type retaining wall having a 5 m tall stem. The wall retains soil level with its top. The soil weighs 18000 N/m <sup>3</sup> and has angle of repose of 30°. The safe bearing capacity of soil is 200 KN/m <sup>2</sup> . Coefficient of friction between soil and concrete is 0.55. Use M20 concrete and Fe415 steel. Draw the reinforcement details.	

<b>Q. 3</b>	Solve <i>any One Question</i> out of the two.	<b>20 marks</b>
<b>A</b>	Design a dog legged staircase for floor-to-floor height of 3.1 m subjected to live load of 3 KN/m <sup>2</sup> and floor finish of 1 KN/m <sup>2</sup> . Available room size is 3.5 m x 5 m. Draw reinforcement details for both the flights. Use M20 grade of concrete and Fe415 steel.	
<b>B</b>	Design a circular water tank of capacity 2500000 liter if the depth of water in the tank be limited to 3 m with 0.25 m free board. The joint of the wall and base slab is rigid. Use IS code method to design the walls. Sketch the reinforcement details.	

<b>Q. 4</b>	Solve <i>any Two Question</i> out of the three.	<b>20 marks</b>
<b>A</b>	A prestress concrete beam 200 mm wide and 300 mm deep is prestressed with wires (area = 320 mm <sup>2</sup> ) located at a constant eccentricity of 50 mm and carrying an initial stress of 1000 N/mm <sup>2</sup> . The span of the beam is 10 m. Calculate the percentage loss of stress in wires if i) if the beam is pretensioned and ii) the beam is post-tensioned, using the following data. $E_s = 210 \text{ KN} / \text{mm}^2$ , $E_c = 35 \text{ KN} / \text{mm}^2$ , Relaxation of steel stress = 5 percent of initial stress, shrinkage of concrete = $300 \times 10^{-6}$ for pretensioning and $200 \times 10^{-6}$ for post tensioning, creep coefficient = 1.6, slip at anchorage = 1 mm, frictional coefficient for wave effect = 0.0015 per m.	
<b>B</b>	What is the importance of ductile design and detailing in earthquake resisting structures? Discuss in detail.	
<b>C</b>	What are the different systems of pre-tensioning in prestress concrete. Explain anyone system.	