# LESSON PLAN FOR SUMMER SESSION (2022-23)

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| **PROGRAMME : CIVIL ENGINEERING** | **NAME OF THE FACULTY: MR. ARABINDA SAHU** |
| **COURSE NAME : STRUCTURAL DESIGN-I** | **SESSION : 2022-23** |
| **COURSE CODE : TH.1** | **DATE : 15/09/22 To 22/12/22** |
| **SEMESTER : 4TH** | **Total Week :- 14** |
| **PERIODS/WEEK: 5** | |
| **TOTAL PERIODS:70** | |

| WEEK | PERIODS | UNITS | TOPICS |
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| Feb. 3rd Week | 1 | 1 | **1. Working stress method (WSM):** 1.1<br>Objectives of design and detailing. State Different methods of design of concrete structure. |
| | 2 | 1 | 1.2 Introduction to reinforced concrete, R.C. sections their behavior, |
| | 3 | 1 | Grades of concrete and steel. Permissible stresses, assumption in W.S.M. |
| | 4 | 1 | 1.3 Flexural design of single reinforced sections from first principles. |
| | 5 | 1 | Analysis of single reinforced sections from first principles. |
| Feb. 4th Week | 6 | 1 | 1.4 Concept of under reinforced, |
| | 7 | 1 | Concept over reinforced and balanced sections, |
| | 8 | 1 | 1.5 Advantages and disadvantages of WSM, reasons for its obsolescence. |
| | 9 | 1 | 1.5 Advantages and disadvantages of WSM, reasons for its obsolescence. |
| | 10 | 2 | **2. Philosophy Of Limit State Method (LSM)** 2.1<br>Definition, Advantages of LSM over WSM, IS code suggestions regarding design philosophy. |
| Mar. 1st Week | 11 | 2 | 2.2 Types of Limit states, partial safety factors for materials strength as per IS 875 |
| | 12 | 2 | Characteristic strength,characteristic load, design load, loading on structure as per I.S. 875 |
| | 13 | 2 | 2.3 Study of I.S specification regarding spacing of reinforcement in slab, cover to reinforcement in slab, beam column & footing, |
| | 14 | 2 | Minimum reinforcement in slab, beam & column, |
| | 15 | 2 | Lapping, anchorage, effective span for beam & slab. |
| Mar. 2nd Week | 16 | 3 | **3. Analysis and Design of single and Double reinforced section (LSM)**<br>3.1 Limit state of collapse (flexure), Assumptions, |
| | 17 | 3 | Stress-Strain relationship for concrete and steel, neutral axis, |
| | 18 | 3 | Stress block diagram and strain diagram for singly reinforced section. |
| | 19 | 3 | 3.2 Concept of under- reinforced, over-reinforced and limiting section, neutral axis co-efficient, |
| | 20 | 3 | Limiting value of moment of resistance |
| Mar. 3rd Week | 21 | | **Monthly Test-1** |
| | 22 | 3 | Limiting percentage of steel required for limiting singly R.C. section. |
| | 23 | 3 | 3.3 Analysis and design: determination of design constants, |
| | 24 | 3 | Moment of resistance and area of steel for rectangular sections |
| | 25 | 3 | 3.4 Necessity of doubly reinforced section, |
| Mar. 4th Week | 26 | 3 | Design of doubly reinforced rectangular section |
| | 27 | 4 | **4. Shear, Bond and Development Length (LSM)**<br>4.1 Nominal shear stress in R.C. section, design shear strength of concrete, |
| | 28 | 4 | Maximum shear stress, design of shear reinforcement, |
| | 29 | 4 | Minimum shear reinforcement, forms of shear reinforcement. |
| | 30 | 4 | 4.2 Bond and types of bond, bond stress, check for bond stress, |
| Apr. 1st Week | 31 | 4 | Development length in tension and compression, anchorage value for hooks 90° bend |
| | 32 | 4 | Development length in tension and compression, anchorage value for hooks 90° bend |
| | 33 | 4 | Anchorage value for hooks 45° bend standards lapping of bars, check for development length. |
| | 34 | 4 | 4.3 Numerical problems on deciding whether shear reinforcement is required or not |
| | 35 | 4 | 4.3 Numerical problems on deciding whether shear reinforcement is required or not |
| Apr. 2nd Week | 36 | 4 | Numrical problem on check for adequacy of the section in shear. |
| | 37 | 4 | Design of shear reinforcement in beams (Explain through examples only). |
| | 38 | 4 | Design of shear reinforcement in beams (Explain through examples only). |
| | 39 | 4 | Design of Minimum shear reinforcement in beams (Explain through examples only). |
| | 40 | 4 | Design of Minimum shear reinforcement in beams (Explain through examples only). |
| Apr. 3rd Week | 41 | | **Monthly Test-2** |
| | 42 | 5 | **5. Analysis and Design of T-Beam (LSM)** 5.1 |
| | 43 | 5 | Effective width of flange as per IS: 456-2000 code provisions. |
| | 44 | 5 | 5.2 Analysis of singly reinforced T-Beam, strain diagram & Stress diagram, depth of neutral axis |
| | 45 | 5 | 5.2 Analysis of singly reinforced T-Beam, strain diagram & Stress diagram, depth of neutral axis |
| Apr. 4th Week | 46 | | **Internal Assessment Exam** |
| | 47 | 5 | Moment of resistance of T-beam section with neutral axis lying within the flange. |
| | 48 | 5 | Moment of resistance of T-beam section with neutral axis lying within the flange. |
| | 49 | 6 | 5.3 Simple numerical problems on deciding effective flange width. |
| | 50 | 6 | 5.3 Simple numerical problems on deciding effective flange width. |

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| Apr. 5th Week | 51 | 6 | **6. Analysis and Design of Slab and Stair case (LSM)**<br>6.1 Design of simply supported one-way slabs for flexure check for deflection control and shear. |
| | 52 | 6 | 6.1 Design of simply supported one-way slabs for flexure check for deflection control and shear. |
| | 53 | 6 | 6.2 Design of one-way cantilever slabs and cantilevers chajjas for flexure check for deflection control and check for development length and shear. |
| | 54 | 6 | 6.2 Design of one-way cantilever slabs and cantilevers chajjas for flexure check for deflection control and check for development length and shear. |
| | 55 | 6 | 6.3 Design of two-way simply supported slabs for flexure with corner free to lift. |
| May. 1st Week | 56 | 6 | 6.3 Design of two-way simply supported slabs for flexure with corner free to lift. |
| | 57 | 6 | 6.4 Design of dog-legged staircase |
| | 58 | 6 | 6.4 Design of dog-legged staircase |
| | 59 | 6 | 6.5 Detailing of reinforcement in stairs spanning longitudinally |
| | 60 | 7 | **7. Design of Axially loaded columns and Footings (LSM)** 7.1<br>Assumptions in limit state of collapse- compression. |
| May. 2nd Week | 61 | 7 | 7.2 Definition and classification of columns, effective length of column. Specification for minimum reinforcement; cover, maximum reinforcement, |
| | 62 | 7 | Number of bars in rectangular, square and circular sections, diameter and spacing of lateral ties. |
| | 63 | 7 | 7.3 Analysis and design of axially loaded short square, rectangular and circular columns (with lateral ties only). |
| | 64 | 7 | 7.3 Analysis and design of axially loaded short square, rectangular and circular columns (with lateral ties only). |
| | 65 | 7 | 7.4 Types of footing, Design of isolated square column footing of uniform thickness for flexure and shear. |
| May. 3rd Week | 66 | 7 | 7.4 Types of footing, Design of isolated square column footing of uniform thickness for flexure and shear. |
| | 67 | | **Monthly Test-3** |
| | 68 | | **Doubt Clearing Class & Previous year question Paper discussion.** |
| | 69 | | **Doubt Clearing Class & Previous year question Paper discussion.** |
| | 70 | | **Doubt Clearing Class & Previous year question Paper discussion.** |

Concern faculty

HOD
Civil engineering
13.2.23

Academic Coordinator
GP Nabarangpur

Principal
GP Nabarangpur
13/2/23