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 2020-2021 and onwards

Under CBCS PATTERN

BACHELOR OF SCIENCE - MATHEMATICS

Course Scheme and Scheme of Examinations

(For students admitted from 2020-2021and onwards)

Part	Category	Course Code	Title of the Course	Hrs/ week	Exam hrs.	CIA	ESE	Total marks	Credits
	I –SEMESTER								
I	Language : I	20LTU01/ 20LHU01/ 20LFU01/	Tamil- I/ Hindi-I/ French-I/ Kannada-I/ Malayalam-I/	6	3	25	75	100	4
II	English : I	20LEU01	English: I	6	3	25	75	100	4
III	Core : I	20MAU01	Classical Algebra	4	3	25	75	100	4
III	Core : II	20MAU02	Calculus	5	3	25	75	100	4
III	Core : III	20MAU03	Comprehension in Mathematics – I(Self Study Course - Online Exam)	--	$1\frac{1}{2}$	--	50	50	1
III	Core Allied : I	20MAU04	Physics - I	4	3	25	75	100	4
III	Core Allied Practical: I	20MAU05	Physics Practical	3	-	-	-	-	-
IV	Foundation Course : I	20FCU01	Environmental Studies	2	3	--	50	50	2
			TOTAL	**30**				**600**	**2**
	II –SEMESTER								

I	Language : II	20LTU02/ 20LHU02/ 20LFU02/ 20LKU02/	Tamil- II/ Hindi-II/ French II/ Kannada-II/ Malayalam-II/ Sanskrit-II	6	3	25	75	100	4
II	English : II	20LEU02	English: II	6	3	25	75	100	4
III	Core : IV	20MAU06	Analytical Geometry	5	3	25	75	100	4
III	Core : V	20MAU07	Differential Equations and Laplace Transforms	4	3	25	75	100	3
III	Core : VI	20MAU08	Comprehension in Mathematics – II (Self Study Course - Online	--	$1\frac{1}{2}$	--	50	50	1
III	Core Allied I	20MAU09	Physics – II	4	3	25	75	100	4
III	Core Allied Practical : II	20MAU05	Physics Practical	3	3	40	60	100	3
IV	Foundation Course : II	20FCU02	Yoga and Ethics	2	3	--	50	50	2
			TOTAL	**30**				**700**	**2**
	III –SEMESTER								
I	Language : I	20LTU03/ 20LHU03/ 20LFU03/	Tamil- III/ Hindi-III/ French-III/ Kannada-III/ Malayalam-III/	6	3	25	75	100	4
II	English : I	20LEU03	English: III	6	3	25	75	100	4
III	Core : VII	20MAU10	Statics	4	3	25	75	100	3
III	Core : VIII	20MAU11	Trigonometry, Vector Calculus and Fourier Series	5	3	25	75	100	4
III	Core : IX	20MAU12	Comprehension in Mathematics – III (Self Study Course - Online Exam)	--	$1\frac{1}{2}$	--	50	50	1

III	Core Allied : I	20MAU13	Statistics - I	5	3	25	75	100	3
IV	Ability Enhancement	20AEUMA1	Information Security	2	3	100	---	100	2
IV	Non- Major Elective	20NMU01A/ 20NMU01B	Indian Women and Society/ Advanced Tamil	2	3	--	50	50	2
			TOTAL	**30**				**700**	**23**
	IV –SEMESTER								
I	Language : I	20LTU04/ 20LHU04/ 20LFU04/	Tamil- IV/ Hindi-IV/ French-IV/ Kannada-IV/ Malayalam-IV/	6	3	25	75	100	4
II	English : I	20LEU04	English: IV	6	3	25	75	100	4
III	Core : X	20MAU14	Dynamics	3	3	25	75	100	3
III	Core : XI	20MAU15	Numerical Methods	5	3	25	75	100	4
III	Core : XII	20MAU16	Comprehension in Mathematics – IV (Self Study Course - Online Exam)	--	$1\frac{1}{2}$	--	50	50	1
III	Core Allied : II	20MAU17	Statistics - II	5	3	25	75	100	3
IV	Skill Enhancement	20SEUMA1	Internet Basics and Office Automation Tools- Practical	2	3	40	60	100	2
IV	Ability Enhancement - II	20AEU02	Consumer Rights	3	2	--	50	50	2
			TOTAL	**30**				**700**	**23**
	V –SEMESTER								
III	Core : XIII	20MAU18	Abstract Algebra	6	3	25	75	100	5
III	Core : XIV	20MAU19	Real Analysis - I	6	3	25	75	100	5

III	Core : XV	20MAU20	Complex Analysis - I	6	3	25	75	100	5
III	Core : XVI	20MAU21	Comprehension in Mathematics – V (Self Study Course - Online Exam)	--	$1\frac{1}{2}$	--	50	50	1
IV	Open Elective	***	***	4	3	25	75	100	3
V	Proficiency Enhancement	20PEUMA01	Financial Mathematics (Self Study)	--	3	100	--	100	2
III	Core : XVII	20MAU22	Institutional training/Article ship Training/Mini Project	--	--	100	-	100	1
III	Elective I	20MAU23A/ 20MAU23B	Operations Research – I/ Applied Algebra - I	6	3	25	75	100	4
IV	Skill Enhancement Course : II	20SEUMA2	Life Skills (Soft skills/Entrepreneurship skills/Homepreneurship)	2	--	100	--	100	2
			TOTAL	**30**				**850**	**2**
			VI –SEMESTER						
III	Core : XIX	20MAU24	Linear Algebra	6	3	25	75	100	5
III	Core : XX	20MAU25	Real Analysis - II	6	3	25	75	100	5
III	Core : XXI	20MAU26	Complex Analysis - II	6	3	25	75	100	5
III	Core : XXII	20CPU27	Comprehension in Mathematics – VI (Self Study Course - Online Exam)	--	$1\frac{1}{2}$	--	50	50	1
III	Elective II	20MAU28A/ 20MAU28B	Operations Research – II/ Applied Algebra - II	5	3	25	75	100	4

III	Elective III	20MAU29A/ 20MAU29B	Graph Theory Stochastic Process	5	3	25	75	100	4
IV	Skill Enhancement Course :III	20SEUMA3	HTML – Practical	2	3	40	60	100	2
			TOTAL	**30**				**650**	**2**
V	Community Engagement		NSS/YRC/RRC/CCC/PHY.EDU		I – VI SEMESTER				1
			Students Social activity (Curriculum related)		I – VI SEMESTER				1
			Total Marks: 4200 Total credits: 150						

15/10/22

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DEPARTMENT OF MATHEMATICS

I SEMESTER

CATEGORY	COURSE CODE	TITLE OF THE COURSE	C	P	CREDIT
CORE	20MAU01	CLASSICAL ALGEBRA	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, Convergence and Divergence 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 & K_3
CO5	evaluate the problems by using different types of methods.	K_5

UNIT I: BINOMIAL AND EXPONENTIAL THEOREMS (10 Hours)

Binomial theorem (statement only)- Application of the Binomial theorem to the summation of series - Exponential theorems (statement only) - Summation of series.

UNIT II: LOGARITHMIC SERIES (10 Hours)

Logarithmic series theorem - Statement and proof - Immediate application to summation and approximation only.

UNIT III: CONVERGENCE AND DIVERGENCE OF SERIES (10 Hours)

Convergence and divergence of series –Definitions -Comparison tests-Cauchy's condensation test - De Alembert's test-Cauchy's root test - Raabe's test -Absolute convergence.

UNIT IV: THEORY OF EQUATIONS (10 Hours)

Roots of an equation-Relations between the roots and coefficients-Transformations of equations- Reciprocal equations.

UNIT V: MULTIPLE ROOTS (8 Hours)

Descartes's rule of signs -Rolle's Theorem - Multiple roots - Horner's method.

TEXT BOOK

Manicavachagom Pillay, T.K., Natarajan.T, Ganapathy.K.S. (2017)– "Algebra Volume - I", publishedby: Divya Subramanian for Ananda book Depot, Chennai.

UNIT	CHAPTER	PAGE NUMBER
I	III	143-152
	IV	188-207
II	IV	213-230
III	II	41-89
IV	VI	282-303, 318-327
V	VI	351-362, 376-382

REFERENCE BOOK

Kandasamy.P. Thilagavathy .K (2004) –"Mathematics for B.Sc. Branch I -Vol. I.

S. Chand and Company Ltd, New Delhi.

CATEGORY	COURSE CODE	TITLE OF THE COURSE	C	P	CREDIT
CORE	20MAU02	CALCULUS	60	-	4

Preamble

To enable the students to learn and gain knowledge about curvature and integration.

Course Outcomes

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

CO NUMBER	CO STATEMENT	KNOWLEDGE LEVEL
CO1	gain the idea about curvature and different types of integrals.	K_1& K_2
CO2	apply integration to compute arc lengths, volumes of revolution and surface areas of revolution.	K_3
CO3	analyze convergence / divergence of integrals.	K_4
CO4	analyze the properties of Beta and Gama functions.	K_4
CO5	evaluate double and triple integrals by using Beta and Gama functions and total differentiation.	K_5

UNIT I:CURVATURE **(12 Hours)**

Envelope- method of finding the envelope-Curvature-circle, radius, Centre of curvature-Radius of curvature in Cartesian and polar forms-Evolutes and envelope-Pedal equations.

UNIT II:INTEGRATION **(12 Hours)**

Integration-definite integral-method of integration-integration of rational algebraic functions-integration of irrational function.

UNIT III: MULTIPLE INTEGRAL **(12 Hours)**

Evaluation of double integral – double integrals in polar coordinates-Evaluation of triple integrals-Applications multiple integrals.

UNIT IV: CHANGE OF VARIABLE **(12 Hours)**

Jacobion-change of variable in double and triple integrals- transformations from Cartesian to polar coordinates- transformations from Cartesian to spherical polar coordinates.

UNIT V: MULTIPLE INTEGRALS **(12 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 (2017) – "Calculus vol 1 and vol 2"- Viswanathan Publishers.

Vol – I	**Unit - I**	**Chapter X**	**Page: 281 - 316**
Vol – II	**Unit – II**	**Chapter I**	**Page: 1 - 60**
Vol – II	**Unit –III**	**Chapter V**	**Page: 203 – 228**
Vol – II	**Unit -IV**	**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.

CATEGORY	COURSE CODE	TITLE OF THE COURSE	C	P	CREDIT
FOUNDATION COURSE - I	20FCU01	ENVIRONMENTAL STUDIES	24	-	2

Preamble

To bring about an awareness of a variety of environmental concerns and to create a pro-environmental attitude and a behavioral pattern in society that is based oncreating sustainable lifestyle

Course Outcomes

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

CO NUMBER	CO STATEMENT	KNOWLEDGE LEVEL
CO1	give information about the environment and the resources to act at our own level to protect them.	K_1
CO2	analyze the roles of organisms as part of interconnected food webs, populations, communities, and ecosystems	K_4
CO3	understand the scale dependence of biodiversity and its measurement	K_2
CO4	learn how to assess pollution sources, study exposure pathways and fate, and evaluate consequences of human exposure to pollution and its impacts to environmental quality.	K_1,K_3
CO5	balance our economic, environmental and social needs, allowing prosperity for now and future generations	K_5

Unit I: Multidisciplinary Nature of Environmental Studies (4 Hours)

i) Definition, Scope and Importance

ii) Need for Public Awareness

iii) Natural Resources

a) Natural Resources and Associated Problems

Forest Resources: Use and Over-exploitation, Deforestation, Case Studies. Timber Extraction, Mining, Dams and their Effects on Forests and Tribal People.

Water Resources: Use and Over-utilization of Surface and Ground Water, Floods, Drought, Conflicts over Water, Dams – Benefits and Problems.

Mineral Resources: Use and Exploitation, Environmental Effects of Extracting and using Mineral Resources, Case Studies.

Food Resources: World Food Problems, Changes Caused by Agriculture and Overgrazing, Effects of Modern Agriculture, Fertilizer-Pesticide Problems, Water Logging, Salinity, Case Studies.

Energy Resources: Growing Energy Needs, Renewable and Non-Renewable Energy Sources, Use of Alternate Sources, Case Studies.

Land Resources: Land as a Resource, Land Degradation, Man Induced Landslides, Soil Erosion and Desertification.

b) Role of an Individual in Conservation of Natural Resources

c) Equitable Use of Resources for Sustainable Lifestyles

Unit II: Ecosystems **(5 Hours)**

i) Concept of an Ecosystem

ii) Structure and Function of an Ecosystem

iii) Producers, Consumers and Decomposers

iv) Energy Flow in the Ecosystem

v) Ecological Succession

vi) Food Chains, Food Webs and Ecological Pyramids

vii) Introduction Types, Characteristics Features, Structure and Function of the following Ecosystem:

a) Forest Ecosystem

b) Grassland Ecosystem

c) Desert Ecosystem

d) Aquatic Ecosystems (Ponds, Streams, Lakes, Rivers, Ocean, Estuaries)

Unit III: Biodiversity and its Conservation **(5 Hours)**

i) Introduction – Definition – Genetic, Species and Ecosystem Diversity

ii) Bio-geographical Classification of India

iii) Value of Biodiversity – Consumptive Use, Productive Use, Social, Ethical, Aesthetic and Option Value

iv) Biodiversity at Global, National and Local Levels

v) India as a Mega-Diversity Nation

vi) Hot-Spots of Biodiversity

vii) Threats to Biodiversity – Habitat Loss, Poaching of Wildlife, Man-Wildlife Conflicts

viii) Endangered and Endemic Species of India

ix) Conservation of Biodiversity – In-situ and Ex-situ and Conservation of Biodiversity

Unit IV: Environmental Pollution **(5 Hours)**

i) Definition, Causes, Effects and Control Measures of:

a) Air Pollution

b) Water Pollution

c) Soil Pollution

d) Noise Pollution

e) Thermal Pollution

ii) Solid Waste Management – Causes, Effects and Control Measures of Urban and Industrial Wastes

iii) Role of an Individual in Prevention of Pollution

iv) Pollution Case Studies

v) Disaster Management – Floods, Earthquake, Cyclone and Landslides

Unit V: Social Issues and the Environment **(5 Hours)**

i) Sustainable Development

ii) Urban Problems Related to Energy

iii) Water Conservation, Rainwater Harvesting, Watershed Management

iv) Resettlement and Rehabilitation of People; Its Problems and Concerns, Case Studies

v) Environmental Ethics – Issues and Possible Solutions

vi) Climate Change, Global Warming, Ozone Layer, Depletion, acid Rain, Nuclear Accidents and Holocaust, Case Studies

vii) Consumerism and Waste Products

viii) Environmental Protection Act

ix) Air (Prevention and Control of Pollution) Act

x) Water (Prevention and Control of Pollution) Act

xi) Wildlife Protection Act

xii) Forest Conservation Act

xiii) Issues Involved in Enforcement of Environmental Legislation

xiv) Public Awareness

xv) Human Population and the Environment

- Population Growth and Distribution
- Population Explosion – Family Welfare Programme
- Environment and Human Health
- Human Rights
- Value Education
- HIV/AIDS
- Women and Child Welfare
- Role of Information Technology in Environment and Human Health
- Medical Transcription and Bioinformatics

TEXT BOOK

Environmental Studies, Bharathiar University, Publication Division, 2004

REFERENCE BOOK

R.C.Sharma & Gurbir Sangha (2005) -Environmental Studies,Kalyani Publishers

II SEMESTER

CATEGORY	COURSE CODE	TITLE OF THE COURSE	C	P	CREDIT
CORE	20MAU06	ANALYTICAL GEOMETRY	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 and gain the knowledge about the concepts of conic, Straight line, Sphere, cone and cylinder.	K_1& K_2
CO2	apply the concepts of analytic geometry to technical problems.	K_3
CO3	analyze the Coplanarity of straight-lines.	K_4
CO4	describe mathematical ideas from cone, cylinder, sphere and conic.	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: CONICOIDS **(12 Hours)**

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

TEXT BOOKS

1. Manickavasagam Pillai.T. K. and Natarajan.T, (2016) - "Analytical Geometry of 2D" , S. Viswanathan Printers and Publishers Pvt. Ltd, Chennai.
2. Manickavasagam Pillai.T. K. and Natarajan.T, (2016) - "Analytical Geometry of 3D" , S. Viswanathan Printers and Publishers Pvt. Ltd, Chennai.

Unit - I	**Book - 1**	**Chapter IX**	**Page: 325-330 Results without proof and Page 331-363**
Unit – II	**Book –2**	**Chapter III**	**Page: 46- 71**
Unit – III	**Book - 2**	**Chapter IV**	**Page: 92 – 110**
Unit – IV	**Book - 2**	**Chapter V**	**Page: 115 – 138**
Unit - V	**Book - 2**	**Chapter V**	**Page: 141 – 160**

REFERENCE BOOK

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

CATEGORY	COURSE CODE	TITLE OF THE COURSE	C	P	CREDIT
CORE	20MAU07	DIFFERENTIAL EQUATIONS AND LAPLACE TRANSFORMS	48	-	3

Preamble

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

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 and PDE.	K_1 ,K_2
CO2	evaluate the solutions for second order linear ODEs with constant coefficients.	K_5
CO3	apply Laplace and inverse Laplace transforms to solve the problems based on second order linear differential equations.	K_3& K_5
CO4	analyze the difference between Laplace and inverse Laplace transforms.	K_4
CO5	solve the problems based on Euler's and Lagrange's linear differential equations.	K_5

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.

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),* $\frac{f(t)}{t}$.

UNIT V: INVERSE LAPLACE TRANSFORMS (10 Hours)

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

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**
Unit - III	**Chapter I**	**Page: 117 – 143, 150 – 162**
Unit - IV	**Chapter I**	**Page: 187-201**
Unit - V	**Chapter I**	**Page: 202-236**

REFERENCE BOOK

Narayanan. S and Manicavachagam Pillai. T. K.(1996) - "Differential Equations", S. Viswanathan (Printers and Publishers) Pvt. Ltd, Chennai.

CATEGORY	COURSE CODE	TITLE OF THE COURSE	C	P	CREDIT
FOUNDATION COURSE - II	20FCU02	YOGA AND ETHICS	24	-	2

Preamble

To enable the learners to acquire the knowledge on basic yogasanas and values and practice them in real life.

Course Outcomes

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

CO NUMBER	CO STATEMENT	KNOWLEDGE LEVEL
CO1	acquire the basic knowledge on yoga and value education.	K_1
CO2	understand the importance of yoga, mental exercises, principles of life and components of values	K_2
CO3	enhance their physical and mental health by practicing the different types of asanas, kriyas, mental exercises and values.	K_3
CO4	lead a meaningful life for the fulfillment of the needs of family, workplace, society and country.	K_4

UNIT I : YOGA AND HEALTH (5 Hours)

Theory:

Yoga-Meaning- Importance of Yoga – Pancha Koshas - Benefits of Yoga-General Guidelines.

Practice:

Dynamic Exercise- Surya Namaskar-Basic Set of Asanas-Pranayama & Kriya.

UNIT II: ART OF NURTURING THE MIND (5 Hours)

Theory:

Ten Stages of Mind-Mental Frequency – Methods for Concentration

Eradication of Worries- Benefits of Blessings- Greatness of Friendship- Individual Peace and World Peace

Practice: - Worksheet

UNIT III: PHILOSOPHY AND PRINCIPLES OF LIFE (5Hours)

Theory: Purpose and Philosophy of Life- Introspection – Analysis of Thought - Moralization of Desires- Neutralization of Anger.

Vigilance and Anti- Corruption- Redressal mechanism - Urban planning and Administration.

Practice - Worksheet

UNIT IV: VALUE EDUCATION (Part-I) (5 Hours)

Theory: Ethical Values: Meaning – Need and Significance- Types - Value education – Aim of education and value education

Components of value education: Individual values – Self-discipline, Self Confidence, Self-Initiative, Empathy, Compassion, Forgiveness, Honesty, Sacrifice, Sincerity, Self-control, Tolerance and Courage.

Practice - Worksheet

UNIT V: VALUE EDUCATION (Part-II) (4 Hours)

Theory: Family Values

Constitutional or National values – Democracy, Socialism, Secularism, Equality, Justice, Liberty, Freedom and Fraternity.

Social values – Pity and probity, self-control, universal brotherhood.

Professional values – Knowledge thirst, sincerity in profession, regularity, punctuality and faith.

Religious values – Tolerance, wisdom, character.

Practice - Worksheet

REFERENCE BOOKS:

1 Vethathiri Maharishi (2015), 'Yoga for human excellence'- Sri Vethathiri Publications.

2. Value Education for human excellence- study material by Bharathiar University.

3. Value Education - Study Material by P.K.R Arts College for Women.

SEMESTER III

CATEGORY	COURSE CODE	TITLE OF THE COURSE	C	P	CREDIT
CORE	20MAU10	STATICS	48	-	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, coplanarforces, and 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 (10 Hours)

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

UNIT II: RESOLUTION OF FORCES (10 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 **(10 Hours)**

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

UNIT IV: COPLANAR FORCES **(10 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 **(8 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	20MAU11	TRIGONOMETRY, VECTOR CALCULUS AND FOURIER SERIES	60	-	4

Preamble

To enable the students to gain knowledge about expansion in series of trigonometric functions and its applications, vectorfield 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 (12 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 nθand sin nθin powers of sines and cosines – Expansion of sin θ, cos θ andtan θ in powers of θ.

UNIT II: SUMMATION OF SERIES (12 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 (12 Hours)

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

UNIT IV: INTEGRATION OF VECTORS **(12 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 **(12 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.

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

CATEGORY	COURSE CODE	TITLE OF THE COURSE	C	P	CREDIT
CORE ALLIED - I	20MAU13	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	apply the concept of mean, median and mode to the given data	K_3
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: MEASURES OF CENTRAL TENDENCY (13 Hours)

Measures of Central Tendency- arithmetic mean, median, mode, geometric mean, harmonic mean for individual observations, discrete and continuous series.

UNIT V: CORRELATION AND REGRESSION ANALYSIS(11 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**

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

UNIT	CHAPTER	SECTION	PAGE
IV	**VII**	**-**	**159,162-175,196-209,212-227,251-260**
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
ABILITY ENHANCEMENT COURSE - I	20AEUMA1	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	20NMU01A	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

SEMESTER IV

CATEGORY	COURSE CODE	TITLE OF THE COURSE	C	P	CREDIT
CORE	20MAU14	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 behavior of objects in motion	K_5

UNIT I: PROJECTILES (7 Hours)

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

UNIT II:SIMPLE HARMONIC MOTION (7 Hours)

Geometrical representation of simpleharmonic motions -Composition of two simpleharmonic 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 centralorbit - 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	20MAU15	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 – Differences 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 VIII	193 –209, 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
CORE ALLIED - II	20MAU17	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 and the properties of Binomial, Poisson, Normal distributions	K_4
CO5	evaluate the testing of significance for standard deviation, proportions, difference of means, and difference of proportion by using exact test.	K_5

UNIT I : PROBABILITY DISTRIBUTIONS (13 Hours)

Binomial distribution- properties of Binomial distribution- fitting of Binomial distribution-Poisson distribution- role of Poisson distribution-fitting a Poisson distribution-Normal distribution- relation among Binomial, Poisson and Normal distributions-properties of Normal distribution-fitting a Normal distribution

UNIT II : 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 III: 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 IV:TEST OF HYPOTHESIS& TEST OF SIGNIFICANCE(13 Hours)

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

Standard error - Large sample tests with respect to mean, standard deviation, 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:

1. S.P.Gupta,(2004) 33rd revised edition-" Statistical methods", Sultan chand & Sons.

UNIT	CHAPTER	SECTION	PAGE
I	**II**	**-**	**809,813,817-824,826-846,853-856**

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

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

3. P.N.Arora, Sumeet Arora, S.Arora (2013) 4th edition, "Comprehensive statistical methods", S.Chand & company pvt. Ltd

UNIT	CHAPTER	SECTION	PAGE
V	**XV**	**15.1-15.8**	**15.1-15.6**

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 COURSE -I	20SEUMA1	INTERNET BASICS AND OFFICE AUTOMATION TOOLS - PRACTICAL	-	24	2

LIST OF PROGRAMS

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

1. Open your Gmail account and do the following: Compose and send a mail, Attach a file, Forward a mail and reply for a mail
2. Open your Gmail account and do the following: Download the attached document of a mail received, upload your resume in anyone job portal and send a mail to large number of recipients using cc and bcc options
3. To open and read newspaper sites, TV program schedules using search engine. Also to verify a university/college detail by opening their websites
4. Prepare a document with different font styles, font sizes, paragraph formatting, header and footer
5. Insert a table to do Data entry, Alignment, Inserting and deleting rows and columns and change of table format
6. Create a new document using templates
7. Insert various charts for some data entry in spread sheet
8. To do manipulation in the students mark list (Total, Average, Result and Rank)
9. Create a presentation slide for any mathematics subject and apply animation
10. Create a presentation slide and use hyperlink

20AEU02	CONSUMER RIGHTS	CATEGORY	L	P	CREDIT
		Ability Enhancement Course : II	36	-	2

Preamble

This paper seeks to familiarize the students with their rights and responsibilities as aconsumer, 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, andthe 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 **8 Lectures**

Consumer and Markets: Concept of Consumer, Nature of markets: Liberalization andGlobalization of markets with special reference to Indian Consumer Markets, E-Commerce withreference 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, ConsumerSatisfaction/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 **8 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: ConsumerProtection Councils at the Central, State and District Levels; Adjudicatory Bodies: DistrictForums, State Commissions, and National Commission: Their Composition, Powers, andJurisdiction (Pecuniary and Territorial), Role of Supreme Court under the CPA with importantcase law.

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

8 Lectures

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

Unit 4: Role of Industry Regulators in Consumer Protection 6 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 6 Lectures

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

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

Note: Unit 2 and 3 refers to the Consumer Protection Act, 1986. Any change in law wouldbe 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

SEMESTER V

CATEGORY	COURSE CODE	TITLE OF THE COURSE	C	P	CREDIT
CORE	**20MAU18**	**ABSTRACT ALGEBRA**	**72**	**-**	**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 (12 Hours)

Sets – Mappings – The integers.

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

UNIT II: SUB GROUPS (15 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 (15 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 (15 Hours)

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

UNIT V: IDEALS AND QUOTIENT RINGS(15 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	Section
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	20MAU19	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	Recall the definitions of upper bounds, lower bounds, countable sets, uncountable sets, open sets, closed sets, metric space and limit of a function.	K_1
CO2	Discuss the concepts of upper bounds, lower bounds, countable sets, uncountable sets, open sets, closed sets, metric space and limit of a function.	K_2
CO3	Apply the concepts of limits for a vector – valued functions.	K_3
CO4	Compare the concepts of countable sets, uncountable sets, open sets, closed sets, adherent points and accumulation points.	K_4
CO5	Evaluate the upper bounds, lower bounds, supremum, infimum for real number system.	K_5

UNIT I: THE REAL NUMBER SYSTEMS (15 Hours)

The Real 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.

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 –Closed sets - Adherent points- Accumulation points - closed sets and adherent points -The Bolzano Weierstrass theorem (statement only) – The Cantor intersection Theorem (statement only).

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

Covering –Lindelof covering theorem (statement only) –the Heine Borel covering theorem (statement only) –Compactnessin 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.

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 - 2.12.
III	3	3.1-3.3, 3.5-3.9.
IV	3	3.10-3.16
V	4	4.1- 4.5

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.

CATEGORY	COURSE CODE	TITLE OF THE COURSE	C	P	CREDIT
CORE	20MAU20	COMPLEX ANALYSIS – I	72	-	5

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, lineartransformations, limits and continuity.	K_1 & K_2
CO2	gain the knowledge about differentiability, analyticity of Complex functions and circle of convergence of power series.	K_1
CO3	apply the theorems and results to solve a variety of problems arising in Analytic functions	K_3
CO4	Analyze the convergence of power series , conformal mappings and analytic function	K_4
CO5	discuss the integral of a complex functions.	K_5

UNIT I: COMPLEX NUMBER SYSTEM (12 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 (15 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 (15 Hours)

Absolute convergence –Circle of convergence –Analyticity of the sum of power series in the Circle of convergence (term differentiation of a series)

Exponential, Logarithmic, Trigonometric and Hyperbolic functions.

UNIT IV: ELEMENTARY ANDCONFORMAL MAPPING (15 Hours)

Conjugate Harmonic functions: Definition and determination, Conformal Mapping: Isogonal mapping –Conformal mapping-Mapping $z \rightarrow f(z)$, where f is analytic, particularly the Mappings: $w= e^z$; $w = z^{1/2}$; w=sin z, w=cos z

UNIT V: COMPLEX INTEGRATION (15 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	20PEUMA01	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 - I	20MAU23A	OPERATIONS RESEARCH-I	72	-	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.	K_5

UNIT I: LINEAR PROGRAMMING PROBLEM (12 HOURS)

Linear Programming - Mathematical Model assumption of linear Programming - Graphical method - Principles of Simplex method.

UNIT II: ARTIFICIAL VARIABLE TECHNIQUES (15 HOURS)

Two-phase method - Big-M method.

UNIT III: INTEGER PROGRAMMING PROBLEM (15 HOURS)

Integer Programming Problem - Gomory's fractional cut Method.

UNIT IV: QUEUING THEORY (15 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 (15 HOURS)

Decision Making environment - Decisions under uncertainty - Decision under risk.

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	39-46
	3	65-78
	4	99-105
II	4	106-114
III	7	177-188
IV	21	589-611
V	16	415-430

REFERENCE BOOKS

1. DharaniVenkata 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 - I	20MAU23B	APPLIED ALGEBRA - I	72	-	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 (15 HOURS)

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

UNITII: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 (15 HOURS)

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

UNIT IV: ALGEBRA STRUCTURES (15 HOURS)

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

UNIT V: LATTICES AND BOOLEAN ALGEBRA (15 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.

SEMESTER VI

CATEGORY	COURSE CODE	TITLE OF THE COURSE	C	P	CREDIT
CORE	**20MAU24**	**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.	$\mathbf{K_1}$
CO2	understand the basic concepts of Linear Algebra	$\mathbf{K_2}$
CO3	apply Linear Algebra concepts to find the dimensions	$\mathbf{K_3}$
CO4	analyze the concepts of basic theorems and inequalities.	$\mathbf{K_4}$
CO5	evaluate the characterization of linear vectors, linear transformations and linear functional.	$\mathbf{K_5}$

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.

TEXT BOOK

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

UNIT	CHAPTER	PAGE NUMBER
I	II	6-26
II	III & IV	48-57 , 73-91
III	V	111-136
IV	VII	207- 232
V	X	273-296

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	20MAU25	REAL ANALYSIS II	72	-	5

Preamble

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

Course Outcomes

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

CO NUMBER	CO STATEMENT	KNOWLEDGE LEVEL
CO1	Recall the definitions of continuous functions, connectedness, derivatives and monotonic functions.	K_1
CO2	Discuss the concepts of continuous functions, connectedness, derivatives and monotonic functions.	K_2
CO3	Apply the concepts of monotonic functions for the functions of bounded variations.	K_3
CO4	Compare the concepts of continuity and uniform continuity.	K_4
CO5	Evaluate the problems based on Rolles Theorem, Mean Value Theorem and Fixed Point Theorem.	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.

UNIT II: CONTINUITY (12 Hours)

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

UNIT III: DERIVATIVES (15 Hours)

Introduction - Definition of derivative –Derivatives and continuity –Algebra of derivatives – the chain rule —one-sided derivatives and infinite derivatives – functions with non-zero derivatives.

UNIT IV: DERIVATIVES **(15 Hours)**

Zero derivatives and local extrema - Rolle's theorem –The mean value theorem for derivatives – Intermediate value theorem for derivatives.

UNIT V: FUNCTIONS OF BOUNDED VARIATION **(15 Hours)**

Introduction -Properties of monotonic functions –Functions of bounded variation –Total Variation –Additive properties of total variation (statement only).

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 - 4.12**
II	**4**	**4.16 , 4.17, 4.19 - 4.21,4.23.**
III	**5**	**5.1 - 5.7**
IV	**5**	**5.8-5.11**
V	**6**	**6.1- 6.5.**

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.

CATEGORY	COURSE CODE	TITLE OF THE COURSE	C	P	CREDIT
CORE	**20MAU26**	**COMPLEX ANALYSIS – II**	**72**	**-**	**5**

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 theunit 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 –Principleof 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 10	9.5 to 9.12, 9.13. 10.1, 10.2 and 10.4.
IV	10	10.3 and 10.4.
V	11	11.1to 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 - II	20MAU28A	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 Simulation methods to discover how the real system behaves under a variety of prescribed conditions.	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.

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: SIMULATION (12 Hours) Introduction – Simulation Models – Event Type Simulation – Generation of Random Numbers – Monte-Carlo Simulation – Simulation of a Queueing System.

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
II	27	823-840
III	22	639 – 646 656 - 661
IV	12	327-341
V	13	347-353

REFERENCE BOOKS:

1. DharaniVenkata 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 - II	20MAU28B	APPLIED ALGEBRA -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
CORE	**20MAU29B**	**STOCHASTIC PROCESS**	**60**	**-**	**4**

Preamble

To enable the students to learn and gain knowledge about Stochastic process.

Course Outcomes

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

CO NUMBER	CO STATEMENT	KNOWLEDGE LEVEL
CO1	understand discrete and continuous time Markov	**K_1& K_2**

	chains and their properties	
CO2	know Poisson process and itsapplications	**K_3**
CO3	apply the different Queuing models in real situations	**K_3**
CO4	analyze classification of states and chains	**K_4**
CO5	evaluate the multichannel models	**K_5**

Unit I:LAPLACE TRANSFORMS (12 HOURS)

Generating function –Laplace Transforms –Laplace Transforms of a Probability Distribution function difference equations –Differential difference equation –Matrix analysis.

Unit II:MARKOV CHAINS (12 HOURS)

Stochastic process –notion-Specification –Stationary process –Markov chains –Definition and examples –Higher transition probabilities.

Unit III:TRANSITION PROBABILITIES (12 HOURS)

Classification of states and chains –Determination of higher transition probabilities –

Stability of Markov system –Limiting behavior.

Unit IV:POISSON PROCESS (12 HOURS)

Poisson process and related distributions –Generalization of Poisson process –Birth and

death process.

Unit V:QUEUING AND RELIABILITY (12 HOURS)

Stochastic process in queuing and reliability –Queuing systems, m/m/1 models-Birth and

death process in queuing theory –Multi channel models –Bulk queues.

TEXT BOOK

J.Medhi, Scope and treatment as in "Stochastic process" (2nd edition), New Age International, 2002.

Unit I: Chapter 1(Except1.4)

Unit II: Chapter 2 (Except2.4)

Chapter 3-3.1, 3.2

Unit III: Chapter 3 –3.4, 3.5, 3.6

Unit IV: Chapter 4 –4.2, 4.3, 4.4

Unit V: Chapter 10 –10.1, 10.2, 10.3, 10.4, 10.5(Except10.6, 10.7)

CATEGORY	COURSE CODE	TITLE OF THE COURSE	C	P	CREDIT
ELECTIVE - III	**20MAU29B**	**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 ENHANCEMENTCOURSE - III	20SEUMA3	HTML – PRACTICAL	-	24	2

LIST OF PROGRAMS

All the following listed programs have to be executed and recorded

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
6. A Program to illustrate Table tag
7. A Program to illustrate Frame tag
8. A Program to illustrate Form tag
9. A Program to illustrate CSS (Cascading Style Sheet)
10. A Program in HTML using JavaScript

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