

Enrollment No.....



**Faculty of Engineering**  
**End Sem (Even) Examination May-2022**  
**CE5CS06 Design of Concrete Structures**

Programme: M.Tech.

Branch/Specialisation: CE

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

Note: 1. 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.

2. Use of Codes IS 456 is permitted.

- Q.1 i. If  $h_w/l_w < 1$ , it is called as ..... shear wall. 1  
 (a) Squat (b) Short (c) Slender (d) None of these
- ii. Minimum thickness of shear wall as per IS 13920 is- 1  
 (a) 150 mm (b) 100 mm (c) 450 mm (d) None of these
- iii. Which is not a limitation of direct design method of flat slab? 1  
 (a) There shall be minimum of three continuous spans in each direction,  
 (b) The panels shall be rectangular, and the ratio of the longer span to the shorter span within a panel shall not be greater than 2.0,  
 (c) It shall be permissible to offset columns to a maximum of 10 percent of the span in the direction of the offset notwithstanding the provision in (b),  
 (d) None of these
- iv. A continuous beam is considered as deep beam, if effective span to overall depth ratio is less than- 1  
 (a) 2.5 (b) 2 (c) 4 (d) None of these
- v. Folded plates are subjected to- 1  
 (a) Plate action (b) Slab action  
 (c) Both (a) and (b) (d) None of these
- vi. In general, ..... is/are applicable to all proportions of folded plates and ideally suited for use in design office. 1  
 (a) Whitney method (b) Simpson method  
 (c) Both (a) and (b) (d) None of these
- vii. Gauss curvature is zero for .... 1  
 (a) Synclastic shells (b) Anticlastic shells  
 (c) Singly curved shells (d) None of these

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- viii. Frames provided at ends of shell to support and preserve the geometry of the shell are called as- **1**  
 (a) Traverses (b) Chord width  
 (c) Edge beams (d) All of these
- ix. While calculating deflection due to shrinkage for cantilever, coefficient  $K_3$  is equal to- **1**  
 (a) 0.063 (b) 0.125 (c) 0.5 (d) 0.086
- x. The surface width of the cracks should not, in general, exceed..... in members where cracking is not harmful and does not have any serious adverse effects upon the preservation of reinforcing steel nor upon the durability of the structures. **1**  
 (a) 0.1 mm (b) 0.3 mm (c) 0.01 (d) 1.0
- Q.2 Attempt any two: **5**
- What are shear walls? Also specify their classifications. **5**
  - Define boundary element in shear wall; with proper sketches. **5**
  - Draw stress and strain diagrams for concrete and steel in shear walls with proper illustrations. **5**
- Q.3 i. Explain load sharing of grid beams with help of diagrams and formulae. **3**
- ii. For the following data calculate deflection at the centre of the grid plate by rigorous method- **7**  
 $2a = 200 \text{ mm}$ ,  $2b = 600 \text{ mm}$ ,  $C = 0.191$ ,  $a_1$  and  $b_1 = 2\text{m}$ ,  $k_1 = 0.263$ ,  $q = 7 \text{ kN/m}^2$ , M-20 Grade Concrete,  $a_x = 12 \text{ m}$ ,  $b_y = 16 \text{ m}$ .
- OR iii. Calculate the negative and positive BMs in column and middle strips of flat slab interior panel (with drop) of size  $6\text{m} \times 6\text{m}$  supported by  $500\text{mm} \times 500\text{mm}$  column size. LL =  $3 \text{ kN/sq. mt.}$  and weight of finishes =  $2.5 \text{ kN/sq. mt.}$  **7**
- Q.4 i. What is slab action and plate action in folded plates? **3**
- ii. A folded plate with two folds AB and BC is subjected to moments in the plane of the plates. Calculate the stress in the folded plate, using following data- Thickness of plate  $110 \text{ mm}$ , depth of plate  $2.1 \text{ m}$ , Moment in plate  $M_1$  and  $M_2 = 360 \text{ kN-m}$ . **7**
- OR iii. Derive the equation of three shear for folded plate. **7**

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- Q.5 i. What is Gauss Curvature? Define shells on its basis. **3**
- ii. Design a Hyper shell roof of the inverted umbrella type, supported on central RCC column to cover a plan area of  $10\text{m} \times 10\text{m}$ . Use M-20 grade concrete and Fe 415 steel grade. **7**  
 Assume other data suitably, if any.
- OR iii. A RCC shell with circular directrix bearing following parameters- **7**  
 Semi central angle =  $60^\circ$ ,  $2L = 24 \text{ m}$ ,  $R = 6 \text{ m}$ ,  $t = 60 \text{ mm}$ . The shell is subjected to load intensity of  $0.75 \text{ kN/m}^2$  of curved surface. Determine the maximum stresses in the shell. Also calculate maximum BM and tension in edge beam.
- Q.6 Attempt any two: **5**
- Explain components of short term and long-term deflections. **5**
  - Discuss the factors which may affect creep deformation. **5**
  - Discuss major influencing factors which control the width of cracks in a flexural member. **5**

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# Scheme of Marking



Faculty of Engineering  
End Sem (Even) Examination May-2022  
Design of Concrete Structures (T) - CE5CS06 (T)

Programme: M.Tech. Branch/Specialisation: Civil/Structural Engineering

Q.1	i)	If $h_w/l_w < 1$ , it is called as .....shear wall. (a) Squat	1
	ii)	Minimum thickness of shear wall as per IS 13920 is (a) 150 mm	1
	iii)	Which is not a limitation of Direct Design method of Flat slab? (d) None of these	1
	iv)	A continuous beam is considered as deep beam, if effective span to overall depth ratio is less than – (a) 2.5	1
	v)	Folded plates are subjected to – (c) both of these	1
	vi)	In general, ..... is/are applicable to all proportions of folded plates and ideally suited for use in design office. (c) both of these	1
	vii)	Gauss curvature is zero for .... (c) Singly curved shells	1
	viii)	Frames provided at ends of shell to support and preserve the geometry of the shell are called as – (a) Traverses	1
	ix)	While calculating deflection due to shrinkage for cantilever, coefficient $K_3$ is equal to- (c) 0.5	1
	x)	The surface width of the cracks should not, in general, Exceed..... in members where cracking is not harmful and does not have any serious adverse effects upon the preservation of reinforcing steel nor upon the durability of the structures (b) 0.3 mm	1
Q.2		Attempt any two:	
	i.	Definition 2.5 marks, classification 2.5 marks	
	ii.	Definition 2.5 marks, sketches 2.5 marks	
	iii.	Strain diagram, stress diagrams for concrete and steel 3@1 marks=3 marks, Illustration 2 marks	

Q.3	i.	Explanation 1 marks, diagram 1 marks, formulae 1 marks	
	ii.	Calculation of Denominator factors (3 nos.) 3@1 marks=3 marks, Formulae 1 marks, calculations=3 marks	
OR	iii.	Calculation of loads 2.0 marks, calculation of negative and positive BMs in both strips 4.0 marks	
Q.4	i.	Slab action 1.5 marks, plate action 1.5 marks	
	ii.	Preliminary calculations 1 marks, Calculation of edge shear forces 3 marks, calculation of resultant stresses 3@ 1 mark=3 marks. Stress diagrams=1 marks	
OR	iii.	Equations for top stresses 2@1.5 marks =3 marks, equations for components 2@ 1.5 mark=3 marks, final equation 1 mark	
Q.5	i.	Definition 1.5 marks classification 1.5 marks	
	ii.	Tensile stress calculation 2.5 marks, compression ribs 2.5 marks, edge beams 2.0 marks	
OR	iii.	Calculation of Maximum stress 3 marks, Maxi. BM 2 marks, Tension 2 marks	
Q.6		Attempt any two:	
	i.	Each components @1 marks = 5 marks	
	ii.	Minimum 3 factors with equal weightage	
	iii.	Minimum 3 factors with equal weightage	