UNIVERSITY OF MADRAS

B.Sc. DEGREE PROGRAMME IN MATHEMATICS

SYLLABUS WITH EFFECT FROM 2023-2024

<table>
<tr><td>Title of the Course</td><td colspan="7">INDUSTRIAL MATHEMATICS – RESOURCE MANAGEMENT TECHNIQUES</td></tr>
<tr><td>Paper Number</td><td colspan="7">CORE M7</td></tr>
<tr><td rowspan="2">Category</td><td rowspan="2">Core</td><td>Year</td><td>II</td><td rowspan="2">Credits</td><td rowspan="2">5</td><td rowspan="2">Course Code</td><td rowspan="2">234C4A</td></tr>
<tr><td>Semester</td><td>IV</td></tr>
<tr><td rowspan="2">Instructional Hours per week</td><td colspan="2">Lecture</td><td colspan="2">Tutorial</td><td colspan="2">Lab Practice</td><td>Total</td></tr>
<tr><td colspan="2">3</td><td colspan="2">1</td><td colspan="2">--</td><td>4</td></tr>
<tr><td>Pre-requisite</td><td colspan="7">12th Standard Mathematics</td></tr>
<tr><td>Objectives of the Course</td><td colspan="7">• The students acquire knowledge in Linear Programming, Solving Assignment and Transportation Problems and Sequencing problems.
• The students get to know about Simulation and Monte Carlo method of Simulation and Sampling Theory.</td></tr>
<tr><td rowspan="5">Course Outline</td><td colspan="7">UNIT-I: Linear programming: Formulation – graphical solution. Simplex method. Big-M method.
Chapter 6 :Sections 6.1 – 6.13, 6.20 – 6.31 Hours 15</td></tr>
<tr><td colspan="7">UNIT-II: Transportation Problem: Mathematical Formulation. Basic Feasible solution. North West Corner rule– Least Cost Method– Vogel's approximation– Optimal Solution– Unbalanced Transportation Problems– Degeneracy in Transportation problems.
Assignment Problem: Mathematical Formulation. Comparison with Transportation Model. Hungarian Method. Unbalanced Assignment Problems.
Sequencing Problem: n jobs on 2 machines – n jobs on 3 machines – two jobs on m machines – n jobs on m machines.
Chapter 9, Sections 9.1 – 9.12 ,Chapter 8 Sections 8.1 – 8.5
Chapter 10, Sections 10.1 – 10.6 Hours 15</td></tr>
<tr><td colspan="7">UNIT-III: Simulation: Monte Carlo Method – Definition, Types, Advantages and Disadvantages and Limitations, Phases. Generation of Random Numbers – Mid-Square method. Monte Carlo method of Simulation and Applications.
Chapter 4, Section: 4.1, 4.11, 4.12, 4.1, [Omit 4.13] Hours 15</td></tr>
<tr><td colspan="7">UNIT-IV: The Acceptance Sampling Problem – Advantages and Disadvantages of Sampling – Types of Sampling Plans – Lot Formation – Random Sampling – Guidelines for using Acceptance Sampling.
Chapter 15: Sections 15.1 Hours 15</td></tr>
<tr><td colspan="7">UNIT-V: Acceptance Sampling by attributes: Single Sampling Plan for attributes – Definition of a single sampling plan – The OC Curve – Designing a single sampling plan with a specified OC curve – Rectifying inspection.
Chapter 15: Section 15.2 Hours 15</td></tr>
<tr><td></td><td colspan="7">Total Hours:75</td></tr>
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Extended Professional Component (is a part of internal component only, Not to be included in the External Examination question paper)	Questions related to the above topics, from various competitive examinations UPSC / TNPSC / others to be solved (To be discussed during the Tutorial hour)
Skills acquired from this course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill
Recommend edText	Operations Research S.D. Sharma, 12th Edition, **Units 1, 2, 3** Montgomery. D.C (1991) Introduction to Statistical Quality Control (7th Edition), John Wiley and sons, New York **Units 4 & 5**
Reference Books	1. Resource Management Techniques by Sundaresan. 2. Probability, Random Variables and Stochastic Process, Papoulis A, Tata McGraw Hill Education Pvt. Ltd, New Delhi 3. Elements of Probability and Statistics, Baisnab A, Jas M, Tata McGraw Hill, Education Pvt. Ltd, New Delhi, 1993
Website and e-Learning Source	https://www.openintro.org/book/stat https://www.spscforexcel.com/knowledge/control-chart-basics/control-charts

Course Learning Outcome (for Mapping with POs and PSOs)

Students will be able to

CLO 1: Understand Fomulation of Linear Programming Problem and solving LPP using Graphical and Simplex Method.
CLO 2: Get skilled to solve transportation problem and sequencing problem.
CLO 3: Understand simulation techniques.
CLO 4: Construct Shewhart control charts and use variable control charts to monitor process performance.
CLO 5: Design and implement acceptance sampling plans for attributes and variables.

	POs						PSOs		
	1	2	3	4	5	6	1	2	3
CLO 1	3	1	3	--	1	--	3	2	1
CLO 2	2	1	3	1	1	--	3	2	1
CLO 3	3	1	3	1	1	--	3	2	1
CLO 4	3	1	3	1	--	--	3	2	1
CLO 5	3	1	3	1	--	--	3	2	1