**19CE32E2 – ADVANCED STRUCTURAL DESIGN**

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

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| **Course Objectives** | 1. To carryout design of slender columns, concrete walls and grid floors.
2. To carryout seismic analysis of multi storey building frames.
3. To carry out plastic design of beams and columns according to BIS code of practices.
4. To carry out plastic design of frames according to BIS code of practices.
5. To carryout design of pre stressed concrete beams under flexure and shear.
6. To carryout design of pre stressed concrete slabs, pressure pipes and sleepers.
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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, 6th Edition, 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** |
| **CO1** | 3 | - | 2 | - | 1 | - | - | 1 | - | - | - | 2 |
| **CO2** | 3 | - | 1 | - | 1 | - | - | - | - | - | - | 1 |
| **CO3** | 3 | - | 2 | - | 1 | - | - | 1 | - | - | - | 2 |
| **CO4** | 3 | - | 2 | - | 1 | - | - | 1 | - | - | - | 2 |
| **CO5** | 3 | - | 2 | - | 1 | - | - | 1 | - | - | - | 3 |
| **CO6** | 3 | - | 2 | - | 1 | - | - | 1 | - | - | - | 1 |