MUTHAYAMMAL ENGINEERING COLLEGE

(An Autonomous Institution)

(Approved by AICTE, New Delhi, Accredited by NAAC & Affiliated to Anna University)

Rasipuram - 637 408, Namakkal Dist., Tamil Nadu

MKC

CIVIL

2021-22

Must Know Concepts (MKC)

Subject		19CEC09 / DESIGN OF REINFORCED CONCRETE ELEMENTS		
S.No	**Term**	**Notation (Symbol)**	**Concept/Definition/Meaning/Units/Equation/ Expression**	**Units**
Unit I Methods of Design of Concrete Structures				
1	Size of aggregate	-	Shall not exceed one fourth of the thinnest structural member as per IS 456:2000	mm
2	Concrete	-	Strong in compression, weak in tension	-
3	Side face Reinforcement	-	If the beam depth exceeds 750mm	-
4	Unit weight of cement	-	1440	Kg/m^3
5	Factor of safety for concrete	γ	1.5	-
6	Factor of safety for steel	γ_s	1.15	-
7	Factored load	W	Working load x factor of safety	kN/m (or) kN/m^2
8	Modular ratio	m	$280/3\sigma_{cbc}$	-
9	Over all depth of beam	D	Sum of Effective depth and effective cover	mm
10	Maximum strain in concrete	ε	0.0035	-
11	Under reinforced section	-	$x_u < x_u max$	-
12	Balanced Section	-	$x_u = x_u max$	-
13	Over reinforced section	-	$x_u > x_u max$	-
14	Simply supported beam	-	A beam supported on the ends which are free to rotate and have no moment resistance	-
15	Fixed beam	-	A beam supported on both ends and restrained from rotation.	-
16	Over hanging beam	-	A simple beam extending beyond its support on one end.	-
17	Double overhanging beam	-	A simple beam with both ends extending beyond its supports on both ends	-

18	Continuous beam	-	A beam extending over more than two supports.	-
19	Cantilever beam	-	A projecting beam fixed only at one end.	-
20	Trussed beam	-	A beam strengthened by adding a cable or rod to form a truss	-
21	Compression zone	C	Above the neutral axis	-
22	Tension zone	T	Below the neutral axis	-
23	Nominal mix	-	M5, M7.5, M10, M15 and M20	-
24	Design mix	-	M25 and above	-
25	Span to effective depth ratio	-	Cantilever -7, Simply support – 20, Continuous - 26	
UNIT-II Limit State Design of Beam				
26	Bond stress	τ	Stress developed at the interface of the steel	N/mm^2
27	OPC	-	Ordinary Portland Cement	-
28	ANA	X_a	Actual depth of Neutral Axis	mm
29	CNA	X_c	Critical depth of Neutral Axis	mm
30	Effective span	l_e	Centre to centre distance of the supports	m (or) mm
31	Clear span	l	Face to face distance of supports	m (or) mm
32	Over all span	L	Outer to outer distance of supports	m (or) mm
33	Maximum permitted deflection	δ	Should not exceed span/250	mm
34	Design methods of concrete	-	Working stress method, limit state method, ultimate load method	
35	Clear cover for RCC beam	-	25mm or dia of bar(greater), 30mm or 2x dia of bar	mm
36	Size of concrete cube	-	150mmx150mmx150mm	mm
37	Characteristic compressive strength	f_{ck}	Not more than 5% of test results are expected to fall	N/mm^2
38	HYSD bars	-	High Yield Strength Deformed bars	-
39	MS bars	-	Mild Steel Bars	-
40	TMT Bars	-	Thermo Mechanical Treated bars	-
41	Mix ratio for M_{10} grade concrete	-	1:3:6	-

42	Mix ratio for M_{15} grade concrete	-	1:2:4	-
43	Mix ratio for M_{20} grade concrete	-	1:1.5:3	-
44	Types of loads	-	Live load, Dead load, Wind load, Snow load, Earth quake load	-
45	Nominal shear stress	τ_v	Vu/bd	N/mm^2
46	High strength concrete grade	f_{ck}	M_{60} to M_{80}	N/mm^2
47	Under reinforced section	-	percentage of steel in a section is less than that required for a balanced section	-
48	Over reinforced section	-	percentage of steel in a section is more than that required for a balanced section	-
49	Doubly Reinforced Sections	-	Reinforced both in tension and compression	-
50	Flange		Portion of the slab assists in resisting the effects of the loads	-
UNIT-III Limit State Design of Slab				
51	Slab	-	Horizontal thin structural element	-
52	Types of slab	-	One way slab, Two way slab	-
53	One way slab	-	The ratio of Longer to shorter span is greater than 2	-
54	Two way slab	-	The ratio of Longer to shorter span is less than or equal to 2	-
55	Effective span	-	Effective span equal to center of support (or) clean span, whichever is less	-
56	Diameter of steel bar in slab	-	Not exceed 1/8 of total thickness of slab	mm
57	Maximum spacing	-	The bars shall not be more than 3 times or 300mm Distribution bars shall not be more than 5 times (or) 450mm	mm
58	Clear cover for RCC Slab	-	15mm cover for diameter of bar less than 12mm And 20mm for diameter of bar greater than 12mm	mm
59	Staircase	-	Used to enable people or goods to be moved from floor to floor	-
60	Flight	-	Uninterrupted series of steps	-
61	Landing	-	Flat platform at the head of series of steps	
62	Stairwell	-	Space in which stair/landing are housed	
63	Handrail	-	To reduce the risk of injury from falling to a lower level	
64	Tread	-	Upper surface of a step on which the foot is placed	
65	Rise	-	Vertical portion between two successive treads	
66	Rise for residential	R	150 - 180	mm

	building			
67	Rise for public building	R	120 - 150	mm
68	Tread for residential building	T	220 - 250	mm
69	Tread for public building	T	250 - 300	mm
70	Pitch angle	-	Pitch of the stair should not be more than 38^0	Degree
71	Width of stair	-	Should be from 0.8m to 1.0m for residential building and 1.8m to 2m for public building	m
72	Number of steps	-	Each flight should not be greater than 12	Nos
73	Head room	-	Shall not be less than 2.1m	m
74	Types of staircase	-	Straight , Quarter turn, Dog – legged, Open well, geometrical, Spiral , Bifurcated	-
75	Stringer	-	The inclined sides of the stair carrying the steps	-
Unit IV Limit State Design of Columns				
76	Column	-	Vertical structural member subjected to compressive load / Compression member	-
77	Types of column	-	Short column, Long column	-
78	Short column	-	Slenderness ratio is less than 12	-
79	Long column	-	Slenderness ratio is greater than 12	-
80	Slenderness ratio	λ	Ratio between effective length of the column to least lateral dimension	-
81	Tied column	-	Main reinforcements that are tied with closely spaced ties	-
82	Spiral column	-	Longitudinal reinforcements are tied with closely spaced helix	-
83	Composite column	-	Embedded with one more materials inside of the column	-
84	Axially loaded column	-	Load acting exactly at the centroid of the column	-
85	Uniaxial loaded column	-	Axial load and bending moment along one direction	-
86	Biaxial loaded column	-	Axial load and bending moment along two direction	-
87	Braced column	-	Prevented from side sway	-
88	Unbraced column	-	Subjected to lateral deflection	-
89	Maximum strain	ε	Outermost compression fiber is taken as 0.0035 in bending	-
90	Maximum compressive	ε	Concrete in axial tension is taken as 0.002	-

	strain			
91	Minimum eccentricity	e_{min}	(L/500) + (D/30) not less than 20mm	mm
92	Ultimate load carrying capacity	Pu	$0.4f_{ck}Ac + 0.67f_yAsc$	kN
93	Minimum Number of bar	-	Rectangular column-4, Circular column - 6	Nos
94	Minimum diameter	Ø	Longitudinal reinforcement for column is 12mm	mm
95	Area of the steel in distribution steel	Ast	0.15% of the total cross sectional area for Mild steel 0.12% of the total cross sectional area for HYSD bars	mm^2
96	Unit weight	-	Brick masonry =19, Stone masonry = 23	KN/m^2
97	Slender column	-	Slenderness ratio is greater than 12	-
98	Buckling of Columns	-	Form of deformation as a result of axial-compression forces	-
99	Unsupported length	-	The clear distance between the floor and the underside of the lower beam	-
100	equivalent or effective length	-	The distance between two adjacent points of contra flexure on the column	-
Unit V Limit State Design of Footing				
101	Footing (or) Foundation	-	Which is located below the ground level	-
102	Dispersion angle	-	45^0	Degree
103	Bearing Capacity	-	The supporting power of a soil or rock is referred to as its bearing capacity	-
104	Types of foundation	-	Shallow foundation, deep foundation	
105	Shallow Foundations	-	Depth of foundation is less than or equal to its width	-
106	Allowable Bearing Capacity	-	Soil fails in shear nor there is excessive settlement	-
107	Ultimate Bearing Capacity	-	That causes failure of the soil or rock supporting the foundation.	-
108	Shear Failure	-	A failure in a soil or rock mass caused by shearing strain	-
109	General Shear Failure	-	A failure in which the shear strength of the soil	-
110	Local Shear Failure	-	A failure in which the shear strength of the soil	-
111	Punching Shear Failure	-	Shear failure where the foundation pushes	-
112	Continuous Footing	-	A horizontally long footing supporting a wall.	-
113	Deep Foundation	-	A foundation that derives its support by transferring loads to soil at some depth below the structure.	-

114	Floating Foundation	-	The weight of the building approximately equal to the full weight of soil and water removed from the site	-
115	Isolated Footing	-	Also, spread or pad footing. A footing designed to support a structural load from a single column	-
116	Shallow Foundation	-	A foundation that derives its support by transferring load directly to soil or rock at a shallow depth	-
117	Rafts or Mat	-	A structural slab utilized as a footing, which usually encompasses the entire building footprint	-
118	Types of deep foundation	-	Pile foundation Pier foundation	-
119	Batter pile	-	A pile driven in at an angle inclined to the vertical to provide higher resistance to lateral loads.	-
120	End-bearing pile	-	A pile, the support the resistance of the foundation material on which the pile tip rests.	-
121	Friction pile	-	Soil friction and/or adhesion mobilized along the side of the embedded pile.	-
122	Pier	-	Piers are often of large enough diameter to enable down-hole inspection.	-
123	Types of Piles	-	Timber, steel or pre-stressed reinforced concrete.	-
124	Well foundation	-	Adopted for bridge construction	-
125	Contact Pressure	-	Soil reaction produce a upward pressure	-

Placement Questions				
126	The brick laid with its length parallel to the face of a wall	-	Stretcher	-
127	In verandah (corridor) floors outward slope is	-	1 in 60	-
128	The local swelling of a finished plaster	-	Blistering	-
129	The portion of a brick cut across the width	-	Bat	-
130	According to ICAO, all markings on the runways are	-	White	-
131	Free body diagram is an	-	Isolated joint with all the forces	-
132	Bulking of sand is maximum if moisture content is about	-	4	%
133	For masonry work with solid bricks, consistency of mortar should be	-	9 to 13	cm

134	The forces acting on the web splice of a plate girder are	-	Shear and bending forces	-
135	Settling velocity increases with	-	Depth of tank	-
136	The plinth area of a building not includes	-	Area of cantilevered porch	-
137	Los Angeles testing machine is used to conduct	-	Abrasion test	-
138	The meander pattern of a river is developed by	-	Dominant discharge	-
139	Canals taken off from ice-fed perennial rivers, are known	-	Perennial canals	-
140	Different grades are joined together by	-	Vertical curve	-
141	What is the average of first five multiples of 12?	-	36	-
142	What is the HCF of 1095 and 1168?	-	73	-
143	What is the area of triangle with base 5m and height 10m	-	25	m^2
144	A: B: C is in the ratio of 3:2:5. How much money will C get out of Rs1260?	-	630	-
145	What is the probability of getting an even number when a dice is rolled?	-	1/2	-
146	What is the market price of a 9% share when a person gets 180 by investing Rs4000?	-	Rs.200	-
147	If 30% of a certain number is 12.6, what is the number?	-	42	-
148	Complete the series 2, 5, 9, 19, 37……..	-	75	-
149	Find the average of first 4 consecutive even numbers	-	5	-
150	Find the average of first 9 consecutive odd numbers	-	9	-
Faculty Team prepared	Dr.M.Harikaran	Signature		

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