

As Per NEP 2020

University of Mumbai



Syllabus for Basket of OE (Scheme I)	
Board of Studies in Mathematics	
UG First Year Programme	
Semester	II
Title of Paper	Credits
1. Quantitative Techniques – II	2
2.	
3.	
From the Academic Year	2024-25

Name of the Course: Quantitative Techniques – II (OE – I)

Sr. No.	Heading	Particulars
1	Description the course: Including but Not limited to:	This course deals with the Basic Mathematics that forms an essential component of Most of the Competitive and Entrance Examinations, such as Banking, Management Entrance, UPSC/MPSC, SET/NET, GMAT/GRE to quote a few. Although the Math-concepts involved in these examinations are of elementary level, the nature of the problems in such exams is far different, and the difficulty level of the questions is much higher, than the typical ones, based on which students are tested in schools. A person appearing for such exams is expected to have a thorough understanding of the concepts, to have ability to think logically, and to be able to interpret the data, presented in different manner.
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 revises the basic mathematical concepts learned during school career. However, the problems asked in this course would be mostly advanced and indirect, and would demand broader and critical thinking. The course aims to enhance the reasoning power and logical thinking of the learners and nurture their intellect so as to make them competent across all competitive exams. 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 competitive and entrance examinations	
8	Course Outcomes (OC): After completion of the course, learners will be able to	

	OC1: understand the difference between equations and inequalities OC2: learn the concepts related to linear and quadratic equations, such as roots and their nature in different situations. OC3: realize how to perform various operations (such as addition, subtraction, multiplication and division) on inequalities and grasp their consequences. OC4: understand the difference between permutations and combinations OC5: learn the concepts and theorems related to probability, such as addition rule, multiplication rule, independent events. OC6: realize the various formulae and their applications in finding area and perimeter of various geometric shapes
9	Modules:- Module 1: Equations and Inequalities 1. Equations - I • Linear Equation in one variable • Linear Equation in two variables • Simultaneous Equations in two and three variables • Forming simultaneous equations 2. Equations - II • Quadratic Equation in one variable • Methods of solving a quadratic equation, such as (a) factorization, (b) technique of completing square, (c) use of the formula $\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ • Discriminant and Nature of the roots of a quadratic equation • Equations of higher degree and solving the same, when one root is given/known. Use of synthetic division 3. Inequalities • Concept of inequality, types of inequality such as $<$, $>$, $\leq$, $\geq$. • Simple rules related to inequality such as ○ Adding same quantity to both sides doesn't alter inequality ○ Subtracting same quantity from both sides doesn't alter inequality ○ Multiplying both sides by same positive quantity doesn't alter inequality ○ Dividing both sides by same positive quantity doesn't alter inequality ○ Multiplication or Division by negative quantities alter inequality [The problems to be asked should be of varied levels of difficulty. A few ones based on directly applying a given formula may be asked at the beginning; however, the latter ones should demand critical analysis of the given information and a thoughtful selection of the method/formula to solve the same.] Module 2: Counting Techniques, Probability and Geometry 1. Permutations and Combinations • The idea of Permutations and Combinations

	- The factorial notation and formulae for $P(n, r)$ and $C(n, r)$ 2. Probability - The concept and definition of Probability - The addition rule in Probability - The multiplication rule (in case of independent events) in Probability 3. Geometry - Formulae for the area and perimeter of various standard geometric shapes, such as triangles and quadrilaterals. - Using area of triangle to obtain areas of non-standard shape - Relation of internal/external angle and the number of sides of a regular polygon - Circumference and Area of a circle	
10	Text Books - Bible To Basic Mathematics, Pragati Agarwal - Quantitative Aptitude for Competitive Examinations, R. S. Agarwal - Logical and Analytical Reasoning: Useful for All Competitive Exams, A. K. Gupta	
11	Reference Books - Arithmetic : Subjective And Objective For Competitive Examinations, R. S. Agarwal - Maths Book For Competitive Exams, Vikas Bhalla - Reasoning For Competitive Examinations, Nishit K Sinha	
	<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><th>Sr. No</th><th>Particulars</th><th>Marks</th></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					
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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><th colspan="4">Note: Attempt any TWO questions out of THREE.</th></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/OC2 (b) Question based on OC3 (c) Question based on OC4 (d) Question based on OC5/OC6</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/OC2 (b) Question based on OC3 (c) Question based on OC4 (d) Question based on OC5/OC6</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)</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/OC2 (b) Question based on OC3 (c) Question based on OC4 (d) Question based on OC5/OC6	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/OC2 (b) Question based on OC3 (c) Question based on OC4 (d) Question based on OC5/OC6	15 Marks	Q.No.3	Module 1 and 2	Attempt any THREE out of FOUR . (Each question of 5 marks)	15 Marks	
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Sign of the BOS

Chairman

Dr. Bhausaheb S Desale

**The Chairman, Board of
Studies in Mathematics**

Sign of the

Offg. Associate Dean

Dr. Madhav R. Rajwade

**Faculty of Science &
Technology**

Sign of the

Offg. Dean

Prof. Shivram S. Garje

**Faculty of Science &
Technology**