P.K.R. ARTS COLLEGE FOR WOMEN (AUTONOMOUS)

(Accredited with 'A' grade by NAAC - Affiliated to Bharathiar University, Coimbatore)

GOBICHETTIPALAYAM – 638 476

DEPARTMENT OF MATHEMATICS

BACHELOR OF SCIENCE IN MATHEMATICS

Syllabus

For the candidates admitted from the Academic Year 2017-2018 and onwards

Under CBCS PATTERN

BACHELOR OF SCIENCE - MATHEMATICS

Course Scheme and Scheme of Examinations

(For students admitted from 2017-2018 and onwards)

Part	Category	Course Code	Title of the Course	Contact Hrs/ week	Exam Duration Hrs.	Max.Marks			Credits
						CIA	ESE	Total	
SEMESTER-I								
I	Language: I	17LTU01/ 17LFU01/ 17LKU01/	Tamil- I/ French-I/ Kannada-I	6	3	25	75	100	4
II	English: I	17LEU01	English- I	6	3	25	75	100	4
III	Core: I	17MAU01	Classical Algebra	4	3	25	75	100	4
III	Core :II	17MAU02	Calculus	5	3	25	75	100	5
III	Allied : I	17MAU03	Physics – I	4	3	25	75	100	4
III	Allied Practical	17MAU04	Physics	3	-	-	-	-	-
IV	Foundation Course: I	17FCU01	Environmental studies	2	3	-	50	50	2
			TOTAL	30				550	23
SEMESTER-II								
I	Language: II	17LTU02/ 17LFU02/ 17LKU02/	Tamil- II/ French-II/ Kannada-II	6	3	25	75	100	4
II	English: II	17LEU02	English- II	6	3	25	75	100	4
III	Core: III	17MAU05	Analytical Geometry	5	3	25	75	100	4

III	Core : IV	17MAU06	Differential Equations and Laplace transforms	4	3	25	75	100	3
III	Allied : I	17MAU07	Physics - II	4	3	25	75	100	4
III	Allied Practical: I	17MAU04	Physics	3	3	40	60	100	3
IV	Foundation Course : II	17FCU02	Yoga & Value Education	2	3	-	50	50	2
			TOTAL	30				650	24

SEMESTER-III

I	Language: III	17LTU03/ 17LFU03/ 17LKU03/	Tamil- III/ French-III / Kannada-III	6	3	25	75	100	4
II	English: III	17LEU03	English- III	6	3	25	75	100	4
III	Core : V	17MAU08	Statics	3	3	25	75	100	3
III	Core : VI	17MAU09	Trigonometry, Vector Calculus and Fourier Series	3	3	25	75	100	3
III	Core : VII	17MAU10	Comprehension in Mathematics – I (Online Exam)	-	$1\frac{1}{2}$	-	50	50	1
III	Allied : II	17MAU11	Statistics - I	5	3	25	75	100	3
IV	Skill Enhancement course : I	17SEU01	Information Security	2	3	100	-	100	2

IV	Non - Major Elective - I	17NMU01A/ 17NMU01B	Indian Women and society / Basic Tamil	2	3	-	50	50	2
IV	Non - Major Elective - II	17NMU02A/ 17NMU02B	Career Enhancement / Consumer Rights (Online Exam)	3	-	-	-	-	-
			TOTAL	30				700	22
SEMESTER - IV									
I	Language: IV	17LTU04/ 17LFU04/ 17LKU04/	Tamil- IV/ French-IV/ Kannada-IV	6	3	25	75	100	4
II	English: IV	17LEU04	English - IV	6	3	25	75	100	4
III	Core : VIII	17MAU12	Dynamics	3	3	25	75	100	3
III	Core : IX	17MAU13	Numerical Methods	5	3	25	75	100	4
III	Core : X	17MAU14	Comprehension in Mathematics – II (Online Exam)	-	$1\frac{1}{2}$	-	50	50	1
III	Allied : II	17MAU15	Statistics - II	5	3	25	75	100	3
IV	Skill Enhancement course : II	17SEUMA2	Basics of Internet - **Practical**	2	3	40	60	100	2
IV	Non - Major Elective - II	17NMU02A/ 17NMU02B	Career Enhancement / Consumer Rights (Online Exam)	3	$1\frac{1}{2}$	50	-	50	2
			TOTAL	30				700	23

			SEMESTER – V						
III	Core : XI	17MAU16	Abstract Algebra	7	3	25	75	100	5
III	Core : XII	17MAU17	Real Analysis - I	6	3	25	75	100	5
III	Core : XIII	17MAU18	Complex Analysis - I	7	3	25	75	100	6
III	Core : XIV	17MAU19	Comprehension in Mathematics – III (Online Exam) (Self-Study)	-	$1\frac{1}{2}$	-	50	50	1
III	Core Optional : XV	***	Core Optional	3	3	25	75	100	3
V	Proficiency Enhancement (Self Study)	17PEUMA1	Financial Mathematics	-	3	100	-	100	2
III	Core : XVI	17MAU20	Institutional Training	-	3	100	-	100	1
III	Elective : 1	17MAU21A/ 17MAU21B	Operations Research-I/ Discrete Mathematics - I	5	3	25	75	100	4
IV	Skill Enhancement course: III	17SEUMA3	Web Programming HTML and PHP - Practical	2	3	40	60	100	2
			TOTAL	30				850	29
			SEMESTER – VI						
III	Core : XVII	17MAU22	Linear Algebra	6	3	25	75	100	5
III	Core : XVIII	17MAU23	Real Analysis - II	6	3	25	75	100	5
III	Core : XIX	17MAU24	Complex Analysis – II	6	3	25	75	100	6
III	Core : XX	17MAU25	Comprehension in Mathematics - IV (Online Exam)	-	$1\frac{1}{2}$	-	50	50	1
III	Elective : II	17MAU26A/ 17MAU26B	Operations Research –II/ Discrete Mathematics - II	5	3	25	75	100	4

III	Elective : III	17MAU27A/ 17MAU27B	Latex / Graph Theory	5	3	25	75	100	4
IV	Skill Enhancement course : IV	17SEUMA4	Latex– **Practical**	2	3	40	60	100	2
			TOTAL	30				650	27
V	Extension Activity		NSS / YRC / RRC / CCC / PHYSICAL EDUCATION	II – VI SEMESTER					1
			Department Extension Activity	II – VI SEMESTER					1
			Total Marks - 4100 Total credit - 150						150

R. Jan 15|10|22

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DEPARTMENT OF MATHEMATICS

I SEMESTER

CLASSICAL ALGEBRA	CATEGORY	L	P	CREDIT
	CORE	48	-	4

Preamble

To enable the students to learn about the convergence and divergence of the series and to find the roots for the different types of the equations.

Course Outcomes

On the successful completion of the course, students will be able to

CO NUMBER	CO STATEMENT	KNOWLEDGE LEVEL
CO1	understand the concept of Binomial and Exponential theorems, Convergency and Divergency of series, and multiple roots of an equation.	K_2
CO2	gain the knowledge about the concept of sequence, series and Theory of equations.	K_1
CO3	identify the concept of convergence and divergence through different types of test.	K_4
CO4	learn how to use reciprocals and transformations to solve equations.	$K_{2 \, \& \, 3}$
CO5	evaluate the problems by using Newton's and Horner's method and by different types of test.	K_5

UNIT I: Binomial and Exponential Theorems   **(10 Hours)**

        Binomial & exponential theorems (statements only)-their immediate application to summation and approximation only.

UNIT II: Logarithmic Series   **(10 Hours)**

        Logarithmic series theorem - Statement and proof - Immediate application to summation and approximation only. Convergency and divergency of series –Definitions, Elementary results- Comparison tests-De Alemberts and Cauchy's tests.

UNIT III: Convergence and Divergence of Series   **(10 Hours)**

        Absolute convergence- series of positive terms-Cauchy's condensation test-Raabe's test.

UNIT IV: Theory of Equations   **(10 Hours)**

        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: Multiple Roots   **(8 Hours)**

        Multiple roots-Roll's theorem -position of real roots of $f(x) = 0$ - Newton's method of approximation to a root –Horner's method.

TEXT BOOK

        Manicavachagam Pillai,T.K., Natarajan.T,Ganapathy.K.S. (2013)– "Algebra", S. Viswanatham Printers & Publishers Private Ltd.

Unit - I	Chapter III	Page: 99-152
	Chapter IV	Page: 188-212
Unit – II	Chapter IV	Page: 213-245
	Chapter II	Page: 20-72
Unit –III	Chapter II	Page: 73-89
Unit -IV&V	Chapter VI	Page: 282-382

REFERENCE BOOKS

1. Kandasamy.P. Thilagavathy .K (2004) – " Mathematics for B.Sc. Branch I -Vol. I. (For B.Sc -I semester) S. Chand and Company Ltd, New Delhi.

2. Bali.N.P. – " Algebra" - Laxmi publications.

CALCULUS	CATEGORY	L	P	CREDIT
	CORE	48	-	5

Preamble

To enable the students to learn and gain knowledge about curvatures, integrations and its geometrical applications.

Course Outcomes

On the successful completion of the course, students will be able to

CO NUMBER	CO STATEMENT	KNOWLEDGE LEVEL
CO1	gain the idea of curvature & integrals	K_1 **&** K_2
CO2	apply integration to compute arc lengths, volumes of revolution and surface areas of revolution.	K_3
CO3	determine convergence / divergence of improper integrals.	K_4
CO4	evaluate double and triple integrals by using Beta and Gama functions.	K_5

UNIT I: Curvature   **(10 Hours)**

Curvature-Radius of curvature in Cartesian and polar forms-Evolutes and envelopes-Pedal equations-Total differentiation-Euler''s theorem on homogeneous functions.

UNIT II: Integration   **(10 Hours)**

Integration of $f''(x)/f(x)$, $f''(x)\sqrt{f(x)}$,(px+q)/$\sqrt{(ax2+bx+c)}$], [$\sqrt{(x-a)/(b-x)}$], [$\sqrt{(x-a)(b-x)}$,1/[$\sqrt{(x-a)(b-x)}$,1/(acosx+bsinx+c), 1/(acos2x+bsin2x+c),Integration by parts.

UNIT III: Double and Triple Integral   **(10 Hours)**

Reduction formulae-problems-Evaluation of double and triple integrals-Applications to calculations of areas and volumes-Areas in polar coordinates.

UNIT IV: Change of order of integration   **(10 Hours)**

Change of order of integration in double integral-Jacobions-Change of variables in double and triple integrals.

UNIT V: Multiple Integrals   **(8 Hours)**

Beta and Gamma integrals-their properties, relation between them-Evaluation of multiple integrals using Beta and Gamma functions.

TEXT BOOK

Narayanan.S. and Manicavachasam Pillai.T.K (2013) – " Calculus vol 1 and vol 2"- Viswanathan Publishers.

Vol – I	Unit - I	Chapter X	Page: 280 - 323
Vol – II	Unit – II	Chapter I	Page: 1 - 79
Vol – II	Unit –III	Chapter I	Page: 79-97
		Chapter V	Page: 213 – 243
Vol – II	Unit -IV	Chapter VI	Page: 204 – 210
		Chapter VI	Page: 251-269
Vol – II	Unit – V	Chapter VII	Page: 278-300

REFERENCE BOOK

Kandasamy. P & Thilagavathy (2004) - " Mathematics for B.Sc –Vol I and. II", S.Chand and Co.

ANALYTICAL	CATEGORY	L	P	CREDIT
GEOMETRY	CORE	60	-	4

Preamble

To enable the students to learn and visualize the fundamental ideas about co-ordinate geometry.

Course Outcomes

On the successful completion of the course, students will be able to

CO NUMBER	CO STATEMENT	KNOWLEDGE LEVEL
CO1	understand the concepts of conic,Straight line,Sphere, cone and cylinder	K_1 & K_2
CO2	to apply the concepts of analytic geometry to technical problems	K_3 & K_4
CO3	translate descriptive problems into mathematical formulae and solve them	K_2 & K_5
CO4	describe mathematical ideas from cone, cylinder, sphere and conic	K_1 & K_4
CO5	evaluate the nature of geometrical coordinates	K_5

UNIT I: Conic   **(10 Hours)**

Polar coordinates equation of a conic - Directrix-chord- Tangent-normal- Simple problems.

UNIT II: Straight Lines   **(14 Hours)**

Straight lines - Coplanarity of straight-line-Shortest distance (S.D) and equation of S.D between two lines-Simple problems.

UNIT III: Sphere   **(12 Hours)**

Sphere-Standard equation of sphere-Results based on the properties of a sphere-Tangent plane to a sphere- Equation of a circle.

UNIT IV: Cone and Cylinder   **(12 Hours)**

       Cone whose vertex is at the origin- Envelope cone of a sphere - Right circular cone-Equation of a cylinder- Right circular cylinder.

UNIT V: Conicoides   **(12 Hours)**

       Nature of a conicoid- Standard equation of central conicoid –Enveloping cone tangent plane- Condition for tangency – Director Sphere- Director plane.

Note: Distribution of Marks: Theory 20% Problem 80%.

TEXT BOOKS

1. DuraiPandian.P & others (1989) – ''Analytical Geometry'', Emerald Publishers,135 Anna Salai,Madras – 600 002.

2. Manickavasagam Pillai.T. K. and Natarajan.T, (2011) - ''Analytical Geometry of 2D'' , S. Viswanathan Printers and Publishers Pvt. Ltd, Chennai.

Unit - I	Book - 2	Chapter VI	Section - 1 - Page : 162 only
		Chapter IX	Page: 325-330 Results without proof
			& Page 331-363
Unit – II	Book - 1	Chapter IV	Section 4.1-4.9
Unit – III	Book - 1	Chapter V	Section 5.1-5.8
Unit – IV	Book - 1	Chapter V I	Section 6.1-6.7
Unit - V	Book - 1	Chapter VI	Section 6.9-6.11

REFERENCE BOOK

   Bali.N.P.(1991) – ''Solid Geometry'', Laxmi Publications (P) Ltd.

DIFFERENTIAL EQUATIONS AND LAPLACE TRANSFORMS	CATEGORY	L	P	CREDIT
	CORE	48	-	3

Preamble

To enable the students to learn the method of solving Differential Equations.

Course Outcomes

On the successful completion of the course, students will be able to

CO NUMBER	CO STATEMENT	KNOWLEDGE LEVEL
CO1	understand the basic concepts and recognize certain basic types of first order ODE, PDE,laplace and inverse laplace transforms.	K_1 ,K_2 & K_4
CO2	evaluate the general and complete solutions for second order linear ODEs with constant coefficients	K_5
CO3	apply laplace and inverse laplace transforms to compute solutions of second order linear differential equations	K_3

UNIT I: Ordinary Differential Equations (8 Hours)

Equations of First Order and of Degree Higher than one – Solvable for p, x, y – Clairaut's Equation.

UNIT II: Linear Differential Equations (10 Hours)

Finding the solution of second and higher order with constant coefficients with Right Hand Side is of the form Ve^{ax} where V is a function of x – Euler's Homogeneous Linear Differential Equations- Methods of variation of parameters.

14

UNIT III: Partial Differential Equations   **(10 Hours)**

       Formation of equations by eliminating arbitrary constants and arbitrary functions – Solutions of P.D Equations – Solutions of Partial Differential Equations by direct integration – Methods to solve the first order P.D. Equations in the standard forms - Lagrange's Linear Equations.

UNIT IV: Laplace Transforms   **(10 Hours)**

      Definition – Laplace Transforms of standard functions – Linearity property – First Shifting Theorem – Transform of *tf(t), , f́(t), f̋(t)*.

UNIT V: Inverse Laplace Transforms   **(10 Hours)**

       Inverse Laplace Transforms – Applications to solutions of First Order and Second Order Differential Equations with constant coefficients.

Note: Distribution of Marks: Theory 20%   Problem 80%.

TEXTBOOK

   Kandasamy. P, Thilagavathi. K (2004) "Mathematics for B.Sc– Volume III", S. Chand and Company Ltd,New Delhi.

Unit - I	Chapter I	Page: 1-15
Unit – II	Chapter II ,IV,V	Page: 16-40, 48-65
Unit - III	Chapter I	Page: 117 – 142, 150 – 162
Unit - IV	Chapter I	Page: 187-202
Unit - V	Chapter I	Page: 202-246

REFERENCE BOOK

     Narayanan. S and Manicavachagom Pillai. T. K.(1991) - " Calculus" , S. Viswanathan (Printers and Publishers) Pvt. Ltd, Chennai.

CATEGORY	COURSE CODE	TITLE OF THE COURSE	C	P	CREDIT
CORE	17MAU08	STATICS	36	-	3

Preamble

To enable the students to realize the nature of parallel forces, resultant forces and coplanar forces.

Course Outcomes

On the successful completion of the course, students will be able to

CO NUMBER	CO STATEMENT	KNOWLEDGE LEVEL
CO1	understand the concept of forces acting on a body	K_2
CO2	gain the knowledge about parallel forces,coplanar forces,moment of a force, couple and conditions of equilibrium of forces.	K_1
CO3	analyze problems in a systematic and logical manner and to evaluate resultant of a couple and force.	$K_{4\&}\ K_5$
CO4	apply the triangle law, parallelogram law and polygon law of forces to find the resultant force.	$K_{3\ \&}\ K_5$
CO5	construct free-body diagrams and to calculate the reactions necessary to ensure static equilibrium.	K_5

UNIT I: FORCES ACTING AT A POINT   **(7 Hours)**

Parallelogram law-triangle law –Converse of Triangle Law-Polygon Law of Forces-Lami's Theorem.

UNIT II: RESOLUTION OF FORCES   **(7 Hours)**

(λ,μ) theorem –Resolution of forces- Components of a force- Resultant of any number of forces acting at a point- Conditions of equilibrium.

UNIT III: PARALLEL FORCES AND MOMENTS   **(8 Hours)**

       Parallel Forces – Moments- Varignon's Thorem of moments- Generalised theorem of moments-Couples- Equilibrium of two couples-Equivalence of two couples-Resultant of a couple and a force .

UNIT IV: COPLANAR FORCES   **(7 Hours)**

       Coplanar forces acting on a rigid body- Theorem on three co-planar forces- Reduction of coplanar forces- Equation to the line of action of the resultant

UNIT V: CATENARY   **(7 Hours)**

       Equilibrium of strings and chains – Equation of the common catenary – Definitions – Tension at any point – Geometrical properties of the common catenary.

TEXT BOOK

Venkataraman M.K., (2005) – "Statics", Eleventh edition, Agasthiar Publications, Trichy.

Unit	Chapter	Page
I	II	06-26
II	II	28-33,36-41, 43-50
III	III IV	52-75 84-87, 91-97
IV	V VI	98 & 99 143-167
V	XI	375-391

REFERENCE BOOKS

1. Dharmapadam A.V.(2011) –" Statics" , S.Viswanathan Printers and Publishing Pvt., Ltd.

2. Duraipandian. P. and Laxmi Duraipandian(1988) –" Mechanics" , S.Chand and Company Ltd, Ram Nagar, New Delhi -55.

3.Prof.Khanna.M.L.(1995) –" Statics" , Fifteenth edition,Jai Prakash Nath & Co., Meerut.

CATEGORY	COURSE CODE	TITLE OF THE COURSE	C	P	CREDIT
CORE	17MAU09	TRIGONOMETRY, VECTOR CALCULUS AND FOURIER SERIES	36	-	3

Preamble

To enable the students to gain knowledge about expansion in series of trigonometric functions and its applications ,vector field and Fourier series.

Course Outcomes

On the successful completion of the course, students will be able to

CO NUMBER	CO STATEMENT	KNOWLEDGE LEVEL
CO1	gain the knowledge about the series	K_2
CO2	gain the knowledge about summation of series and Logarithm of complex quantities.	K_1
CO3	apply the concept of Scalar and vector fields to find the magnitude and direction.	K_3
CO4	analyze how to use line & surface integral.	K_4
CO5	evaluate the problems by using Gauss divergence theorem, Strokes theorem and Periodic functions.	K_5

UNIT I: EXPANSION IN SERIES   (8 Hours)

Expansion in Series – Expansion of $\cos^n\theta$, $\sin^n\theta$, in a series of cosines and sines of multiples of θ – Expansions of $\cos n\theta$ and $\sin n\theta$ in powers of sines and cosines – Expansion of $\sin\theta$, $\cos\theta$ and $\tan\theta$ in powers of θ.

UNIT II: SUMMATION OF SERIES   (7 Hours)

Logarithm of complex quantities - Summation of series – C + iS method of summation- Exponential series-Trigonometric and Hyperbolic series- Gregory's series .

UNIT III: DIFFERENTIATION OF VECTORS   (7 Hours)

Scalar and vector fields –Differentiation of vectors – Gradient, Divergence and Curl.

UNIT IV: INTEGRATION OF VECTORS   **(7 Hours)**

Integration of vectors – Line integral – Surface integral – Green's theorem in the plane – Gauss divergence theorem – Strokes theorem – (Statements only) - Verification of the above said theorems.

UNIT V: FOURIER SERIES   **(7 Hours)**

Periodic functions – Fourier series of periodicity 2π – Even and Odd functions - Half range series.

TEXT BOOK:

Kandasamy. P, Thilagavathi. K - " Mathematics for B.Sc. Branch I", Volume I, II (2004) and Volume IV(2005), S.Chand and Company Ltd, New Delhi.

UNIT	VOLUME	CHAPTER	PAGE NUMBER
I	I	II	122 – 139
II	II	I	242 – 247
		II	248 – 276
III	IV	I	1-7
		II	8-23
IV	IV	III	24 – 92
V	IV	I	93-145

REFERENCE BOOKS:

1. Manichavasagam Pillai T.K and Narayanan S.(2012) - " Trigonometry " , Viswanathan Publishers and Printers Pvt. Ltd.

1. Manichavasagam Pillai T.K and Narayanan S., Hanumantha Rao (2011) –
 " Ancillary Mathematics", Volume II, Viswanathan Publishers and Printers Pvt. Ltd.

CATEGORY	COURSE CODE	TITLE OF THE COURSE	C	P	CREDIT
ALLIED	17MAU11	STATISTICS - I	60	-	3

Preamble

To enable the students to understand mathematical aspects of statistics

Course Outcomes

On the successful completion of the course, students will be able to

CO NUMBER	CO STATEMENT	KNOWLEDGE LEVEL
CO1	understand the basic concepts of one dimensional and two dimensional random variables, probability distribution functions and moments.	$K_1 \& K_2$
CO2	analyze and apply the concept of mathematical expectations, probability distributions, transformation of variables in real life problems.	$K_3 \& K_4$
CO3	analyze the properties of binomial, Poisson, normal distributions.	K_4
CO4	evaluate the coefficient of correlation and regression.	K_5
CO5	solve the problems based on different types of distributions.	K_5

UNIT I : RANDOM VARIABLES   (12 Hours)

Random variables - Discrete and continuous random variables - Distribution function -Properties - Probability mass function, probability density function - Simple problems.

UNIT II :   MATHEMATICAL EXPECTATION   (12 Hours)

Mathematical expectation- Addition and multiplication theorems on expectations - Moment generating and cumulating generating and characteristic functions and their properties.

UNIT III : TRANSFORMATION OF VARIABLES   (12 Hours)

Joint probability distributions - Marginal and conditional probability distributions- independence of random variables - Transformation of variables (one and two dimensional only)- Tchebychev's inequality.

UNIT IV : PROBABILITY DISTRIBUTIONS   **(14 Hours)**

Binomial, Poisson and Normal distributions and their properties

UNIT V: CORRELATION AND REGRESSION ANALYSIS   **(10 Hours)**

CORRELATION: Meaning - Definition –Scatter diagram, Karl Pearson's co-efficient of correlation, Spearman's Rank correlation, advantages and limitations of correlation.

REGRESSION ANALYSIS: Meaning of regression and linear prediction – Regression in two variables – Uses of regression.

TEXT BOOK:

1.Guptha, S.C & Kapoor, V.K.,(2007) "Fundamentals of Mathematical statistics", Sultan Chand & Sons, New Delhi.

UNIT	CHAPTER	SECTION	PAGE
I	V	5.1 – 5.4	5.1 – 5.31
II	VI, VII	6.1 – 6.5, 7.1 – 7.3	6.1 – 6.10, 7.1 – 7.14
III	V, VII	5.5 – 5.7, 7.5	5.32-5.60, 7.24 – 7.26
IV	VIII, IX	8.4 – 8.5, 9.2	8.4 – 8.19, 8.28 – 8.35, 9.3 – 9.10

2.Navnitham. PA.(2012) - **"**Business Mathematics and Statistics**"**, Jai publishers, Trichy.

UNIT	CHAPTER	SECTION	PAGE
V	XII & XIII	-	503-554

REFERENCE BOOKS

1. Guptha ,C.B and Vijay Guptha.,(2008) "Introduction to Statistical methods", Vikas Publishing house Pvt,Ltd.

2. Guptha, S.P. (2014), "Statistical methods", Sultan Chand & Sons,.

CATEGORY	COURSE CODE	TITLE OF THE COURSE	C	P	CREDIT
SKILL ENHANCEMENT	17SEU01	INFORMATION SECURITY	24	-	2

Preamble

To learn about the basics of Information Security.

Course Outcomes

On the successful completion of the course, students will be able to:

CO Number	CO Statement	Knowledge Level
CO1	Obtain fundamental knowledge of Information Security	K1,K2
CO2	Learn basic concepts of Risks in Information Security	K1,K2
CO3	Familiarize the ideas of security planning and policies	K2,K3
CO4	Understand with Privacy and Ethical Issues in Information Security	K3,K4
CO5	Learn about Cryptography	K4, K5

UNIT – I: INTRODUCTION TO INFORMATION SECURITY   (5 HOURS)

Information Security: Principles, Concepts and definitions - The need for Information Security - Benefits of information security. The Security Problem in Computing: The meaning of computer Security - Computer Criminals.

UNIT – II: INFORMATION RISK   (5 HOURS)

Information Risk: Threats and vulnerabilities of Information systems – Introduction to Risk management. Information security management Policy, standards and procedures.

UNIT – III: SECURITY PLANNING   (5 HOURS)

Administering Security: Security planning - Security planning team members - Assuring Commitment to a security plan - Business Continuity Plan - Incident response plan - Organizational Security policies, Physical Security.

UNIT – IV: PRIVACY AND ETHICAL ISSUES IN INFORMATION SECURITY

(5 HOURS)

Legal Privacy and Ethical Issues in Information Security: Protecting Programs and data - Information and the law - Rights of Employees and Employers - Software failures - Computer Crime - Ethical issues in Information Security.

UNIT – V: CRYPTOGRAPHY **(4 HOURS)**

Cryptography: Introduction to Cryptography - What is Cryptography – Plain text – Cipher text – Substitution Ciphers - Transposition Ciphers.

TEXT BOOK:

Sumitra Kisan and D.Chandrasekhar Rao,Information Security Lecture Notes, Department of Computer Science and Engineering & Information Technology, Veer Surendra Sai University of Technology (Formerly UCE,   Burla) urla, Sambalpur, Odisha .

REFERENCE BOOK:

Andy Taylor (Editor) ,David Alexander, Amanda Finch & David Sutton, Information Security Management Principles An ISEB Certificate , The British Computer Society. 2008

CATEGORY	COURSE CODE	TITLE OF THE COURSE	C	P	CREDIT
NON- MAJOR ELECTIVE	17NMU01A	INDIAN WOMEN AND SOCIETY	24	-	2

Preamble

To familiarize students with the specific cultural contexts of women in India.

Course Outcomes

On the successful completion of the course, students will be able to:

CO Number	CO Statement	Knowledge Level
CO1	Demonstrate knowledge of the history of women's studies as an academic discipline	K1,K2
CO2	Analyze the various roles of women and the challenges faced by them in the society	K3
CO3	Assimilate and evaluate the importance of women health	K3,K5
CO4	Identify the different issues related to women in general	K4
CO5	Assessing the Women Empowerment and the role of Central & State Government in developing Women	K5

UNIT I: HISTORICAL BACKGROUND   **(5 HOURS)**

History of Women's status from Vedic times, Women's participation in India's Pre and Post Independence movement and Economic Independence, fundamental rights and importance of women in Modern Society

UNIT II: ROLE OF WOMEN (CHALLENGES & REMEDIES)   **(5 HOURS)**

Women in Family, Agriculture, Education, Business, Media, Defense, Research and Development, Sports, Civil Services, Banking Services, Social Work, Politics and Law

UNIT III: WOMEN AND HEALTH   **(5 HOURS)**

Women and health issues, Malnutrition, Factors leading to anemia, Reproductive maternal health and Infant mortality, Stress.

UNIT IV: ISSUES OF WOMEN **(5 HOURS)**

Women's issues, Dowry Related Harassment and Dowry Deaths, Gender based violence against women, Sexual harassment, Loopholes in Practice to control women issues.

UNIT V: WOMEN EMPOWERMENT **(4 HOURS)**

Meaning, objectives, Problems and Issues of Women Empowerment, Factors leading to Women Empowerment, Role and Organization of National Commission for Women, Central and State Social Welfare Board for Women Empowerment, Reality of women empowerment in the era of globalization.

REFERENCE BOOKS:

S.No	Authors	Title	Publishers	Year of Publication
1	Mala Khullar	Writing the Women's Movement: A Reader	Zubaan	2005
2	IAWS	The State and the Women's Movement in India	IAWS, Delhi	1994
3	Kosambi, Meera	Crossing Thresholds: Feminist Essays in Social History	Permanent Black	2007
4	T Rowbotham, Sheila	Hidden from History: Women's Oppression and the Fight against It	Pluto Press, London	1975
5	Susheela Mehta	Revolution and the Status of Women	Metropolitan Book co.pvt ltd, New Delhi	1989

CATEGORY	COURSE CODE	TITLE OF THE COURSE	C	P	CREDIT
NON- MAJOR ELECTIVE	17NMU01B	BASIC TAMIL	24	-	2

CATEGORY	COURSE CODE	TITLE OF THE COURSE	C	P	CREDIT
NON- MAJOR ELECTIVE	17NMU02A	CAREER ENHANCEMENT (ONLINE EXAM)	36	-	2

UNIT I: GENERAL SCIENCE

Physics: Universe-General Scientific laws-Scientific instruments-Inventions anddiscoveries-National scientific laboratories-Science glossary-Mechanics and properties of matter-Physical quantities, standards and units-Force, motion and energy-Electricity and Magnetism, Electronics and Communication -Heat, light and sound-Atomic and nuclear physics-Solid State Physics – Spectroscopy-Geophysics - Astronomy and space science

Chemistry: Elements and Compounds-Acids, bases and salts-Oxidation and reduction-Chemistry of ores and metals-Carbon, nitrogen and their compounds-Fertilizers, pesticides, insecticides-Biochemistry and biotechnology- Electrochemistry - Polymers and plastics

Botany: Main Concepts of life science-The cell-basic unit of life-Classification of living organism-Nutrition and dietetics-Respiration-Excretion of metabolic waste-Bio-communication

Zoology: Blood and blood circulation-Endocrine system-Reproductive system-Genetics the science of heredity-Environment, ecology, health and hygiene, Biodiversity and its conservation-Human diseases-Communicable diseases and noncommunicable diseases-prevention and remedies- Alcoholism and drug abuse-Animals, plants and human life

UNIT II: CURRENT EVENTS

History: Latest diary of events – National--National symbols-Profile of States-Defence, national security and terrorism-World organizations-pacts and summits-Eminent persons & places in news-Sports & games-Books & authors - Awards & honours-Cultural panorama-Latest historical events-- India and its neighbours-- Latest terminology- Appointments-who is who?

Political Science1: India's foreign policy-2. Latest court verdicts – public opinion-3. Problems in conduct of public elections-4. Political parties and political system in India-5. Public awareness & General administration-6. Role of

Voluntary organizations & Govt.,-7. Welfare oriented govt. schemes, their utility

Geography: Geographical landmarks-Policy on environment and ecology—

Economics: Current socio-economic problems-New economic policy & govt.sector

Science: Latest inventions on science & technology-Latest discoveries in Health Science-Mass media & communication 111

UNIT III: GEOGRAPHY

Earth and Universe-Solar system-Atmosphere hydrosphere, lithosphere-Monsoon, rainfall, weather and climate-Water resources --- rivers in India-Soil, minerals & natural resources-Natural vegetation-Forest & wildlife-Agricultural pattern, livestock & fisheries-Transport including Surface transport & communication-Social geography – population-density and distribution-Natural calamities – disaster management-Climate change - impact and consequences - mitigation measures-Pollution Control

UNIT IV: HISTORY AND CULTURE OF INDIA

Pre-historic events--Indus valley civilization-Vedic, Aryan and Sangam age-Maurya dynasty-Buddhism and Jainism-Guptas, Delhi Sultans, Mughals and Marathas-Age of Vijayanagaram and the bahmanis-South Indian history-Culture and Heritage of Tamil people-Advent of European invasion-Expansion and consolidation of British rule-Effect of British rule on socio-economic factors-Social reforms and religious movements-India since independence-Characteristics of Indian culture-Unity in diversity –race, colour, language, custom-India-as secular state-Organizations for fine arts, dance, drama, music-Growth of rationalist, Dravidian movement in TN-Political parties and populist schemes- Prominent personalities in the various spheres – Arts, Science, literature and Philosophy – Mother Teresa, Swami Vivekananda, Pandit Ravishankar , M.S.Subbulakshmi, Rukmani Arundel and J.Krishnamoorthy etc.

Unit V: INDIAN POLITY

Constitution of India-. Preamble to the constitution- Salient features of constitution- Union, State and territory- Citizenship-rights amend duties-Fundamental rights- Fundamental duties- Human rights charter- Union legislature – Parliament- State executive- State Legislature – assembly- Status of Jammu & Kashmir- Local government – panchayat raj – Tamil Nadu- Judiciary in India – Rule of law/Due process of law- Indian federalism – center – state relations-. Emergency provisions- Civil services in India- Administrative

challenges in a welfare state- Complexities of district administration- Elections -

Election Commission Union and State. Official language and Schedule-VIII Amendments to

constitution- Schedules to constitution-. Administrative reforms & tribunals- Corruption in public

life- Anti-corruption measures – Central

Vigilance Commission, lok-adalats, Ombudsman, - Comptroller and Auditor

General of India- Right to information - Central and State Commission-

Empowerment of women- Voluntary organizations and public grievances

Redressal- Consumer protection forms

UNIT VI: INDIAN ECONOMY

Nature of Indian economy-Need for economic planning-Five-year plan

models-anassessment-Land reforms & agriculture-Application of science in agriculture-Industrial

growth-Capital formation and investment-Role of public sector & disinvestment-Development of

infrastructure- National income- Public finance

112 & fiscal policy- Price policy & public distribution- Banking, money & monetary

policy- Role of Foreign Direct Investment (FDI)- WTO-globalization &

privatization- Rural welfare oriented programmes- Social sector problems –

population, education, health, employment, poverty-HRD – sustainable economic

growth- Economic trends in Tamil Nadu -Energy Different sources and

development- Finance Commission -Planning Commission- National

Development Council

UNIT VI: INDIAN NATIONAL MOVEMENT

National renaissance-Early uprising against British rule-1857 Revolt- Indian

National Congress-Emergence of national leaders-Gandhi, Nehru, Tagore, Nethaji-Growth of

militant movements -Different modes of agitations-Era of different

Acts & Pacts-World war & final phase struggle-Communalism led to partition-

Role of Tamil Nadu in freedom struggle - Rajaji, VOC, Periyar, Bharathiar &

Others-Birth of political parties /political system in India since independence-

Unit VII: APTITUDE & MENTAL ABILITY TESTS

Conversion of information to data-Collection, compilation and presentation of data

- Tables, graphs, diagrams-Parametric representation of data-Analytical interpretation of data

-Simplification-Percentage-Highest Common Factor(HCF)-Lowest Common Multiple

(LCM)-Ratio and Proportion-Simple interest-

Compound interest-Area-Volume-Time and Work-Behavioral ability -Basic
terms, Communications in information technology-Application of Information
and Communication Technology (ICT)- Decision making and problem solving-
Logical Reasoning-Puzzles-Dice-Visual Reasoning-Alpha numeric Reasoning-
Number Series-Logical Number/Alphabetical/Diagrammatic Sequences-
….

CATEGORY	COURSE CODE	TITLE OF THE COURSE	C	P	CREDIT
NON- MAJOR ELECTIVE	17NMU02B	CONSUMER RIGHTS	24	-	2

Preamble

This paper seeks to familiarize the students with their rights and responsibilities as a consumer, the social framework of consumer rights and legal framework of protecting consumer rights.

Course Outcomes

On the successful completion of the course, students will be able to:

CO Number	CO Statement	Knowledge Level
CO1	Understand the procedure of redress of consumer complaints, and the role of different agencies in establishing product and service standards	K2, K3
CO2	To provide a comprehensive introduction to the Consumer Protection Law in India	K1,K2
CO3	Have a conceptual knowledge about the Grievance Redressal Mechanism under the Indian Consumer Protection Law	K3
CO4	Evaluate the regulations and legal actions that helps to protect consumers	K5
CO5	Evaluate the Contemporary Issues in Consumer Affairs	K4,K5

Unit 1: Conceptual Framework   **13 Lectures**

Consumer and Markets: Concept of Consumer, Nature of markets: Liberalization and Globalization of markets with special reference to Indian Consumer Markets, E-Commerce with reference to Indian Market, Concept of Price in Retail and Wholesale, Maximum Retail Price (MRP), Fair Price, GST, labeling and packaging along with relevant laws, Legal

Metrology. **Experiencing and Voicing Dissatisfaction**: Consumer buying process, Consumer Satisfaction/dissatisfaction-Grievances-complaint, Consumer Complaining Behaviour: Alternatives available to Dissatisfied Consumers; Complaint Handling Process: ISO 10000 suite

Unit 2: The Consumer Protection Law in India   13 Lectures

Objectives and Basic Concepts: Consumer rights and UN Guidelines on consumer protection, Consumer goods, defect in goods, spurious goods and services, service, deficiency in service, unfair trade practice, and restrictive trade practice.

Organizational set-up under the Consumer Protection Act: Advisory Bodies: Consumer Protection Councils at the Central, State and District Levels; Adjudicatory Bodies: District Forums, State Commissions, and National Commission: Their Composition, Powers, and Jurisdiction (Pecuniary and Territorial), Role of Supreme Court under the CPA with important case law.

Unit 3: Grievance Redressal Mechanism under the Indian Consumer Protection Law
                                                                  13 Lectures

Who can file a complaint? Grounds of filing a complaint; Limitation period; Procedure for filing and hearing of a complaint; Disposal of cases, Relief/Remedy available; Temporary Injunction, Enforcement of order, Appeal, frivolous and vexatious complaints; Offences and penalties. **Leading Cases decided under Consumer Protection law by Supreme Court/National Commission**: Medical Negligence; Banking; Insurance; Housing & Real Estate; Electricity and Telecom Services; Education; Defective Products; Unfair Trade Practices.

Unit 4: Role of Industry Regulators in Consumer Protection   13 lectures

i. Banking: RBI and Banking Ombudsman

ii. Insurance: IRDA and Insurance Ombudsman

iii. Telecommunication: TRAI

iv. Food Products: FSSAI

v. Electricity Supply: Electricity Regulatory Commission

vi. Real Estate Regulatory Authority

Unit 5: Contemporary Issues in Consumer Affairs　　　　　　**13 Lectures**

Consumer Movement in India: Evolution of Consumer Movement in India, Formation of consumer organizations and their role in consumer protection, Misleading Advertisements and sustainable consumption, National Consumer Helpline, Comparative Product testing, Sustainable consumption and energy ratings.

Quality and Standardization: Voluntary and Mandatory standards; Role of BIS, Indian Standards Mark (ISI), Ag-mark, Hallmarking, Licensing and Surveillance; Role of International Standards: ISO an Overview

Note: Unit 2 and 3 refers to the Consumer Protection Act, 1986. Any change in law would be added appropriately after the new law is notified

Suggested Readings:

1. Khanna, Sri Ram, Savita Hanspal, Sheetal Kapoor, and H.K. Awasthi. (2007) *Consumer Affairs,* Universities Press.

2. Choudhary, Ram Naresh Prasad (2005). *Consumer Protection Law Provisions and Procedure,* Deep and Deep Publications Pvt Ltd.

3. G. Ganesan and M. Sumathy. (2012). *Globalisation and Consumerism: Issues and Challenges*, Regal Publications

4. Suresh Misra and Sapna Chadah (2012). Consumer Protection in India: Issues and Concerns, IIPA, New Delhi

5. Rajyalaxmi Rao (2012), *Consumer is King,* Universal Law Publishing Company

6. Girimaji, Pushpa (2002). *Consumer Right for Everyone* Penguin Books.

7. E-books :- www.consumereducation.in

8. Empowering Consumers e-book,

9. ebook, www.consumeraffairs.nic.in

10. *The Consumer Protection Act, 1986 and its later versions.* www.bis.org

Articles

1. Misra Suresh, (Aug 2017) "Is the Indian Consumer Protected? One India One People.

2. Raman Mittal, Sonkar Sumit and Parineet Kaur (2016) Regulating Unfair Trade Practices: An Analysis of the Past and Present Indian Legislative Models, Journal of Consumer Policy.

3. Chakravarthy, S. (2014). MRTP Act metamorphoses into Competition Act. CUTS Institute for Regulation and Competition position paper. Available online at www.cuts-international.org/doc01.doc.

4. Kapoor Sheetal (2013) "Banking and the Consumer" Akademos (ISSN 2231-0584)

5. Bhatt K. N., Misra Suresh and Chadah Sapna (2010). Consumer, Consumerism and Consumer Protection, Abhijeet Publications.

6. Kapoor Sheetal (2010) "Advertising-An Essential Part of Consumer's Life-Its Legal and Ethical Aspects", Consumer Protection and Trade Practices Journal, October 2010.

7. Verma, D.P.S. (2002). Regulating Misleading Advertisements, Legal Provisions and Institutional Framework. Vikalpa. Vol. 26. No. 2. pp. 51-57.

Periodicals

1. Consumer Protection Judgments (CPJ) (Relevant cases reported in various issues)

2. Recent issues of magazines: International Journal on consumer law and practice, National Law School of India University, Bengaluru

3. '*Consumer Voice*', Published by VOICE Society, New Delhi.

Websites:

www.ncdrc.nic.in

www.consumeraffairs.nic.in

www.iso.org.

www.bis.org.in

www.consumereducation.in

www.consumervoice.in

www.fssai.gov.in

www.cercindia.org

CATEGORY	COURSE CODE	TITLE OF THE COURSE	C	P	CREDIT
CORE	17MAU12	DYNAMICS	36	-	3

Preamble

To enable the students to gain the knowledge about projectiles, simple harmonic motion, central orbits.

Course Outcomes

On the successful completion of the course, students will be able to

CO NUMBER	CO STATEMENT	KNOWLEDGE LEVEL
CO1	understand the reason for dynamic changes in the body.	K_2
CO2	gain the knowledge about the field Kinematics, projectile,simple harmonic motion and impact of a particle on a surface.	K_1
CO3	analyze the theoretical relations that exist between force,solid matter and motion.	K_4
CO4	apply the fundamental laws and principles to solve the problems	K_2 & K_3
CO5	evaluate the behaviour of objects in motion	K_5

UNIT I: PROJECTILES   (7 Hours)

Path of a projectile-Greatest height-Time of filght-Range on an inclined plane through the point of projection-Maximum range.

UNIT II: SIMPLE HARMONIC MOTION   (7 Hours)

Geometrical representation of simple harmonic motions -Composition of two simple harmonic motions of the same period in a straight line and in two perpendicular lines.

UNIT III: CENTRAL ORBITS (8 Hours)

Radial and transverse components of velocity and acceleration - Differential equation of central orbit - Pedal equations- Two-fold problems in central orbits.

UNIT IV: IMPACT ON A FIXED SURFACE (7 Hours)

Fundamental laws of impact: Newton's Experimental Law-Principle of conservation of Momentum -Impact on a smooth fixed plane.

UNIT V: IMPACT OF SMOOTH ELASTIC SPHERES (7 Hours)

Direct impact of two smooth spheres – Oblique impact of two smooth spheres - Loss of kinetic energy due to impact of two smooth spheres.

TEXT BOOK

M.K.Venkataraman.M.K., (2014) – "Dynamics", 16th edition , Agasthiar Publications, Trichy.

Unit	Chapter	Page	Section
I	VI	139-160, 172-182	6.1-6.8, 6.12-6.16
II	X	309-330	10.1-10.7
III	XI	356-359, 371-383	11.1-11.3, 11.5-11.11
IV&V	VIII	215-228, 232-241, 244-248	8.1-8.4, 8.5-8.8

REFERENCE BOOKS

1. Dharamapadam.A.V. (2011) – "Dynamics", S.Viswanathan Printers and Publishers Pvt., Ltd, Chennai.
2. Naryanamurthi.M.&Nagaratnam.N(2008) - " Dynamics", National Publishers, New Delhi.

CATEGORY	COURSE CODE	TITLE OF THE COURSE	C	P	CREDIT
CORE	17MAU13	NUMERICAL METHODS	60	-	4

Preamble

To enable the students to learn and gain knowledge about linear algebraic and transcendental equations and system of linear equations.

Course Outcomes

On the successful completion of the course, students will be able to

CO NUMBER	CO STATEMENT	KNOWLEDGE LEVEL
CO1	define the Numerical Algebraic and Transcendental Equations and gain the knowledge about the Interpolation.	K_1 & K_2
CO2	analyze and apply the various methods to solve the Algebraic and Transcendental Equations and the system of Simultaneous linear algebraic equations.	K_4 & K_3
CO3	analyze the different kinds of difference operators.	K_4
CO4	learn and analyze the convergence conditions of Iteration and Newton – Raphson method.	K_2 & K_4
CO5	evaluate the problems by using different types of methods.	K_5

UNIT I: THE SOLUTION OF NUMERICAL ALGEBRAIC AND TRANSCENDENTAL EQUATIONS (10 Hours)

Introduction – The Bisection Method – Method of Successive Approximations or the Iteration Method – Convergence condition of Iteration Method – The Method of False Position (Regula Falsi Method).

UNIT II: NEWTON-RAPHSON METHOD **(12 Hours)**

Newton's Iteration Method or Newton-Raphson Method - Convergence condition of Newton-Raphson Method – Order of Convergence of Newton-Raphson Method.

UNIT III: SIMULTANEOUS LINEAR ALGEBRAIC EQUATIONS **(12 Hours)**

Introduction – Gauss Elimination Method – Gauss Jordan Method – Method of Triangularisation - Iterative Methods – Gauss Jacobi Method of Iteration – Gauss-Seidal Method of Iteration.

UNIT IV: FINITE DIFFERENCES **(12 Hours)**

Introduction – First Differences – Higher Differences – Difference Tables – Forward Differences - Backward Differences - Properties of the operator Δ - Simple Problems – Diffrences of a Polynomial – The Operator E .

UNIT V: INTERPOLATION **(14 Hours)**

Introduction – Linear Interpolation - Gregory – Newton Forward Interpolation Formula - Gregory –Newton Backward Interpolation Formula . Divided Differences – Properties of Divided Differences – Newton's interpolation formula for unequal intervals.

TEXT BOOK:

Dr.Venkataraman.M.K.(2013) – "Numerical Methods in Science and Technology", The National Publishing Company, Chennai.

UNIT	CHAPTER	PAGE NUMBER
I	III	81 – 97
II	III	97 – 100, 102-106
III	IV	113 – 120, 126 – 130, 140 - 146
IV	V	153 – 165,177 - 184
V	VI	193 – 209,
	VIII	244 – 253.

REFERENCE BOOK:

Kandasamy. P, Thilagavathi. K and Gunavathi. K (2010) - "Numerical methods" – S. Chand and Company Ltd, New Delhi.

CATEGORY	COURSE CODE	TITLE OF THE COURSE	C	P	CREDIT
ALLIED	17MAU15	STATISTICS - II	60	-	3

Preamble

To enable the students to understand mathematical aspects of applied statistics

Course Outcomes

On the successful completion of the course, students will be able to

CO NUMBER	CO STATEMENT	KNOWLEDGE LEVEL
CO1	understand the basic concepts of population, sample, point estimation, moments, type – I and type – II errors.	K_1&K_2
CO2	analyze the concepts of different types of estimation.	K_4
CO3	apply the methods of estimation and its characteristics to solve problems .	K_3
CO4	analyze the concept of test of significance, non sampling, simple random sampling, stratified random sampling, and systematic sampling.	K_4
CO5	evaluate the testing of significance for standard deviation, proportions, difference of means, difference of propotion by using exact test.	K_5

UNIT I : ESTIMATION   (12 Hours)

Concept of population, sample, statistics, parameter - Point estimation - Concept of point estimation - Consistency, unbiasedness, efficiency - Sufficiency – Cramer Rao inequality - Simple problems.

UNIT II : METHODS OF ESTIMATION AND CONFIDENCE LIMITS   (12 Hours)

Methods of estimation - Maximum likelihood, moments, and minimum chi-square – Properties - Interval estimation - Confidence interval and confidence limits.

UNIT III : TEST OF HYPOTHESIS   **(12 Hours)**

   Type-I error and II errors - Power test – Neymann-Pearson Lemma - Concept of most powerful test (statements and results only).

UNIT IV : TEST OF SIGNIFICANCE   **(14 Hours)**

   Standard error - Large sample tests with respect to mean, standard deviaton, proportion, difference between means, standard deviations and proportions - Exact tests based on t and F distributions - Simple problems.

UNIT V: SAMPLING   **(10 Hours)**

   Sampling from finite population - Simple random sampling, stratified random sampling and systematic sampling - Estimation of mean, total and their standard errors. Sampling and non sampling errors (concepts only).

TEXT BOOK:

   Guptha, S.C & Kapoor, V.K.,(2007) - "Fundamentals of Mathematical statistics", Sultan chand & Sons.

UNIT	CHAPTER	SECTION	PAGE
I	XVII	17.1 – 17.3	17.1- 17.20
II	XVII	17.6 – 17.7	17.30 – 17.52
III	XVIII	18.1 – 18.5	18.2 – 18.10
IV	XIV,XVI	14.4 – 14.8, 16.3, 16.6	14.6 – 14.23, 14.25 – 14.36, 16.12 – 16.16, 16.36 – 16.39
V	XIV	14.1 – 14.3	14.2 – 14.6

REFERENCE BOOKS

1. Guptha ,C.B and Vijay Guptha (2008) "Introduction to Statistical methods",Vikas publishing house pvt Ltd .
2. Guptha, S.P.(2014) "Statistical methods", Sultan Chand & Sons.

CATEGORY	COURSE CODE	TITLE OF THE COURSE	C	P	CREDIT
SKILL ENHANCEMENT	17SEUMA02	BASICS OF INTERNET - PRACTICAL	-	24	2

LIST OF PROGRAMS

All the following listed programs have to be executed and recorded.

1. To create an email-id.

2. To compose and send a mail.

3. To forward a mail and to reply for a mail.

4. To send a mail with an attachment.

5. To download the attached document of a mail received.

6. To send a mail to a large number of recipients using cc and bcc options.

7. To search a thing using a search engine.

8. To open and read newspaper sites, TV program schedules using Internet.

9. To verify a university /college details by opening their websites.

10. To upload your resume with any one job portal.

CATEGORY	COURSE CODE	TITLE OF THE COURSE	C	P	CREDIT
CORE	17MAU16	ABSTRACT ALGEBRA	84	-	5

Preamble :

To enable the students to learn and gain knowledge about Sets , Groups and Rings.

Course Outcomes

On the successful completion of the course, students will be able to

CO NUMBER	CO STATEMENT	KNOWLEDGE LEVEL
CO1	gain the knowledge about Sets , Mappings, Groups, Rings and Ideals and Quotient Rings.	K_1
CO2	understand the basic concepts of Abstract Algebra.	K_2
CO3	analyze Cauchy's theorem and Sylow's theorem for Abelian groups.	K4
CO4	apply the concepts of set theory and group theory to analyze some basic theorems.	K_3
CO5	evaluate the features of set theory.	K_5

UNIT I: SETS AND GROUPS   **(18 Hours)**

Sets – Mappings – The integers.

 Groups: Abelian group, Symmetric group Definitions and Examples – Basic properties.

UNIT II: SUB GROUPS   **(18 Hours)**

Subgroups – Cyclic subgroup - Index of a group – Order of an element – Fermat theorem - A

Counting Principle - Normal Subgroups and Quotient Groups.

UNIT III: HOMOMORPHISMS OF GROUPS   (18 Hours)

Homomorphisms – Cauchy's theorem for Abelian groups – Sylow's theorem for Abelian groups Automorphisms – Inner automorphism - Cayley's theorem, permutation groups.

UNIT IV: RINGS   (16 Hours)

Rings: Definition and Examples –Some Special Classes of Rings – Commutative ring – Field – Integral domain - Homomorphisms of Rings.

UNIT V: IDEALS AND QUOTIENT RINGS   (14 Hours)

Ideals and Quotient Rings – More Ideals and Quotient Rings – Maximal ideal - The field of Quotients of an Integral Domain.

TEXT BOOK

Herstein.I.N (2014)—"Topics in Algebra", 2nd edition, John Wiley & Sons, New York

Unit	Chapter	Page Number
I	I,II	1.1-1.3, 2.1-2.3
II	II	2.4-2.6
III	II	2.7-2.10
IV	III	3.1-3.3
V	III	3.4-3.6

REFERENCE BOOKS

1.Fraleigh John .B (1986) - "An First course in Abstract Algebra",Narosa Publishing House , New Delhi Madras Bombay Calcutta.

2.Arumugam and Issac A.T (2003) - "Scitech Publishing (India) Pvt Ltd.

3. Vasishtha A.R(1994 – 95) - "Modern Algebra", Krishna Prakashan Mandir, Meerut.

CATEGORY	COURSE CODE	TITLE OF THE COURSE	C	P	CREDIT
CORE	17MAU17	REAL ANALYSIS - I	72	-	5

Preamble

To enable the students to learn and gain knowledge about Real number system , Point set topology and limits.

Course Outcomes

On the successful completion of the course, students will be able to

CO NUMBER	CO STATEMENT	KNOWLEDGE LEVEL
CO1	define and recognize the basic notations of set theory, convergence, element of points set topology, derivatives and limits .	K_1 & K_2
CO2	apply standard results about closures, intersections, and unions of open and closed sets;	K_3
CO3	analyze various theorems like Bolzano – Weierstrass theorem and to emphasize the proofs development.	K_4
CO4	prove the theorems in element of points set topology, Euclidean space and Metric space.	K_5
CO5	prove the theorems in convergence criteria, derivatives and limits.	K_5

UNIT I: THE REAL AND COMPLEX NUMBER SYSTEMS   (15 Hours)

The Real and Complex number systems : Introduction - 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 – The Archimedian property of the real number system – Absolute values and the triangle inequality –The Cauchy-Schwarz inequality .

UNIT II: BASIC NOTIONS OF SET THEORY   (15 Hours)

Basic notions of set theory : Introduction - 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 –Uncountability of the real number system –Set algebra - Countable collection of countable sets.

UNIT III: ELEMENTS OF POINT SET TOPOLOGY   (15 Hours)

Elements of point set topology: Introduction - Euclidean space R^n –Open balls and open sets in R^n. The structure of open Sets in R^1 –Closed sets - Adherent points- Accumulation points - closed sets and adherent points -The Bolzano Weierstrass theorem – The Cantor intersection Theorem.

UNIT IV: ELEMENTS OF POINT SET TOPOLOGY   (15 Hours)

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

UNIT V: LIMITS   (12 Hours)

Limits: Introduction - Convergent sequences in a metric space –Cauchy sequences – Complete metric Spaces. Limit of a function - Limit of a vector valued functions.

TEXTBOOK

APOSTOL.T.M – (2002) ''Mathematical Analysis'', 2nd edition, 20th Reprint., Addison-Wisely, Narosa Publishing Company, Chennai.

UNIT	CHAPTER	SECTION
I	1	1.1-1.3, 1.6-1.12, 1.14, 1.18, 1.19
II	2	2.1, 2.5-2.15.
III	3	3.1-3.9.
IV	3	3.10-3.16
V	4	4.1- 4.5, 4.7.

REFERENCE BOOKS

1. Goldberg.R.R –(1990), "Methods of Real Analysis", NY, John Wiley, New York.

2. Simmons.G.F – (1963), "Introduction to Topology and Modern Analysis", McGraw – Hill, New York.

3. Birkhoff.G and MacLane – (1965)," A survey of Modern Algebra", 3rd Edition, Macmillian, New York.

4. Sharma.J.N and VasisthaA.R - (1997)," Real Analysis", Krishna Prakashan Media (P) Ltd.

CATEGORY	COURSE CODE	TITLE OF THE COURSE	C	P	CREDIT
CORE	17MAU18	COMPLEX ANALYSIS – I	84	-	6

Preamble

To enable the students to learn complex number system, complex functions and complex integration.

Course Outcomes

On the successful completion of the course, students will be able to

CO NUMBER	CO STATEMENT	KNOWLEDGE LEVEL
CO1	understand the definitions of Analytic functions, linear transformations , limits and continuity.	K_1 & K_2
CO2	gain the knowledge about differentiability, analyticity and circle of convergence	K_1
CO3	apply the theorems and results to solve a variety of problems arising in Analytic functions	K_3
CO4	analyze power series , control mappings and analytic function	K_4
CO5	evaluate the integral of a complex functions.	K_5

UNIT I: COMPLEX NUMBER SYSTEM   (18 Hours)

Complex number –Field of Complex numbers – Conjugation –Absolute value -Argument – Simple Mappings.

i) w =z +α ii) w = az iii) w =1/z invariance of cross-ratio under bilinear transformation – Definition of extended complex plane – Stereographic projection.

UNIT II: ANALYTIC FUNCTIONS   (18 Hours)

Limit of a function –Continuity –Differentiability – Analytical function defined in a region – Necessary conditions for differentiability –Sufficient conditions for differentiability – Cauchy-Riemann equation in polar coordinates –Complex function as a function of z and $\overline{z}$

UNIT III: POWER SERIES AND ELEMENTARY FUNCTIONS   **(18 Hours)**

Absolute convergence –Circle of convergence –Analyticity of the sum of power

series in the Circle of convergence (term term differentiation of a series)

Exponential, Logarithmic, Trigonometric and Hyperbolic functions.

UNIT IV: ELEMENTARY AND CONFORMAL MAPPING   **(16 Hours)**

Conjugate Hormonic functions: Definition and determination, Conformal Mapping:

Isogonal mapping –Conformal mapping-Mapping z→f(z), where f is analytic, particularly the

Mappings: w= e^z ; w = $z^{1/2}$; w=sin z, w=cos z

UNIT V: COMPLEX INTEGRATION   **(14 Hours)**

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.

TEXT BOOK:

　　　Duraipandian.P and Kayalal Pachaiyappa (2014) ," Complex analysis", S.Chand &

Company PVT.LID. New Delhi.

UNIT	CHAPTER	SECTION
I	1	**1.1 to 1.3, 1.6 to 1.9**
	2	**2.1 to 2.2, 2.6 to 2.10,**
	7	**7.1& 7.10**
II	4	**4.1 to 4.10**
III	6	**6.1 to 6.11**
IV	6	**6.12 to 6.13**
	7	**7.5 to 7.9**
V	8	**8.1 to 8.9 & 8.13**

REFERENCE BOOKS:

1. Pillai.T.K.M. & Narayanan.S (1997) " Complex Analysis ", S.Viswanathan pvt ltd –
   Chennai.

2. Sharma.J.N. (2016), "Complex Analysis", Krishan Prakashan Media – Meerut.

CATEGORY	COURSE CODE	TITLE OF THE COURSE	C	P	CREDIT
PROFICIENCY ENHANCEMENT	17PEUMA01	FINANCIAL MATHEMATICS (SELF STUDY)	-	-	2

Preamble

To enable the students to gain the knowledge about Financial Mathematics.

Course Outcomes

On the successful completion of the course, students will be able to

CO NUMBER	CO STATEMENT	KNOWLEDGE LEVEL
CO1	understand and gain knowledge about Measures of Central tendency.	K_1 & K_2
CO2	apply different methods to solve problems on Bankers Discount and Bankers Gain.	K_3
CO3	learn how to apply the various techniques of Transportation problems	K_3
CO4	analyze simple and compound Interest.	K_4
CO5	evaluate Forecasting method problems	K_5

UNIT I : MATHEMATICS OF FINANCE

Simple Interest.- Compound Interest.

UNIT II : MATHEMATICS OF FINANCE

Annuities- Present value of annuities- Sinking Fund –Discounting

UNIT III : MEASURE OF CENTRAL TENDENCY

Arithmetic Mean - Median – Mode

UNIT IV : TRANSPORTATION PROBLEM

Transportation problem – North west corner method- Least cost method – Vogel's approximation method

UNIT V : FORECASTING

Forecasting methods- Moving averages- Weighted moving Averages-Exponential smoothing .

TEXT BOOKS

1.Navnitham. P.A.(2012) - "Business mathematics and statistics", Jai publishers, Trichy.

2. Manmohan, P.K. Gupta, Kanthiswarup, S(2016) –"Operations Research", Chand & sons.

UNIT	BOOK	CHAPTER	PAGE
I	I Part-I	2	43-64
II	I Part-I	2	65-88
III	I Part-II	7	159-181, 196-227
IV	II	10	247-258
V	II	31	915-923

REFRENCE BOOKS

1. Gupta. S.P.(2016-17) - "Statistical Methods", Sultan Chand & Sons, New Delhi.
2. Guptha ,C.B and Vijay Guptha (1988) - "Introduction to Statistical methods".
3. 1. Hamdy A Taha (2002) – "Operations Research", 7th edition ,Pearson Education.

CATEGORY	COURSE CODE	TITLE OF THE COURSE	C	P	CREDIT
ELECTIVE	17MAU21A	OPERATIONS RESEARCH-I	60	-	4

Preamble

To enable the students to learn decision making problems based on deterministic and parabolistic models.

Course Outcomes

On the successful completion of the course, students will be able to

CO NUMBER	CO STATEMENT	KNOWLEDGE LEVEL
CO1	understand the meaning, purpose, and tools of operations research.	K_2
CO2	gain the knowledge about LPP.	K_1
CO3	apply the concepts of queuing theory to solve real life problem	K_3
CO4	analyze the use of decision analysis	K_4
CO5	evaluate the problems by using various methods such as Gomory's fractional cut Method, Branch Bound Method.	K_5

UNIT I: LINEAR PROGRAMMING PROBLEM   (12 HOURS)

Linear Programming -Mathematical Model assumption of linear Programming – Graphical method -Principles of Simplex method, Big-M Method.

UNIT II: DUALITY   (10 HOURS)

Two-phase method- Duality, Dual simplex method.

UNIT III: INTEGER PROGRAMMING PROBLEM   (12 HOURS)

Integer Programming Problem – Gomory's fractional cut Method – Branch Bound Method.

UNIT IV: QUEUING THEORY   **(14 HOURS)**

        Queuing Theory -Definition of waiting line model -Queue discipline -Traffic intensity -Poisson arrival –Birth death process -Problem from single server: finite and infinite population model .

UNIT V: DECISION ANALYSIS   **(12 HOURS)**

        Decision Making environment – Decisions under uncertainty – Decision under risk – Decision – Tree Analysis.

Text Book:

        Kantiswarup, P. K. Gupta, Man Mohan (2017) –" Operations Research", 18th Revised edition, S. Chand & Sons Education Publications, New Delhi,

UNIT	CHAPTER	PAGE
I	2	39-63
	4	87-114
II	4,5	107-108,109
		129-133,138-142
III	7	177-191
IV	21	589-621
V	16	415-435

REFERENCE BOOKS

1. Dharani Venkata Krishnan .S – " Operations Research Principles and Problems" Keerthi publishing house PVT Ltd.

2. Prem Kumar Gupta D. S. Hira – "Operations Research " , S. Chand & Company Ltd, Ram Nagar, New Delhi.

CATEGORY	COURSE CODE	TITLE OF THE COURSE	C	P	CREDIT
ELECTIVE	17MAU21B	DISCRETE MATHEMATICS - I	60	-	4

Preamble :

To enable the students to learn and gain knowledge about the mathematical logic and algebraic structures, Lattices and Boolean Algebra.

Course Outcomes

On the successful completion of the course, students will be able to

CO NUMBER	CO STATEMENT	KNOWLEDGE LEVEL
CO1	define the basic terms of logical operations, relations, functions.	K_1
CO2	apply the rules of inference and tests for validity in predicate calculus.	K_3
CO3	analyze the types of functions.	K_4
CO4	evaluate boolean functions and simplify expression using the properties of boolean algebra.	K_5
CO5	understand the concepts of Lattices and boolean algebra	K_2

UNIT I: MATHEMATICAL LOGIC   (12 HOURS)

Connections well formed formulas – Tautology - Equivalence of Formulas - Tautological implications - Duality law - Normal forms.

UNIT II: THEORY OF INFERENCE   (12 HOURS)

Theory of inference - predicate calculus - Variables – Quantifiers - Free and bound Variables - Theory of inference of predicate calculus.

UNIT III: RELATIONS AND FUNCTIONS   (12 HOURS)

Composition of relations - Composition of functions - Inverse functions - Hashing functions - Permutation function.

UNIT IV: ALGEBRA STRUCTURES   (12 HOURS)

Semi groups - Free semi groups – Monoids – Groups - Cosets - Sets - Normal subgroups - Homomorphism.

UNIT V: LATTICES AND BOOLEAN ALGEBRA   (12 HOURS)

Partial ordering - Poset – Lattices - Boolean algebra - Boolean functions - Theorems - Minimisation of Boolean functions.

TEXT BOOK

Veerarajan.T(2014) - '' Discrete Mathematics with Graph theory and Coimbinatorics'', McGraw Hill Education (India) Pvt. Ltd, New Delhi.

UNIT	CHAPTER	PAGE NUMBER
I	I	1-24
II	I	27-45
III	II, IV	66-68, 182-210,217
IV	V	232-242, 261-268
V	II	96-109, 114-117, 121-137

REFERENCE BOOK:

J.P Tremblay and R.P Manohar (1975)-"Discrete Mathematical Structures with applications to computer science", Mc.Graw Hill.

CATEGORY	COURSE CODE	TITLE OF THE COURSE	C	P	CREDIT
SKILL ENHANCEMENT	17SEUMA03	WEB PROGRAMMING – HTML and PHP - PRACTICAL	-	24	2

LIST OF PROGRAMS

All the following listed programs have to be executed and recorded

HTML

1. A Program to illustrate body, pre tags, text formatting tags

2. A Program to illustrate text Font tag, comment, h1….h6, and div tag

3. A Program to illustrate all types of list tag

4. A Program to illustrate img tag, Hyper Link tag (Anchor tag)

5. A Program to illustrate image map

PHP

1. Create a simple HTML form and accept the user name and display the name through PHP echo statement
2. Write a PHP script, which changes the color of the first character of a word
3. Write a PHP script to redirect a user to a different page
4. Write a PHP program to swap two variables
5. Write a PHP program to remove duplicates from a sorted list

CATEGORY	COURSE CODE	TITLE OF THE COURSE	C	P	CREDIT
CORE	17MAU22	LINEAR ALGEBRA	72	-	5

Preamble :

To enable the students to learn and gain knowledge about linear algebra and linear transformations.

Course Outcomes

On the successful completion of the course, students will be able to

CO NUMBER	CO STATEMENT	KNOWLEDGE LEVEL
CO1	gain the knowledge about Vector space, Basis, Dual spaces, Inner product spaces.	K_1
CO2	understand the basic concepts of Linear Algebra	K_2
CO3	apply Linear Algebra concepts to find the dimensions	K_3
CO4	analyze the concepts of basic theorems and inequalities.	K_4
CO5	evaluate the characterization of linear vectors, linear transformations and linear functional.	K_5

UNIT I: VECTOR SPACES AND SUBSPACES   (15 Hours)

Group-Field-External and Internal compositions-Linear Algebra-Definition-Subspaces-Linear Combination-Linear Span-Linear Sum-Internal Direct Sum-Complementary Subspaces-Disjoint Spaces-External Direct Sum-Quotient Space-Elementary Properties-Theorems related to vector spaces, Subspaces and Linear Span

UNIT II: LINEAR DEPENDENCE OF VECTORS AND BASIS   **(15 Hours)**

Vector-Zero vector -Operation on vector –Vectors in C^n and R^n-Linearly dependent and Linearly independent-Basic theorems regarding linear dependent of vectors-Cauchy Schwarz's inequality-Minkowski's inequality.

Basis–Finitely generated spaces-Dimension co-ordinates-Existence theorem– Replacement theorem-Invarience of number of elements in a basis-Extension theorem- Theorems related to basis and dimension.

UNIT III: LINEAR TRASFORMATIONS   **(15 Hours)**

Trasformations-Onto and into maps-One –one and many-one maps-Products of functions-Linear transformation-Isomorphisms-Kernal and range space of a linear map-Nulity and rank-Singular and non-singular transformation-linear operator-Invertible operator-Some theorems.

UNIT IV:LINEAR FUCTIONALS AND THE DUAL SPACE   **(15 Hours)**

Linear functional and its examples-Dual space- Dual basis-Reflexivity-Annihilator-Transpose of a linear map-Theorems and solved examples.

UNIT V:INNER PRODUCT SPACES   **(12 Hours)**

Inner product-Norm-orthogonality-orthogonal and orthonormal sets-Angle between two vetors-Adjoint operator-Complete orthonormal set-Symmetric operator-T-invariant-Theorem and solved examples-Bessel's inequality-Grahm Schmidt orthogonalization process-Theorems and problems related to linear operators.

TEXT BOOK

Gupta.K. P.(1988) "Linear algebra", Pragathi Prakashan Publishers , Meerut India limited.

UNIT	CHAPTER	PAGE NUMBER
I	II	6-47
II	III & IV	48-57 , 73-95
III	V	111-143
IV	VII	207- 238
V	X	273-340

REFERENCE BOOKS

1.Herstein.I.N(2014)—"Topics in Algebra", Second Edition, John Wiley & Sons, New York.

2.Sharama S.D - "Linear algebra" Kedarnath ramnath Publishers, Meerut.

3.Vasishtha A.R(1994 – 95)—"Modern Algebra", Krishna Prakashan Mandir, Meerut.

CATEGORY	COURSE CODE	TITLE OF THE COURSE	C	P	CREDIT
CORE	17MAU23	REAL ANALYSIS II	72	-	5

Preamble

To enable the students to learn and gain knowledge about Continuity, Derivatives, Functions of Bounded variation and Riemann Stieltjes integral.

Course Outcomes

On the successful completion of the course, students will be able to

CO NUMBER	CO STATEMENT	KNOWLEDGE LEVEL
CO1	define and understand the basic notations of continuity, Derivatives, Functions of Bounded variation	K_1 & K_2
CO2	apply the use of limits of continuous functions, including the fact that continuous functions attain extreme values on compact sets;	K_3
CO3	analyze the concepts of continuity criteria, derivatives and Riemann-Stieltjes integral.	K_4
CO4	prove the theorems in, Continuity, Derivatives, and Functions of Bounded variation	K_5
CO5	prove the theorems in Riemann-Stieltjes integral.	K_5

UNIT I: CONTINUITY   (15 Hours)

Continuous functions –Continuity of composite functions– Examples of continuous functions - Continuity and inverse images of open or closed sets – Functions continuous on compact sets.

UNIT II: CONTINUITY   (12 Hours)

Connectedness –Components of a metric space – Uniform continuity : Uniform continuity and compact sets –Fixed point theorem for contractions – Monotonic functions.

UNIT III: DERIVATIVES   (15 Hours)

Introduction - Definition of derivative –Derivatives and continuity –Algebra of derivatives –
the chain rule —Rolle's theorem –The mean value theorem for derivatives – Intermediate
value theorem for derivatives - Taylor's formula with remainder.

UNIT IV: FUNCTIONS OF BOUNDED VARIATION   (15 Hours)

Introduction -Properties of monotonic functions –Functions of bounded variation –Total
Variation –Additive properties of total variation - Total variation on [a, x] as a function of x
– Functions of bounded variation expressed as the difference of increasing functions.

UNIT V: RIEMANN – STIELTJES INTEGRAL   (15 Hours)

The Riemann - Stieltjes integral : Introduction –Notation –The definition of Riemann –
Stieltjes integral –Linear properties –Integration by parts –Change of variable in a Riemann –
Stieltjes integral –Reduction to a Riemann integral.

TEXTBOOK

Apostol T.M – (2002) "Mathematical Analysis", 2nd edition, 20th Reprint., Addison-
Wisely, Narosa Publishing Company, Chennai.

UNIT	CHAPTER	SECTION
I	4	4.8 - 4.9, 4.11 - 4.13
II	4	4.16 , 4.17, 4.19 - 4.21,4.23.
III	5	5.1 - 5.5, 5.9 - 5.12.
IV	6	6.1- 6.7.
V	7	7.1 - 7.7

REFERENCE BOOKS

1. Goldberg.R.R –(1990), "Methods of Real Analysis", NY, John Wiley, New York.

2. Simmons.G.F – (1963), "Introduction to Topology and Modern Analysis", McGraw – Hill,
    New York.

3. Birkhoff.G and MacLane – (1965)," A survey of Modern Algebra", 3rd Edition,
    Macmillian, New York.

4. Sharma.J.N and VasisthaA.R - (1997)," Real Analysis", Krishna Prakashan Media (P) Ltd.

CATEGORY	COURSE CODE	TITLE OF THE COURSE	C	P	CREDIT
CORE	17MAU24	COMPLEX ANALYSIS – II	72	-	6

Preamble

To enable the students to learn analytic functions, meromorphic functions, contour integration and real definite integrals.

Course Outcomes

On the successful completion of the course, students will be able to

CO NUMBER	CO STATEMENT	KNOWLEDGE LEVEL
CO1	understand the definitions of Analytic functions and singularities	K_2
CO2	gain the knowledge about Taylor's series, Laurent's series and definite integrals	K_1
CO3	apply the theorems and results to solve a variety of problems involving Analytical function	K_3
CO4	identify and analyze the singularities, residues, Taylor and Laurent series	K_2 & K_4
CO5	evaluate the complicated real definite integrals	K_5

UNIT I : RESULTS BASED ON CAUCHY'S THEOREM (I)　　　　　**(15 Hours)**

Zeros of a function -Cauchy's Inequality – Lioville's theorem –Fundamental theorem of algebra –Maximum modulus theorem –Gauss mean value theorem –Gauss mean value theorem for a harmonic function on a circle .

UNIT II: RESULTS BASED ON CAUCHY'S THEOREM (II)　　　　　**(15 Hours)**

Taylor's series –Laurent's series .

UNIT III: SINGULARITIES AND RESIDUES　　　　　**(15 Hours)**

Singular point - Isolated singularities (Removable Singularity, pole and essentialsingularity) –Residues –Residue theorem.

UNIT IV: REAL DEFINITE INTEGRALS   (15 Hours)

Evaluation using the calculus of residues – Integration on the unit circle –Integral with - ∞

and + ∞ as lower and upper limits with the following integrals:

i) P(x) /Q(x) where the degree of Q(x) exceeds that of P(x) at least by 2.

ii) (sin ax).f(x), (cos ax).f(x), where a>0 and f(z) →0 as z→ ∞ and f(z) does not have a pole

on the real axis.

iii) f(x) where f(z) has a finite number of poles on the real axis.

Integral of the type $\int_x^{a-1} \frac{x}{1+x} \, dx$; 0< a <1;

UNIT V: MEROMORPHIC FUNCTIONS   (12 Hours)

Theorem on number of zeros minus number of poles –Principle of argument: Rouche's

theorem – Theorem that a function which is meromorphic in the extended plane is a rational

function.

TEXT BOOK:

Duraipandian.P and Kayalal Pachaiyappa(2014), "Complex Analysis", S.Chand
and Company pvt.ltd, New Delhi.

UNIT	CHAPTER	SECTION
I	8	8.10, 8.11
II	9	9.1 to 9.3, 9.13.
III	9	9.5 to 9.12, 9.13.
	10	10.1, 10.2 and 10.4.
IV	10	10.3 and 10.4.
V	11	11.1 to 11.3 (Omit theorems 11.5 and 11.6)

REFERENCE BOOKS:

1. Pillai.T.K.M. & Narayanan.S (1997) " Complex Analysis ", S.Viswanathan pvt ltd –
Chennai.

2. Sharma.J.N. (2016), "Complex Analysis", Krishan Prakashan Media – Meerut.

CATEGORY	COURSE CODE	TITLE OF THE COURSE	C	P	CREDIT
ELECTIVE	17MAU26A	OPERATIONS RESEARCH-II	60	-	4

Preamble

To enable the students to understand various mathematical applications in industries-Decision making for real time environment.

Course Outcomes

On the successful completion of the course, students will be able to

CO NUMBER	CO STATEMENT	KNOWLEDGE LEVEL
CO1	understand the basic concepts, models and statements of the operations research.	K_2
CO2	gain the knowledge about quantitative models.	K_1
CO3	apply the various method to solve a linear programming problems.	K_3
CO4	analyze the use of different types of quantitative decision making processes	K_4
CO5	evaluate and develop mathematical arguments in a logical manner	K_5

UNIT-I: REPLACEMENT (14 Hours)

Introduction - Replacement of equipment / assets that deteriorates gradually -
Replacement of equipment that fails suddenly and problems, reliability.

UNIT-II: NON-LINEAR PROGRAMMING PROBLEMS (12 Hours)

Non-linear Programming Problems – General NLPP – Lagrange multiplier – Hessian bordered Matrix – Kuhn Tucker Condition – Problems.

UNIT-III: INVENTORY CONTROL   **(12 Hours)**

Introduction – Types of inventories – Inventory costs – EOQ Problem with no shortages – Production problem with no shortages – EOQ with shortages – Production problem with shortages – EOQ with price breaks.

UNIT-IV: SEQUENCING PROBLEMS   **(12 Hours)**

Introduction-Problem of sequencing - Basic terms used in sequencing- Processing n-jobs through 2 machines - Processing n –jobs through k machines - Processing 2 jobs through k machines(Problems only).

UNIT-V: DYNAMIC PROGRAMMING PROBLEM   **(10 Hours)**

Dynamic Programming Problem – Recursive equation approach – D.P.P Algorithm – Solution of L.P.P by D.P.P.

TEXT BOOK:

Kandiswarup, P. K. Gupta, Man Mohan (2017) –" Operations Research", 18th Revised edition, S. Chand & Sons Education Publications, New Delhi.

UNIT	CHAPTER	PAGE
I	18	477-495, 500-503
II	27	823-840
III	19	507-539
IV	12	327-341
V	13	347-353

REFERENCE BOOKS:

1. Dharani Venkata Krishnan .S – " Operations Research Principles and Problems" Keerthi publishing house PVT Ltd.

2.Prem Kumar Gupta D. S. Hira – "Operations Research " , S. Chand & Company Ltd, Ram Nagar, New Delhi.

CATEGORY	COURSE CODE	TITLE OF THE COURSE	C	P	CREDIT
ELECTIVE	17MAU26B	DISCRETE MATHEMATICS -II	60	-	4

Preamble :

To enable the students to learn and gain knowledge about the Formal languages Automata Theory and Graph Theory **.**

Course Outcomes

On the successful completion of the course, students will be able to

CO NUMBER	CO STATEMENT	KNOWLEDGE LEVEL
CO1	understand the basic concepts of graph theory and finite state automata	K_2
CO2	gain the knowledge about different types of grammars.	K_1
CO3	apply the concepts of graph theory to solve problems in computer networks.	K_3
CO4	analyze and design finite automata, formal languages and grammars.	K_4
CO5	construct finite state machines and the equivalent regular expressions	K_5

UNIT-I: FORMAL LANGUAGES AND AUTOMATA   (15 HOURS)

Formal languages and Automata: Regular expressions - Types of grammar - Regular Grammar - Context free and sensitive grammars - Finite state automata.

UNIT-II: CLOSURE OPERATIONS   (10 HOURS)

Closure operations

UNIT – III: CONTEXT FREE LANGUAGES   (9 HOURS)

Context free languages

UNIT – IV: GRAPH THEORY　　　　　　　　　　　**(13 HOURS)**

Graph Theory: Directed and undirected graphs - Paths - Reachability –

Connectedness - Matric representation - Eular paths - Hamiltonean paths - Warshall's

Algorithm.

UNIT – V: TREES　　　　　　　　　　　　　　**(13 HOURS)**

Trees - Binary trees simple theorems and applications.

TEXT BOOK

1.Veerarajan.T(2014) - "Discrete   Mathematics   with   Graph   theory   and

Coimbinatorics", McGraw Hill Education (India) Pvt. Ltd, New Delhi.

2.Rani Sironmoney(1984)-"Formal Languages and Automata",The Christian

Literature Society, Madras 600 003.

BOOK	UNIT	CHAPTER	PAGE
1	**I**	**VIII**	**448-460, 462-469**
2	**II**	**III**	**20-28**
2	**III**	**IV**	**29-52**
1	**IV**	**VII**	**366-394, 396-398**
1	**V**	**VII**	**415-416, 418-426**

REFERENCE BOOKS:

1.P. Tremblay and R.P Manohar (1975) -"Discrete Mathematical Structures with
applications to computer science", Mc.Graw Hill.

2. J.K. Sharma (2005) - "Discrete Mathematics", Second Edition, Macmillan India
Ltd.

CATEGORY	COURSE CODE	TITLE OF THE COURSE	C	P	CREDIT
ELECTIVE	17MAU27A	LATEX	60	-	4

Preamble :

To enable the students to learn and gain knowledge about the concepts of LaTex and the LaTex commands to write programs.

Course Outcomes

On the successful completion of the course, students will be able to

CO NUMBER	CO STATEMENT	KNOWLEDGE LEVEL
CO1	learn the environment of LaTex.	K_1
CO2	understand the basics of LaTex .	K_2
CO3	apply LaTex concepts in creating tables.	K_3
CO4	analyze the concepts of LaTex to write programs.	K_4
CO5	determine the LaTex commands .	K_5

UNIT I: COMMANDS AND ENVIRONMENTS   **(12 Hours)**

Commands and Environments : Command names and arguments – Environments – Declarations – Lengths – Special Characters – Fragile Commands.

UNIT II: DOCUMENT LAYOUT AND ORGANIZATION   **(12 Hours)**

Document Layout and Organization : Document class – Page style – Parts of the document – Table of contents – Fine-Tuning text – Word division.

UNIT III: DISPLAYED TEXT   **(12 Hours)**

Displayed Text: Changing font – Centering and indenting – Lists – Generalized lists – Theorem-like declarations –Tabulator stops – Boxes.

UNIT IV: TABLES   **(12 Hours)**

Tables – Printing literal text – Footnotes and marginal notes.

UNIT V: MATHEMATICAL FORMULAS   (12 Hours)

Mathematical Formulas: Mathematical environments – Main elements of math mode – Mathematical symbols – Additional elements – Fine-tuning mathematics.

TEXT BOOK:

Kopka .H and P.W. Daly (1999) – "A Guide to LATEX", Third Edition, Addison – Wesley, London.

UNIT	CHAPTER	SECTION
I	2	2.1 - 2.6
II	3	3.1 - 3.6
III	4	4.1 - 4.7
IV	4	4.8 - 4.10
V	5	5.1 - 5.5.

REFERENCE BOOK:

Fundamentals of Latex for Mathematicians, Physicists and Engineers by Velusamy Kavitha and Mani Mallika Arjunan Lap Lambert Academy Publishing, Germany, 2013

CATEGORY	COURSE CODE	TITLE OF THE COURSE	C	P	CREDIT
ELECTIVE	17MAU27B	GRAPH THEORY	60	-	4

Preamble :

To enable the students to learn and gain knowledge about Graph Theory.

Course Outcomes

On the successful completion of the course, students will be able to

CO NUMBER	CO STATEMENT	KNOWLEDGE LEVEL
CO1	gain the knowledge about various types of Graphs and understand the basic concepts of Graph Theory	K_1 &K_2
CO2	apply Euler's theorem on planar Graphs	K_3
CO3	analyze the difference between Eulerian and Hamiltonian graphs and apply Fleury's algorithm to solve the problems.	K_3&K_4
CO4	evaluate the characterization of the graphs	K_5
CO5	understand the concepts of Connectivity, Eulerion Digraphs and Tournaments.	K_2

UNIT I:BASICS OF GRAPHS   **(12 Hours)**

Graphs –Sub graphs – Degree of a vertex walks, paths and cycles in a Graphs – connectedness- cut vertex and cut edge.

UNIT II: EULERIAN, HAMILTONION AND BIPARTITE GRAPHS   **(12 Hours)**

Euler and Hamiltonion Graphs – Algorithm for Eulerian circuits –Weighed graphs-Bipartite Graphs –Trees.

UNIT III: MATRICES AND VECTOR SPACES ASSOCIATED WITH GRAPHS

                                                                (12 Hours)

Matrix representation of a graph – Vector spaces associated with a graph – Cycle spaces and cut set space.

UNIT IV: PLANAR GRAPHS   (12 Hours)

Planar graphs – Euler's theorem on planar graphs – Characterization of planar graphs (no proof) of the difficult part of the characterization.

UNIT V: DIRECTED GRAPHS   (12 Hours)

Directed graphs – Connectivity – Eulerion Digraphs – Tournaments.

TEXT BOOK

Choudum.S. A.(1987) "A First Course in Graph Theory", Macmillan Publishers India limited

UNIT	CHAPTER	SECTIONS
I	I	1.1- .7
II	II,III	2.1-2.4, 3.1&3.3
III	IV	4.1- 4.4
IV	V	5.1, 5.2 & 5.5
V	VII	7.1, 7.2, 7.4& 7.5

REFERENCE BOOKS

1.Narasingh Deo,(1995) -"Graph Theory", Prentice Hall of India.

2. Harary(1988) -"Graph Theory", Narosa Publishing HQCK.

CATEGORY	COURSE CODE	TITLE OF THE COURSE	C	P	CREDIT
SKILL ENHANCEMENT	17SEUMA04	LATEX – PRACTICAL	-	24	2

LIST OF PROGRAMS

All the following listed programs have to be executed and recorded

1. Type the following paragraph in LaTex, using the {quote} environment. Format the paragraph with the following: Text height 9.5 inches, Text width 6.30 inches, Left margin 0.10 inches, Right margin 0.120 inches, Top margin -0.6 inch, Line space 1.5 inches. Also, include a foot note.

2. Produce a document in LATEX, using two-columns, Insert a title centered for the two columns.

3. Produce a title page in LATEX, with the following:
(i)Title of the page,(ii)Name and Addresses of two authors,(iii)Footnotes for the corresponding author; e-mail address and telephone numbers of the each author,(iv)Date.

4. Create a document in LATEX to produce the bibliographic information, using the {bibliography} environment.

5. Create the following table using LATEX:

S.No.	Register Number	Name of the Student	Percentage of Marks	Rank
1	XXXXXX	XXXXXX	XXXXX	XXXX
2	XXXXXX	XXXXXXX	XXXX	XXXX
3	XXXXXX	XXXXXX	XXXX	XXXXX

6. Using LaTex, generate the following formula:

$$a_0 + \cfrac{1}{a_1 + \cfrac{1}{a_2 + \cfrac{1}{a_3 + \cfrac{1}{a_4}}}} + \begin{pmatrix} a & b \\ c & d \end{pmatrix} + \sum_{\alpha=0}^{\infty} (\beta^\alpha + \Gamma^\alpha)$$

7. Using LaTex, generate the following with the { eqnarray } environment:

$$(x + y)(x - y) = x^2 - xy + xy - y^2$$
$$= x^2 - y^2 \qquad\qquad (1.1)$$
$$(x + y)^2 = x^2 + 2xy + y^2 \qquad\qquad (1.2)$$
$$X_n u_1 + \ldots\ldots + x_{n+t-1}\, u_t = x_n u_1 + (a\, x_n + c)u_2 + \ldots\ldots$$
$$+ a^{t-1}\, x_n + c(a^{t-2} + \ldots\ldots + 1)u_t$$
$$= (u_1 + a\, u_2 + \ldots.. + a^{t-1}\, u_t)x_n + h(u_1, \ldots\ldots.. u_t)$$

8. Using LaTex, draw the following diagram:

9. Using LaTex, create a minipage or parbox environment with the following properties.

   i) to push the text to the top of the box.

   ii) to center the text within the box.

   iii) to shove it to the bottom of the box.

   [NOTE: All the contents should be placed within the box itself.]

10. Using LaTex, create a paragraph with parbox inside a \fbox command, which should

   brings the effect that the entire parbox is framed.

R. Jaw

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