

**Gandhi Institute of Engineering and Technology University, Odisha, Gunupur
(GIET University)**



M.Tech. (Second Semester - Regular) Examinations, May - 2026
24MSEPC12001 – Advanced Reinforced Concrete Design
(Structural Engineering)

Time: 3 hrs

Maximum: 60 Marks

Answer ALL questions

(The figures in the right hand margin indicate marks)

PART – A**(2 x 5 = 10 Marks)**Q.1. Answer **ALL** questions

	CO #	Blooms Level
a. Define characteristic load.	CO1	K2
b. State the assumptions made in limit state design for flexure.	CO2	K2
c. Define slenderness ratio.	CO3	K2
d. Define two-way slab.	CO4	K2
e. Define shape factor..	CO5	K2

PART – B**(10 x 5 = 50 Marks)**Answer **ALL** the questions

	Marks	CO #	Blooms Level
2.a. Explain the behavior of under-reinforced, balanced, and over-reinforced sections with neat sketches.	5	CO1	K3
b. Describe the stress-strain characteristics of concrete and reinforcing steel adopted in Limit State Design.	5	CO1	K3
(OR)			
c. Discuss the design principles of doubly reinforced beams using Limit State Method.	5	CO1	K3
d. Explain the effect of torsion on cracking behavior of reinforced concrete beams.	5	CO1	K3
3.a. Determine the moment of resistance of a section 350 mm wide and 500 mm deep upto the centre of reinforcement, if it is reinforced with			
i. 4-12 mm Fe 415 grade bars.	10	CO2	K3
ii. 5-18 mm Fe 415 grade bars			
(Assume M20 Concrete)			
(OR)			
b. A RC beam has an effective depth of 400 mm and width of 300 mm. It contains 3-25 mm Fe 500 grade bars in tension. Determine the shear reinforcement needed for a factored shear force of 250 kN if	10	CO2	K3
i. Mix is M20			
ii. Mix is M 30			
4.a. Design a slender braced circular column under uni-axial bending with the following data:			
Size of column = 40 cm			
Effective length = 6 m			
Unsupported length = 7 m	10	CO3	K3
Factored load = 1200 kN			
Factored moment = 75 kNm (top) and 50 kNm (bottom)			
Assume M20 grade concrete and Fe415 steel.			

(OR)

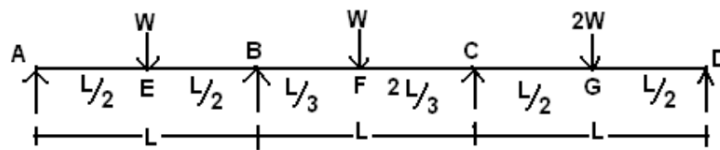
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|------|--|----|-----|----|
| b. | Explain the significance of crack width limitation in water retaining structures. | 5 | CO3 | K3 |
| c. | Explain the design procedure for axially loaded short columns. | 5 | CO3 | K3 |
| 5.a. | A square slab is simply supported on three sides and is free on the fourth side. If the moment capacities are equal in both directions, calculate collapse load. | 10 | CO4 | K3 |

(OR)

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|------|--|---|-----|----|
| b. | Explain the internal and external work done in yield line analysis. | 5 | CO4 | K3 |
| c. | Discuss the advantages of yield line theory over elastic analysis. | 5 | CO4 | K3 |
| 6.a. | Discuss the different types of collapse mechanisms in beams. | 5 | CO5 | K3 |
| b. | Discuss the behavior of statically indeterminate structures under plastic loading. | 5 | CO5 | K3 |

(OR)

- c. Determine the collapse load 'W' for the continuous beam with constant plastic moment M_p .



10 CO5 K3

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