**19CE3101 - STRUCTURAL ANALYSIS –II**

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| **Course Category**  | Professional Core | **Credits**  | 3 |
| **Course Type**  | Theory | **Lecture - Tutorial - Practical**  | 2-1-0 |
| **Prerequisite**  | Structural Analysis - I | **Sessional Evaluation**  | 40 |
| **Semester End Exam Evaluation**  | 60 |
| **Total Marks**  | 100 |

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| **Course Objectives** | 1. To state and prove the second theorem of Castigliano and apply it for analysis of indeterminate trusses.
2. To determine the support reactions, shear force and bending moment of determinate beams using influence line diagram method.
3. To apply the method of slope deflection for analysis of indeterminate beams and frames.
4. To analyze indeterminate beams and frames using moment distribution method.
5. To analyze indeterminate beams and frames using Kani’s method.
6. To assess the location of plastic hinges in beams and frames.
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| **Course Outcomes** | CO1 | Analyze indeterminate trusses using Castigliano’s theorem - II. |
| CO2 | Analyze determinate beams subjected to moving loads using the influence line diagram method. |
| CO3 | Calculate support reactions, shear force, and bending moment and draw analytical diagrams of indeterminate beams and frames using slope deflection method. |
| CO4 | Calculate support reactions, shear force, and bending moment and draw analytical diagrams of indeterminate beams and frames using moment distribution method. |
| CO5 | Apply Kani’s method for analysis of indeterminate beams and frames. |
| CO6 | Identify the location of plastic hinges in beams and frames. |
| **Course****Content** | **UNIT – I****INDETERMINATE TRUSSES:** Determination of static and kinematic indeterminacies – Solution of trusses having up to two degree of internal and external indeterminacies – Castigliano’s theorem – II.**UNIT – II****INFLUENCE LINES :** Influence lines for reactions, shear force and bending moment for determinate structures – Maximum shear force and bending moment for single, two, multipoint loads , UDL-longer and shorter than span - EUDL.**UNIT – III****SLOPE DEFLECTION METHOD:** Introduction - Beams with degree of indeterminacy not exceeding three – Effect of sinking of supports – Frames with sway limited to single bay single storey.**UNIT – IV****MOMENT DISTRIBUTION METHOD:** Introduction - Beams with degree of indeterminacy not exceeding three, Frames with sway limited to single bay single storey – Effect of sinking of supports.**UNIT – V****KANI’S METHOD:** Introduction -Continuous beams – Settlement of supports – Single bay portal frames with side sway.**UNIT – VI****PLASTIC ANALYSIS:** Idealized stress strain diagram – Shape factors – Moment - Curvature relationships – Plastic hinges – Collapse mechanism – Analysis of fixed, continuous beams and portal frames. |
| **Textbooks****and****References** | **TEXTBOOKS:**1. T.S. Thandavamoorthy, *Structural Analysis*, Oxford University Press, 1st Edition, 2011.
2. R. Vaidyanathan & Dr. P. Perumal, *Structural Analysis Vol. I & II*, Laxmi Publications, 4th Edition, 2016.
3. V.N. Vazirani, M.M. Ratwani and Dr. S.K Duggal, *Analysis of Structures* *Vol. I & II*, Khanna Publishers, 16th Edition, 2019.

**REFERENCE BOOKS:**1. G.S. Pandit, S.P. Gupta & R. Gupta, *Theory of Structures – Vol. I*, McGraw Hill Companies, 1st Edition, 2017.
2. S.B. Junnarkar and H.J. Shah, *Mechanics of Structures Vol. I & II*, Charotar Publishing House Pvt. Ltd, 24th Edition, 2015.
3. R.C. Hibbeler, *Structural Analysis*, Pearson Education, 9th Edition, 2017.
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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** | 2 | - | 1 | 1 | - | - | - | - | - | - | - | 1 |
| **CO2** | 2 | 1 | 2 | 1 | 1 | - | - | - | - | - | - | 2 |
| **CO3** | 2 | - | 1 | - | 2 | - | - | - | - | - | - | 2 |
| **CO4** | 2 | - | 1 | - | 2 | - | - | - | - | - | - | 2 |
| **CO5** | 2 | - | 1 | - | 2 | - | - | - | - | - | - | 2 |
| **CO6** | 3 | 1 | - | 1 | - | - | - | - | - | - | - | 1 |