Department of Mathematics

Course Syllabus **B.Sc. Mathematics with Computer Applications** **2019 batch**

Course Profile

Sem.	Course Code	Course Title	Course Type	Hrs./ Wk.		Credits	Passed in Academic Council	Offered to	Offered by
				TH	L				
I	PART I	TAMIL / HINDI / FRENCH	TH	6		3 / 4	AV2014	ALLM	SUTAM
	PART II	ENGLISH	TH	6		3 / 4	AV2014	ALLM	SUENG
	MAT1301FM	TRIGONOMETRY AND THEORY OF EQUATIONS	TH	4		3	AU2013	SUMAT	SUMAT
	MAT1502CM	ADVANCED CALCULUS I	TH	5		5	BA2018	SUMAT	SUMAT
	PHY1402AA	GENERAL PHYSICS	TH	5		4	BA2018	SUMAT	SUPHY
	MAT1202FS	COMMUNICATION SKILLS THROUGH MATHEMATICS	TH	2		2	AZ2017	SUMAT	SUMAT
	VBC1101FV / UIV1101FV	HEALTHY TRANSITION FROM ADOLESCENCE TO ADULTHOOD / BIBLICAL ESSENTIALS FOR EMERGING ADULTS	TH	2		1	BA 2018	ALLM /AUACH SUACH	Centre for VBC / IVBC
		TOTAL		**30**		**21 / 23**			
II	PART I	TAMIL / HINDI / FRENCH	TH	6		3 / 4	AV2014	ALLM	AUTAM
	PART II	ENGLISH	TH	6		3 / 4	AV2014	ALLM	AUENG
	MAT2402CM	SEQUENCES AND SERIES	TH	4		4	AU2013	SUMAT	SUMAT
	MAT2403CM	ANALYTICAL GEOMETRY OF 3D	TH	4		4	BB2019	SUMAT	SUMAT
		SUPPORT COURSE	**TH**	**5**		**4**		**-**	**-**
	MAT2201FS	COMMUNICATION SKILLS FOR MATHEMATICS	TH	2		2	BA2018	SUMAT	SUMAT
	ELECTIVE	ENVIRONMENTAL ELECTIVES	TH	2		2	AU2013	ALLM	CED
	VBC0102FV / VBC0103FV	CIVIC EDUCATION / FAMILY LIFE EDUCATION		1		1	AV2014	ALLM	Centre for VBC
	UIV2101FI	BIBLICAL FOUNDATION FOR FAMILY LIFE					BA2018	AUACH/ SUACH	Centre for IVBC
		TOTAL		**30**		**23 / 25**			

SUPPORT COURSE

Sem.	Course Code	Course Title	Course Type	Hrs./Wk.		Credits	Passed in Academic Council	Offered to	Offered by
				TH	L				
I	MAE2401AT	PROGRAMMING IN C	TH	3	2	4	BA2018	SUMAT	SUMAT

Department of Mathematics

Course Syllabus **B.Sc. Mathematics with Computer Applications** **2019 batch**

Sem.	Course Code	Course Title	Course Type	Hrs./Wk.		Credits	Passed in Academic Council	Offered to	Offered by
				TH	L				
III	MAT3401CM	VECTOR ANALYSIS AND DIFFERENTIAL GEOMETRY	TH	4		4	AV2014	SUMAT	SUMAT
	MAT3501CM	MODERN ALGEBRA	TH	6		5	AV2014	SUMAT	SUMAT
	MAT3502CM	STATISTICS	TH	6		5	BB2019	SUMAT	SUMAT
	MAT3504CM	DIFFERENTIAL EQUATIONS AND LAPLACE TRANSFORMS	TH	6		5	BD2019	AUMAT	SUMAT
	MAE3401AT	PROGRAMMING WITH C++	LT	3	2	4	AV2014	SUMAT	SUMAT
	NON-MAJOR ELECTIVE		TH / LA	2		2			
	VOCATIONAL COURSE					2		ALLM	CED
	VBC0102FV / VBC0103FV/ UIV3101FV	CIVIC EDUCATION / FAMILY LIFE EDUCATION / CIVICS IN THE BIBLE		1		1	AV2014/ AV2014/ BB2019	ALLM / AUACH SUACH	Centre for VBC / IVBC
		TOTAL		**30**		**26**			
IV	MAT4501CM	LINEAR ALGEBRA	TH	6		5	AV2014	SUMAT	SUMAT
	MAT4503CM	REAL ANALYSIS	TH	6		5	AV2014	SUMAT	SUMAT
	MAT4504CM	ADVANCED STATISTICS	TH	6		5	BA2018	SUMAT	SUMAT
	MAE4501CM	DATA STRUCTURES AND ALGORITHMS	TH	6		5	BA2018	SUMAT	SUMAT
	MAT4201SS	QUANTITATIVE APTITUDE	TH	2		2	AV2014	SUMAT	SUMAT
	NON-MAJOR ELECTIVE		TH/LA	2		2			
	VBC0202FV /VBC0203FV	HUMAN RIGHTS AND DUTIES / FOUNDATION COURSE ON WOMEN'S STUDIES	TH	2		2	AV2014/ AY2016	ALLM	Centre for VBC / IVBC
	UIV4201FV	HUMAN RIGHTS IN THE BIBLE					BB2019	SUACH	
		TOTAL		**30**		**25**			

Department of Mathematics

Course Syllabus **B.Sc. Mathematics with Computer Applications** **2019 batch**

NON-MAJOR ELECTIVES

Sem.	Course code	Course Title	Course Type	Hrs./Wk.		Credits	Passed in Academic Council	Offered to	Offered by
				Theory	Lab				
III	CRMA3201EI	FOUNDATION COURSE IN MATHEMATICS AND COMMERCE FOR COMPETITIVE EXAMINATIONS	T	2		2	AZ-2017	ALL	SUCOM & SUMAT
	CSMA3201EI	BASICS IN DISCRETE MATHEMATICS	T	2		2	AV-2014	ALL	SUCSC & SUMAT
	BAMA3201EI	OPTIMIZATION TECHNIQUES IN MANAGEMENT	T	2		2	BA2018	ALL	SUMAT & SUBBA
IV	ENMA4201EI	BASIC COURSE IN MATHEMATICS AND ENGLISH FOR COMPETETIVE EXAMINATIONS	T	2		2	AV-2014	ALL	SUENG & SUMAT
	CSMA4201EP	NUMERICAL METHODS USING SCILAB	L		2		BA2018	ALL	SUCSC & SUMAT
	BTMA4201EI	DEMOGRAPHY AND VITAL STATISTICS	T	2		2	BA2018	ALL	SUMAT & SUBTY

Department of Mathematics

Course Syllabus **B.Sc. Mathematics with Computer Applications** **2019 batch**

Sem.	Course Code	Course Title	Course Type	Hrs./Wk.		Credits	Passed in Academic Council	Offered to	Offered by
				TH	LA				
V	MAT5501CM	ADVANCED CALCULUS – II	TH	6		5	AW2015	SUMAT	MAT
	MAE5502CT	RDBMS WITH VISUAL BASIC	LT	3	3	5	BD2019	SUMAT	SUMAT
	MAT5504CM	GRAPH THEORY	TH	6		5	BA2018	SUMAT	MAT
	MAT5202CM	INTRODUCTION TO RESEARCH METHODOLOGY	TH	2		2	BD2019	SUMAT	MAT
	MAT0602LM	APPLICATIONS OF MATHEMATICAL TOOLS FOR HUMAN LIFE ENHANCEMENT		4		–	BD2019	SUMAT	MAT
	INTERDISCIPLINARY COURSE		TH	4		4			
	VBC0202FV / VBC0203FV	HUMAN RIGHTS AND DUTIES / FOUNDATION COURSE ON WOMEN'S STUDIES	TH	2		2	AV2014 / AY2016	ALLM	Centre for VE
	UIV5201FI	BIBLICAL PERSPECTIVES ON WOMEN					BB2019	AUCH / SUCH	
		TOTAL		**30**		**23**			

VI	MAE6401CT	OBJECT ORIENTED PROGRAMMING - II	LT	3	2	4	AW2015	SUMAT	SUMAT
	MAE6501CM	OPERATIONS RESEARCH	TH	6		5	AW2015	SUMAT	SUMAT
	MAE6502CM	MECHANICS	TH	5		5	AW2015	SUMAT	SUMAT
	MAT0602LM	APPLICATIONS OF MATHEMATICAL TOOLS FOR HUMAN LIFE ENHANCEMENT	PR	4		6	BD2019	SUMAT	SUMAT
	MAT6501CM	COMPLEX ANALYSIS	TH	5		5	BB2019	SUMAT	SUMAT
		INTERDISCIPLINARY COURSES	TH	4		4			
	VBC6101FV	ENCHANCING SOCIAL GRACE	TH	1		1	BB2019	SUMAT	CENTRE FOR VE
	UIV6101F1	BIBLICAL PERSPECTIVES OB LEADERSHIP						SUCH	
			TOTAL	**30**		**30**			

Course Syllabus **B.Sc. Mathematics with Computer Applications** **2019 batch**

INTERDISCIPLINARY COURSE

Sem.	Course code	Course Title	Course Type	Hrs./Wk.		Credits	Passed in Academic Council	Offered to	Offered by
				Theory	Lab				
V	BTMA5401DM	APPLICATIONS OF STATISTICS IN GENETICS	T	4			AW-2015	SUMAT &SUBTE	SUMAT &SU SUBTE
	ITMA5402DM	PARALLEL INTERCONNECTION NETWORK	T	4		4	AZ-2017	SUMAT &SUITM	SUMAT &SUITM
	ITMA5403DM	FORMAL LANGUAGES AND AUTOMATA THEORY	T	4		4	BA2018	SUMAT &SUITM	SUMAT &SUITM
VI	ITMA6401DT	APPLICATIONS OF FUZZYSETS USING MATLAB	T/L	3	1		BA2018	SUMAT &SUITM	SUMAT &SUITM
	CSMA6401DT	APPLICATIONS OF FUZZYSETS USING MATLAB	T/L	3	1		BA2018	SUMAT &SUCSC	SUMAT &SUCSC
	MAPH6402DM	INTRODUCTION TO ASTROPHYSICS					AZ2017	SUMAT &SUPHY	SUMAT &SUPHY

MAT1301FM TRIGONOMETRY AND THEORY OF EQUATIONS

(Theory)

LEARNING OUTCOME : **4 Hrs./Wk.**

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

- understand the fundamental concepts in Algebra.
- solve problems using the expansions of trigonometrical functions.
- find the roots of the equations by various methods.

COURSE OUTLINE :

UNIT-I : **15 Hrs.**

Expansions: Expansions of sin nθ, cos nθ, tan nθ powers of sines and cosines of θ in terms of functions of multiples of θ, expansions of sinθ and cosθ in a series of ascending powers of θ.

UNIT-II : **10 Hrs.**

Hyperbolic Functions: Relation between hyperbolic functions, inverse hyperbolic functions.

UNIT-III : **15 Hrs.**

Theory of Equations: Remainder Theorem, relations between the roots and coefficients of equations, symmetric functions of the roots, sum of the powers of the roots of an equation, Newton's Theorem on the sum of the powers of the roots.

UNIT-IV : **10 Hrs.**

Transformations of Equations: Roots with signs changed, roots multiplied by a given number, reciprocal equations, to increase or to decrease the roots of a given equation by a given quantity, removal of terms.

UNIT-V : **10 Hrs.**

Descartes' Rule of signs, Rolle's Theorem, Horner's method.

TEXT BOOK(S)

Manicavasagom Pillay T.K., Natarajan S. and Ganapathy, **Algebra Volume I**, Chennai, S. Viswanathan Printers and Publishers Pvt. Ltd., 2003, Chapters: VI (Sections 1 to19, 24, 25, 30). Narayanan S. and Manicavachagom Pillay T.K., **Trigonometry**, Chennai, S. Viswanathan Printers and Publishers Pvt. Ltd., 2003, Chapters: III and IV.

REFERENCE BOOK(S)

Vittal P.R., **Trigonometry**, Chennai, Marghan Publications, 1988.

MAT1502CM ADVANCED CALCULUS – I

(Theory)

LEARNING OUTCOME: **5 hrs./Wk.**

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

- evaluate integrals using reduction formulae
- apply change of variables in evaluating multiple integrals
- understand the concepts of limit, continuity and differentiability

COURSE CONTENT:

UNIT I: INTEGRALS **15 hrs.**

Properties and evaluation of definite integrals, reduction formulae.

UNIT II: MULTIPLE INTEGRALS **15 hrs.**

Double and triple integrals, change of variables, Jacobian of two and three variables

UNIT III: APPLICATIONS OF MULTIPLE INTEGRALS: **15 hrs.**

Area, surface area and volume using double and triple integrals.

UNIT IV: LIMITS **15 hrs.**

Limits, limit of a function, basic theorems on limit, infinite limits, standard limits

UNIT V: CONTINUITY AND DIFFERENTIABILITY **15 hrs.**

Definitions of continuity, algebra of continuous functions, types of discontinuities, differentiability.

TEXT BOOK(S):

Arumugam S. and Isaac A, (2001). Calculus, Palayamkottai: New Gamma Publishing House, Print. Chapters: Part II: Ch. II (Sections 2.6,2.8), Ch. III.

Arumugam S. and Isaac A, (1999). Calculus Volume I, Palayamkottai: New Gamma Publishing House, Print. Chapters: I, II (Sections 2.0 to 2.3), III (Section 1).

Arumugam S. and Isaac A, (2001). Calculus Volume II, Palayamkottai: New Gamma Publishing House, Print. Chapters: IV(4.4), VI (Sections 6.2, 6.5, 6.6).

REFERENCE BOOK(S):

Narayanan S. and Manicavachagom Pillay T.K, (2011). Calculus Volume II, Chennai: Viswanathan Printers and Publishers Pvt. Ltd, Print.

Narayanan S. and Manickavachagom Pillay T.K, (1993). Calculus Volume I, Chennai: Viswanathan Printers and Publishers Pvt. Ltd., Print.

MAT1202FS COMMUNICATION SKILLS THROUGH MATHEMATICS

(Theory)

LEARNING OUTCOME: **2 hrs./wk.**

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

- enhance her vocabulary in Mathematics
- develop her listening, reading and speaking skills in Mathematics

COURSE OUTLINE :

UNIT I : VOCABULARY: **4 hrs.**

Introduction of all the basic Mathematical terms

UNIT II: LISTENING AND SPEAKING: **10 hrs.**

Exercise on pronouncing Mathematical symbols and Mathematical terms – different types of proofs – listen to a Mathematical concept and answer questions based on it – oral presentation on any mathematical concept.

UNIT III: READING AND WRITING: **10 hrs.**

Comprehension on Mathematical concepts.

UNIT - IV: GRAPHICAL REPRESENTATION **6 hrs.**

Express the given data graphically as bar charts - line graphs – histogram – pie charts.

REFERENCE BOOK(S)

HoThi Phuong, Le ThiKieu Van, *English for Mathematics*, Ho Chi Minh City University of Education, Foreign Language Section, 2003.e-book.

Zubair P.P., *Encyclopeadia of Mathematics (Set of 2 Volumes) World's Great Mathematicians Volume II*, New Delhi, APH Publishing Corporation, 2012. Print.

Zubair P.P., *Encyclopeadia of Mathematics (Set of 2 Volumes) Teaching of Mathematics Volume I*, New Delhi, APH Publishing Corporation, 2012. Print.

Irfan Alikhan and Atiya Khanum, *Fundamentals of Biostatistics*, Hyderabad, Ukaaz Publications, 2004, Print. Chapter:3: (3.2)

PHY1402AA GENERAL PHYSICS

(THEORY)

LEARNING OUTCOME **5 hrs./wk.**

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

- identify the properties of light and appreciate the wonders of it in nature
- interpret the behavior of matter in electric and magnetic field
- acquire knowledge of crystal structures and the basic function of logic gates

COURSE CONTENT

UNITI: LIGHT 18 hrs.

Nature of Light – sources of light – the speed of light – waves, wave fronts, and rays – reflection and refraction – total internal reflection – dispersion – polarization – polarizing filters – using polarizing filters – polarization by reflection – circular and elliptical polarization.

DEMONSTRATIONS: reflection and refraction, total internal reflection, dispersion of light through prism, polarimeter.

UNITII: ELECTRICITY AND MAGNEITSM 18 hrs.

Electric Charge – conductors, insulators and induced charges – Coulomb's law – electric field and electric forces– electric field lines – Gauss's law – applications of Gauss's law–magnetism – magnetic field – magnetic field line and magnetic flux – motion of charged particles in magnetic field – applications of motion of charged particles.

DEMONSTRATIONS: Magnetic field line of a bar magnet and horseshoe magnet.

UNITIII: MATERIAL SCIENCE 12 hrs.

Fundamental definitions in crystallography – nomenclature of crystal directions – nomenclature of crystal planes: Miller indices – symmetry elements of a crystalline solid – crystal structures of important engineering materials.

DEMONSTRATIONS: Models of crystal structures.

UNITIV: NUCLEAR PHYSICS 12 hrs.

Properties of nuclei– nuclear density – nuclides and isotopes – nuclear binding and nuclear structure– nuclear force – natural radioactivity – activities and half-lives– biological effects of radiation.

UNITV: DIGITAL ELETRONICS 15 hrs.

Gates – inverters – OR gates – AND gates – Boolean algebra – NOR gates – NAND gates – De Morgan's first theorem – De Morgan's second theorem – Exclusive OR gates – the controlled inverters – Exclusive NOR gates – Boolean relations –sum of products method –algebraic simplification –Karnaugh maps – pairs, quads and octets –Karnaugh simplification–Don't care conditions.

DEMONSTRATIONS Function of logic gates, De Morgan's theorem.

TEXT BOOK(S)

Albert Paul Malvino, (2012). *Digital Computer Electronics: An introduction to Microcomputers*, (3rd ed.), New Delhi: Tata McGraw–Hill Publishing Company Limited. Print.

Chapters: 2, 3 ,5.

Arumugam M, (2002). *Materials Science*, (3rd ed.), Kumbakonam: Anuradha Publications. Print.

Chapters: 3.1 – 3.6.

Hugh D. Young, Roger A. Freedman, A. Lewis Ford, (2012). *University Physics with Modern Physics*, (13th ed.), San Francisco: Pearson Education. Print.

Chapters: 21.1 –21.4, 21.6, 22.3 – 22.4, 27.1 – 27.5, 33.1 – 33.5, 43.1 (Pg. No:1439–1441), 43.2 (Pg.No: 1444–1446), 43.3 (Pg.No:1454,1455), 43.4, 43.5.

REFERENCE BOOK(S)

Albert Paul Malvino Donald P.Leach, (1996). *Digital Principles and Applications*, (4thed.), New Delhi: Tata McGraw Hill Publishing Company Limited. Print.

Jerold Touger, (2006). *Introductory Physics: Building Understanding*, New Delhi: John Wiley & Sons, Wiley–India Edition. Print.

Mitchel E Schultz, (2011). *Grob's Basic Electronics*, (11thed.), New York: McGraw – Hill International Publications. Print.

Tewari K.K, (1990).*Electricity and Magnetism*, (2nd ed.), New Delhi: S. Chand & Company Ltd. Print.

MAT2402CM SEQUENCES AND SERIES

(Theory)

4 Hrs./Wk.

LEARNING OUTCOME :

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

- understand the concepts of sequences and series
- appreciate the properties of convergent and divergent sequences
- test the convergence of series

COURSE OUTLINE :

UNIT-I : **15 Hrs.**

Sequences: Bounded, monotonic, convergent, divergent and oscillating sequences, Algebra of limits

UNIT-II : **10 Hrs.**

Behaviour of monotonic sequences, Cauchy's limit theorem, sub sequences, limit points.

UNIT-III : **10 Hrs.**

Cauchy sequences: Cauchy sequence, Cauchy's general principle of convergence.

UNIT-IV : **15 Hrs.**

Series: Convergence and divergence of series, comparison test ,Kummer's test.

UNIT-V : **10 Hrs.**

Root test, condensation test, integral test, alternating series, absolute convergence.

TEXT BOOK(S)

Arumugam S. and Isaac A., **Sequences and Series**, Palayamkottai, New Gamma Publishing House, 2010, Chapters: III (Sections 1 to 11), IV, V (Sections 1 and 2).

REFERENCE BOOK(S)

Bhupendra singh, Rimple Pandir and Sudhir K. Pundir, **Analysis I**, Meerut, Pragati Prakashan, 2003.

Course Syllabus **B.Sc. Mathematics with Computer Applications** **2019 batch**

MAT2403CM ANALYTICAL GEOMETRY OF 3D

(Theory)

LEARNING OUTCOME : **4 Hrs./Wk.**

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

- acquire the basic concepts in three dimensional geometry
- express the equations of straight lines and planes in different forms
- apply the concepts in three dimensional geometry to solve problems

COURSE OUTLINE :

UNIT-I : **13 Hrs.**

Equation of a plane – intercept form, normal form, angle between the planes, equation of a plane through the line of intersection of two given planes, length of the perpendicular from a point to a plane, equation of the planes bisecting the angle between the planes.

UNIT-II : **12 Hrs.**

Straight lines: Equation of a straight line in symmetrical form, planes and straight lines

UNIT-III : **15 Hrs.**

Coplanar lines, shortest distance between two lines, intersection of three planes, volume of a tetrahedron.

UNIT-IV : **12 Hrs.**

.General equation of a sphere, length of the tangent from a point to a sphere, plane section of a sphere, intersection of two spheres, equation of a tangent plane to a sphere.

UNIT-V : **8 Hrs.**

Cone - right circular cone, Cylinder - right circular cylinder, simple problems

TEXT BOOK(S)

Manicavachagom Pillay T.K. and Natarajan T, **A textbook of Analytical Geometry, Part II – 3 dimensions**, Chennai, S. Viswanathan Printers & Publishers Pvt. Ltd, 2008, Chapters: I, II, III (Page 46 to 71, 84 to 91), IV, V (Page 115 to 123, 134 to 139).

REFERENCE BOOK(S)

Dipak Chatterjee, **Analytic solid Geometry**, New Delhi, Prentice Hall of India, 2003.
Duraipandian P., Laxmi Duraipandian and Muhilan D, **Analytical Geometry (3-D)**, Chennai, Emerald Publishers, 1984.
Mathew K.C., Veeraragavan S. and Ragavan T., **A text Book of Co-ordinate Geometry of Two and Three Dimensions**, New Delhi, Chand S and Company Ltd., 1984.

MAE2401AT PROGRAMMING IN C

(Lab cum Theory)

LEARNING OUTCOME: **3T + 2L hrs./Wk.**

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

- understand the basic principles of programming.
- develop programming concepts to solve any problem.

- think logically and write programs confidently.

COURSE CONTENT:

UNIT I: INTRODUCTION TO C **5T + 2L hrs.**

Introduction – constants – variables and data types – operators and expressions – input and output operators.

UNIT II: DECISION MAKING, BRANCHING AND LOOPING **10T + 10L hrs.**

Control statements – if – if else – switch – goto – break – for – while – do while.

UNIT III: ARRAYS AND FUNCTIONS **15T + 10L hrs.**

Arrays – functions – recursion – structure – union – bit fields – string functions.

UNITIV: POINTERS **10T + 6L hrs.**

Pointer declaration – pointer arithmetic – pointer arrays – pointers with functions.

UNITV: FILES **5T + 2L hrs.**

Defining and opening a file – closing a file – input/output operations on files.

TEXT BOOK(S):

Balagurusamy E., (2011). *Programming in ANSIC*, New Delhi: Tata McGraw Hall Publishing Company Limited, Print. Chapters: 1,2,3,5,6,7 (Sections 7.1 to 7.7), 8, 9 (Sections 9.1 to 9.18), 10 (Sections 10.1 to 10.8, 10.10 to 10.12), 11(Sections 11.1 to 11.16), 12 (Sections 12.1 to 12.4).

REFERENCE BOOK(S):

Pandiyaraja P., (2005). *Programming in C*, Chennai: S.Vishwanathan Printers and Publishers Limited, Print.

YashavantKanetkar, (2007). *Let us C*, New Delhi: BPB Publications, Print.

MAT2201FS COMMUNICATION SKILLS FOR MATHEMATICS

(Theory)

LEARNING OUTCOME: **2 hrs./Wk.**

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

- enhance her reading skill and comprehension skill
- understand and solve numerical problems
- interpret data from graphs

COURSE CONTENT:

UNIT I: COMPREHENDING SKILL **10 hrs.**

Read and understand a Mathematical problem and formulate it.

UNIT II: NUMERICAL SKILLS **10 hrs.**

H.C.F. and L.C.M. of numbers, simplification of decimal fractions, square roots, cube roots, average, problem on numbers, problems on ages, percentage, profit and loss, ratio and proportion, permutations and combinations, probability.

UNIT III: GRAPHICAL INTERPRETATION **10 hrs.**

Bar charts, line graphs, histogram, pie charts.

REFERENCE BOOK(S):

Aggarwal R.S., (2010). *Quantitative Aptitude*, New Delhi: S. Chand and Company Limited, Print.

Gupta P.K. and Manmohan, (2007). *Problems in Operations Research*, New Delhi: Sultan Chand and Son Educational Publishers, Print.

MAT3401CM VECTOR ANALYSIS AND DIFFERENTIAL GEOMETRY

LEARNING OUTCOME : **4 Hrs./Wk.**

On successful completion of the course- the student will be able to

- explain the concepts in vector differentiation and integration.
- evaluate integrals using Gauss'- Green's and Stoke's theorems.
- calculate curvature and torsion of a curve

COURSE OUTLINE :

UNIT-I : **10 Hrs.**

Vector Differentiation: Gradient- curl- divergence- solenoidal- irrotational- operators involving ∇ twice.

UNIT-II : **10 Hrs.**

Vector Integration: Line integrals- volume Integrals- surface integrals.

UNIT-III : **10 Hrs.**

Gauss divergence theorem- Green's theorem in space

UNIT-IV : **15 Hrs.**

Stoke's theorem- Green's theorem in plane and its applications

UNIT-V : **\15 Hrs.**

Differential Geometry: Tangent- principal normal- binormal- osculating plane- curvature- torsion- Serret- Frenet formulae

TEXT BOOK(S)

Narayanan S. and ManicavachagomPillay T.K- **Vector Algebra and Analysis**- Madras: Viswanathan printers and publishers private limited- 1995- Chapters: 4 to 6.

REFERENCE BOOK(S)

Arumugam S. and Thangapandi Isaac. A- **Analytical Geometry of 3D and Vector Calculus**- Palayamkottai- New gamma publishing House- 2011.

Mittal S.C. and Aggarwal D.C- **Differential Geometry**- Meerut- Krishna Prakasham media (P) Ltd- 2003.

Seymour Lipschutz- Dennis Spellman- Murray R. Spiegel- **Vector Analysis**- New Delhi- Tata McGraw Hill Education Private Limited- 2009.

MAT3501CM MODERN ALGEBRA

(Theory)

LEARNING OUTCOME: **6 Hrs./Wk.**

On successful completion of the course- the student will be able to

- recognize the basic concepts of groups- rings and fields
- solve problems based on these basic concepts
- apply the concepts to derive generalised results.

COURSE OUTLINE :

UNIT-I : 15 Hrs.

Groups:- Definition and examples- permutations- subgroups- cyclic groups- order of an element of a group

UNIT-II : 20 Hrs.

Cosets and Lagrange's theorem- normal subgroups- quotient groups

UNIT-III : 20 Hrs.

Isomorphism- automorphism- homomorphisms- fundamental theorem of homomorphism on groups.

UNIT-IV : 20 Hrs.

Rings:- Examples- properties- isomorphism- types of rings- characteristic of a ring- subrings- Ideals- quotient rings- maximal and prime ideals- homomorphism of rings

UNIT-V : 15 Hrs.

Fundamental theorem of homomorphism in rings- field of quotients of an integral domain.

TEXT BOOK(S)

Arumugam S. and Thangapandi Isaac A- **Modern Algebra**- Chennai: Scitech Publication (India)- 2008- Chapters: Chapter 3 (3.1, 3.4 to 3.11)- Chapter 4 (4.1 to 4.11).

REFERENCE BOOK(S)

Surjeet Singh and QaziZameeruddin - **Modern Algebra** - Noida- Vikas Publishing House Pvt. Ltd- 2012.

Vasishtha A.R. and Vasishtha A.K - **Modern Algebra** - Delhi – Krishna Prakashan Media (P) Ltd- 2006.

MAT3504CM DIFFERENTIAL EQUATIONS AND LAPLACE TRANSFORMS

(THEORY)

LEARNING OUTCOME: 6 hrs./wk.

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

- solve the differential equations using various methods
- solve differential equation using Laplace and inverse transforms
- identify the suitable methods to solve partial differential equations
- apply differential equations to real life situations

COURSE CONTENT:

UNIT I: DIFFERENTIAL EQUATIONS OF FIRST ORDER 15 hrs.

Exact differential equations – integrating factors – equations of first order and higher degree.

UNIT II: APPLICATIONS OF FIRST ORDER DIFFERENTIAL EQUATIONS 15 hrs.

Dynamics of tumor growth – problem of epidemiology – mixture problem – one dimensional heat flow – flow of water from an orifice – orthogonal trajectories.

UNIT III: LINEAR EQUATIONS OF HIGHER ORDER 20 hrs.

Linear equations with variable co-efficients – equation reducible to the linear equations – Linear equations of the second order – complete solution given a known integral – Reduction to the normal form – Change of the independent variable – Variation of Parameters.

UNIT IV: LAPLACE TRANSFORMS **20 hrs.**

Laplace transforms – inverse Laplace transforms – solution of differential equations using Laplace transforms.

UNITV: PARTIAL DIFFERENTIAL EQUATIONS **20 hrs.**

Partial differential equations of first order – formation of first order partial differential equations – solving first order partial differential equations – Lagrange's Method – some standard forms – Charpit's method.

TEXT BOOK(S):

Narayanan, S. and Manicavachagom Pillay, T.K., (2012). *Differential Equations and its Applications*, Chennai: S. Viswanathan Pvt. Ltd. Print. Chapters: Unit I: Ch. II (Section 6), IV, Unit III: Ch. V (Sections 5 and 6), Ch. VIII (Sections 1,2,3,4), Unit IV: Ch. IX (Sections 1 to 11) Unit V: Ch. XII.

Zafar Ahsan, (2004). *Differential Equations and its Applications*, New Delhi: Prentice Hall of India Pvt. Ltd. Print. Unit II: Ch. IV (Sections 4.1,4.2, 4.9. 4.11, 4.15, 4.19 (only 'flow of liquid from a small orifice'),4.20).

REFERENCE BOOK(S):

Arumugam, S. and Isaac, A., (2008). *Differential Equations*, Palayamkottai: Gamma Publishing House. Print.

Sankarappan, S. and Kalavathy, S., (2005). *Differential Equations and Laplace transforms*, Chennai: Vijay Nicole Imprints Private Ltd. Print.

Vasishtha, A.R., Sharma, S.K., and Sukhendra Singh, (1992-93). *Differential Equations*, Meerut: U.P. Krishna Prakasan Mandir. Print.

Venkatraman, M.K. and Manorama Sridhar, (2004). *Differential Equations and Laplace Transforms*, Chennai: The National Publishing Company. Print.

MAT3502CM STATISTICS

(THEORY)

LEARNING OUTCOME: **6 hrs./wk.**

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

- classify the data and represent it diagrammatically
- compute measures of central tendency and measures of dispersion
- fit a straight line and a second degree parabola for the given data
- apply the concepts of correlation, regression and probability in real life situations

COURSE CONTENT:

UNIT I: FREQUENCY DISTRIBUTIONS AND MEASURES OF CENTRAL TENDENCY **20 hrs.**

Frequency distributions – graphic representation of a frequency distribution – measures of central tendency -requisites for an ideal measure of central tendency – arithmetic mean – median – mode – geometric mean – harmonic mean – selection of an average – partition values.

UNIT II: MEASURES OF DISPERSION, SKEWNESS AND KURTOSIS 25 hrs.

Dispersion – characteristics for an ideal measure of dispersion – measures of dispersion – range – quartile deviation – mean deviation – standard deviation and root mean square deviation – coefficient of dispersion – moments – Pearson's β and γ co-efficient – skewness – kurtosis.

UNIT III: CURVE FITTING AND PRINCIPLE OF LEAST SQUARES 10 hrs.

Curve fitting – most plausible solution of a system of linear equations – conversion of data to linear form.

UNIT IV: CORRELATION AND REGRESSION 15 hrs.

Bivariate distribution – correlation - scatter diagram- Karl Pearson's coefficient of correlation – calculation of the correlation coefficient for a bivariate frequency distribution – probable error of correlation coefficient – rank correlation – regression.

UNIT V: THEORY OF PROBABILITY AND MATHEMATICAL EXPECTATION 20 hrs.

Introduction – short history – definitions of various terms –Mathematical tools: preliminary notion of sets – axiomatic approach to probability – probability – Mathematical notion – law of multiplication or theorem of compound probability – Baye's theorem - Mathematical expectation – addition theorem of expectation – multiplication theorem of expectation – co-variance – expectation of linear combination of random variables – variance of a linear combination of random variables – expectation of a continuous random variable – conditional expectation and conditional variance.

TEXT BOOK(S):

Gupta S.C and Kapoor V.K, (2009). *Elements of Mathematical Statistics,* New Delhi : Sultan Chand and Sons. Print.

(Chapter: 2, 3, 4, 6 (6.1 to 6.8) 9, 10).

REFERENCE BOOK(S):

Arumugam S. and Thangapandi Isaac A., (2007).*Statistics,* Palayamkottai : New Gamma Publishing House. Print.

Gupta S.P., (2006). *Statistical Methods*, New Delhi : Sultan Chand and sons. Print.

BAMA3201EI OPTIMIZATION TECHNIQUES IN MANAGEMENT

(THEORY)

(Prerequisite: Open to ALL OTHER THAN B.Sc. Mathematics with Computer Applications, B.Sc. Computer Applications and B.Sc. Information Technology and Management Students)

LEARNING OUTCOME: 2 hrs./wk.

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

- use various optimization techniques for decision making
- solve transportation and assignment problems using different methods
- change network scheduling techniques in uncertainty context

COURSE CONTENT:

UNIT I: TRANSPORTATION PROBLEM **8 hrs.**

Introduction of Operational Research – Definitions of Operations Research – General transportation problem – northwest corner rule – least cost method – Vogel's approximation method – Difference between a balanced transportation problem and an unbalanced transportation problem.

UNIT II: ASSIGNMENT PROBLEM **7 hrs.**

Assignment Problem – Mathematical formulation and assignment method – solution methods of assignment problem – special cases in assignment problem.

UNIT III: NETWORK SCHEDULING BY PERT/CPM **8 hrs.**

Introduction – Network: Basic Components – Logical Sequencing – Rules of Network Construction – Concurrent activities – Critical Path Analysis

UNIT IV: DECISION ANALYSIS **7 hrs.**

Introduction – Decision making problem – Decision making process – Decision making Environment – Decision under Uncertainty.

TEXT BOOK(S):

Kanti Swarup, P.K. Gupta and Man Mohan, (2015). *Operations Research*, (18th ed.), New Delhi: Sultan Chand and Sons Educational Publishers. Print. Chapter 10 (10.1-10.13 theorems statement only), Chapter 11, (11.1 - 11.4) theorems statement only), Chapter 16(16.1-16.5), Chapter 25(25.1-25.6).

REFERENCE BOOK(S):

Sharma, J.K., (1997). *Operations Research,* (3rd ed.), Delhi: Macmillan Company of India Ltd., Print.

CSMA3201EI BASICS IN DISCRETE MATHEMATICS

(Theory)

LEARNING OUTCOME: 2 Hrs./Wk.

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

·verify the validity of statements using truth tables

·express the different concepts and methods in Boolean algebra and propositional calculus

·construct minimal Boolean expressions using prime implicants and Karnaugh maps

COURSE OUTLINE:

UNIT-I: 8 Hrs.

Boolean Algebra: Basic definitions and theorems, Boolean expressions, sum of products forms.

UNIT-II : 7 Hrs.

Minimal Boolean expressions, prime implicants, Karnaugh maps.

UNIT-III : 8 Hrs.

Propositional Calculus: Statements, basic operations, truth value of compound statements, propositions and truth tables, tautologies and contradictions, logical equivalence, negation and DeMorgan"s laws.

UNIT-IV : 7 Hrs.

Algebra of propositions, conditional and biconditional statements.

TEXT BOOK(S)

Seymour Lipschutz and Mare Lars Lipsor, Discrete Mathematics, New Delhi, (Schaum Series) McGraw Hill Publishing Company Ltd, 1999, Chapters: 12 (12.1-12.9), 13(13.1, 13.3, 13.6, 13.7).

REFERENCE BOOK(S)

Tremblay J.P., Manohar R, Discrete Mathematical Structures with Applications to Computer Science, TATA McGraw-Hill Publishing company limited, 2001.

Venkataraman M.K, Sridharan N, Chandrasekaran N, Discrete Mathematics, The National Publishing Company, 2000.

CRMA3201EI FOUNDATION COURSE IN MATHEMATICS AND COMMERCE FOR COMPETITIVE EXAMINATIONS

(Theory)

LEARNING OUTCOME : 2 Hrs./Wk.

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

·acquire computational skills

·practice speed in doing problems

·develop confidence to appear for competitive examinations

COURSE OUTLINE :

UNIT-I : MENSURATION 10 Hrs.

Profit and loss, simple interest, compound interest, area, volume and surface area

UNIT-II : DATA INTERPRETATION 5 Hrs.

Bar graphs, pie charts, line graphs

UNIT-III : EQUATIONS 5 Hrs.

Linear –simultaneous linear equations upto three variables –quadratic and cubic equations in one variable (Business application)

UNIT-IV : DIFFERENTIATION 10 Hrs.

Basic concepts of differentiation –marginal cost-marginal revenue –elasticity of demand –optimisation. (cost minimisation and profit maximisation)

REFERENCE BOOK(S)

Aggarwal R.S, Quantitative Aptitude, New Delhi, S. Chand and Company Ltd, 2011.

Sancheti D. C, Kapoor V.K, Business Mathematics, New Delhi, Sultan Chand and Sons, 2002.

BTMA4201EI DEMOGRAPHY AND VITAL STATISTICS

(THEORY)

LEARNING OUTCOME **2 hrs. / wk.**

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

- identify appropriate methods of finding the fertility rate, reproduction rate and death rate

- analyze typical demographic patterns and their comparability across populations
- interpret the concept of demographic transition and its related effects on population expansion

COURSE CONTENT:

UNITI: POPULATION, DEVELOPMENT AND ENVIRONMENT 7 hrs.

Introduction – Concepts– definitions– relevance and measurement of population – Population trends in the twentieth century– Concepts of stable population– Population explosion – Threatened or real– distant or imminent – international aspects of population growth and distribution– Pattern – determinants and demographic effects of sex and age structure– Age pyramids and projections – Individual aging and population aging.

UNIT II: EFFECT OF POPULATION GROWTH AND HEALTH 8 hrs.

Concepts – impact and measures of components of population –Nuptiality– Fertility –mortality and morbidity. Life expectancy– Women empowerment and its demographic consequences– Reproductive Health – physiology of human reproduction – reproductive– importance of the study fertility in population dynamics – prevalence of RTI (reproductive tract infection)– STDs and HIV / AIDS; estimated levels and interventions. **Family Planning Methods–**Advantages / disadvantages– effectiveness- Survey on health status of College (critical analysis of data, correlation of factors and report preparation.

UNIT III: VITAL STATISTICS – FERTILITY RATE 8 hrs.

Introduction to vital statistics– importance of vital statistics– methods of obtaining vital statistics– Population census method– Registration method– Analytic method– measurement of fertility– crude birth rate– general fertility rate– specific fertility rate– total fertility rate.

UNIT IV: VITAL STATISTICS – REPRODUCTION RATE AND DEATH RATE 7 hrs.

Reproduction rate – gross reproduction rate – net reproduction rate – measurement of mortality – crude death rate – specific death rate – standardized death rate – life tables.

TEXT BOOK(S):

Odum, E. P., and Barrett, G. W. (1971). *Fundamentals of ecology* (Vol. 3). Philadelphia: Saunders Chicago. Print.

Park, J. E., and Park, K. (1997). *Textbook of social and preventive medicine*. Jabalpur: Banarsidas Bhanot Publishers. Print.

Manoharan .M, (2004). *Statistical methods*, Palani Paramount Publications Print. Chapter 15.

REFERENCE BOOK(S):

Ehrlich, P. R., and Ehrlich, A. H, (1972). *Population, Resources, Environment: Issues in Human Ecology*. San Francisco: WH Freeman. Print.

Hannan, M. T., and Freeman, J, (1977*). The Population Ecology of Organizations*. *American journal of sociology*, *82*(5), 929–964. Print.

Jhingan, M. L. Bhatt, B.K. and Desai, J.N, (2003). *Demography*. New Delhi: Vrinda Publications. Print.

Jones, M. L., and Swartz, S. L, (1984). *Demography and phenology of gray whales and evaluation of whale–watching activities in Laguna San Ignacio*. Baja California Sur, Mexico. Print.

Lee, Ronald D, (1994). *The Formal Demography of Population Aging, Transfers, and the Economic Life Cycle*. Demography of aging: 8–49. Print.

Sharma, R. K, (2004). *Demography and Population Problems*. Atlantic Publishers and Distributors. Print.

MAT4501CM LINEAR ALGEBRA

(Theory)

LEARNING OUTCOME : **6 Hrs./Wk.**

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

- apply the different concepts and methods in vector spaces and inner product spaces
- compute the inverse of a matrix, eigen values and eigen vectors of a matrix using Cayley Hamilton theorem
- classify various kinds of lattices

COURSE OUTLINE :

UNIT-I : VECTOR SPACES **15 Hrs.**

Definition, examples, subspaces, linear transformations, span of a set

UNIT-II : LINEAR INDEPENDENCE OF VECTORS **20 Hrs.**

Linear independence, basis and dimension, rank and nullity, matrix of a linear transformation

UNIT-III : INNER PRODUCT SPACES **15 Hrs.**

Definition, examples, orthogonality, orthogonal complement.

UNIT-IV : THEORY OF MATRICES **20 Hrs.**

Algebra of matrices, types of matrices, inverse of a matrix, elementary transformations, rank of a matrix, simultaneous linear equations, characteristic equation and Cayley Hamilton Theorem, eigen values and eigen vectors of a matrix.

UNIT-V : BILINEAR FORMS AND LATTICES **20 Hrs.**

Bilinear forms, quadratic forms, partially ordered sets, lattices, distributive lattices, modular lattices, Boolean algebras.

TEXT BOOK(S)

Arumugam.S and Thangapandi Isaac.A, **Modern Algebra**, Chennai, Scitech Publications (India) Pvt Ltd, 2003, Chapters: 5 to9.

REFERENCE BOOK(S)

Khanna.M.L, **Modern Algebra**, Meerut, New Delhi, Jai Prakash Nath and Co., Educational Publishers, 1991.

Sharma.S.D, **Linear Algebra**, Meerut , New Delhi, Kedar Nath Ram Nath and Co, 1997.

MAT4503CM REAL ANALYSIS

(Theory)

LEARNING OUTCOME : **6 Hrs./Wk.**

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

- describe the concepts of metric spaces, complete metric spaces, compactness and connectedness
- learn the technique of formal proof of theorems
- solve problems logically

COURSE OUTLINE :

UNIT-I : METRIC SPACES **20 Hrs.**

Definitions, examples, bounded sets in a metric space, open balls, open sets, subspaces, interior of a set, closed sets, closure, limit points and dense sets.

UNIT-II : COMPLETE METRIC SPACES AND CONTINUITY **20 Hrs.**

Completeness, Cantor's intersection theorem, Baire's category theorem, definition of continuity, properties of continuous functions, homeomorphism, uniform continuity, discontinuous functions on R –definitions and examples only.

UNIT-III : CONNECTEDNESS **15 Hrs.**

Definition and examples, connected subsets of R, connectedness and continuity.

UNIT-IV : COMPACTNESS **20 Hrs.**

Compact spaces, compact subsets of R, equivalent characterizations for compactness, compactness and continuity.

UNIT-V : COMPLETION OF A METRIC SPACE **15 Hrs.**

Pointwise convergence, uniform convergence -definition and examples only, the metric space C [a, b], contraction mapping theorem, completion of a metric space.

TEXT BOOK(S)

Arumugam.S and Thangapandi Isaac.A., **Modern Analysis**, Palayamkottai,, New Gamma Publishers, 2012, Chapters: 2 to 6, Chapter7 (Sections 7.0, 7.1, 7.2, 7.4), Chapters 8,9.

REFERENCE BOOK(S)

Richard R.Goldberg, **Methods of Real Analysis**, New Delhi, Oxford and IBH Publishing Company, 1970.

Sharma J.N, **Mathematical Analysis-I (Metric Spaces)**, Meerut, New Delhi, Manoj Printers, 1974-75.

MAT4504CM ADVANCED STATISTICS

(Theory)

LEARNING OUTCOME: **6 Hrs./Wk.**

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

- understand the concepts of distributions and apply in real life situation
- analyze and interpret data using sampling techniques
- test the significance of samples using analysis of variance

COURSE CONTENT:

UNIT I: DISCRETE DISTRIBUTIONS: 20 Hrs.

Binomial Distribution – moments, recurrence relation for the moments – mean deviation about mean – mode – moment generating function – characteristic function – cumulants of the binomial distribution– Poisson distribution – moments – mode – moment generating function – characteristic function – cumulants of the Poisson distribution.

UNIT II: NORMAL DISTRIBUTION: 20 Hrs.

Chief characteristics of normal distribution – mode – median – moments – moment generating function – cumulant generating function of the normal distribution.

UNIT III: SAMPLING AND LARGE SAMPLE TESTS: 20 Hrs.

Types of sampling – tests of significance – tests of significance for large samples.

UNIT IV: EXACT SAMPLING DISTRIBUTIONS: 20 Hrs.

Chi–square distribution – moment generating function – cumulant generating function – mode – skewness – applications of Chi–square distribution – Student's t – Fisher's t – applications of t distribution – F-statistic – applications of F-distribution.

UNIT V: ANALYSIS OF VARIANCE: 10 Hrs.

One way and two way classifications – Latin Square designs

TEXT BOOK(S):

Kapoor V. K., and Gupta S C. (2015). *Elements of mathematical Statistics*, Delhi: Sultan Chand & Sons, Chapters 7, 8 (8.2: 8.2.2-8.2.14), Chapters 12, 13, 14(14.1,14.2,14.2.2,14.2.5 to 14.3.2)– Chapters 17(problems only) ,18.7(problems only), Print.

REFERENCE BOOK(S):

Arumugam S., and Thangapandi Isaac A., (2006). *Statistics,*Palayamkottai: New Gamma Publishing house, Print.

Gupta.S.C., and Kapoor. V.K., (2002). *Fundamentals of Mathematical Statistics*, Sultan Chand & Sons, Print.

MAE4501CM DATA STRUCTURES AND ALGORITHMS

(Theory)

LEARNING OUTCOME: 6 hrs./Wk.

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

- categorize the different types of data structures
- apply appropriate data structures to process a given data
- formulate algorithms for application oriented problems

COURSE CONTENT:

UNIT I: ALGORITHM 12 hrs.

Algorithmic notation – controlstructures – complexity of algorithms – other asymptotic notations for complexity of algorithm – sub algorithms – variables – data types.

UNIT II: ARRAYS, RECORDS AND POINTERS 25 hrs.

Linear arrays – representation of linear arrays in memory –traversing linear arrays – inserting and deleting – linear search – binary search – multidimensional arrays – pointers – pointer arrays – sparse matrices – bubble sort – insertion sort – selection sort – merging – merge - sort – radix sort.

UNIT III: LINKED LISTS 18 hrs.

Linked lists – representation of linked lists in memory – traversing a linked list – searching linked list – memory allocation – garbage collection – insertion into a linked list – deletion from a linked list – header linked lists – two - way lists.

UNIT IV: STACKS, QUEUES, RECURSION 18 hrs.

stacks – array representation of stacks – linked representation of stacks – arithmetic expression – polish notation – quick sort – an application of stacks – recursion – towers of Hanoi – implementation of recursive procedures by stacks – queues – linked representation of queues – dequeues – priority queues.

UNIT V: TREES 17 hrs.

Binary trees – representation of binary trees in memory – traversing binary trees – traversal algorithms using stacks – binary search trees – searching and inserting in binary search trees – deleting in a binary search tree – heap – heap sort – general trees – NP- complete.

TEXT BOOK(S):

Ellis Horowitz and SartajSahini, (1983). *Fundamentals of data structures*, Gurgaon: Galgotia Book source, Print.

Seymour Lipschutz and VijayalakshmiPai G A, (2008). *Data Structures, Schaum's outlines*, New Delhi: Tata McGraw Hill Publishing Company limited, Print. Chapters: 2, 4 (4.1 to 4.10, 4.13 to 4.14) 5, 6, 7 (7.1 to 7.5, 7.7 to 7.9, 7.17, 7.19), 9 (9.3 to 9.7).

REFERENCE BOOK(S):

Wirth Niklaus, (1985). *Algorithms + Data Structures = Programs*, New Delhi: Prentice Hall, Print.

MAT4201SS QUANTITATIVE APTITUDE

(Theory)

LEARNING OUTCOME : **2 Hrs./Wk.**

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

- develop computational skills in Mathematics
- practice speed in doing problems
- prepare themselves with confidence to face competitive exams

COURSE OUTLINE :

UNIT-I : **8 Hrs.**

Numbers, problems on ages

UNIT-II : **7 Hrs.**

Partnership, chain rule.

UNIT-III : **8 Hrs.**

Problems on trains, boats and streams

UNIT-IV : **7 Hrs.**

Calender, clocks, height and distances

TEXT BOOK(S)

Aggarwal R.S, **Quantitative Aptitude**, New Delhi, S.Chand and company Ltd, 2006, Chapters: (Sections 1, 8,13,14,18,19, 27, 28, 34).

REFERENCE BOOK(S)

Eugene D.Jafle, **GMAT (Graduates Management Admission Test)**, New Delhi-2, Galgotia Publication Pvt.Ltd, 1996.

Samuel C.Brownstein, **SAT (Scholastic Aptitude Test)**, New Delhi -2, Galgotia Publications (P) Ltd, 1997.

Thomas H.Martinson, **Super Course for the GMAT**, New Delhi -2, Goyl Saab Publishers, 1998.

CSMA4201EP NUMERICAL METHODS USING SCILAB

(Lab)

LEARNING OUTCOME : **2 Hrs./Wk.**

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

- acquire knowledge on the basics of SCILAB
- apply the methods in SCILAB for solving problems
- write programs for numerical problems using SCILAB

COURSE OUTLINE :

EXPERIMENTS/LAB : **30 Hrs.**

INTRODUCTION TO SCILAB

Programs to work in SCILAB Environment, Scalars, Vectors, Complex numbers and Matrices – Programs to get Graphic output by Plotting.

PROGRAMMING IN SCILAB

Programs to implement Operators and Flow control statements – Programs to handle Matrices with Loops – Programs to implement User defined functions and String handling functions.

SOLVING TRANSCENDENTAL AND ALGEBRAIC EQUATIONS

Programs to solve algebraic and transcendental equation by bisection method, false position method and Newton-Raphson method. Programs for solving linear system of equations using Gauss elimination method and Gauss Jordan method.

DIFFERENTIATION & INTEGRATION

Numerical Differentiation: Programs for Numerical Differentiation using Newton's Forward and Backward difference formulae. Numerical Integration: Programs for numerical integration using Trapezoidal rule, Simpson's 1/3 rd and 3/8th rules.

WEBSITE(S) :

www.scilab.org
www.scilab.in/spoken-tutorial
http://www-irma.u-strasbg.fr/

ENMA4201EI BASIC COURSE IN MATHEMATICS AND ENGLISH FOR COMPETITIVE EXAMINATIONS

(Theory)

LEARNING OUTCOME : **2 Hrs./Wk.**

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

- acquire communicative competence
- develop critical acumen
- prepare effectively in language tests for competitive exams.
- acquire computational skills in Mathematics
- develop speed and efficiency in solving problems

COURSE OUTLINE :

UNIT-I : **11 Hrs.**

Simplification, Problems on numbers, Time and work, Time and distance, Permutations and combinations

UNIT-II : **4 Hrs.**

Ratio and proportions, Surds and indices

UNIT-III : **8 Hrs.**

Synonyms, Antonyms, One – word substitution, Idioms and Phrases, Foreign Expressions

UNIT-IV : **7 Hrs.**

Reading comprehension, Reorganizing jumbled sentences, Spotting the errors, Analogy

REFERENCE BOOK(S)

Aggarwal R. S, **Quantitative Aptitude**, New Delhi, S. Chand and company Ltd, 2011. Best, Wolfred D, **The Students' Companion**, New Delhi, Harper Collins, 2000. Bhatnagar, R.P.and Rajul, Bhargava, **English for Competitive Examination**, New Delhi, Macmillan India Ltd, 2000.

Eugene D. Jafle, **GMAT (Graduates Management Admission Test)**, New Delhi -2, Galgotia Publication Pvt. Ltd, 1996.

Thorpe, Edgar and Showick Thorpe, **Objective English**, Singapore, Pearson Education, 2003. Wood, Frederick, **Current English Usage**, London, Macmillan, 1987.

MAT5202CM INTRODUCTION TO RESEARCH METHODOLOGY

(THEORY)

LEARNING OUTCOME **2 hrs./wk.**

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

- classify different types of research
- distinguish between interventional and non-interventional studies
- choose appropriate method to collect data
- apply different types of sampling techniques
- compile a report in the proper format

COURSE CONTENT:

UNIT I: FUNDAMENTALS AND CLASSIFICATION OF RESEARCH **6 hrs.**

Meaning – purpose of research – characteristics of research – characteristics of a researcher – pure research – applied research – exploratory research – descriptive research – diagnostic study – evaluation study – action research – experimental research – analytical study or statistical method – historical research – survey research – case study – field studies and research process.

UNIT II: REVIEW OF LITERATURE, FORMULATION OF RESEARCH OBJECTIVES, TYPES OF STUDY **6 hrs.**

Need for literature review – sources of information – steps involved in collection – general and specific objectives – hypothesis – non-intervention studies and intervention studies.

UNIT III: DATA AND DATA COLLECTION TECHNIQUES AND TOOLS **6 hrs.**

Classification of data – data collection techniques and tools.

UNIT IV: SAMPLING TECHNIQUES **6 hrs.**

Advantages of sampling – disadvantages of sampling and essentials of sampling.

UNIT V: REPORT WRITING **6 hrs.**

Characteristics of a good report – format and contents of a research report.

TEXTBOOK(S):

Vijayalakshmi G. and Sivapragasam C., *(2008). Research Methods-Tips and Techniques*, Chennai: MJP Publishers, Print. (Chapter: 1,2,3 (pages 1-14),5,6,8(pages 25-32,41-52), 9,10 (pages 53-87), 15 (pages 187-208).

REFERENCE BOOK(S):

Kothari C.R. and Gaurav Garg., (2014). *Research Methodology* (3rd ed.), New Delhi: New Age International Publishers, Print.

Ranjit Kumar, (2011). Research Methodology, *A step-by step guide for beginners* (3rd ed.), London: Sage Publications, Print.

Santosh Gupta, (2005). *Research Methodology and Statistical Techniques*, New Delhi: Deep & Deep Publications, Print.

E-Book(s):

Research Methodology, (2014-15). Shivaji University, Kolhapur: Centre for Distance Education sited on 22.10.2019.

LIFE FRONTIER ENGAGEMENT

Semester V **Total Hours: 4 hrs./week**
Semester VI **Total Hours: 4 hrs./week**

MAT0602LM APPLICATIONS OF MATHEMATICAL TOOLS FOR HUMAN LIFE ENHANCEMENT

OBJECTIVES

- To facilitate students to appreciate her academic learning through experiential learning by disciplinary and interdisciplinary community engagements thereby enhancing their civic responsibilities in society
- To empower students with appropriate academic strategies and innovative assessment and evaluation criteria to facilitate experiential learning for students to discover real life values
- To transform each student to be productive caring citizens of our global society through the vibrant, community- based action research programme

LEARNING OUTCOME:

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

- develop core values such as service, team building and time management
- take part effectively as an individual and as a member or leader in diverse teams
- improve her knowledge about her social and civic responsibilities
- summarize and share her experiences and findings to her peer and society
- compile reports and make effective presentations

SECTION I:

COMMON UNIT **10 hrs.**

Understanding Life Frontier Engagement,

a) Service Learning and Life Frontier Engagement
b) Principles, engagement, reflection, reciprocity, public dissemination
c) Meaning of community and understanding of community dynamics
d) Programme planning in Life Frontier Engagement, stages: Need analysis, Problem identification, Goal setting, Concept finalization, planning for stages of research, research and analysis, reflection and dissemination of results.

e) Ethical concerns in Life Frontier Engagement, Confidentiality, Conflict of interest, Informed consent.

ACTIVITY MODULE FOR SECTION I:

a) (i) Making students understand the concept of Service Learning and Life Frontier Engagement based on the information in the reading material given using student centered learning activities

(ii) Interaction with any local group in a nearby community (Example: Children, adolescents, adults within or outside college) and identifying community dynamics

(iii) Need based analysis to be done on the community by framing a questionnaire for base line socio economic survey

b) (i) Asking students to prepare a programme plan based on the sub, themes and target group identified by the department

(ii) Presentation by teams by refining the ideas of students based on program planning stages

c) Activity based on case studies on relevant ethical issues in community engagement

SECTION II: THEMATIC CONCEPTS **20 hrs.**

- Education
- Health and Hygiene
- Infrastructure and Resources
- Employment
- Entrepreneurship

CLASSIFICATIONAL CONCEPT:

- Significance of school / Higher Education
- Importance of physical / mental health
- Consideration of personal / societal hygiene
- Exploration and acquainting with the government schemes / resources
- Optimization in small / medium scale industries

CO-RELATIONAL CONCEPT:

- Educational status: income level, gender, culture of the community and basic amenities in schools
- Factors influencing health
- Infrastructure and Resources: Basic amenities of life, Government schemes / plans
- Employment: Education, Private / Government Sector, income, job satisfaction
- Entrepreneurship: Technical training, Government schemes / plans, resources, optimization

THEORETICAL CONCEPT:

Collection and classification of data, identifying suitable mathematical concepts such as statistical tools, optimization techniques, techniques in graph theory, fuzzy sets etc., to analyse and interpret the data.

ACTIVITY MODULE:

- Orientation to the students about the community interaction
- Building a rapport between the target community and students
- Exposure to different mathematical methodologies

- Training on computational skills using software (R)
- Identifying the need of the community through survey
- Framing questionnaire and collection of data
- Classifying the data and identifying the Mathematical concept applicable for the situation
- Journal writing

SECTION III: COMMUNITY ENGAGEMENT PROCESS- 90 hrs.

A community will be selected in Madurai district. A need-based assessment will be carried out to study the quality of life in the chosen community such as the level of education, primary occupation, available resources, basic amenities, health and hygiene etc. The appropriate project topic will be identified based on the assessment. Data collection will be done by interviewing the community. The collected data will be classified, analysed and interpreted using suitable mathematical tools. Documentation of the plan, visits and process is done systematically. Reflection sessions will be conducted periodically to enlighten the students' learning. Suitable intervention programmes will be planned and implemented. Final report will be evaluated. The outcome of the analysis will be shared with the chosen community, governmental and non-governmental institutions to bring about a change in the society.

MAE5502CT RDBMS WITH VISUAL BASIC

(LAB CUM THEORY)

LEARNING OUTCOME 3T + 3L hrs./wk.

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

- relate operators and functions to execute queries in SQL
- compile programs using Integrated Development Environment
- develop Graphical User Interface using controls
- create Multiple Document Interface
- apply VB to access database in SQL

COURSE CONTENT:

UNIT I: DATABASE MANAGEMENT 15T + 15L hrs.

RDBMS – basic database management concepts – database models – ER diagram – normalization – select statements – operators – single row functions – date functions – character functions – numeric functions – group functions – set operators – union – union all – minus – join concept – simple join – table aliases – self join – sub queries – multiple sub queries – correlated sub query – integrity constraints – domain integrity – check constraints – entity integrity – referential integrity constraints – deferrable constraints.

UNIT II: Basic controls and looping's in VB 10T +10 L hrs.

Introduction – designing the interface – writing the code – managing VB2010 data – performing mathematical operations – string manipulation – controlling program flow – select case control structure – looping.

UNIT III: FUNCTIONS 7T + 7L hrs.

Functions – string functions – mathematical functions – formatting functions – formatting date and time – creating user defined functions.

UNIT IV: ADVANCED CONTROLS 7T + 7L hrs.

Using advanced controls – creating and managing graphics – arrays – using timer creating animation – adding menus and tool bar – reading and writing files–Creating MDI forms.

UNIT V: WORKING WITH DATABASE 6T + 6L hrs.

Connecting to a database – understanding data tables – creating a data adapter – referencing fields in a data row – navigating records – adding – editing and deleting records.

TEXTBOOK(S):

James Foxall, (2010). S*ams Teach Yourself Visual Basic 2010 in 24 hours*, USA: Pearson Education, Inc. Print. (Page :451 – 465), (136-141)).

Liew Voon Kiong, (2017). *Visual Basic 2010 made easy,* US: CreateSpace Independent Publishing Platform. Print.

(Chapters :1-16,19-24).

George Koch and Kevin Lonely, (1997). *ORACLE The complete reference*, (3rd ed.), New Delhi: Tata Mc Graw Hill. Print.

REFERENCE BOOK(S):

Evangelos Petroutsos, (2010). *Mastering visual basic 2010,* Wiley Publishing, Inc. Print.

Michael Halvorson, (2010). *Microsoft Visual Basic 2010,* Microsoft Press. Print.

Thearon Willis and Bryan Newsome, (2016). *Beginning Visual Basic 2010,* Wiley Publishing, Inc. Print.

MAT5504CM GRAPH THEORY

(Theory)

LEARNING OUTCOME: 6 hrs./Wk.

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

- identify the different types of graphs
- explain the various concepts of graphs such as connectedness and directed graphs
- relate the concept of colourability with planarity

COURSE OUTLINE:

UNIT I: GRAPHS, SUBGRAPHS AND DIRECTED GRAPHS 20 hrs.

Definitions and examples – degrees – subgraphs – isomorphism – Ramsey numbers – independent sets and coverings – intersection graphs and line graphs – matrices – definitions and basic properties of directed graphs.

UNIT II: OPERATIONS ON GRAPHS AND DEGREE SEQUENCES 15 hrs.

Operations on graphs – degree sequences – graphic sequences.

UNIT III: CONNECTEDNESS AND TREES 20 hrs.

Walks – trails – paths – connectedness – components – blocks – connectivity – characterization of trees – centre of a tree.

UNIT IV: TRAVERSABILITY **15 hrs.**

Eulerian and Hamiltonian graphs – matchings.

UNIT V: PLANARITY AND COLOURABILITY **20 hrs.**

Definition – properties – characterization of planar graphs – chromatic number – chromatic index – the five - colour theorem.

TEXT BOOK(S)

Arumugam S. and Ramachandran S., (2005). Invitation to Graph Theory, Chennai: Scitech Publications Pvt. Ltd., Print. Chapters: Chapters 2 to 7, Chapter 8(Sections 8.0 to 8.2), Chapter 9(Sections 9.0 to 9.2), Chapter 10 (Sections 10.0, 10.1).

REFERENCE BOOK(S)

Choudum S. A., (2000). A first course in Graph Theory, New Delhi: Macmillan Publishing House, Print.

Kumaravelu S. and Susheela Kumaravel, (1999). Graph theory, Sivakasi: Janki Calendar Corporation, Print.

ITMA5403DM FORMAL LANGUAGES AND AUTOMATA THEORY (THEORY)

LEARNING OUTCOME: **4 hrs./wk.**

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

- •differentiate the types of grammar in formal languages
- •recognize the deterministic and nondeterministic finite automata
- •identify the relation between languages and finite automata

COURSE CONTENT:

UNITI: THEORY OF COMPUTATION AND FINITE AUTOMATA **12 hrs.**

0cluding proofs of theorems).

UNIT II: REGULAR LANGUAGES AND REGULAR GRAMMARS **12 hrs.**

Regular expressions – connection between regular expressions and regular languages – regular grammars – closure properties of regular languages – identifying non-regular languages. (excluding proofs of theorems).

UNIT III: CONTEXT-FREE LANGUAGES **12 hrs.**

Context free grammars – parsing and ambiguity – methods for transforming grammars – two normal forms (excluding proofs of theorems).

UNIT IV: PUSHDOWN AUTOMATA **12 hrs.**

Nondeterministic pushdown automata – pushdown automata and context-free languages – deterministic pushdown automata and deterministic context-free languages. (excluding proofs of theorems).

UNIT V: TURING MACHINES **12 hrs.**

The standard turing machine – combining turing machines for complicated tasks (excluding proofs of theorems).

TEXT BOOK(S):

Peter Linz, (2008). An Introduction to Formal Languages and Automata, New Delhi: Narosa Publishing House. Print. Chapters: 1 (1.1, 1.2), 2 (2.1, 2.2, 2.3), 3 (3.1, 3.2, 3.3) 4 (4.1, 4.3) 5 (5.1, 5.2) 6 (6.1, 6.2) 7 (7.1, 7.2, 7.3) 9 (9.1, 9.2).

REFERENCE BOOK(S):

Rajendrakumar, (2010). Theory of Automata, Languages and Computation, New Delhi: Tata McGraw Hill Education Private Limited. Print.

John E. Hopcroft, Rajeev Motwani Jeffrey and D. Ullman, (2001). Introduction to Automata Theory, Languages and Computation, (II ed.), Pearson Education Asia. Print.

Maheshwari, S.N., (1989). Introduction to Automata Theory Languages and Computation, New Delhi: Narosa Publishing house. Print

MAT5501CM ADVANCED CALCULUS –II

(Theory)

LEARNING OUTCOME : **5 Hrs./Wk.**

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

- •understand the concepts of Riemann integration and improper integrals
- •solve problems in sequences and series of functions and Fourier series
- •evaluate integrals using Beta & Gamma functions

COURSE OUTLINE :

UNIT-I : RIEMANN INTEGRATION: **20 Hrs.**

Riemann integrability and integral of bounded functions over finite domain, Darboux'stheorem, another equivalent definition of integrability, conditions for integrability, particular classes of bounded integrable functions , properties of integrable functions, functions defined by definite integrals, mean value theorem of integral calculus, change of variables in an integral, integration by parts.

UNIT-II : SEQUENCES AND SERIES OF FUNCTIONS: **10 Hrs.**

Necessary and sufficientcondition for point wise and uniform convergence, properties of uniformly convergent sequence of functions, infinite series of functions, test of the uniform convergence of a series.

UNIT-III : IMPROPER INTEGRALS: **15 Hrs**

Definitions, test for convergence at 'a' and infinity -positive integrand and f(x) not necessarily positive-absolute convergence, tests for conditional convergence.

UNIT-IV : FOURIER SERIES: **15 Hrs.**

Fourier series, main theorem, Dirichlet's condition, Fourier series for odd and even functions, half range series, other forms of Fourier series.

UNIT-V : BETA AND GAMMA FUNCTIONS: **15 Hrs.**

Definition, the Gamma function, recurrence formula for gamma of n , connection between the gamma function and factorials, table of values and graph of the gamma function, value of gamma of 1/2, the beta function, other forms of beta function, relation between the beta function and gamma function.

TEXT BOOK(S)

Shanthi Narayan, Mittal.P.K, A Course of Mathematical analysis, II edition, New Delhi: Chand.Sand company, Ltd, 2004, Chapters: 6, 7, 9 & 10. Print.Venkataraman M.K., Higher Mathematics for Engineering and Science, Madras: The National Publishing Company, 1998, Chapters: 1. Print.

REFERENCE BOOK(S)

Malik.S.C and Savita Arora, Mathematical Analysis, II Edition, Wiley Eastern Ltd, New York: McGraw Hill Company, 1994. Print.

BTMA5401DM APPLICATIONS OF STATISTICS IN GENETICS

(Theory)

LEARNING OUTCOME : **4 Hrs./Wk.**

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

•comprehend the basic concepts in Statistics for biological data •apply statistical science to solve the biological problems

•analyze data and interpret the results

COURSE OUTLINE :

UNIT-I : BASICS OF GENETICS **12 Hrs.**

Genetics as a discipline in biology, Definition-phenotype, trait, inheritance, genotype, gene, loci, dominant, recessive, forward and reverse genetics Simple Mendelian traits and inheritance pattern-monohybrid and dihybrid ratio-Punnet Square method.

UNIT-II : PROBABILITY AND HEREDITY **12 Hrs.**

Basic definitions and rules of probability–Laws of coincidence happening with reference to albinism-fraction, binomial and combination of two methods with respects to genetic variations-eye colour of drosophila, coat colour in rabbit.

UNIT-III : SAMPLING DATA &TESTING FOR GOODNESS OF FIT **12 Hrs.**

Types of biological data-quantitative and qualitative data, nominal, ordinal and time series -discrete and continuous data.Introduction to sampling and hypothesis testing-Chi-square test-assumptions of validity of chi square test, Applications of Chi-square test-based on Hardy-Weinberg equilibrium, linkage and recombination of genes-gene frequency, multiple alleles in blood grouping of man.

UNIT-IV : TEST OF SIGNIFICANCE (t-TEST) **12 Hrs.**

Introduction, comparison of means of two small samples-student's t –test (paired and unpaired).Examples based on experimental biostatistics-comparing the varieties of two gamma irradiation effect on seed growth etc.

UNIT-V : TEST OF SIGNIFICANCE (ANOVA) **12 Hrs.**

Multiple sample comparison by Analysis of variance (ANOVA) one and two way classification-case studies related to solving genetics problems.

TEXT BOOK(S)

Gurumani N., An introduction to Biostatistics, 2nd revised edition, Chennai: M.J.P Publishers, 2005. Print.

Khan and Khanum, Fundamentals of Biostatistics, 2nd edition, Hyderabad: Ukaaz Publications, 2004, Chapters: Unit III -8.1, 8.2, 8.3, 8.4(8.4.2 –8.4.4), Unit II -9.1, 9.2(9.2.2-9.2.4), Unit V -9.3 & 9.4. Print.

VermaP.Sand AgarwalV. K,Genetics, 9th edition, New Delhi: S. Chand & company LTD, 2009, Chapters: Unit I -9, 10 & 11, Unit II -16, 17 & 18, Unit III -19 & 20. Print.

Sinnot E. W., Dunn L.C and Dobzhansky T, Principles of Genetics, 4th edition, New Delhi: Tata Mc Graw Hill Pub. Co. Ltd, 1973. Print.

Winchester A. M., Genetics,3rd edition, Newyork: Oxford and IBH, 1967, Chapters: Unit I -4, 5 &6, Unit II -7 & 14. Print.

Zar J.H, Biostatistical Analysis, 4th edition, Singapore: Pearson Education Pvt. Ltd, 1999. Print.

REFERENCE BOOK(S)

Bailey N.T.J, Statistical Methods in Biology, 3rd edition, UK: Cambridge University Press, 1999. Print.Daniel WW, Biostatistics, 2nd Edition, New York: John Wiley & Sons, 1978. Print.

Lewis AE, Biostatistics, Chennai: Affiliated East West Press, 1971. Print.

Mackenzie A, Mathematics and Statistics for Life Scientists, 1st edition, Noida: S.P.Printers, 2005. Print.

Naren.KR.Dutta, Biostatistics, Practical approach, NewDelhi:110002: Kanishka publisher, 2001. Print.

Wardlaw A.C, Practical statistics for experimental biologists, 2nd Ed. London:Wiley, 2000. Print.

ITMA5402DM PARALLEL INTERCONNECTION NETWORKS

(Theory)

LEARNING OUTCOME: **4 Hrs./Wk.**

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

- understand the structures of various interconnection networks
- assess communication and computing possibilities of network architecture
- predict the performance of parallel applications

COURSE OUTLINE:

UNIT I: INTRODUCTION TO NETWORKS **12 Hrs.**

Interconnection Networks –Basic concepts and Notations on Graphs -Trees –k-ary Trees –Embedding of graphs –Planar Graphs and Layout of VLSI Circuits –Diameter of Graphs.

UNIT II: TRANSITIVE GRAPHS **12 Hrs.**

Vertex Transitive Graphs –Edge Transitive Graphs –Cayley Graphs –Properties of Cayley Graphs.

UNIT III: TYPES OF NETWORKS **12 Hrs.**

Cartesian Product -Hypercube Networks –de Brujin Networks –Mesh Networks –Butterfly Networks.

UNIT IV: PARALLEL NETWORK PARAMETERS **12Hrs.**

Fault Tolerance of networks –Principles of Network Design –Routing in Networks –Prim's Algorithm

UNIT V: FORWARDING INDEX OF ROUTING 12Hrs.

Routing Mechanisms for Interconnection Networks -Forwarding index of routing -Edge forwarding index of routing –Delay of Faults –Tolerant Routing.

TEXT BOOK(S)

Martin Jones (2015), Python for Biologists: A Complete Programming Course for Beginners. USA: John Wiley & Sons. Print. JunmingXu, (2001).

Topological Structure and Analysis of Interconnection Networks. Netherlands: Kluwer Academic Publishers. Print.Xu, J. (2013).

Topological structure and analysis of interconnection networks(Vol. 7).Germany: Springer Science & Business Media. Print.

Kumar, V., Grama, A., Gupta, A., & Karypis, G. (2003). Introduction to Parallel Computing (2nd ed.). Boston: Addison Wesley. Print.

Chapters: UNIT I –1 -1.1 (1.1.1,1.1.2,1.1.3), 1.2(1.2.1,1.2.2 &1.2.3 (theorems statement only)), 1.3(1.3.1,1.3.2,1.3.3) ,1.4.1, UNIT II -2-2.2 (2.2.1, 2.2.2, 2.2.5)UNIT III –2-, 2.3.1, 2.3.2, 3-3.1(3.1.1.,3.1.2), 3.2(3.2.1,3.2.3 theorems statement only, 3.2.6), 3.4.5, 3.5.1, 3.5.3, 3.5.4.UNIT IV -1-1.4 (1.4.3), 1.5(1.5.3), 1.6(1.6.1,1.6.2), 2ndText Book (10.2)UNIT V –2nd Text Book (2.6), 4 -4.1.1,4.1.2 & 4.1.3 (without theorems)

REFERENCE BOOK(S):

Garey, M.R. and Johnson, D.S. (1979). Computers and Intractability, A Guide to the Theory of NP-Completeness. New York: W. H. Freeman & Co. Print.

Bezrukov, S. L. (2001). Embedding complete trees into the hypercube. Discrete Applied Mathematics, 110 (2), 101-119.Leighton, F. T. (2014). Introduction to parallel algorithms and architectures: Arrays· trees· hypercubes. Netherlands: Elsevier.Print.

ITMA6401DT /CSMA6401DT APPLICATION OF FUZZY SETS USING MATLAB

(LAB CUM THEORY)

LEARNING OUTCOME: 3T + 1L hrs./wk.

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

- differentiate fuzzy and crisp sets
- apply fuzzy logic and fuzzy relations in real life situations
- apply MATLAB to solve fuzzy related problems

COURSE CONTENT:

UNIT I: FUZZY SETS 12 T hrs.

Crisp set – fuzzy set – membership function – Universe – Support set – Ordinary fuzzy set –Interval valued fuzzy set – L -Fuzzy set – Level 2 fuzzy set – cut – strong cut – height of fuzzy set – Normal – subnormal – operations on fuzzy sets-properties of fuzzy sets – fuzzy numbers.

UNIT II: FUZZY LOGIC 12 T hrs.

Crisp logic – fuzzy logic – representation of fuzzy logic – Linguistic variables – fuzzy relations equivalence relations – fuzzy if then rules – fuzzy rules and relations – Advantages of fuzzy logic – Approximate reasoning.

UNIT III: IMPLEMENTATION OF FUZZY SETS IN MATLAB 6T + 6L hrs.

Fuzzy Set Representations – Discrete representation – Vector representation – Matrix representation – LR representation – L-set representation – Creating Fuzzy Set – Conversion between Fuzzy Set Representations – Plotting Fuzzy Sets – Operations on Fuzzy Sets –Operations for Fuzzy Sets in Discrete Representation – Logical Operations – Operations for Fuzzy Sets in LR Representation – Operations for Fuzzy Sets in L-set Representation.

UNIT IV: IMPLEMENTATION OF FUZZY LOGIC IN MATLAB 6T + 6L hrs.

The FIS Editor – The Membership Function Editor – The Rule Editor – The Rule Viewer – The Surface Viewer – To Build Fuzzy Inference Systems Using Custom Functions – Programs on Fuzzy Logic and Fuzzy Relations.

UNIT V: APPLICATIONS 9T + 3L hrs.

Applications of Fuzzy in Mathematics: Decision making and systems science Applications of Fuzzy in Computer Science: Pattern Recognition.

TEXT BOOK(S):

George J.Klir Bo Yuan., (2000).*Fuzzy sets and Fuzzy Logic theory and applications*, New Delhi: Prentice Hall of India,Chapters:1(1.2 - 1.4), 4(4.1 - 4.3), 5(5.1, 5.3, 5.5), 8(8.1 - 8.3), 15(15.1 - 15.3).

Olaf Wolkenhauer.,(1999) *Fuzzy Systems Toolbox for use with MATLAB and SIMULINK*: User's Guide, Chapters: unit III, Print.

S. N. Sivanandam., S. Sumathi & S. N. Deepa, *Introduction to Fuzzy Logic using MATLAB:* Springer, Print.

REFERENCE BOOK(S):

H.J.Zimmermann.,(2006). *Fuzzy set theory and its applications*, Springer International Edition, Print.

STUDY MATERIAL(S):

Fuzzy Logic Toolbox, User's Guide, Mathworks.com - Unit V, Print.

MAPH6402DM INTRODUCTION TO ASTROPHYSICS

(THEORY)

LEARNING OUTCOME 4Hrs./Wk.

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

- recognize the principles involved in astrophysical measurements
- identify the basic principles behind the formation, evolution and death of stars
- become familiar with celestial coordinates and successive phases of the moon
- explain the occurrences of solar and lunar eclipse

COURSE OUTLINE:

UNIT I: COSMOLOGY AND MEASUREMENT TOOLS OF ASTRONOMY 12 hrs.

Refracting telescopes – reflecting telescopes – angular resolution – charged coupled devices – radio telescopes – classifying galaxies – the Hubble law – the expanding universe – the big bang

UNIT II: NATURE OF STARS AND STELLAR EVOLUTION 12 hrs.

Stellar distances and parallax – apparent brightness and luminosity – the magnitude scale – star colors and temperature – the Hertzprung-Russell diagram – protostars and dark nebulae – reaching the main sequence – red giants – planetary nebulae – white dwarfs – core-collapse supernovae.

UNIT III: CELESTIAL SPHERE 12 hrs.

Celestial sphere – diurnal motion – celestial axis and equator – celestial horizon – zenith and nadir – celestial meridian – celestial points – northern and southern hemispheres – eastern and western hemispheres – visible and invisible hemispheres – declination circles – verticals – parallactic angle – rising and setting – transit or culmination – due east – due west – due north – due south – annual motion of the Sun – ecliptic – obliquity – first point of Aries – first point of Libra-equinoxes and solstices – colures – celestial co–ordinates – to trace the changes in the co-ordinates of the Sun in the course of a year – sidereal time – latitude of a place – to find the hour angle of a body at rising or setting – to find the duration of day time – morning and evening stars – circumpolar stars – the zones of the Earth – to trace the variations in the duration of day and night during the year at different stations

UNIT IV: THE MOON 12 hrs.

Sidereal month – synodic month – elongation – conjunction – opposition – quadratures – daily motion of the moon – successive phases of the moon – moon exhibits the same side to the earth – Metonic cycle – golden number – epact – Sunday letter – Earth shine.

UNIT V: OUR SUN 12 hrs.

The photosphere – the chromosphere – the corona –thermonuclear energy – lunar – solar eclipses –penumbral regions – maximum and minimum number of eclipses in a year

TEXTBOOK(S)

Kumaravelu S. and Kumaravelu, Susheela. (2004). *Astronomy.* Nagercoil: SKV Publications. Print.

Chapters: Chap–II Articles 39 – 63, 67, 69, 77, 80 – 82, Chap–III Articles 87 – 88 and 91

Chap – XII Articles 229 – 242, 250 – 251 and 254 Chap–XIII Articles 256 – 259, 272 – 274.

William J. Kaufman III, Roger A. Freedman and Robert M. Geller. (2014). *Universe* (10th ed.). USA: W.H. Freeman Company. Print.

Chapters:6.1–6.4,6.6,16.1,16.5–16.7,17.1–17.4,17.7,18.3,18.4,19.2,20.3(Pg No.567–568), 20.4 (Pg No. 569 – 570), 20.6 (Pg No. 575 – 577),23.3,23.5,25.2,25.3.

REFERENCE BOOK(S)

Abhayankar K.D. (2001). *Astrophysics: Stars and Galaxies.* India: Universities Press. Print.

Baidyanath Basu, Tanuka Chattopadyay and Sudhindra Nath Biswas. (2011). *An introduction to Astrophysics (2nd* ed.). New Delhi: PHI learning private Ltd. Print.

Bhattacharya, A.B. Joardar, S. Bhattacharya, R. (2010). *Astronomy and Astrophysics*. India: Overseas Press (India) Pvt. Ltd. Print.

Krishnaswamy, K.S. (2007). *Astrophysics: A Modern Perspective.* New Delhi: New Age International (P) Limited. Print.

Michael A. Seeds. (2001). *Foundations of Astronomy.* USA: Brooks/ Cole Thomson learning. Print.

Sasidharan, G.K. (2008). *The Great Universe*. New Delhi: S. Chand & Company Ltd. Print.

Srinivasan G. (2011). *Can stars find peace?*. New Delhi: Universities Press. Print.

MAT6501CM COMPLEX ANALYSIS

(THEORY)

LEARNING OUTCOME **5 hrs. / wk.**

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

- describe the concepts of complex numbers and the geometrical representation of the extended complex plane
- apply the concept and consequence of analytic functions and CR equations in different branches of Science
- evaluate line integrals using Cauchy's theorem and definite integrals using residues

COURSE CONTENT:

UNIT I: COMPLEX NUMBERS AND ANALYTIC FUNCTIONS **15 hrs.**

Circles and straight lines – regions in the complex plane – the extended complex plane – functions of a complex variable – limits - continuous functions – differentiability – Cauchy Riemann's equations – analytic functions – harmonic functions – conformal mapping.

UNIT II: BILINEAR TRANSFORMATIONS **15 hrs.**

Elementary transformations – bilinear transformations – cross ratio – fixed points of bilinear transformations – some special bilinear transformations

UNIT III: COMPLEX INTEGRATION **15 hrs.**

Definite integral – Cauchy 's theorem – Cauchy 's integral formula – higher derivatives.

UNIT IV: SERIES EXPANSIONS **15 hrs.**

Taylor's series – Laurent 's series – zeros of an analytic function – singularities.

UNIT V: CALCULUS OF RESIDUES **15 hrs.**

Residues – Cauchy 's residue theorem – evaluation of definite integrals.

TEXT BOOK(S):

Arumugam S. Thangapandi Isaac A. and Somasundaram A., (2005). *Complex Analysis*. Chennai: Scitech Publications (India) Pvt. Ltd., Print. (Chapter- 1 (1.7 to 1.9), 2, 3, 6, 7, 8)

REFERENCE BOOK(S):

Narayan Shanti, (2001). *Theory of functions of a complex variable,* New Delhi: Chand. S and Company Ltd., Print.

Churchill, V. (1960). *Theory of complex variable*s, Oxford: Mcgraw Hill University Press. Print.

Copson, E.T. (1960). *An introduction to the theory functions of a complex variable,* London: Oxford University Press. Print.

Course Syllabus **B.Sc. Mathematics with Computer Applications** **2019 batch**

LIFE FRONTIER ENGAGEMENT

Semester V **Total Hours: 4 hrs./week**
Semester VI **Total Hours: 4 hrs./week**

MAT0602LM APPLICATIONS OF MATHEMATICAL TOOLS FOR HUMAN LIFE ENHANCEMENT

OBJECTIVES

- To facilitate students to appreciate her academic learning through experiential learning by disciplinary and interdisciplinary community engagements thereby enhancing their civic responsibilities in society
- To empower students with appropriate academic strategies and innovative assessment and evaluation criteria to facilitate experiential learning for students to discover real life values
- To transform each student to be productive caring citizens of our global society through the vibrant, community- based action research programme

LEARNING OUTCOME:

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

- develop core values such as service, team building and time management
- take part effectively as an individual and as a member or leader in diverse teams
- improve her knowledge about her social and civic responsibilities
- summarize and share her experiences and findings to her peer and society
- compile reports and make effective presentations

SECTION I:

COMMON UNIT **10 hrs.**

Understanding Life Frontier Engagement,

f) Service Learning and Life Frontier Engagement
g) Principles, engagement, reflection, reciprocity, public dissemination
h) Meaning of community and understanding of community dynamics
i) Programme planning in Life Frontier Engagement, stages: Need analysis, Problem identification, Goal setting, Concept finalization, planning for stages of research, research and analysis, reflection and dissemination of results.
j) Ethical concerns in Life Frontier Engagement, Confidentiality, Conflict of interest, Informed consent.

ACTIVITY MODULE FOR SECTION I:

d) (i) Making students understand the concept of Service Learning and Life Frontier Engagement based on the information in the reading material given using student centered learning activities
(ii) Interaction with any local group in a nearby community (Example: Children, adolescents, adults within or outside college) and identifying community dynamics
(iii) Need based analysis to be done on the community by framing a questionnaire for base line socio economic survey

e) (i) Asking students to prepare a programme plan based on the sub, themes and target group identified by the department

(ii) Presentation by teams by refining the ideas of students based on program planning stages

f) Activity based on case studies on relevant ethical issues in community engagement

SECTION II: THEMATIC CONCEPTS **20 hrs.**

- Education
- Health and Hygiene
- Infrastructure and Resources
- Employment
- Entrepreneurship

CLASSIFICATIONAL CONCEPT:

- Significance of school / Higher Education
- Importance of physical / mental health
- Consideration of personal / societal hygiene
- Exploration and acquainting with the government schemes / resources
- Optimization in small / medium scale industries

CO-RELATIONAL CONCEPT:

- Educational status: income level, gender, culture of the community and basic amenities in schools
- Factors influencing health
- Infrastructure and Resources: Basic amenities of life, Government schemes / plans
- Employment: Education, Private / Government Sector, income, job satisfaction
- Entrepreneurship: Technical training, Government schemes / plans, resources, optimization

THEORETICAL CONCEPT:

Collection and classification of data, identifying suitable mathematical concepts such as statistical tools, optimization techniques, techniques in graph theory, fuzzy sets etc., to analyse and interpret the data.

ACTIVITY MODULE:

- Orientation to the students about the community interaction
- Building a rapport between the target community and students
- Exposure to different mathematical methodologies
- Training on computational skills using software (R)
- Identifying the need of the community through survey
- Framing questionnaire and collection of data
- Classifying the data and identifying the Mathematical concept applicable for the situation
- Journal writing

SECTION III: COMMUNITY ENGAGEMENT PROCESS- **90 hrs.**

A community will be selected in Madurai district. A need-based assessment will be carried out to study the quality of life in the chosen community such as the level of education, primary occupation, available resources, basic amenities, health and hygiene etc. The appropriate project topic will be identified based on the assessment. Data collection will be done by interviewing the community. The collected data will be classified, analysed and interpreted using suitable mathematical tools.

Documentation of the plan, visits and process is done systematically. Reflection sessions will be conducted periodically to enlighten the students' learning. Suitable intervention programmes will be planned and implemented. Final report will be evaluated. The outcome of the analysis will be shared with the chosen community, governmental and non-governmental institutions to bring about a change in the society.

MAE6401CT OBJECT OREIENTED PROGRAMMING - II

(Lab cum Theory)

LEARNING OUTCOME : **3T + 2L Hrs./Wk.**

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

- understand the concepts of Object Oriented Programming
- implement the concepts of data abstraction, inheritance, interfaces and multithreading
- develop animated applications using applets and AWT controls

COURSE OUTLINE :

UNIT-I : INTRODUCTION TO JAVA **5T + 3L Hrs.**

Developing a Java program – data types, literals – Expressions, Operators – Control Statements.

UNIT-II : CLASSES, ARRAYS, STRINGS & CONSTRUCTORS **10T + 7L Hrs.**

Classes – Attributes – Met

hods – More about classes – Constructors and Finalizer – Casting and Converting

UNIT-III : INHERITANCE, INTRODUCTION TO APPLETS AND GRAPHICS **10T + 10L Hrs.**

Introduction to Inheritance – Overriding Final – Abstract – Inner classes – Developing an applet – Major applet activities – Graphics, Color and Font class.

UNIT-IV : EXCEPTIONS, PACKAGES, INTERFACES AND MULTITHREADING **10T + 5L Hrs.**

Basics of exception handling – Creation of user-defined exceptions – Packages – Interfaces – Java Thread Model – Creation of Multiple threads – Synchronization

UNIT-V : AWT **10T + 5L Hrs.**

Introduction – Windows Fundamentals – Working with graphics – Working with fonts – Controls – Layout Managers – Menu bars and Menus.

EXPERIMENTS / LAB EXERCISES :

1. Programs which read, process and display different data types
2. Programs which deal with looping and control statements
3. Programs designed to read and process single and multidimensional arrays
4. Programs for designing a class
5. Programs which deal with constructors and finalizer
6. Programs involving applications using pre defined Java exceptions
7. Programs which impart AWT components using Applet

TEXT BOOK(S)

Herbert Schildt, *The complete Reference Java 2*, New Delhi: Fifth Edition: Tata McGraw Hill, 2008, Chapters: 1 – 11, 12(pg no. 328 – 331),19(pg. no. 627 – 638, 643, 644), 20(pg. no. 658, 663, 664, 670, 671), 21(pg. no. 687 – 693, 705-711 ,717 – 722), 22(pg. no.775). Print.

REFERENCE BOOK(S)

Card Strocker, G. Thomas Plew, *Java Programming*, Galgotia Publications, 2002. Print.

Patrick Naughton, *Java Handbook*, New Delhi: Tata McGraw Hill, 2002. Print.

Willtrain, *Java 1.2*, New Delhi: BPB Publications, 2000. Print.

Xavier C, *Projects on Java*, Chennai: Scitech Publications, 2006. Print.

MAE6501CM OPERATIONS RESEARCH

(Theory)

LEARNING OUTCOME : **6 Hrs./Wk.**

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

- formulate a real life problem mathematically
- solve linear programming problems using graphical and simplex method
- apply optimization techniques in transportation and assignment problems
- identify the optimal strategies for the players in a two-person zero-sum game

COURSE OUTLINE :

UNIT-I : LINEAR PROGRAMMING PROBLEM: **20 Hrs.**

Mathematical formulation of the problem, graphical solution of Linear Programming Problem, simplex method (All theorems – statements only)

UNIT-II : USE OF ARTIFICIAL VARIABLES: **20 Hrs.**

Big M method, Duality in linear programming, solution by duality, dual simplex method (All theorems – statements only).

UNIT-III : TRANSPORTATION PROBLEM: **20 Hrs.**

General Transportation Problem, Transportation table, loops in Transportation table, solution of a transportation problem, transportation algorithm (MODI method), unbalanced transportation problem, Assignment problem: Mathematical formulation of the problem, solution of the assignment problem, maximization in assignment problems.

UNIT-IV : GAMES AND STRATEGIES: **15 Hrs.**

Maximin - Minimax principle, games without saddle points –mixed strategies, graphical solution on 2 x n and m x 2 games, dominance property, general solution of m x n rectangular games by LP method

UNIT-V : NETWORK SCHEDULING BY PERT/CPM: **15 Hrs.**

Network basic components, logical sequencing, rules of network construction, concurrent activities, critical path analysis, and probability considerations in PERT

TEXT BOOK(S)

KantiSwarup, Gupta, Man Mohan, *Operations Research*, Delhi: Sultan Chand & Sons, 2006, Chapters: 2, 3, 4(4:1 - 4:4(big M method only)), 5(5:1 – 5:7), 10(10:1-10:12, 10:14(exceptional case 1 and 4)), 11(11:1-11:4(maximization case only)), 17(17.1 – 17.7,17.9(LP method only)), 21(21:1-21:6). Print.

REFERENCE BOOK(S)

Gupta P.K, Man Mohan, *Problems in Operations Research*, New Delhi: Sultan Chand & Sons, 2003.Print.
Venkataraman M.K, *Linear Programming*, Chennai: The National Publishing Co, 1994. Print.

MAE6502CM MECHANICS

(Theory)

LEARNING OUTCOME :

5 Hrs./Wk.

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

- resolve a force in any two directions
- understand the concepts of couples, moments, coplanar forces and collision of elastic bodies
- represent a practical problem pictorially and solve it

COURSE OUTLINE :

UNIT-I : STATICS: 15 Hrs.

Forces acting at a point, parallelogram of forces, triangle of forces, perpendicular triangle of forces, Lami's theorem, resolution of a force, Conditions of equilibrium of any number of forces acting upon a particle.

UNIT-II : PARALLEL FORCES, COUPLES AND EQUILIBRIUM OF THREE FORCES ACTING ON A RIGID BODY: 16 Hrs.

Parallel forces, moment of a force, Varignon's theorem on moments, couples, related theorems. Trigonometrical Theorems (Statement only) and related problems, coplanar forces (necessary results only).

UNIT-III : FRICTION: 16 Hrs.

Definition, Statical and Limiting Friction, Laws of friction, Coefficient of friction, Angle of friction, cone of friction, equilibrium of a particle on a rough inclined plane, equilibrium of a body on a rough, inclined plane under any force, equilibrium of a body on a rough inclined plane under a force parallel to the plane and related problems.

UNIT-IV : PROJECTILES: 16 Hrs.

Path of a projectile is a parabola, characteristics of motion of a projectile, Range on an inclined plane and related problems.

UNIT-V : COLLISION OF ELASTIC BODIES: 2 Hrs.

Definitions, Fundamental laws of impact, Newton's experimental law, principle of conservation of momentum, impact of a smooth sphere on a fixed smooth plane, direct impact of two smooth spheres, loss of kinetic energy due to direct impact of two smooth spheres, oblique impact of two smooth spheres, loss of kinetic energy due to oblique impact of two smooth spheres

TEXT BOOK(S)

Venkataraman.M.K, *Dynamics*, Trichy: Agasthiar Book Depot, 2005, Chapters: 6 (6.1-6.16), 8(8.1-8.8).Print.
Venkataraman.M.K, *Statics*, Trichy: Agasthiar Book Depot, 2005, Chapters: 2, 3(3.1-3.13), 4, 5 (5.1 - 5.6 (upto pg. no. 122), 5.7), 7(7.1 - 7.13 (upto pg. no. 251)) Print.

REFERENCE BOOK(S)

Duraipandian. P, LaxmiDuraipandian, Muthamizh Jaya Pragasam, *Mechanics*, New Delhi:Chand. S & Company Ltd, 2006. Print.

Loney.S.L, *The Elements of Statics and Dynamics Part I statics*, New Delhi: Surjeet Publications, 1989.

Print.

Loney.S.L, *The Elements of Statics and Dynamics Part II Dynamics*, New Delhi: Surjeet Publications, 1989. Print.

SEM II						
MAT0408CD	**DISCRETE MATHEMATICS**	**TH**	**ALLM**	**MAT**	**4**	**AZ2017**
SEM III						
MAT0404CD	**SET THEORY AND NUMBER SYSTEMS**	**TH**	**ALLM**	**MAT**	**4**	**AS2011**
MAT0407CD	**NUMERICAL METHODS**	**TH**	**ALLM**	**MAT**	**4**	**AZ2017**
SEM IV						
MAT0401CD	**NUMBER THEORY**	**TH**	**ALLM**	**MAT**	**4**	**AU2013**
SEM V						
MAT0404CD	**SET THEORY AND NUMBER SYSTEMS**	**TH**	**ALLM**	**MAT**	**4**	**AS2011**

MAT0408CD DISCRETE MATHEMATICS

(Theory)

LEARNING OUTCOMES:

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

• construct mathematical arguments using logical connectivity and quantifiers

• verify the correctness of an argument using propositional calculus, predicate logic and truth tables

• appreciate the basic principles of Boolean Algebra

COURSE OUTLINE:

UNIT I: PROPOSITIONAL CALCULUS

Statements – basic operations – propositions and truth tables – tautologies and contradictions –logical equivalence, negation – De Morgan's laws – Algebra of propositions – conditional andbiconditional statements.

UNIT II: ORDERED SETS AND LATTICES

Poset – maximal and minimal elements – supremum and infimum – similar and well ordered sets –lattices – sublattices – distributive lattices – complemented lattices.

UNIT III: BOOLEAN ALGEBRA AND LOGIC GATES

Basic definition and theorems – Boolean expressions – sum of products – product of sum – logicgates – minimal Boolean expressions – prime implicant – Karnaugh maps.

UNIT IV: NORMAL FORM

Disjunctive – Conjunctive – Principal disjunctive – Principal conjunctive.

UNIT V: THEORY OF INFERENCE FOR THE STATEMENT CALCULUS

Validity using Truth Tables – Rules of inference – Consistency of premises and indirect method ofproof.

TEXT BOOK(S)

Lipschutz, Seymour. Mare Lars Lipsor. (1999). Discrete Mathematics. Schaum Series, New Delhi:McGraw Hill Publishing Company Ltd. Print.Chapters 5,11,12,13

Tremblay, J.P. Manohar, R. (2001).Discrete Mathematical Structures with Applications to ComputerScience. New Delhi: TATA McGraw-Hill Publishing Company limited. Print.

Chapters: 1-3(1-3.1 to 1-3.4) & 1-4 (1-4.1 to 1-4.3)

REFERENCE BOOK

Venkataraman, M.K. Sridharan, N. and Chandrasekaran N. (2000). Discrete Mathematics. Chennai:The National Publishing Company. Print.

MAT0404CD SET THEORY AND NUMBER SYSTEM

(THEORY)

LEARNING OUTCOMES:

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

- apply set theory to solve problems
- understand and appreciable the development of number system in a new approach of equivalence classes
- understand various properties of natural numbers, integers, rational numbers and real numbers and apply in arithmetic, algebra, geometry and calculus

COURSE CONTENT:

UNIT I: THEORY OF SETS

The concept of a set – set inclusion – union of sets – intersection of sets – Difference of sets – complement of a set –symmetric difference and Cartesian product.

UNIT II: NATURAL NUMBERS

Axiom of Induction – recursion theorem – addition and Multiplication in N – order in N – initial segment – terminal segment –finite sets – axiom of choice – denumerable sets.

UNIT III: INTEGERS

Construction – addition in Z – order in Z – embedding.

UNIT IV: RATIONAL NUMBERS

Construction – addition – multiplication and order in Q – embedding – ordered fields – dense orders.

UNIT V: REAL NUMBERS AND COMPLEX NUMBERS

Construction of real numbers – addition and multiplication in R – order in R – embedding – complex numbers – definition –embedding.

TEXTBOOK(S):

Arumugam. S & Thangapandi Isaac A, (2007). Modern Algebra, Chennai: Scitech Publications (India) Pvt. Ltd. Print.

Leon W. Cohen& Gertrude Ehrlich, (2012). The structure of the Real Number systems, New Jersey. Van Nostrand Company,

Princeton, Print. Chapters 1,2,3,4(up to embedding) and 6(up to Embedding).

REFERENCE BOOK(S):

Arumugam. S & Thangapandi Isaac A, (1997). Set Theory, Number system

and theory of Equations, New Gamma PublicationHouse, Print.

Narayanan. K.S. & Manichavachagom Pillai T.K, (1982).Modern Algebra,

Vol.I, Chennai: Viswanathan Publishers, Print.

MAT0407CD NUMERICAL METHODS

(Theory)

LEARNING OUTCOMES:

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

- employ appropriate numerical methods to obtain approximate solutions to mathematical problems
- apply iterative methods to solve algebraic and transcendental equations
- use different interpolation formulae in numerical differentiation
- integrate and solve first order differential equations numerically

COURSE OUTLINE:

UNIT I: NUMERICAL SOLUTIONS OF ALGEBRAIC AND TRANSCENDENTAL EQUATIONS

Bisection method – Regulafalsi method – Iteration method – Newton - Raphson method.

UNIT II: INTERPOLATION WITH EQUAL INTERVALS

Newton's forward and backward formulae – Gauss 's forward and backward formulae – Stirling 's formula – Bessel 's formula – Laplace – Everetts formula.

UNIT III: INTERPOLATION WITH UNEQUAL INTERVALS

Newton's divided difference formula – Lagrange 's Interpolation formula – Inverse Interpolation.

UNIT IV: NUMERICAL DIFFERENTIATION & INTEGRATION

Newton's formula – Stirling 's formula – Numerical Integration: Trapezoidal rule – Simpson 's rule.

UNIT V: SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS OF FIRST ORDER

Taylor – Picard and Euler methods.

TEXT BOOK

Venkataraman, M.K. (2003).Numerical methods in Science and Engineering (fifth edition). Chennai: The National Publishing Company. Print. Ch.3 (1,2,3,4,5), 6(1-5), 7(1-10), 8(1-9), 9(1-13).

REFERENCE BOOK(S)

Balagurusamy,E. (1998).Computer oriented Statistical & Numerical methods. New Delhi: Macmillan India Limited. Print.

Gupta, B.D. (1995).Numerical Analysis. Delhi: Konark Publishers Pvt. Ltd. Print.

Sasthry, S.S. (1989). Introduction Methods of Numerical Analysis. New Delhi: Prentice Hall of India Pvt. Ltd. Print.

MAT0401CD NUMBER THEORY

(THEORY)

COURSE OUTCOMES:

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

- Understand the basic concepts of number theory
- apply certain techniques to solve problems
- know more about primes, composite numbers and congruences

COURSE CONTENT:

UNITI:

Divisibility –primeand composite numbers – Associates – division algorithm – g.c.d, Euclidean algorithm – l.c.m – coprimes – Sieve of Erathosthenes – Fundamental theorem of arithmetic – positional representation of integers, number of divisors – sum of divisors – symbols d(n) –(n) – Arithmetical functions – perfect numbers – Euclids theorem on perfect numbers – Amicable numbers – Euler function (n) – greatest integer function – Mobius function – inversion formula and its converse – Fibonacci numbers – generating functions – Lucas numbers.

UNITII:

Congruences – Definitions – residue classes – complete & residue systems – reduced residue systems– casting out 9 – magic numbers – divisibility tests – linear congruences – solution of congruences – Chinese remainder theorem.

UNITIII:

Theorem of Fermat & Wilson – Little Fermat's theorem – Euler's extension – inverse modulo – Wilson's theorem & its converse – Lagrange's theorem – Wolstenholme theorem.

UNITIV:

Algebraic congruences – Factor theorem for polynomials – number of solutions – congruences of prime power modulii, composite modulii – identical congruences – conditional congruences – multiple roots.

TEXTBOOK(S):

Kumaravelu S. & Susheela Kumaravelu, (2002).*Elements of Number Theory*, Sivakasi: Raja Sankar Offset Printers. Print. Chapters: 3, 4, 6, 7 and 8.

REFERENCE BOOK(S):

Sudhir K. Pundir & Rimple Pundir, (2006).*Theory of Numbers*, Meerut: PragatiPakashan.Print.