<table>
<tr><td>Module Code</td><td>MA4023</td><td>Title</td><td colspan="4">Operational Research</td></tr>
<tr><td rowspan="2">Credits</td><td rowspan="2">03</td><td rowspan="2">Hours/ Week</td><td>Lectures</td><td>03</td><td rowspan="2">Pre-requisites</td><td rowspan="2">MA1013</td></tr>
<tr><td>Lab/Tutorials</td><td>-</td></tr>
<tr><td colspan="7"><u>Learning Outcomes</u>

At the end of the course the student should be able to
• Identify appropriate OR techniques in a given real world problem.
• Perform sensitivity analysis in the chosen OR model.
• Choose an appropriate algorithm for the given the OR technique.
• Use the TORA software for engineering problems.</td></tr>
<tr><td colspan="7"><u>Outline Syllabus</u>
• Modeling with linear programming, geometrical solution to problems with two decision variables, simplex method including Big M-method and two phase method of a solution of problems with mixed constraints.
• Duality in linear programming, Transportation and assignment problems, trans-shipment problems. Theory of zero sum, two person matrix games.
• Revised simplex algorithm. Dual simplex algorithm, sensitivity analysis, and parametric programming.
• Integer programming, Gomory's cutting plane, branch and bound, the knapsack problem.
• Dynamic programming, the inventory model. Non-linear optimization.
• Introduction to network algorithm including minimum connector problems: Shortest and longest path algorithms and critical path analysis. PERT model.</td></tr>
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