

**SEMESTER I**  
**ALLIED – I : PAPER – I**  
**MATHEMATICAL STATISTICS – I**

**Instructional Hrs. : 105**

**Sub.Code : 16MCUA101**

**Max.Marks: CIA – 25; ESE – 75**

**Credits : 5**

**Objective:**

- To study about the random variables.
- The students will be able to apply statistical tools in real life problems as well as in research.
- The contents of this paper is a prerequisite for learning SPSS package.

**UNIT I**

**21 Hrs.**

**Random Variables :** Random Variable – Cumulative Distribution Function – Continuous Random Variable – Two Dimensional Random Variable – Marginal Probability Distribution – Conditional Probability Distribution – *Independent Random Variables.*

**UNIT II**

**21 Hrs.**

**Characteristics of Distributions :** Expectation or Mean Value – Function of a Random Variable – Properties of Expected Values. Variability (or dispersion) – *Properties of Variance* – Sample Mean and Sample Variance – Mean and Standard Deviation of the Combination of Two samples – Frequency Table – Tchebchev's Inequality.

**UNIT III**

**21 Hrs.**

**Characteristics of Distributions :** Moments – Moment Generating Function – Measures of Location - Measures of Dispersion – Skewness – Kurtosis – Covariance – Sample Correlation Coefficient - Correlation for a Grouped Data – *Rank Correlation.*

**UNIT IV****21 Hrs.**

**Least Square and Regression Analysis :** Curve Fitting – Principle of Least Squares – Fitting a Straight Line – Fitting a Second Degree Polynomial – To Fit a Curve of the form  $y = ae^{bx}$ ,  $y = ab^x$ ,  $y = ax^b$  - Regression of First Kind – Regression of Second Kind – Scatter Diagram – Lines of Regression – *Regression Line of Y on X* – Properties of Regression Coefficient – Angle between the Regression Lines.

**UNIT V****21 Hrs.**

**Discrete Distribution and Continuous Distributions :** *Binomial Distribution* – Poisson Distribution – Continuous Distribution : Normal Distribution – Rectangular Distribution(Uniform Distribution) – Exponential Distribution.

**Note :** *Italics denotes Self Study Topics.*

**TEXT BOOK:**

1. S.Venkataraman, P.R.Vittal., *Mathematical Statistics*, 1973.

Unit	Chapter	Sections	Page No
I	2	2.1, 2.2, 2.3, 2.5, 2.6, 2.7, 2.8	39-70
II	3	3.1, 3.2, 3.3, 3.4 - 3.8	73-110
III	3	3.9 - 3.19	111-157
IV	11	11.1 - 11.4, 11.7 - 11.14	379-405
V	4 & 5	4.1, 4.2, 5.1, 5.2, 5.3	163-198, 203-241

- Question Paper setters are asked to confine to the **above text book only.**

**SEMESTER - II**  
**CORE PAPER - IV**  
**TRIGONOMETRY AND VECTOR ANALYSIS**

**Instructional Hrs. 75**

**Sub. Code: 16MCUC204**

**Max. Marks: CIA -25; ESE -75**

**Credits: 4**

**Objective:** This paper deals with Expansion of Trigonometric Functions, Line Integral, Surface Integral and Volume Integral.

**UNIT I**

**15 Hrs.**

**Expansions :** Expansions of  $\cos n\theta$ ,  $\sin n\theta$ ,  $\tan n\theta$ ,  $\cos^n \theta$  and  $\sin^n \theta$  - **Hyperbolic Functions :** Hyperbolic Functions - Relations between Hyperbolic Functions - Inverse Hyperbolic Functions - **Logarithms of a Complex Quantities :** Logarithms of a Complex Quantities - **Summation of Trigonometrical Series :** Method of Differences - When angles are in A.P - *Summation of Series by using Complex Quantities.*

**UNIT II**

**15 Hrs.**

**Spherical Trigonometry:** Geometry of the Sphere - Length of a Small Circle Arc - Latitude and Longitude - Spherical Triangle - Cosine Formula - Sine Formula - Supplemental Cosine Formula - Cotangent Formula or Four Consecutive Parts Formula - Sine-Cosine Formula - *Formula for Half Angles* - *Formula for Half a Side* - Napier's Analogies - Delambre's Analogies - Formulae for a Right-Angled Triangle - Solution of Right-Angled Spherical Triangle.

**UNIT III**

**15 Hrs.**

**Differentiation of Scalar and Vector Point Functions:** Scalar and Vector functions - Level Surfaces - Directional derivative of a Scalar Point Function - Gradient of a Scalar Point Function - Summation notation for Gradient - Gradient of  $f(r)$  - Divergence and Curl of a Vector Point Function - Summation notation for Divergence and Curl - Laplacian Differential Operator - Other Differential Operators - Divergence and Curl of a Gradient - *Divergence and Curl of a Curl* - Examples.

**UNIT IV****15 Hrs.**

**Integration of Point Functions:** Line Integrals - Independence of Path of Integration - Conservative Field and Scalar Potential - *Line Integral of a Conservative Vector* - Surface Integrals - Volume Integrals - Cylindrical and Spherical Polar Coordinates - Examples.

**UNIT V****15 Hrs.**

**Integral Theorems:** Integral Theorems - Gauss' Divergence Theorem - Integral Theorems Derived from the Divergence Theorem - Green's Theorem in Plane - Stoke's Theorem - Integral Theorems Derived from Stoke's Theorem - *Operational meanings of  $\nabla$ ,  $\nabla \cdot$ ,  $\nabla \times$  in terms of surface integrals* - Examples.

**Note :** *Italics denote Self Study Topics*

**TEXT BOOKS**

1. **S.Narayanan** and **T.K .Manicavachagom Pillay.**, *Trigonometry*, S.Viswanathan Publishers, 2004.

Unit	Chapter	Section	Page.No
	3	1, 2, 3, 4, 5	61 - 92
I	4	1, 2	93 - 108
	5	5	122 - 130
	6	1, 2, 3	131 - 148

2. **Dr.B.S.Grewal.**, *Higher Engineering Mathematics*, Khanna Publishers, 35<sup>th</sup> Edition, August, 2000.

Unit	Chapter	Section	Page.No
II	31	31.1 - 31.15	964 - 985

3. **P. Duraipandian, Kayalal Pachaiappa**, *Vector Analysis*, S.Chand & Company PVT.Ltd., First Edition 2014.

Unit	Chapter	Section	Page.No
III	2	2.1 - 2.13	20 - 51
IV	3	3.1 - 3.8	84 - 122
V	4	4.1 - 4.8	123 - 184

## REFERENCE BOOKS

1. **M.L.Khanna**, *Trigonometry*, Jai Prakash Nath & Co., Educational Publisher, 14<sup>th</sup> Edition 1993.
2. **M.D.Raisinghania, H.C.Saxena, H.K.Dass**, *Simplified Course in Trigonometry*, S.Chand and Company Ltd., 1<sup>st</sup> Edition 1999.
3. **M.D. Raisinghania**, *Vector Calculus*, S.Chand and Company Ltd., 3<sup>rd</sup> Edition, 1997.

- Question Paper Setters Confine to the above Text Book only.

**SEMESTER II**  
**ALLIED – I : PAPER – II**  
**MATHEMATICAL STATISTICS – II**

**Instructional Hrs. : 105**

**Sub.Code : 16MCUA202**

**Max.Marks : CIA – 25; ESE – 75**

**Credits : 5**

**Objective :**

- To study about the Sampling distribution.
- The students will be able to apply statistical tools in real life problems as well as in research.
- The contents of this paper are a prerequisite for learning SPSS package.

**UNIT I**

**21 Hrs.**

**Sampling Distribution :**  $\chi^2$  Distribution – *Students t Distribution* – Snedecor's F Distribution – Sampling Distribution – Sampling Distribution of Mean and Variance in Samples from a Normal Distribution – The Central Limit Theorem.

**UNIT II**

**21 Hrs.**

**Theory of Estimation :** Introduction – Properties of Good Estimators – *Method of Moments* – Principle of Maximum Likelihood.

**UNIT III**

**21 Hrs.**

**Testing Hypothesis and Tests of Significance:** General Method of Testing Hypothesis – Test of Significance based on the *normal*, t, F Distribution – Small Samples – Significance of the difference between the Variance of Two Samples.

**UNIT IV****21 Hrs.**

**Tests of Goodness of Fit :**The Chi-Square Test of Hypothesis – Chi-Square Test of Goodness of Fit – *Application to Contingency Tables.*

**UNIT V****21 Hrs.**

**Sampling from Finite Populations:** Random Sampling – Methods of Selection of a Random Sample – Estimates of the Mean and Variance of the Mean in Simple Random Sampling – Stratified Random Sampling – *Optimum Allocation* – Systematic Samples.

**Note :** *Italics denotes Self Study Topics.*

**TEXT BOOK:**

1. S.Venkataraman, P.R.Vittal., *Mathematical Statistics*, 1973.

<b>Unit</b>	<b>Chapter</b>	<b>Sections</b>	<b>Page No</b>
I	6	6.4, 6.5, 6.6, 6.7, 6.9	258-281, 283-285
II	7	7.1 - 7.4	291-312
III	9	9.1 - 9.4	328-357
IV	10	10.1, 10.2	358-378
V	12	12.1 - 12.6	406-432

- Question Paper setters are asked to confine to the **above text book only.**

**SEMESTER - VI**  
**PRACTICAL – MATHEMATICAL SOFTWARE**  
**(MATLAB, SPSS & LATEX)**

**Instructional Hrs: 4**

**Subject Code: 16MCUCP05**

**Max.Marks: CIA- 40; ESE-60**

**Credits :3**

**MATLAB :**

1. Write a program to find the following for the matrices  
(i) Sum (ii) Product (iii) Determinant (iv) Sum of the diagonal (v) 2<sup>nd</sup> row of the transpose.
2. Write a program to  
(i) Find the Eigen values, Eigen vectors & Inverse for a given matrix.  
(ii) Check whether the given matrix is orthogonal.
3. Write a program to find the solution of a given system of equations by LU Decomposition method.
4. Write a program to solve the given system of equations by using Gaussian Elimination method.
5. Write a program to find the value of  
(i)  $\sin(x)$  and  $\sinh(x)$  (ii)  $\cos(x)$  and  $\cosh(x)$  (iii)  $\tan(x)$  and  $\tanh(x)$  for  $x = 0, \frac{\pi}{2}, \pi$
6. Write a program to find the zero of the function  $x^2 - \sin x$  at  $x = \frac{\pi}{4}$
7. Write a program to evaluate the following (i) Single Integral (ii) Double Integral with finite limits.
8. Write a program to solve Lagrangian polynomial for the given data.  
X: 3    7    9    10  
Y: 168    120    72    63
9. Write a program to check whether the given function is (i) Continuous (ii) Differentiable (iii) Analytic .



**SPSS:**

10. Write a program to find the following for the numerical data  
(i) Mean (ii) Median (iii) Harmonic Mean (iv) Geometric Mean (v) Variance and Standard Deviation.
11. Write a program to find the probability function by using  
(i) Binomial Distribution (ii) Poisson Distribution (iii) Normal Distribution.
12. Write a program to create a database, present the data through charts and diagrams and summarize the data using frequencies.
13. Write a program to apply T- test for an analysis of (i) One sample (ii) Independent samples (iii) Paired samples.
14. Write a program to analysis means of different variables by using one way ANOVA table.
15. Write a program to fit a (i) Straight line (ii) Exponential.

**LATEX:**

16. Type a Document in different ways( Left, Right, Center ,Justify) .
17. Type your own Bio-Data.
18. Draw a Table Structure.
19. Type a given Mathematical expression using Differentiation, Integration & Trigonometry.
20. Type a given Article.