AC – 24/05/2024
Item No. – 6.3 Sem. I (1a)

As Per NEP 2020

University of Mumbai

Syllabus for Basket of OE	
Board of Studies in Mathematics	
UG First Year Programme	
Semester	**I**
Title of Paper	**Credits 2/ 4**
I) Financial Mathematics I	**2**
From the Academic Year	**2024-25**

Name of the Course: Financial Mathematics - I

Sr. No.	Heading	Particulars
1	**Description the course:** **Including but not limited to:**	This course offers a comprehensive exploration of key concepts in finance, statistics, and mathematical modeling. Through this course students delve into topics such as interest, annuities, measures of central tendency, and dispersion. It focuses on financial mathematics, covering simple and compound interest, Equated Monthly Installments (EMI), and annuity calculations. It also offers statistical analysis, learning about various measures of central tendency and dispersion. The course aims to equip students with practical analytical skills and mathematical tools applicable to real-world scenarios in finance and statistics.
2	**Vertical:**	OE
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 a thorough examination of finance and statistics fundamentals. Covering interest, annuities, and statistical measures like central tendency and dispersion, it equips students with practical skills for real-world applications in finance and data analysis. By the end, students gain a strong understanding of these concepts for effective decision-making. CO1: To understand the concepts of simple interest, compound interest and Equated Monthly Instalments (EMI) enabling complex financial analysis. CO2: To introduce students to various measures of central tendency such as arithmetic mean, weighted mean, mode, combined mean, and its relevance in statistical analysis. CO3: To calculate measures of dispersion including median, quartiles, deciles, and percentiles, providing insight into data spread. CO4: To use standard deviation and its relative measures, facilitating a deeper understanding of data variability.	
8	**Course Outcomes (OC):**	

	After completion of the course, students will be able to. OC1: apply simple interest, compound interest, EMIs formulas for various scenarios, including multiple compounding periods for effective loan management. OC2: compute present and future values of annuities, aiding in long-term financial planning. OC3: calculate and interpret different measures of central tendency, providing insight into data distribution. OC4: understand the importance of mode as a measure of central tendency and its application in real-world scenarios. OC5: develop a solid understanding of standard deviation and its relative measures, facilitating advanced statistical analysis and interpretation.
9	**Modules: -** **Module 1: Interest and Annuity** • Simple Interest and Compound Interest, Compounded more than once a year. • Calculations involving up to 4 time periods. • Annuity, Immediate and due, Present value, Future value of an Annuity • Equated Monthly Instalments (EMI) using reducing & flat interest system.
	Module 2: Measures of Central Tendency and Dispersion • Arithmetic mean, Weighted mean, Combined mean • Median, Quartiles, Deciles, Percentiles • Mode • Range, Quartile deviation, Mean deviation from mean, median, mode • Standard deviation and their relative measures.
10	**Text Books** 1. Fundamentals of Mathematical Statistics,12th Edition, S. C. Gupta and V. K. Kapoor, Sultan Chand & Sons, 2020. 2. Statistics for Business and Economics, 11th Edition, David R. Anderson, Dennis J. Sweeney and Thomas A. Williams, Cengage Learning, 2011. 3. Introductory Statistics, 8th Edition, Prem S. Mann, John Wiley & Sons Inc., 2013.
11	**Reference Books** 1. A First Course in Statistics, 12th Edition, James McClave and Terry Sincich, Pearson Education Limited, 2018. 2. Introductory Statistics, Barbara Illowsky, Susan Dean and Laurel Chiappetta, OpenStax, 2013.
	<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.

<table>
<tr><td></td><td colspan="2">Semester End Examination of 30 marks for each paper.
Separate head of passing is required for internal and semester end examination.</td></tr>
<tr><td>12</td><td>Internal Continuous Assessment: 40%
Semester End Examination: 60%</td><td></td></tr>
<tr><td>13</td><td>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>
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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)</td><td></td></tr>
<tr><td>14</td><td colspan="2">Format of Question Paper:
The semester-end examination will be of 30 marks of one hour duration covering the entiresyllabus 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/OC2
(b) Question based on OC3
(c) Question based on OC4
(d) Question based on 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/OC2
(b) Question based on OC3</td><td>15 Marks</td></tr>
</table></td></tr>
</table>

	(c) Question based on OC4 (d) Question based on OC5		
Q.No.3	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	15 Marks

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

AC – 20/04/2024
Item No. – 6.6 Sem. I (1a)

As Per NEP 2020

University of Mumbai

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

Name of the Course: Quantitative Techniques – I (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 enhance the reasoning 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 logical thinking of the learners CO4. To make learners competent across all competitive and entrance examinations.	
8	**Course Outcomes (OC):** After completion of the course, students will be able to. OC1: understand the integers, rational numbers, real numbers and their operations. OC2: learn the concepts of GCD, LCM. OC3: understand the concepts related to averages and percentages, such as arithmetic mean.	

	geometric mean, harmonic mean OC4: evaluate the ratios and proportions OC5: understand the Profit, Loss, Percentage Profit and Percentage Loss. OC6: learn the concepts related to Time, Speed and Distance.
9	**Modules:-** **Module 1: Elementary Arithmetic - I** 1. Numbers and BODMAS: • Review of the number systems (Integers, Whole Numbers, Rational Numbers and Real Numbers) • Review of the basic operations and their results (like odd + even = odd, odd × even = even, odd raised to even is odd etc) • Easy tricks to do fast calculations (multiplication, squares, square-roots etc) • GCD and CLM of two or more numbers. 2. Averages and Percentage: • The three different means viz. Arithmetic Mean, Geometric Mean, Harmonic Mean • Properties of the three means, such as (a) AM-GM-HM inequality, (b) The mean of two numbers lies in between the two numbers, (c) In case of several numbers, the product of AM and the number of numbers equals the addition of numbers, (d) In case of several numbers, the product of the numbers equals the GM raised to the number of numbers, (e) The effect of adding the same quantity to each number on AM, (f) The effect of multiplying each number by the same quantity on GM • Percentage 3. Ratio and Proportion: • Concept of Ratio of two quantities • Ratio related properties such as invertendo, alternendo, componendo, dividendo etc • Direct and Inverse Proportion [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: Elementary Arithmetic – II 1. Profit and Loss: • Definitions of Profit and Loss • The concept of Percentage Profit and Percentage Loss 2. Time, Speed and Distance: • The concept of average speed based on the total distance crossed and the total time taken • The difference between crossing a pole/tower/tree/human and crossing a tunnel/bridge/station • Crossing a stationary object versus crossing a moving object

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- Moving with/against the current (in a river)

3. Work, Pipes and Cisterns:

- Work done in unit time is reciprocal of the total work done (assuming that the amount of work done in each unit time is same),
- Filling/refilling/emptying cisterns.

</td></tr>
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1. Bible To Basic Mathematics, Pragati Agarwal
2. Quantitative Aptitude for Competitive Examinations, R. S. Agarwal
3. Logical and Analytical Reasoning: Useful for All Competitive Exams, A. K. Gupta</td></tr>
<tr><td>11</td><td colspan="2">Reference Books

1. Arithmetic : Subjective And Objective For Competitive Examinations, R. S. Agarwal
2. Maths Book For Competitive Exams, Vikas Bhalla
3. Reasoning For Competitive Examinations, Nishit K Sinha</td></tr>
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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
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