Enrollment No......................................

Faculty of Engineering

End Sem (Odd) Examination Dec-2022
CE3ES02 / CE3ET02
Advanced Design of RCC Structures

Programme: B.Tech.   Branch/Specialisation: CE

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

Note: (a) 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.

       (b) Assume all suitable data. IS code for relevant design are permitted.

Q.1   i.   What is the degree of static indeterminacy of a pin supported portal   **1**
frame?
(a) 1   (b) 2   (c) 3   (d) 4

   ii.   Minimum grade of concrete in RCC for mild exposure condition-   **1**
(a) M20   (b) M30   (c) M40   (d) M45

   iii.   Toe projection of cantilever retaining wall-   **1**
(a) 0.3B   (b) 0.4B   (c) 0.5B   (d) 0.6B

   iv.   Shear Key below the retaining wall is mainly designed to avoid   **1**
_____.
(a) Sliding   (b) Overturning
(c) Both (a) and (b)   (d) None of these

   v.   The modular ratio m of a concrete whose permissible compressive   **1**
stress is C, may be obtained from the equation.
(a) 280/3C   (b) 300/3C   (c) 380/3C   (d) 480/4C

   vi.   According to IS: 3370 (Part-2) permissible direct tensile stress in   **1**
M25 grade of concrete.
(a) 1.3   (b) 1.5   (c) 1.7   (d) 1.9

   vii.   Major load in the silo is resisted by _____ action.   **1**
(a) Bearing   (b) Bearing compression
(c) Shearing tension   (d) Friction on side walls

   viii.   Formula for hoop tension is-   **1**
(a) PD/6t   (b) PD/4t   (c) PD/2t   (d) PD/8t

ix. The classification of prestressed concrete is based on the method of _____. **1**
(a) Bending moments   (b) Stresses acting
(c) Designing   (d) Loading

x. Prestressed concrete is widely used in construction by _____. **1**
(a) Bore wells   (b) Houses
(c) Nuclear pressure vessels   (d) Roofs

Q.2 i. Draw diagram showing various components of industrial shed. **3**

ii. A portal frame with ends hinged is to be analysed for the following data: **7**
Spacing of frames = 4.5m, height of columns = 4.5m, distance between column centres = 10m, LL on roof = $2.5kN/m^2$, SBC of soil is 150kN/square meter. Find design moments.

OR iii. Solve the frame shown in Fig. 01 by portal method. **7**

FIG:01
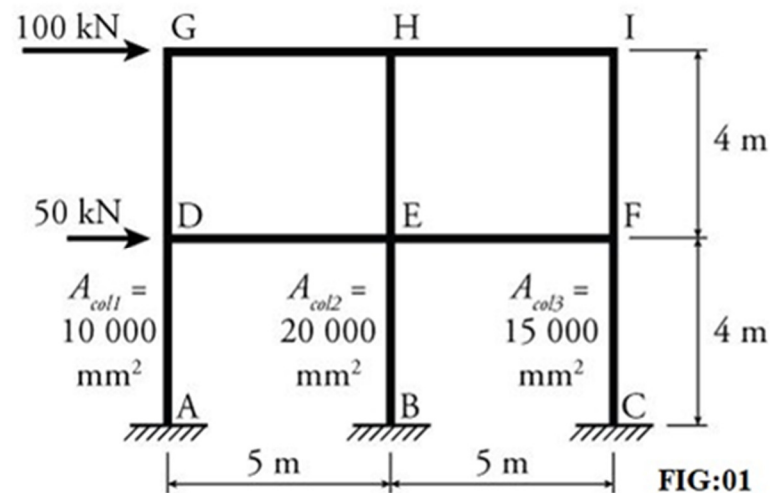
Q.3 i. Define retaining wall. Give the name of various type of retaining wall. **3**

ii. Design a cantilever retaining wall to retain an earth embankment with a horizontal top 3.5 m above ground level, density of earth $=18kN/m^3$ angle of internal friction=30 degree, SBC of soil is $200kN/m^2$.Take coefficient of friction between soil and concrete 0.5. Adopt M20 grade concrete and fe415 steel. **7**

OR iii. Design a counterfort retaining wall to retain an earth embankment 10m high above base slab, density of earth $=18kN/m^3$ angle of internal friction=30 degree, SBC of soil is $200kN/m^2$.Take coefficient of friction between soil and concrete 0.45. Adopt M30 grade concrete and fe250 steel. Assume centre to centre spacing between counterfort as 5 m. **7**

Q.4 i. What do you understand by water tank? What are the requirements of water tank? **3**

ii. Design a circular water tank with flexible base for capacity of 400kl.The depth of water is to be 5m. Take M20 and Fe250. **7**

OR iii. Design a wall of circular water tank of 200kl capacity having rigid wall and base connection. Maximum depth of water is limited to 3.2m. **7**

Q.5 i. Write the difference between bunker and silo. **3**

ii. A silo with internal diameter 6m. height of cylindrical portion 15m and central opening with 0.5m is to be built to store wheat. Design the cylindrical wall. **7**

OR iii. Design a bunker to store 330 kN of coal with the following data: **7**
Unit weight of coal=$8400N/m^3$
Angle of repose=30 degree
Coefficient of friction between coal and concrete=0.45

Q.6 i. Discuss the advantages of prestressed concrete. **3**

ii. A simply supported prestressed concrete beam of rectangular cross section 400*600mm is loaded with a total uniformly distributed load of 256 kN over a span of 6m. Sketch the distribution of stresses at mid span and end section if the prestressing force is 1920kN and the tendon is- **7**
(a) Concentric
(b) Eccentric located at 200 mm above the bottom fibre

OR iii. State the various losses in pretensioned member with expression. **7**

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Marking Scheme
CE3ET02 Advanced Design of RCC Structures

Q.1		What is the degree of indeterminacy of a pin supported portal frame? B) 2	1
	i)	Minimum grade of concrete in RCC for mild exposure condition A) M20	1
	ii)	Toe projection of cantilever retaining wall A)0.3B	1
	iii)	Shear Key below the retaining wall is mainly designed to avoid _____. A)Sliding	1
	iv)	The modular ratio m of a concrete whose permissible compressive stress is C, may be obtained from the equation. A) 280/3c	1
	v)	According to IS : 3370 (Part-2)permissible direct tensile stress in M25 grade of concrete. A)1.3	1
	vi)	Major load in the silo is resisted by ……..action D)friction on side walls	1
	vii)	Formula for hoop tension is C)PD/2t	1
	viii)	The classification of prestressed concrete is based on the method of _____ B)Stresses acting	1
	ix)	Prestressed concrete is widely used in construction by _____ c) Nuclear pressure vessels	1

Q.2	i.	Draw Diagram Showing various Components of Industrial Shed. 1 mark for each diagram	3
	ii.	General details 1 mark Load Calculation 2 marks Design moments For Beam 2 marks For column 2 marks	7
	iii.	shear force in column 0 .5 marks moment in column 2marks shear force in beam 0.5 marks moment in beam 2 marks	7
Q.3	i.	Define Retaining wall? 1 mark Give the name of various type of retaining wall ? 2 marks	3
	ii.	Design the stem of cantilever General arrangement details/drawing 1.5 mark Proportioning 1 mark Calculation of earth pressure 2 marks Calculation of Bending moment 1.5 marks Design of stem (steel calculation) 1 mark	7
OR	iii.	Design the slab of a counterfort General arrangement details 1.5 mark Drawing 1 mark Calculation of earth pressure 2 marks Calculation of Bending moment 1.5 marks Design the upright slab (steel calculation) 1 mark	7
Q.4	i.	what do you understand by water tank ? 1 mark what are the requirement of water tank? 2marks	3
	ii.	Design a circular tank with flexible base for capacity 400 kL. General arrangement 1 mark Capacity calculation 1.5 marks	7

		Hoop tension and steel calculation 2 marks Vertical steel calculation 1.5 marks Sketch 1 mark	
OR	iii.	Design a circular tank with rigid base for capacity 200 kL. General arrangement 1 mark Capacity calculation 1.5 marks Hoop tension and steel calculation 2 marks Vertical steel calculation 1.5 marks Sketch 1 mark	7
Q.5	i.	Difference between bunker and silo? 1 mark each difference	3
	ii.	Design the cylindrical wall and apply checks. Pressure calculation 3 marks Design 2 marks Checks 2 marks	7
OR	iii.	Design side walls of a rectangular bunker Pressure calculation 3 marks Design 3 marks Sketch 1 mark	7
Q.6	i.	advantages of prestressed concrete 1 marks each	3
	ii.	Find eccentric prestressing force General arrangement details / sketch 2 marks Formula 1 mark Calculation of e" and equation framing 3 marks Calculation of force 1 marks	7
OR	iii.	each losses in pretensioned member with expression? 1 marks*6 Empirical formula 1 mark	7