

|           |                                                                                                                                                                                                                                                                                                                                                                                      |    |              |   |                                   |                                       |
|-----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|--------------|---|-----------------------------------|---------------------------------------|
| 1.        | Name of Course                                                                                                                                                                                                                                                                                                                                                                       |    |              |   | Structural Analysis II            |                                       |
| 2.        | Course Code                                                                                                                                                                                                                                                                                                                                                                          |    |              |   | JSTA2153                          |                                       |
|           | JSTA= the first alphabet identify the faculty within which the subject is offered., JSTA= the remaining three alphabet identify the course that offers the subject, 2153 = the first digit identify level of study; in this case undergraduate level, 2153 = the second and third digits identify subject identity and 2153 = the fourth digit identify credit value or credit hours |    |              |   |                                   |                                       |
| 3.        | Name(s) of academic staff                                                                                                                                                                                                                                                                                                                                                            |    |              |   | To be Assigned                    |                                       |
| 4.        | Rationale for the inclusion of the course/module in the programme                                                                                                                                                                                                                                                                                                                    |    |              |   | Core subject in Civil engineering |                                       |
| 5.        | Semester and Year offered                                                                                                                                                                                                                                                                                                                                                            |    |              |   | 2/2                               |                                       |
| 6.        | Total Student Learning Time (SLT)                                                                                                                                                                                                                                                                                                                                                    |    | Face to Face |   |                                   | Total Guided and Independent Learning |
|           |                                                                                                                                                                                                                                                                                                                                                                                      |    | L            | T | P/S                               |                                       |
|           | L = Lecture      T = Tutorial                                                                                                                                                                                                                                                                                                                                                        | 42 | 14           | - | -                                 | Independent Study(IS) = 70            |
|           | P = Practical      S=Studio Works                                                                                                                                                                                                                                                                                                                                                    |    |              |   |                                   | Total =126                            |
| O= Others |                                                                                                                                                                                                                                                                                                                                                                                      |    |              |   |                                   |                                       |
| 7.        | Credit Value                                                                                                                                                                                                                                                                                                                                                                         |    |              |   | 3.0                               |                                       |
|           | Lectures ( 3 hours per week x 14 weeks)<br>Tutorial ( 1 hour per week x 14 weeks )                                                                                                                                                                                                                                                                                                   |    |              |   |                                   |                                       |
| 8.        | Prerequisite (if any)                                                                                                                                                                                                                                                                                                                                                                |    |              |   | Structural Analysis I (JSTA1073)  |                                       |
| 9.        | Course Objectives                                                                                                                                                                                                                                                                                                                                                                    |    |              |   |                                   |                                       |
|           | 1. The objective of this course is to equip the students with advanced knowledge of structure analysis using flexibility and stiffeners method.                                                                                                                                                                                                                                      |    |              |   |                                   |                                       |
|           | Course Learning Outcomes (CLO)                                                                                                                                                                                                                                                                                                                                                       |    |              |   |                                   |                                       |
|           | At the end of the semester students should be able to:                                                                                                                                                                                                                                                                                                                               |    |              |   |                                   |                                       |
|           | CLO1: Apply Quantitative analysis of structures in continuous beam,2-D frame and 3.D frame.                                                                                                                                                                                                                                                                                          |    |              |   |                                   |                                       |
|           | CLO2: Apply the matrix method to analyze any structure required to design civil engineering works.                                                                                                                                                                                                                                                                                   |    |              |   |                                   |                                       |
|           | CLO3: Apply flexibility to analyze any structures required to design civil engineering works                                                                                                                                                                                                                                                                                         |    |              |   |                                   |                                       |
|           | CLO4: Apply stifferens to analyze any structure required to design civil engineering works                                                                                                                                                                                                                                                                                           |    |              |   |                                   |                                       |
|           | CLO5: Analyze space frame                                                                                                                                                                                                                                                                                                                                                            |    |              |   |                                   |                                       |
|           |                                                                                                                                                                                                                                                                                                                                                                                      |    |              |   |                                   |                                       |
| 10.       | Transferable Skills:                                                                                                                                                                                                                                                                                                                                                                 |    |              |   |                                   |                                       |
|           | This course is expected the development of the following transferable skills:                                                                                                                                                                                                                                                                                                        |    |              |   |                                   |                                       |
|           | 1. Self-management – an ability to manage time and task                                                                                                                                                                                                                                                                                                                              |    |              |   |                                   |                                       |
|           | 2. An ability to learn both independently and co—operatively;                                                                                                                                                                                                                                                                                                                        |    |              |   |                                   |                                       |
|           | 3. An ability to use library skills, to find and organize information ;                                                                                                                                                                                                                                                                                                              |    |              |   |                                   |                                       |
|           | 4. An ability to use a wide range of academic skills (research, analysis, synthesis etc.);                                                                                                                                                                                                                                                                                           |    |              |   |                                   |                                       |
|           | 5. An ability to take responsibility and carry out agreed task;                                                                                                                                                                                                                                                                                                                      |    |              |   |                                   |                                       |
|           | 6. An ability to analyse;                                                                                                                                                                                                                                                                                                                                                            |    |              |   |                                   |                                       |
|           | 7. An ability to think laterally about a problem;                                                                                                                                                                                                                                                                                                                                    |    |              |   |                                   |                                       |
|           | 8. An ability to solve the problems                                                                                                                                                                                                                                                                                                                                                  |    |              |   |                                   |                                       |
|           | 9. An ability to use specialist software where relevant to the discipline.                                                                                                                                                                                                                                                                                                           |    |              |   |                                   |                                       |
|           |                                                                                                                                                                                                                                                                                                                                                                                      |    |              |   |                                   |                                       |
| 11.       | Teaching-learning and assessment strategy                                                                                                                                                                                                                                                                                                                                            |    |              |   |                                   |                                       |
|           | A variety of leaching strategies are used throughout the course, including the following:                                                                                                                                                                                                                                                                                            |    |              |   |                                   |                                       |
|           | • Classroom Lessons; Lecturer and power point presentations                                                                                                                                                                                                                                                                                                                          |    |              |   |                                   |                                       |
|           | • Tutorial Session;                                                                                                                                                                                                                                                                                                                                                                  |    |              |   |                                   |                                       |
|           | • Student-Lecturer Discussion                                                                                                                                                                                                                                                                                                                                                        |    |              |   |                                   |                                       |
|           |                                                                                                                                                                                                                                                                                                                                                                                      |    |              |   |                                   |                                       |

|                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                    |            |            |     |                  |     |      |     |                    |            |       |  |                     |                    |
|---------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|------------|------------|-----|------------------|-----|------|-----|--------------------|------------|-------|--|---------------------|--------------------|
|                     | <ul style="list-style-type: none"> <li>• Collaborative and Co-operative learn;</li> <li>• Independent study.</li> </ul> <p><b>Assessment:</b></p> <table> <tr> <td><b>Course Work</b></td><td><b>40%</b></td></tr> <tr> <td>Assignment</td><td>10%</td></tr> <tr> <td>Tutorial/Quizzes</td><td>10%</td></tr> <tr> <td>Test</td><td>20%</td></tr> <tr> <td><b>Examination</b></td><td><b>60%</b></td></tr> <tr> <td colspan="2"><hr/></td></tr> <tr> <td><b><u>Total</u></b></td><td><b><u>100%</u></b></td></tr> </table>                                 | <b>Course Work</b> | <b>40%</b> | Assignment | 10% | Tutorial/Quizzes | 10% | Test | 20% | <b>Examination</b> | <b>60%</b> | <hr/> |  | <b><u>Total</u></b> | <b><u>100%</u></b> |
| <b>Course Work</b>  | <b>40%</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                    |            |            |     |                  |     |      |     |                    |            |       |  |                     |                    |
| Assignment          | 10%                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                    |            |            |     |                  |     |      |     |                    |            |       |  |                     |                    |
| Tutorial/Quizzes    | 10%                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                    |            |            |     |                  |     |      |     |                    |            |       |  |                     |                    |
| Test                | 20%                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                    |            |            |     |                  |     |      |     |                    |            |       |  |                     |                    |
| <b>Examination</b>  | <b>60%</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                    |            |            |     |                  |     |      |     |                    |            |       |  |                     |                    |
| <hr/>               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                    |            |            |     |                  |     |      |     |                    |            |       |  |                     |                    |
| <b><u>Total</u></b> | <b><u>100%</u></b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                    |            |            |     |                  |     |      |     |                    |            |       |  |                     |                    |
| 12.                 | <p><b>Synopsis:</b></p> <p>This course describes matrix method for analysis of framed structures. Both flexibility and stiffness methods of structural analysis are covered. These subjects include descriptions of the types of framed structures to be analyzed and their deformations due to loads and other causes. Basic concepts of equilibrium, compatibility, determinacy, mobility, superposition, flexibility and stiffness coefficients, equivalent joint loads, energy virtual and qualitative analysis of structures are also discussed.</p> |                    |            |            |     |                  |     |      |     |                    |            |       |  |                     |                    |
| 13.                 | <p><b>Mode of Delivery:</b></p> <p>Lectures</p> <p>Tutorial</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                    |            |            |     |                  |     |      |     |                    |            |       |  |                     |                    |

|     |                                                                                                                  |                                                                                             |                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                            |
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| 14. | <b>Performance Criteria :</b>                                                                                    |                                                                                             |                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                            |
|     | CLO-PLO                                                                                                          | Assessment Tool                                                                             | 1                                                                                                                                                                                                                                                                 | 2                                                                                                                                                                                                                                                                 | 3                                                                                                                                                                                                                                                                         | 4                                                                                                                                                                                                                                                                 | 5                                                                                                                                                                                                                                                                          |
|     | Marks                                                                                                            |                                                                                             | 0-39                                                                                                                                                                                                                                                              | 40-49                                                                                                                                                                                                                                                             | 50-59                                                                                                                                                                                                                                                                     | 60-74                                                                                                                                                                                                                                                             | 75-100                                                                                                                                                                                                                                                                     |
|     | Grade                                                                                                            |                                                                                             | (F)                                                                                                                                                                                                                                                               | (D,D+)                                                                                                                                                                                                                                                            | (C-,C,C+)                                                                                                                                                                                                                                                                 | (B-,B,B+)                                                                                                                                                                                                                                                         | (A-,A,A+)                                                                                                                                                                                                                                                                  |
|     | <b>CLO1:</b><br><br>Apply Quantitative analysis of structures in continuous beam, 2-D frame and 3.D frame.       | <b>Assignment</b><br><b>Tutorial</b><br><b>Quizzes</b><br><b>Test</b><br><b>Examination</b> | <b>Fail to:</b> <ul style="list-style-type: none"> <li>Learn both independent and cooperatively</li> <li>Use library skills, to find and organize information</li> <li>Take responsibility and carry out laboratory test</li> <li>Manage time and task</li> </ul> | <b>Poor to:</b> <ul style="list-style-type: none"> <li>Learn both independent and cooperatively</li> <li>Use library skills, to find and organize information</li> <li>Take responsibility and carry out laboratory test</li> <li>Manage time and task</li> </ul> | <b>Satisfactory to:</b> <ul style="list-style-type: none"> <li>Learn both independent and cooperatively</li> <li>Use library skills, to find and organize information</li> <li>Take responsibility and carry out laboratory test</li> <li>Manage time and task</li> </ul> | <b>Good to:</b> <ul style="list-style-type: none"> <li>Learn both independent and cooperatively</li> <li>Use library skills, to find and organize information</li> <li>Take responsibility and carry out laboratory test</li> <li>Manage time and task</li> </ul> | <b>Excellent to:</b> <ul style="list-style-type: none"> <li>To: Learn both independent and cooperatively</li> <li>Use library skills, to find and organize information</li> <li>Take responsibility and carry out laboratory test</li> <li>Manage time and task</li> </ul> |
|     | <b>CLO2:</b><br><br>Apply the matrix method to analyze any structure required to design civil engineering works. | <b>Assignment</b><br><b>Tutorial</b><br><b>Quizzes</b><br><b>Test</b><br><b>Examination</b> | <b>Fail to:</b> <ul style="list-style-type: none"> <li>Learn both independent and cooperatively</li> <li>Use library skills, to find and organize information</li> <li>Take responsibility and carry out laboratory test</li> <li>Manage time</li> </ul>          | <b>Poor to:</b> <ul style="list-style-type: none"> <li>Learn both independent and cooperatively</li> <li>Use library skills, to find and organize information</li> <li>Take responsibility and carry out laboratory test</li> <li>Manage time</li> </ul>          | <b>Satisfactory to:</b> <ul style="list-style-type: none"> <li>Learn both independent and cooperatively</li> <li>Use library skills, to find and organize information</li> <li>Take responsibility and carry out laboratory test</li> <li>Manage time and</li> </ul>      | <b>Good to:</b> <ul style="list-style-type: none"> <li>Learn both independent and cooperatively</li> <li>Use library skills, to find and organize information</li> <li>Take responsibility and carry out laboratory test</li> </ul>                               | <b>Excellent to:</b> <ul style="list-style-type: none"> <li>To: Learn both independent and cooperatively</li> <li>Use library skills, to find and organize information</li> <li>Take responsibility and carry out laboratory test</li> <li>Manage time and</li> </ul>      |

|  |                                                                                                            |                                                                                             |                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                    |
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|  |                                                                                                            |                                                                                             | and task                                                                                                                                                                                                                                                                  | and task                                                                                                                                                                                                                                                                  | task                                                                                                                                                                                                                                                                              | • Manage time and task                                                                                                                                                                                                                                                    | task                                                                                                                                                                                                                                                                               |
|  | <b>CLO3:</b><br><br>Apply flexibility to analyze any structures required to design civil engineering works | <b>Assignment</b><br><b>Tutorial</b><br><b>Quizzes</b><br><b>Test</b><br><b>Examination</b> | <b>Fail to:</b> <ul style="list-style-type: none"> <li>• Learn both independent and cooperatively</li> <li>• Use library skills, to find and organize information</li> <li>• Take responsibility and carry out laboratory test</li> <li>• Manage time and task</li> </ul> | <b>Poor to:</b> <ul style="list-style-type: none"> <li>• Learn both independent and cooperatively</li> <li>• Use library skills, to find and organize information</li> <li>• Take responsibility and carry out laboratory test</li> <li>• Manage time and task</li> </ul> | <b>Satisfactory to:</b> <ul style="list-style-type: none"> <li>• Learn both independent and cooperatively</li> <li>• Use library skills, to find and organize information</li> <li>• Take responsibility and carry out laboratory test</li> <li>• Manage time and task</li> </ul> | <b>Good to:</b> <ul style="list-style-type: none"> <li>• Learn both independent and cooperatively</li> <li>• Use library skills, to find and organize information</li> <li>• Take responsibility and carry out laboratory test</li> <li>• Manage time and task</li> </ul> | <b>Excellent to:</b> <ul style="list-style-type: none"> <li>• To: Learn both independent and cooperatively</li> <li>• Use library skills, to find and organize information</li> <li>• Take responsibility and carry out laboratory test</li> <li>• Manage time and task</li> </ul> |
|  | <b>CLO4:</b><br><br>Apply stifferens to analyze any structure required to design civil engineering works   | <b>Assignment</b><br><b>Tutorial</b><br><b>Quizzes</b><br><b>Test</b><br><b>Examination</b> | <b>Fail to:</b> <ul style="list-style-type: none"> <li>• Learn both independent and cooperatively</li> <li>• Use library skills, to find and organize information</li> <li>• Take responsibility and carry out laboratory test</li> <li>• Manage time and task</li> </ul> | <b>Poor to:</b> <ul style="list-style-type: none"> <li>• Learn both independent and cooperatively</li> <li>• Use library skills, to find and organize information</li> <li>• Take responsibility and carry out laboratory test</li> <li>• Manage time and task</li> </ul> | <b>Satisfactory to:</b> <ul style="list-style-type: none"> <li>• Learn both independent and cooperatively</li> <li>• Use library skills, to find and organize information</li> <li>• Take responsibility and carry out laboratory test</li> <li>• Manage time and task</li> </ul> | <b>Good to:</b> <ul style="list-style-type: none"> <li>• Learn both independent and cooperatively</li> <li>• Use library skills, to find and organize information</li> <li>• Take responsibility and carry out laboratory test</li> <li>• Manage time and task</li> </ul> | <b>Excellent to:</b> <ul style="list-style-type: none"> <li>• To: Learn both independent and cooperatively</li> <li>• Use library skills, to find and organize information</li> <li>• Take responsibility and carry out laboratory test</li> <li>• Manage time and task</li> </ul> |

|  |                                         |                                                                     |                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                    |
|--|-----------------------------------------|---------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | <b>CLO5:</b><br><br>Analyze space frame | <b>Assignment<br/>Tutorial<br/>Quizzes<br/>Test<br/>Examination</b> | <b>Fail to:</b> <ul style="list-style-type: none"> <li>• Learn both independent and cooperatively</li> <li>• Use library skills, to find and organize information</li> <li>• Take responsibility and carry out laboratory test</li> <li>• Manage time and task</li> </ul> | <b>Poor to:</b> <ul style="list-style-type: none"> <li>• Learn both independent and cooperatively</li> <li>• Use library skills, to find and organize information</li> <li>• Take responsibility and carry out laboratory test</li> <li>• Manage time and task</li> </ul> | <b>Satisfactory to:</b> <ul style="list-style-type: none"> <li>• Learn both independent and cooperatively</li> <li>• Use library skills, to find and organize information</li> <li>• Take responsibility and carry out laboratory test</li> <li>• Manage time and task</li> </ul> | <b>Good to:</b> <ul style="list-style-type: none"> <li>• Learn both independent and cooperatively</li> <li>• Use library skills, to find and organize information</li> <li>• Take responsibility and carry out laboratory test</li> <li>• Manage time and task</li> </ul> | <b>Excellent to:</b> <ul style="list-style-type: none"> <li>• To: Learn both independent and cooperatively</li> <li>• Use library skills, to find and organize information</li> <li>• Take responsibility and carry out laboratory test</li> <li>• Manage time and task</li> </ul> |
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| 15. | Mapping of the Programme Objectives to the Programme Learning Outcomes                                                                                                                                                                 |                                                                                       |                                                                               |                                                                              |                                                                                           |                                                                              |                                                                                                                                                                            |                                                                                                         |                                                         |                                                                                             |                                                                                                              |                                        |
|-----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|-------------------------------------------------------------------------------|------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------|------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------|---------------------------------------------------------|---------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------|----------------------------------------|
|     | <div> <div>Programme Learning Outcomes (PLO)</div> <div>Programme Objectives (PO)</div> </div>                                                                                                                                         | PLO1: Ability to acquire and apply knowledge of science and engineering fundamentals; | PLO2: Acquired in-depth technical competence in civil engineering discipline; | PLO3: Ability to undertake problem identification, formulation and solution; | PLO4: Ability to utilize systems approach to design and evaluate operational performance; | PLO5: Understanding of the principles of design for sustainable development; | PLO6: Understanding of professional ethics, Islamic values, social, cultural, global and environmental responsibilities of a professional engineer and commitment to them; | PLO7: Ability to communicate effectively, not only with engineers but also with the community at large; | PLO8: ability to function effectively as an individual; | PLO9: Ability to function effectively in group with the capacity to be a leader or manager; | PLO10: Recognizing the need to undertake lifelong learning, and possessing /acquiring the capacity to do so; | PLO11: ability to become Entrepreneur; |
|     | PEO1: To produce graduates with proficient knowledge and competency in various areas in Civil/ Electrical/ Mechanical Engineering                                                                                                      | ✓                                                                                     | ✓                                                                             | ✓                                                                            |                                                                                           |                                                                              |                                                                                                                                                                            |                                                                                                         |                                                         |                                                                                             |                                                                                                              |                                        |
|     | PEO2: To produce graduates with professional, generic attributes to meet the present and future global demands.                                                                                                                        |                                                                                       |                                                                               |                                                                              | ✓                                                                                         | ✓                                                                            | ✓                                                                                                                                                                          |                                                                                                         |                                                         | ✓                                                                                           | ✓                                                                                                            |                                        |
|     | PEO3: To produce graduates with Islamic humanistic values and reinvention skills to meet the requirement of a dynamic environment. These skills include Civil Intelligence, Moral Intelligence, Self-Reliance and Communication Skills |                                                                                       |                                                                               |                                                                              |                                                                                           |                                                                              |                                                                                                                                                                            | ✓                                                                                                       | ✓                                                       | ✓                                                                                           |                                                                                                              | ✓                                      |

|     |                                                                                                              |                                                                                              |                                                                                      |                                                                                     |                                                                                                  |                                                                                     |                                                                                                                                                                                   |                                                                                                                |                                                                |                                                                                                    |                                                                                                                     |                                               |
|-----|--------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------|----------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------|-----------------------------------------------|
| 16. | Mapping of the course Learning Outcome to the Programme Outcome                                              |                                                                                              |                                                                                      |                                                                                     |                                                                                                  |                                                                                     |                                                                                                                                                                                   |                                                                                                                |                                                                |                                                                                                    |                                                                                                                     |                                               |
|     | <div>Programme Learning Outcomes (PLO)</div> <div>Course Learning Outcome (CLO)</div>                        | <b>PLO1:</b> Ability to acquire and apply knowledge of science and engineering fundamentals; | <b>PLO2:</b> Acquired in-depth technical competence in civil engineering discipline; | <b>PLO3:</b> Ability to undertake problem identification, formulation and solution; | <b>PLO4:</b> Ability to utilize systems approach to design and evaluate operational performance; | <b>PLO5:</b> Understanding of the principles of design for sustainable development; | <b>PLO6:</b> Understanding of professional ethics, Islamic values, social, cultural, global and environmental responsibilities of a professional engineer and commitment to them; | <b>PLO7:</b> Ability to communicate effectively, not only with engineers but also with the community at large; | <b>PLO8:</b> ability to function effectively as an individual; | <b>PLO9:</b> Ability to function effectively in group with the capacity to be a leader or manager; | <b>PLO10:</b> Recognizing the need to undertake lifelong learning, and possessing /acquiring the capacity to do so; | <b>PLO11:</b> ability to become Entrepreneur; |
|     | <b>CLO1:</b><br>Apply Quantitative analysis of structures in continuous beam, 2-D frame and 3.D frame.       | ✓                                                                                            |                                                                                      |                                                                                     |                                                                                                  |                                                                                     |                                                                                                                                                                                   |                                                                                                                |                                                                |                                                                                                    |                                                                                                                     |                                               |
|     | <b>CLO2:</b><br>Apply the matrix method to analyze any structure required to design civil engineering works. | ✓                                                                                            |                                                                                      |                                                                                     |                                                                                                  |                                                                                     |                                                                                                                                                                                   |                                                                                                                |                                                                |                                                                                                    |                                                                                                                     |                                               |
|     | <b>CLO3:</b><br>Apply flexibility to analyze any structures required to design civil engineering works       | ✓                                                                                            | ✓                                                                                    | ✓                                                                                   |                                                                                                  |                                                                                     |                                                                                                                                                                                   |                                                                                                                |                                                                |                                                                                                    |                                                                                                                     |                                               |
|     | <b>CLO4:</b><br>Apply stifferens to analyze any structure required to design civil engineering works         | ✓                                                                                            | ✓                                                                                    | ✓                                                                                   |                                                                                                  |                                                                                     |                                                                                                                                                                                   |                                                                                                                |                                                                |                                                                                                    |                                                                                                                     |                                               |
|     | <b>CLO5:</b><br>Analyze space frame                                                                          | ✓                                                                                            | ✓                                                                                    | ✓                                                                                   |                                                                                                  |                                                                                     |                                                                                                                                                                                   |                                                                                                                |                                                                |                                                                                                    |                                                                                                                     |                                               |

|              |                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                |            |   |    |     |       |
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| 17.          | Content outline of the course/module and the SLT per topic |                                                                                                                                                                                                                                                                                                                                                                                                                                |            |   |    |     |       |
|              |                                                            | Details                                                                                                                                                                                                                                                                                                                                                                                                                        | SLT (Hour) |   |    |     |       |
|              |                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                | L          | T | P  | IS  | Total |
|              | Topic 1                                                    | <b>Qualitative analysis of structures</b> <ul style="list-style-type: none"><li>Continuous beams, 2-D frames and 3-D frames and bracing system</li></ul>                                                                                                                                                                                                                                                                       | 6          | 2 | -  | 10  | 18    |
|              | Topic 2                                                    | <b>Introduction to Concepts of Matrix Method</b> <ul style="list-style-type: none"><li>Types of framed structures and its deformations.</li><li>Structural idealization, degree of indeterminacy and degree of freedom.</li><li>Structural mobilities &amp; principle of superposition.</li><li>Concepts of virtual work, complementary and strain energy.</li><li>Flexibility and stiffness influence coefficients.</li></ul> | 6          | 2 | -  | 10  | 18    |
|              | Topic 3                                                    | <b>Flexibility Methods</b> <ul style="list-style-type: none"><li>Flexibility matrix (beams, frames, arch, trusses, composite Structure)</li><li>Temperature changes, support displacements and fabrications errors.</li><li>Joint displacements, member end actions &amp; support reactions.</li><li>Formalization of the Flexibility Method.</li></ul>                                                                        | 12         | 4 | -  | 20  | 36    |
|              | Topic 4                                                    | <b>Stiffness Method</b> <ul style="list-style-type: none"><li>Stiffness matrix (beams, frames, trusses, composite structures)</li><li>Temperature changes, support displacements and fabrication errors.</li><li>Joint displacements, member end actions &amp; support reactions.</li><li>Formalization of the stiffness method.</li></ul>                                                                                     | 15         | 5 | -  | 25  | 45    |
|              | Topic 5                                                    | <b>Space Frame analysis</b>                                                                                                                                                                                                                                                                                                                                                                                                    | 3          | 1 | -  | 5   | 9     |
| Total (Hour) |                                                            | 42                                                                                                                                                                                                                                                                                                                                                                                                                             | 14         | - | 70 | 126 |       |

|     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|-----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 18. | <p><b>Main references supporting the course</b></p> <ol style="list-style-type: none"> <li>1. Structural Analysis (7th Edition) by R. C. Hibbeler (May 15, 2008)</li> <li>2. Matrix Analysis of Structures by Aslam Kassimali (Jan 1, 2011)</li> <li>3. Elementary Behaviour of Composite Steel and Concrete Structural Members by Deric Oehlers and Mark A. Bradford (Feb 28, 2000)</li> <li>4. Analysis of Structures: Strength and Behaviour by T. S. Thandavamoorthy (Apr 21, 2005)</li> <li>5. The Behaviour and Design of Steel Structures to EC3 by N.S. Trahair, M.A. Bradford, David Nethercot and Leroy Gardner (Jan 31, 2008)</li> </ol>                                                                                                                                                                                                      |
|     | <p><b>Additional references supporting the course</b></p> <ol style="list-style-type: none"> <li>1. Y.Y. Hsieh, Elementary Theory of Structures, Prentice Hall, 1995</li> <li>2. F. Arbabi, Structural Analysis &amp; Behaviour, Mc Graw Hill, International Edition, 1991.</li> <li>3. P. Bhat, H.M. Nelson, Structures, 3rd Edition, ELBS, Longman Group</li> <li>6. UK. Ltd., 1990. F. Arbabi, Structural Analysis &amp; Behaviour, Mc Graw-Hill, International Editions, Singapore 1991.</li> <li>7. W. Weaver &amp; J.M. Gere - Matrix Analysis of Framed Structures, VNR, 1980.</li> <li>8. A. Ghali, A.M. Neville &amp; Y.K. Cheung, - Structure Analysis – A Unified Classical &amp; Matric Approach, Chapman &amp; Hall, 1978.</li> <li>4. Tung Au &amp; Paul Christiano – Fundamentals of Structural Analysis, Prentice Hall, 1993.</li> </ol> |
| 19. | <p><b>Other additional information</b></p> <p>All materials will be available to the students in the library.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |