

As Per NEP 2020

University of Mumbai



Syllabus for Basket of OE Vertical 3

Faculty of Science	
Board of Studies in Mathematics	
Second Year Programme	
Semester	III
Title of Paper	Credits
I) Mathematics for Industry and Management- I	2
From the Academic Year	2025-26

Name of the Course: Mathematics for Industry and Management- I

Sr. No.	Heading	Particulars
1	Description the course: Including but not limited to:	Management of a business is a laborious task, and often the manager is confronted with severe situations, such as how to maximize the profit or minimize the cost with the same resources and constraints, how to arrange/queue the various projects, what decision to take for the future, considering the volatile market conditions and so on! Operations Research, a branch of Mathematics, deals with such and other problems of the industry and management, and attempts to provide optimal solutions for them.
2	Vertical:	Open Elective
3	Type:	Theory
4	Credits:	2 credits (1 credit = 15 Hours for Theory or 30 Hours of Practical work in a semester)
5	Hours Allotted:	30 Hours
6	Marks Allotted:	50 Marks
7	Course Objectives (CO): CO1: To impart to the learners the applicability of Mathematics in Industry and Management. CO2: To make the learners learn the concepts of optimal solution, no solution, infinitely many solutions to a given problem. CO3: To make the learners aware of the various sub-branches of Operations Research (Transportation, Assignment, Sequencing, Resource Allocation etc). CO4: To enable the learners to develop mathematical models for various industrial problems.	
8	Course Outcomes (OC): After completion of the course, students will be able to OC1: understand and remember the concept/idea of Operations Research. OC2: apply graphical method to solve linear programming problem. OC3: analyse the difference between graphical and simplex method. OC4: assess when graphical methods are inadequate and apply simplex method in such cases. OC5: design mathematical models for problems related to industry.	
9	Modules:- Module 1: Elements of Linear Programming - I Introduction to Operations Research, Aspects of Decision Making, Objective of Operations Research, Definition and Characteristic of Operations Research, Scope of Operations Research. Introduction to Linear Programming Models, Properties of Linear Programming Models, Basic Assumptions, Terminology, General LPP, Maximization and Minimization Models,	

	Graphical Method to solve a maximization/minimization problem.																		
	Module 2: Elements of Linear Programming – II Simplex Method, Comparison between Simplex Method and Graphical Method, Maximization Problem, Minimization Problem, Artificial Variable Method Tie and Degeneracy in an LPP, Unbounded solution, Concept of Duality, Converting a Primal into a Dual, Dual simplex method																		
10	Text Books 1. Operations Research, by P. Rama Murthy, New Age International Publishers 2. Operations Research, by Prem Kumar Gupta, D. S. Hira S. Chand Publishers																		
11	Reference Books 1. Introduction to Operations Research, by <u>Frederick S. Hillier</u> , CBS Publishers 2. Operations Research an Introduction, by P. Mariappan, Pearson India																		
	<u>Scheme of the Examination</u>																		
	The performance of the learners shall be evaluated into two parts. • Internal Continuous Assessment of 20 marks for each paper. • Semester End Examination of 30 marks for each paper. • Separate head of passing is required for internal and semester end examination.																		
12	Internal Continuous Assessment: 40%	External, Semester End Examination 60%																	
		Individual Passing in Internal and External Examination																	
13	Continuous Evaluation through: Quizzes, Class Tests, presentations, projects, role play, creative writing, assignments etc. (at least 3)																		
	<table border="1"> <thead> <tr> <th>Sr. No.</th><th>Particulars</th><th>Marks</th><th></th></tr> </thead> <tbody> <tr> <td>1</td><td>A class test of 10 marks is to be conducted during each semester in an Offline mode.</td><td>10</td><td></td></tr> <tr> <td>2</td><td>Project on any one topic related to the syllabus or a quiz (offline/online) on one of the modules.</td><td>05</td><td></td></tr> <tr> <td>3</td><td>Seminar/ group presentation on any one topic related to the syllabus.</td><td>05</td><td></td></tr> </tbody> </table>	Sr. No.	Particulars	Marks		1	A class test of 10 marks is to be conducted during each semester in an Offline mode.	10		2	Project on any one topic related to the syllabus or a quiz (offline/online) on one of the modules.	05		3	Seminar/ group presentation on any one topic related to the syllabus.	05			
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	Paper pattern of the Test (Offline)																		

	Mode with One hour duration): Q1: Definitions/Fill in the blanks/ True or False with Justification. (04 Marks: 4 x 1). Q2: Attempt any 2 from 3 descriptive questions. (06 marks: 2 × 3)																	
14	Format of Question Paper: The semester-end examination will be of 30 marks of one hour duration covering the entire syllabus of the semester. <table><tr><td colspan="4">Note: Attempt any TWO questions out of THREE.</td></tr><tr><td>Q.No.1</td><td>Module 1 and 2</td><td>Attempt any THREE out of FOUR. (Each question of 5 marks) (a) Question based on OC1 (b) Question based on OC2 (c) Question based on OC3 (d) Question based on OC4/OC5</td><td>15 Marks</td></tr><tr><td>Q.No.2</td><td>Module 1 and 2</td><td>Attempt any THREE out of FOUR. (Each question of 5 marks) (a) Question based on OC1 (b) Question based on OC2 (c) Question based on OC3 (d) Question based on OC4/OC5</td><td>15 Marks</td></tr><tr><td>Q.No.3</td><td>Module 1 and 2</td><td>Attempt any THREE out of FOUR. (Each question of 5 marks) (a) Question based on OC1 (b) Question based on OC2 (c) Question based on OC3 (d) Question based on OC4/OC5</td><td>15 Marks</td></tr></table>		Note: Attempt any TWO questions out of THREE.				Q.No.1	Module 1 and 2	Attempt any THREE out of FOUR . (Each question of 5 marks) (a) Question based on OC1 (b) Question based on OC2 (c) Question based on OC3 (d) Question based on OC4/OC5	15 Marks	Q.No.2	Module 1 and 2	Attempt any THREE out of FOUR . (Each question of 5 marks) (a) Question based on OC1 (b) Question based on OC2 (c) Question based on OC3 (d) Question based on OC4/OC5	15 Marks	Q.No.3	Module 1 and 2	Attempt any THREE out of FOUR . (Each question of 5 marks) (a) Question based on OC1 (b) Question based on OC2 (c) Question based on OC3 (d) Question based on OC4/OC5	15 Marks
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Sd/-
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Chairman
Prof. B.S. Desale
BOS in Mathematics

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Dr. Madhav R. Rajwade
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Technology

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