**20CE41E4 – ADVANCED STRUCTURAL DESIGN**

**(Civil Engineering)**

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| **Course Category**  | Professional Elective | **Credits** | 3 |
| **Course Type** | Theory | **Lecture - Tutorial - Practical** | 3-0- 0 |
| **Prerequisite** | Elemental Design of Reinforced Concrete Structures  | **Sessional Evaluation** | 40 |
| **Semester End Exam Evaluation** | 60 |
| **Total Marks** | 100 |

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| **Course Outcomes** | CO1 | Design slender reinforced concrete columns, concrete walls and grid floors. |
| CO2 | Analyze multi storey building frames for seismic forces. |
| CO3 | Perform Plastic design of beams and columns. |
| CO4 | Perform Plastic design of frames according to BIS code of practices. |
| CO5 | Design pre-stressed concrete beams by using limit state design. |
| CO6 | Perform the design of prestressed concrete slabs, pressure pipes and railway sleepers. |
| **Course****Content** | **UNIT – I**Design of slender columns - Concrete walls under vertical loads - Grid floors.**UNIT – II**Introduction to seismic analysis - Different methods of computing seismic forces on buildings –Analysis of multi-storey building frames - Ductility considerations in earthquake resistant design of RC buildings based on IS 13920.**UNIT – III**Plastic design of simply supported and continuous beams –Columns **UNIT – IV**Plastic design of frames– Steps/process to as per the most recent BIS code of practices~~-~~ Deign of purlins.**UNIT – V**Design of Pre- stressed beams for strength in limit state in flexure and shear – Limit state strength at transfer conditions – Limit state of deflection and cracking.**UNIT – VI**Design of reinforcement in anchor zones – Design of Pre- stressed rectangular slabs – Design of pressure pipes – Design of railway sleepers. |
| **Textbooks****and****References** | **TEXTBOOKS:**1. P.C. Varghese, *Advanced Reinforced Concrete Design*, PHI Publisher, 2nd revised edition, 2011.
2. Dr. S. Ramchandra and V. Gehlot, *Design of Steel Structures Vol-2*, standard publishers distributors, 9th revised and enlarged edition, 2015.
3. N. Krishna Raju, *Prestressed Concrete*, McGraw hill education, 6thEdition, 2018.

**REFERENCES:** 1. G.S.Pandit & S.P.Gupta, *Prestressed Concrete*, CBS Publishers, and distributors Pvt. Ltd., 1st Edition, 2019.
2. N. Krishna Raju, *Advanced Reinforced Concrete Design*, CBS Publishers, and distributors Pvt. Ltd., 3rd Edition, 2016.
3. Pankaj Agarwal & Manish Shrikhande, *Earthquake Resistant Design of Structures*, Prentice Hall of India Pvt. Ltd, 2011.
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**CO-PO Mapping:**3-High Mapping, 2-Moderate Mapping, 1-Low Mapping, - -Not Mapping

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|   | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** | **PSO3** |
| **CO1** | 3 | 3 | 2 | - | 1 | - | - | 2 | - | - | - | 2 | - | 1 | 1 |
| **CO2** | 3 | 3 | 1 | - | 1 | - | - | - | - | - | - | 1 | - | 1 | 1 |
| **CO3** | 3 | 3 | 2 | - | 1 | - | - | 2 | - | - | - | 2 | - | 1 | 1 |
| **CO4** | 3 | 3 | 2 | - | 1 | - | - | 2 | - | - | - | 2 | - | 1 | 1 |
| **CO5** | 3 | 3 | 2 | - | 1 | - | - | 2 | - | - | - | 3 | - | 1 | 1 |
| **CO6** | 3 | 3 | 2 | - | 1 | - | - | 2 | - | - | - | 1 | - | 1 | 1 |