SEMESTER – I

Allied Practical – MATHEMATICAL SOFTWARE - I

Instructional Hrs.: 30   **Sub. Code: 16MSUAP01**

Max. Marks: CIA – 10; ESE – 15   **Credit: 1**

Objective: The aim of this paper is to teach statistical software to the students, which is mainly skill – oriented, job – oriented and research oriented. At the end of the course, the students will be able to (i) create data base (ii) present the data (iii) analyze the data using statistical tools.

List of Practical

1. Using R software as a calculator.
2. Data entry, manipulation and retrieval (Notepad, Excel sheet).
3. Data frame, creating matrices.
4. Descriptive statistics, Graphics - pie diagram, box plot, histogram, bar plot.
5. Object orientation, defining functions.
6. To find mean, median, geometric mean, harmonic mean of numerical data and edit the output.
7. To determine standard deviation, variance and checking the consistency of the given data and edit the output.
8. Bivariate data- scatter plot, correlation co-efficient, fitting linear regression line.
9. Multiple linear regression models.
10. Computation of probabilities in various distributions.(Binomial, Poisson, Normal)
11. Drawing the graph of probability mass and density functions.
12. One and two sample't' test and paired't' test.

Core Practical – MATHEMATICAL SOFTWARE - II

Instructional Hrs: 30   **Sub. Code: 16MSUCP01**

Max. Marks: CIA – 10; ESE – 15   **Credit: 1**

Objective: To equip the students with the knowledge of Mathematical Software.

List of Practical

1. (a). Draw a circle with given centre and radius/ with given centre and a point on the circle.

    (b). Draw a line passing through two given points/ through given one point and find its slope.

2. Draw a cone, cylinder and sphere.

3. To find the roots of the given equation and vice versa. Check whether it is a polynomial in the real line R.

4. To find the divisors, factorial and the next prime number for the given positive integer. Check whether the given integer is a perfect square.

5. Plot the given polynomial function and its derivative.

6. Differentiate and integrate the given transcendental equation.

7. Solving ordinary differential equations of first and second order by direct method and iterative method (Euler's method).

8. To solve simultaneous linear and quadratic equations.

9. To evaluate definite integrals with given algebraic functions by direct integration and numerical integration (Trapezoidal rule).

10. Application of multiple integrals to find area and volume.

SEMESTER – II

Core – III

INTEGRAL CALCULUS

Instructional Hrs.: 60   **Sub.Code:15MSUC203/15MCUC203**

Max. Marks: CIA – 25; ESE – 75   **Credits: 4**

Objective: On successful completion of course the students will gain knowledge about the different types of Integrations, its geometrical application, proper and improper integration.

UNIT I   **12 Hrs.**

Integration: Integration of the types $f'(x)/f(x)$, $dx/(ax^2+bx+c)$, $lx+m/(ax^2+bx+c)$,

$(px+q)/\sqrt{ax^2+bx+c}$, $\sqrt{(x-\alpha)(\beta-x)}$, $\sqrt{(x-\alpha)/(\beta-x)}$, $1/\sqrt{(x-\alpha)(\beta-x)}$, $\dfrac{1}{a\cos x+b}$

or $\dfrac{1}{a\sin x+b}$ and $\dfrac{1}{\left(a^2\cos^2 x+b^2\sin^2 x\right)}$ $-$ *Integration by parts*.

UNIT II   **12 Hrs.**

Reduction formulae: Reduction formulae $-$ Problems $-$ *Bernoulli's formula* $-$ Problems.

UNIT III   **12 Hrs.**

Multiple Integrals: Evaluation of Double and Triple Integrals $-$ Applications to Calculation of Areas and *Volumes*.

UNIT IV   **12 Hrs.**

Multiple Integrals: Change of Order of Integration in Double Integrals $-$ *Jacobians* $-$ Change of Variables in Double and Triple Integrals.

UNIT V   **12 Hrs.**

Improper Integrals: Notion of Improper Integrals – Their Convergence – Simple Tests for Convergence – Simple Problems – Beta and Gamma Integrals – Their Properties – Relation between them – *Evaluation of Multiple Integrals using Beta and Gamma Functions.*

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

TEXT BOOK

1.   **S.Narayanan** and **T.K .Manicavachagom Pillay,** *Calculus*, Vol. II, S. Viswanathan Printers and Publishers Pvt. Ltd., Chennai, Reprint 2012 – 2013.

Unit	Chapter	Sections
I	1	6.5, 7.3, 7.4, 8: Case (i) – (iii), (ix), 9, 10, 12
II	1	13.1 – 13.10, 15.1
III	5	2.1, 2.2 (Multiple Integrals), 3.1, 3.2, 4, 5.1, 5.4, 6.3
IV	5	2.2 (Changing the Order)
	6	1.1, 1.2, 2.1- 2.4
V	7	1.1 – 1.5, 2.1 – 2.3, 3, 4, 5, 6

REFERENCE BOOKS

1.   **Khail Ahmad,** *Text book of Integral Calculus and Differential Equations*, Anamaya Publishers, New Delhi, 2005.
2.   **K.R.Rajagopalan, N.Seshadri and G.Shanmugasundaram,** *Text book of Calculus,* S.Chand and Company Ltd., New Delhi, 1982.
3.   **P.R.Vittal and V.Malini,** *Calculus,* Margham Publications, 2nd Edition, 1998.

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