

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	IV
Title of Paper	Credits
I) Quantitative Techniques – IV	2
From the Academic Year	2025-26

Name of the Course: Quantitative Techniques – IV

Sr. No	Heading	Particulars
1	Description the course: Including but Not limited to:	This course is designed for students studying quantitative methods from business perspective for the first time. It deals with the Basic Mathematics that forms an essential component of most of the professional courses like CA, ICWA etc. It communicates the practical aspects of mathematics in a way that reflects applications in day-to-day life.
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): This course provides the basic concepts and applications of mathematics to business and economics. The problems asked in this course would be mostly advanced and indirect, and would demand broader and critical thinking. The course aims to learn the fundamental concepts in calculus of one variable and game theory and nurture their intellect to apply them in daily practical/ real life scenario. CO1. To reinforce the basic math concepts and ideas within the learners CO2. To improve the cognitive power of the learners and make them think over and apply concepts/formulae to solve math problems of indirect nature, thereby developing their problem-solving capacity. CO3. To develop rational thinking of the learners CO4. To make learners competent across all professional examinations	
8	Course Outcomes (OC): After completion of the course, learners will be able to	

	OC1: understand linear functions in Business and Economics and remember minimax / maximin principle to compute value of the game OC2: apply concept of limit of a function and continuity of a function and apply formula of Algebraic method to find value of the game OC3: analyse the concept of derivative of a function to use in micro/macro-economics theory and analyse dominance rules to reduce the size of game payoff matrix so as to compute value of the game. OC4: evaluate indefinite integration related to economics, definite integral as area under the curve to business & economics and evaluate value of the game by arithmetic method, matrix method. OC5: construct graph to find value of the game by graphical method.
9	Modules:- Module 1: Elementary Calculus and its applications 1) Definition of a function in one variable and its terminologies. Some useful linear functions in Business and Economics, Examples (word problems) 2) Definition of limit of a function and continuity of a function in one variable, Examples (word problems) 3) Definition of derivative of a function in one variable, derivatives of some standard functions (only formulae), Rules of differentiation (statements only), Applications to differentiation to micro-economics theory (cost, revenue, elasticity) and micro-economics theory (income, consumption, savings), Maxima and Minima, word problem type examples expected, everywhere 4) Definition of Indefinite Integral, integration of some standard functions (only formulae), Rules of integration (statements only), Applications of indefinite integration to economics, Definite integral and its applications as area under the curve to business and economics, word problem type examples expected, everywhere. Module 2: Game Theory 1) Introduction: Game, Strategy: Pure Strategy and Mixed Strategy, Payoff, 2) Two-Person Zero-Sum Game, Payoff matrix. 3) Pure Strategies (Games with Saddle point): maximin principle, minimax principle, Optimal Strategy, value of the game, Rules to determine saddle point. 4) Mixed Strategies (Games without saddle point) : • Rules of Dominance • Algebraic method (Prefer Alternative method by formula in a_{ij}) • Arithmetic method • Matrix method • Graphical method
10	Text Books 1. Business Mathematics: Theory and Applications, J. K. Sharma, Ane Books, 2007, Ane's Student Edition. 2. Operations Research: Theory and Applications, J. K. Sharma, Trinity Press, sixth edition, 2016

11	Reference Books 1. Business Mathematics, D.C. Sancheti, V. K. Kapoor, eleventh edition: March 1993, Sultan Chand and Sons, Educational Publishers, New Delhi. 2. An introduction to management Science: Operation Research. Kanti Swarup, P.K.Gupta, Man Mohan; Ninteenth edition 2017, reprint 2019, Sultan Chand and Sons, Educational Publishers, New Delhi.														
	<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%		Semester End Examination: 60%												
13	Continuous Evaluation through: Quizzes, Class Tests, presentations, projects, role play, creative writing, assignments etc. (at least 3) <table><tr><td>Sr. No</td><td>Particulars</td><td>Marks</td></tr><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></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></tr><tr><td>3</td><td>Seminar/ group presentation on any one topic related to the syllabus.</td><td>05</td></tr></table> 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 x 3)		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	
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													
14	Format of Question Paper: The semester-end examination will be of 30 marks of one hour duration covering the entiresyllabus of the semester. Note: Attempt any TWO questions out of THREE. <table><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></table>			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.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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BOS in Mathematics

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