| Paper Code: BS-121 | Paper: Mathematics-I | | | |
|---|---|---|---|---|
| Paper ID: | | L | T/P | C |
| Marking Scheme: | | 3 | 1 | 4 |

1. Teachers Continuous Evaluation: 25 marks
2. Term end Theory Examinations: 75 marks

**Instruction for paper setter (Term end Theory Examinations):**

1. There should be 9 questions in the term end examinations question paper.
2. The first (1st) question should be compulsory and cover the entire syllabus. This question should be objective, single line answers or short answer type question of total 15 marks.
3. Apart from question 1 which is compulsory, rest of the paper shall consist of 4 units as per the syllabus. Every unit shall have two questions covering the corresponding unit of the syllabus. However, the student shall be asked to attempt only one of the two questions in the unit. Individual questions may contain upto 5 sub-parts / sub-questions. Each Unit shall have a marks weightage of 15.
4. The questions are to be framed keeping in view the learning outcomes of the course / paper. The standard / level of the questions to be asked should be at the level of the prescribed textbook.
5. The requirement of (scientific) calculators / log-tables / data – tables may be specified if required.

**Course Objectives:**

| | |
|---|---|
| 1: | To understand differential calculus methods to solve formulated engineering problems. |
| 2: | To understand integral calculus methods to solve formulated engineering problems. |
| 3: | To understand sequence and series to solve formulated engineering problems. |
| 4: | To understand linear algebra to solve formulated engineering problems. |

**Course Outcomes (CO):**

| | |
|---|---|
| CO1: | Ability to use differential calculus methods to solve formulated engineering problems. |
| CO2: | Ability to use integral calculus methods to solve formulated engineering problems. |
| CO3: | Ability to sequence and series to solve formulated engineering problems. |
| CO4: | Ability to use linear algebra to solve formulated engineering problems. |

**Course Outcomes (CO to Programme Outcomes (PO) Mapping (scale 1: low, 2: Medium, 3: High**

| CO/PO | PO01 | PO02 | PO03 | PO04 | PO05 | PO06 | PO07 | PO08 | PO09 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | - | 3 | 1 | 1 | 1 | - | - | - | - | - | 1 | 2 |
| CO2 | - | 3 | 1 | 1 | 1 | - | - | - | - | - | 1 | 2 |
| CO3 | - | 3 | 2 | 2 | 1 | - | - | - | - | - | 2 | 2 |
| CO4 | - | 3 | 3 | 3 | 1 | - | - | - | - | - | 2 | 2 |

**Unit-I**

**Differential Calculus:** Functions, limit of a function, derivative of functions, implicit functions, chain rule, application of derivative to Maxima and Minima; successive differentiation; Leibnitz theorem, Taylor's and McLaurin's series for functions of single variables for exponential, trigonometric and logarithmic functions. [10 hrs]

**Unit-II**

**Integral Calculus:** Integration: Integration by parts, and substitutions, Integration using partial fractions. Reduction formulae of trigonometric functions, Definite integrals and its properties; Application of integration to areas and arc lengths for Cartesian curves only; Simpson's and Trapezoidal rule.

[10 hrs]

**Unit-III**

**Sequences and Series:** Arithmetic Progression (A.P.), Arithmetic Mean (A.M.), Geometric Progression (G.P.), general term of a G.P., sum of n terms of a G.P. Arithmetic and geometric series, infinite G.P. and its sum, geometric mean (G.M.).

Convergence and divergence of series, tests for convergence; Comparison test, Ratio test, Cauchy's nth root test, Leibnitz test, conditional and absolute convergence.

**Unit-IV** [10 hrs]

**Matrices and Determinants:** Matrices, Types of matrices, zero matrix, transpose of a matrix, symmetric and skew symmetric matrices. Addition, multiplication and scalar multiplication of matrices, simple properties of addition, multiplication and scalar multiplication. Determinant of a square matrix (up to 3 × 3 matrices), properties of determinants, minors, cofactors. Adjoint of a square matrix, Concept of elementary row and column operations, Inverse of a matrix, symmetric, skew-symmetric and orthogonal matrices, solution of system of linear equations. [10 hrs]

**Text/References:**


1. E. Kreyszig, Advanced Engineering Mathematics, 10th Ed., Wiley Eastern Ltd., 2011.
2. B.S. Grewal, Elementary Engineering Mathematics, Khanna publisher
3. B.S. Grewal, Higher Engineering Mathematics, Khanna publisher
4. Shanti Narayan, Matrices, S. Chand & Co.
5. Schaum Outline Series, Linear Algebra, McGraw Hill
6. Shanti Narayan and Dr. P. K. Mittal, Integral Calculus, S. Chand & Co.
7. Shanti Narayan and Dr. P. K. Mittal, Differential Calculus, S. Chand & Co.


1/9/22 Abha 1/9/22

| Paper Code: BS-122 | Paper: Mathematics-II | L | T/P | C |
|---|---|---|---|---|
| Paper ID: | | 3 | 1 | 4 |

**Marking Scheme:**

1. Teachers Continuous Evaluation: 25 marks
2. Term end Theory Examinations: 75 marks

**Instruction for paper setter (Term end Theory Examinations):**

1. There should be 9 questions in the term end examinations question paper.
2. The first (1st) question should be compulsory and cover the entire syllabus. This question should be objective, single line answers or short answer type question of total 15 marks.
3. Apart from question 1 which is compulsory, rest of the paper shall consist of 4 units as per the syllabus. Every unit shall have two questions covering the corresponding unit of the syllabus. However, the student shall be asked to attempt only one of the two questions in the unit. Individual questions may contain upto 5 sub-parts / sub-questions. Each Unit shall have at marks weightage of 15.
4. The questions are to be framed keeping in view the learning outcomes of the course / paper. The standard / level of the questions to be asked should be at the level of the prescribed textbook.
5. The requirement of (scientific) calculators / log-tables / data – tables may be specified if required.

**Course Objectives:**

| | |
|---|---|
| 1: | To understand linear algebra to solve formulated engineering problems. |
| 2: | To understand differential methods to solve formulated engineering problems. |
| 3: | To understand multivariate calculus methods to solve formulated engineering problems. |
| 4: | To understand vector calculus methods to solve formulated engineering problems. |

**Course Outcomes (CO):**

| | |
|---|---|
| CO1: | Ability to use linear algebra to solve formulated engineering problems. |
| CO2: | Ability to use differential methods to solve formulated engineering problems. |
| CO3: | Ability to multivariate calculus methods to solve formulated engineering problems. |
| CO4: | Ability to use vector calculus methods to solve formulated engineering problems. |

**Course Outcomes (CO to Programme Outcomes (PO) Mapping (scale 1: low, 2: Medium, 3: High**

| CO/PO | PO01 | PO02 | PO03 | PO04 | PO05 | PO06 | PO07 | PO08 | PO09 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | - | 3 | 1 | 1 | 1 | - | - | - | - | - | 1 | 2 |
| CO2 | - | 3 | 1 | 1 | 1 | - | - | - | - | - | 1 | 2 |
| CO3 | - | 3 | 2 | 2 | 1 | - | - | - | - | - | 2 | 2 |
| CO4 | - | 3 | 3 | 3 | 1 | - | - | - | - | - | 2 | 2 |

**Unit-I**

**Linear Algebra**

Linearly independent and dependent of vectors, Rank of a matrix, Solution of system of linear equations. Gauss elimination method, Eigenvalues and eigenvectors, Properties of eigenvalues; Cayley-Hamilton Theorem and its application. [10 hrs]

**Unit-II**

**Differential Equations**

Formation of differential equation, Variable separable and homogeneous differential equations of first order, Linear differential equations of first order and first degree (Leibnitz and Benoulli's form), Exact differential equation, General linear differential equations with constant coefficients, Complimentary functions: Particular integral [10 hrs]

9/9/22 11/9/22

**Unit-III**

**Multivariable Calculus**

Partial derivatives, Chain rule, Total derivative: Jacobian, Maxima, Minima and saddle points; Method of Lagrange multipliers; Multiple Integration: Double integrals (Cartesian), change of order of integration in double integrals, Change of variables (Cartesian and polar), Applications: areas and volumes.

[10 hrs]

**Unit-IV**

**Vector calculus**

Vectors and scalars, magnitude and direction of a vector. Types of vectors, position vector of a point. Dot product and Vector product, scalar triple product.

Scalar and vector point function. Gradient of scalar field and directional derivatives, curl and divergence of vector fields, line integrals. [10 hrs]

**Text/References:**


1. E. Kreyszig, Advanced Engineering Mathematics, 10th Ed., Wiley Eastern Ltd., 2011.
2. B.S. Grewal, Elementary Engineering Mathematics, Khanna publisher
3. B.S. Grewal, Higher Engineering Mathematics, Khanna publisher
4. Shanti Narayan, Matrices, S. Chand & Co.
5. N.M. Kapoor, Differential Equations, Pitamber Pub Co.
6. Schaum Outline Series, Linear Algebra, McGraw Hill
7. Schaum Outline Series, Vector Analysis, McGraw Hill


1/9/22 Abha 1/9/22

| Paper Code: BS-124. | Paper: Probability and Statistics | L | P | C |
|---|---|---|---|---|
| Paper ID: | | 3 | 2 | 4 |

**Marking Scheme:**

1. Teachers Continuous Evaluation: 25 marks
2. Term end Theory Examinations: 50 marks
3. Term end Practical Examinations: 25 marks

**Instruction for paper setter (Term end Theory Examinations):**

1. There should be 9 questions in the term end examinations question paper.
2. The first (1st) question should be compulsory and cover the entire syllabus. This question should be objective, single line answers or short answer type question of total 15 marks.
3. Apart from question 1 which is compulsory, rest of the paper shall consist of 4 units as per the syllabus. Every unit shall have two questions covering the corresponding unit of the syllabus. However, the student shall be asked to attempt only one of the two questions in the unit. Individual questions may contain upto 5 sub-parts / sub-questions. Each Unit shall have a marks weight age of 15.
4. The questions are to be framed keeping in view the learning outcomes of the course / paper. The standard / level of the questions to be asked should be at the level of the prescribed textbook.
5. The requirement of (scientific) calculators / log-tables / data – tables may be specified if required.

**Course Objectives:**

| | |
|---|---|
| 1: | To understand central tendency and measure of dispersion to solve formulated engineering problems. |
| 2: | To understand skewness, kurtosis, correlation and regression to solve formulated engineering problems. |
| 3: | To understand probability and probability distributions to solve formulated engineering problems. |
| 4: | To understand and use test of hypothesis to solve formulated engineering problems. |

**Course Outcomes (CO):**

| | |
|---|---|
| CO1: | Ability to use central tendency and measure of dispersion to solve formulated engineering problems. |
| CO2: | Ability to use skewness, kurtosis, correlation and regression to solve formulated engineering problems. |
| CO3: | Ability to use probability and probability distributions to solve formulated engineering problems. |
| CO4: | Ability to use test of hypothesis to solve formulated engineering problems. |

**Course Outcomes (CO to Programme Outcomes (PO) Mapping (scale 1: low, 2: Medium, 3: High**

| CO/PO | PO01 | PO02 | PO03 | PO04 | PO05 | PO06 | PO07 | PO08 | PO09 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | - | 3 | 1 | 1 | 1 | - | - | - | - | - | 1 | 2 |
| CO2 | - | 3 | 1 | 1 | 1 | - | - | - | - | - | 1 | 2 |
| CO3 | - | 3 | 2 | 2 | 1 | - | - | - | - | - | 2 | 2 |
| CO4 | - | 3 | 3 | 3 | 1 | - | - | - | - | - | 2 | 2 |

**Unit-I:**

Frequency distributions. Discrete and continuous series, Histogram, Frequency polygon, Measure of central tendency, Mean, Median Mode, Measure of dispersion, Range, Quartile deviation, Mean deviation, standard deviation, Relation between measure of dispersion, Coefficients of dispersion, coefficient of variation. [10 hrs]

**Unit-II:**

Skewness and Measure of Skewness, Karl Pearson's coefficients of Skewness, moments, Relation between moments about mean and moments about any other point. Kurtosis, type of Kurtosis, Coefficients of Kurtosis. Correlation and Karl Pearson's coefficients of correlation, Linear Regression, Lines of Regression, coefficients of Regression, Properties of regression coefficients, angle between two lines of regression. [10 hrs]

19/12 19/12

**Unit III**

Sample space, Event, Event space, Discrete Random Variables and Probability Distributions: Discrete Random Variables, Probability Distributions and Probability Mass Functions, Cumulative Distribution Functions, Continuous Random Variables and Probability Distributions: Continuous Random Variables, Probability Distributions and Probability density Functions, Cumulative Distribution Functions, Mean, Variance, Moment generating functions and Moments.

Binomial Distribution, Poisson Distribution and Normal Distribution. [10 hrs]

**Unit IV**

Testing of Hypothesis: Statistical hypothesis, Large sample tests based on Normal distribution for single proportion and difference of proportion and for single mean and difference of means, Tests based on t-distribution and F distributions, Goodness of fit. [10 hrs]

**Note:** Laboratory practicals from the syllabus be conducted.

**Textbooks:**


1. Douglas G. Montgomery and Runger, Applied Statistics and Probability for Engineers, Wiley, 2018
2. S. C. Gupta and V. K. Kapoor, Fundamentals of Mathematical Statistics, S. Chand & Co., 10th edition, 2000.
3. Schaum's Ouline Series, Introduction to Probability and Statistics, McGraw Hill


**References:**


1. Richard A. Johnson, Miller and Freund's Probability and Statistics for Engineers, Pearson, 10th Ed., 2018.
2. Ronald E. Walpole, Raymond H. Myers, Sharon L. Myers and Keying Ye, Probability & Statistics for Engineers & Scientists, Pearson, 2016.
3. B. C. Gupta, Irwin Guttman, and Kalanka P. Jayalath, Statistics and Probability with Applications for Engineers and Scientists using Minitab, R and JMP, Wiley, 2020.
4. Jay Devore, Probability and Statistics for Engineering and the Sciences, Cengage Learning, 2014.
5. William W. Hines, Douglas C. Montgomery, David M. Goldman, and Connie M. Borror, Probability and Statistics in Emgineering, Wiley, 2003


11/9/22 11/9/22