GUJARAT TECHNOLOGICAL UNIVERSITY

CIVIL ENGINEERING
STRUCTURAL ANALYSIS-II
SUBJECT CODE: 2150608
B.E. 5th SEMESTER

Type of course: Applied Mechanics

Prerequisite: Mechanics of Solids, Structural Analysis-I

Rationale: This subject is conceptual applications of principles of mechanics of rigid and deformable bodies in Engineering.

Teaching and Examination Scheme:

<table>
<thead>
<tr>
<th>Teaching Scheme</th>
<th>Credits</th>
<th>Examination Marks</th>
<th>Total Marks</th>
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<tbody>
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<td>2</td>
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<td>6</td>
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Content:

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<thead>
<tr>
<th>Sr. No.</th>
<th>Topics</th>
<th>Teaching Hrs.</th>
<th>Weightage %</th>
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<tbody>
<tr>
<td>1</td>
<td>Energy Principles: Castigliano's theorems, computation of displacements of statically determinate beams, trusses and frames by unit load method, analysis of indeterminate structures – beams, trusses, frames</td>
<td>10</td>
<td>15</td>
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<td>2</td>
<td>Slope Deflection Method Analysis of continuous beams for various loading including settlement/rotation of support, analysis of simple portal frame with sway.</td>
<td>08</td>
<td>15</td>
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<td>3</td>
<td>Moment Distribution Method Analysis of continuous beams &amp; frames including sway, use of symmetry of structure up to two storeyed / two bay frames.</td>
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<td>15</td>
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<td>4</td>
<td>Influence line diagrams ILD for statically determinate beams- I.L.D of support reaction, shear force and moment bending moment for beams subjected to u.d.l and several point loads, criteria for maximum effects, ILD for statically determinate trusses, forces in members for u.d.l and point loads</td>
<td>08</td>
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<td>ILD for statically indeterminate beams: Muller-Breslau's principle, steps for obtaining I.L. for reaction and internal forces in propped cantilever and continuous beams, qualitative I.L. for rigid jointed structures having higher degree of statically indeterminacy.</td>
<td>06</td>
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<td>5</td>
<td>Matrix Methods: Types of skeletal structures, Internal forces and deformations. Introduction and applications of stiffness method to analyze beams, Trusses and plane frames by system approach. Introduction and applications of Flexibility method to analyze beams, Trusses and plane frames by system approach.</td>
<td>08</td>
<td>15</td>
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Suggested Specification table with Marks (Theory):

<table>
<thead>
<tr>
<th>R Level</th>
<th>U Level</th>
<th>A Level</th>
<th>N Level</th>
<th>E Level</th>
<th>C Level</th>
</tr>
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<tr>
<td>20</td>
<td>20</td>
<td>20</td>
<td>25</td>
<td>15</td>
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</tbody>
</table>

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above
Levels (Revised Bloom’s Taxonomy)

Note: This specification table shall be treated as a general guideline for students and teachers. The actual
distribution of marks in the question paper may vary slightly from above table.

Reference Books:
3. Gere & Weaver; Matrix Analysis of framed structures, CBS Publications
4. Ryder G.H.; Strength of Materials; Mcmillan
5. Gere & Timoshenko; Mechanics of Materials; CBS Publishers & Distributors, Delhi
6. Hibbler R C; Structural Analysis; Pearson Education

Course Outcome:
After learning the course the students should be able to:

1. Apply equilibrium and compatibility equations to determine response of statically determinate and
   indeterminate structures.
2. Determine displacements and internal forces of statically indeterminate structures by classical, iterative and
   matrix methods.
3. Determine internal forces and reactions in determinate and indeterminate structures subjected to moving
   loads.

Term-Work:
The students will have to solve at least five examples and related theory from each topic as an assignment/tutorial.
Practical examinations shall consist of oral based on term-work and above course.

List of Tutorials:

1. Prepare working model to understand behavior of portal frame/s with different support condition and
   different types of joints.
2. Verification of Muller- Breslau’s Principle

List of Open Source Software/learning website:
www.nptel.iitm.ac.in/courses/

Active learning Assignments (AL) : Preparation of power-point slides, which include videos, animations, pictures, graphics for better understanding theory and practical work – The faculty will allocate chapters/ parts of chapters to groups of students so that the entire syllabus to be covered. The Power-point slides should be put up on
the web-site of the College/ Institute, along with the names of the students of the group, the name of the faculty, Department and College on the first slide. The best three works should submit to GTU.