

Name :
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APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
07 THRISSUR CLUSTER

FIRST SEMESTER M.TECH. DEGREE EXAMINATION MARCH 2021

Department of Civil Engineering

Structural Engineering

07CE6303 ADVANCED DESIGN OF CONCRETE STRUCTURES

Time:3 hours

Max.Marks: 60

Answer all six questions. Part 'a' of each question is compulsory.

Answer either part 'b' or part 'c' of each question

(The use of IS 456-2000,ACI 318 are permitted in the examination hall)

(Make and state necessary assumptions wherever necessary)

Q.no.	Module 1	Marks
1a	What is confined concrete? Discuss how the spiral and rectangular hoop reinforcements enhances the strength of concrete.	4

Answer b or c

- | | | |
|---|---|---|
| b | The cross section of a simply supported beam of 6m span is 300mm x 400 mm. The beam is supporting a uniformly distributed live load of intensity 10kN/m over entire span. The beam is supporting a superimposed dead load of 10kN/m in addition to self weight. The beam is reinforced with 3 nos of 16 mm diameter bars at top and 3 Nos. of 20 mm diameter bars at bottom with clear covers of 25 mm each. Assume M20 concrete and Fe415 grade steel. Calculate the short term deflection at mid-span due to live load alone. | 5 |
| c | i) Explain stress-strain characteristics of reinforcing steel and the 'Bauschinger' effect of steel under cyclic loading. | 2 |

	ii) Explain the behavior of concrete under uniaxial and triaxial stresses.	3
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Q.no.	Module 2	Marks
2a	What are the factors affecting the crack width? Explain with codal provisions for reducing the crack width.	4

Answer b or c

- | | | |
|---|---|---|
| b | A beam of width 300mm,depth 500mm and clear cover of 20mm is reinforced with 3-25mm Φ bars. Section is subjected to a maximum bending moment of 450kNm. Calculate the maximum probable crack width as per IS 456. Assume | 5 |
|---|---|---|

M20 concrete and Fe415 steel.

- c Illustrate the steps involved in the design of shear wall as per IS 13920:1993 **5**

Q.no.	Module 3	Marks
3a	How are the ties designed in Strut and Tie Models?	4

Answer b or c

- b** A transfer girder has to carry two 600mm square column each with a factored load of 4000 kN located at 1/3 rd of the span. The beam has a thickness of 600mm. Total height of 4000mm over a span of 12m. Design the beam for the given loads using ACI method, ignoring self weight. Adopt M35 concrete and Fe415 steel. **5**
- c** Design a corbel projecting from a 350 mm x 350 mm column. It is to be designed to support a precast beam reaction forces at 100 mm from the face of column. The factored vertical load to be carried is 350 kN. A horizontal force of 50 kN is assumed to develop to account for creep & shrinkage deformation. Adopt M 35 concrete and Fe 415 steel. **5**

Q.no.	Module 4	Marks
4a	What are the different types of raft foundations ?	4

Answer b or c

- b** A building consists of 9 columns 400mm X 400mm sizes arranged in 3 rows of three each. The distance between the columns is 5.0 m each. The total service load on all the columns is 500kN. The allowable soil pressure is 100 kN/m². Design the raft foundation. **5**
- c** Outline the procedure for designing a raft slab for a chimney supported on a ring beam over the raft. **5**

Q.no.	Module 5	Marks
5a	Explain the different types of pile foundations.	5

Answer b or c

- b** Design a pile for transmitting an axial load of 1200kN. The pile is to be embedded in hard strata up to a depth of 6 m. Use M 20grade of concrete and Fe415 grade steel **7**
- c** Design a pile cap for a column of size 500 mm X 500 mm carrying a load of 1500kN, supported by two piles. The size of the piles may be taken as 300 mm x 350 mm. The c/c distance between the piles is 1.2m. Use the M30 concrete and Fe415 grade steel. **7**

Q.no.	Module 6	Marks
6a	What is meant by 'moment redistribution' and what are its implications in the design of design of RCC sections.	5
Answer b or c		
b	i) Explain the limitations given in the IS code regarding 'moment redistribution'	4
	ii) Can the 'moment redistribution' be applied to the design of columns, why?	3
c	Draw the design bending moment diagram of a beam of span 6 m, fixed at both ends and carrying ultimate uniformly distributed load of 20kN/m with full redistribution of 30 %	7