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| Logo_MEC  **2021-2022**  **MUST KNOW CONCEPTS**  **CIVIL** | **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** |

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| **Course Code & Curse Name** | **:** | **16CED13 & Design of Reinforced Concrete Elements** |

**Year/Sem/Sec : III/V/-**

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| **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/m3 |
| 5 | Factor of safety for concrete | γ | 1.5 | - |
| 6 | Factor of safety for steel | γs | 1.15 | - |
| 7 | Factored load | W | Working load x factor of safety | kN/m (or) kN/m2 |
| 8 | Modular ratio | m | 280/3σcbc | - |
| 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 | - | xu  < xumax | - |
| 12 | Balanced Section | - | xu  = xumax | - |
| 13 | Over reinforced section | - | xu  > xumax | - |
| 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](https://en.wikipedia.org/wiki/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/mm2 |
| 27 | OPC | - | Ordinary Portland Cement | - |
| 28 | ANA | Xa | Actual depth of Neutral Axis | mm |
| 29 | CNA | Xc | Critical depth of Neutral Axis | mm |
| 30 | Effective span | le | 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 | fck | Not more than 5% of test results are expected to fall | N/mm2 |
| 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 M10 grade concrete | - | 1:3:6 | - |
| 42 | Mix ratio for M15 grade concrete | - | 1:2:4 | - |
| 43 | Mix ratio for M20 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 | τv | Vu/bd | N/mm2 |
| 46 | High strength concrete grade | fck | M60 to M80 | N/mm2 |
| 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 building | R | 150 - 180 | mm |
| 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 380 | 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 strain | ε | Concrete in axial tension is taken as 0.002 | - |
| 91 | Minimum eccentricity | emin | (L/500) + (D/30) not less than 20mm | mm |
| 92 | Ultimate load carrying capacity | Pu | 0.4fckAc + 0.67fyAsc | 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 | mm2 |
| 96 | Unit weight | - | Brick masonry =19, Stone masonry = 23 | KN/m2 |
| 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 | - | 450 | 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 | - |

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| **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 | m2 |
| 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 | - |

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| **Faculty Team Prepared** | | **Signatures** |  |
|  | **Dr.M.Harikaran** |  |
|  |  | **HoD** | **HoD** |