

**SEMESTER – III**  
**PART III – ALLIED**  
**ALLIED MATHEMATICS – PAPER I**  
**(for Physics & Chemistry)**

**Instructional Hrs. : 75**

**Max Marks : CIA – 20; ESE - 55**

**Sub. Code :16MSUA303**

**Credits : 4**

**Objective:** On successful completion of this course, the students will gain knowledge about different types of series, solving ordinary and partial differential equations and also the Applications of Laplace transformations in solving differential equations.

**UNIT I**

**15 Hrs.**

**Algebra:** Binomial, Exponential and *Logarithmic Series* – Approximations obtained by Binomial Theorem – Summation related to Binomial, Exponential and Logarithmic Series.

**UNIT II**

**15 Hrs.**

**Differential Equations:** Differential Equation of the form  $(aD^2 + bD + c)y = e^{ax} \phi(x)$  where  $a, b, c$  are constants,  $\phi(x) = \sin mx$  or  $\cos mx$  or  $x^m$ . Solutions of Homogeneous Linear Differential Equations of the form  $(ax^2D^2 + bxD + c)y = X$  where  $a, b, c$  are constants and  $X$  is a function of  $x$ .

**UNIT III**

**15 Hrs.**

**Partial Differential Equations:** Formation of Partial Differential Equations by eliminating arbitrary constants and arbitrary functions – Solutions of standard types of First Order Equations

$$f(p, q) = 0, f(x, p, q) = 0, f(y, p, q) = 0, f(z, p, q) = 0$$

$$f_1(x, p) = f_2(y, q); z = px + qy + f(p, q)$$

*Lagrange's Method* of solving Linear Partial Differential Equation  $Pp + Qq = R$  (Problems only).

#### UNIT IV

15 Hrs.

**Laplace Transformation:** Definition – Laplace Transform of  $e^{at}$ ,  $\cos at$ ,  $\sin at$ ,  $\cosh at$ ,  $\sinh at$ ,  $t^n - e^{at} f(t)$ ,  $t^n f(t)$ ,  $n$  is a positive integer.

#### UNIT V

15 Hrs.

**Inverse Laplace Transform:** Solving ordinary differential equations with constant coefficients – *Solving systems of differential equations.*

**Note:** Italics denote Self Study topics

#### TEXT BOOKS

- 1) S.Narayanan and T.K.Manicavachagom Pillay, *Ancillary Mathematics*, Book I, Reprint 2012 – 2013.
- 2) S.Narayanan, R.Hanumantha Rao and T.K.Manicavachagom Pillay, *Ancillary Mathematics*, Vol – II, S.Viswanathan Printers and Publishers Pvt. Ltd., Chennai, 2007.

#### REFERENCE BOOKS

- 1) A.Singaravelu, *Allied Mathematics*, A.R.S. Publications, Fourth Revised Edition – August 2013
- Question paper setters are asked to confine to the above **text books** only.

**SEMESTER - III**  
**Allied Practical – I**  
**SAGE MATH**  
**(for B.Sc., Physics and Chemistry)**

**Instructional Hrs.: 30**

**Sub.Code:16MSUAP01**

**Max. Marks: ESE – 25**

**Credit: 1**

**Objective:** The main aim of this paper is to make the students understand and apply the mathematical concepts in solving problems using Free Open Math software SAGE Math.

**List of Practical**

- 1) Solving ordinary differential equations
- 2) Solving partial differential equations
- 3) Solving quadratic equations
- 4) Solving integral equations
- 5) Solving integral equations with limits
- 6) Solving linear equations
- 7) Laplace transforms of functions
- 8) Surface area using double integrals
- 9) Volume using triple integrals
- 10) Area of a circle
- 11) Reading a Matrix, Matrix addition and multiplication
- 12) Transpose of a matrix
- 13) Inverse of a matrix
- 14) Set operations and laws for the given data

**SEMESTER – IV**  
**PART III – ALLIED**  
**ALLIED MATHEMATICS – PAPER II**  
**(for Physics & Chemistry)**

**Instructional Hrs. : 75**  
**Max Marks : CIA - 20; ESE - 55**

**Sub. Code :16MSUA404**  
**Credits : 4**

**Objective:** On successful completion of this course, the students will gain knowledge about differentiation, integration, Fourier Series and Trigonometry.

**UNIT I** **15 Hrs.**

**Calculus: Differentiation:** Curvature and Radius of Curvature in Cartesian – and *Polar form*- Evolutes – Pedal Equations.

**UNIT II** **15 Hrs.**

**Integration:** Multiple Integrals – Evaluation of Double Integrals (Excluding Changing The Order of Integration) – Double Integrals in Polar coordinates – *Evaluation of Triple integrals* .

**UNIT III** **15 Hrs.**

**Application of Integration:** *Application of Double integral in Evaluating Area Between Curves*– Jacobian of Two and Three Variables – Beta and Gamma Functions – Relation – Evaluation of Double and Triple Integrals Using Beta and Gamma Functions.

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

**Fourier Series:** Definition – Finding Fourier Coefficients for a Given Periodic Function with Period  $2\pi$  – *Odd and Even Functions* (Problems only).

## UNIT V

15 Hrs.

**Trigonometry:** Applications of Demoivre's Theorem –  $\cos n\theta$ ,  $\sin n\theta$ ,  $\tan n\theta$  – Expansions of  $\cos n\theta$ ,  $\sin n\theta$  – Expressions of  $\sin\theta$ ,  $\cos\theta$ ,  $\tan\theta$  in powers of  $\theta$  – Hyperbolic functions – *Relations between Circular and Hyperbolic functions*

**Note:** *Italics denote Self Study topics*

### TEXT BOOKS

- 1) S.Narayanan and T.K.Manicavachagom Pillay, *Calculus*, Vol.I, Reprint 2012 – 2013. ( For Unit I)
- 2) S.Narayanan and T.K.Manicavachagom Pillay, *Calculus*, Vol.II, Reprint 2012 – 2013. (For Units II & III)
- 3) A.Singaravelu, *Allied Mathematics*, A.R.S. Publications, Fourth Revised Edition – August 2013. ( For Units IV & V)

Chapter	Page no.
7	7.193 – 7.244
6	6.4 – 6.36

### REFERENCE BOOKS

- 1) S.Narayanan and T.K.Manicavachagom Pillay, *Calculus*, Vol.III, Reprint 2012 – 2013.
- 2) S.Narayanan and T.K.Manicavachagom Pillay, *Trigonometry*, S.Viswanathan Printers and Publishers Pvt. Ltd., 2012

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**SEMESTER – IV**  
**Allied Practical – II**  
**OCTAVE**  
**(for B.Sc., Physics and Chemistry)**

**Instructional Hrs.: 30**

**Sub.Code:16MSUAP02**

**Max. Marks: ESE – 25**

**Credit: 1**

**Objective:** The main aim of this paper is to make the students understand and apply the mathematical concepts in solving problems using Free Open Math software Octave.

**List of Practical**

- 1) Plotting, labelling and naming two and three dimensional graphs with different line styles
- 2) Finding the equation of straight line for the given co-ordinates
- 3) Evaluating  $\frac{f(x)}{g(x)h(x)}$ , where  $f$ ,  $g$  and  $h$  are polynomial functions in some interval and plotting its graph
- 4) Finding the curvature of the given curve
- 5) Evaluating A.P and G.P series
- 6) Evaluating the sum of squares of 'n' numbers
- 7) Plotting the projection in the XY, YZ, ZX planes for  
$$x(t) = \cos(t), y(t) = \sin(t), z(t) = t$$
- 8) Solving a system of linear equations with four unknowns and four equations
- 9) Solving second and third order differential equations

**SEMESTER – III**  
**PART III – ALLIED**  
**MATHEMATICS FOR COMMERCE**

**Instructional Hrs. : 90**

**Sub. Code: 16MAUA303**

**Max. Marks: CIA – 25; ESE – 75**

**Credits: 5**

**Objective:** The objective is to provide basic knowledge of mathematics and its applications to business situations.

**UNIT I**

**18 Hrs.**

**Number System :** Introduction – Natural Number System – Highest Common Factor – *Least Common Multiple* – Progression – Arithmetic Progression–Arithmetic mean– Geometric Progression –Geometric Mean – Ratios – Proportion – Mixtures.

**Unit II**

**18 Hrs.**

**Matrices :** Introduction – Types of matrices – Algebra of matrices – Transpose of a matrix – Determinants – Inverse of a matrix – Solution of simultaneous equations –*Rank of a matrix.*

**Unit III**

**18 Hrs.**

**Mathematics of Finance :** Simple Interest – Compound Interest – Effective and Nominal Rate of Interest – *depreciation* – Annuities .

**Unit IV**

**18 Hrs.**

**Discounting of Bills :** Sinking fund – Amortization table –Discounting – Banker's Discount– True Discount – *Banker's Gain* – cash value – Actual Rate of interest – Equated Due Date.

## Unit V

18 Hrs.

**Applications of Differentiation :** Introduction to differentiation – Elasticity – Elasticity of Demand –Elasticity of supply – Marginal cost and Marginal Revenue. *Relation between Marginal Revenue & Elasticity of Demand* – Maxima and Minima.

**Applications of Integration:** Introduction to Integration – Calculation of cost function – *Calculation of Revenue function.*

### Case Studies:

- Calculate Secondary overhead distribution summary using Simultaneous Equations method.
- Preparation of Bank statement.
- Applications of matrix in Business Problems.
- Develop an Amortization table for Loan amount – EMI calculation.
- Obtain the revenue function for  $x$  units of sales & find the marginal revenue.

**Note:** *Italics* denote Self Study topics.

### TEXT BOOKS

1. **M.Wilson** *Business Mathematics*, Himalaya Publishing House, Reprint 2016. (For units I, II and V)
2. **P.A. Navnitham**, *Business Mathematics & Statistics*, Jai Publishers, 2017. (For units III and IV)

### REFERENCE BOOK

1. **B.C.Mehta and G.M.K. Madnani**, *Mathematics for Economists*, Sultan Chand and Sons, Reprint 2004.
- Question paper setters are asked to confine to the above **text books** only.



**SEMESTER – IV**  
**PART III – ALLIED STATISTICS FOR COMMERCE**

**Instructional Hrs. :75**

**Sub. Code: 16MAUA404**

**Max. Marks: CIA – 20; ESE – 55**

**Credits: 4**

**Objective:** To provide basic knowledge of Statistics, Index numbers, Interpolation, Time Series and their applications.

**UNIT I**

**15 Hrs.**

**Diagrams and Measures of Central tendency :** Diagrammatic Presentation – Bar and Pie Diagrams – Graphic presentation –Graph of Frequency Distribution. Measures of Central Tendency – Averages – Simple and Weighted – Mean, Median, Mode, Geometric Mean and Harmonic Mean – Their Computation – *Properties and Uses.*

**UNIT II**

**15 Hrs.**

**Measures of Dispersion :** Range, Coefficient of Range, Quartile Deviation, Coefficient of Quartile Deviation – Mean Deviation, Coefficient of Mean Deviation, Standard Deviation and *Coefficient of Variation.*

**UNIT II**

**15 Hrs.**

**Correlation and Regression:** Correlation – Meaning and Definition – Scatter Diagram – Pearson's Coefficient of Correlation – Rank Correlation – Computation and interpretation – Regression – Properties of Regression Coefficient – Meaning of Regression – Regression Equations – Mathematical properties of Regression coefficient – *Uses of Regression.*

## UNIT IV

15 Hrs.

**Index numbers and Interpolation :** Index Numbers – Meaning – Uses – Methods of Construction – Aggregative and Relative Types – Tests of consistency of index Number – Consumer price index Number – *Methods of Construction* – Interpolation – Binomial method – Method of advancing differences – Newton’s method of backward differences – Lagrange Method .

## UNIT V

15 Hrs.

**Analysis of time Series:** Meaning – Time series Components – Models – Measurement of Secular Trend – *Measurement of Seasonal Variation.*

### Case Studies:

- Collect marks scored by 150 students in an examination and make a frequency distribution table, subject wise and class wise.
- Collect data relating to prices of shares of two companies for ten days and ascertain stability of share prices.
- Select 10 items of daily consumed products and collect base year quantity, base year price and current year price in your street/place. Calculate Cost of Living Index.
- Fit a straight line trend for the production of a company for 10 years & forecast the future trend.
- Collect the sales & profit of 10 items in a shop and find the correlation between sales and profit.

**Note:** *Italics* denotes Self Study topics

## TEXT BOOK

1. **R.S.N Pillai, Bagavathi**, *Statistics Theory and Practice* , Sultan Chand & Co., New Delhi, Reprint 2015.

## REFERENCE BOOKS

1. **PA. Navnitham**, *Business Mathematics & Statistics*, Jai Publishers, 2017.
2. **P.R.Vittal**, *Business Mathematics & Statistics*, Jai Publishers, Trichy, 2004.
  - Question paper setters are asked to confine to the above **text books** only.

**SEMESTER – IV**  
**Allied Practical – STATISTICAL SOFTWARE**  
**(for B.Com)**

**Instructional Hrs.: 15**

**Sub. Code: 16MAUAP01**

**Max. Marks: ESE – 25**

**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 and operations with 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. To find the range and skewness for the given data.
9. Bivariate data- scatter plot, correlation co-efficient, fitting linear regression line.
10. Multiple linear regression models.
11. Analysis of Variance (ANOVA).