UG-School of Management

Details of Lesson Plan

S.No.	Particulars	Details
1.	Course Name	Business Mathematics & Statistics
2.	Course Code	BCMMJ-101
3.	Academic Year	2024-25
4.	Semester	IST
5.	Number of Lesson plans	33
6.	Faculty Assigned	Dr Pallavi Sharma

Pallavi

Faculty Signature

Lesson Plan No. 1	Course Name: Business Mathematics and Statistics Topic: Matrix and its types	Course No.: BCMMJ-101

Objectives	At the end of the lesson the student shall be able to: a. Understand the definition of a matrix and its various types. b. Identify different types of matrices such as square, diagonal, identity, zero, row, and column matrices. c. Apply the knowledge to categorize matrices based on their properties.
Teaching Aids (if any)	a. Chalk & talk
Teaching Development	1. **Introduction** (5 minutes) - Ask questions - What is a matrix? - Introduce the concept of a matrix and its importance in mathematics and other fields. - Provide a basic definition and examples of matrices. 2. **Development** (15 minutes) a. Introduction to Matrices - Explain the different types of matrices: -Square Matrix: Where the number of rows equals the number of columns. -Diagonal Matrix: A square matrix where all elements outside the main diagonal are zero. -Identity Matrix: A diagonal matrix where all the elements on the main diagonal are 1. -Zero Matrix: A matrix where all elements are zero. -Row Matrix: A matrix that has only one row. -Column Matrix: A matrix that has only one column. b. Provide examples for each type and solve problems to illustrate the concepts. c. Use diagrams and tables to show how these matrices are structured. 3. **Exercise** (20 minutes) – - Engage students with questions that require identifying and categorizing different types of matrices. - Do various problems on construction of matrices and its specific types.
Closure	1. Summarize the lesson learning outcomes and get affirmation from

	students on these. 2. Suggested video links: https://nptel.ac.in/courses/122104018 3. Homework Do various problems on construction of matrices and identification of its types. Spend 5 minutes to wrap up and consolidate the leanings.
Evaluation	1. Reflective Questions (What, why, Who?). Allow students to answer and discuss. - Conduct a quiz with MCQs on matrix types and encourage students to discuss their answers and reasoning. Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 2	Course Name: Business Mathematics and Statistics Topic: Types of Matrices	Course No.: BCMMJ-101

Objectives	At the end of the lesson the student shall be able to: a. Gain knowledge about all types of matrices. b. Understand types of matrices with the help of an example.
Teaching Aids (if any)	a. Chalk & talk b. Group discussion
Teaching Development	1. **Introduction** (5 minutes) - Ask questions About all types of matrices - Encourage students to try answering the question. - Introduce the students with the concept and explain what the various types of a matrix are in a simple way. 2. **Development** (10 minutes) a. Introduction types of matrices. - Explain the concept. b. Explain all the types of matrices. - Explain various examples. - Explain the difference between types of matrices. 3. Exercise (30 minutes) – - Have discussion to summarize the lecture - Ask questions related to topic - Ask any student to recapitulate the topic done
Closure	1. Summarize the lesson learning outcomes and get affirmation from students on these. 2. Suggested video links: https://nptel.ac.in/courses/122104018 Covers the following: What are the types of matrix with the help of an example? Spend 5 minutes to wrap up and consolidate the leanings.
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. - Quiz based activity including MCQs Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 3	Course Name: Business Mathematics and Statistics Topic: Algebra of Matrices	Course No.: BCMMJ-101

Objectives	At the end of the lesson the student shall be able to: a. Understand the basic operations of matrices including addition, subtraction, and scalar multiplication. b. Apply the operations on matrices to solve mathematical problems. c. Develop proficiency in performing algebraic manipulations with matrices.
Teaching Aids (if any)	a. Chalk & talk
Teaching Development	1. **Introduction** (5 minutes) - Ask questions. - Begin by asking students if they recall what a matrix is and how matrices are used. - Introduce the concept of algebra of matrices and explain why these operations are essential in various fields like computer science, economics, and engineering. 2. **Development** (15 minutes) a. **Matrix Addition and Subtraction** - Explain how two matrices of the same dimensions can be added or subtracted by adding or subtracting their corresponding elements. **b. Scalar Multiplication** - Explain how a matrix is multiplied by a scalar (a single number) by multiplying each element of the matrix by that scalar. 3. **Exercise** (20 minutes) - Engage students with a set of problems that require adding, subtracting, and multiplying matrices by a scalar. - Encourage group work to solve more complex problems involving matrix algebra. - Ask students to come to the board and explain their solutions to the class.
Closure	1. Summarize the lesson learning outcomes and get affirmation from students on these. 2. Suggested video links: https://www.learncbse.in/ncert-solutions-for-class-12th-maths-chapter-3-matrices/ 3. Homework

	Practice problems on matrix addition, subtraction, and scalar multiplication from the textbook. Spend 5 minutes to wrap up and consolidate the leanings.
Evaluation	1. Reflective Questions (What, why, Who?). Allow students to answer and discuss. Quiz based activity including MCQs Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 4	Course Name: Business Mathematics and Statistics Topic: Multiplication of two matrices	Course No.: BCMMJ-101

Objectives	At the end of the lesson the student shall be able to: a. Understand the rules and conditions necessary for multiplying two matrices. b. Perform the multiplication of two matrices and interpret the resulting matrix. c. Apply matrix multiplication in solving mathematical problems and real-world applications.
Teaching Aids (if any)	a. Chalk & talk
Teaching Development	1. **Introduction** (5 minutes) - Ask questions. - What do you think happens when we multiply two matrices? - Introduce matrix multiplication as a fundamental operation in linear algebra, crucial for various applications like transformations, computer graphics, and system of equations. 2. **Development** (10 minutes) a. Introduction multiplication of two matrices. - Explain how we can multiply two matrices with examples. -Conditions for Matrix Multiplication: -Explain the requirement that the number of columns in the first matrix must be equal to the number of rows in the second matrix for multiplication to be possible. - Explain general form of multiplication of two matrices. - Explain with the help of example. - Solve various questions based on it. 3. **Exercise** (25 minutes) – - Provide a set of matrices for students to multiply, starting with simpler examples and gradually increasing in complexity. - Include both square and non-square matrices to reinforce the conditions for multiplication. - Work through one or two examples together, then have students complete the rest in pairs or small groups.
Closure	1. Summarize the lesson learning outcomes and get affirmation from students on these. 2. Suggested video links: https://www.learncbse.in/ncert-solutions-for-class-12th-maths-chapter-3-matrices/ 3. Homework

	Assign problems on matrix multiplication from the textbook, ensuring a mix of easy and challenging problems. Spend 5 minutes to wrap up and consolidate the learnings.
Evaluation	1. Reflective Questions (What, why, Who?). Allow students to answer and discuss. - Quiz based activity including MCQs. Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 5	Course Name: Business Mathematics and Statistics Topic: Transpose of a matrix	Course No.: BCMMJ-101

Objectives	At the end of the lesson the student shall be able to: a. Gain knowledge about transpose of a matrix. b. Understand about symmetric and skew symmetric matrix.
Teaching Aids (if any)	a. Chalk & talk
Teaching Development	1. **Introduction** (5 minutes) - Ask questions About transpose of a matrix. - Encourage students to try answering the question. - Introduce the students with the concept. 2. **Development** (10 minutes) a. Introduction transpose of a matrix. - Explain how we can find transpose of a matrix with examples. b. Explain properties of transpose. - Explain symmetric and skew symmetric matrix with the help of example. - Solve various questions based on it. 3. Exercise (30 minutes) – - Have discussion to summarize the lecture - Ask questions related to topic - Ask any student to recapitulate the topic done
Closure	1. Summarize the lesson learning outcomes and get affirmation from students on these. 2. Suggested video links: https://www.learncbse.in/ncert-solutions-for-class-12th-maths-chapter-3-matrices/ Covers the following: How we find transpose of a matrix and use it in symmetric and skew symmetric matrix with the help of various problems? Spend 5 minutes to wrap up and consolidate the leanings.
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. - Quiz based activity including MCQs Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 6	Course Name: Business Mathematics and Statistics Topic: Determinant of a matrix	Course No.: BCMMJ-101

Objectives	At the end of the lesson the student shall be able to: a. Gain knowledge about determinant of a matrix b. Understand about how we can find determinant of a matrix of different orders.
Teaching Aids (if any)	a. Chalk & talk
Teaching Development	1. **Introduction** (5 minutes) - Ask questions Related to determinant of a matrix. - Encourage students to try answering the question. - Introduce the students with the concept. 2. **Development** (10 minutes) a. Introduction determinant of a matrix. - Explain how we can find determinant of a matrix with examples. b. Explain method of solving determinant row and column wise. - Solve various questions based on it. 3. Exercise (30 minutes) – - Have discussion to summarize the lecture - Ask questions related to topic - Ask any student to recapitulate the topic done
Closure	1. Summarize the lesson learning outcomes and get affirmation from students on these. 2. Suggested video links: https://www.learncbse.in/ncert-solutions-for-class-12th-maths-chapter-3-matrices/ Covers the following: How we can find determinant of a matrix with the help of various problems? Spend 5 minutes to wrap up and consolidate the leanings.
Evaluation	- Reflective Questions (What, Why, Who?). Allow students to answer and discuss. - Quiz based activity including MCQs Spend 5 minutes to evaluate student assimilation of the lesson contents

i

Lesson Plan No. 7	Course Name: Business Mathematics and Statistics Topic: Minors and cofactors of a matrix	Course No.: BCMMJ-101

Objectives	At the end of the lesson the student shall be able to: a. Gain knowledge about minors and cofactors of a matrix b. Understand about how we can find minors and cofactors of a matrix of different orders.
Teaching Aids (if any)	a. Chalk & talk
Teaching Development	1. **Introduction** (5 minutes) - Ask questions Related to cofactors of a matrix. - Encourage students to try answering the question. - Introduce the students with the concept. 2. **Development** (10 minutes) a. Introduction cofactors of a matrix. - Explain how we can find cofactors of a matrix with examples. b. Explain how we can find cofactors o different order from minors of a matrix. - Solve various questions based on it. 3. Exercise (30 minutes) – - Have discussion to summarize the lecture - Ask questions related to topic - Ask any student to recapitulate the topic done
Closure	1. Summarize the lesson learning outcomes and get affirmation from students on these. 2. Suggested video links: https://www.learncbse.in/ncert-solutions-for-class-12th-maths-chapter-3-matrices/ Covers the following: How we can find cofactors of a matrix with the help of various problems? Spend 5 minutes to wrap up and consolidate the leanings.
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. - Quiz based activity including MCQs Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 8	Course Name: Business Mathematics and Statistics Topic: Adjoint of a matrix	Course No.: BCMMJ-101

Objectives	At the end of the lesson the student shall be able to: a. Gain the knowledge about adjoint of a matrix. b. Understand about how we can find adjoint of a matrix.
Teaching Aids (if any)	a. Chalk & talk
Teaching Development	1. **Introduction** (5 minutes) - Ask questions Related to adjoint of a matrix. - Encourage students to try answering the question. - Introduce the students with the concept. 2. **Development** (10 minutes) a. Introduction about adjoint of a matrix. - Explain how we can find adjoint of a matrix from cofactors. - Solve various questions based on it. 3. Exercise (30 minutes) – - Have discussion to summarize the lecture - Ask questions related to topic - Ask any student to recapitulate the topic done
Closure	1. Summarize the lesson learning outcomes and get affirmation from students on these. 2. Suggested video links: https://ncert.nic.in/pdf/publication/exemplarproblem/classXII/mathematics/leep204.pdf Covers the following: How we can find adjoint of a matrix with the help of various problems? Spend 5 minutes to wrap up and consolidate the leanings.
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. - Conduct a minute-paper activity - Quiz based activity including MCQs Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 9	Course Name: Business Mathematics and Statistics Topic: Inverse of a matrix	Course No.: BCMMJ-101

Objectives	At the end of the lesson the student shall be able to: a. Gain knowledge about inverse of a matrix. b. Understand about how we can find inverse of a matrix.
Teaching Aids (if any	a. Chalk & talk
Teaching Development	1. **Introduction** (5 minutes) - Ask questions Related to inverse of a matrix. - Encourage students to try answering the question. - Introduce the students with the concept. 2. **Development** (10 minutes) a. Introduction about inverse of a matrix. - Explain how we can find inverse of a matrix through adjoint - Solve various questions based on it. 3. Exercise (30 minutes) – - Have discussion to summarize the lecture - Ask questions related to topic - Ask any student to recapitulate the topic done
Closure	1. Summarize the lesson learning outcomes and get affirmation from students on these. 2. Suggested video links: https://ncert.nic.in/pdf/publication/exemplarproblem/classXII/mathematics/leep204.pdf Covers the following: How we can find inverse of a matrix through adjoint with the help of various problems? Spend 5 minutes to wrap up and consolidate the leanings.
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. - Conduct a minute-paper activity - Quiz based activity including MCQs Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 10	Course Name: Business Mathematics and Statistics Topic: Applications of a matrix	Course No.: BCMMJ-101

Objectives	At the end of the lesson the student shall be able to: a. Gain knowledge about application of a matrix. b. Understand about how we can solution of simple business and economic problems from matrix.
Teaching Aids (if any	a. Chalk & talk b. Group discussion
Teaching Development	1. **Introduction** (5 minutes) - Ask questions Related to application of a matrix. - Encourage students to try answering the question. - Introduce the students with the concept. 2. **Development** (10 minutes) a. Introduction about application of a matrix. - Explain about applications of matrices. - Solution of simple business and economic problems. - How we can solve linear equations from inverse of a matrix. 3. Exercise (30 minutes) – - Have discussion to summarize the lecture - Ask questions related to topic - Ask any student to recapitulate the topic done
Closure	1. Summarize the lesson learning outcomes and get affirmation from students on these. 2. Suggested video links: https://www.youtube.com/watch?v=7gJU3dl6WDs https://www.youtube.com/watch?v=qK5ngErADdc Covers the following: How we can solution of linear equation from inverse and solution of solution of simple business and economic problems. Spend 5 minutes to wrap up and consolidate the leanings.
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. - Conduct a minute-paper activity - Quiz based activity including MCQs Spend 5 minutes to evaluate student assimilation of the lesson contents.

Lesson Plan No. 11	Course Name: Business Mathematics and Statistics Topic: Simple Interest	Course No.: BCMMJ-101

Objectives	At the end of the lesson the student shall be able to: a. Understand the concept of simple interest and how it is calculated. b. Identify the key components involved in simple interest calculations (Principal, Rate, and Time). c. Apply the formula for simple interest to solve real-world problems involving loans, investments, and savings.
Teaching Aids (if any)	a. Chalk & talk b. Calculator
Teaching Development	1. **Introduction** (5 minutes) - Ask questions -What is Interest? - What do you understand by interest? - Why is it important in financial transactions? - Define simple interest as the additional money paid on a principal amount over time at a fixed interest rate. - Highlight the importance of understanding simple interest in both personal and business finance. 2. **Development** (10 minutes) a. Introduction about interest. - Explain the Formula: - Introduce the formula for simple interest: SI = P × R × T / 100 where: P = Principal amount R = Rate of interest per annum T = Time period in years - Explain each component of the formula and its significance. b. Illustrative Examples - Provide numerical examples to calculate simple interest. - Discuss how varying any of the three factors (P, R, T) affects the total interest. - Solve problems involving different scenarios when the other values are given. - Use real-world examples, like bank savings accounts or loans, to make the concept relatable. 3. **Exercise** (25 minutes) - Pose questions requiring students to calculate simple interest given - different values. - Encourage students to solve problems individually and then discuss their solutions with the class. - Provide problems with different levels of difficulty to cater to diverse student abilities.
Closure	1. Summarize the lesson learning outcomes and get affirmation from

	students on these. 2. Suggested video links: https://archive.nptel.ac.in/courses/112/107/112107209/ 3. Homework Assign problems involving simple interest calculations from the textbook. Spend 5 minutes to wrap up and consolidate the leanings.
Evaluation	1. Reflective Questions (What, why, Who?). Allow students to answer and discuss. 3. Conduct a Group discussion activity. Spend 5 minutes to evaluate student assimilation of the lesson contents.

Lesson Plan No. 12	Course Name: Business Mathematics and Statistics Topic: Compound Interest	Course No.: BCMMJ-101

Objectives	At the end of the lesson the student shall be able to: a. Gather about the concept of compound interest. b. Interpret about how to find compound interest when interest is completed annually but time is in fraction.
Teaching Aids (if any)	a. Chalk & talk b. Calculator
Teaching Development	1. **Introduction** (5 minutes) - Ask questions - What is simple interest? - What is rate of interest? - Encourage students to try answering the question. - Introduce the students with the concept. 2. **Development** (10 minutes) -Introduction about compound interest. - Explain about compound interest when interest is completed annually but time is in fraction. - How to solve problems when interest is completed annually but time is in fraction. 3. Exercise (30 minutes) – - Have discussion to summarize the lecture - Ask questions related to topic - Ask any student to recapitulate the topic done
Closure	1. Summarize the lesson learning outcomes and get affirmation from students on these. 2. Suggested video links: https://archive.nptel.ac.in/courses/109/107/109107115/ Covers the following: How we interpret about compound interest when interest is completed annually but time is in fraction? Spend 5 minutes to wrap up and consolidate the leanings.
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. - Conduct a test on board. Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 13	Course Name: Business Mathematics and Statistics Topic: Compound interest when interest is half yearly and quarterly.	Course No.: BCMMJ-101

Objectives	At the end of the lesson the student shall be able to: a. Gain about the concept of compound interest. b. Interpret about how to find compound interest when interest is half yearly and quarterly.
Teaching Aids (if any)	a. Chalk & talk b. Calculator
Teaching Development	1. **Introduction** (5 minutes) - Ask questions - How to calculate compound interest annually? - How to calculate compound interest when time is in fraction. - Encourage students to try answering the question. - Introduce the students with the concept. 2. **Development** (10 minutes) - Introduction about compound interest. - Explain about compound interest when interest is half yearly. - Explain about compound interest when interest is quarterly. - How to solve problems when interest is half yearly and quarterly. 3. Exercise (30 minutes) – - Have discussion to summarize the lecture - Ask questions related to topic - Ask any student to recapitulate the topic done
Closure	1. Summarize the lesson learning outcomes and get affirmation from students on these. 2. Suggested video links: https://archive.nptel.ac.in/courses/109/107/109107115/ 3. Homework Problems on how we interpret about compound interest when interest is half yearly and quarterly? Spend 5 minutes to wrap up and consolidate the leanings.
Evaluation	1. Reflective Questions (What, why, Who?). Allow students to answer and discuss. - Quiz based activity including MCQs Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 14	Course Name: Business Mathematics and Statistics Topic: Nominal rate of interest	Course No.: BCMMJ-101

Objectives	At the end of the lesson the student shall be able to: a. Gain about the concept of rate interest. b. Interpret about how to find nominal rate of interest.
Teaching Aids (if any)	a. Chalk & talk b. Calculator
Teaching Development	1. **Introduction** (5 minutes) - Ask questions - Related to nominal rate of interest - Encourage students to try answering the question. - Introduce the students with the concept. 2. **Development** (10 minutes) - Introduction about rate of interest. - Explain about nominal rate of interest. - How to solve problems of nominal rate of interest? 3. Exercise (30 minutes) – - Have discussion to summarize the lecture - Ask questions related to topic - Ask any student to recapitulate the topic done
Closure	1. Summarize the lesson learning outcomes and get affirmation from students on these. 2. Suggested video links: http://www.digimat.in/nptel/courses/video/109107115/L02.html Covers the following: How we interpret about nominal rate of interest? Spend 5 minutes to wrap up and consolidate the leanings.
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. - Conduct a minute-paper activity - Quiz based activity including MCQs Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 15	Course Name: Business Mathematics and Statistics Topic: Effective rate of interest	Course No.: BCMMJ-101

Objectives	At the end of the lesson the student shall be able to: a. Gain knowledge about the concept effective rate of interest. b. Interpret about how to find effective rate of interest.
Teaching Aids (if any)	a. Chalk & talk b. Calculator
Teaching Development	1. **Introduction** (5 minutes) - Ask questions - Related to effective rate of interest - Encourage students to try answering the question. - Introduce the students with the concept. 2. **Development** (10 minutes) - Introduction about rate of interest. - Explain about effective rate of interest. - How to solve problems of effective rate of interest? 3. Exercise (30 minutes) – - Have discussion to summarize the lecture - Ask questions related to topic - Ask any student to recapitulate the topic done
Closure	1. Summarize the lesson learning outcomes and get affirmation from students on these. 2. Suggested video links: https://archive.nptel.ac.in/courses/112/107/112107209/ Covers the following: How we interpret about effective rate of interest? Spend 5 minutes to wrap up and consolidate the leanings.
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. - Conduct a group discussion activity Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 16	Course Name: Business Mathematics and Statistics Topic: Continuous rate of interest	Course No.: BCMMJ-101

Objectives	At the end of the lesson the student shall be able to: a. Gain knowledge about the concept of continuous rate of interest. b. Interpret about how to find continuous rate of interest.
Teaching Aids (if any)	a. Chalk & talk b. Calculator
Teaching Development	1. **Introduction** (5 minutes) - Ask questions - Related to continuous rate of interest - Encourage students to try answering the question. - Introduce the students with the concept. 2. **Development** (10 minutes) - Introduction about continuous rate of interest. - Explain about continuous rate of interest. - How to solve problems of continuous rate of interest? 3. Exercise (30 minutes) – - Have discussion to summarize the lecture - Ask questions related to topic - Ask any student to recapitulate the topic done
Closure	1. Summarize the lesson learning outcomes and get affirmation from students on these. 2. Suggested video links: https://archive.nptel.ac.in/courses/109/107/109107115/ Covers the following: How we interpret about continuous rate of interest? Spend 5 minutes to wrap up and consolidate the leanings.
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. - Conduct a white board activity. Spend 5 minutes to evaluate student assimilation of the lesson contents.

Lesson Plan No. 17	Course Name: Business Mathematics and Statistics Topic: Compounding and Discounting of sum using nominal rate of interest	Course No.: BCMMJ-101

Objectives	At the end of the lesson the student shall be able to: a. Articulate the concept of Compounding and Discounting of sum using nominal rate of interest. b. Interpret about how to find Compounding and Discounting.
Teaching Aids (if any)	a. Chalk & talk b. Calculator
Teaching Development	1. **Introduction** (5 minutes) - Ask questions - What is present value? - What is future value? - Encourage students to try answering the question. - Introduce the students with the concept. 2. **Development** (10 minutes) - Introduction about Future value and Present value - Introduction about Compounding and Discounting. - Explain about Compounding and Discounting. - How to solve problems of Compounding and Discounting? 3. Exercise (30 minutes) – - Have discussion to summarize the lecture - Ask questions related to topic - Ask any student to recapitulate the topic done
Closure	1. Summarize the lesson learning outcomes and get affirmation from students on these. 2. Suggested video links: https://archive.nptel.ac.in/courses/112/107/112107260/ Covers the following: How we interpret about continuous rate of interest? Spend 5 minutes to wrap up and consolidate the leanings.
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. - Quiz based activity including MCQs Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 18	Course Name: Business Mathematics and Statistics **Topic: Compounding and discounting of sum using effective rate of interest**	Course No.: BCMMJ-101

Objectives	At the end of the lesson the student shall be able to: a. Articulate about the concept compounding and discounting of sum using effective rate of interest. b. Interpret about how to find compounding and discounting of sum using effective rate of interest.
Teaching Aids (if any)	a. Chalk & talk b. Calculator
Teaching Development	1. **Introduction** (5 minutes) - Ask questions - What is effective rate? - What is compound? - What is discount? - Encourage students to try answering the question. - Introduce the students with the concept. 2. **Development** (10 minutes) - Introduction about Compounding and discounting of sum using effective rate of interest. - Explain about Compounding and discounting using effective rate of interest. - How to solve problems of Compounding and discounting using effective rate of interest? 3. Exercise (30 minutes) – - Have discussion to summarize the lecture - Ask questions related to topic - Ask any student to recapitulate the topic done
Closure	1. Summarize the lesson learning outcomes and get affirmation from students on these. 2. Suggested video links: https://archive.nptel.ac.in/courses/112/107/112107260/ Covers the following: How we interpret about Compounding and discounting using effective rate of interest? Spend 5 minutes to wrap up and consolidate the leanings.

Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. Spend 5 minutes to evaluate student assimilation of the lesson contents.

Lesson Plan No. 19	Course Name: Business Mathematics and Statistics Topic: Compounding and discounting of sum using continuous rate of interest	Course No.: BCMMJ-101

Objectives	At the end of the lesson the student shall be able to: a. Articulate about the concept compounding and discounting of sum using continuous rate of interest. b. Interpret about how to find compounding and discounting of sum using continuous rate of interest.
Teaching Aids (if any)	a. Chalk & talk b. Calculator
Teaching Development	1. **Introduction** (5 minutes) - Ask questions - Related to Compounding and discounting of sum using continuous rate of interest. - Encourage students to try answering the question. - Introduce the students with the concept. 2. **Development** (10 minutes) - Introduction about Compounding and discounting of sum using continuous rate of interest. - Explain about Compounding and discounting using continuous rate of interest. - How to solve problems of Compounding and discounting using continuous rate of interest? 3. Exercise (30 minutes) – - Have discussion to summarize the lecture - Ask questions related to topic - Ask any student to recapitulate the topic done
Closure	1. Summarize the lesson learning outcomes and get affirmation from students on these. 2. Suggested video links: https://archive.nptel.ac.in/courses/112/107/112107260/ Covers the following: How we interpret about Compounding and discounting using Continuous rate of interest? Spend 5 minutes to wrap up and consolidate the leanings.

Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. Spend 5 minutes to evaluate student assimilation of the lesson contents.

Lesson Plan No. 20	Course Name: Business Mathematics and Statistics Topic: Measure of central tendency	Course No.: BCMMJ-101

Objectives	At the end of the lesson the student shall be able to: a. Articulate about the concept of measures of central tendency. b. Introduce the concept of arithmetic mean, geometric mean and harmonic mean. c. Interpret about how to calculate different types of mean.
Teaching Aids (if any	a. Chalk & talk b. Calculator
Teaching Development	1. **Introduction** (5 minutes) - Ask questions - What is mean? And how to calculate simple mean? - Encourage students to try answering the question. - Introduction of new terms and difference between three types of mean. 2. **Development** (10 minutes) a. Introduction about measures of central tendency including different types of mean. b. Discuss their properties and applications. c. Explain about finding geometric mean, arithmetic mean and harmonic mean. d. How to solve problems related to concept of mean. 3. Exercise (30 minutes) – - Have discussion to summarize the lecture - Ask questions related to topic - Ask any student to recapitulate the topic done - Solve problems related to topic of mean.
Closure	1. Summarize the lesson learning outcomes and get affirmation from students on these. **2.** Suggested reading content: http://www.uop.edu.pk/ocontents/chapter%203.pdf Spend 5 minutes to wrap up and consolidate the leanings.
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. - Conduct a minute-paper activity - Quiz based activity including MCQs Spend 5 minutes to evaluate student assimilation of the lesson contents.

Lesson Plan No. 21	Course Name: Business Mathematics and Statistics Topic: Median and mode	Course No.: BCMMJ-101

Objectives	At the end of the lesson the student shall be able to: a. Articulate about the concept of measures of central tendency. b. Introduce the concept of mode and median. c. Interpret about how to calculate mode and median of data.
Teaching Aids (if any	a. Chalk & talk b. Calculator
Teaching Development	1. **Introduction** (5 minutes) - Ask questions - Encourage students to try answering the question. - Introduction of new measures of central tendency i.e. Mode and Median. 2. **Development** (10 minutes) a. Introduce the concept of mode and median with their properties and applications. b. Explain about finding mode and median. c. How to solve problems related to mode and median for grouped as well as ungrouped data. 3. Exercise (30 minutes) – - Have discussion to summarize the lecture - Ask questions related to topic - Ask any student to recapitulate the topic done - Solve questions related to topic of mode and median.
Closure	1. Summarize the lesson learning outcomes and get affirmation from students on these. **2.** Suggested video content: http://www.uop.edu.pk/ocontents/chapter%203.pdf **3.** Give Problems related to topic to do at home. Spend 5 minutes to wrap up and consolidate the leanings.
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. - Conduct a minute-paper activity - Quiz based activity including MCQs Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 22	Course Name: Business Mathematics and Statistics Topic: Quartiles, Deciles and percentiles	Course No.: BCMMJ-101

Objectives	At the end of the lesson the student shall be able to: a. Articulate about the concept of partition values- quartiles, deciles and percentiles. b. Interpret about how to calculate partition values of data.
Teaching Aids (if any	a. Chalk & talk b. Calculator
Teaching Development	1. **Introduction** (5 minutes) - Ask questions - Encourage students to try answering the question. - Introduction of new concept of partition values and three different types of partition values. 2. **Development** (10 minutes) a. Introduce the concept of quartiles, deciles and percentiles and their applications b. Explain about finding partition values. c. How to solve problems related to partition values and its applications. 3. Exercise (30 minutes) – - Have discussion to summarize the lecture - Ask questions related to topic - Ask any student to recapitulate the topic done - Solve questions related to topic of partition values.
Closure	1. Summarize the lesson learning outcomes and get affirmation from students on these. **2.** Suggested reading content: https://www.selfstudys.com/sitepdfs/6AT1sJPneNNR4smd3LQQ **3.** Give Problems related to topic to do at home. Spend 5 minutes to wrap up and consolidate the leanings.
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. - Conduct a minute-paper activity - Quiz based activity including MCQs Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 23	Course Name: Business Mathematics and Statistics Topic: Range and Quartile Deviation	Course No.: BCMMJ-101

Objectives	At the end of the lesson the student shall be able to: a. Articulate about the concept of Measures of Variation: absolute and relative. b. Interpret about how to calculate Measures of Variation: Range and Quartile Deviation.
Teaching Aids (if any	a. Chalk & talk b. Calculator
Teaching Development	**1. Introduction** (5 minutes) - Ask questions. - What is absolute and relative variation? - What is Range? - What are quartiles? - Encourage students to try answering the question. - Introduction of new concept of Measures of Variation: absolute and relative and four different types of Measures of Variation. **Development** (10 minutes) a. Introduce the concept of Range and Quartile Deviation and their applications. b. Explain about finding Range and Quartile Deviation. c. How to solve problems related to Range and Quartile Deviation. **2. Exercise** (30 minutes) - Do various problems on Range and Quartile Deviation.
Closure	1. Summarize the lesson learning outcomes and get affirmation from students on these. **2.** Suggested video link: http://www.nitttrc.edu.in/nptel/courses/video/110105060/L03.html **3.** Homework: Give Problems related to Range and Quartile Deviation to solve. Spend 5 minutes to wrap up and consolidate the leanings.
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss.

	- Conduct a minute-paper activity - Quiz based activity including MCQs Spend 5 minutes to evaluate student assimilation of the lesson contents.

Lesson Plan No. 24	Course Name: Business Mathematics and Statistics Topic: Mean Deviation	Course No.: BCMMJ-101

Objectives	At the end of the lesson the student shall be able to: a. Articulate about the concept of Measures of Variation: Mean Deviation. b. Interpret about how to calculate Mean Deviation about mean, median and mode.
Teaching Aids (if any	a. Chalk & talk b. Calculator
Teaching Development	**1. Introduction** (5 minutes) - Ask questions. - Encourage students to try answering the question. - Introduction of new concept of Measures of Variation: Mean Deviation about mean, median and mode. **2. Development** (15 minutes) a. Introduce the concept of Mean Deviation about mean, median and mode and their applications. b. Explain about finding Mean Deviation about mean, median and mode. c. How to solve problems related to Mean Deviation about mean, median and mode. **3. Exercise** (25 minutes) - Do various problems on Mean Deviation about mean, median and mode.
Closure	1. Summarize the lesson learning outcomes and get affirmation from students on these. **2.** Suggested Video http://www.nitttrc.edu.in/nptel/courses/video/110105060/L03.html 3. Homework**:** Give Problems related to Mean Deviation about mean, median and mode to solve. Spend 5 minutes to wrap up and consolidate the leanings.
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. - Conduct a minute-paper activity - Quiz based activity including MCQs

	Spend 5 minutes to evaluate student assimilation of the lesson contents.

Lesson Plan No. 25	Course Name: Business Mathematics and Statistics Topic: Standard Deviation and Variance	Course No.: BCMMJ-101

Objectives	At the end of the lesson the student shall be able to: a. Articulate about the concept of Measures of Variation: Standard Deviation and variance. b. Interpret about how to calculate Standard Deviation and variance.
Teaching Aids (if any	a. Chalk & talk b. Calculator
Teaching Development	**1. Introduction** (5 minutes) - Ask questions. - What is mean? - What is assumed mean? - Encourage students to try answering the question. - Introduction of new concept of Measures of Variation: Standard Deviation and variance. **Development** (10 minutes) a. Introduce the concept of Standard Deviation and variance and their applications. b. Explain about finding Standard Deviation and variance. c. How to solve problems related to Standard Deviation and variance. **2. Exercise** (30 minutes) - Do various problems on Standard Deviation and variance.
Closure	1. Summarize the lesson learning outcomes and get affirmation from students on these. **2.** Suggested Video: http://www.nitttrc.edu.in/nptel/courses/video/110105060/L03.html **3.** Homework: Give Problems related to Standard Deviation and variance to solve. Spend 5 minutes to wrap up and consolidate the leanings.
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. - Conduct a minute-paper activity - Quiz based activity including MCQs Spend 5 minutes to evaluate student assimilation of the lesson contents.

Lesson Plan No. 26	Course Name: Business Mathematics and Statistics Topic: Correlation Analysis	Course No.: BCMMJ-101

Objectives	At the end of the lesson the student shall be able to: a. Articulate the concept of Correlation, its various types and properties. b. Solve the different problems of Correlation.
Teaching Aids (if any)	a. Chalk & talk b. Calculator
Teaching Development	1. **Introduction** (5 minutes) - Ask questions. - What is the most commonly used techniques for investigating the relationship between two quantitative variables? - Introduce the concept of Correlation. - Talk about its applications in day-to-day life. 2. **Development** (15 minutes) a. Introduce the concept of Correlation and its types https://www.youtube.com/watch?v=Ot-ztTT-9Jk b. Introduce the concept of Properties of Correlation https://www.youtube.com/watch?v=MXTsSXIa4i0 c. Explain Karl Pearson's Method of correlation 3. **Exercise** (20 minutes) -Do various problems on Correlation using Karl Pearson's Method.
Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from students on these. 2. Suggested Reading http://home.iitk.ac.in/~shalab/course5.htm 3. Homework - Given some questions on Karl Pearson's Method of correlation to solve. Spend 5 minutes to wrap up and consolidate the leanings.
Evaluation	1. Reflective Questions (What, why, Who?). Allow students to answer and discuss. - Quiz based activity including MCQs Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 27	Course Name: Business Mathematics and Statistics Topic: Correlation Analysis (Spearman's Method)	Course No.: BCMMJ-101

Objectives	At the end of the lesson the student shall be able to: a. Articulate the concept of Regression and its types, its properties. b. Solve the different problems of Regression.
Teaching Aids (if any)	a. Chalk & talk b. Calculator
Teaching Development	1. **Introduction** (5 minutes) - Ask questions. - What is the most commonly used techniques for investigating the relationship between two quantitative variables? - Introduce the concept of Rank Correlation. - Talk about its applications in day-to-day life. - Highlight its important characteristics. 2. **Development** (15 minutes) a. Explain Spearman's Rank Correlation Method. b. Correlation Coefficient when ranks are given and when ranks are not given. c. Correlation coefficient when ranks are repeated. d. Introduce the Properties of Correlation coefficient. 3. **Exercise** (20 minutes) - Do various problems on Correlation using Spearman's Rank Correlation Method.
Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from students on these. 2. Suggested Reading http://home.iitk.ac.in/~shalab/course5.htm 3. Homework - Given some questions on Spearman's Rank Correlation Method. to solve. Spend 5 minutes to wrap up and consolidate the learning.
Evaluation	1. Reflective Questions (What, why, Who?). Allow students to answer and discuss. - Quiz based activity including MCQs Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 28	Course Name: Business Mathematics and Statistics Topic: Regression Analysis	Course No.: BCMMJ-101

Objectives	At the end of the lesson the student shall be able to: a. Articulate the concept of Spearman's rank Correlation method. b. Solve the different problems of Correlation.
Teaching Aids (if any)	a. Chalk & talk b. Calculator
Teaching Development	1. **Introduction** (5 minutes) - Ask questions. - What is the most commonly used techniques for investigating the relationship between two quantitative variables? - Introduce the concept of Regression. - Talk about its applications in day-to-day life. - Highlight its important characteristics. 2. **Development** (15 minutes) a. Introduce the concept of Regression and its types. b. Explain Properties of Regression. c. Explain relationship between Correlation and Regression coefficients. 3. **Exercise** (20 minutes) - Do various problems on Regression and relationship between Correlation and Regression.
Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from students on these. 2. Suggested Reading http://home.iitk.ac.in/~shalab/course5.htm 3. Homework - Given some questions on Correlation and Regression Analysis to solve. Spend 5 minutes to wrap up and consolidate the learning.
Evaluation	1. Reflective Questions (What, why, Who?). Allow students to answer and discuss. - Quiz based activity including MCQs Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 29	Course Name: Business Mathematics and Statistics Topic: Index numbers & its construction	Course No.: BCMMJ-101

Objectives	At the end of the lesson the student shall be able to: a. Articulate about the concept of index numbers, its meaning and uses. b. Interpret about how to construct index numbers and its types: c. Simple and weighted.
Teaching Aids (if any)	a. Chalk & talk b. Calculator
Teaching Development	1. **Introduction** (5 minutes) - Ask questions. - Introduction of the new concept of index numbers and its construction. - Discuss the types of construction of index numbers: Simple and Weighted. - Talk about its applications in day-to-day life. - Highlight its important characteristics. 2. **Development** (15 minutes) a. Introduce the concept of index numbers, its formal definition and uses. b. Explain about how to construct index numbers with their different types. 3. **Exercise** (20 minutes) - Have discussion to summarize the lecture - Ask questions related to topic - Ask any student to recapitulate the topic done - Solve questions related to topic of index numbers and construction.
Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from students on these. 2. Suggested Reading Content: https://www.geeksforgeeks.org/index-number-meaning-characteristics-uses-and-limitations/ https://www.geeksforgeeks.org/methods-of-construction-of-index-number/ 3. Give Problems related to a topic to do at home. Spend 5 minutes to wrap up and consolidate the leanings.
Evaluation	1. Reflective Questions (What, why, Who?). Allow students to answer and discuss. 4. Quiz based activity including MCQs Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 30	Course Name: Business Mathematics and Statistics Topic: Tests of adequacy of index numbers	Course No.: BCMMJ-101

Objectives	At the end of the lesson the student shall be able to: a. Articulate the concept of Regression and its types, its properties. b. Solve the different problems of Regression.
Teaching Aids (if any)	a. Chalk & talk b. Calculator
Teaching Development	1. **Introduction** (5 minutes) - Ask questions - Encourage students to try answering the question. - Introduction of the new concept of tests of adequacy of index numbers 2. **Development** (15minutes) a. Introduce the concept of tests of adequacy, its formal definition and uses. b. Explain about how to solve the problems of test of adequacy of index numbers. 3. **Exercise** (20 minutes) – - Have discussion to summarize the lecture - Ask questions related to topic - Ask any student to recapitulate the topic done - Solve questions related to topic of index numbers.
Closure	1. Summarize the lesson learning outcomes and get affirmation from students on these. 2. Give Problems related to a topic to do at home. Spend 5 minutes to wrap up and consolidate the leanings.
Evaluation	1. Reflective Questions (What, why, Who?). Allow students to answer and discuss. - Conduct a minute-paper activity - Quiz based activity including MCQs Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 31	Course Name: Business Mathematics and Statistics Topic: Consumer Price indices	Course No.: BCMMJ-101

Objectives	At the end of the lesson the student shall be able to: a. Articulate about the concept of Consumer Price indices b. Solve various problems related to concept of consumer price index numbers.
Teaching Aids (if any)	a. Chalk & talk b. Calculator
Teaching Development	1. **Introduction** (5 minutes) - Ask questions - Introduction of the new concept of Consumer price index numbers and its construction. - Discuss and solve various problems on consumer price indices. 2. **Development** (15 minutes) a. Introduce the concept of consumer price index numbers, its formal definition and uses. b. Explain about how to construct consumer price index numbers and solve various problems on it. 3. **Exercise** (20 minutes) – - Have discussion to summarize the lecture - Ask questions related to topic - Ask any student to recapitulate the topic done - Solve questions related to topic of consumer price index numbers and its construction.
Closure	1. Summarize the lesson learning outcomes and get affirmation from students on these. **2.** Suggested reading content: Statistical Methods by Gupta S.P. Published by Sultan Chand and Sons 45th (2017) Pg. 532. **3.** Give Problems related to a topic to do at home. Spend 5 minutes to wrap up and consolidate the leanings.
Evaluation	1. Reflective Questions (What, why, Who?). Allow students to answer and discuss. Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 32	Course Name: Business Mathematics and Statistics Topic: Time Series Analysis	Course No.: BCMMJ-101

Objectives	At the end of the lesson the student shall be able to: a. Articulate about the concept of Components of time series b. Solve the problems based on components of time series.
Teaching Aids (if any)	a. Chalk & talk b. Calculator
Teaching Development	1. **Introduction** (5 minutes) - Ask questions - Introduction of the new concept of components of time. - Discuss the different types of components of time series. 2. **Development** (15 minutes) a. Introduce the concept of components of time series. b. Solve various problems based on the topic. 3. **Exercise** (10 minutes) – - Have discussion to summarize the lecture - Ask questions related to topic - Ask any student to recapitulate the topic done Solve questions related to topic of components of time series.
Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from Summarize the lesson learning outcomes and get affirmation from students on these. **2.** Suggested reading content: Components of Time Series Data – Geeks for Geeks **3.** Give Problems related to a topic to do at home. Spend 5 minutes to wrap up and consolidate the leanings.
Evaluation	1. Reflective Questions (What, why, Who?). Allow students to answer and discuss. Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 33	Course Name: Business Mathematics and Statistics Topic: Trend Analysis in Time Series	Course No.: BCMMJ-101

Objectives	At the end of the lesson the student shall be able to: a. Articulate about the concept of trend analysis and finding trend by moving average method. b. Study the concept of Fitting of linear trend line using principle of least squares c. Solve various problems based on trend analysis concept.
Teaching Aids (if any)	a. Chalk & talk b. Calculator
Teaching Development	1. **Introduction** (5 minutes) - Ask questions - Introduction of the new concept of trend analysis and finding trend line by two different methods. - Discuss and solve various problems based on methods of finding trend. 2. **Development** (15 minutes) a. Introduce the concept of trend analysis, its formal definition and uses. b. Explain about how to find trend by average method and by the use of principle of least squares. 3. **Exercise** (20 minutes) – - Have discussion to summarize the lecture - Ask questions related to topic - Ask any student to recapitulate the topic done - Solve questions related to topic of trend analysis and its construction.
Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from students on these. 2. Suggested Reading https://bncollegebgp.ac.in/wp-content/uploads/2020/06/ppt-on-LSM.pdf 3. Homework - Given some questions on Spearman's Rank Correlation Method. to solve. Spend 5 minutes to wrap up and consolidate the learning.
Evaluation	1. Reflective Questions (What, why, Who?). Allow students to answer and discuss. Spend 5 minutes to evaluate student assimilation of the lesson contents