P.K.R. ARTS COLLEGE FOR WOMEN

(Accredited with 'A' Grade by NAAC)

Autonomous Institution-Affiliated to Bharathiar University

Gobichettipalayam-638 476

DEPARTMENT OF MATHEMATICS

BACHELOR OF SCIENCE IN MATHEMATICS

SYLLABUS

For all the candidates admitted from the Academic Year

2021-2022 and onwards

Under CBCS PATTERN

P.K.R ARTS COLLEGE FOR WOMEN (Autonomous),
Gobichettipalayam – 638476.

BACHELOR OF SCIENCE - MATHEMATICS
Programme Scheme and Scheme of Examinations
(For students admitted from 2021-2022 & onwards)
(For branches offering Part-I and Part-II for four semesters)

Scholastic Courses:

Category/Part	Component	Course Code	Title of the Course	Hrs/ week	Exam hrs	CIA	ESE	Total marks	Credits
	SEMESTER - I								
I	Language : I	21LTU01/ 21LHU01/ 21LFU01/ 21LKU01/ 21LMU01/ 21LSU01	Tamil - I/ Hindi - I/ French - I/ Kannada - I/ Malayalam - I/ Sanskrit-I	6	3	50	50	100	4
II	English: I	21LEU01	English - I	6	3	50	50	100	4
III	Core : I	21MAU01	Classical Algebra	4	3	50	50	100	3
III	Core : II	21MAU02	Differential Calculus	5	3	50	50	100	4
III	Core : III Allied : I	21MAU03	Physics - I	4	3	50	50	100	4
III	****	****	Physics Practical	3	-	-	-	-	-
IV	Foundation : I	21FCU01	Environmental studies (Curriculum as recommended by UGC)	2	3	--	50	50	2
			TOTAL	**30**				**550**	**21**

	SEMESTER - II								
I	Language : II	21LTU02/ 21LHU02/ 21LFU02/ 21LKU02/ 21LMU02/ 21LSU02	Tamil- II/ Hindi-II/ French II/ Kannada-II/ Malayalam-II/ Sanskrit-II	6	3	50	50	100	4
II	English : II	21LEU02	English: II	6	3	50	50	100	4
III	Core : IV	21MAU04	Analytical Geometry	4	3	50	50	100	3
III	Core : V	21MAU05	Integral Calculus	5	3	50	50	100	4
III	Core : VI Allied : I	21MAU06	Physics – II	4	3	50	50	100	4
III	Core : VII Allied Practical: I	21MAU07	Physics Practical	3	3	50	50	100	3
IV	Foundation : II	21FCU02	Yoga and Ethics	2	3	--	50	50	2
			TOTAL	**30**				**650**	**24**
	SEMESTER - III								
I	Language : III	21LTU03/ 21LHU03/ 21LFU03/ 21LKU03/ 21LMU03/ 21LSU03	Tamil- III/ Hindi-III/ French-III/ Kannada-III/ Malayalam-III/ Sanskrit-III	6	3	50	50	100	4
II	English : III	21LEU03	English: III	6	3	50	50	100	4
III	Core : VIII	21MAU08	Differential Equations and Laplace Transforms	4	3	50	50	100	3
III	Core : IX	21MAU09	Trigonometry, Vector Calculus and Fourier Series	5	3	50	50	100	3
III	Core : X Allied : II	21MAU10	Statistics - I	5	3	50	50	100	4
IV	Ability Enhancement : I	21AEU01	Information Security	2	3	--	50	50	2
IV	Non- Major Elective	21NMU01A/ 21NMU01B	Indian Women and Society/ Advanced Tamil	2	3	--	50	50	2
			TOTAL	**30**				**600**	**22**

	SEMESTER - IV								
I	Language : IV	21LTU04/ 21LHU04/ 21LFU04/ 21LKU04/ 21LMU04/ 21LSU04	Tamil- IV/ Hindi-IV/ French-IV/ Kannada-IV/ Malayalam-IV/ Sanskrit-IV	6	3	50	50	100	4
II	English : IV	21LEU04	English: IV	6	3	50	50	100	4
III	Core : XI	21MAU11	Mechanics	4	3	50	50	100	3
III	Core : XII	21MAU12	Numerical Methods	4	3	50	50	100	3
III	Core : XIII Allied : II	21MAU13	Statistics - II	5	3	50	50	100	4
IV	Skill Enhancement : I	21SEMAU01	Internet Basics and Office Automation Tools - Practical	2	3	50	-	50	1
IV	Ability Enhancement : II	21AEU02	Consumer Rights (Curriculum as recommended by UGC)	3	3	-	50	50	2
			TOTAL	**30**				**600**	**21**
	SEMESTER – V								
III	Core : XIV	21MAU14	Abstract Algebra	6	3	50	50	100	5
III	Core : XV	21MAU15	Real Analysis - I	6	3	50	50	100	5
III	Core : XVI	21MAU16	Complex Analysis - I	6	3	50	50	100	5
III	Core : XVII	21MAU17A/ 21MAU17B/ 21MAU17C	Institutional Training/ Article ship Training/ Mini Project	--	3	100	--	100	1
III	Core : XVIII (Open Elective)		Offered for students of other programmes / departments	4	3	50	50	100	2
III	Core : XIX Elective : I	21MAU18A/ 21MAU18B	Operations Research – I/ Applied Algebra - I	5	3	50	50	100	4

IV	Skill Enhancement : II	21SEU02	Life Skills (Jeevan Kaushal) (Curriculum as recommended by UGC)	3	3	50	-	50	1
V	Proficiency Enhancement	21PEMAU01	Financial Mathematics (Self Study)	--	3	--	100	100	2
			TOTAL	**30**				**750**	**25**
SEMESTER – VI									
III	Core : XX	21MAU19	Linear Algebra	6	3	50	50	100	5
III	Core : XXI	21MAU20	Real Analysis - II	6	3	50	50	100	5
III	Core : XXII	21MAU21	Complex Analysis - II	6	3	50	50	100	5
III	Core : XXIII Elective : II	21MAU22A/ 21MAU22B	Operations Research – II/ Applied Algebra - II	5	3	50	50	100	4
III	Core : XIV Elective : III	21MAU23A/ 21MAU23B	Graph Theory/ Fuzzy Mathematics	5	3	50	50	100	4
IV	Skill Enhancement : III	21SEMAU03	Latex - Practical	2	3	50	-	50	1
			TOTAL	**30**				**550**	**24**
V	Competency Enhancement		NSS/YRC/RRC/CCC/PHY.EDU/ Others		SEMESTER I – VI				1
			Professional Grooming		SEMESTER I – VI				1
			Students Social activity (Related to the Curriculum)		SEMESTER I –VI				1

Total Marks: 3700 & Total credits: 140

SYLLABUS

(For students admitted from 2021-2022 & onwards)

SEMESTER - I

CATEGORY	COURSE TYPE	COURSE CODE	COURSE TITLE	CONTACT HOURS	CREDIT
PART III	**CORE - I**	**21MAU01**	**CLASSICAL ALGEBRA**	**48**	**3**

Contact hours per week: 4

Year	Semester	Internal Marks	External Marks	Total Marks
First	**I**	**50**	**50**	**100**

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

S.NO	CO STATEMENT	KNOWLEDGE LEVEL
CO1	recall the concepts of Binomial, Exponential, Logarithmic series, Convergence and Divergence of series, multiple roots of an equation.	$\mathbf{K_1}$
CO2	express the summation of series, Theory of equations, Convergence and Divergence of series.	$\mathbf{K_2}$
CO3	apply Binomial, Exponential, Logarithmic series for finding summation of series, different types of methods to find convergence and divergence of series and the roots of an equation.	$\mathbf{K_3}$
CO4	analyze the Binomial, Exponential, Logarithmic, convergence and divergence of series and roots of an equation.	$\mathbf{K_4}$
CO5	evaluate the multiple roots and summation of series the problems by using different types of methods.	$\mathbf{K_5}$

K_1 - Remember; K_2 – Understand; K_3 - Apply; K_4 - Analyze; K_5 – Evaluate.

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	9	9	9	9	3	3	3
CO2	9	9	9	9	3	3	3
CO3	9	9	9	9	3	3	3
CO4	9	3	3	3	1	1	1
CO5	3	3	3	3	1	1	1
Total Contribution of COs to POs	39	33	33	33	11	11	11
Weighted Percentage of COs contribution to POs	**2.29**	**2.10**	**2.27**	**2.49**	**1.44**	**1.43**	**1.82**

Level of Correlation: 0–No Correlation; 1–Low Correlation; 3–Medium Correlation; 9- High Correlation between COs and POs

COURSE CONTENT:

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: THEORY OF EQUATIONS (cont…) (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	3	143-152
	4	188-207
II	4	213-230
III	2	41-89
IV	6	282-303, 318-327
V	6	351-362, 376-382

REFERENCE BOOK

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

WEB REFERENCES:

1. http://www.jjernigan.com/172/ConvergenceDivergenceNotes.pdf
2. http://home.iitk.ac.in/~psraj/mth101/lecture_notes/Lecture11-13.pdf
3. https://maths4uem.files.wordpress.com/2015/09/1028-infinite-series.pdf

CATEGORY	COURSE TYPE	COURSE CODE	COURSE TITLE	CONTACT HOURS	CREDIT
PART III	CORE - II	21MAU02	DIFFERENTIAL CALCULUS	60	4

Contact hours per week: 5

Year	Semester	Internal Marks	External Marks	Total Marks
First	I	50	50	100

Preamble

To enable the students to learn and gain knowledge about differentiation.

Course Outcomes

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

CO NUMBER	CO STATEMENT	KNOWLEDGE LEVEL
CO1	remember all the formulae in differentiation	K_1
CO2	explain the differentiation of derivatives, successive differentiation, maxima and minima, partial differentiation and curvature	K_2
CO3	apply various differential formulae for solving successive differentiation, maxima and minima, partial differentiation and curvature	K_3
CO4	analyze the properties of derivatives, successive differentiation, maxima and minima, partial differentiation and curvature	K_4
CO5	evaluate the two variable and three variable functions by using derivatives, successive differentiation, maxima and minima, partial differentiation and curvature	K_5

K_1 - Remember; K_2 – Understand; K_3 - Apply; K_4 - Analyze; K_5 – Evaluate.

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	9	9	9	9	9	9	3
CO2	9	9	9	9	3	3	3
CO3	9	9	9	9	3	3	1
CO4	9	9	9	9	1	1	1
CO5	9	9	3	3	0	0	0
Total Contribution of COs to POs	45	45	39	39	22	22	8
Weighted Percentage of COs contribution to POs	**2.64**	**2.86**	**2.69**	**2.94**	**2.88**	**2.86**	**1.32**

Level of Correlation: 0–No Correlation; 1–Low Correlation; 3–Medium Correlation; 9- High Correlation between COs and POs

COURSE CONTENT:

UNIT I: DERIVATIVES (12 Hours)

Introduction – Derivative of a constant function – Algebra of derivatives – Derivative of $y = x^n$ - Derivative of $y = e^x$ - Derivative of $y = a^x$ - Derivative of $y = \log_e x$ - Derivative of Trigonometric functions – Derivatives of inverse Trigonometric functions – Derivative of hyperbolic functions – Derivative of inverse hyperbolic functions – Derivative of parametric function – Differentiation of implicit function – Logarithm differentiation – Differentiation of infinite series.

UNIT II: SUCCESSIVE DIFFERENTIATION (12 Hours)

Definition – n^{th} derivatives of some standard functions – Determination of n^{th} derivative of rational functions – The derivatives of the products of the powers of sines and cosines – Leibnitz's theorem.

UNIT III: MAXIMA AND MINIMA **(12 Hours)**

Maxima and Minima values of a function – A necessary condition for extreme values – Sufficient condition for extreme values – Use of second order derivatives – Application to problems.

UNIT IV: PARTIAL DIFFERENTIATION **(12 Hours)**

Introduction – Functions of two variables – Functions of three or more variables – Neighbourhood of a point (a,b) – Continuity of a function of two variables – Limit of a function of two variables – Partial derivatives – Geometrical representation of a function of two variables – Homogenous function – Total differentials – Differentiation of composite function – Change of variables – Differentiation of implicit function.

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

Curvature – Radius of curvature in Cartesian and Polar coordinates – Centre of curvature – Evolutes & Involutes.

TEXT BOOK

1) Mohanty R.K (2014) – "Differential Calculus" – ANMOL Publications pvt ltd.

2) Narayanan.S. and Manicavachasam Pillai.T.K (2017) – "Calculus vol 1"- Viswanathan Publishers.

TEXT BOOK	UNIT	CHAPTER	PAGE NUMBER
Book 1	Unit - I	Chapter 4	Page: 82 - 125
Book 1	Unit – II	Chapter 5	Page: 129 - 160
Book 1	Unit –III	Chapter 8	Page: 241 – 265
Book 1	Unit -IV	Chapter 10	Page: 288-323
Book 2	Unit – V	Chapter 7	Page: 281-316

REFERENCE BOOK

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

WEB REFERENCES:

https://youtu.be/KijGLjxKlsY

https://youtu.be/mzj25fNxobc

https://www.slideshare.net/lohit91/maxima-minima

CATEGORY	COURSE TYPE	COURSE CODE	COURSE TITLE	CONTACT HOURS	CREDIT
PART IV	FOUNDATION - I	21FCU01	ENVIRONMENTAL STUDIES	24	2

Contact hours per week: 2

Year	Semester	Internal Marks	External Marks	Total Marks
First	I	-	50	50

Preamble

To bring about an awareness of a variety of environmental concerns and to create a pro-environmental attitude and a behavioural 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	Define environment, ecosystem, biodiversity, environmental pollution and social issues.	K1
CO2	Explain the natural resources, types of ecosystem, geographical classification of India, causes of environmental pollution and the problems related to the society.	K2
CO3	Identify the information related to environment and the resources to protect it.	K3
CO4	Analyze the classification of natural resources, energy flow in the ecosystem, threats to biodiversity, disaster management and the role of information technology in environment and human health.	K4
CO5	Assess the environmental issues with a focus on sustainability.	K5

K_1 - Remember; K_2 – Understand; K_3 - Apply; K_4 - Analyze; K_5 – Evaluate.

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

CO/PO	PSO	PO2	PO3	PO4	PO5	PO6	PO7
CO1	9	9	9	9	3	3	3
CO2	9	9	9	9	3	1	3
CO3	9	9	9	9	1	1	3

CO4	9	9	9	9	1	1	3
CO5	9	9	3	3	1	1	3
Total Contribution of COs to POs	45	45	39	39	9	7	15
Weighted Percentage of COs contribution to POs	**2.64**	**2.86**	**2.69**	**2.94**	**1.18**	**0.91**	**2.48**

Level of Correlation: 0–No Correlation; 1–Low Correlation; 3–Medium Correlation; 9- High Correlation between COs and POs

COURSE CONTENT:

Unit I 4 Hours

Multidisciplinary Nature of Environmental Studies:

Environment: Definition, Components, Segments and Types. **Natural Resources:**Meaning, Components: (1. **Forest**-Meaning, Importance and Types 2. **Water**- Meaning, Types and Problems 3. **Mineral**- Meaning and Classification 4.**Food**-Meaning and Problems 5.**Energy**-Meaning, Forms and Types 6.**Land**- Meaning, Structure and Functions, Components), **Classification**: Renewable and Non-Renewable Resources, Role of an Individual in Conservation of Natural Resources.

Unit II 5 Hours

Ecosystems – Definition, Features, Structure and Function of an Ecosystem, Producers, Consumers and Decomposers, Energy Flow in the Ecosystem (Water,Carbon,Nitrogen,Oxygen and Energy), Food Chains, Food Webs and Ecological Pyramids

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

- Forest Ecosystem
- Grassland Ecosystem
- Desert Ecosystem

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

Unit III **5 Hours**

Biodiversity and its Conservation-Introduction – Definition – Genetic, Species and Ecosystem Diversity, Biogeographical Classification of India -Value of Biodiversity – Consumptive Use, Productive Use, Social, Ethical, Aesthetic and Option Value- Biodiversity at Global, National and Local Levels- India as a Mega-Diversity Nation- Hot-Spots of Biodiversity- Threats to Biodiversity – Habitat Loss, Poaching of Wildlife, Man-Wildlife Conflicts- Endangered and Endemic Species of IndiaConservation of Biodiversity – In-situ and Ex-situ and Conservation of Biodiversity.

Unit IV **5 Hours**

Environmental Pollution: Definition, Causes, Effects, control measures and Prevention Acts for Air, Water, Soil, Noise, Thermal Pollutions and Nuclear Hazards. **Solid Waste Management**: Meaning, Causes, effects and control measures of urban andindustrial wastes.**Disaster Management**: Meaning, Types of Disasters: floods, earthquake, cyclone and landslides.**Environmental Ethics:** Issues and possible solutions- Climate change, global warming, acid rain, ozone layer depletion, nuclear - accidents and holocaust. Consumerism and waste products, Public Awareness.

Unit V **5 Hours**

Social Issues and the Environment: From Unsustainable to Sustainable development- Urban problems related to energy- Water conservation, rain water harvesting, watershed management- Resettlement and rehabilitation of people; its problems and concerns.

Human Population and the Environment: Population growth and distribution- Population explosion – Family Welfare Programme-Environment and human health- HIV/AIDS- Role of Information Technology in Environment and human health- Medical transcription and bio-informatics.

REFERENCE

1. Agarwal, K.C. 2001 Environmental Biology, Nidi Publ. Ltd. Bikaner.
2. Bharucha Erach, The Biodiversity of India, Mapin Publishing Pvt. Ltd., Ahmedabad
3. Brunner R.C., 1989, Hazardous Waste Incineration, McGraw Hill Inc. 480p
4. Clark R.S., Marine Pollution, Clanderson Press Oxford (TB)
5. Cunningham, W.P. Cooper, T.H. Gorhani, E & Hepworth, M.T. 2001,
6. Environmental Encyclopedia, Jaico Publ. House, Mumabai, 1196p
7. De A.K., Environmental Chemistry, Wiley Eastern Ltd.
8. Down to Earth, Centre for Science and Environment (R)
9. Gleick, H.P. 1993. Water in crisis, Pacific Institute for Studies in Dev.,
10. Environment & Security. Stockholm Env. Institute Oxford Univ. Press. 473p

11. Hawkins R.E., Encyclopedia of Indian Natural History, Bombay Natural
12. History Society, Bombay (R)
13. Heywood, V.H & Waston, R.T. 1995. Global Biodiversity Assessment,Cambridge Univ. Press 1140p.
14. Jadhav, H & Bhosale, V.M. 1995. Environmental Protection and Laws, Himalaya Pub. House, Delhi 284 p.
15. Mckinney, M.L. & School, R.M. 1996. Environmental Science systems &Solutions, Web enhanced edition. 639p.
16. Mhaskar A.K., Matter Hazardous, Techno-Science Publication (TB)
17. Miller T.G. Jr. Environmental Science, Wadsworth Publishing Co. (TB)
18. Odum, E.P. 1971. Fundamentals of Ecology. W.B. Saunders Co. USA, 574p
19. Rao M N. & Datta, A.K. 1987. Waste Water treatment. Oxford & IBH Publ.Co. Pvt. Ltd. 345p.
20. Sharma B.K., 2001. Environmental Chemistry. Geol Publ. House, Meerut
21. Survey of the Environment, The Hindu (M)
22. Townsend C., Harper J, and Michael Begon, Essentials of Ecology, BlackwellScience (TB)

SEMESTER - II

CATEGORY	COURSE TYPE	COURSE CODE	COURSE TITLE	CONTACT HOURS	CREDIT
PART III	CORE- IV	21MAU04	ANALYTICAL GEOMETRY	48	3

Contact hours per week: 4

Year	Semester	Internal Marks	External Marks	Total Marks
First	II	50	50	100

Preamble

To enable the students to learn and visualize the fundamental ideas about conic, Straight line, Sphere, cone, cylinder and conicoid.

Course Outcomes

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

CO NUMBER	CO STATEMENT	KNOWLEDGE LEVEL
CO1	recall the definitions based on conic, Straight line, Sphere, cone, cylinder and conicoid.	K_1
CO2	express the concepts of conic, Straight line, Sphere, cone, cylinder and conicoid.	K_2
CO3	apply the various concepts of straight lines, conic, sphere, cone, cylinder and conicoid to determine the respective equations.	K_3
CO4	analyze the concepts of two dimensional and three dimensional Analytical Geometry.	K_4
CO5	evaluate the equation of a conic, sphere, cone, cylinder and shortest distance between two straight lines.	K_5

K_1 - Remember; K_2 – Understand; K_3 - Apply; K_4 - Analyze; K_5 – Evaluate.

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	9	9	9	9	3	3	3
CO2	9	9	9	9	3	3	3
CO3	9	9	9	9	3	3	3
CO4	9	3	3	3	3	3	3
CO5	3	3	3	3	1	1	1
Total Contribution of COs to POs	39	33	33	33	13	13	13
Weighted Percentage of COs contribution to POs	**2.29**	**2.10**	**2.27**	**2.49**	**1.70**	**1.69**	**2.15**

Level of Correlation: 0–No Correlation; 1–Low Correlation; 3–Medium Correlation; 9- High Correlation between COs and POs

COURSE CONTENT:

UNIT I: CONIC (10 Hours)

Polar coordinates equation of a conic - Directrix-Chord- Tangent-Normal- Simple problems.

UNIT II: STRAIGHT LINES (10 Hours)

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

UNIT III: SPHERE (10 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 (10 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 **(8 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	BOOK	CHAPTER	PAGE NUMBER
Unit - I	**Book - 1**	**Chapter 9**	**Page: 325-330 Results without proof and Page 331-363**
Unit – II	**Book –2**	**Chapter 3**	**Page: 46- 71**
Unit – III	**Book - 2**	**Chapter 4**	**Page: 92 – 110**
Unit – IV	**Book - 2**	**Chapter 5**	**Page: 115 – 138**
Unit - V	**Book - 2**	**Chapter 5**	**Page: 141 – 160**

REFERENCE BOOK

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

WEB RESOURCES:

1. http://www.brainkart.com/article/Three-Dimensional-Analytical-Geometry_6453/
2. http://egyankosh.ac.in/bitstream/123456789/11990/1/Unit-2.pdf
3. https://en.wikipedia.org/wiki/Analytic_geometry

CATEGORY	COURSE TYPE	COURSE CODE	COURSE TITLE	CONTACT HOURS	CREDIT
PART III	CORE- V	21MAU05	INTEGRAL CALCULUS	60	4

Contact hours per week: 5

Year	Semester	Internal Marks	External Marks	Total Marks
First	II	50	50	100

Preamble

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

Course Outcomes

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

CO NUMBER	CO STATEMENT	KNOWLEDGE LEVEL
CO1	recall the basic definitions of Integration	K_1
CO2	explain the integration of rational, irrational, trigonometric and Improper integrals	K_2
CO3	apply various integral formulae to solve rational, irrational, trigonometric and Improper integrals	K_3
CO4	analyze the properties of Methods of integration, integration of rational- irrational- trigonometric functions, Beta and Gama functions and convergence/divergence of integrals	K_4
CO5	evaluate double and triple integrals by using Methods of integration, Integration of rational-irrational- trigonometric functions and Improper integrals.	K_5

K_1 **- Remember;** K_2 **– Understand;** K_3 **- Apply;** K_4 **- Analyze;** K_5 **– Evaluate**.

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

CO/PO	PSO	PO2	PO3	PO4	PO5	PO6	PO7
CO1	9	9	9	9	9	9	3
CO2	9	9	9	9	3	3	3
CO3	9	9	9	9	3	3	1
CO4	9	9	9	9	1	1	1
CO5	9	9	3	3	0	0	0
Total Contribution of COs to POs	45	45	39	39	22	22	8
Weighted Percentage of COs contribution to POs	**2.64**	**2.86**	**2.69**	**2.94**	**2.88**	**2.86**	**1.32**

Level of Correlation: 0–No Correlation; 1–Low Correlation; 3–Medium Correlation; 9- High Correlation between COs and POs

COURSE CONTENT:

UNIT I: METHODS OF INTEGRATION (12 Hours)

Methods of integration – Integration by substitution – Three important deduction of substitution – Six important integrals – Integration of some important forms – Integration by parts of a product – Extension of the rule of integration by parts.

UNIT II: INTEGRATION OF RATIONAL FUNCTION (12 Hours)

Introduction – Linear non-repeated factors only in the denominator – Linear repeated factors only in the denominator – Quadratic non-repeated factors only in the denominator – Quadratic repeated factors only in the denominator – Integration without breaking into partial fraction – Integrand consisting of even power of x only – Integration of algebric rational functions by substdxitution2 - Integration of algebric rational functions of e^x.

UNIT III: INTEGRATION OF IRRATIONAL FUNCTIONS (12 Hours)

Integration of rational function of $(ax+b)^{1/n}$ - Integrals of the type (i) $\int\sqrt{(ax^2+bx+c)}dx$ (ii) $\int(px+q)\sqrt{(ax^2+bx+c)}dx$ - Integrals of the type (i) $\int\frac{dx}{\sqrt{(ax^2+bx+c)}}$ (ii) $\int\frac{px+q}{\sqrt{(ax^2+bx+c)}}dx$ - Integration of $\int\frac{dx}{(px+q)\sqrt{(ax+b)}}$, $\int\frac{dx}{(px^2+qx+r)\sqrt{(ax+b)}}$, $\int\frac{dx}{(px+q)\sqrt{(ax^2+bx+c)}}$, $\int\frac{dx}{(px^2+qx+r)\sqrt{(ax^2+bx+c)}}$, $\int x^p(a+bx^n)^q dx$.

UNIT IV: INTEGRATION OF TRIGONOMETRIC FUNCTIONS (12 Hours)

Integration of - $\sin^n x$, n>0 – $\cos^n x$, n>0 – $\tan^n x$ and $\cot^n x$, n>0 – $\sec^n x$, $\operatorname{cosec}^n x$, x>0 - $\sin^p x\cos^q x$, p>0,q>0 – Integration $\sin^p x\cos^q x$, when p+q is a negative even integer.

UNIT V: IMPROPER INTEGRALS (12 Hours)

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

TEXT BOOK

i) Mohanty R.K (2014) – "Integral Calculus" – ANMOL Publications pvt ltd.

ii) Narayanan.S. and Manicavachasam Pillai.T.K (2017) – "Calculus vol 2"- Viswanathan Publishers.

BOOK	UNIT	CHAPTER	PAGE NUMBER
Book I	Unit - I	Chapter 1	Page: 1 - 57
Book I	Unit – II	Chapter 2	Page: 59 - 81
Book I	Unit –III	Chapter 3	Page: 86 – 122
Book I	Unit -IV	Chapter 4	Page: 124-165
Book II	Unit – V	Chapter 7	Page: 278-300

REFERENCE BOOK

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

WEB REFERENCES:

1. https://www.slideshare.net/FarzadJavidanrad/integral-calculus-43522803V
2. https://www.youtube.com/watch?v=o75AqTInKDU
3. https://www.youtube.com/watch?v=bzIrspIDYIs

CATEGORY	COURSE TYPE	COURSE CODE	COURSE TITLE	CONTACT HOURS	CREDIT
PART IV	FOUNDATION - II	21FCU02	YOGA AND ETHICS	24	2

Contact hours per week: 2

Year	Semester	Internal Marks	External Marks	Total Marks
First	II	-	50	50

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	recollect the basic terminologies in yoga and value education	K1
CO2	demonstrate the importance of yoga, mental exercises, principles of life and components of values.	K2
CO3	apply the techniques of dynamic & mental exercises and philosophical values in real life	K3
CO4	classify the different types of asanas, stages of mind, analysis of thought, ethical values and social values.	K4
CO5	evaluate how the yoga and value education make a person strong both physically and mentally	K5

K_1 - Remember; K_2 – Understand; K_3 - Apply; K_4 - Analyze; K_5 – Evaluate.

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	9	9	9	3	1	1	3
CO2	9	9	9	3	3	1	3
CO3	9	9	9	3	3	3	3
CO4	9	9	9	3	3	3	3
CO5	9	9	9	3	3	3	3
Total Contribution of COs to POs	45	45	45	15	13	11	15
Weighted Percentage of COs contribution to POs	**2.64**	**2.86**	**3.10**	**1.13**	**1.70**	**1.43**	**2.48**

Level of Correlation: 0–No Correlation; 1–Low Correlation; 3–Medium Correlation; 9- High Correlation between COs and POs

COURSE CONTENT:

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.

UNITII 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 (5 Hours)

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)

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)

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 TYPE	COURSE CODE	COURSE TITLE	CONTACT HOURS	CREDIT
PART III	CORE - VIII	21MAU08	DIFFERENTIAL EQUATIONS AND LAPLACE TRANSFORMS	48	3

Contact hours per week: 4

Year	Semester	Internal Marks	External Marks	Total Marks
Second	III	50	50	100

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	recall the basic concepts of ordinary, partial, linear differential equations and Laplace transforms.	K_1
CO2	identify the solutions of ordinary, partial differential equations, Laplace and inverse Laplace transformations.	K_2
CO3	apply Clairaut's form, Laplace and inverse Laplace transforms, direct integration to solve Differential Equations.	K_3
CO4	analyze the difference between Laplace and inverse Laplace transforms, ordinary and partial differential equations.	K_4
CO5	evaluate the solutions for ordinary, partial, linear differential equations and Laplace transforms.	K_5

K_1 - Remember; K_2 – Understand; K_3 - Apply; K_4 - Analyze; K_5 – Evaluate.

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	9	9	9	9	3	3	3
CO2	9	9	9	9	3	3	3
CO3	9	9	9	9	3	3	3
CO4	9	9	9	9	3	3	3
CO5	9	9	9	9	3	3	3
Total Contribution of COs to POs	45	45	45	45	15	15	15
Weighted Percentage of COs contribution to POs	**2.64**	**2.86**	**3.10**	**3.39**	**1.96**	**1.95**	**2.48**

Level of Correlation: 0–No Correlation; 1–Low Correlation; 3–Medium Correlation; 9- High Correlation between COs and POs

COURSE CONTENT:

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	CHAPTER	PAGE NUMBER
Unit - I	**Chapter 1**	**Page: 1-15**
Unit – II	**Chapter 2,4,5**	**Page: 16-40**
Unit - III	**Chapter 1**	**Page: 117 – 143, 150 – 162**
Unit - IV	**Chapter 1**	**Page: 187-201**
Unit - V	**Chapter 1**	**Page: 202-236**

REFERENCE BOOK

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

WEB RESOURCES:

1. http://www.nptelvideos.in/2012/11/mathematics-iii.html
2. https://www.digimat.in/nptel/courses/video/111108081/L02.html
3. https://www.ijsr.net/archive/v2i1/ijsron2013331.pdf
4. https://www.whitman.edu/mathematics/calculus_online/chapter17.html

CATEGORY	COURSE TYPE	COURSE CODE	COURSE TITLE	CONTACT HOURS	CREDIT
PART III	CORE - IX	21MAU09	TRIGONOMETRY, VECTOR CALCULUS AND FOURIER SERIES	60	3

Contact hours per week: 5

Year	Semester	Internal Marks	External Marks	Total Marks
Second	III	50	50	100

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	recall the basic concepts of cosines and sines of multiples of θ, logarithmic of complex quantity, scalar and vector fields, integration of vectors and periodic functions	K_1
CO2	illustrate the concepts of summation of series using binomial, exponential and logarithmic series theorem, differentiation of vectors, line integral and surface integral and Fourier series of periodicity 2π	K_2
CO3	apply C+iS method, Green's theorem, Gauss divergence theorem, Stoke's theorem and Half range series for finding summation of series and values of integrals.	K_3
CO4	analyze the relation between trigonometric series and hyperbolic series, Grogory's series and gradient, divergent, curl, also Gauss theorem and Stoke's theorem, even and odd function	K_4
CO5	evaluate the integrals using Gauss divergence theorem, Stoke's theorem and Fourier series of	K_5

	periodicity 2π using Dirichlet conditions	

K_1 - Remember; K_2 – Understand; K_3 - Apply; K_4 - Analyze; K_5 – Evaluate.

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	9	9	9	9	3	3	3
CO2	9	9	9	9	3	3	3
CO3	9	9	9	3	3	3	3
CO4	3	3	3	3	1	0	0
CO5	3	3	3	1	0	0	0
Total Contribution of COs to POs	39	33	33	25	10	9	9
Weighted Percentage of COs contribution to POs	**2.29**	**2.10**	**2.27**	**1.89**	**1.31**	**1.17**	**1.49**

Level of Correlation: 0–No Correlation; 1–Low Correlation; 3–Medium Correlation; 9- High Correlation between COs and POs

COURSE CONTENT:

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 (2104) and Volume IV (2105), S.Chand and Company Ltd, New Delhi.

UNIT	VOLUME	CHAPTER	PAGE NUMBER
I	I	2	122 – 139
II	II	1	242 – 247
		2	248 – 276
III	IV	1	1-7
		2	8-23
IV	IV	3	24 – 92
V	IV	1	93-145

REFERENCE BOOKS:

1. Manichavasagam Pillai T.K and Narayanan S. (2112) -"Trigonometry", Viswanathan Publishers and Printers Pvt. Ltd.

2. Manichavasagam Pillai T.K and Narayanan S., Hanumantha Rao (2111) – "Ancillary Mathematics", Volume II, Viswanathan Publishersand Printers Pvt. Ltd.

WEB RESOURCES:

1. https://mathworld.wolfram.com/FourierSeries.html
2. https://math.libretexts.org/Bookshelves/Calculus/Book%3A_Vector_Calculus_(Corral)/04%3A_Line_and_Surface_Integrals/4.06%3A_Gradient_Divergence_Curl_and_Laplacian
3. https://youtu.be/Gk70xiGQlw8

CATEGORY	COURSE TYPE	COURSE CODE	COURSE TITLE	CONTACT HOURS	CREDIT
PART III	CORE – X ALLIED - II	21MAU10	STATISTICS - I	60	4

Contact hours per week: 5

Year	Semester	Internal Marks	External Marks	Total Marks
Second	III	50	50	100

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	recall the definitions of random variable, mathematical expectation, transformation of variable, measures of central tendency, correlation and regression analysis.	K_1
CO2	explain the concepts of random variable, mathematical expectation, transformation of variable, measures of central tendency, correlation and regression analysis.	K_2
CO3	interpret the concepts of random variable, mathematical expectation, transformation of variable, measures of central tendency, correlation and regression analysis.	K_3
CO4	analyze the properties of mathematical expectation, transformation of variable, relationship among mean, median, mode, correlation coefficient and regression equation.	K_4

CO5	evaluate the problems based on one and two dimensional probability mass and density functions, measures of central tendency, correlation and predict the regression equation.	**K_5**

K_1 - Remember; K_2 – Understand; K_3 - Apply; K_4 - Analyze; K_5 – Evaluate.

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	9	9	9	9	3	3	3
CO2	9	9	9	9	3	3	3
CO3	9	9	9	9	3	3	3
CO4	9	9	9	9	3	3	3
CO5	9	9	3	3	3	3	3
Total Contribution of COs to POs	45	45	39	39	15	15	15
Weighted Percentage of COs contribution to POs	**2.64**	**2.86**	**2.69**	**2.94**	**1.96**	**1.95**	**2.48**

Level of Correlation: 0–No Correlation; 1–Low Correlation; 3–Medium Correlation; 9- High Correlation between COs and POs

COURSE CONTENT:

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.,(2107) "Fundamentals of Mathematical statistics", Sultan Chand & Sons, New Delhi.

UNIT	CHAPTER	SECTION	PAGE
I	5	5.1 – 5.4	5.1 – 5.31
II	6,7	6.1 – 6.5, 7.1 – 7.3	6.1 – 6.10, 7.1 – 7.14
III	5,7	5.5 – 5.7, 7.5	5.32-5.60, 7.24 – 7.26

2. Navnitham. PA. (2112) - **"**Business Mathematics and Statistics**"**, Jai publishers, Trichy.

UNIT	CHAPTER	PAGE
IV	7	159,162-175,196-219,212-227,251-260
V	12,13	503-523, 540-553

REFERENCE BOOKS

1. Guptha, C.B and Vijay Guptha., (2108) "Introduction to Statistical methods", Vikas Publishing house Pvt, Ltd.
2. Guptha, S.P. (2114), "Statistical methods", Sultan Chand & Sons.

WEB REFERENCES:

1.https://stats.libretexts.org/Bookshelves/Introductory_Statistics/Book%3A_Introductory_Statistics_(Shafer_and_Zhang)/00%3A_Front_Matter/03%3A_Table_of_Contents

2. https://en.wikipedia.org/wiki/Statistics

3. https://dailymedicos.com/application-of-statistics-in-the-medical-field/

4. https://study.com/academy/lesson/application-of-statistics-in-daily-life.html

5. https://study.com/academy/lesson/application-of-statistics-in-business.html

CATEGORY	COURSE TYPE	COURSE CODE	COURSE TITLE	CONTACT HOURS	CREDIT
PART IV	ABILITY ENHANCEMENT - I	21AEU01	INFORMATION SECURITY	24	2

Contact hours per week: 2

Year	Semester	Internal Marks	External Marks	Total Marks
Second	III	-	50	50

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	Recall the fundamental concepts of Information Security, Risk and Security policies	K1
CO2	Discuss the concepts of Risks, vulnerabilities, ethical and privacy issues	K2
CO3	Apply the ideas in security planning and construct the policies	K3
CO4	Categorizethe Privacy, Ethical Issues, Laws, Software Issues and Crimes	K4
CO5	Summarize Cryptography, cipher text and threats in information security	K5

K_1 - Remember; K_2 – Understand; K_3 - Apply; K_4 - Analyze; K_5 – Evaluate.

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	9	9	9	9	9	9	9
CO2	9	9	9	9	9	9	3
CO3	9	9	9	9	3	3	3

CO4	9	9	9	9	3	3	3
CO5	9	9	9	9	3	1	1
Total Contribution of COs to POs	45	45	45	45	27	16	19
Weighted Percentage of COs contribution to POs	**2.64**	**2.86**	**3.10**	**3.39**	**3.53**	**2.08**	**3.15**

Level of Correlation: 0–No Correlation; 1–Low Correlation; 3–Medium Correlation; 9- High Correlation between COs and POs

COURSE CONTENT:

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 (4 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 (5 Hours)

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

TEXT BOOK:

1. SumitraKisan and D.ChandrasekharRao,Information Security Lecture Notes, Departmentof Computer Science and Engineering & Information Technology, Veer SurendraSaiUniversity of Technology (Formerly UCE, Burla) Burla, Sambalpur, Odisha.

REFERENCE BOOK:

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

CATEGORY	COURSE TYPE	COURSE CODE	COURSE TITLE	CONTACT HOURS	CREDIT
PART IV	NON-MAJOR ELECTIVE	21NMU01A	INDIAN WOMEN AND SOCIETY	24	2

Contact hours per week: 2

Year	Semester	Internal Marks	External Marks	Total Marks
Second	III	-	50	50

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	know women status in Indian society as an academic discipline	K1
CO2	interpret the various roles of women, challenges and issues faced by them in the society	K2
CO3	find out solutions to their legal issues and product themselves from the violence against women emphasize on women entrepreneurship for their empowerment	K3
CO4	critically analyze the lifestyle and challenges of women	K4
CO5	discuss the importance of women health and issues related to women in general	K5

K_1 - Remember; K_2 – Understand; K_3 - Apply; K_4 - Analyze; K_5 – Evaluate.

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	9	9	9	9	0	0	0
CO2	9	9	9	9	3	0	3
CO3	9	9	9	9	9	9	9
CO4	3	3	3	9	9	9	9

CO5	3	3	1	1	1	9	9
Total Contribution of COs to POs	33	33	31	37	22	27	30
Weighted Percentage of COs contribution to POs	**1.94**	**2.10**	**2.14**	**2.79**	**2.88**	**3.51**	**4.97**

Level of Correlation: 0–No Correlation; 1–Low Correlation; 3–Medium Correlation; 9- High Correlation between COs and POs

COURSE CONTENT:

UNIT: I Historical Background (5 Hours)

History of Women's status from Vedic times, Women's participation inIndia'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	TRowbotham, Sheila	Hidden from History: Women's Oppression and the Fightagainst It	Pluto Press, London	1975
5	Susheela Mehta	Revolution and the Status of Women	Metropolitan Bookco.pvt ltd, New Delhi	1989

SEMESTER - IV

CATEGORY	COURSE TYPE	COURSE CODE	COURSE TITLE	CONTACT HOURS	CREDIT
PART III	CORE - XI	21MAU11	MECHANICS	48	3

Contact hours per week: 4

Year	Semester	Internal Marks	External Marks	Total Marks
Second	IV	50	50	100

Preamble

To enable the students to gain the knowledge about parallel forces, resultant forces, coplanar forces, projectiles, impact on a fixed surface, central orbits.

Course Outcomes

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

CO NUMBER	CO STATEMENT	KNOWLEDGE LEVEL
CO1	recall the concepts of fundamental laws, moments, coplanar forces, projectiles and equations of motion of central orbits.	K_1
CO2	explain the different types of laws, forces, radial and transverse components of orbits, height, time and range of a projectile, direct and oblique impact.	K_2
CO3	apply the principles of static equilibrium, projectiles, conservation of momentum, reduction of forces to solve simple real life problems.	K_3
CO4	analyze the equilibrium of a particle, projectiles, radial and transverse components of orbits and impact of elastic bodies.	K_4
CO5	evaluate two fold problems in central orbits, magnitude and resultant of the forces, before and after impact velocities, range on an inclined plane.	K_5

K_1 - Remember; K_2 – Understand; K_3 - Apply; K_4 - Analyze; K_5 – Evaluate.

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	9	9	9	9	3	3	3
CO2	9	9	9	9	3	3	3
CO3	9	9	9	9	3	3	3
CO4	9	9	9	9	3	3	3
CO5	9	9	9	9	1	1	1
Total Contribution of COs to POs	45	45	45	45	13	13	13
Weighted Percentage of COs contribution to POs	**2.64**	**2.86**	**3.10**	**3.39**	**1.70**	**1.69**	**2.15**

Level of Correlation: 0–No Correlation; 1–Low Correlation; 3–Medium Correlation; 9- High Correlation between COs and POs

COURSE CONTENT:

UNIT I: FORCES ACTING AT A POINT AND MOMENTS (10 Hours)

Parallelogram law-triangle law –Converse of Triangle Law-Polygon Law of Forces-Lami's Theorem - Parallel Forces – Moments- Varignon's Theorem of moments-Generalized theorem of moments

UNIT II: 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 III: PROJECTILES (10 Hours)

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

UNIT IV: CENTRAL ORBITS (10 Hours)

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

UNIT V : IMPACT ON A FIXED SURFACE (8 Hours)

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

IMPACT OF SMOOTH ELASTIC SPHERES

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

1. Venkataraman M.K., (2005) – "Statics", Eleventh edition,Agasthiar Publications, Trichy.
2. Venkataraman.M.K., (2014) –"Dynamics", 16thedition,Agasthiar Publications, Trichy.

Unit	Chapter	Page
I	2 , 3	06-26, 52-75
II	5 6	98 & 99 143-167
III	6	139-160, 172-182
IV	11	356-359, 371-383
V	8	215-228, 232-241, 244-248

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

WEB RESOURCES:

1. https://www.askiitians.com/iit-jee-physics/mechanics/motion-of-projectile.aspx
2. https://youtu.be/Shm1diiyrPY
3. https://en.wikipedia.org/wiki/Dynamics_(mechanics)

CATEGORY	COURSE TYPE	COURSE CODE	COURSE TITLE	CONTACT HOURS	CREDIT
PART III	CORE - XII	21MAU12	NUMERICAL METHODS	48	3

Contact hours per week: 4

Year	Semester	Internal Marks	External Marks	Total Marks
Second	IV	50	50	100

Preamble

To enable the students to learn and gain knowledge about linear algebraic and transcendental equations, system of linear equations, Finite differences, Interpolation and Numerical Differentiation.

Course Outcomes

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

CO NUMBER	CO STATEMENT	KNOWLEDGE LEVEL
CO1	recall the basic concepts of linear algebraic and transcendental equations, simultaneous equations, Finite differences, Interpolation and Numerical Differentiation.	K_1
CO2	explain the procedure in finding the roots and values of an equation and the various difference tables to get the unknown values.	K_2
CO3	apply various methods to solve the Algebraic, Transcendental, Simultaneous equations and using the difference table to get the unknown values.	K_3
CO4	compare the various methods involved in solving Simultaneous equations and different kinds of difference operators	K_4

CO5	evaluate the problems by using Bisection method, iterative method, Newton-Raphson method, direct and indirect method and Newton's formula.	**K_5**

K_1 - Remember; K_2 – Understand; K_3 - Apply; K_4 - Analyze; K_5 – Evaluate.

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	9	9	9	9	9	9	9
CO2	9	9	9	9	9	9	9
CO3	9	9	9	9	9	9	9
CO4	9	9	9	3	3	3	3
CO5	9	3	3	3	3	3	3
Total Contribution of COs to Pos	45	39	39	33	33	33	33
Weighted Percentage of COs contribution to Pos	**2.64**	**2.48**	**2.69**	**2.49**	**4.31**	**4.29**	**5.46**

Level of Correlation: 0–No Correlation; 1–Low Correlation; 3–Medium Correlation; 9- High Correlation between COs and POs

COURSE CONTENT:

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

Introduction – The Bisection Method – Method of Successive Approximations or the Iteration Method –Newton's Iteration Method or Newton-Raphson Method - Convergence condition of Newton-Raphson Method – Order of Convergence of Newton-Raphson Method.

UNIT II: SIMULTANEOUS LINEAR ALGEBRAIC EQUATIONS (10 Hours)

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

UNIT III: FINITE DIFFERENCES (10 Hours)

Introduction – First Differences – Higher Differences – Difference Tables – Forward Differences - Backward Differences –Central Differences- Properties of the operator Δ– Diffrences of a Polynomial – The Operator E –Relationship between the Operators.

UNIT IV: INTERPOLATION (10 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.

UNIT V: NUMERICAL DIFFERENTIATION (8 Hours)

Introduction – Newton's Forward difference Formula –Newton's Backward difference Formula -Derivative using Stirling's Formula– Maxima and Minima Functions.

TEXT BOOK:

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

UNIT	CHAPTER	PAGE NUMBER
I	3	81– 90 97-105
II	4	113 – 120, 126 – 130, 140 – 146
III	5	153 – 165,177 – 184
IV	6	193 –202, 244 – 253.
V	9	265-274, 277-278

REFERENCE BOOK:

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

WEB REFERENCES:

1. https://brilliant.org/wiki/newton-raphson-method/
2. https://www.geeksforgeeks.org/newton-forward-backward-interpolation/
3. https://youtu.be/v7kapVuoWhY

CATEGORY	COURSE TYPE	COURSE CODE	COURSE TITLE	CONTACT HOURS	CREDIT
PART III	CORE – XIII ALLIED - II	21MAU13	STATISTICS - II	60	4

Contact hours per week: 5

Year	Semester	Internal Marks	External Marks	Total Marks
Second	IV	50	50	100

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	recall the basic definitions and notations of probability distributions, estimation, sampling, confidence limit, test of hypothesis and test of significance.	K_1
CO2	identify the concepts of probability distributions, estimation, sampling, confidence limit, test of hypothesis and test of significance.	K_2
CO3	classify the distribution, method of estimation, types of error and sampling.	K_3
CO4	examine the problems based on probability distributions, estimation, test of hypothesis.	K_4
CO5	evaluate the various types of distributions, estimation, limits, errors and significance.	K_5

K_1 - Remember; K_2 – Understand; K_3 - Apply; K_4 - Analyze; K_5 – Evaluate.

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	9	9	9	9	3	3	3
CO2	9	9	9	9	3	3	3
CO3	9	9	9	9	3	3	3
CO4	9	9	9	9	3	3	3
CO5	9	9	3	3	3	3	3
Total Contribution of COs to Pos	45	45	39	39	15	15	15
Weighted Percentage of COs contribution to Pos	**2.64**	**2.86**	**2.69**	**2.94**	**1.96**	**1.95**	**2.48**

Level of Correlation: 0–No Correlation; 1–Low Correlation; 3–Medium Correlation; 9- High Correlation between COs and POs

COURSE CONTENT:

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,(2104) 33rd revised edition-" Statistical methods", Sultan chand & Sons.

UNIT	CHAPTER	SECTION	PAGE
I	**2**	**-**	**809,813,817-824,826-846,853-856**

2. Guptha, S.C & Kapoor, V.K.,(2107) - "Fundamentals of Mathematical statistics",Sultan chand & Sons.

UNIT	CHAPTER	SECTION	PAGE
II	**17**	**17.1 – 17.3**	**17.1- 17.21**
III	**17**	**17.6 – 17.7**	**17.30 – 17.52**
IV	**18 ,14,16**	**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 (2113) 4th edition, "Comprehensive statistical methods", S.Chand & company pvt. Ltd

UNIT	CHAPTER	SECTION	PAGE
V	**15**	**15.1-15.8**	**15.1-15.6**

REFERENCE BOOKS

1. Guptha C.B and Vijay Guptha (2108) "Introduction to Statistical methods", Vikas publishing house pvt Ltd .
2. Guptha S.P.(2114) "Statistical methods", Sultan Chand & Sons.

WEB REFERENCES:

1.https://stats.libretexts.org/Bookshelves/Introductory_Statistics/Book%3A_Introductory_Statistics_(Shafer_and_Zhang)/00%3A_Front_Matter/03%3A_Table_of_Contents
2. https://en.wikipedia.org/wiki/Statistics

3. https://dailymedicos.com/application-of-statistics-in-the-medical-field/
4. https://study.com/academy/lesson/application-of-statistics-in-daily-life.html
5. https://study.com/academy/lesson/application-of-statistics-in-business.html

CATEGORY	COURSE TYPE	COURSE CODE	COURSE TITLE	CONTACT HOURS	CREDIT
PART IV	SKILL ENHANCEMENT -I	21SEMAU01	INTERNET BASICS AND OFFICE AUTOMATION TOOLS - PRACTICAL	24	1

Contact hours per week: 2

Year	Semester	Internal Marks	External Marks	Total Marks
Second	IV	50	-	50

Preamble

To enable the students to learn and gain knowledge about internet basics and MS Office

Course Outcomes

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

CO NUMBER	CO STATEMENT	KNOWLEDGE LEVEL
CO1	Understand to work on gmail account, websites and MS Office	K_1
CO2	Visualize various websites and presentations	K_2
CO3	Apply different formats in documents, excel sheets, presentations and all the options in gmail account	K_3
CO4	Examine the programs based on gmail account, websites and MS Office	K_4
CO5	Create a Gmail account, a document, a spread sheet and a presentation slide	K_5

K_1 - Remember; K_2 – Understand; K_3 - Apply; K_4 - Analyze; K_5 – Evaluate.

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	9	9	9	9	9	9	9
CO2	9	9	9	9	9	9	9

CO3	9	9	9	9	9	9	3
CO4	9	9	9	9	3	3	1
CO5	9	9	9	9	3	3	1
Total Contribution of COs to POs	45	45	45	45	33	33	22
Weighted Percentage of COs contribution to POs	**2.64**	**2.86**	**3.10**	**3.39**	**4.31**	**4.29**	**3.64**

Level of Correlation: 0–No Correlation; 1–Low Correlation; 3–Medium Correlation; 9- High Correlation between COs and POs

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

WEB REFERENCES:

1. https://youtu.be/4vRazeA4UMc
2. https://youtu.be/0vFLJM_UN14
3. https://youtu.be/WJe_oYa3itE

CATEGORY	COURSE TYPE	COURSE CODE	COURSE TITLE	CONTACT HOURS	CREDIT
PART IV	ABILITY ENHANCEMENT -II	21AEU02	CONSUMER RIGHTS	36	2

Contact hours per week: 3

Year	Semester	Internal Marks	External Marks	Total Marks
Second	IV	-	50	50

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	Memorize the procedure of redress of consumer complaints, and the role of different agencies in establishing product and service standards	K1
CO2	Explain the Consumer Protection Law in India	K2
CO3	Impart sound practical grounding about the practice of consumer law and the procedure followed	K3
CO4	Evaluate the regulations and legal actions that helps to protect consumers	K4
CO5	Analyse the knowledge and skills needed for a career in this field	K5

K_1 - Remember; K_2 – Understand; K_3 - Apply; K_4 - Analyze; K_5 – Evaluate.

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	9	9	9	9	1	0	1
CO2	9	9	9	9	1	0	1

CO3	9	9	9	3	3	1	1
CO4	9	3	1	1	3	3	3
CO5	9	1	3	0	9	9	9
Total Contribution of COs to POs	45	31	31	22	17	13	15
Weighted Percentage of COs contribution to POs	**2.64**	**1.97**	**2.14**	**1.66**	**2.22**	**1.69**	**2.48**

Level of Correlation: 0–No Correlation; 1–Low Correlation; 3–Medium Correlation; 9- High Correlation between COs and POs

COURSE CONTENT:

UNIT: I Conceptual Framework (8 Hours)

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: II The Consumer Protection Law in India (8 Hours)

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: III Grievance Redressal Mechanism under the Indian Consumer Protection Law (8 Hours)

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; 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: IV Role of Industry Regulators in Consumer Protection (6 Hours)

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: V Contemporary Issues in Consumer Affairs (6 Hours)

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.

WEB REFERENCES:

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 TYPE	COURSE CODE	COURSE TITLE	CONTACT HOURS	CREDIT
PART III	CORE - XIV	21MAU14	ABSTRACT ALGEBRA	72	5

Contact hours per week: 6

Year	Semester	Internal Marks	External Marks	Total Marks
Third	V	50	50	100

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	recall the definition and basic ideas of Sets, Mappings, Groups, Rings and Ideals.	K_1
CO2	interpret the basic concepts of Abstract Algebra.	K_2
CO3	apply theoretical ideas of set theory and group theory for solving the simple problems .	K4
CO4	analyze the various theorems and lemmas for groups and Rings .	K_3
CO5	evaluate the simple problems of set theory ,Group theory and ring theory.	K_5

K_1 - Remember; K_2 – Understand; K_3 - Apply; K_4 - Analyze; K_5 – Evaluate.

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	9	9	9	9	3	3	3

CO2	9	9	9	9	3	3	3
CO3	9	9	9	9	3	3	1
CO4	9	9	9	9	1	1	1
CO5	9	9	3	3	1	1	1
Total Contribution of COs to POs	45	45	39	39	17	17	16
Weighted Percentage of COs contribution to POs	**2.64**	**2.86**	**2.69**	**2.94**	**2.22**	**2.21**	**2.65**

Level of Correlation: 0–No Correlation; 1–Low Correlation; 3–Medium Correlation; 9- High Correlation between COs and POs

COURSE CONTENT:

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	1,2	1.1-1.3, 2.1-2.3
II	2	2.4-2.6
III	2	2.7-2.10
IV	3	3.1-3.3
V	3	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.

WEB REFERENCES:

https://www.youtube.com/watch?v=maACVONq5IU
https://www.youtube.com/watch?v=BVf5FFIbaaQ
https://www.youtube.com/watch?v=KCSZ4QhOw0I

https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&cad=rja&uact=8&ved=2ahUKEwjkt-bSjpfzAhV63jgGHSgfAGsQFnoECAYQAQ&url=https%3A%2F%2Fwww.slideshare.net%2FYuriyMaturin%2Fabstract-algebra-58750320&usg=AOvVaw0SOjw-8D-gD_ZB6FM2ekVH

CATEGORY	COURSE TYPE	COURSE CODE	COURSE TITLE	CONTACT HOURS	CREDIT
PART III	CORE - XV	21MAU15	REAL ANALYSIS - I	72	5

Contact hours per week: 6

Year	Semester	Internal Marks	External Marks	Total Marks
Third	V	50	50	100

Preamble

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

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 and metric space.	K_1
CO2	Explain the concepts of upper bounds, lower bounds, countable sets, uncountable sets, open sets, closed setsand metric space.	K_2
CO3	Apply the concepts of limits for a vector – valued functions, finite and infinite sets for countable and uncountable sets, adherent points, accumulation points, interior points in open and closed sets.	K_3
CO4	Analyze the concepts of countable sets, uncountable sets, open sets, closed sets, adherent points and accumulation points.	K_4
CO5	Verify the concepts of upper bounds, lower bounds, supremum, infimum for real number system, relations, functions, Open balls, open sets, Closed sets, Adherent points, Accumulation points.	K_5

K_1 - Remember; K_2 – Understand; K_3 - Apply; K_4 - Analyze; K_5 – Evaluate.

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	9	9	1	3	1	3	0
CO2	9	9	1	3	1	3	0
CO3	9	9	9	9	1	9	0
CO4	9	9	9	9	1	9	0
CO5	9	9	9	9	1	9	0
Total Contribution of COs to POs	45	45	29	33	5	33	0
Weighted Percentage of COs contribution to POs	**2.64**	**2.86**	**2.00**	**2.49**	**0.65**	**4.29**	**0.00**

Level of Correlation: 0–No Correlation; 1–Low Correlation; 3–Medium Correlation; 9- High Correlation between COs and POs

COURSE CONTENT:

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.

WEB REFERENCES:

1. https://ocw.mit.edu/courses/mathematics/18-100c-real-analysis-fall-2012/
2. https://www.jirka.org/ra/
3. https://www.macalester.edu/aratra/

CATEGORY	COURSE TYPE	COURSE CODE	COURSE TITLE	CONTACT HOURS	CREDIT
PART III	CORE - XVI	21MAU16	COMPLEX ANALYSIS – I	72	5

Contact hours per week: 6

Year	Semester	Internal Marks	External Marks	Total Marks
Third	V	50	50	100

Preamble

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

Course Outcomes

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

CO NUMBER	CO STATEMENT	KNOWLEDGE LEVEL
CO1	recall the basic concepts of complex functions, power series, simple mappings and complex integration.	K_1
CO2	explain the differentiability and analyticity of complex functions, properties of complex function, convergence of power series, conformal mapping and contour integrals.	K_2
CO3	apply the theorem and results to solve a variety of problems arising in analytic function.	K_3
CO4	analyze the linear transformations, conditions for differentiability, conformal mapping and convergence of power series.	K_4
CO5	evaluate integrals of analytic functions and the effect of various transformations and mappings.	K_5

K_1 - Remember; K_2 – Understand; K_3 - Apply; K_4 - Analyze; K_5 – Evaluate.

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	9	9	9	9	3	3	3
CO2	9	9	9	9	3	3	1
CO3	9	9	9	9	3	3	1
CO4	9	9	9	9	1	1	1
CO5	9	9	9	3	1	1	0
Total Contribution of COs to POs	45	45	45	39	11	11	6
Weighted Percentage of COs contribution to POs	**2.64**	**2.86**	**3.10**	**2.94**	**1.44**	**1.43**	**0.99**

Level of Correlation: 0–No Correlation; 1–Low Correlation; 3–Medium Correlation; 9- High Correlation between COs and POs

COURSE CONTENT:

UNIT I: COMPLEX NUMBER SYSTEM (12 Hours)

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

i) $w = z + \alpha$ 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→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.Ltd. New Delhi.

UNIT	CHAPTER	SECTION
I	1 2 7	1.1 to 1.3, 1.6 to 1.9 2.1 , 2.6 to 2.10, 7.1& 7.10
II	4	4.1 to 4.10
III	6	6.1 to 6.11
IV	6 7	6.12 to 6.13 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. (2116),"Complex Analysis", Krishan Prakashan Media – Meerut.

WEB REFERENCES:

https://nptel.ac.in/courses/111/103/111103070/

https://nptel.ac.in/courses/111/107/111107056/

https://nptel.ac.in/courses/122/103/122103012/

CATEGORY	COURSE TYPE	COURSE CODE	COURSE TITLE	CONTACT HOURS	CREDIT
PART III	CORE - XVII	21MAU17A/ 21MAU17B/ 21MAU17C	INSTITUTIONAL TRAINING/ARTICLE SHIP TRAINING/MINI PROJECT	-	1

Contact hours per week: -

Year	Semester	Internal Marks	External Marks	Total Marks
Third	V	100	-	100

Preamble

To enable the students to learn and gain knowledge about their principal areas of study.

Course Outcomes

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

CO NUMBER	CO STATEMENT	KNOWLEDGE LEVEL
CO1	recall the basic concepts related to the project work	K_1
CO2	illustrate the knowledge about their principal areas of project work	K_2
CO3	applying the relative notions in the respective areas and finding the results	K_3
CO4	analyzing results with the existing results	K_4
CO5	interpreting the results with suitable examples	K_5

K_1 - Remember; K_2 – Understand; K_3 - Apply; K_4 - Analyze; K_5 – Evaluate.

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	9	9	9	9	9	9	9
CO2	9	9	9	9	9	9	9
CO3	9	9	9	9	9	9	9
CO4	9	9	9	9	3	3	3
CO5	9	9	9	9	3	3	3
Total Contribution of COs to POs	45	45	45	45	33	33	33
Weighted Percentage of COs contribution to POs	**2.64**	**2.86**	**3.10**	**3.39**	**4.31**	**4.29**	**5.46**

Level of Correlation: 0–No Correlation; 1–Low Correlation; 3–Medium Correlation; 9- High Correlation between COs and POs

CATEGORY	COURSE TYPE	COURSE CODE	COURSE TITLE	CONTACT HOURS	CREDIT
PART III	CORE - XIX ELECTIVE - I	21MAU18A	OPERATIONS RESEARCH-I	60	4

Contact hours per week: 5

Year	Semester	Internal Marks	External Marks	Total Marks
Third	V	50	50	100

Preamble

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

Course Outcomes

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

CO NUMBER	CO STATEMENT	KNOWLEDGE LEVEL
CO1	outline the meaning, purpose and tools of Linear programming,Transportation, Assignment and Replacement models.	K_1
CO2	explain the procedures for Linear programming, Transportation, Assignment and Replacement Theory.	K_2
CO3	illustrate the methodologies to get the optimal solution and the period of replacement.	K_3
CO4	measure the mathematical background of Linear programming, minimum Transportation cost, Assignment techniques and the mechanism behind the sudden failure of systems.	K_4
CO5	evaluate different situations after the solution of Linear programming, Transportation, Assignment and Replacement models.	K_5

K_1 - Remember; K_2 – Understand; K_3 - Apply; K_4 - Analyze; K_5 – Evaluate.

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	9	9	9	9	9	9	9
CO2	9	9	9	9	9	9	9
CO3	9	9	9	9	3	3	3
CO4	9	9	3	3	1	1	1
CO5	9	3	3	1	0	0	0
Total Contribution of COs to POs	45	39	33	31	22	22	22
Weighted Percentage of COs contribution to POs	**2.64**	**2.48**	**2.27**	**2.34**	**2.88**	**2.86**	**3.64**

Level of Correlation: 0–No Correlation; 1–Low Correlation; 3–Medium Correlation; 9- High Correlation between COs and POs

COURSE CONTENT:

UNIT I: LINEAR PROGRAMMING PROBLEM (12 HOURS)

Introduction-Linear Programming Problem - Mathematical formulation of the problem–Ilustrations on Mathematical formulation of LPP's-Graphical method - Principles of Simplex method.

UNIT II:ARTIFICIAL VARIABLE TECHNIQUE (12 HOURS)

Use of Artificial Variables-Two phase method-Big M method

UNIT III: TRANSPORTATION PROBLEM (12 HOURS)

Solution of a Transportation problem-Finding an IBFS-Test for Optimality-MODI Method-Some Exceptional Cases.

UNIT IV: ASSIGNMENT PROBLEM (12 HOURS)

Introduction-Mathematical Formulation of the Problem-Solution methods of Assignment Problem-Special Cases in Assignment Problem.

UNIT V: REPLACEMENT (12 Hours)

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

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 3 4	39-46 65-78 99-105
II	4	106-114
III	10	252-281
IV	11	295-311
V	18	477-495

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.

WEB REFERENCES:

https://www.youtube.com/watch?v=Hw2CP_4iK4U

https://www.youtube.com/watch?v=vKVkOpNDZ2s

https://www.slideshare.net/mplad/two-phase-method-linear-programming

CATEGORY	COURSE TYPE	COURSE CODE	COURSE TITLE	CONTACT HOURS	CREDIT
PART III	CORE - XIX ELECTIVE - I	21MAU18B	APPLIED ALGEBRA - I	60	4

Contact hours per week: 5

Year	Semester	Internal Marks	External Marks	Total Marks
Third	V	50	50	100

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	recall the basic concepts of logical operations, relations and functions, graphs, lattices and Boolean functions.	K_1
CO2	illustrate the properties of logical operations, relations and functions, graphs, lattices and Boolean functions.	K_2
CO3	apply the various formulae to solve the rules of tautology, rules of inference, properties of functions, groups and Boolean algebra.	K_3
CO4	examine the relation between tautology and contradiction, Subgroup and normal Subgroup.	K_4
CO5	evaluate the problems based on logical expressions, relations, functions and Boolean algebra.	K_5

K_1 - Remember; K_2 – Understand; K_3 - Apply; K_4 - Analyze; K_5 – Evaluate.

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	9	9	9	9	9	9	9
CO2	9	9	9	9	9	9	9
CO3	9	9	9	9	3	3	3
CO4	9	9	3	3	1	1	1
CO5	9	3	3	1	0	0	0
Total Contribution of COs to POs	45	39	33	31	22	22	22
Weighted Percentage of COs contribution to POs	**2.64**	**2.48**	**2.27**	**2.34**	**2.88**	**2.86**	**3.64**

Level of Correlation: 0–No Correlation; 1–Low Correlation; 3–Medium Correlation; 9- High Correlation between COs and POs

COURSE CONTENT:

UNIT I:MATHEMATICAL LOGIC (12 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 (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(2114) - " Discrete Mathematics with Graph theory and Coimbinatorics", McGraw Hill Education(India) Pvt. Ltd, New Delhi.

UNIT	CHAPTER	PAGE NUMBER
I	1	1-24
II	1	27-45
III	2, 4	66-68, 182-210,217
IV	5	232-242, 261-268
V	2	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.

WEB REFERENCES:

1. https://youtu.be/UM_i1Cs1Vzw
2. https://youtu.be/fzd0Viu6Qx8
3. https://www.slideshare.net/rupalirana07/ch-2-lattice-boolean-algebra

CATEGORY	COURSE TYPE	COURSE CODE	COURSE TITLE	CONTACT HOURS	CREDIT
PART - IV	SKILL ENHANCEMENT: II	21SEU02	LIFE SKILLS (Jeevan Kaushal)	36	1

Contact hours per week: 3

Year	Semester	Internal Marks	External Marks	Total Marks
Third	V	50	-	50

PREAMBLE

To inculcate both personal and professional skills in the students in the areas of understanding of self and others, interpersonal skills, high performance teams, leadership potential, communication & presentation skills, techniques of problem solving, decision making, fostering creativity and innovation for personal and professional excellence, stress management, time management and conflict management and inculcation of human values.

COURSE OUTCOME:

After completion of the course, the learners will be able to:

COs	CO STATEMENT	KNOWLEDGE LEVEL
CO1	Identify the common communication problems, what good communication skills are and what they can do to improve their abilities	K1
CO2	Demonstrate communication through the digital media	K2
CO3	Prepare themselves to situations as an individual and as a team.	K3
CO4	Analyse various leadership models, strengths and abilities to create their leadership vision	K4
CO5	Appraise their potential as human beings and conduct themselves properly in the ways of theworld.	K5

K_1 – Remember; K_2 – Understand; K_3 – Apply; K_4 – Analyze; K_5 – Evaluate; K_6 – Create.

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

CO/PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
CO 1	3	9	3	1	3	3	1
CO 2	1	9	3	1	3	9	1
CO 3	1	3	3	3	9	3	3
CO 4	1	3	3	3	9	9	3
CO 5	1	3	3	1	3	1	9
Total Contribution of COs to POs	7	27	15	9	27	25	17
Weighted Percentage of COs Contribution to POs	**0.41**	**1.72**	**1.03**	**0.68**	**3.53**	**3.25**	**2.81**

Level of Correlation: 0–No Correlation; 1–Low Correlation; 3–Medium Correlation; 9- High Correlation between COs and POs

COURSE CONTENT:

UNIT – I: (8 Hours)

Communication Skills: Listening, Speaking, Reading, Writing and different modes of writing

UNIT – II: (7 Hours)

Digital Communication and Presentation Skills: Digital Literacy,Effective use of Social Media, Non-verbal communication, Presentation Skills

UNIT – III (7 Hours)

Team Skills: Trust and Collaboration, Listening as a Team Skill, Brainstorming, Social and Cultural Etiquettes, Internal Communication

UNIT – IV (7 Hours)

Leadership and Management Skills: Leadership Skills, Managerial Skills, Entrepreneurial Skills, Innovative Leadership and Design Thinking

UNIT – V (7 Hours)

Universal Human Values:

Ethics and Integrity, Love & Compassion, Truth, Non-Violence, Righteousness, Peace, Service, Renunciation (Sacrifice)

TEXT BOOKS:

1. Sen Madhucchanda (2010), An Introduction to Critical Thinking, Pearson, Delhi
2. Silvia P. J. (2007), How to Read a Lot, American Psychological Association, Washington DC
3. Sinek S. (2009). Start with Why: How Great Leaders Inspire Everyone to Take Action. Penguin
4. Kelly T., Kelly D. (2014). Creative Confidence: Unleashing the Creative Potential Within Us

REFERENCE BOOK:

1. Elkington, J., & Hartigan, P. (2008). The Power of Unreasonable People: How Social Entrepreneurs Create Markets that Change the World. Harvard Business Press

WEB REFERENCES:

- Developing Soft Skills and Personality :https://www.youtube.com/playlist?list=PLzf4HHlsQFwJZel_j2PUy0pwjVUgj7KlJ
- Course on Leadership - https://nptel.ac.in/courses/122105021/9
- https://www.ugc.ac.in/e-book/SKILL%20ENG.pdf
- Knowledge@Wharton Interviews Former Indian President APJ Abdul Kalam - . "A Leader Should Know How to Manage Failure" – www.youtube.com/ watch?v=laGZaS4sdeU
- Martin, R. (2007). How Successful Leaders Think. *Harvard Business Review*, *85*(6): 60.
- Fries, K. (2019). 8 Essential Qualities That Define Great Leadership. *Forbes*. Retrieved 2019-02-15
- How to Build Your Creative Confidence, Ted Talk by David Kelly - https://www.ted.com/talks/david_kelley_how_to_build_your_creative_confidence

CATEGORY	COURSE TYPE	COURSE CODE	COURSE TITLE	CONTACT HOURS	CREDIT
PART V	PROFICIENCY ENHANCEMENT	21PEMAU01	FINANCIAL MATHEMATICS (SELF STUDY)	-	2

Contact hours per week: -

Year	Semester	Internal Marks	External Marks	Total Marks
Third	V	-	100	100

Preamble

To enable the students to gain the knowledge about simple interest and compound interest, Annuities, Mean Median, Mode, Transportation problem and Forecasting methods.

Course Outcomes

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

CO NUMBER	CO STATEMENT	KNOWLEDGE LEVEL
CO1	recall the basic definitions of simple interest and compound interest, Annuities, Mean Median, Mode, Transportation problem and Forecasting methods.	K_1
CO2	explain the basic concepts of simple interest and compound interest, Annuities, Mean Median, Mode, Transportation problem and Forecasting methods.	K_2
CO3	apply various formulae to solve the problems on simple interest and compound interest, Annuities, Mean Median, Mode, Transportation problem and Forecasting methods.	K_3
CO4	analyze the relations between Mean Median, Mode and Forecasting methods	K_4
CO5	evaluate the problems on simple interest and compound interest, Annuities, Mean Median, Mode, Transportation problem and Forecasting methods.	K_5

K_1 - Remember; K_2 – Understand; K_3 - Apply; K_4 - Analyze; K_5 – Evaluate.

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	9	9	9	9	3	9	3
CO2	9	9	9	9	3	9	3
CO3	9	9	9	9	1	3	3
CO4	9	9	9	9	1	3	3
CO5	9	9	9	9	0	3	3
Total Contribution of COs to POs	45	45	45	45	8	27	15
Weighted Percentage of COs contribution to POs	**2.64**	**2.86**	**3.10**	**3.39**	**1.05**	**3.51**	**2.48**

Level of Correlation: 0–No Correlation; 1–Low Correlation; 3–Medium Correlation; 9- High Correlation between COs and POs

COURSE CONTENT:

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

Mean Median, Mode, Geometric Mean and Harmonic Mean - Merits and demerits.

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	159-270
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.

SEMESTER - VI

CATEGORY	COURSE TYPE	COURSE CODE	COURSE TITLE	CONTACT HOURS	CREDIT
PART III	CORE – XX	21MAU19	LINEAR ALGEBRA	72	5

Contact hours per week: 6

Year	Semester	Internal Marks	External Marks	Total Marks
Third	VI	50	50	100

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	recall the definitions and preliminaries in Vector space, Basis, Dual spaces, Inner product spaces.	K_1
CO2	explain the basic concepts of Linear Algebra	K_2
CO3	apply conceptual ideas of Linear Algebra in simple problems.	K_3
CO4	analyze the theorems and inequalities on linear functions and linear functional .	K_4
CO5	evaluate the characterization of linear vectors, linear transformations and linear functional.	K_5

K_1 - Remember; K_2 – Understand; K_3 - Apply; K_4 - Analyze; K_5 – Evaluate.

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	9	9	9	9	3	3	3

CO2	9	9	9	9	3	3	3
CO3	9	9	9	9	3	3	3
CO4	9	9	9	9	1	1	1
CO5	9	9	3	3	1	1	1
Total Contribution of COs to Pos	45	45	39	39	17	17	17
Weighted Percentage of COs contribution to POs	**2.64**	**2.86**	**2.69**	**2.94**	**2.22**	**2.21**	**2.81**

Level of Correlation: 0–No Correlation; 1–Low Correlation; 3–Medium Correlation; 9- High Correlation between COs and POs

COURSE CONTENT:

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.

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	2	6-26
II	3,4	48-57 , 73-91
III	5	111-136
IV	7	207- 232
V	10	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.

WEB REFERENCES:

https://youtu.be/t5ckUuSsWe4
https://www.youtube.com/watch?v=ozwodzD5bJM

https://www.youtube.com/watch?v=j3YpNG1oBMo

CATEGORY	COURSE TYPE	COURSE CODE	COURSE TITLE	CONTACT HOURS	CREDIT
PART III	CORE – XXI	21MAU20	REAL ANALYSIS II	72	5

Contact hours per week: 6

Year	Semester	Internal Marks	External Marks	Total Marks
Third	VI	50	50	100

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, uniform continuous functions, connectedness, derivatives and monotonic functions.	K_1
CO2	explain the concepts of continuous functions, uniform continuous functions, connectedness, derivatives and monotonic functions.	K_2
CO3	Apply the concepts of monotonic functions for the functions of bounded variations, total variations, Continuity and inverse images of open or closed sets.	K_3
CO4	Analyze the concepts of continuity, uniform continuity, bounded variations, total variations.	K_4
CO5	Evaluate the problems based on Chain Rule, Rolles Theorem, Mean Value Theorem and Fixed Point Theorem.	K_5

K_1 - Remember; K_2 – Understand; K_3 - Apply; K_4 - Analyze; K_5 – Evaluate.

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	9	9	1	3	1	3	0
CO2	9	9	1	3	1	3	0
CO3	9	9	9	9	1	9	0
CO4	9	9	9	9	1	9	0
CO5	9	9	9	9	1	9	0
Total Contribution of COs to POs	45	45	29	33	5	33	0
Weighted Percentage of COs contribution to Pos	**2.64**	**2.86**	**2.00**	**2.49**	**0.65**	**4.29**	**0.00**

Level of Correlation: 0–No Correlation; 1–Low Correlation; 3–Medium Correlation; 9- High Correlation between COs and POs

COURSE CONTENT:

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.

WEB REFERENCES:

1. http://assets.press.princeton.edu
2. https://mathcs.org/analysis/reals
3. https://bookstore.ams.org

CATEGORY	COURSE TYPE	COURSE CODE	COURSE TITLE	CONTACT HOURS	CREDIT
PART III	CORE – XXII	21MAU21	COMPLEX ANALYSIS – II	72	5

Contact hours per week: 6

Year	Semester	Internal Marks	External Marks	Total Marks
Third	VI	50	50	100

Preamble

To enable the students to learn the immediate consequence of Cauchy's theorem, analytic and meromorphic functions and contour integration.

Course Outcomes

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

CO NUMBER	CO STATEMENT	KNOWLEDGE LEVEL
CO1	recall the results of Cauchy's theorem, Taylor's and Laurent's series, singularities, residues and meromorphic function.	K_1
CO2	describe the results based on Cauchy's theorem, singularities, residues and meromorphic function.	K_2
CO3	examine the singularities, poles and residues of complex function, types of real definite integrals.	K_3
CO4	analyze the Taylor's and Laurent's expansion, behavior of a function at an isolated singularity and zeros and poles of meromorphic function.	K_4
CO5	evaluate the series expansion and roots of analytic functions and the real definite integrals.	K_5

K_1 - Remember; K_2 – Understand; K_3 - Apply; K_4 - Analyze; K_5 – Evaluate.

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	9	9	9	9	3	3	1
CO2	9	9	9	9	3	3	1
CO3	9	9	9	9	3	3	1
CO4	9	9	9	3	1	1	1
CO5	9	9	9	3	1	0	0
Total Contribution of COs to Pos	45	45	45	33	11	10	4
Weighted Percentage of COs contribution to Pos	**2.64**	**2.86**	**3.10**	**2.49**	**1.44**	**1.30**	**0.66**

Level of Correlation: 0–No Correlation; 1–Low Correlation; 3–Medium Correlation; 9- High Correlation between COs and POs

COURSE CONTENT:

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(2114), "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. (2116), "Complex Analysis", Krishan Prakashan Media – Meerut.

WEB REFERENCES:

https://nptel.ac.in/courses/111/103/111103070/

https://nptel.ac.in/courses/111/106/111106094/

https://nptel.ac.in/courses/122/103/122103012/

CATEGORY	COURSE TYPE	COURSE CODE	COURSE TITLE	CONTACT HOURS	CREDIT
PART III	CORE – XXIII ELECTIVE - II	21MAU22A	OPERATIONS RESEARCH-II	60	4

Contact hours per week: 5

Year	Semester	Internal Marks	External Marks	Total Marks
Third	VI	50	50	100

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	recall the basic concepts, models and statements of Integer programming, Sequencing, Dynamic Programming, level of information and NLPP	K_1
CO2	express the procedures and steps for Integer programming, Sequencing, Dynamic Programming, Information theory and NLPP	K_2
CO3	examine the pure integer values, order of jobs, optimal solution and the level of information transmission	K_3
CO4	inspect the Kuhn-Tucker conditions, optimality and the time to complete the jobs	K_4
CO5	measure the mathematical arguments in a logical manner, Dynamic programming model and its applications in industry	K_5

K_1 - Remember; K_2 – Understand; K_3 - Apply; K_4 - Analyze; K_5 – Evaluate.

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	9	9	9	9	9	9	9
CO2	9	9	9	9	9	9	9
CO3	9	9	9	9	3	3	3
CO4	9	9	3	3	1	1	1
CO5	9	3	3	1	0	0	0
Total Contribution of COs to Pos	45	39	33	31	22	22	22
Weighted Percentage of COs contribution to Pos	**2.64**	**2.48**	**2.27**	**2.34**	**2.88**	**2.86**	**3.64**

Level of Correlation: 0–No Correlation; 1–Low Correlation; 3–Medium Correlation; 9- High Correlation between COs and POs

COURSE CONTENT:

UNIT-I: INTEGER PROGRAMMING PROBLEM (14 Hours)

Introduction –pure and mixed IPP – Gomory's all IPP method – Fractional cutmethod – All integer LPP- Mixd integer LPP.

UNIT-II: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-III: DYNAMIC PROGRAMMING PROBLEM (10 Hours)

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

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

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

UNIT-V: INFORMATION THEORY (12 Hours)

Introduction – A measure of information – Entropy – the expected information – some properties of entropy functions – Joint and conditional entropies.

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	7	177 – 188
II	12	327-341
III	13	347-353
IV	27	823-840 894 & 895 901 - 903
V	30	885 – 890

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.

WEB REFERENCES:

https://www.youtube.com/watch?v=5_Xyp7NZVxU

https://www.youtube.com/watch?v=EwcjyxuwUkI

https://www.slideshare.net/hakeemrehman/integer-programming-68158750

CATEGORY	COURSE TYPE	COURSE CODE	COURSE TITLE	CONTACT HOURS	CREDIT
PART III	CORE – XXIII ELECTIVE - II	21MAU22B	APPLIED ALGEBRA -II	60	4

Contact hours per week: 5

Year	Semester	Internal Marks	External Marks	Total Marks
Third	VI	50	50	100

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	recall the basic definitions of grammars, operations, languages, graphs and trees.	K_1
CO2	explain the concepts of grammars, operations, languages, graphs and trees.	K_2
CO3	identify the different types of grammar in formal languages and graphs.	K_3
CO4	analyze the problems based on directed and undirected graphs, formal languages and context free languages.	K_4
CO5	evaluate the problems on regular expression, closure operations, context free languages, graphs and trees.	K_5

K_1 - Remember; K_2 – Understand; K_3 - Apply; K_4 - Analyze; K_5 – Evaluate.

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	9	9	9	9	9	9	9
CO2	9	9	9	9	9	9	9
CO3	9	9	9	9	3	3	3
CO4	9	9	3	3	1	1	1
CO5	9	3	3	1	0	0	0
Total Contribution of COs to Pos	45	39	33	31	22	22	22
Weighted Percentage of COs contribution to Pos	**2.64**	**2.48**	**2.27**	**2.34**	**2.88**	**2.86**	**3.64**

Level of Correlation: 0–No Correlation; 1–Low Correlation; 3–Medium Correlation; 9- High Correlation between COs and POs

COURSE CONTENT:

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(2114) - "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	8	448-460, 462-469
2	II	3	21-28
2	III	4	29-52
1	IV	7	366-394, 396-398
1	V	7	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 (2105) - "Discrete Mathematics", Second Edition, Macmillan India Ltd.

WEB REFERENCES:

1. https://youtu.be/APRPT4KrzMA
2. https://youtu.be/sWsXBY19o8I
3. https://youtu.be/zeeDbFNFEEg

CATEGORY	COURSE TYPE	COURSE CODE	COURSE TITLE	CONTACT HOURS	CREDIT
PART III	CORE – XXIV ELECTIVE - III	21MAU23A	GRAPH THEORY	60	4

Contact hours per week: 5

Year	Semester	Internal Marks	External Marks	Total Marks
Third	VI	50	50	100

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	recall fundamentals of Graph Theory	K_1
CO2	demonstrate the concepts of graph theory	K_2
CO3	apply algorithms and procedures to solve the problems.	K_3
CO4	analyze the contexts in simple, directed,bipartite , planar, Eulerian and Hamiltonian graphs	K_4
CO5	evaluate the characterization of the graphs	K_5

K_1 - Remember; K_2 – Understand; K_3 - Apply; K_4 - Analyze; K_5 – Evaluate.

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	9	9	9	9	3	3	3

CO2	9	9	9	9	3	3	3
CO3	9	9	9	9	3	3	3
CO4	9	9	9	9	1	1	1
CO5	9	9	3	3	0	0	0
Total Contribution of COs to Pos	45	45	39	39	10	10	10
Weighted Percentage of COs contribution to Pos	**2.64**	**2.86**	**2.69**	**2.94**	**1.31**	**1.30**	**1.66**

Level of Correlation: 0–No Correlation; 1–Low Correlation; 3–Medium Correlation; 9- High Correlation between COs and POs

COURSE CONTENT:

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	1	1.1- .7
II	2,3	2.1-2.4, 3.1&3.3
III	4	4.1- 4.4
IV	5	5.1, 5.2 & 5.5
V	7	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.

WEB REFERENCES:

1. https://www.tutorialspoint.com/graph_theory/graph_theory_fundamentals.htm
2. https://www.tutorialspoint.com/graph_theory/graph_theory_traversability.htm
3. https://en.wikipedia.org/wiki/Planar_graph

CATEGORY	COURSE TYPE	COURSE CODE	COURSE TITLE	CONTACT HOURS	CREDIT
PART III	CORE – XXIV ELECTIVE - III	21MAU23B	FUZZY MATHEMATICS	60	4

Contact hours per week: 5

Year	Semester	Internal Marks	External Marks	Total Marks
Third	VI	50	50	100

Preamble

To enable the students to learn the fuzzy set theory, fundamentals of fuzzy algebra.

Course Outcomes

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

CO NUMBER	CO STATEMENT	KNOWLEDGE LEVEL
CO1	recall the basic concepts of fuzzy algebra.	K_1
CO2	Interpret the theoretical ideas of fuzzy algebra.	K_2
CO3	apply the concepts of fuzzy subsets, fuzzy mappings, fuzzy relations, fuzzy logic, fuzzy groups, fuzzy rings on simple problems.	K_3
CO4	analyze fuzzy subgroup and Preimage of subgroupiod.	K_4
CO5	evaluate the features of fuzzy subsets, fuzzy mappings, fuzzy relations, fuzzy logic, fuzzy groups, fuzzy rings.	K_5

K_1 - Remember; K_2 – Understand; K_3 - Apply; K_4 - Analyze; K_5 – Evaluate.

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	9	9	9	9	3	3	3
CO2	9	9	9	3	3	3	1
CO3	9	9	3	3	3	1	1
CO4	9	3	3	1	1	0	0
CO5	3	3	3	1	0	0	0
Total Contribution of COs to POs	45	45	39	39	10	10	10
Weighted Percentage of COs contribution to POs	**2.64**	**2.86**	**2.69**	**2.94**	**1.31**	**1.30**	**1.66**

Level of Correlation: 0–No Correlation; 1–Low Correlation; 3–Medium Correlation; 9- High Correlation between COs and POs

COURSE CONTENT:

UNIT I: (12 Hours)

Introduction – Fuzzy subsets – Lattices and Boolean algebras – L fuzzy sets – operations on fuzzy – α level sets – properties of fuzzy subsets.

UNIT II: (12 Hours)

Algebraic product and sum of two fuzzy subsets – properties satisfied by Addition and product – Cartesian product of fuzzy subsets.

UNIT III: (12 Hours)

Introduction – Algebra of fuzzy relations – logic – connectives.

UNIT IV: (12 Hours)

Some more connectives – Introduction – fuzzy subgroup – homomorphic image and preimage of subgroupoid.

UNIT V: (12 Hours)

Fuzzy invariant subgroups - fuzzy subrings.

TEXTBOOK

S. Nanda and N.R. Das Fuzzy Mathematical Concepts, Narosa Publishing House, New Delhi, 2010.

UNIT	CHAPTER	PAGE NUMBER
Unit - I	**Chapter 1**	**Section : 1.1, 1.2, 1.4, 1.5, 1.7, 1.9, 1.10.**
Unit – II	**Chapter 1**	**Section : 1.11 – 1.13**
Unit - III	**Chapter 2**	**Section : 2.1 – 2.4**
Unit - IV	**Chapter 2 & 3**	**Section : 2.5 & 3.1 – 3.3**
Unit - V	**Chapter 3**	**Section : 3.4, 3.5**

REFERENCE BOOK

1. M.Ganesh, Introduction to Fuzzy sets & Fuzzy logic, Prentice Hall of India Pvt. Ltd.,

2. John N. Mordeson and Premchand S. Nair, Fuzzy Mathematics, Spring verlong, 2001.

WEB REFERENCES:

1. https://youtu.be/LUz-FbwPh3Q
2. https://youtu.be/IZWTduVCrf8
3. https://en.wikipedia.org/wiki/Fuzzy_mathematics

CATEGORY	COURSE TYPE	COURSE CODE	COURSE TITLE	CONTACT HOURS	CREDIT
PART IV	SKILL ENHANCEMENT - III	21SEMAU03	LATEX - PRACTICAL	24	1

Contact hours per week: 2

Year	Semester	Internal Marks	External Marks	Total Marks
Third	VI	50	-	50

Preamble :

To enable the students to get experienced about Typesetting Latex

Course Outcomes

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

CO NUMBER	CO STATEMENT	KNOWLEDGE LEVEL
CO1	Memorize the commands and environments provided in Latex	K_1
CO2	Express the mathematical formulae, equations and tables	K_2
CO3	Demonstrate various environments	K_3
CO4	Analyze different document types	K_4
CO5	Construct different types of documents and latex beamer presentation	K_5

K_1 - Remember; K_2 – Understand; K_3 - Apply; K_4 - Analyze; K_5 – Evaluate.

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	9	9	9	9	9	9	9

CO2	9	9	9	9	9	9	9
CO3	9	9	9	9	9	9	9
CO4	9	9	9	9	3	5	3
CO5	9	9	9	9	3	3	1
Total Contribution of COs to POs	45	45	45	45	33	35	30
Weighted Percentage of COs contribution to POs	**2.64**	**2.86**	**3.10**	**3.39**	**4.31**	**4.55**	**4.97**

Level of Correlation: 0–No Correlation; 1–Low Correlation; 3–Medium Correlation; 9- High Correlation between COs and POs

LIST OF PRACTICAL

1. Using LaTeX, type a document in different ways (Left, Right, Center, Justify)

2. Using LaTeX environment, type the following text

(a) Numbering 1

- Bullet 1
- Bullet 2

(b) Numbering 2

i. Type 3

3. Using LaTeX environment, type the following text

1 Modern Algebra

1.1 Group

1.1.1 Subgroup

1.2 Ring

1.2.1 Homomorphism

4. Using LaTeX, type your own Curriculum Vitae.

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, type the following Case Statements.

(a) $$x_{\lambda}=\begin{cases} x & if\ \lambda\ is\ an\ eigen\ value; \\ -x & if\ -\lambda\ is\ an\ eigen\ value; \\ 0 & otherwise. \end{cases}$$

(b) $$|x|=\begin{cases} x & if\ x\geq 0; \\ -x & if\ x<0; \\ 0 & otherwise. \end{cases}$$

8. Using LaTeX, type the following Matrices

(a) $$\begin{pmatrix} a_{11} & \cdots & a_{1n} \\ \vdots & \ddots & \vdots \\ a_{m1} & \cdots & a_{mn} \end{pmatrix}$$

(b) $$B=\begin{array}{c} \\ s_1 \\ s_2 \\ s_3 \\ s_4 \\ s_5 \end{array}\begin{array}{c} \begin{array}{ccc} d_1 & d_2 & d_3 \end{array} \\ \begin{pmatrix} (0.6,0.2) & (0.6,0.2) & (0.3,0.4) \\ (0.3,0.5) & (0.2,0.6) & (0.7,0.2) \\ (0.1,0.8) & (0.2,0.7) & (0.7,0.2) \\ (0.4,0.5) & (0.7,0.2) & (0.3,0.4) \\ (0.1,0.7) & (0.1,0.8) & (0.2,0.7) \end{pmatrix} \end{array}$$

9. Using LaTeX, type the following complicated mathematical structures.

(a) $$\int_0^{\infty} e^{-\rho}\,\rho^{2l}\left[L_{n+l}^{2l+1}(\rho)\right]^2\rho^2\,d\rho=\frac{2n\left[(n+l)!\right]^3}{(n-l-1)!}$$

(b) $\sqrt{\sqrt{n!+\sqrt{45}}} + \int_0^x \int_{\sqrt{\sqrt{16}}}^x \sqrt{\sqrt{e^x}}\, dx + \frac{d^2y}{dx^2}$

10. Create a frame environment with title LaTex Beamer presentation and include author name, institute, current date and footnote.

11. Include few figures in documents.

12. Create reference using bibliography environment and cite the references in a document.

WEB REFERENCES:

1. https://www.overleaf.com/
2. https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&cad=rja&uact=8&ved=2ahUKEwi76srznJfzAhUMb30KHbe-DmEQFnoECFIQAQ&url=https%3A%2F%2Fen.wikibooks.org%2Fwiki%2FLaTeX&usg=AOvVaw2ArcMcGRJVL_9QatNg6A1h
3. http://www.docs.is.ed.ac.uk/skills/documents/3722/3722-2014.pdf

CATEGORY	COURSE CODE	TITLE OF THE COURSE	CONTACT HOURS	CLASS
VALUE ADDED COURSE		VEDIC MATHEMATICS	40	I – B.Sc MATHEMATICS

Preamble

To enable the students to learn and gain knowledge about Vedic Mathematics

Course Outcomes

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

CO NUMBER	CO STATEMENT	KNOWLEDGE LEVEL
CO1	racall the basic concepts of vedic Mathematics	K_1
CO2	explain the concept of Vedic Mathematics in subtraction, multiplication, addition, divition, square and cube .	K_2
CO3	apply the Sutras of Vedic Mathematics to compute subtraction, multiplication, addition,divition,square, cubic and Linear Equations.	K_3
CO4	analyze the traditional method and vedic method.	K_4
CO5	evaluate the problems on Vedic Mathematics in subtraction, multiplication, addition, division, square , cube and Linear Equations.	K_5

K_1 - Remember; K_2 – Understand; K_3 - Apply; K_4 - Analyze; K_5 – Evaluate.

COURSE CONTENT:

UNIT: I

Introduction – Sutras of Vedic Mathematics – Advantages of using Vedic Mathematics – Applications of Vedic Mathematics in the Modern World- Simplification by Traditional Method versus Vedic method – Comparision between Traditional Method

and Vedic method-. Sutra for finding Square of a number-Conversion of Vulgar Fraction into Decimal.

UNIT: II ADDITION AND MULTIPLICATION

Addition-Multiplication-Subtraction of a number from an aadhar — Multiplication of two numbers close to an aadhar (base)Method– Cases : I , II and III- Division by 9-All from 9 and the last from 10 (Subtraction) – Cases : I , II and III.

UNIT: III MULTIPLICATION AND DIVISION

Two – digit Multiplication without carry - Two – digit Multiplication with carry over – Three – digit Multiplication- Division-When the remainder is positive and negative-Multiplication by 12-Divisibility by 4-Multiplication-Division-"Antyayordasakepi" sutra.

UNIT: IV LINEAR EQUATION

Linear Equation – "Shunyan Samyasamuchaye" sutra- Solving Simultaneous Linear Equations (Anurupye Shunyamanyat & Sankalana Vyavkalanabhyam).- Roots of a Quadratic Eqation-Roots of Cubic Equations-Roots of a Quadratic Equation.

UNIT: V SQUARE AND CUBE

Square of a number –Cube of a number-Rational Expression-Square root-Cube root.

TEXT BOOK:

Sumita Bose -2017 "Vedic Mathematics"– V&S Publishers, New Delhi.

Unit - I	**Page: 19-28**
Unit – II	**Page: 62-65,29-36**
Unit –III	**Page: 37-45,68-71,79-86,102-104**
Unit –IV	**Page: 46-61**
Unit – V	**Page: 98-101, 105-107, 118-125**

REFERENCE BOOK:

1.H.K. Gupta -2014 "Vedic Mathematics"– BPI Publishers, New Delhi.

CATEGORY	COURSE CODE	TITLE OF THE COURSE	CONTACT HOURS	CLASS
VALUE ADDED COURSE		PROFESSIONAL ENGLISH FOR PHYSICAL SCIENCE	40	II – B.Sc MATHEMATICS

Preamble

To enable the students to learn language skills, critical thinking and communicative skills in professional contexts

Course Outcomes

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

CO NUMBER	CO STATEMENT	KNOWLEDGE LEVEL
CO1	To develop the language skills of students by offering adequate practice in professional contexts.	K_3
CO2	To enhance the lexical, grammatical, socio-linguistic and communicative competence students.	K_2
CO3	To focus on developing students' language skills and knowledge of domain specific registers.	K_4
CO4	To develop strategic competence that will help in efficient communication.	K_5
CO5	To sharpen students' critical thinking skills and make students culturally aware of the target situation	K_4

K_1 - Remember; K_2 – Understand; K_3 - Apply; K_4 - Analyze; K_5 – Evaluate.

COURSE CONTENT:

UNIT I: COMMUNICATION

1.Listening: Listening to instructions

2.Speaking: Telephone etiquette and official phone conversations

3.Reading:Short passages (3 passages, one from each–Physics,

Chemistry,Mathematics/Computer Science)

4.Writing:Letters and Emails in professional context

5.Grammar in Context:•Wh and Yes/No questions•Questiontags•Imperatives

6.Vocabulary:Word formation

i)Creating antonyms using Prefixes

ii)Intensifying prefixes (E.g inflammable)

iii)Changing wordsusing suffixes

A) Noun Endings

B) Adjective Endings

C) Verb Endings

UNIT II: DESCRIPTION

1. Listening:Listening to process description
2. Speaking:Role playFormal:
   - With faculty and mentors in academic environment
   - Workplace communicationInformal:
   - Withpeers in academic environment
   - Workplace communication
3. Reading: Reading passages on products, equipment and gadgets
4. Writing: Writing sentence definitions (e.g. computer) and extended definitions(e.g. artificial intelligence)Picture Description–Description of Natural Phenomena(100 words)
5. Grammarin Context: Connectives and linkers.Vocabulary:Synonyms (register)-Compare & contrast expressions.

UNIT III: NEGOTIATION STRATEGIES

1. Listening:Listening to interviews of specialists / inventorsin thefield(Subjectspecific)
2. Speaking:Brainstorming(mind mapping). Small group discussions (subject-specific)
3. Reading:Longer Reading text.(Comprehensive passages)
4. Writing:Essay Writing (250 word essay on topics related to subject area, likepollution,use of pesticides in cultivation, merits and demerits of devices likemobile phones, merits and demerits of technology in development)
5. Grammar in Context:
   - Active voice & Passive voice

- If conditional
- Vocabulary: i) Collocations ii) Phrasal verbs

UNIT IV:PRESENTATION SKILLS

1. Listening:Listening to presentations, listening to lectures,watchingdocumentaries (discovery / history channelvideos with subtitles)

2. Speaking:Short speech.Making formal presentations (PPT)

3. Reading:Reading a written speech byeminent personalities in the relevantfield /short poems / short biography.

4. Writing:Writing RecommendationsInterpreting visuals-charts/ tables/flow diagrams

5. Grammar in Context:ModalsVocabulary:Single word substitution(register)

UNIT V:CRITICAL THINKING SKILLS

1. Listening:Listening to advertisements/news and brief documentary films (withsubtitles)

2. Speaking:Problem-Solution Speeches (Brief speeches). E.g. Should the use ofpublic transport Be promoted to curb pollution?

3. Reading: Motivational stories on Professional Competence, Professional Ethicsand Life Skills (subject- specific)

4. Writing:Studying problemsandfindingsolutions(Essay in 210 words)

5. Grammar:Framingsimple sentences

6.Vocabulary:Fixed expressions

SUGGESTED ACTIVITIES

UNITI

1. Listening:Links for formal conversation can be given-Gap filling exercises–Multiple Choice questions– Making notes.

2. Speaking:Role play activity

3. Reading:Note making. Note-Taking.

4. Writing: Guided Writing (developing hints)EmailWriting

5. Grammar&Vocabulary:Worksheets–Games.

UNIT II

1. Listening:Process Descriptions (Processes of condensation and evaporation./Process of Measuring the thickness of a wireusing a screw-gauge./process of exaction of sugar from sugarcane)

2. Speaking:Role PlayReading:Multiple choice questions-Evaluative answers–Classifying And labeling

3. Writing:Picture description–Description of natural phenomena (rainbow,earthquake,volcanic eruption, erosion, natural disasters in 100 words).

4. Grammar: Activities, Worksheets & Games

5. Vocabulary:Expansion of compound nouns

UNIT III

1. Listening:Gap fillingexercises–Listening comprehension
2. Speaking:DebatesReading:Readingcomprehension
3. Writing:Essay Writing
4. Grammar &Vocabulary:Activities, Worksheets & Games.

UNIT IV

1. Listening:Note taking (of listening & viewing items)-Filling a table based on the listening item.

2. Speaking:JAM, Presentations. (PPT-TECHNICAL)

3. Reading:Reading comprehension

4. Writing:Difference between recommendations and instructionsQuestions/MCQs based on graphs/flow diagrams/charts

5. Grammar &Vocabulary:Activities, Worksheets & Games.

UNIT V

1. Listening:Radio News/ TVNews telecast
2. Speaking:Watch or listen to documentaries and ask questions
3. Reading:Reading motivational stories (success stories in subject area)
4. Writing:Essay writing.
5. Grammar&Vocabulary:Activities, Worksheets & Games

CATEGORY	COURSE CODE	TITLE OF THE COURSE	CONTACT HOURS	CLASS
VALUE ADDED COURSE	***	NUMERICAL APTITUDE	40	III – B.Sc MATHEMATICS

Preamble

To enable the students to learn about the concepts of aptitude.

Course Outcomes

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

CO NUMBER	CO STATEMENT	KNOWLEDGE LEVEL
CO1	recall the formulae in numerical aptitude	K_1
CO2	explain the procedure for solving the problems numerically.	K_2
CO3	apply various formulae to obtain the numerical solutions.	K_3
CO4	analyze the problems based on Ages and percentage.	K_4
CO5	evaluate the solutions of simple problems on numbers ,ages and percentage.	K_5

K_1 - Remember; K_2 – Understand; K_3 - Apply; K_4 - Analyze; K_5 – Evaluate.

COURSE CONTENT:

UNIT I

Numbers-H.C.F and L.C.M of Numbers-Simplification

UNIT II

Square roots and Cube roots .

UNIT III

Problem on Numbers.

UNIT IV

Problem on Ages.

UNIT V

Percentage- Concept of percentage.

TEXT BOOK:

Aggarwal R.S. (2012 Edition), Quantitative Aptitude for Competitive Examinations, S. Chand & Company Ltd, New Delhi

REFERENCE BOOKS:

1. Sijwali B. S.(2007), Quantitative Aptitude,Arihand Publications (India) PVT LTD.

2. AbhijitGuha(2006), Quantitative Aptitude for Competitive Examinations, McGraw Hill Companies.

CATEGORY	COURSE CODE	TITLE OF THE COURSE	CONTACT HOURS	CLASS
CERTIFICATE COURSE	***	MATLAB	40	II – B.Sc MATHEMATICS

COURSE CONTENT:

Unit-I

Introduction-Basics of MATLAB-Input-Output-File types-Platform dependence-General commands

Unit-II

Interactive computation-Matrices and Vertices-Matrix array operations

Unit-III

Programming in MATLAB-Scripts and functions-Script files-Function files-Language specific features-Advanced Data objects

Unit-IV

Plotting-Two-dimensional plots- Three dimensional plots

Unit-V

Applications-Linear algebra- Solving a linear system-Finding Eigen values and Eigen vectors-Matrix Factorizations

Reference Book:

"An introduction to MATLAB" David.F.Griffiths, March 2015

CATEGORY	COURSE TYPE	COURSE CODE	TITLE OF THE COURSE	CONTACT HOURS	CREDIT
OPEN ELECTIVE	CORE - XVIII		MATHEMATICS FOR BUSINESS	36	3

Preamble

To enable the students to learn Business Mathematics.

Course Outcomes

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

CO NUMBER	CO STATEMENT	KNOWLEDGE LEVEL
CO1	recall the basic concepts of sequence and series ,matrix, set theory, simple interest and compound interest.	K_1
CO2	interpret sequence and series ,matrix, set theory, simple interest and compound interest.	K_2
CO3	apply different quantitative models in solving business problems	K_3
CO4	determine the solutions of the problems based on matrix , simple interest and compound interest problems	K_4
CO5	evaluate the problems on sequence and series ,matrix, set theory, simple interest and compound interest problems.	K_5

K_1 - Remember; K_2 – Understand; K_3 - Apply; K_4 - Analyze; K_5 – Evaluate.

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	9	9	9	9	3	3	3
CO2	9	9	9	3	3	3	1
CO3	9	9	3	3	3	1	1
CO4	9	3	3	1	1	0	0
CO5	3	3	3	1	0	0	0

Total Contribution of COs to POs	39	33	27	17	10	7	5
Weighted Percentage of COs contribution to POs	**2.29**	**2.10**	**1.86**	**1.28**	**1.31**	**0.91**	**0.83**

Level of Correlation: 0–No Correlation; 1–Low Correlation; 3–Medium Correlation; 9- High Correlation between COs and POs

COURSE CONTENT:

UNIT I: SERIES (10 Hours)

Sequence and series - Arithmetic progression –Geometric progression – Arithmetic mean - Geometric mean – Harmonic mean.

UNIT II: MATRICES (6 Hours)

Fundamental ideas about Matrices and their operational rules- Matrix Multiplication- Inverse of a matrix.

UNIT III: SET THEORY (6 Hours)

Introduction- Types of sets- Set operation- Venn diagrams, Inconsistency of data.

UNIT IV: MATHEMATICS OF FINANCE (7 Hours)

Simple Interest.

UNIT V:MATHEMATICS OF FINANCE (7 Hours)

Compound Interest.

NOTE: No derivation and proof, simple problems only.

TEXT BOOK

Navnitham P.A (2012) – "Business Mathematics and Statistics", Sultan Chand & Sons, New Delhi.

UNIT	CHAPTER	PAGE
I	**1**	**1 -33.**
II	**4**	**147-184.**
III	**3**	**104-136.**
IV	**2**	**43-51.**
V	**2**	**51-61.**

REFERENCE BOOK:

Vittal.P.R (2002) - "Business Mathematics and Statistics, Margham publishers, Chennai.

WEB REFERENCES:

1. http://www.mim.ac.mw/books/Business%20mathematics%20and%20statistics,%206th%20ed.pdf
2. https://en.wikipedia.org/wiki/Business_mathematics
3. https://youtu.be/pn2Fx9-G1Ds

CATEGORY	COURSE CODE	TITLE OF THE COURSE	CREDIT
EXTRA CREDIT		NUMERICAL TECHNIQUES	4

Preamble

To enable the students to learn and gain knowledge about simultaneous linear algebraic equations **,** interpolation ,numerical differentiation and integration .

Course Outcomes

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

CO NUMBER	CO STATEMENT	KNOWLEDGE LEVEL
CO1	recall the basic definitions of simultaneous linear algebraic equations **,** interpolation , numerical differentiation and integration.	K_1
CO2	explain the concepts of simultaneous linear algebraic equations **,** interpolation , numerical differentiation and integration.	K_2
CO3	apply different formulae to solve the problems on simultaneous linear algebraic equations **,** interpolation , numerical differentiation and integration.	K_3
CO4	analyze simultaneous equations and interpolation.	K_4
CO5	evaluate the problems based on Gauss Elimination Method ,Gauss Jordan Method, interpolation , numerical differentiation and integration.	K_5

K_1 - Remember; K_2 – Understand; K_3 - Apply; K_4 - Analyze; K_5 – Evaluate.

COURSE CONTENT:

UNIT I: SIMULTANEOUS LINEAR ALGEBRAIC EQUATIONS

Introduction – Gauss Elimination Method – Gauss Jordan Method – Inversion of a matrix using Gauss Elimination method

UNIT II: SIMULTANEOUS LINEAR ALGEBRAIC EQUATIONS(cont…)

Method of Triangularisation method - Crout's method.

UNIT III: CENTRAL DIFFERENCE INTERPOLATION FORMULAE

Central Difference table – Gauss's forward interpolation formula - Gauss's backward interpolation formula

UNIT IV: NUMERICAL DIFFERENTIATION

Introduction – Newton's forward difference formula to compute the derivatives - Newton's backward difference formula to compute the derivatives – Problems

UNIT V: NUMERICAL INTEGRATION

Numerical Integration – The Trapezoidal Rule – Simpson's $1/3^{rd}$ and Simpson's $3/8^{th}$ Rules.

TEXT BOOK:

1. Dr.P.Kandasamy,Dr.K.Thilagavathi,Dr.K.Gunavathi(2005)-"Numerical Methods", S.Chand & Company LTD, New Delhi-110055.

UNIT	CHAPTER	PAGE NUMBER
I	IV	112-126
II	IV	126-141
III	VII	231-240
IV	IX	281-283,286,287
V	IX	299-305,308-313

REFERENCE BOOKS:

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

CATEGORY	COURSE CODE	TITLE OF THE COURSE	CREDIT
EXTRA CREDIT		MATRIX THEORY	4

Preamble

To enable the students to gain the knowledge about matrix theory.

Course Outcomes

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

CO NUMBER	CO STATEMENT	KNOWLEDGE LEVEL
CO1	recall the notions and definitions of matrices, determinants, adjoint matrix, ranks, eigen values and eigen vectors	K_1
CO2	explain the concepts of matrices, determinants, adjoint matrix, ranks, eigen values and eigen vectors	K_2
CO3	apply matrix theory to numerical problems	K_3
CO4	examine ranks , orthogonality, eigen values , eigen vectors , Jordan canonical form, real quadratic form and the solution of system of simultaneous linear equations	K_4
CO5	evaluate inverse matrix**,** ranks , orthogonality, eigen values , eigen vectors , Jordan canonical form, real quadratic form and the solution of system of simultaneous linear equations	K_5

K_1 - Remember; K_2 – Understand; K_3 - Apply; K_4 - Analyze; K_5 – Evaluate.

COURSE CONTENT:

UNIT - I: Matrix Types and operations

Types of Matrices- Matrix operations- Matrix equations

UNIT - II: Determinants

Minor, cofactor, Algebraic complement- Laplace's expansion – multiplication of determinants- Jacobi's theorems.

UNIT - III : Solution to System of linear equations

Adjoint or adjugate of a matrix – Cramer's rule- Inverse of a matrix

UNIT - IV: Rank and orthogonality

Orthogonal and unilateral matrices- Rank of a matrix- Congruent matrix

UNIT - V: Eigenvalues and Eigen vectors

Cayley-Hamilton theorem- Minimal polynomial- Similarity of matrices – Diagonalization – Jordan canonical form – Real quadratic form

TEXT BOOK

Dipak Chatterjee (2009) second edition-"Abstract Algebra",PHI Learning pvt. Ltd, New Delhi

Unit	Section	Page
I	**8.1-8.3**	**245-256**
II	**8.4**	**257-268**
III	**8.5-8.7**	**268-276**
IV	**8.8-8.10**	**277-292**
V	**8.11**	**293-315**

CATEGORY	COURSE CODE	TITLE OF THE COURSE	CREDIT
EXTRA CREDIT		GROUP THEORY	**4**

Preamble:

To enable the students to learn and gain knowledge about types of Groups and some functions on groups.

Course Outcomes

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

CO NUMBER	CO STATEMENT	KNOWLEDGE LEVEL
CO1	recollect the definitions and fundamental ideas of various Groups and some functions on groups.	$\mathbf{K_1}$
CO2	Illustrate the basic concepts on types of Groups.	$\mathbf{K_2}$
CO3	apply theoretical ideas of set theory and group theory for solving the simple problems .	$\mathbf{K_4}$
CO4	analyze the various theorems and lemmas for groups.	$\mathbf{K_3}$
CO5	evaluate the simple problems of Group theory.	$\mathbf{K_5}$

K_1 - Remember; K_2 – Understand; K_3 - Apply; K_4 - Analyze; K_5 – Evaluate.

COURSE CONTENT:

UNIT I: GROUP (12 Hours)

Binary operations-Groups: Definitions and Examples – Basic properties.

UNIT II: SUB GROUPS (15 Hours)

Abelian group, Symmetric group , permutation groups ,alternating groups,Quaternion group

UNIT III:SOME SPECIAL GROUPS AND SUB GROUPS (15 Hours)

Klein's Group Subgroups – Group of isometries- Symmetric group -I_sDihedral Group-Automorphism of group-Cyclic subgroup - Index of a group – Order of an element – Lagrange's theorem .

UNIT IV: SUB GROUPS AND HOMOMORPHISMS (15 Hours)

Normal Subgroups –centralizer –normalizer- commutator-Quotient Groups -Homomorphism theorem.

UNIT V: REPRESENTATION THEOREMS (15 Hours)

Cayley's theorem -Cauchy's theorem – Sylow's theorem

TEXT BOOK

Dipak Chaterjee (2009)—"Topics in Algebra", 2nd edition, PHI Learning PVT ltd,New Delhi

UNIT	CHAPTER	SECTION
I	2	2.1 - 2.2
II	2	2.3.1 - 2.3.3
III	2	2.3.4 - 2.4.3
IV	2	2.4.4 - 2.5
V	2	2.6 - 2.8

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	CREDIT
EXTRA CREDIT		PROGRAMMING IN C	4

Preamble

To enable the students to learn and gain knowledge about C Programming such as its structure, data types, operators in C.

Course Outcomes

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

CO NUMBER	CO STATEMENT	KNOWLEDGE LEVEL
CO1	recall the basic concepts of c programming	K_1
CO2	explain the concept of operator, expression, managing input, output operations- decision making	K_2
CO3	identity the importance of c programming	K_3
CO4	analyze the necessary features of operator, expression, managing input- output operations, decision making	K_4
CO5	evaluate the values of mathematical function by using operators, expression, decision making and branching	K_5

UNIT - I : Constants, Variable and Data Types

Introduction – Importance of C- Basic structure of C programming –Character set- Tokens- keywords and identifiers- Constants- Variables – Data types – Declaration of variable – Assiging values to a variable – Defining symbolic constant.

UNIT - II : Operators

Introduction - Arithmetic operators – relational operators- logical operators – assignment operators – increment and decrement operators – conditional operators- special operators.

UNIT - III : Expressions

Arithmetic expression – Evaluation of expressions – precedence of arithmetic operators – some computational problems – Type conversion in expression – operator precedence and associativity mathematical functions.

UNIT – IV: Managing Input – Output Operations

Introduction – Reading character- writing character – formatted input- formatted output.

UNIT –V: Decision Making and Branching

Introduction – Decision making with IF statement – simple IF statement –IF ELSE statement – Nesting of IF ELSE statement –ELSE IF ladder - the Switch statement - the ? Operator – the GOTO statement.

Text Book

E. Balaguruswamy, Programming in ANSI C, Third Edition, Tata McGrawHill Publishing Company Limited.

UNIT	CHAPTER	SECTION
I	1 & 2	1.1, 1.2, 1.8, 2.1 – 2.11
II	3	3.1 - .3.9
III	3	3.10 – 3.16
IV	4	4.1 -4.5
V	5	5.1 – 5.9

REFERENCE BOOKS:

1. Programming with Ansi and Turbo C – Ashok N.Kamthane (Pearson Education Publishers,2002)
2. Programming In C – Kris A.Jamsa (Galgotia Publications Pvt.ltd.1992)

SYLLABUS FOR ALLIED COURSES

SEMESTER - I

BBA

BUSINESS MATHEMATICS	CATEGORY	CONTACT HOURS	CREDIT
	CORE ALLIED	60	4

Preamble

To enable the students to gain the knowledge about the series, set theory, matrix, simple and compound interest, linear programming problem.

Course Outcomes

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

CO NUMBER	CO STATEMENT	KNOWLEDGE LEVEL
CO1	recall the notions and concepts of set theory, matrices, series, simple and compound interest and LPP	K_1
CO2	classify interests, series, sets and matrices	K_2
CO3	apply the formulae to solve the different business problems based on interests, series, matrix, sets and LPP	K_3
CO4	examine series, sets and set operations, interests , matrix and matrix operations and LPP	K_4
CO5	evaluate LPP using graphical method, set operations and the solution of system of simultaneous linear equations	K_5

K_1 - Remember; K_2 – Understand; K_3 - Apply; K_4 - Analyze; K_5 – Evaluate.

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	9	9	9	9	3	3	3
CO2	9	9	9	9	1	1	1

CO3	9	9	3	3	1	1	1
CO4	9	9	3	3	1	1	0
CO5	9	9	3	3	1	1	0
Total Contribution of COs to POs	45	45	27	27	7	7	5
Weighted Percentage of COs contribution to POs	**2.58**	**3.24**	**2.37**	**2.85**	**0.89**	**1.28**	**0.82**

Level of Correlation: 0–No Correlation; 1–Low Correlation; 3–Medium Correlation; 9- High Correlation between COs and POs

COURSE CONTENT:

UNIT - I: SERIES (12 Hours)

Sequence and series - Arithmetic progression –Geometric progression .

UNIT- II: SET THEORY (12 Hours)

Introduction- Types of sets- Set operation- Venn diagrams.

UNIT - III : MATHEMATICS OF FINANCE (12 Hours)

Basic concepts - Simple Interest and Compound Interest: Simple Interest – Formulae and problems – Compound Interest – Formulae and problems.

UNIT - IV: MATRICES, DETERMINANTS (12 Hours)

Definition of a matrix- Order of a matrix – Types of a matrix– Matrix operations: A System of Linear Equations – Determinants- Cramer's Rule.

UNIT - V: LINEAR PROGRAMMING PROBLEM (12 Hours)

Introduction-meaning and scope -Limitations -Linear Programming Problem – Formulation of LPP – Solution by Graphical Method Solution.

NOTE: Distribution Of Marks: Theory 20%, Problem 80%.

TEXT BOOK

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

Unit - I	**Chapter 1**	**Page: 1-29**
Unit - II	**Chapter 3**	**Page: 104-126**
Unit -III	**Chapter 2**	**Page: 43-60**
Unit -IV	**Chapter 4**	**Page: 147-175**
Unit -V	**Chapter 9**	**Page: 328-345**

REFERENCE BOOKS:

1. Sundaresan and Jayaseelan, (2013)- " Introduction to Business Mathematics", Sultan chand Co& Ltd, Newdelhi.
2. Sanchetti, D.C and Kapoor, V.K.(2011)- " Business Mathematics" , Sultan chand Co& Ltd, Newdelhi.
3. G.K.Ranganath, C.S.Sampamgiram and Y.Rajan(1998)-"A Text book Business Mathematics-Himalaya Publishing House.

WEB REFERENCES:

1. https://www.youtube.com/watch?v=xFAwNmq5nX8
2. https://youtu.be/pn2Fx9-G1Ds
3. https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&cad=rja&uact=8&ved=2ahUKEwjgnuGA9JbzAhVNgUsFHQ88BngQFnoECAYQAQ&url=https%3A%2F%2Fwww.slideshare.net%2FEShubina%2Fset-theory&usg=AOvVaw00ArORMHIhl7hXEse-TTPj
4. https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&cad=rja&uact=8&ved=2ahUKEwiQj5ek9JbzAhUYXSsKHWDJBh4QFnoECDQQAQ&url=https%3A%2F%2Fwww.craftonhills.edu%2Fcurrent-students%2Ftutoring-center%2Fmathematics-tutoring%2Fmatrices-cramers.pdf&usg=AOvVaw0eqkDuobIihESS3V0IVLKs

B.Sc (CS) / B.Sc (IT) / BCA DEGREE PROGRAMME

MATHEMATICAL STRUCTURE FOR COMPUTER SCIENCE	COURSE CODE	CATEGORY	CONTACT HOURS	CREDIT
		CORE ALLIED	60	3

Preamble

To enable the students to learn about Matrices ,Simultaneous Linear equations, Numerical Differentiation and Integration and also Measures of central tendency.

Course Outcome

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

CO NUMBER	CO STATEMENT	KNOWLEDGE LEVEL
CO1	recall the basic definitions of Matrices, upper and lower triangular matrix, Numerical Differentiation and Integration, Measures of central tendency and Simultaneous algebraic equations.	$\mathbf{K_1}$
CO2	explain the basic concepts of Matrices, Gauss Elimination, Gauss Jordon, Gauss Jacobi Methods, Gauss Seidel Methods and also Newton's forward & backward Difference Formula , Newton's cotes formula and also Measures of central tendency.	$\mathbf{K_2}$
CO3	apply various formulae to solve the problems on Matrices, Numerical Differentiation and Integration, Measures of central tendency and algebraic equations.	$\mathbf{K_3}$
CO4	analyze the relationship between mean , median , mode and Trapezoidal Rule & Simpson's rule	$\mathbf{K_4}$
CO5	evaluate the problems under Matrices ,Simultaneous Linear equations, Numerical Differentiation and Integration and also Measures of central tendency.	$\mathbf{K_5}$

K_1 - Remember; K_2 – Understand; K_3 - Apply; K_4 - Analyze; K_5 – Evaluate.

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	9	9	9	9	3	3	3
CO2	9	9	9	9	3	3	3
CO3	9	9	9	9	3	3	3
CO4	9	9	3	3	1	1	1
CO5	3	3	3	3	0	0	0
Total Contribution of COs to POs	39	39	33	33	10	10	10
Weighted Percentage of COs contribution to POs							
CS	2.24	2.34	2.05	2.17	0.98	0.95	0.97
IT	2.23	2.31	2.05	2.19	0.96	0.85	0.96
BCA	2.25	2.37	2.01	2.16	0.95	0.90	1.28

Level of Correlation: 0–No Correlation; 1–Low Correlation; 3–Medium Correlation; 9- High Correlation between COs and POs

COURSE CONTENT:

UNIT I: MATRIX (15 Hours)

Matrices – Introduction –Addition , Subtraction and Multiplication of Matrix – Determination – Inverse of a matrix – Rank of a Matrix .

UNIT II: SIMULTANEOUS LINEAR ALGEBRAIC EQUATION (10 Hours)

System of Simultaneous Linear algebraic Equation . Gauss Elimination, Gauss Jordon, Gauss Jacobi Methods, Gauss Seidel Methods.

UNIT III: NUMERICAL DIFFERENTIATION (10 Hours)

Newton's forward Difference Formula - Backward Difference Formula – Stirling's formula.

UNIT IV: NUMERICAL INTEGRATION (10 Hours)

Introduction- Newton's cotes formula - Trapezoidal Rule - Simpson's 1/3 rule – Simpson's 3/8 rule.

UNIT V: MEASURES OF CENTRAL TENDENCY (15 Hours)

Mean, Median and Mode – Relationship among mean median and mode.

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

TEXT BOOKS:

1. P.A.Navanitham (Revised Edition -2012) "Business Mathematics and Statistics", Jai Publishers, Trichy-21, April 2012.

   (Unit I & V)

2. P.Kandasamy , K.Thilagavathy,K.Gunavathi. (Revised Edition -2005) "Numerical Methods " S.Chand & Company Ltd,Ram Nagar, New Delhi-110 055.

   (Unit II & III & IV)

UNIT	BOOK	CHAPTER	PAGE
I	1	Part I	147-188.
II	2	4	112-121, 145-159.
III	2	9	280-290.
IV	2	9	299-317.
V	1	Part II	159-181,196-227.

REFERENCE BOOKS:

1. E. Balagurusamy –(2007) "Numerical Methods", 22nd Edition ,Tata McGraw Hill, New Delhi.
2. S. C. Gupta, V. K. Kapoor – (2007)"Fundamental of Mathematical Statistics", 12th Edition, Sultan Chand & Sons, New Delhi.

WEB RESOURCES:

1. https://youtu.be/J8dSwvPfEc4
2. https://www.slideshare.net/TausifShahanshah/presentation-on-numerical-integration
3. https://www.slideshare.net/CasperWendy/measures-of-central-tendency-mean-median-mode

B.Com (PA) DEGREE PROGRAMME

MATHEMATICS FOR BUSINESS	CATEGORY	CONTACT HOURS	CREDIT
	CORE ALLIED	52	4

Preamble

To enable the students to gain knowledge about sequence and series ,matrix, set theory, LPP,simple interest and compound interest.

Course Outcomes

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

CO NUMBER	CO STATEMENT	KNOWLEDGE LEVEL
CO1	recall the basic concepts of sequence and series ,matrix, set theory, LPP, simple interest and compound interest.	K_1
CO2	explain sequence and series ,matrix, set theory, LPP, simple interest and compound interest.	K_2
CO3	apply different quantitative models in solving business problems	K_3
CO4	determine the solutions of the problems based on matrix , simple interest and compound interest problems	K_4
CO5	evaluate the problems on sequence and series ,matrix, set theory , annuity ,simple interest and compound interest problems.	K_5

K_1 - Remember; K_2 – Understand; K_3 - Apply; K_4 - Analyze; K_5 – Evaluate.

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	9	9	9	9	3	3	3
CO2	9	9	9	9	3	3	3
CO3	9	9	9	9	1	1	1
CO4	9	9	9	9	1	1	1

CO5	9	9	9	3	0	0	0
Total Contribution of COs to POs	45	45	45	39	8	8	8
Weighted Percentage of COs contribution to POs	2.61	2.99	3.05	3.72	1.33	1.07	1.38

Level of Correlation: 0–No Correlation; 1–Low Correlation; 3–Medium Correlation; 9- High Correlation between COs and POs

COURSE CONTENT:

UNIT I: SET THEORY (**10 Hours)**

Definition – Description of sets – Types of sets – Venn diagram – Set operations – Laws on Sets - Number of elements – Cartesian product

UNIT II: SEQUENCE AND SERIES **(10 Hours)**

Introduction – Arithmetic progression – Arithmetic Means – Geometric Progression – Geometric Means – Harmonic Progression – Harmonic Means

UNIT III: MATHEMATICS OF FINANCE **(10 Hours)**

Basic concepts – Simple interest – Compound interest - Depreciation - Annuity – Present value – Future value – Sinking fund – Amortisation table – Dicounting – True discount – Banker's gain

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

Matrix: Basic Concepts – Addition and Multiplication of matrices – Inverse of a matrix –Rank of matrix - Solution of simultaneous linear equations.

UNIT V: LINEAR PROGRAMMING PROBLEM **(10 Hours)**

Linear Programming Problem – Formation – Solution by Graphical Method Solution by Simplex Method.

TEXT BOOK:

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

UNIT	CHAPTER	PAGE
I	3	104 - 138
II	1	1 – 33
III	2	43 – 88
IV	4	147 - 200
V	9	328 - 374

REFERENCE BOOKS:

1. Sundaresan and Jayaseelan, (2013)-“ Introduction to Business Mathematics ”, Sultan chand Co& Ltd, Newdelhi.
2. Sanchetti D.C and Kapoor V.K.(2011)- “ Business Mathematics” , Sultan chand Co& Ltd, Newdelhi.
3. G.K.Ranganath, C.S.Sampamgiram and Y.Rajan(2015)-“A Text book of Business Mathematics-Himalaya Publishing House.

WEB RESOURCES:

1. https://www.youtube.com/watch?v=xFAwNmq5nX8
2. https://youtu.be/pn2Fx9-G1Ds
3. https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&cad=rja&uact=8&ved=2ahUKEwjgnuGA9JbzAhVNgUsFHQ88BngQFnoECAYQAQ&url=https%3A%2F%2Fwww.slideshare.net%2FEShubina%2Fset-theory&usg=AOvVaw00ArORMHIhl7hXEse-TTPj
4. https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&cad=rja&uact=8&ved=2ahUKEwiQj5ek9JbzAhUYXSsKHWDJBh4QFnoECDQQAQ&url=https%3A%2F%2Fwww.craftonhills.edu%2Fcurrent-students%2Ftutoring-center%2Fmathematics-tutoring%2Fmatrices-cramers.pdf&usg=AOvVaw0eqkDuobIihESS3V0IVLKs

B.Sc (PHY) DEGREE PROGRAMME

ALLIED MATHEMATICS-I	CATEGORY	CONTACT HOURS	CREDIT
	CORE ALLIED	84	

Preamble

To enable the students to learn about matrices and determinants, different types of equations, Laplace transforms and Fourier series.

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 matrices, polynomial equations, Laplace, inverse Laplace transforms and Fourier series.	**K_1**
CO2	explain the operations of matrix, roots of the equations, standard functions of Laplace , inverse Laplace transforms and Fourier series.	**K_2**
CO3	apply the concepts of matrices, theory of equations , Fourier series of functions, Laplace and inverse Laplace transforms to solve the problems.	**K_3**
CO4	analyze Cramer's Rule, Irrational roots, complex roots , hyperbolic functions and Transform of $tf(t), f(t)/t$.	**K_4**
CO5	evaluate the problems in Laplace transforms, inverse Laplace transforms, Matrices, Reciprocal Equations and Fourier series.	**K_5**

K_1 - Remember; K_2 – Understand; K_3 - Apply; K_4 - Analyze; K_5 – Evaluate.

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	9	9	9	9	3	3	3
CO2	9	9	9	9	3	3	3
CO3	9	9	9	9	3	3	3
CO4	9	9	9	9	1	1	1
CO5	9	9	3	3	0	0	0
Total Contribution of COs to POs	45	45	39	39	10	10	10
Weighted Percentage of COs contribution to POs	2.27	2.54	2.46	2.90	0.93	1.12	1.21

Level of Correlation: 0–No Correlation; 1–Low Correlation; 3–Medium Correlation; 9- High Correlation between COs and POs

COURSE CONTENT:

UNIT I: MATRICES, DETERMINANTS (15 Hours)

Definition of a matrix- Order of a matrix – Types of a matrix– Matrix operations I:A System of Linear Equations – Determinants- Cramer's Rule – Matrix Operation II: Inverse of a matrix –Rank of matrix .

UNIT II:THEORY OF EQUATIONS (20 Hours)

Polynomial Equations with real coefficients - Irrational roots, complex roots - Reciprocal Equations - Newton's method to find a root approximately**.**

UNIT III: LAPLACE TRANSFORMS (20 Hours)

Definition – Laplace Transform of Standard functions – Linearity property – First shifting theorem – Transform of $tf(t), f(t)/t$.

UNIT-IV: INVERSE LAPLACE TRANSFORMS (15 Hours)

Inverse Laplace transforms of standard functions – First shift theorem - Laplace Transform of derivatives and integrals.

UNIT V: FOURIER SERIES **(14 Hours)**

Fourier series of functions in $(0, 2\pi)$ and $(-\pi, \pi)$.

NOTE: Distribution of Marks: Problem 100%.

TEXT BOOKS

1. Navnitham. P.A.(2012) - "Business mathematics and statistics", Jai publishers, TRICHY.
2. Kandasamy. P, Thilagavathi. K(2012) - "ALLIED MATHEMATICS", Paper-I, S.Chand and Company Ltd, New Delhi.
3. Kandasamy. P, Thilagavathi. K "MATHEMATICS for B.Sc– Volume III(2004) and Volume IV(2005)", S. Chand and Company Ltd,New Delhi.

UNIT	BOOK	CHAPTER	VOLUME	PAGE NO
I	1	4	I	147-188
II	2	1,2,3	I	39-47,56-71
III	3	1	III	187-201
IV	3	1	III	202-225
V	3	1	IV	93-134

REFERENCE BOOKS

1. Manickavasagam Pillai.T.K.and Narayanan.S(2012) – "Trigonometry" - Viswanathan Publishers and Printers Pvt. Ltd.
2. Manickavasagam Pillai.T.K.and Narayanan.S.,Hanumantha Rao.R(2011) - "Ancillary Mathematics", Volume-II Viswanathan Publishers and Printers Pvt. Ltd.

WEB REFERENCES:

1. https://en.wikipedia.org/wiki/Inverse_Laplace_transform
2. https://youtu.be/5nNPf_EB7Es
3. https://nptel.ac.in/courses/111/107/111107112/

SEMESTER - II

BBA DEGREE PROGRAMME

BUSINESS STATISTICS	CATEGORY	CONTACT HOURS	CREDIT
	CORE ALLIED	60	4

Preamble

To enable the students to gain the knowledge about diagrams and graphs, measures of central tendency, time series, correlation and regression.

Course Outcomes

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

CO NUMBER	CO STATEMENT	KNOWLEDGE LEVEL
CO1	recall the formulae of mean, median, mode, correlation, regression and secular trend methods	K_1
CO2	identify one and two dimensional diagrams, properties of correlation and regression, graphs of time series and types of averages	K_2
CO3	draw trend line, regression line, graphs, one dimensional and two dimensional diagrams.	K_3
CO4	analyze the time series, co-efficient of correlation and regression equations and relationship among mean, median, mode.	K_4
CO5	evaluate the problems on correlation and regression , measures of central tendency, time series and graphs of time series	K_5

K_1 - Remember; K_2 – Understand; K_3 - Apply; K_4 - Analyze; K_5 – Evaluate.

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	9	9	9	9	3	3	3
CO2	9	9	9	9	1	1	1
CO3	9	9	3	3	1	1	1
CO4	9	9	3	3	1	1	0
CO5	9	9	3	3	1	1	0
Total Contribution of COs to POs	45	45	27	27	7	7	5
Weighted Percentage of COs contribution to POs	**2.58**	**3.24**	**2.37**	**2.85**	**0.89**	**1.28**	**0.82**

Level of Correlation: 0–No Correlation; 1–Low Correlation; 3–Medium Correlation; 9- High Correlation between COs and POs

COURSE CONTENT:

UNIT –I: DIAGRAMS AND GRAPHS (12 Hours)

Diagrams - Rules for Constructions- Types of Diagrams-Drawing Diagrams in one dimensional, two dimensional. Graphs- Graphs of time series & Historigrams – Graphs of frequency distribution (equal class-intervals only)

UNIT –II: MEASURES OF CENTRAL TENDENCY (12 Hours)

Meaning and definition-Types of averages -Arithmetic mean –Median – Mode

UNIT–III: CORRELATION (12 Hours)

Correlation Analysis – Meaning of correlation; Types of correlation -Scatter Diagram - Karl Pearson's coefficient of correlation - Spearman's rank correlation coefficient – Concurrent Deviation Method.

UNIT –IV: REGRESSION (12 Hours)

Simple linear regression- Meaning and uses - Differences between Correlation and regression - Two regression lines -Properties of Regression lines and Co-efficient.

UNIT –V: ANALYSIS OF TIME SERIES **(12 Hours)**

Analysis of Time Series: Definition – Uses - Methods of Secular Trend – Graphical Method – Method of Semi Averages – Method of Moving Averages – Method of Least squares.

NOTE: No derivation and proof, simple problems only.

TEXT BOOK

Navnitam. PA(2012) – "Business Mathematics and Statistics", Jai Publishers, Trichy.

UNIT	CHAPTER	PAGE
I	VI	98-118, 124-134
II	VII	159 – 227
III	XII	503-539
IV	XIII	540-553,563-571
V	XIV	579-600

REFERENCE BOOKS:

1. Gupta S.P(2014) – "Statistical Methods" , Sultan Chand & Sons, New Delhi.
2. Vittal. P.R(2002) - Business Mathematics and Statistics, Margham publishers, Chennai.

WEB REFERENCES:

1. https://statisticsbyjim.com/basics/measures-central-tendency-mean-median-mode/
2. http://www.pitt.edu/~super4/33011-34001/33851.ppt
3. https://www.itl.nist.gov/div898/handbook/pmc/section4/pmc4.htm

B.Sc (CS) / B.Sc (IT) / BCA DEGREE PROGRAMME

DISCRETE MATHEMATICS	COURSE CODE	CATEGORY	CONTACT HOURS	CREDIT
		CORE ALLIED	60	3

Preamble

To enable the students to gain knowledge about the set theory, logical operations, relations, grammars and graphs

Course Outcomes

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

CO NUMBER	CO STATEMENT	KNOWLEDGE LEVEL
CO1	recall the basic terms of set operations, logical operations, relations, grammars and graphs	**K_1**
CO2	explain the concepts of sets, relations, logical operations and graphs.	**K_2**
CO3	apply the various formulae to solve the problems based on set operations, logical operations, relations, grammars and graphs.	**K_3**
CO4	examine the relation between sets, logical operations and graphs.	**K_4**
CO5	evaluate the problems on set operations, logical operations, relations, grammars and graphs.	**K_5**

K_1 - Remember; K_2 – Understand; K_3 - Apply; K_4 - Analyze; K_5 – Evaluate.

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	9	9	9	9	3	3	3
CO2	9	9	9	9	3	3	3
CO3	9	9	9	9	3	3	3

CO4	9	9	9	3	1	1	1
CO5	3	3	3	3	0	0	0
Total Contribution of COs to POs	39	39	39	33	10	10	10
Weighted Percentage of COs contribution to POs							
CS	2.24	2.34	2.42	2.17	0.98	0.95	0.97
IT	2.23	2.31	2.43	2.19	0.96	0.85	0.96
BCA	2.25	2.37	2.37	2.16	0.95	0.90	1.28

Level of Correlation: 0–No Correlation; 1–Low Correlation; 3–Medium Correlation; 9- High Correlation between COs and POs

COURSE CONTENT:

UNIT I: SET THEORY (12 Hours)

Introduction-Set and its elements-Set description-Types of sets-Venn-Euler Diagrams- Set operations and laws of set theory.

UNIT II: RELATIONS (12 Hours)

Binary relations – Cartesian product of sets - Set operations on relations-Types of relations – Partial order relations – Equivalence relation – Composition of relations .

UNIT III: GRAPH THEORY (12 Hours)

Introduction – Basic terminology – Paths, cycles and connectivity – Sub graphs - Types of graphs – Isomorphic graphs-Homeomorphic graphs-Representation of graphs in computer memory.

UNIT IV: MATHEMATICAL LOGIC (12 Hours)

Introduction- Prepositional calculus –Basic logical operations- Tautologies-Contradiction-Contingency-Argument-Method of proof- Equivalence and implication.

UNIT V: LANGUAGE, GRAMMAR AND AUTOMATA (12 Hours)

Introduction-Languages – Operations on languages – Regular expressions and regular languages – Grammar – Types of grammars – Finite state machine.

TEXT BOOK

Sharma.J.K. (2010) – "Discrete Mathematics", Macmillan publishers India Ltd.

UNIT	CHAPTER	PAGE NUMBER
I	I	1-16
II	III	77-85,92-93
III	IX	221-247
IV	XII	333-341,352-364
V	XV	440-467

REFERENCE BOOKS:

1.Tremblay.J.P.,Manohar.R.(1997) – "Discrete Mathematical Structures with Applications to Computer Science", Mc Graw Hill Education (India) Pvt.Ltd.

2. Venkataraman.M.K., Sridharan.N, Chandarasekaran.N.(2001) – "Discrete Mathematics", National Publishing Company, Chennai.

WEB RESOURCES:

1. https://youtu.be/xlUFkMKSB3Y

2. https://youtu.be/oaOm2pnKkyY

B.Com (PA) DEGREE PROGRAMME

STATISTICS FOR BUSINESS	CATEGORY	CONTACT HOURS	CREDIT
	CORE ALLIED	48	3

Preamble

To enable the students to learn the Statistical methods and their applications in Commerce

Course Outcomes

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

CO NUMBER	CO STATEMENT	KNOWLEDGE LEVEL
CO1	recall the basic definitions of statistics, measures of central tendency, correlation, regression, time series and probability	K_1
CO2	explain the concept based on statistics, measures of central tendency, correlation, regression, time series and probability	K_2
C03	apply various formulae to solve the problems on statistics, measures of central tendency, correlation, regression, time series and probability.	K_3
CO4	analyze the relations between Mean Median, Mode, correlation and regression	K_4
CO5	evaluate the problems on statistics, measures of central tendency, correlation, regression, time series and probability	K_5

K_1 - Remember; K_2 – Understand; K_3 - Apply; K_4 - Analyze; K_5 – Evaluate.

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	9	9	9	9	3	9	3
CO2	9	9	9	9	3	9	3
CO3	9	9	9	9	3	3	1
CO4	9	9	9	9	3	3	1
CO5	9	9	9	9	3	3	0
Total Contribution	45	45	45	45	15	27	8

of COs to POs							
Weighted Percentage of COs contribution to POs	2.61	2.99	3.05	4.30	2.50	3.62	1.38

Level of Correlation: 0–No Correlation; 1–Low Correlation; 3–Medium Correlation; 9- High Correlation between COs and POs

COURSE CONTENT:

UNIT I : (**10 Hours)**

STATISTICS: Introduction to statistics- Meaning - Definition – Methods of collecting data – Primary and Secondary data- Classification and tabulation – Diagrammatic and graphical representation.

UNIT II : (**10 Hours)**

MEASURES OF CENTRAL TENDENCY: Mean Median, Mode, Geometric Mean and Harmonic Mean - Merits and demerits.

UNIT III (**10 Hours)**

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

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

UNIT IV (**10 Hours)**

TIME SERIES: Definition of Time Series - Components of Time Series-Methods of estimating trend – Graphic, Semi-average, Moving average and Method of Least squares – Advantages and Disadvantages

UNIT V (**8 Hours)**

PROBABILITY: Definition – Concept – Addition and Multiplication theorems.

(No derivation and proof, Simple Problems only).

Therory – 20%

Problems – 80%

TEXT BOOK

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

UNIT	CHAPTER	PAGE
I	I, III V, VI	1-19, 28-40, 60-91, 98-147

II	VII	159-270
III	XII & XIII	503-554
IV	XIV	579-601
V	XVI	654-680

REFERENCE BOOKS

1. Gupta. S.P. (2016) - "Statistical Methods", Sultan Chand & Sons, New Delhi.
2. Vittal. P.R. (2013) - "Mathematical Statistics", Margham Publishers, Chennai.

WEB RESOURCES:

1. https://statisticsbyjim.com/basics/measures-central-tendency-mean-median-mode/
2. http://www.pitt.edu/~super4/33011-34001/33851.ppt
3. https://www.itl.nist.gov/div898/handbook/pmc/section4/pmc4.htm

B.Sc (PHYSICS) DEGREE PROGRAMME

ALLIED MATHEMATICS-II	CATEGORY	CONTACT HOURS	CREDIT
	CORE ALLIED	84	4

Preamble

To enable the students to learn and gain the knowledge and ideas about curvature, multiple integrals, Ordinary and Partial differential equations.

Course Outcomes

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

CO NUMBER	CO STATEMENT	KNOWLEDGE LEVEL
CO1	recall the basic concepts of curvature ,differentiation and integration .	$\mathbf{K_1}$
CO2	express radius of curvature, double and triple integrals, beta and gamma functions, ordinary and partial differential equations.	$\mathbf{K_2}$
CO3	apply the formula for Beta - Gamma functions, radius and centre of curvature for finding the results.	$\mathbf{K_3}$
CO4	analyze the general of ordinary, partial differential equations , Beta - Gamma functions and change of order of integrations..	$\mathbf{K_4}$
CO5	Evaluation of multiple integrals and differential equations.	$\mathbf{K_5}$

K_1 - Remember; K_2 – Understand; K_3 - Apply; K_4 - Analyze; K_5 – Evaluate.

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	9	9	9	9	3	3	3
CO2	9	9	9	9	3	3	3
CO3	9	9	9	9	3	3	3
CO4	9	9	9	9	3	3	3
CO5	9	9	9	9	3	3	3
Total Contribution of COs to POs	45	45	45	45	15	15	15
Weighted Percentage of COs contribution to POs	2.27	2.54	2.84	3.35	1.40	1.68	1.82

Level of Correlation: 0–No Correlation; 1–Low Correlation; 3–Medium Correlation; 9- High Correlation between COs and POs

COURSE CONTENT:

UNIT I:CURVATURE (20 Hours)

Curvature – Radius of curvature – Center of curvature – Circle of curvature

UNIT II: INTEGRATION (20 Hours)

Evaluation of double integrals - Change of order of integration in double integrals -Evaluation of triple integrals .

UNIT III:BETA AND GAMMA FUNCTIONS (20 Hours)

Beta and Gamma functions – Relations between Beta and Gamma functions – Evaluation of multiple integrals using Beta and Gamma functions.

UNIT IV:ORDINARY DIFFERENTIAL EQUATIONS (10 Hours)

Solving second order linear differential equations with constant coefficients whose R.H.S is of the form ve^{mx}, where v is any function of x-to find the meanings for $f(D^2)\sin(ax+b)$ and $f(D^2)\cos(ax+b)$.

UNIT V:PARTIAL DIFFERENTIAL EQUATIONS(14 Hours)

Formation of partial differential equations by elimination of arbitrary constants and functions -Definitions of general, particular and complete solutions - Solving standard forms f(p, q) = 0.

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

TEXT BOOK

1. Kandasamy. P, Thilagavathi.K.(2004) - "Mathematics for B.Sc. Branch I", 1st edition,Volume II and III, S.Chand and Company Ltd, New Delhi.

   2.Narayanan.S. and Manicavachasam Pillai.T.K (2017) – " Calculus Volume II"- Viswanathan Publishers.

UNIT	BOOK	CHAPTER	VOLUME	PAGE NO
I	1	II	II	324-344
II	1	VI	II	432-444
III	2	VIII	II	278-295
IV	1	II	III	16-35
V	1	I	III	117-136

REFERENCE BOOK:

Narayan.S and Manicavachagam Pillay.T.K. (1993) - "Ancillary Mathematics", Viswanathan Publishers and Printers Pvt. Ltd.

WEB REFERENCES:

1. https://en.wikipedia.org/wiki/Beta_function
2. https://users.aber.ac.uk/ruw/teach/260/classification.php

SEMESTER - III

B.Sc (C/S), B.C.A. DEGREE PROGRAMME

OPERATIONS RESEARCH	COURSE CODE	CATEGORY	CONTACT HOURS	CREDIT
		CORE ALLIED	48	3

Preamble

To enable the students to understand how to formulate a real-world problem into a LPP.

Course Outcomes

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

CO NUMBER	CO STATEMENT	KNOWLEDGE LEVEL
CO1	recall the mathematical tools that are needed to solve Operations Research problems.	K_1
CO2	discuss the properties of Transportation, Assignment, Game Theory, Replacement models and CPM problems.	K_2
CO3	identify the solution of LPP, Transportation, Assignment, Game Theory, Replacement models and CPM problems.	K_3
CO4	analyze the salient features of operations research in different problem solving methods.	K_4
CO5	evaluate the problems on LPP, Transportation, Assignment, Game Theory, Replacement models and CPM problems.	K_5

K_1 - Remember; K_2 – Understand; K_3 - Apply; K_4 - Analyze; K_5 – Evaluate.

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	9	9	9	9	3	3	3
CO2	9	9	9	9	3	3	3
CO3	9	9	9	9	3	3	3
CO4	9	9	9	9	3	3	3
CO5	3	3	3	3	1	1	1
Total Contribution of COs to POs	39	39	39	39	12	12	12
Weighted Percentage of COs contribution to POs							
CS	2.24	2.34	2.42	2.56	1.18	1.15	1.16
BCA	2.25	2.37	2.37	2.56	1.14	1.08	1.54

Level of Correlation: 0–No Correlation; 1–Low Correlation; 3–Medium Correlation; 9- High Correlation between COs and POs

COURSE CONTENT:

UNIT-I: LINEAR PROGRAMMING PROBLEM (10 HOURS)

Linear Programming -Mathematical Model assumption of linear Programming – Graphical method -Simplex method (Simple Problems only).

UNIT-II:TRANSPORTATION AND ASSIGNMENT PROBLEM(10 HOURS)

Transportation problem-NWC method-Least cost method-VAM method-assignment problem.

UNIT-III:GAME THEORY(10 HOURS)

Game Theory -Concept of Pure and Mixed Strategies –Solving 2 x 2 matrix with and withoutsaddle point -n x 2 -2 x m games.

UNIT-IV: REPLACEMENT (10 HOURS)

Replacement models -Elementary replacement models -Present value -Rate of return -Depreciation -Individual replacement –Group replacement.

UNIT-V:CPM(8 HOURS)

Network representation - CPM -Backward pass -Forward pass.

TEXT BOOKS:

1. Manmohan, P.K. Gupta, Kanthiswarup, S(2017) –"Operations Research" Chand & sons.

UNIT	CHAPTER	PAGE
I	2,3,4	39-78, 87, 99-106
II	10,11	247,252-258, 298-314
III	17	443-457
IV	18	477-495
V	25	763-780

REFERENCE BOOKS:

1. Hamdy A Taha (2002) – "Operations Research" Pearson Education, 7th edition,

2. P.K. Gupta, D.S. Hira-"Problems in Operations Research",S. Chand Publishers.

WEB REFERENCES:

1. https://en.wikipedia.org/wiki/Operations_research

2. https://www.bbau.ac.in/dept/UIET/EMER-601%20Operation%20Research%20Queuing%20theory.pdf

3. https://www.researchgate.net/publication/311694393_SIMPLEX_METHOD

4. http://nsdl.niscair.res.in/jspui/bitstream/123456789/1047/1/Chapter%208.pdf