Vellalar College for Women (Autonomous), Erode - 12.

Bachelor of Science in Mathematics

2016 - 2017 Onwards

Course Content and Scheme of Examinations (CBCS Pattern)

Semester I

Part	Study Component	Subject Code	Title of the Paper	Inst. Hrs./ Week	Exam. Dur. Hrs.	Max. Marks			Credits
						CIA	ESE	Total	
I	Language I	15TAMU101/ 14HINU101	Tamil / Hindi	6	3	25	75	100	3
II	Language II	13ENLU101	English	6	3	25	75	100	3
III	Core	10MSUC101	Classical Algebra ©	4	3	25	75	100	4
		15MSUC102	Differential Calculus ©	5	3	25	75	100	4
	Allied I	13MSUA101	Statistics for Mathematics - I	5	3	20	55	75	4
		16MSUAP01	Allied Practical - Mathematical Software - I	2	3	10	15	25	1
IV	Foundation Course	09FOCU1ES	Environmental Studies	2	3	-	100	100	2
Semester II								**600**	**21**
I	Language I	15TAMU202/ 14HINU202	Tamil / Hindi	6	3	25	75	100	3
II	Language II	13ENLU202	English	6	3	25	75	100	3
III	Core	15MSUC203	Integral Calculus ©	4	3	25	75	100	4
		15MSUC204	Trigonometry and Vector Calculus ©	3	3	20	55	75	3 / 4
		16MSUCP01	Core Practical - Mathematical Software - II	2	3	10	15	25	1 / 4
	Allied I	13MSUA202	Statistics for Mathematics - II	7	3	25	75	100	5
IV	Value Education	14VEDU2HR	Value Education & Human Rights	2	3	-	100	100	2
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Semester III										
Part	**Study Component**	**Subject Code**	**Title of the Paper**	**Inst. Hrs./ Week**	**Exam. Dur. Hrs.**	**Max. Marks**			**Credits**	
						CIA	**ESE**	**Total**		
I	Language I	14TAMU303/ 14HINU303	Tamil / Hindi	6	3	25	75	100	3	
II	Language II	13ENLU303	English	6	3	25	75	100	3	
III	Core	15MSUC305	Analytical Geometry	3	3	25	75	100	4	
		08MSUC306	Statics	3	3	25	75	100	4	
	Allied II	10PHUA001	Physics - I	7	3	20	55	75	4	
IV	Skill Based Subject I	15MSUSP01	SBS - Practical - Latex (Cafeteria System)	3	3	40	60	100	3	
	Basic Tamil			2	-	100	-	100	2	
	Advanced Tamil				3	25	75			
	Non - Major Elective I	15MSUN301	Vedic Mathematics - I		3	-	100			
Semester IV								**675**	**23**	
I	Language I	14TAMU404/ 14HINU404	Tamil / Hindi	6	3	25	75	100	3	
II	Language II	13ENLU404	English	6	3	25	75	100	3	
III	Core	15MSUC407	Transforms and Fourier Series©	3	3	25	75	100	4	
		08MSUC408	Dynamics	3	3	25	75	100	4	
	Allied II	10PHUA002	Physics - II (Theory)	4	3	20	55	75	4	6
		10PHUAP01	Physics - II (Practical)	3	3	20	30	50	2	
IV	Skill Based Subject II	15MSUS402	Multi-Skill Development Paper ©	3	1	40	60	100	3	
	Basic Tamil			2	-	100	-	100	2	
	Advanced Tamil				3	25	75			
	Non Major Elective II	09MSUN402	Statistical Package(Theory & Practical)		3	-	100			
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Semester V										
Part	**Study Component**	**Subject Code**	**Paper Title**	**Inst. Hrs./ Week**	**Exam. Dur. Hrs.**	**Max. Marks**			**Credits**	
						CIA	**ESE**	**Total**		
III	Core	15MSUC509	Real Analysis - I ©	5	3	25	75	100	3	
		15MSUC510	Complex Analysis - I ©	5	3	25	75	100	4	
		09MSUC511	Modern Algebra - I ©	5	3	25	75	100	4	
		11MSUC512	'C' Programming (Theory)	4	3	25	75	100	3	5
		11MSUCP02	Core Practical - 'C' Programming	3	3	40	60	100	2	
	Elective I	15MSUE501	Operations Research - I	5	3	25	75	100	5	
IV	Skill Based Subject III	15MSUS503	Numerical Methods - I (Cafeteria System)	3	3	25	75	100	3	
Semester VI								**700**	**24**	
III	Core	15MSUC613	Real Analysis - II ©	5	3	25	75	100	4	
		15MSUC614	Complex Analysis - II ©	5	3	25	75	100	4	
		15MSUC615	Modern Algebra - II ©	5	3	25	75	100	4	
	Elective II	15MSUE602	Discrete Mathematics	5	3	20	55	75	3	5
		16MSUEP01	Elective Practical - Mathematical Software - III	2	3	-	25	25	2	
	Elective III	15MSUE603	Operations Research - II ©	5	3	25	75	100	5	
IV	Skill Based Subject IV	15MSUS604	Numerical Methods - II (Cafeteria System)	3	3	25	75	100	3	
V	Extension Activity		NCC / NSS / Physical Education / YRC/Green Society/Citizen Consumer Club/Entrepreneurship Development Programme	-	-	-	-	100	1	
								700	**26**	
Total (I - VI Semesters)								**4000**	**140**	

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SKILL BASED SUBJECTS		
1	15MSUS301	SBS - Practical I - Latex (Cafeteria System)
2	13MSUS402	Multi - Skill Development Paper
3	15MSUS503	Numerical Methods - I (Cafeteria System)
4	15MSUS604	Numerical Methods - II (Cafeteria System)
NON MAJOR ELECTIVES		
1	15MSUN301	Vedic Mathematics - I
2	09MSUN402	Statistical Package (Theory and Practical)

SELF - LEARNING PAPERS (Optional)					
Sl.No.	**Subject Code**	**Title of the Paper**	**Exam. Dur. Hrs.**	**Max. Marks**	**Credits**
1	13MSUSL02	Astronomy	3	100	5
2	13AUGSL05	General Awareness(On line exam)	3	100	5
3	15MSUSL15	Scilab(On line exam)	1	Completed	5
4	14MSUSL25	LaTeX(On line exam)	1	Completed	5

SEMESTER – I

Core – I

CLASSICAL ALGEBRA

Instructional Hrs.: 60 **Sub.Code:10MSUC101/10MCUC101**

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

Objective: In this course, students are exposed to topics like Summation of Series, Convergence and Divergence and Theory of Equations. The stress is on the development of problem solving skills.

UNIT I **12 Hrs.**

Binomial and ExponentialSeries: Theorems – Statements and Proofs – Their Immediate Application to Summation and *Approximation* Only.

UNIT II **12 Hrs.**

Logarithmic Series: Theorem – Statement and Proof – Immediate Application to Summation and Approximation only – Convergence and Divergence of Series – Definitions, Elementary results – *Comparison Tests* – De Alembert's and Cauchy's Tests.

UNIT III **12 Hrs.**

Absolute Convergence: Series of Positive terms – Cauchy's Condensation Test – *Raabe's Test.*

UNIT IV **12 Hrs.**

Theory of Equations: Roots of an Equation – Relations Connecting the Roots and Coefficients – Transformations of Equations – Character and Position of Roots – Descarte's Rule of Signs – Symmetric Function of Roots – *Reciprocal Equations.*

UNIT V **12 Hrs.**

Theory of Equations: Multiple Roots – Rolle's Theorem – Position of Real Roots of $f(x) = 0$ – Newton's Method of Approximation for Finding Positive Roots upto Two Decimal Places – *Horner's Method upto Two Decimal Places.*

Note: *Italics* denote Self Study Topics

TEXT BOOK

1. **T.Natarajan, T.K.Manicavachagom Pillay** and **K.S.Ganapathy,***Algebra,* S.Viswanathan Printers and Publishers Pvt. Ltd., Reprint, 2012 – 2013.

REFERENCE BOOKS

1. **Anadha Padanadha S Nadar** and **T.V. Laxmi Narasimhan**, *Algebra*, Rachouse & Sons, 1st Edition, 1972
2. **P.N. Chatterjee,***Algebra*, Rajhans Agencies,13th Edition, 1990.
3. **M. K. Singal** and **Asha Rani Singal,** *Algebra,* R.Chand & Co., 12th Edition, 1982.

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

SEMESTER – I

Core – II

DIFFERENTIAL CALCULUS

Instructional Hrs.: 75 **Sub. Code: 15MSUC102/ 15MCUC102**

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

Objective:

The course aims to provide logical skills in the curvature and the formation of differential equations, to expose to different techniques of finding solutions to these equations .In addition stress is laid on the applications of these equations in Geometrical and Physical Problems.

UNIT I **15 Hrs.**

Curvature: Radius of curvature in Cartesian and *polar forms* – Evolutes and Involutes – Envelopes – Singularities – Multiple Points.

UNIT II **15 Hrs.**

Curvature: Pedal Equations – *Total Differentiation* – Euler's Theorem on Homogeneous Functions.

UNIT III **15 Hrs.**

Differentiation: Particular Integral of Equations of Second Order with Constant Co – efficient for xe^{mx} – Higher Order Equations when *F(D)* is easily Factorizable – Linear equations with Variable Co – efficients (Reducible to Quadratic form).

UNIT IV **15 Hrs.**

Ordinary Differential equations: First Order Higher Degree Equations – Solvable for x, y, p – Clairaut's form – Simultaneous Differential Equations of the form $(i)f_1(D)x + f_1(D)y = f_1(t)$,

$g_1(D)x + g_2(D)y = f_2(t)$ where f_1, f_2, g_1 and g_2 are rational functions of $D = \frac{d}{dt}$ with constant coefficients $f_1 \; and f_2$ are Explicit functions of t. $\frac{dx}{P} = \frac{dy}{Q} = \frac{dz}{R}$, Conditions of Integrability.

UNIT V **15 Hrs.**

Partial Differential Equations: Formation of Equations by Eliminating Arbitrary Constants and Arbitrary Functions. Definitions of General, Particular and Complete solutions – Singular and General Solutions of First Order Equations in the Standard Forms $(i)f(p,q) = 0, (ii)f(z,p,q) = 0, (iii)f(x,p) = g(y,q), (iv)z = px + qy + f(p,q)$. Lagrange's Method of Solving Linear Differential Equations $Pp + Qq = R$.

Note: *Italics* denote Self Study Topics

TEXT BOOKS

1. **S.Narayanan** and **T.K.Manicavachagom Pillay,***Calculus,* VolI, S.Viswanathan Printers and Publishers Pvt. Ltd., Chennai, Reprint 2012 – 2013. (Units I, II)
2. **S.Narayanan** and **T.K.Manicavachagom Pillay,***Calculus,* VolIII, S.Viswanathan Printers and Publishers Pvt. Ltd., Chennai, Reprint 2012 – 2013. (Units III, IV, V)

REFERENCE BOOKS

1. **David.V.Widder,** *Advanced Calculus,* Prentice Hall of India Pvt. Ltd., New Delhi, 2nd Edition, 1961.
2. **S . Sudha,** *Differential Equations and Integral Transforms,*Emerald Publishers, Chennai, 2003.

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

SEMESTER I

Allied – I

STATISTICS FOR MATHEMATICS – I

Instructional Hrs.:75 **Sub. Code: 13MSUA101**

Max. Marks: CIA – 20; ESE – 55 **Credits: 4**

Objective:

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

UNIT I **15 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 **15 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 – Tchebechev's Inequality.

UNIT III **15 Hrs.**

Characteristics of Distribution: Moments – *Moment Generating Function* – Measures of Location – Measures of Dispersion – Skewness – Kurtosis – Covariance – Correlation – Sample Correlation Coefficient – Correlation for a grouped data – Rank Correlation.

UNIT IV **15 Hrs.**

Least Squares and Regression Analysis: Curve Fitting – Principle of Least Square – 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 X on Y – Regression line of Y on X – Properties of Regression Coefficient – *Angle between the Regression Lines*.

UNIT V **15 Hrs.**

Discrete Distributions & Continuous Distributions: Binomial Distribution – Poisson Distribution – Continuous Distribution: *Normal Distribution*.

Note : *Italics* denotes Self Study Topics.

TEXT BOOK:

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

Unit	Chapter(s)	Section(s)	Pages
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	3.8 – 3.19 (except 3.11)	111 – 121 & 131 – 157
IV	11	11.1 – 11.4, 11.7 – 11.14	379 – 405
V	4 & 5	4.1, 4.2, 5.1	163 – 198 & 203 – 229

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

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.

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 $f'(x)/f(x)$, $dx/(ax^2+bx+c)$, $lx+m/(ax^2+bx+c)$, $(px+q)/\sqrt{ax^2+bx+c}$, $\sqrt{(x-\alpha)(\beta-x)}$, $\sqrt{(x-\alpha)/(\beta-x)}$, $1/\sqrt{(x-\alpha)(\beta-x)}$, $\frac{1}{a\cos x+b}$ or $\frac{1}{a\sin x+b}$ and $\frac{1}{(a^2\cos^2 x+b^2\sin^2 x)}$ – *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

SEMESTER – II

Core – IV

TRIGONOMETRY AND VECTOR CALCULUS

Instructional Hrs. 45 **Sub. Code: 15MSUC204**

Max. Marks: CIA – 20; ESE – 55 **Credits: 3**

Objective: This paper deals with expansion of trigonometric functions, line integral, surface integral and volume integral.

UNIT I **9 Hrs.**

Expansions and Hyperbolic Functions: Expansion of $\cos n\phi$, $\sin n\phi$, $\cos^n \phi$, $\sin^n \phi$ – *Hyperbolic functions* – Separations of real and imaginary parts of s $(\alpha + i\beta)$, c $(\alpha + i\beta)$, t $(\alpha + i\beta)$, s $(\alpha + i\beta)$, $\cosh(\alpha + i\beta)$, $\tanh(\alpha + i\beta)$, $\tan^{-1}(\alpha + i\beta)$.

UNIT II **9 Hrs.**

Logarithm of a complex number and Summation of Series: Logarithm of a complex number – Summation of trigonometric Series – *When angles are in A.P. – method of Differences.*

UNIT III **9 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 **9 Hrs.**

Integration of Scalar and Vector 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 **9 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* $\nabla, \nabla., \nabla \times$ *in terms of surface integrals* – Examples.

Note:*Italics* denote Self Study Topics

TEXT BOOKS

1. **P. Duraipandian, Kayal Pachaiappa,** *Vector Analysis,* S.Chand & Co., 1st Edition, 2014.
2. **S.Narayanan** and **T.K** .**Manicavachagom Pillay.**, *Trigonometry***,** S. Viswanathan Publishers, 2004.

REFERENCE BOOKS

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

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

SEMESTER – II

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

Allied – I

STATISTICS FOR MATHEMATICS – II

Instructional Hrs.: 105 **Sub. Code: 13MSUA202**

Max.Marks: CIA – 25; ESE – 75 **Credits: 5**

Objective:

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

UNIT I **21 Hrs.**

Sampling Distribution: χ^2 Distribution – Students' *t* Distribution – Snedecor's *F* Distribution – Sampling Distributions of *Mean* and Variance in Samples from a Normal Distribution.

UNIT II **21 Hrs.**

Theory of Estimation: Introduction – Properties of Good Estimators – *Method of Moments* – Principal of Maximum likelihood.

UNIT III **21 Hrs.**

Testing Hypotheses and Tests of Significance: GeneralMethod of Testing Hypothesis – Test of Significance based on the *normal*, *t* and *F* Distribution – Small Samples – Significance of the difference between the variances 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 denote Self Study Topics.

TEXT BOOK

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

Unit	Chapter(s)	Section(s)	Pages
I	6	6.4, 6.5, 6.6, 6.7	258 – 281
II	7	7.1 to 7.4	291 – 312
III	9	9.1 to 9.4	328 – 357
IV	10	10.1, 10.2	358 – 378
V	12	12.1 to 12.6	406 – 431

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

SEMESTER – III

Core – V

ANALYTICAL GEOMETRY

Instructional Hrs: 45 **Sub.Code: 15MSUC305**

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

Objective: On successful completion of this course, the students will gain knowledge about the regular geometrical figures and their properties.

UNIT I **9 Hrs.**

Analytical geometry of two dimensions: Polar coordinates – General polar equation of a straight line – polar equation of the circle on A_1A_2 as diameter – Equation of a straight line – circle – conic – chord, tangent, *normal* – simple problems.

UNIT II **9 Hrs.**

Analytical geometry of three dimensions: Straight line: straight line as the intersection of two planes – Symmetrical form of the equations of a line – The symmetrical form of the equations of the line – *Equation of a straight line passing through two givenpoints* – The plane and the straight line. Coplanar lines.

UNIT III **9 Hrs.**

Sphere: Definition – The equation of a sphere when the centre and radius are given – The equation $x^2 + y^2 + z^2 + 2ux + 2vy + 2wz + d = 0$ always represents a sphere and to find it's center and radius – The length of the tangent from the point (x_1, y_1, z_1) to the sphere $x^2 + y^2 + z^2 + 2ux + 2vy + 2wz + d = 0$ – *Equation of a circle on a sphere* – Intersection of two spheres is a circle – Equation of the tangent plane to the sphere $x^2 + y^2 + z^2 + 2ux + 2vy + 2wz + d = 0$ at the point (x_1, y_1, z_1).

UNIT IV **9 Hrs.**

Cone and Cylinder: The equation of a surface – Cone – Right circular cone – Intersection of a straight line and a quadric cone – Tangent plane and normal – Condition for the plane $lx+my+nz=0$ to touch the quadric cone $ax^2+by^2+cz^2+2fyz+2gzx+2hxy=0$ – The angle between the lines in which the plane $ux+vy+wz=0$ cuts the cone – Condition that the cone has three mutually perpendicular generators – *cylinder*.

UNIT V **9 Hrs.**

Central Quadrics: The intersection of a line and a quadric – Tangents and tangent planes – Condition for the plane $lx+my+nz=p$ to touch the conicoid – $ax^2+by^2+cz^2=1$ – Polar planes and *polar lines* – Normal at the point (x_1,y_1,z_1) to the conicoid $ax^2+by^2+cz^2=1$.

Note: *Italics* denote Self Study Topics.

TEXT BOOKS

1. **T.K.Manicavachagom Pillay,** *Analytical Geometry of 2D*, S. Viswanathan. Printers and Publishers Pvt. Ltd. Chennai, 2003.
2. **P.Duraipandian,***Analytical Geometry*, Emerald Publishers, Chennai, Reprint, 2000.

REFERENCE BOOKS

1. **A.K.Sharma.,** *Text book of 3D Sphere, cone and Cylinder*, Discovery Publishing House, 1st Edition , 2005.
2. **Barnette Rich Revised by Philip A.Schmidt,***Geometry*, Hill publishing company Ltd., 3rd Edition,
3. **P.Duraipandian, Laxmi Duraipandian and D,Muhilan** *Analytical Geometry – 2D*, Emerald Publishers, 1989.

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

SEMESTER – III

Core – VI

STATICS

Instructional Hrs. : 45 **Sub. Code : 08MSUC306**

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

Objective: To gain knowledge about different types of forces, friction and centre of gravity and their applications.

UNIT I **9 Hrs.**

Forces acting at a point: Parallelogram Law – *Triangle Law ($\lambda - \mu$) Theorem* – polygon of Forces – Condition of Equilibrium of Forces Acting on a Body.

UNIT II **9 Hrs.**

Force: Parallel Forces, Moments and Couples – Composition of Parallel Forces (Like and Unlike) Moment of a Force about a Point and about a Line – *Varignon's theorem.*

UNIT III **9 Hrs.**

Coplanar Forces: Coplanar Forces Acting on a Rigid Body – Theorem on Three Coplanar Forces in Equilibrium – Reduction of a System of Coplanar Forces to a Single Force and Couple – Conditions of Equilibrium – Forces in Three Dimensions – *Invariance* – Wrench Pitch and Equation of Central Axis.

UNIT IV **9 Hrs.**

Friction : Laws of Friction – Angle, Co – efficient and *Cone of Friction – Simple Problems.*

UNIT V **9 Hrs.**

Centre of Gravity: Centre of Gravity (Using Integration Only), *Equilibrium of Strings* and Chains.

Note :*Italics* denote Self Study Topics

TEXT BOOK

1. **M.K.Venkataraman**., *Statics,* Agasthiar Publications, Trichy, 10th Edition, 2002.

REFERENCE BOOKS

1. **S.L. Loney,** *The Elements of Statics and Dynamics,* S.Chand and Company Private Ltd., New Delhi, 7th Edition, 1987.
2. **P.N. Chatterji,** *Statics,* Rajhans Publications, Meerut(U.P.), 16th Edition, 1996.
3. **N.P. Bali.,** *Golden Statics,* Laxmi Publications, Delhi, 5th Revised Edition, 1980.

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

SEMESTER – III

SKILL BASED SUBJECT – I

SBS – Practical – LaTeX

Instructional Hrs: 45 **Sub Code: 15MSUSP01**

Max. Marks: 100 (ESE – 60; CIA – 40) **Credits: 3**

Objective: Latex is a documentation package. This course will help the students for neat documentation.

List of Practical

1. Type a Document in different alignments (Left, Right, Center, Justify).
2. Type a job application.
3. Type your own Bio – Data.
4. Draw a Table Structure.
5. Type a given Mathematical expression using Differentiation, Integration & Trigonometry.
6. Type a given Mathematical expression using all expressions.
7. Type a given expression using all inequalities.
8. Type a given Article.
9. Draw any picture and insert in LateX file.
10. Type a given Question paper.
11. Convert one LateX file into power point presentation.

SEMESTER – IV

Core – VII

TRANSFORMS AND FOUIER SERIES

Instructional Hrs: 45Sub. Code: 15MSUC407 / 15MCUC305

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

Objective: In addition to Laplace Transforms, Also, stress is laid on the applications of the differential equations in geometrical and physical problems. Also, this paper deals with expansion of Fourier series, Fourier Transform and Z – Transforms.

UNIT I **9 Hrs.**

Laplace transforms: Introduction – Definition – Transforms of elementary functions – properties of Laplace transforms – Transforms of periodic functions – Transforms of special functions – Transforms of derivatives – *Transforms of integrals* – Multiplication by t^n – Division by t –Evaluation of integrals by Laplace Transforms.

UNIT II **9 Hrs.**

Inverse Laplace transforms: Inverse Laplace transforms – Method of partial fractions – Other methods of finding inverse transforms – Convolution theorem – Application of differential equations – *Simultaneous linear equations with constant coefficients* – Unit step function – Unit impulse function.

UNIT III **9 Hrs.**

Fourier transforms: Introduction – Definition – Fourier integral theorem – Properties of F – transforms – Convolution– Parseval's identity for F – transform – *Relation between Fourier and Laplace Transform* – Fourier Transforms of the derivatives of a function – Inverse Laplace transforms by method of residue – Application of transforms to boundary value problems .

UNIT IV **9 Hrs.**

Z – transforms : Introduction – Definition – Some standard Z–transforms – Linearity property – Damping rule – Some standard results – Shifting U_n to the right – Multiplication by n – Two basic theorems – *Some useful Z–transforms – Some useful inverse Z– transforms* – Convolution theorems – Convergence of Z–transforms – Two – sided Z–transform – Evaluation of inverse Z–transforms – Applications to difference equations.

UNIT V **9 Hrs.**

Fourier series: Introduction – Euler's formulae – Conditions for a Fourier expansion – Functions having point of discontinuity – Change of interval – Odd and even functions– Half – range series – Typical wave – forms – Parseval's formula – Complex form of F – Series – *Practical Harmonic Analysis*.

TEXT BOOK

1. **B.S.Grewal** , *Higher Engineering Mathematics*, Khanna Publishers, 43rd Edition, 2014.

Unit	Chapter(s)	Section(s)
I	21	21.1 – 21.11
II	21	21.12 – 21.17
III	22	22.1 – 22.11
IV	23	23.1 – 23.16
V	10	10.1 – 10.11

REFERENCE BOOKS

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

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

SEMESTER – IV

Core – VIII

DYNAMICS

Instructional Hrs. : 45 **Sub. Code : 08MSUC408**

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

Objective: The students are trained to work onKinematics, laws of motion, projectile, central orbits, simple harmonic motion, and impact on a fixed surface.

UNIT I **9 Hrs.**

Kinematics: Velocity – Acceleration – Composition of velocities and accelerations – relative velocity – Angular Velocity – Relative Angular Velocity. Motion of a Straight Line:Equations of Motion, Acceleration of Falling Bodies – Vertical Motion under Gravity – Motion Down a Smooth Inclined Plane.

Laws of Motion: Newton's laws of motion. Newton's law of Gravitation – Conservation of Linear Momentum – Work Done by an Elastic String – Work Done by a Couple – Power. Horse Power – Conservative Forces Energy – *Potential Energy and Kinetic Energy* – Principles of Energy.

UNIT II **9 Hrs.**

Projectile: Path of a Projectile – Greatest Height – *Time of Flight* – Range on an Inclined Plane Through the Point of Projection – Maximum Range.

UNIT III **9 Hrs.**

Central Orbits : Radial and Transverse Components of Velocity and Acceleration – Areal Velocity – Central Orbits. Differential Equation of a Central Orbit in Polar Coordinates – *Circular and Elliptic Orbits* – Kepler's Laws of Planetary Motion.

UNIT IV **9 Hrs.**

Simple Harmonic Motion: Amplitude, *Periodic Time*, Phase – Composition of Two Simple Harmonic Motions of the same Period in a Straight Line and in two Perpendicular Lines.

UNIT V **9 Hrs.**

Impact on a Fixed Surface: Impulsive force. Impact on a Smooth Fixed Plane, Direct and Oblique Impact of Two Smooth Spheres, Loss of Kinetic Energy during Direct and *Oblique impacts.*

TEXT BOOK

1. **M.K .Venkataraman**., *Dynamics,* Agasthiar Publications, Trichy, 11th Edition, 2004.

REFERENCE BOOKS

1. **P.N Chatterji,** *Dynamics,* A Rajhans publications, Meerut (U.P.), 9th Edition, 1981.
2. **M.L Khanna,** *Dynamics,* Jai Prakash Nath and Co., 14th Edition, 1984, Meerut.
3. **M.Ray,** *A Text book on Dynamics,* S.Chand and Company Ltd., New Delhi, 10th Edition, 1977.

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

SEMESTER – IV

SKILL BASED SUBJECT II

MULTISKILL DEVELOPMENT PAPER

Instructional Hrs : 45 **Sub Code: 15MSUS402**

Max. Marks : 100 (ESE – 60; CIA – 40) **Credits: 3**

Objective: On successful completion of this course, the students will easily understand the basic concepts and ideas for competitive examinations.

UNIT I **9 Hrs.**

Communication: Question tag – Gerund and Infinitives – Spotting the errors – Vocabulary – Synonyms – Antonyms – Prepositions – Articles – One word substitution – Sentence completion.

UNIT II **9 Hrs.**

Numerical Aptitude : Problems on numbers – Problems on Ages – Percentage – Profit and loss – Ratio & Proportion – Time & Work – Time & Distance – *Simple Interest* – Compound Interest.

UNIT III **9 Hrs.**

Critical Reasoning : Logical Inference Questions and Syllogism.

Analytical Reasoning : Arrangement problems – Family / Blood Relation Qualms – Sense of Directions – Age Doubts.

Verbal Reasoning : Verbal Analogy (Letter series and number series only) – Coding and Decoding.

Practical – Libre office (Units IV, V)

Objective: On successful completion of this course, the students will learn the document writing using libre office, calculations using libre office excel, creation and manipulation of tables using libre office base, and power point slide shows.

Unit: IV **9 Hrs.**

1. Use the style inspector to insert a picture, header and footer of text. Align the paragraph with a picture at the right side of the text.
2. Create a table and fit the contents to the cells. Convert the given text to table and table to text. Apply Borders & Shading.
3. Illustrate the mail merge concept to apply for a suitable job for atleast 5 companies using Auto wizard.
4. Build a worksheet to perform correlation and regression coefficients using formulae and check the answer with built – in functions.
5. Worksheet preparation for electricity bill preparation.
6. Create a Pivot Table & Chart.

Unit: V **9 Hrs.**

7. Prepare a power point presentation using cropping & sizing options. Use all the slide transition facilities and Rehearse timings.
8. Prepare an organizational chart for a college environment using power point presentation.
9. Create a table with the given data using MS Access (use adding & deleting data options).
10. Create a Report & Form with the given data by adding controls.

SEMESTER – V

Core – IX

REAL ANALYSIS – I

Instructional Hrs. 75 **Sub. Code: 15MSUC509 / 15MCUC512**

Max. Marks: CIA – 25; ESE – 75 **Credits: 3**

Objective: To understand the basic notions of Set Theory, Real Number System and to enhance the Mathematical fluency in pure mathematics and to gain knowledge about Covering of Sets and Convergent Sequence.

UNIT I **15 Hrs.**

The real number system: The field axioms – the order axioms – Integers – The Unique Factorization theorem for integers – Rational numbers – Irrational numbers – Upper bounds, maximum elements, least upper bound – The completeness axiom – some properties of the supremum – Properties of the integers deduced from the completeness axioms – The Archimedian property of the real number system – Rational numbers with finite decimal representation of real numbers – Absolute values and the triangle inequality – The Cauchy – Schwarz inequality – P*lus and minus infinity and the extended real number system.* – Simple problems related to upper bound, lower bound, supremum and infimum of a set in *R.*

UNIT II **15 Hrs.**

Basic notions of set theory: Notations – ordered pairs – Cartesian product of pair sets – Relations and Functions – further terminology concerning functions – one – one functions and inverses – Composite functions – Sequences – Similar sets – Finite and Infinite sets – Countable and Uncountable sets – Unaccountability of the real number system – Set algebra – C*ountable collection of countable sets* – Simple problems related to countable and uncountable sets.

UNIT III **15 Hrs.**

Elements of Point Set Topology: Euclidean space R^n *– open balls and open sets in* R^n – The structure of open sets in R^n – closed sets and adherent points – The Bolzano – Weierstrass theorem – the Cantor intersection theorem – Simple problem related to open balls, open sets and closed sets, interior points, adherent points and accumulation points.

UNIT IV **15 Hrs.**

Covering: Lindelof covering theorem – the Heine Borel covering theorem – Compactness in R^n– Metric spaces: Metric spaces – Point set topology in metric spaces – Compact subsets of a metric space – *Boundary of a set* – Examples of metric spaces, compact subsets.

UNIT V **15 Hrs.**

Convergent : Introduction – Sequences in a metric space –Cauchy Sequences – Complete Sequences – Complete metric spaces – *Limit of a function* – Examples of Cauchy sequences, complete sequence and complete metric space.

Note :*Italics* denote Self Study Topics

TEXT BOOK

1. **Tom M. Apostol,** *Mathematical Analysis,* Narosa Publishing House, New Delhi, 2nd Edition, 2002.

Unit	Chapter(s)	Section(s)
I	1	1.1 – 1.20
II	2	2.1 – 2.15
III	3	3.1 – 3.6
IV	3	3.7 – 3.16
V	4	4.1 – 4.5

REFERENCE BOOKS

1. **Robert G.Bartle** and **Donald R. Sherbert,** *Introduction to Real Analysis*, John Wiley and Sons, INC, 2nd Edition, 1994.

2. **K.S.Narayanan** and **Dr. K.Chandrasekhara Rao,** *Real Analysis,* Vol. I, S.Viswanathan Printers & Publishers Pvt.Ltd., 1st Edition, 1995.

3. **K .Viswanatha Naik.**, *Real Analysis*, Emerald Publishers, Reprint – 1992.

4. **S.C.Malik** and **Savita Arora,** *Mathematical Analysis,* Wiley Eastern Ltd., Second Edition, 1991.

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

SEMESTER – V

Core – X

COMPLEX ANALYSIS – I

Instructional Hrs: 75 **Sub.Code:15MSUC510/ 15MCUC306**

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

Objective: On successful completion of this course the students will gain knowledge about complex number system, complex functions, power series, Conjugate harmonic function, complex integration and will develop problem solving skill.

UNIT I **15 Hrs.**

Complex Number System: Complex Number – Field of Complex Numbers – Conjugation – *Absolute Value of a Complex Number* – Inequalities in terms of Moduli.

Complex Plane: Representation of Complex Number – Angle between Two Rays – Equations of Straight Lines and Circles – Elementary Transformations

$$(i)w = z + d(ii)w = az(iii)w = \frac{1}{z}$$

Definition of Extended Complex Plane – Stereographic Projection – fixed points. Invariance of Cross – Ratio under Bilinear Transformation – Circles and Inverse Point – Examples.

UNIT II **15 Hrs.**

Analytic Functions: Complex functions – *Limit of a Function – Continuity of a Function* – Uniform Continuity – Differentiability and Analyticity of a Function – Necessary Conditions for Differentiability – Sufficient Conditions for Differentiability – Cauchy – Riemann Equation in Polar Coordinates – Complex Function as a Function of z and $\bar{z}$ – Examples.

UNIT III **15 Hrs.**

Power Series: Power Series – Absolute Convergence of a Power Series – Circle of Convergence (Term by Term Differentiation of a Series).

Elementary Functions: Exponential, Logarithmic, *Trigonometric andHyperbolic Functions* – Examples.

UNIT IV **15 Hrs.**

Harmonic Function: Definition and Determination – Conformal Mapping – Isogonal Mapping – Conformal Mapping $z \to f(z)$ where f is Analytic – Particularly the Mapping$w = z + \frac{1}{z}$, $w = e^z; w = \cos z$ – Examples.

UNIT V **15 Hrs.**

Complex Integration: Simply and Multiply Connected Regions in the Complex Plane. Integration of $f(z)$from Definition Along a Curve Joining $z_1$and z_2 – Proof of Cauchy's Theorem (using Goursat's Lemma for a Simply Connected Region) – Cauchy's Integral Formula for Higher Derivatives (Statement Only) – *Morera's Theorem* – Examples.

Note:*Italics* denote Self Study Topics

TEXT BOOK

1. **P.Duraipandian, Kayalal Pachaiyappa,** *Complex Analysis*, S.Chand, NewDelhi, 2014.

Unit	Chapter(s)	Section(s)	
I	1	1.1, 1.2, 1.6 – 1.9.	(Examples in 1.1, 1.2, 1.6 to 1.8)
	2	2.1, 2.4 – 2.10	(Examples in 2.1, 2.4 – 2.9)
	7	7.1, 7.3, 7.10.	(Examples in 7.1, 7.3)
II	4	4.1 – 4.10.	(Examples in 4.1 – 4.9)
III	6	6.1 – 6.11,6.13	(Examples in 6.1 – 6.11)
IV	6	6.12, 6.13	(Examples in 6.12)
	7	7.6 – 7.10.	(Examples in 7.6 – 7.9)
V	8	8.6 – 8.9, 8.13	(Examples in 8.6 – 8.9)

REFRENCE BOOKS

1. **Ahlfors V Lars**, *Complex Analysis,* MCGraw – Hill International Book Company, 3rd Edition, 1979.
2. **S.Arumugam, A.Thangapandi Issac and A.Somasundaram,** *Complex Analysis,* New Gamma Publishing House, Palayamkottai, 1999.
3. **V.Karunakaran,** *Complex Analysis,* Narosa Publishing House, 2nd Edition, 2005.

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

SEMESTER V

Core – XI

MO**DERN ALGEBRA – I**

Instructional Hrs. : 75 **Sub. Code : 09MSUC511 / 09MCUC513**

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

Objective: On successful completion of this course the students will gain knowledge about sets, groups, homomorphisms, rings, ideals and quotient rings**.**

UNIT I **15 Hrs.**

Sets, Mapping and Groups: Sets – Mappings – Relations and Binary Operations – Groups – Definition and *Examples* – Basic Properties.

UNIT II **15 Hrs.**

Subgroups: Cyclic Groups – Normal Subgroups &*Quotient Groups.*

UNIT III **15 Hrs.**

Homomorphisms, Automorphism and Permutation Groups: Homomorphisms – *Automorphism* – Cayley's Theorem – Permutation Groups.

UNIT IV **15 Hrs.**

Rings: Definition and Examples Basic Properties – *Special Classes of Rings* – Integral Domains and Fields – Homomorphism of Rings.

UNIT V **15 Hrs.**

Ideals and Quotient Rings: Ideals and Quotient Rings – Maximal, Principal Ideals – The *Field of Quotient of an Integral Domains.*

Note :*Italics* denote Self Study Topics

TEXT BOOK

1. **I.N. Herstein,** *Topics in Algebra*, Wiley India Pvt. Ltd., New Delhi, 2nd Edition, Reprint, 2007.

REFERENCE BOOKS

1. **S.Arumugam and Isaac.A.T**, *Morden Algebra,* Scitech Publications (India) Pvt. Ltd, Chennai, 6th Reprint, December 2006.
2. **Surjeet Singh and Qazi Zameerunddin,***Morden Algebra*, Vikas Publishing House Pvt. Ltd., 7th Edition, Reprint 2004.
3. **John B. Fraleigh**,*A First course in Abstract Algebra,* Narosa Publishing House, New Delhi, 3rd Edition.

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

SEMESTER – V

Core – XII

'C' PROGRAMMING (Theory)

Instructional Hrs.: 60 **Sub.Code: 11MSUC512**

Max. Marks: CIA – 25; ESE – 75 **Credits: 3**

Objective: To Develop Programming Skill in the Computer Language C.

UNIT I **12 Hrs.**

Constants and Variables: Introduction – Character Set – Constants – Keywords and Identifiers – Variables – Data Types – Declaration of Variables – Assigning values to Variables – *Defining Symbolic Constants*.

UNIT II **12 Hrs.**

Operators and Expression: Arithmetic operators – Relational operators – Logical operators – Assignment operators – Increment and Decrement operators – Conditional operators – Special operators – Arithmetic Expressions – Evaluation of Expressions – Precedence of Arithmetic operators – Some Computational Problems – Type Conversions in expressions – Operator precedence and associativity – *Mathematical functions.*

UNIT III **12 Hrs.**

Managing Input and Output Operations: Reading a Character – Writing a Character – Formatted input and output. Decision making and Branching: Decision making with IF statement – Simple IF statement – IF ELSE statement – Nesting of IF …. ELSE statement – ELSE IF ladder – Switch statement – ? operator – GOTO statement – Decision Making and Looping: WHILE statement – DO statement – FOR statement – *Jumps in loops* – Simple programs.

UNIT IV **12 Hrs.**

Arrays: Introduction – One dimensional array – Declaration of one, two dimensional arrays – Initiating one and two dimensional arrays – Declaring and initializing string variables – reading strings from terminal – writing strings on the screen – *Arithmetic operations on characters* – Simple programs.

UNIT V **12 Hrs.**

User – defined Functions: Need for user defined functions – A multifunction program – RETURN values and their types – *function calls* – category of functions – No arguments and No return values – Simple programs.

Note :*Italics* denote Self Study Topics

TEXT BOOK

1. **E.Balagurusamy,** *Programming in ANSI C*, Tata McGraw–Hill Publishing Company Ltd., New Delhi, 3rd Edition, Reprint, 2006.

Unit	Chapter(s)	Section(s)
I	2	2.1 – 2.8, 2.10, 2.11
II	3	3.2 – 3.7, 3.9 – 3.16
III	4	4.1 – 4.5, 5.2 – 5.9, 6.2 – 6.5
IV	7, 8	7.1 – 7.6, 8.1 – 8.5
V	9	9.1 – 9.3, 9.6, 9.7, 9.9, 9.10

REFERENCE BOOKS

1. **Peter Aitken** and **Bradley L.Jones,** *Teach yourself C in 21 days*, Techmedia, New Delhi, 4th Edition.
2. **Tony Zhang,** *Teach yourself C in 24 hours*, Sams Publications, 1st Edition,1997.
3. **Ram Kumar** and **Rakesh Agrawal,** *Programming in ANSI C*, Tata McGraw Hill Publishing Company Ltd., New Delhi, 1993.

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

SEMESTER – V

Core Practical

'C' PROGRAMMING

Instructional Hrs.: 45 **Sub. Code: 11MSUCP02**

Max. Marks: CIA – 40; ESE – 60 **Credits:2**

Objective: This Computer practical course aims to provide strong logical thinking and error free syntax codes writing, to mater the debugging techniques and to present the results in neat form in C language.

PRACTICAL LIST FOR C PROGRAMMING

1. Write a program to find the sum, average for a given set of numbers.
2. Write a program to find the standard deviation for a given set of numbers.
3. Write a program to find the number of palindromes in a given sentence.
4. Write a program to generate '*n*' prime numbers.
5. Write a program to print the Student's marksheet assuming roll no, name, marks in 5 subjects in a structure. Create an array of structures and print the marksheet in the given pattern.
6. Write a program to find the multiplication of two matrices.
7. Write a program to calculate the factorial of a given number.
8. Write a program to find the sum of digits of a given number.
9. Write a program to generate Fibonacci series.
10. Write a program to compute ${}^{n}C_{r} = \frac{n!}{r!(n-r)!}$.
11. Write a program to solve a quadratic equation.

SEMESTER – V

Elective – I

OPERATIONS RESEARCH – I

Instructional Hrs: 75 **Sub. Code: 15MSUE501**

Max. Marks: CIA – 25; ESE – 75 **Credits: 5**

Objective: Operations Research deals mainly with mathematical modeling and formulating real life problems into mathematical models. It also provides methods of solving such models. Hence, it makes the students to apply their mathematical knowledge in real life situations.

UNIT I **15 Hrs.**

Linear programming problem (LPPs):

Mathematical Formulation:Introduction – Linear programming problem – Mathematical Formulation of the Problem – Illustration on Mathematical Formulation of LPPs.

Graphical Solution and Extension: Introduction – Graphical Solution Method – Some Exceptional Cases – General Linear Programming Problem – Canonical and Standard Forms of LPP (Formulae only) .

Simplex Method: The Computational Procedure (problems only).

UNIT II **15 Hrs.**

Linear programming problem:

Simplex Method: Use of Artificial Variables

Duality in Linear Programming: Introduction – General Primal – Dual pair – Formulating a Dual Problem – Primal – Dual Pair in Matrix Form – Duality and Simplex Method – Dual Simplex Method (problems only)

UNIT III **15 Hrs.**

Transportation Problem: Introduction – Solution of a Transportation Problem – Finding a Initial Basic Feasible Solution – Test for Optimality – Economic Interpretation of u_i's and v_i's – Degeneracy in transportation Problem – Transportation Algorithm (MODI Method) – Stepping Stone solution – Some Exceptional Cases.

Assignment Problem: Solution Methods of Assignment Problem – Special Cases in Assignment Problems – The Travelling Salesman Problem (problems only)

UNIT IV **15 Hrs.**

Network Scheduling by CPM/PERT: Introduction – Network: Basic Components – Logical Sequencing – Rules of Network Construction – Concurrent Activities – Critical Path Analysis (Problems only)

UNIT V **15 Hrs.**

Games and Strategies: Introduction – Two – Person Zero – sum Games – Some Basic Terms – The Maximin – Minimax principle – Games without Saddle points – Mixed Strategies – Graphical Solution of $2 \times n$ and $m \times 2$ Games – Dominance Property (problems only)

TEXT BOOK

1. **Kanti Swarup, P.K. Gupta and Manmohan,** *Operations Research,* Sultan Chand & Sons, 2014.

Unit	Chapter(s)	Section(s)
I	2, 3, 4	2.1 – 2.4, 3.1 – 3.5, 4.3
II	4, 5	4.4, 5.1 – 5.4, 5.7, 5.9
III	10, 11	10.1, 10.8 – 10.15, 11.3, 11.4, 11.7
IV	25	25.1 – 25.6
V	17	17.1 – 17.7

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

SEMESTER – V

SKILL BASED SUBJECT – III

NUMERICAL METHODS – I

Instructional Hrs. 45 **Sub. Code: 15MSUS503**

Max. Marks: CIA – 25; ESE – 75 **Credits: 3**

Objective: On successful completion of this course, the students will be able to solve numerical algebraic and transcendental equations, simultaneous linear algebraic equations and to understand finite differences and types of operators.

UNIT I **9 Hrs.**

Solution of numerical, algebraic and transcendental equations: The bisection method – Method of successive approximation – *The method of false position*. (Problems only)

UNIT II **9 Hrs.**

Solution of numerical, algebraic and transcendental equations: Newton–Raphson method – Convergence of Newton's method and rate of Convergence – *Geometrical interpretation of Newton's method* – Horner's Method. (Problems only)

UNIT III **9 Hrs.**

Simultaneous linear algebraic equations: Introduction – Gauss elimination method – computation of the inverse of a matrix using Gauss elimination method – Jacobi method of iteration – *Gauss Seidal method of iteration.* (Problems only).

UNIT IV **9 Hrs.**

Finite differences: Introduction – First differences – higher differences – difference tables – expressing any value of Y in terms of the initial value of y_0 and the differences – backward differences – expressing any value of Y in terms of y_n and the backward differences of y_n – *Central differences* – Alternative notation for the function $y = f(x)$. (Problems only).

UNIT V **9 Hrs.**

Properties of the operators – Differences of a polynomial – The operator E – Relation between E and operator Δ – Relation between D and operator Δ – Other difference operators – *Relationship between operators*. (Problems only)

TEXT BOOK

1. **M.K.Venkataraman,***Numerical Methods in Science and Engineering*, NPC, 1990.

Unit	Chapter(s)	Section(s)
I	3	1 – 4
II	3	5 – 8
III	4	1 – 3, 6
IV	5	1 – 9
V	5	10 – 11, 14 – 18

REFERENE BOOKS

1. **S.C.Chapra and P.C.Raymond,** *Numerical Methods for Engineers*, Tata McGraw – Hill, 2000.
2. **P.Kandasamy, K.Thilagavathy and K.Gunavathi,** *Numerical Methods***,**S.Chand & Company Ltd., 2007.
3. **S.S.Sastry,** *Introductory Methods to Numerical Analysis*, Prentice Hall of India, 1998.

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

SEMESTER – VI

Core – XIII

REAL ANALYSIS – II

Instructional Hrs. : 75 **Sub. Code: 15MSUC613 /15MCUC616**

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

Objective: To gain knowledge about continuous functions, connectedness and to understand the concept of Riemann – Stieltjes integral.

UNIT I **15 Hrs.**

Continuous Functions and Topological Mapping: Continuity of Composite Function – Examples of Continuous Functions – Continuity and Inverse Images of Open or Closed Sets – Functions Continuous on Compact Sets – Topological Mappings – *Bolzano's Theorem* – Simple problems related to continuities and discontinuities of a function.

UNIT II **15 Hrs.**

Connectedness and Uniform Continuity: Connectedness – Components of a Metric Space – Uniform Continuity – Uniform Continuity and Compacts Sets – Fixed Point Theorem for Contractions – *Monotonic Functions* – Simple problems related to uniform continuity and monotonic functions.

UNIT III **15 Hrs.**

Derivatives: Definition of Derivative – Derivatives and Continuity – Algebra of Derivatives – The Chain Rule – One sided Derivatives and Infinite Derivatives – Function with non – zero Derivatives – Intermediate V*alue Theorem for Derivatives* – Simple problems related to differentiability and continuity.

UNIT IV **15 Hrs.**

Derivatives: Zero Derivatives and Local Extrema – Rolle's Theorem – The Mean Value Theorem for Derivatives – Generalized Mean Value Theorem – Taylor's Formula with Remainder – *Derivatives of Vector – Valued Functions* – Partial Derivatives – Simple problems related to mean value theorem, Taylor's theorem and partial derivatives.

UNIT V **15 Hrs.**

The Riemann – Stieltjes Integral: Introduction – Notation – The Definition of Riemann – Stieltjes Integral – Linear Properties – I*ntegration by Parts* – Change of Variables in the Riemann – Stieltjes Integral – Reduction to a Riemann Integral.

Note :*Italics* denote Self Study Topics

TEXT BOOK

1. **Tom.M.Apostol,** *Mathematical Analysis,* Narosa Publishing House, New Delhi, 20th Reprint, 2002**.**

Unit	Chapter(s)	Section(s)
I	4	4.8 – 4.15
II	4	4.16, 4.17, 4.19 – 4.23
III	5	5.1 – 5.7 , 5.11
IV	5	5.8 – 5.10 , 5.12 – 5.14
V	7	7.1 – 7.7

REFERENCE BOOKS

1. **Robert G.Bartle** and **Donald R. Sherbert,** *Introduction to Real Analysis*, John Wiley and Sons, INC, 2nd Edition, 1994.

2. **K.S.Narayanan** and **Dr. K.Chandrasekhara Rao,** *Real Analysis,* Vol. I, S.Viswanathan Printers & Publishers Pvt.Ltd., 1st Edition, 1995.

3. **K .Viswanatha Naik.**, *Real Analysis,* Emerald Publishers, Reprint – 1992.

4. **S.C.Malik** and **Savita Arora,** *Mathematical Analysis,* Wiley Eastern Ltd., 2nd Edition, 1991.

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

SEMESTER – VI

Core – XIV

COMPLEX ANALYSIS – II

Instructional Hrs: 75 **Sub. Code: 15MSUC614/15MCUC409**

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

Objective: On successful completion of this course, the students will gain knowledge about Cauchy's theorem, singularities and residues, meromorphic functions and real definite integrals.

UNIT I **15 Hrs.**

Results based on Cauchy's theorem (I): Zeros of functions – Related integral Theorems: Cauchy's inequality – Lioville's theorem – Fundamental theorem of algebra – Maximum modulus theorem – Gauss theorem on Mean values of a harmonic function on circle – Poisson's Integral – Examples.

UNIT II **15 Hrs.**

Taylor's and Laurent's Series: Results based on Cauchy's Theorem (II) – Taylor's series – Laurent's series – Examples.

UNIT III **15 Hrs.**

Singularities and Residues: Singularities and residues – zeros – Isolated Singularities (Removable singularities, pole and essential singularity) Examples – Residues – Residue theorem – Examples.

UNIT IV **15 Hrs.**

Real definite integrals: Evaluation by calculus of residues – integration and the unit circle – integral with (–) and (+) as lower and upper limits with following integrants:

1. $f(\cos\theta, \sin\theta)$ where f is a Rational Funtion in cosθ and sinθ

2. $\frac{P(x)}{Q(x)}$ where degree of $Q(x)$Exceeds that of $P(x)$ at least by 2

3. $\sin ax.f(x), \cos ax.f(x)$, where $a > 0$ and as $f(z) \to 0$ as $z \to \theta$, $f(z)$does not have a pole on the real axis.

4. $f(x)$ where $f(z)$ has a Finite Number of Poles on the Real Axis and Examples.

UNIT V **15 Hrs.**

Meromorphic Functions: Theorem on number of zeros minus number of poles – principle of argument – Rouche's theorem –Function meromorphic in the extended plane – Examples.

Note: *Italics* denote Self Study Topics

TEXT BOOK

1. **P.Duraipandian and Kayalal Pachaiyappa**, *Complex Analysis*, S.Chand & Co., NewDelhi, 2014.

Unit	Chapter(s)	Section(s)	
I	8	8.10, 8.11, 8.13 (Examples in 8.10 & 8.11)	
II	9	9.1 – 9.4, 9.13	(Examples in 9.1 & 9.4)
III	9	9.5 – 9.12, 9.13 (Examples in 9.5 – 9.12)	
	10	10.1, 10.2	(Examples in 10.1 & 10.2)
IV	10	10.3, 10.4	(Examples in 10.3)
V	11	11.1 – 11.3	(Examples in 11.1 – 11.3)

REFERENCE BOOKS

1. **Ahlfors V Lars**, *Complex Analysis,* MCGraw – Hill International Book Company, 3rd Edition, 1979.
2. **S.Arumugam, A.Thangapandi Issac and A.Somasundaram,** *Complex Analysis,* New Gamma Publishing House, Palayamkottai, 1999.
3. **V.Karunakaran,** *Complex Analysis,* Narosa Publishing House, 2nd Edition, 2005.

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

SEMESTER – VI

Core – XV

MODERN ALGEBRA – II

Instructional Hrs. : 75 **Sub. Code: 15MSUC615/15MCUC617**

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

Objective: On successful completion of this course, the students will gain knowledge about matrices, vector spaces and linear transformations.

UNIT I **15 Hrs**

Matrices: Algebraic operations – *triangular, diagonal, scalar and unit matrices* – Transpose, adjoint and inverse of a square matrix – symmetric and skew – symmetric matrices – Hermitian and Skew – Hermitian matrices – orthogonal and unitary matrices – *rank of a matrix* – characteristic roots and characteristic vectors of a square matrix.

UNIT II **15 Hrs**

Diagonalization and Canonical forms : Diagonalization – *Orthogonal diagonalization* – Minimal polynomial – Quadratic form – Canonical form – Jordon Canonical form.

UNIT III **15 Hrs**

Vector space : Definition and examples – basic properties – Linear independence – Bases – *Dimensions.*

UNIT IV **15 Hrs**

Finite dimensional vector spaces: Homomorphisms of vector spaces – *inner product space.*

UNIT V **15 Hrs**

Linear transformations: Algebra of linear transformations – characteristic roots – *Matrices.*

Note :*Italics* denote Self Study Topics

TEXTBOOKS

1. **P.K. Nayak,** *Linear Algebra: Concepts and Applications*, Books and Allied (Pvt). Ltd, Kolkatta.2011.
2. **I.N.Herstein,** *Topics in Algebra*, Wiley IndiaPvt. Ltd., New Delhi, 2nd Edition, 2007. (Units III, IV, V)

Unit	Chapter(s)	Section(s)
I	3	3.1 - 3.6
	7	7.1,7.2.2
II	7	7.4 - 7.6
III	4	4.1, 4.2
IV	4	4.2, 4.4
V	6	6.1 - 6.3

REFERENCE BOOKS

1. **S.Arumugam and Isaac.A.T**,*Modern Algebra*, Scitech Publications (India) Pvt. Ltd, Chennai, 6th Reprint, December 2006.
2. **Surjeet Singh and Qazi Zameerunddin,***Modern Algebra*, Vikas Publishing House Pvt. Ltd., 7th Edition, Reprint 2004.
3. **M.K.Venkataraman,** *Linear Algebra***,** The National Publishing House, 1st Edition, 1999.

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

SEMESTER – VI

Elective – II

DISCRETE MATHEMATICS

Instructional Hrs: 75 **Sub. Code: 15MSUE602**

Max. Marks: CIA – 25; ESE – 75 **Credits: 3**

Objective: On successful completion of this course, the students will be able to work on Mathematical logic, Predicate calculus, Relations in Set theory, Grammars and Languages, Automata, Lattices and Boolean algebra.

UNIT I **15 Hrs.**

Mathematical Logic: Statements and Notations – Connectives: Negation – Conjunction – Disjunction – Statement formulas and Truth Tables – Conditional & Biconditional – Well – formed formulas – Tautology – Equivalence of formulas – Duality law – Tautological implications – Formulas with distinct truth tables – Functionally complete sets of connectives – *Other connectives.*

UNIT II **15 Hrs.**

Normal forms: Disjunctive, Conjunctive, Principal Disjunctive, Principal Conjunctive Normal forms. **The theory of Inference for the statement Calculus:** Validity using Truth tables – Rules of inference – Consistency of Premises and indirect method of Proof. **The predicate Calculus:** Predicates – The Statement Function, Variables & Quantifiers – Predicate Formulas – *Free & bound variables* – the Universe of discourse. **Inference Theory of the Predicate Calculus:** Valid Formulas & Equivalences – Some valid Formulas over Finite Universe – Special valid Formulas Involving Quantifiers – Theory of Inference for the Predicate calculus.

UNIT III **15 Hrs.**

Relations and Ordering: *Relations* – Properties of Binary Relations in a Set – Relation Matrix and the Graph of a Relation – Partition and Covering of a Set – Equivalence Relations – Composition of Binary Relations – Partial Ordering – Partially Ordered Set: Representation and Associated Terminology.

UNIT IV **15 Hrs.**

Grammars and Languages: *Discussion of Grammars* – Formal Definition of a Language.

Introduction to Computability Theory: Finite – state Acceptors and Regular Grammars.

UNIT V **15 Hrs.**

Lattices and Boolean Algebra: Lattices as Partially Ordered Sets: *Definition and Examples* – some properties of lattices – lattices as algebraic systems – Sublattices, Direct product and Homomorphism – Some special lattices. **Boolean algebra:** Definition and Examples – Subalgebra, Direct product and Homomorphism. **Boolean Functions:** Boolean forms and free Boolean algebras – Values of Boolean Expressions and Boolean functions. **Representation and Minimization of Boolean Functions:** Representation of Boolean functions – Minimization of Boolean functions.

Note:Italics denote Self Study Topics

TEXT BOOK

1. **J.P.Tremblay and R.Manohar,** *Discrete Mathematical Structures with applications to Computer Science*, MCGraw Hill, 1975.

Unit	Chapter(s)	Section(s)
I	1	1.1, 1.2.1 – 1.2.4, 1.2.6 – 1.2.14
II	1	1.3.1 – 1.3.4 1.4.1 – 1.4.3 1.5.1 – 1.5.5 1.6.1 – 1.6.4

III	2	2.3.1 – 2.3.5 & 2.3.7 – 2.3.9
IV	3, 6	3.3.1 – 3.3.2, 6.1
V	4	4.1.1 – 4.4.2

REFERENCE BOOK

1. **R.Sundaresan, K.S. Ganapathy Subramanian andK.Ganeshan**, *Discrete Mathematics*, A.R.Publications, 2013.

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

SEMESTER – VI

Elective Practical – Mathematical Software - III

Instructional Hrs.: 30 **Sub. Code: 16MSUEP01**

Max. Marks: ESE – 25 **Credits: 2**

Objective: The aim of this paper is to make the students understand the concepts of differentiability, continuity and analyticity of a function and to gain knowledge in solving different types of equations using Mathematical Software.

List of Practical

1) Write a program to find the following for the matrices

   (i) Sum (ii) Product (iii) Determinant (iv) Sum of the diagonal (v) 2^{nd} row of the transpose.

2) Write a program to
   (i) Find the Eigen values, Eigen vectors and Inverse of a given matrix.
   (ii) Check whether the given matrix is orthogonal.
3) Solve the system of equations by LU decomposition method.
4) Applications of cyclic group.
5) Stereographic projection.
6) Write a program to solve the given system of equations by using Gaussian Elimination method.
7) Write a program to find the zero of the function$x^2 - \sin x \; atx = \frac{\pi}{4}$.
8) Write a program to solve the first and second order differential equations.
9) Finding the derivative using the central difference formula.
10) Write a program to check whether the given function is
    (i) Continuous (ii) Differentiable (iii) Analytic.

SEMESTER – VI

Elective – III

OPERATIONS RESEARCH – II

Instructional Hrs. 75 **Sub. Code: 15MSUE603**

Max. Marks: CIA – 25; ESE – 75 **Credits: 5**

Objective: Operations Research deals mainly with mathematical modeling and formulating real life problems into mathematical models. It also provides methods of solving such models. Hence, it makes the students to apply their mathematical knowledge in modeling real life situations.

UNIT I **15 Hrs.**

Integer Programming Problems (IPPs) : Introduction – Pure and Mixed Integer Programming Problems – Gomory's All I.P.P. Method – Construction of Gomory's Constraints – Fractional Cut Method – All integer LPP – Fractional Cut Method – Mixed Integer LPP – Applications of Integer Programming (problems only).

UNIT II **15 Hrs.**

Dynamic Programming: Introduction – The Recursive Equation approach – Characteristics of Dynamic Programming – Dynamic Programming Algorithm – Solution of Discrete D.P.P (problems only).

UNIT III **15 Hrs.**

Non – Linear Programming Problems (NLPPs): Introduction – Formulating a Non – Linear Programming Problem (NLPP) – General Non – Linear Programming Problem – Constrained

Optimization with Equality Constraints – Constrained Optimization with Inequality Constraints (problems only).

UNIT IV **15 Hrs.**

Inventory Control: Introduction – Types of Inventories (problems only) – Reasons for carrying inventories – The inventory decisions – Objectives of Scientific inventory control – Costs associated with inventories – Factors Affecting Inventory control – Problems of EOQ with Price breaks.

UNIT V **15 Hrs.**

Queueing Theory: Introduction – Queueing System – Elements of a Queueing System – Operating Characteristics of a Queueing System – Deterministic Queueing System – Probability Distributions in Queueing Systems – Classification of Queueing Model – Definition of Transient and steady states – Poisson Queueing Systems (Model I,II,III,IV,V – problems only).

Note :*Italics* denote Self Study Topics

TEXT BOOK

1. **P.K. Kanti Swarup, Gupta and Man Mohan,** *Operations Research,* Sultan Chand & Sons, 2014.

Unit	Chapter(s)	Section(s)
I	7	7.1 – 7.6, 7.8
II	13	13.1 – 13.5
III	27	27.1 – 27.5
IV	19	19.1 – 19.12
V	21	21.1 – 21.9

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

SEMESTER – VI

SKILL BASED SUBJECT – IV

NUMERICAL METHODS – II

Instructional Hrs. 45 **Sub. Code: 15MSUS604**

Max. Marks: CIA – 25; ESE – 75 **Credits: 3**

Objective: To understand the concepts of numerical interpolations, central difference interpolation formulae, numerical differentiation and numerical integration.

UNIT I **9 Hrs.**

Interpolation: Introduction – Linear interpolation – Gregory – Newton forward interpolation formula – Gregory – *Newton backward interpolation formula*. Equidistant with one or more missing values. (Problems only)

UNIT II **9 Hrs.**

Central differences and Interpolation formula: Central differences – Interpolation formula – Central difference tables – Gauss's forward interpolation formula – Gauss's backward interpolation formula – stirling's formula – *Bessel's formula.* (Problems only)

UNIT III **9 Hrs.**

Divided differences : Properties of divided differences – *Newton's interpolation formula for unequal intervals* – Lagrange's interpolation formula. (Problems only)

UNIT IV **9 Hrs.**

Numerical differentiation: Introduction – Newton's forward difference formula to compute the derivatives – Newton's backward difference formula to compute the derivatives – Derivatives using Stirling's formula – *Maxima and Minima of tabulated function.* (Problems only)

UNIT V **9 Hrs.**

Numerical Integration – The trapezoidal rule – Romberg's method – *Simpson's rule*. (Problems only)

TEXT BOOK

1. **M.K.Venkataraman** , *Numerical Methods in Science and Engineering,* NPC ,1990,

Unit	Chapter(s)	Section(s)
I	6	1 – 5
II	7	1 – 6
III	9	1 – 6
IV	9	1 – 4, 6
V	9	8 – 10

REFERENE BOOKS

1. **S.C.Chapra and P.C.Raymond,** *Numerical Methods for Engineers,* Tata McGraw – Hill, 2000.
2. **P.Kandasamy, K.Thilagavathy and K.Gunavathi,** *Numerical Methods***,**S.Chand & Company Ltd., 2007.
3. **S.S.Sastry,** *Introductory Methods to Numerical Analysis,* Prentice Hall of India, 1998.

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

SEMESTER – III

PART III – ALLIED

ALLIED MATHEMATICS– PAPER I

(for Physics & Chemistry)

Instructional Hrs. : 75Sub. Code :16MSUA301

Max Marks : CIA – 20; ESE - 55 **Credits : 4**

Objective: On successful completion of this course, the students will gain knowledge about

differenttypes of series, solving ordinary and partial differential equations and Laplace transformations.

UNIT I **15 Hrs.**

Algebra: Binomial, Exponential and *Logarithmic Series* – Approximations obtained by Binomial Theorem – Summation related to Binomial, Exponential andLogarithmic 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 LinearPartial Differential Equation $Pp + Qq = R$(Problems only).

UNIT IV **15 Hrs.**

Laplace Transformation: Definition – Laplace Transform ofe^{at} *, cosat, sinat, coshat, sinhat,*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 inculcatethe mathematical concepts through Free Math open software SAGE Math.

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. : 75Sub. Code :16MSUA402

Max Marks : CIA - 20; ESE - 55 **Credits : 4**

Objective: On successful completion of this course, the students will gain knowledge about differentiation, integration, Fourier Series, 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 2π– *Odd and Even Functions* (Problems only).

UNIT V 15 Hrs.

Trigonometry: Applications of Demoivre's Theorem –$cosn\theta$, $sinn\theta$, $tann\theta$– Expansions of $cosn\theta$,$sinn\theta$– 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 Unit II & III)
3) **A.Singaravelu,** *Allied Mathematics,* A.R.S. Publications, Fourth Revised Edition – August 2013. (For Unit IV & V)

Chapter	**Page no.**
7	7.193 – 7.244
6	6.42 – 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

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

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 inculcatethe mathematical concepts through

Free Math open software Octave.

Plotting, labelling and naming two and three dimensional graphs with different line styles

1) Finding the equation of straight line for the given co-ordinates
2) Evaluating $\frac{f(x)}{g(x)h(x)}$, where *f, g* and *h* are polynomial functions in some interval and plotting its graph
3) Finding the curvature of the given curve
4) Evaluating A.P and G.P series
5) Evaluating the sum of squares of *'n'* numbers
6) Plotting the projection in the *XY, YZ, ZX* planes for $x(t)=\cos(t),\ y(t)=\sin(t),\ z(t)=t$
7) Solving a system of linear equations with four unknowns and four equations
8) 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 – *depriciation* – 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 ofSeasonal 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,** S*tatistics Theory and Practice , S*ultan 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).

SEMESTER – III

NON MAJOR ELECTIVE – I

VEDIC MATHEMATICS – I

Instructional Hrs. : 30 **Sub. Code : 15MSUN301**

Max. Marks : ESE – 100 **Credits: 2**

Objective: To teach shortcut methods in Mathematics to non-Mathematics students.

Unit I

Arithmetical Computations: Multiplication – Practical Application in Compound Multiplication – *Division.*

Unit II

Factorisation: Factorisation of Simple Quadratics – Harder Quadratics– *Cubics.*

Unit III

Solving simple Equations: Simple equations (First Principles) – Simple equations (by *Sunyam*).

Unit IV

Solving Equations: Quadratic Equations – *Cubic Equations.*

Unit V

Calculus: Factorisation and Differential Equations – *Integration by Partial Fractions.*

Note :*Italics* denote Self Study Topics

TEXT BOOK

1. **Bharati Krsna Tirthaji Maharaja ,***Vedic Mathematics,* Motilal Banarsidas Publishers Private Limited, Reprint 2003, Delhi.

Unit	**Chapter(s)**
I	3,4 & 5
II	7,8 & 9
III	11 & 12
IV	17 & 18
V	22 & 24

REFERENCE BOOK

1. **Dr.A.Kumar,** *Vedic Mathematics Sutra,* Upkar Prakashan, Agra.

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

SEMESTER – IV

NON – MAJOR ELECTIVE II

STATISTICAL PACKAGE

(Theory and Practical)

Instructional Hrs. : 30 **Sub. Code : 09MSUN402**

Max. Marks : ESE – 100 **Credits: 2**

UNIT I **6 Hrs.**

Introduction: Meaning of Statistics – Definition of Statistics (As Data) – Collection of Data – Classification – Tabulation.

UNIT II **6 Hrs.**

Diagrammatic and Graphical presentation: Diagrammatic Representation – Graphic Presentation.

UNIT III **6 Hrs.**

Measures of Central Tendency: Arithmetic Mean, Median, Mode – Measures of Dispersion – Range – Mean Deviation – Standard Deviation – Coefficient of Variation.

UNIT IV **6 Hrs.**

Correlation: Karl Pearson's Coefficient of Correlation – Spearman's Rank Correlation – Regression – Normal Equations – Regression Equation of X on Y and Y on X.

UNIT V **6 Hrs.**

Practical using SPSS (statistical package for social sciences) software package:

1. Data
    - Insert variables
2. Analyze
    - Descriptive statistics
    - Compare means
    - Correlation
    - Regression
    - Non – parametric tests
3. Graphs.

Note :*Italics* denote Self Study Topics

TEXT BOOK

1. **R.S.N.Pillai and V. Bhagavathi,***Statistics*, S.Chand & Company Ltd., New Delhi, 2nd Edition, 2003.

    UNIT I – p.3 – 6, 31 – 41, 56 – 83.

    UNIT II – p. 84 – 120

    UNIT III – p. 124 – 159, 170 – 178, 234 – 235, 240 – 282.

    UNIT IV – p. 370 – 393, 437 – 486.

    UNIT V – SPSS software package.

REFERENCE BOOKS

1. **B.M. Aggarwal,** *Business Mathematics and Statistics Fundamentals***,** Sultan Chand & Sons, New Delhi, 1st Edition, 2003.
2. **PA. Navnitham,** *Business Mathematics and Statistics*, Jai Publishers, Trichy, 2012.
3. **P.R. Vittal,***Business Statistics and Operations Research*, Margham Publications, Chennai, 3rd Edition, 2004.

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

SELF LEARNING PAPER – I

ASTRONOMY

Sub. Code : 13MSUSL02

Max. Marks : ESE – 100 **Credits: 5**

Objective: The aim of having this paper as a self learning subject is to make the interested students to know about the planets, telescopes and different observatories.

Unit I

Introduction – Telescopes – Binoculars – The Solar System – The Sun – The Moon.

Unit II

Planets – The Inner Planets – The Outer Planets – Comets, Meteors and Meteorites.

Unit III

Eclipses and Occultation – Eclipses and Occultation – Heavenly Lights

Unit IV

The Stars – Nebulae – Galaxies

Unit V

Professional Observatories – Amateur Observatories – Making your own Observatory – Recording Observations – Astrophotography – Making a simple Astrophotography Mount.

TEXT BOOK

1. **Brian Jones**,*The Beginner's guide to Astronomy,* Artists House, London 1991.

Unit I – p.7 – 21.

Unit II – p.22 – 27.

Unit III – p.28 – 31.

Unit IV– p.32 – 47.

Unit V – p.96 – 107.

REFERENCE BOOKS

1. S.Kumaravelu and **Susheela Kumaravelu,** *Astronomy,* 1995.

2. Patrick Moore, *The Guinness Book of Astronomy,* Guinness Superlatives Limited, 2nd Edition, 1983.

3. Valerie Illingworth, *Macmillan Dictionary of Astronomy*, Macmillan Press, London, 2nd Edition, 1985.

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