

Enrollment No.....



Faculty of Engineering  
End Sem Examination May-2024  
CE3CO28 RCC Design

Programme: B.Tech.

Branch/Specialisation: CE

**Duration: 3 Hrs.****Maximum Marks: 60**

Note: All questions are compulsory. Internal choices, if any, are indicated. Answers of Q.1 (MCQs) should be written in full instead of only a, b, c or d. Assume suitable data if necessary. Notations and symbols have their usual meaning.

IS456-2000 will be provided.

- Q.1 i. Partial safety factors considered for dead load in the limit state design method is- 1  
 (a) 1.5 (b) 1.15 (c) 1.25 (d) None of these
- ii. Full form of HYSD in RCC- 1  
 (a) High Strength Deformed Bars  
 (b) High Yield Strength Deformed Bars  
 (c) Hardcore Yield Strength Developed Bars  
 (d) High Yield Strength Developed Bars
- iii. Deflection check for a flexure member is- 1  
 (a) Aspect ratio (b) Modular ratio  
 (c) Span/depth ratio (d) Water/cement ratio
- iv. The minimum effective cover provided in an RCC beam while the environmental conditions are mild and bars provided are 25mm diameter- 1  
 (a) 35 mm (b) 30 mm (c) 25 mm (d) 20 mm
- v. Generally, 50% reinforcement in slab is bent to take care of- 1  
 (a) Shear force  
 (b) Bending moment at the section  
 (c) Possible negative moment at the support  
 (d) None of the given
- vi. A slab 4m x 5m can be designed two way in which condition- 1  
 (a) Its depth is restricted  
 (b) It has support on all four edges  
 (c) It is provided with reinforcement in both directions  
 (d) None of these

[2]

- vii. AS per IS code the minimum diameter for longitudinal bars in column is- **1**  
 (a) 5mm (b) 12mm (c) 16mm (d) 20mm
- viii. Which set of statement for Pitch of ties in column is correct? **1**  
 I. Max. dimension of column  
 II. 300 mm  
 III. 16 times diameter of main bar  
 (a) I and II (b) I, II and III (c) II and III (d) None of these
- ix. A footing is carrying a column which bears 900 kN load, if the SBC of soil is 150 kN/m<sup>2</sup>, the area of footing required will be- **1**  
 (a) 6m<sup>2</sup> (b) 6.6 m<sup>2</sup> (c) 9 m<sup>2</sup> (d) 9.6 m<sup>2</sup>
- x. The critical section for shear in footing is taken at- **1**  
 (a) Face of column  
 (b) Distance half the depth of column from face of column  
 (c) Distance equal to depth of column from face of column  
 (d) Distance equal to depth of footing from face of column
- Q.2 Attempt any two: **5**
- i. Write down the assumptions made in limit state method for collapse (flexure). Establish formula for  $X_{umax}$ . **5**
- ii. Differentiate under and over reinforced sections. **5**
- iii. A rectangular beam section 300mm x 500mm effective size is provided with 3 bars of 20 mm diameter as tensile steel. If the concrete is M20 grade and steel Fe 415, find that section is under or over reinforced. **5**
- Q.3 i. What are the limit states of serviceability? **3**
- ii. Design a rectangular beam to carry an overall load of 15 kN/m. The clear span of the beam is 5.50m. The bearing at each end is 300mm. Use M20 concrete and Fe415 steel. **7**
- OR iii. Design a cantilever beam for a span of 3.00m carrying a overall load of 14 kN/m. Use M20 conc. and Fe 415 steel. **7**
- Q.4 i. Give Codal provisions for slab design in following points: **3**  
 (a) Depth (b) Reinforcement spacing (c) Span ratio
- ii. Design a simply supported slab supported on 200 mm wide beam to the following requirements- **7**  
 (a) Clear span = 3m  
 (b) Live load = 4 kN/m<sup>2</sup>  
 (c) Use M20 concrete and Fe 415 steel.

[3]

- OR iii. Design a two-way slab of 4m x 5m effective size, to carry a live load of 4 kN/m<sup>2</sup>. Use M 20 concrete and Fe415 steel and assume all the edges discontinued. **7**
- Q.5 i. Define short column, long column and slenderness ratio. **4**
- ii. A short RCC column 400mm x 400mm is provided with 4 bars of 16mm and 4 bars of 12mm diameter. If the effective length of column is 4 m, find the ultimate load for the column. Use M20 concrete and Fe 415 steel. **6**
- OR iii. A rectangular concrete column is 400mm x 300mm and has to carry a factored load of 1500 kN. The unsupported length of the column is 3m. Find the area of reinforcement required. Use M20 concrete and Fe 415 steel. **6**
- Q.6 i. List out the causes of failure of foundations. **3**
- ii. A square column 400mm x 400mm carries an axial load of 1200kN. Design square column footing (pad type) if the BC of soil is 200kN/m<sup>2</sup>. Use M20 concrete and Fe 415 steel. **7**
- OR iii. A square column 400mm x 400mm carries an axial load of 1400kN. Design square column footing (sloped type) if the BC of soil is 220kN/m<sup>2</sup>. Use M20 concrete and Fe 415 steel. **7**

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[4]  
**Marking Scheme**  
RCC Design (T) - CE3CO28 (T)

Q.1	i)	a		<b>1</b>
	ii)	b		<b>1</b>
	iii)	c		<b>1</b>
	iv)	c		<b>1</b>
	v)	c		<b>1</b>
	vi)	b		<b>1</b>
	vii)	b		<b>1</b>
	viii)	c		<b>1</b>
	ix)	b		<b>1</b>
	x)	d		<b>1</b>
Q.2	i.	Assumptions -	3 Marks	<b>5</b>
		formula derivation -	2 Marks	
	ii.	Definition-	2 Marks	<b>5</b>
		Relation -	3 Marks	
OR	iii.	5		<b>5</b>
Q.3	i.	Each condition with proper explanation-	1.5Marks Each	<b>3</b>
	ii.	Design -	7 Marks	<b>7</b>
OR	iii.	Design -	7 Marks	<b>7</b>
Q.4	i.	For each provision -	1 Marks	<b>3</b>
	ii.	Design -	7 Marks	<b>7</b>
OR	iii.	Design -	7 Marks	<b>7</b>
Q.5	i.	Each Definition -	1.5 Marks	<b>4</b>
	ii.	Load-	6 Marks	<b>6</b>
OR	iii.	Area of reinforcement-	6 Marks	<b>6</b>
Q.6				
	i.	for each	1 Marks	<b>3</b>
	ii.	Design -	7 Marks	<b>7</b>
	iii.	Design -	7 Marks	<b>7</b>

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