MATHEMATICS DEPARTMENT

B. Sc. MATHEMATICS

Programme Educational Objectives (PEOs)

The B.Sc. (Spl.) Mathematics and B.Sc. Mathematics with Computer Applications programme will enable the student to

- recognize the language of Mathematics and its logical reasoning
- enhance their knowledge in pure and applied Mathematics
- apply appropriate mathematical tools for problem solving
- become competent, resourceful, employable and empowered
- integrate the knowledge of Mathematics in the domain of Computer Science
- pursue higher studies in related fields

Programme Specific Outcomes (PSOs)

Upon completion of B.Sc. (Spl.) Mathematics and B.Sc. Mathematics with Computer Applications programme, the student will be able to

- apply the logical reasoning, arithmetic, aptitude and communication skills
- work efficiently in interdisciplinary projects with competency and Mathematical rigour
- foster the sense of civic responsibility for the social upliftment of the community
- solve algebraic, analytic and numerical problems with enhanced speed and accuracy
- communicate Mathematics effectively to both lay and expert audience using appropriate ICT Tools
- use current techniques, skills and necessary tools which are relevant and appropriate to different fields

Department of Mathematics

Course Syllabus **B.Sc. Mathematics (Aided)** **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	AUTAM
	PART II	ENGLISH	TH	6		3 / 4	AV2014	ALLM	AUENG
	MAT1301FM	TRIGONOMETRY AND THEORY OF EQUATIONS	TH	4		3	AU2013	AUMAT	AUMAT
	MAT1502CM	ADVANCED CALCULUS I	TH	5		5	BA2018	AUMAT	AUMAT
	PHY1402AA	GENERAL PHYSICS	TH	5		4	BA2018	AUMAT	AUPHY
	MAT1202FS	COMMUNICATION SKILLS THROUGH MATHEMATICS	TH	2		2	AZ2017	AUMAT	AUMAT
	VBC1101FV / UIV1101FV	HEALTHY TRANSITION FROM ADOLESCENCE TO ADULTHOOD / BIBLICAL ESSENTIALS FOR EMERGING ADULTS	TH	2		1	BA 2018	ALLM /AUACH SUACH	Centre for VE
		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	AUMAT	AUMAT
	MAT2403CM	ANALYTICAL GEOMETRY OF 3D	TH	4		4	BB2019	AUMAT	AUMAT
	MATQ2401AA / COMQ2401AA	NUMERICAL ANALYSIS / FUNDAMENTALS OF ACCOUNTING	TH	5		4	BB2019	AUMAT	MAT / COM
	MAT2201FS	COMMUNICATION SKILLS FOR MATHEMATICS	TH	2		2	BA2018	AUMAT	AUMAT
	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	AUCH/SUCH	
		TOTAL		30		23 / 25			

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	AUMAT	AUMAT
	MAT3501CM	MODERN ALGEBRA	TH	6		5	AV2014	AUMAT	AUMAT
	MAT3502CM	STATISTICS	TH	6		5	BB2019	AUMAT	AUMAT
	MAT3504CM	DIFFERENTIAL EQUATIONS AND LAPLACE TRANSFORMS	TH	6		5	BD2019	AUMAT	AUMAT
	MAT3401AT	PROGRAMMING IN C	LT	3	2	4	AV2014	AUMAT	AUMAT
	NON-MAJOR ELECTIVE		TH / LA	2		2			
	VOCATIONAL COURSE					2		ALLM	CED
	VBC0102FV / VBC0103FV / UIV3101FV	CIVIC EDUCATION / FAMILY LIFE EDUCATION / CIVICS IN THE BIBLE	TH	1		1	AV2014/ AV2014/ BB2019	ALLM / AUACH SUACH	Centre for VBC / IVBC
		TOTAL		**30**		**28**			

Sem.	Course Code	Course Title	Course Type	Hrs./ Wk.	Credits	Passed in Academic Council	Offered to
III	COMA3201EI	FOUNDATION COURSE IN MATHEMATICS AND COMMERCE FOR COMPETITIVE EXAMINATIONS	TH	TH-2	2	AV2014	ALLM
III	ECMA3201EI	BASICS OF PERSONAL FINANCE	TH	TH-2	2	AV2014	ALLM
III	ENMA3201EI	BASIC COURSE IN MATHEMATICS AND ENGLISH FOR COMPETITIVE EXAMINATIONS	TH	TH-2	2	BA2018	ALLM

IV	MAT4501CM	LINEAR ALGEBRA	TH	6		5	AV2014	AUMAT	AUMAT
	MAT4503CM	REAL ANALYSIS	TH	6		5	AV2014	AUMAT	AUMAT

	MAT4504CM	ADVANCED STATISTICS	TH	6		5	BA2018	AUMAT	AUMAT
	MATQ4501CT/ MATQ4502CT	OBJECT ORIENTED PROGRAMMING WITH C++/ OBJECT ORIENTED PROGRAMMING WITH JAVA	LT	4	2	5	BB2019	AUMAT	AUMAT
	MAT4201SS	QUANTITATIVE APTITUDE	TH	2		2	AV2014	AUMAT	AUMAT
	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 / AUACH SUACH	Centre for VBC / IVBC
	UIV4201FV	HUMAN RIGHTS IN THE BIBLE					BB2019	SUACH	
		TOTAL		**30**		**25**			

Part	Course Code	Course Title	Course Type	Offer to	Offer by	Hr/wk	Cr	Academic Council Book No
IV	ECMA4201EI	LINEAR PROGRAMMING AND NETWORK ANALYSIS	TH	ALLM	ECO & MAT	TH-2	2	AV2014
IV	HIMA4201EI	HISTORY AND MATHEMATICS FOR COMPETITIVE EXAMINATIONS	TH	ALLM	HIS & MAT	TH-2	2	BA2018

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	AUMAT	MAT
	MAT5503CM	OPERATIONS RESEARCH – I	TH	6		5	BA2018	AUMAT	MAT
	MAT5504CM	GRAPH THEORY	TH	6		5	BA2018	AUMAT	MAT

Department of Mathematics

Course Syllabus **B.Sc. Mathematics (Aided)** **2019 batch**

Sem.	Course Code	Course Title	Course Type	Hrs./Wk.		Credits	Passed in Academic Council	Offered to	Offered by
				TH	LA				
	MAT5202CM	INTRODUCTION TO RESEARCH METHODOLOGY	TH	2		2	BD2019	AUMAT	MAT
	MAT0602LM	APPLICATIONS OF MATHEMATICAL TOOLS FOR HUMAN LIFE ENHANCEMENT		4		–	BD2019	AUMAT	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**			

Part	Course Code	Course Title	Course type	Offer to	Offer by	Hour per week	Cr.	Academic Council Book N
III	MAPH5401DM	FOURIER TRANSFORM AND ITS APPLICATIONS	TH	ALLM	MAT & PHY	TH-4	4	AW2015
III	MAZO5401DM	MEDICAL STATISTICS	TH	ALLM	MAT & ZOO	TH-4	4	BA2018

Sem.	Course Code	Course Title	Course Type	Hrs./Wk.		Credits	Passed in Academic Council	Offered to	Offered by
				Theory	Lab				
VI	MAT6501CM	COMPLEX ANALYSIS	TH	5		5	BB2019	AUMAT	MAT
	MAT6502CM	OPERATIONS RESEARCH - II	TH	6		5	BB2019	AUMAT	MAT
	MAT6503CM	MECHANICS	TH	6		5	AW2015	AUMAT	MAT

	MATQ6401CM/ MATQ6402CM	FUZZYSETS / COMBINATORICS	TH	4		4	BA2018	AUMAT	MAT
	MAT0602LM	APPLICATIONS OF MATHEMATICAL TOOLS FOR HUMAN LIFE ENHANCEMENT	TH	4		6	BD2019	AUMAT	MAT
		INTERDISCIPLINARY COURSES	TH	4		4			
	VBC6101FV	ENCHANCING SOCIAL GRACE	TH	**1**		1	BB2019	AUMAT	CENTRE FOR VE
	UIV6101F1	BIBLICAL PERSPECTIVES OB LEADERSHIP						AUCH	
		TOTAL		30		30			

Part	Course Code	Batch No.	Course Title	Course type	Offer to	Offer by	Hour per week	Cr.	Academic Council Book No.
III	CHMA6401DM	--	APPLICATIONS OF GRAPH THEORY IN CHEMISTRY	TH	ALLM	CHE & MAT	TH-4	4	AW2015
III	BOMA6401DM	--	MATHEMATICAL APPLICATIONS IN LIFE SCIENCES	TH	ALLM	MAT & BOT	TH-4	4	BA2018

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 n θ , cos n θ , tan n θ , powers of sines and cosines of θ in terms of functions of multiples of θ , expansions of sin θ and cos θ 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.

Mary Jane Sterling, Trigonometry for dummies, (2nd ed.), New Jersey: John Wiley and Sons Inc. . 2014

Lalji Prasad, Theory of equations, Patna: Paramount Publications, 2016.

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 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)

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

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.

Sadhan Kumar Mapa, *Introduction to Real analysis*, Calcutta: Sarat Book Distributors, 2004.

Khanna M.L. and Varshney, *Real Analysis*, Meerut: Jai Prakash Nath & Co., 2014.

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.

MATQ2401AA NUMERICIAL ANALYSIS

(THEORY)

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

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

- acquire approximate solutions to mathematical problems
- use different interpolation formulae to find approximate numerical values of derivatives
- apply numerical techniques to solve ordinary differential equations

COURSE CONTENT:

UNIT I: NUMERICAL SOLUTION OF ALGEBRAIC AND TRANSCENDENTAL EQUATIONS 15 hrs.

Bisection method – iteration method – method of false position–Newton-Raphson method.

UNIT II: FINITE DIFFERENCES 15 hrs.

First and higher differences – backward differences – central differences – properties of the operator Δ — differences of a polynomial – factorial polynomial – operator E – relationship between the operators–summation of series.

UNIT III: INTERPOLATION WITH EQUAL AND UNEQUAL INTERVALS 17 hrs.

Gregory-Newton's forward and backward interpolation formulae – equidistant terms with one or more missing values –Gauss's forward and backward interpolation formulae – Stirling's formula–Bessel's formula – Laplace-Everett formula– relation between Bessel's and Everett's formulae – divided difference – properties – Newton's divided difference formula– Lagrange's interpolation formula– inverse interpolation.

UNIT IV: NUMERICAL DIFFERENTIATION AND INTEGRATION 14 hrs.

Newton's forward and backward difference formulae to compute derivatives – Stirling's formula – Bessel's formula –maxima and minima of a tabulated function – Numerical integration: Trapezoidal rule–Simpson's rule.

UNIT V: NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS OF FIRST ORDER 14 hrs.

Power series approximations – solution by Taylor series –Picard 's method – Euler's methods.

TEXT BOOK(S):

Venkataraman, M.K., (2004). *Numerical methods in Science and Engineering,* (5thed.), Chennai: The National Publishing Company. Print. (Chapter: 3 (1 – 5),5,6 (1 – 5), 7(1–8),8(1 –4, 9),9(1-8, 10), 11(1– 6, 9 – 12)).

REFERENCE BOOK(S):

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

Sastry, S.S., (2012). *Introduction Methods of Numerical Analysis*, New Delhi: Prentices Hall of India Pvt. Ltd. Print.

Goeland Mittal, (2006). *Numerical Analysis*, Meerut: Pragati Prakashan Educational Publisher. Print.

COMQ2401AA FUNDAMENTALS OF ACCOUNTING

(THEORY)

Course Syllabus **B.Sc. Mathematics (Aided)** **2019 batch**

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

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

• apply the accounting concepts and conventions and prepare journal & ledger

• reconcile the difference between cash book balance and pass book balance

• locate errors in books of accounts and rectify them

• construct balance sheets from trial balance

• prepare income & expenditure a/c of non-trading organisation

COURSE CONTENT:

UNIT I: ACCOUNTING PRINCIPLES **9 hrs.**

Introduction to Accounting Principles – Concepts – Conventions

UNIT II: JOURNAL AND LEDGER **14 hrs.**

Principles of Double entry system of book keeping – Journal – Ledger – Trial Balance

UNIT III: SUBSIDIARY BOOKS **18 hrs.**

Subsidiary books – Purchases book – Sales book – Triple columnar cash book – Petty Cash book – Bank Reconciliation Statement – Rectification of errors – Journal entries for rectification.

UNIT IV: FINAL ACCOUNTS **17 hrs.**

Final Accounts of Trading concerns – Trading and Profit and Loss Account – Balance Sheet – Adjustments.

UNIT V: ACCOUNTS OF NON-TRADING CONCERNS **17 hrs.**

Accounts of Non-Trading organisations – Capital and Revenue – Preparation of Income & Expenditure account.

TEXT BOOK(S):

Reddy, TS. & Moorthy A. Advanced Accountancy. Chennai: Margam Publications, 2012.Print.

REFERENCE BOOK(S):

Goyal, VK. Advanced Accountancy. New Delhi: Excel Books India, 2010.Print.

Gupta, RL & Gupta, VK. Financial Accounting. New Delhi: Sultan Chand & Sons, 2011.Print.

Jain, SP. & Narang, KL. Advanced Accountancy. New Delhi: Kalyani Publishers, 2011.Print.

Narayanaswamy. Financial Accounting. New Delhi: PHI Learning Private Ltd, 2011.Print.

Tulsion, PC. Advanced Accountancy. New Delhi: Tata Mc Graw-Hill, 2010.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 **4 Hrs./Wk.**

LEARNING OUTCOME:

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.

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.

MAT3504CM DIFFERENTIAL EQUATIONS AND LAPLACE TRANSFORMS

(THEORY)

Course Syllabus **B.Sc. Mathematics (Aided)** **2019 batch**

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 solvepartial 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.

MAT3401AT PROGRAMMING IN C

(Lab cum Theory)

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

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

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

analyze logically and write programs confidently.

COURSE OUTLINE :

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- dowhile.

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

Arrays- functions- recursion- structure- union- bit fields- string functions

UNIT-IV : POINTERS **10T + 6L Hrs.**

Pointer declaration- pointer arithmetic- pointer arrays- pointers with functions

UNIT-V : FILES **5T + 2L Hrs.**

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

EXPERIMENTS / LAB :

- Operators
- Control Structures
- Arrays
- Functions
- Pointers
- Files

TEXT BOOK(S):

Balagurusamy E- **Programming in ANSI C**- New Delhi: Tata McGraw Hall Publishing Company Limited- 2011- Chapters: 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., **Programming in C,** Chennai: S. Vishwanathan Printers and Publishers Limited, 2005.

Yashavant Kanetkar- **Let us C**- New Delhi: BPB Publications, 2007.

COMA3201EI 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

ECMA3201EI BASICS OF PERSONAL FINANCE

(Theory)

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

- Acquire knowledge of the various investment avenues and sources of loans
- Take rational decisions on personal savings and loans
- Plan their finances in a comprehensive manner in real life situations

COURSE OUTLINE:

UNIT – I: FINANCIAL MARKETS AND STOCK MARKE **7 Hrs**

Money – Kinds – Value of money – Fluctuations – Business Cycle – Phases – Financial Market – Stock Market – SENSEX – NIFTY- BSE- NSE.

UNIT – II: PERSONAL FINANCE **8Hrs**

a. Savings: Fixed Deposits- Recurring Deposits- Savings Bank Deposits- Post Office Savings- Public Provident Fund – Gold – Mutual Funds- Shares – Insurance: Health and Life – Real Estate.
b. Loans: Education- Housing and Personal loans.

UNIT – III : **7Hrs**

Simple Interest – Compound Interest- Annuities.

UNIT – IV: **8Hrs**

Application – Rate of interest – Continuous compounding – Value of Money – Amount of annuity – EMI.

TEXT BOOK(S)

Amar Pandit- **Financial Planning Book**- New Delhi- Network 18 publications private limited- 2012- Chapters: Unit-ii Chapters 9- 10 and 11.

Harvinder Kaur- **Stock Market Volatality in India**- New Delhi- Deep & Deep publicatios Pvt. Ltd.- 2002. Chapters: Stock Market – Pages 195-225.

Petr Zima- Robert L. Brown- **Schaum outlines – Mathematics of finance**- 2nd edition- USA- McGraw Hillcompany Inc.- 1996.

Sankaran. S- Money Banking and International Trade- Chennai- Margham Publications- 2010.

REFERENCE BOOK(S)

Chauhan Manish, 16 Personal Finance Principles Every Investor Should Know, New Delhi, Network 18 Publications, 2013. Janeka Ane Madisyn, National Stock Exchange of India, Plic press, 2011. Jean Soper, Mathematics for Economics and Business, New Delhi, Atlantic Publishers, 2002. Rakesh Shahani, Financial Market in India, New Delhi, Anambika publishers, 2008, Chapters: Pages: 1 - 17. Sukhani Sudarshan, Trading the Markets, New Delhi, Vision Books, 2013. Sundaram K.P.M., Money, Banking and International Trade, New Delhi, Sultan Chand & Sons, 2010. Teresa Bradley & Paul Patton, Essential Mathematics for Economics and Business, New Delhi, Wiley India, 2008.

WEBSITE(S) : http://www.mywealthguide.com

ENMA3201EI 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 CONTENT:

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, (2011). *Quantitative Aptitude*, New Delhi: S. Chand and company Ltd, Print.

Best, Wolfred D, (2000). *The Students' Companion*, New Delhi: Harper Collins, Print.

Bhatnagar, R.P.and Rajul Bhargava, (2000). *English for Competitive Examination*, New Delhi: Macmillan India Ltd, Print.

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

Thorpe, Edgar and Showick Thorpe, (2003). *Objective English*, Singapore: Pearson Education, Print.

Wood, Frederick, (1987). *Current English Usage*, London: Macmillan, 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.

MATQ4501CT OBJECT ORIENTEDPROGRAMMING WITH C++

(LAB CUM THEORY)

LEARNING OUTCOME 4T+2L hrs./wk.

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

- recognize the concept of object oriented programming
- develop programming skills using the syntax involved in C++ programming
- analyze logically and write programs

COURSE CONTENT:

UNIT I:PRINCIPLES OF OBJECT ORIENTED PROGRAMMING 10T + 4L hrs.

Introduction to OOP concepts – tokens – keywords – identifiers – constants – expressions – if statement – switch statement – while loop – do…while loop – for loop.

UNIT II: FUNCTIONS IN C++ 13T + 6L hrs.

Main function –function prototyping – call by reference – return by reference – inline functions – default arguments – const arguments – recursion – function overloading – friend and virtual functions – math libraryfunctions.

UNIT III: CLASSES, OBJECTS, CONSTRUCTORS ANDDESTRUCTORS 13T + 7L hrs.

Defining a class – member functions – making an outside function inline – nesting of member functions – private member functions – arrays within a class – static data members – static member functions – arrays of objects – objects as function arguments – friend functions – constructors – parameterized constructors – constructors with default arguments – destructors.

UNIT IV: OPERATOR OVERLOADING AND INHERITANCE 13T + 7L hrs.

Operator overloading – overloading unary and binary operators – overloading binary operators using friend functions – rules for overloading operators – Inheritance: defining derived classes – single inheritance – making a private member inheritable – multilevel inheritance – multiple inheritance – abstract classes.

UNIT V: POINTERS, VIRTUAL FUNCTIONS ANDFILES 11T + 6L hrs.

Pointers – pointers to objects – this pointer – pointers to derived classes – virtual functions – files: classes for file stream operations – opening and closing a file.

EXPERIMENTS / LAB EXERCISES:

Programs which deal with conditional and looping statements

Programs using functions and its types

Programs using classes and objects

Programs which deal with array of objects

Programs involving inheritance

Programs which deal with overloading and its types

Program that uses constructors and destructors

Programs that uses pointers and files

TEXT BOOK(S):

Balagurusamy, E., (2015), *Object Oriented Programming with C++,* (4th ed.), New Delhi: Tata McGraw – Hill Education PrivateLimited, Print. (Chapter: 1, 3 (3.1 to 3.4, 3.20, 3.25),4, 5(5.3 to 5.9, 5.11to 5.15), 6(6.2, 6.3, 6.5, 6.11), 7(7.2 to 7.5, 7.8),8(8.2 to 8.6, 8.10), 9 (9.1 to 9.6), 11(11.1 to 11.3)).

REFERENCE BOOK(S):

Ravichandran D, (2012), *Programming with C++,* New Delhi: Tata McGraw-Hill publishing company limited, Print.

Yashwant Kanetkar, (2006), *Let us C++,* New Delhi: BPB Publications, Print.

MATQ4502CT OBJECT ORIENTED PROGRAMMING WITH JAVA

(LAB CUM THEORY)

LEARNING OUTCOME 4T + 2L hrs./wk.

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

- apply object-oriented programming concepts for logic building activities
- design and develop platform independent applications
- develop Java programs using the syntax

COURSE CONTENT:

UNIT I: OVERVIEW OF JAVA **15T + 5L hrs.**

Fundamentals of OOP concepts –basics of Java: history – Java features – Java environment – Java tokens – constants –variables –data types – operators – expressions – control statements.

UNIT II: CLASSES, ARRAYS AND STRINGS **14T + 10L hrs.**

Classes and objects: defining a class – methods – creating objects –accessing class members – constructors – methods overloading – static members – nesting of methods – arrays: one dimensional array – creating an array – two-dimensional array – strings: string arrays – string methods.

UNIT III: INHERITANCE AND INTERFACES **8T + 5L hrs.**

Inheritance: defining a subclass –multilevel inheritance – hierarchical inheritance – overriding methods – final variables and methods – final classes – finalizer methods – abstract methods and classes – visibility control. Interfaces: defining interface – extending interface –implementinginterface– accessing interface variables.

UNIT IV: PACKAGES, EXCEPTIONS AND MULTITHREADING **15T+ 5L hrs.**

Packages: Java API packages – system packages – naming conventions – creating and accessing a packages – adding class to a package – hiding classes. Exception: types of errors – basics of exception handling – multiple catch statements – finally statement – user defined exception. Multithreading: creating threads – life cycle of a thread – thread methods – thread exceptions –thread priority – implementingrunnable interface.

UNIT V: APPLET **8T + 5L hrs.**

Introduction – applet life cycle – creating and executing an applet. Graphics: drawing and filling lines – rectangles – polygon – circles – arcs – line graphs.

EXPERIMENTS / LAB EXERCISES:

Programs which read, process and display different data types

Programs which deal with looping and control statements

Programs designed to read and process single and multidimensional arrays

Programs for designing a class

Programs which deal with constructors and finalizer

Programs involving applications using pre-defined Java exceptions

Programs involving graphics using Applet

TEXT BOOK(S):

Balagurusamy, E.,(2008).*Programming with Java*, (3rd ed.),New Delhi:Tata McGraw-Hill publishing Company limited. Print.(Chapter: 1, 2 (2.1, 2.2, 2.9), 3 (3.2,3.6), 4, 5, 6, 7, 8(8.1 – 8.16,8.18), 9(9.1 – 9.5), 10, 11 (11.1 – 11.9),12 (12.1 – 12.8,12.10), 13, 14, 15(15.1 – 15.7)).

REFERENCE BOOK(S):

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

Herbert Schildt, (2008).*The Complete Reference Java* 2,(5thed.), New Delhi: Tata McGraw – Hill Publishing Company Limited. Print.

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

Willtrain, (2000).*Java1.2*, New Delhi: BPB Publications. Print.

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

Calendar, 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.

ECMA4201EI LINEAR PROGRAMMING AND NETWORK ANALYSIS

(Theory)

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

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

- analyze and formulate the linear programming problem
- solve the linear programming problem using graphical method
- construct network diagrams and solve problems using PERT and CPM

COURSE OUTLINE :

UNIT-I : **7 Hrs.**

Linear Programming : Basic assumptions, components – general form of a LPP – mathematical formulation of a LPP –primal and dual – Economic interpretation of duality.

UNIT-II : **8 Hrs.**

Revenue maximization and cost minimization by graphical method – applications – limitations of linear programming approach.

UNIT-III : **7 Hrs.**

Basic components of network, logical sequencing, rules of network construction

UNIT-IV : **8 Hrs.**

Critical path analysis, probability consideration in PERT.

TEXT BOOK(S)

Man Mohan, Kanti Swarup and P.K. Gupta, **Operations Research**, New Delhi, Sultan Chand and sons, 2006, Chapters: 25 (25.1-25.8).

Mehta B.C & Madnani G.M, **Mathematics for Economists**, New Delhi, Sultan Chand & Sons, 2007, Chapters: 18 (pp. 604 – 618).

REFERENCE BOOK(S)

Gupta, M.P. and J.K. Sharma, **Operations Research for Management**, New Delhi, National Publishing House, 1984.

Himer Frederick S. and Gerald .J. Lieberman, **Introduction to Operations Research**, New York, McGraw Hill Publishing Company, 1990.

Mustafi C.K, **Operations Research**, Methods and Practice, 3/e, New Delhi, New Age International (P) Limited, Publishers, 2011.

Shenoy G.V, U.K. Srivastavaand S.C. Sharma, **Operations Research for Management**, New Delhi, Wiley Eastern Limited, 1991.

Teresa Bradley Paul Patton, **Essential Mathematics for Economics and Business**, New Delhi, John wiley & Sons Ltd, 2008.

Weber E. Jean, **Mathematical Analysis: Business and Economic Applications**, 4 th, New York, Harper & Row, Publishers, 1982.

HIMA4201EI HISTORY AND MATHEMATICS FOR COMPETITIVE EXAMINATIONS

(THEORY)

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

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

- develop confidence to appear for competitive examinations
- keep abreast with current affairs
- acquire employability skills

COURSE OUTLINE:

UNIT I:NUMERICAL ABILITY **6 hrs.**

Decimal fractions – percentage – average – profit and loss

UNITII:LOGICAL REASONING **9 hrs.**

Non-verbal reasoning – series – analogy – classification – verbal reasoning – analogy – series completion – letter coding and decoding.

UNIT III:INDIAN HISTORY **10 hrs.**

Ancient – medival and modern Indian History – National movement.

UNIT IV: CURRENT AFFAIRS **5 hrs.**

Indian polity – economy – geography – current events – Information technology – use of computer – Internet.

TEXT BOOK(S):

Aggarwal R.S, (2007). *A Modern Approach to Verbal and Non-Verbal Reasoning*, New Delhi: S. Chand & Company Ltd., Print.

Aggarwal R.S, (2011). *Quantitative Aptitude*, New Delhi: S. Chand & Company Ltd., Print.

Chopra, P.N., (2003). *A Comprehensive History of Modern India*, New Delhi: Sterling Publishers Pvt.Ltd., Print.

Krishna Redddy.K, (2009). *Indian History for UPSC Civil Services Preliminary Examination*, New Delhi: Tata McGraw Hill, Print.

Majumadar, R.C., Raychaudhuri, H.C., and Datta, (2001). *An AdvancedHistory of India*, New Delhi: MacMillan, Print.

STUDY MATERIAL(S):

JOURNAL AND MAGAZINES

- Encyclopedia of General knowledge
- General Studies manual
- India Quiz Book
- Magazines
- Competitive Master
- Competition success review
- Competition wizard
- India Today

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.

MAT5503CM OPERATIONS RESEARCH – I

(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

COURSE CONTENT:

UNIT I: 20 hrs.

Introduction – Mathematical formulation – linear programming problem – mathematical Formulation of the Problem – Illustration on Mathematical Formulation of LPPs – Graphical Solution Method – Some Exceptional Cases – General Linear Programming Problem – Canonical and Standard Forms of LPP – Insights into the Simplex Method.

UNIT II: 20 hrs.

Fundamental Properties of Solutions – The Computational Procedure – Use of Artificial Variables – Degeneracy in Linear Programming – Solution of Simultaneous Linear Equations – Inverting a Matrix Using Simplex Method – Application of Simplex Method.

UNIT III: **20 hrs.**

Duality in Linear Programming- General Primal – Dual Pair, Formulating a Dual Problem – Primal Dual Pair in Matrix Form – Duality Theorems – Complementary Slackness Theorem – Duality and simplex method – Economic Interpretation of Duality – Dual Simplex Method.

UNIT IV: **17 hrs.**

Transportation Problem – Introduction – LP Formulation of the Transportation Problem – Existence of Solution in T. P – he Transportation table – Loops in Transportation Tables – Solution of a Transportation Problem – Finding an Initial Basic Feasible Solution – Test for Optimality – Degeneracy in Transportation Problem – Transportation Algorithm (MODI Method) – Some Exceptional Cases – Transhipment problems.

UNIT V: **13 hrs.**

Assignment problem – Introduction – Mathematical formulation of the problem – The Assignment method – Special cases in Assignment problem – Travelling salesman problem.

TEXT BOOK(S):

Kanti Swarup., P.K. Gupta., and Man Mohan., (2009). Operations research, New Delhi: Sultan Chand and sons, Chapters 2 – 5, Chapters 10.1,10.3,10.5,10.6, 10.8 – 10.13, 10.15,10.17 Chapters 11.1-11.4,11.7, Print.

REFERENCE BOOK(S):

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

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:

UNITI: 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.

UNITII: REVIEW OF LITERATURE, FORMULATION OF RESEARCH OBJECTIVES, TYPES OFSTUDY **6 hrs.**

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

UNITIII: DATA AND DATA COLLECTION TECHNIQUES AND TOOLS **6 hrs.**

Classification of data – data collection techniques and tools.

UNITIV: SAMPLING TECHNIQUES **6 hrs.**

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

UNITV: 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*(3rded.), 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**

MAT0602LMAPPLICATIONS 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, optimizationtechniques, 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.

MAPH5401DM FOURIER TRANSFORM AND ITS APPLICATIONS

(Theory)

LEARNING OUTCOME : 4 Hrs./Wk.

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

•expand a function in Fourier series

•solve partial differential equations using Fourier transforms

•apply the concept of Fourier series and transforms to simple electronics systems, thermo dynamical problems and diffraction studies in optics

COURSE OUTLINE :

UNIT-I :FOURIER SERIES 12 Hrs.

Euler's formulae, even and odd functions, Dirichlet's conditions, Complex form of Fourier series, Applications: half wave/full wave rectified wave function, rectangular waveand square wave-Gibb's phenomena.

UNIT-II : FOURIER TRANSFORMS 12 Hrs.

Definition, Fourier Integral Theorem, Fourier sine and cosine integrals, Complex form of Fourier, integrals, Fourier integral representation of a function, Fourier Transforms, Fourier sine and cosine transforms , Finite Fourier sine and cosine transforms–FFT -frequently used 1-D functions and their Fourier transforms:sinc function, comb function(qualitative), delta function

UNIT-III : PROPERTIES OF FOURIER TRANSFORMS 12 Hrs.

Linear property, Changeof scale property, shifting property, Modulation theorem, Convolution theorem, Parseval's identity, Fourier Transforms of the derivatives of a function

UNIT-IV : APPLICATIONS I: HEAT CONDUCTION PROBLEMS 12 Hrs.

Heat Equation –Solution by Fourier series –special case of laterally insulated bar and bar insulated at the ends-solution by the method of Fourier integrals, transforms and convolution

UNIT-V : APPLICATIONS II: FRAUNHOFER DIFFRACTION PATTERNS 12 Hrs.

Fraunhofer diffraction-single slit diffraction-interference pattern between two point sources-interference patterns between two slits-transmission diffraction grating-diffraction at an aperture with a prism.

TEXT BOOK(S)

KreyzigE.,Advanced Engineering Mathematics, New Delhi: Wiley India (P) Ltd, 2007, Chapters: 10.2(P532-533),10.3(P538-540),11.5, 11.6. Print.

Grewal B.S., Grewal J.S, Higher Engineering Mathematics, New Delhi: Khanna Publishers, 2009, Chapters: 10(10.1 to 10.3, 10.6, 10.10), 22(sections 22.1 to 22.7, 22.9). Print.

J F James, A student's guide to Fourier transforms with applications in Physics and Engineering,UK: Cambridge University Press, 2011, Chapters: 1.7.2,1.7.5,1.7.7,3.2.1-3.2.3,3.2.5,3.2.7.Print.

REFERENCE BOOK(S)

Eugene Hecht, Schaum's Outline of Theory and Problems of Optics, USA: McGraw Hill, 1975. Print.

Joseph W. Goodman, Introduction to Fourier Optics, 3 rd Ed, USA: Roberts &Company Publishers, 2005. Print.

MAZO5401DM MEDICAL STATISTICS

(THEORY)

LEARNING OUTCOME: 4 hrs./wk.

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

•know the diseases that affect the human body

•apply statistical tools for analyzing the biological data

•refer the association between two attributes

COURSE CONTENT:

UNIT I : CONCEPT OF HEALTH, DISEASE AND EPIDEMIOLOGY 12 hrs.

Definition of health – dimensions of health – concept of disease – Types of diseases – Life style disease (Diabetes – cancer – Cholera – Chicken pox) – genetic disease (Huntington's Chorea) – control and prevention – Epidemiological approach – Definition – tools of measurements: measurement of Mortality – Morbidity.

UNIT II: HEALTH SURVEYS AND ANALYSIS OF DATA 12 hrs.

Health survey methods: Sample size determination – Observational studies (Descriptive – analytical – ecological – cross-sectional – case-control – cohort) – experimental studies (randomized control trials – field trials and community trials) – categorization of data – Analysis: concept and guidelines – Probability – Baye's rule – screening tests – sensitivity – specificity – Predictivity – Relative and Estimated risk – Odds ratio.

UNIT III: CORRELATION AND REGRESSION 12 hrs.

Correlation: significance of correlation – types of correlation – linear & non-linear correlations – measures of correlation – scatter diagram method – Karl Pearson's correlation coefficient – Regression: objectives – types of regression analysis – regression equations – regression coefficient.

UNIT IV: THEORY OF ATTRIBUTES 12 hrs.

Introduction – notations – dichotomy – classes and class frequencies – order of classes and class frequencies – relation between class frequencies – class symbols as operators – consistence of data – conditions of consistency of data – independence of attributes – criterion of independence – symbols $(AB)_0$ and δ– association of attributes – Yule's coefficient of association – coefficient of colligation.

UNIT V: PARAMETRIC AND NON-PARAMETRIC TESTS 12 hrs.

Student's t-test: Student's t-test for single mean – two sample means – Chi-quare test –assumptions of validity of chi square test – applications of Chi-square test: Chi-square test as a test of independence – Chi-square test as a test of homogeneity – Chi-square test as a test of detect linkage.

TEXT BOOK(S):

Freedman D., Pisani R., and Purves. R., (2007). Statistics, (4th ed.), New York, W.W. Norton & Company, Inc. Print.

Gupta S.C., and Kapoor V.K., (2015). Elements of Mathematical Statistics, (3rd ed.). New Delhi, Sultan Chand & Sons. Print. Chapter 11.

Khan and Khanum, (2006). Fundamentals of Biostatistics, (3rd ed.). Hyderabad, UkaazPublications, Print. Chapter 8.1-8.4(8.4.2 – 8.4.4).

Park K., (2011). Park's Text book of Preventive and social medicine, (21st ed.). Jabalpur: M/s Banarasidas Bahot Publishers. Print.

Rastogi V.B., (2011). Ane's student edition, Fundamentals of Biostatistics, (2nd ed.). New Delhi: Ane Books Pvt. Ltd. Print. Chapter 10 (pages: 210 - 224, 231 – 236), Chapter 13 (280 - 290).

Rosner B, (2000). Fundamentals of Biostatistics, (5th ed.). USA: Duxbury Thomson learning. Print.

Verma B.L., Shukla G. D., and Srivastava R.N., (1993). Biostatistics: Perspectives in Healthcare Research and Practice, New Delhi. CBS Publishers and Distributors, Print.

REFERENCE BOOK(S):

Arumugam S and Thangapandi Isaac A, (2013). Statistics, Tamilnadu, Palayamkottai: New Gamma Publishing House. Print.

Das R., and Das P.N, (2009). Ane's Medical series, Instant Medical Biostatistics, New Delhi, Ane Books Pvt. Ltd. Print.

Gurumani N, (2005). An introduction to Biostatistics, (2nd revised ed.). Chennai, MJP publishers. Print.

Guyton and Hall, (1999). Text Book of Medical Physiology, (9th ed.). U.P. India, W.B. Saunders Company. Print.

McConkey E.H, (1997). Human Genetics, Boston, The Molecular Revolution, Jones and Barlett Publication. 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 **15hrs.**

Elementary transformations – bilinear transformations – cross ratio – fixed points of bilineartransformations – 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.

MAT6502CM OPERATIONS RESEARCH - II

(THEORY)

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

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

- explore, understand and compare various queueing situations
- identify the optimal strategies for the players in a two-person zero-sum game
- plan, schedule and determine the minimum time of completion for projects

COURSE CONTENT:

UNITI: GAMES AND STRATEGIES **18hrs.**

Two-person zero sum games–basic terms– maximin-minimax principle– games without saddle point – mixed strategies – graphic solution of 2 x n and m x 2 games– dominance property– general solution of m x n rectangular games.

UNITII: REPLACEMENT PROBLEM **18hrs.**

Replacement of equipment / asset that deteriorates gradually– replacement policy when value of money does not change with time– replacement policy when value of money changes with time.

UNITIII: QUEUEING THEORY **18hrs.**

Queueing system–elements of queueing system– operating characteristics of queueing system– probability distribution in queueing systems– classification of queueing models– definition of transient and steady states– Poisson queueing system– Models: (M/M/1): (infinity/FIFO)– (M/M/1): (N/FIFO)– (M/M/C): (infinity/FIFO).

UNITIV: INVENTORY CONTROL **18hrs**.

The inventory decisions– costs associated with inventories– factors affecting inventory control– economic order quantity (EOQ)– deterministic inventory problems with no shortages– deterministic inventory problem with shortages.

UNITV: NETWORK SCHEDULING BY PERT/CPM **18hrs.**

Network and basic components– logical sequencing– rules of network construction– critical path analysis– probability consideration in PERT.

TEXT BOOK(S):

ManMohan, KantiSwarup and P.K.Gupta, (2006).*Operations Research*, New Delhi: Sultan Chand & Sons, Print.(Chapters: 17(17.1 – 17.7,17.9(LP method only)), 18(18.1,18.2), 19(19.1-19.7), 20(20.1-20.8), 21(21.1 – 21.6)).

REFERENCE BOOK(S):

Gupta P.K, Man Mohan, (2003). *Problems in Operations Research*, New Delhi:Sultan Chand & Sons, Print.

Hamdy, A.Taha, (1987). *Operations Research*, New York: Macmillan Publishing Company, Print.

MAT6503CM MECHANICS

(Theory)

LEARNING OUTCOME : **6 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 : FORCES ACTING AT A POINT, PARALLEL FORCES AND MOMENTS: **20 Hrs.**

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. Parallel forces, moment of a force about a point

UNIT-II : COUPLES, EQUILIBRIUM OF THREE FORCES ACTING ON A RIGID BODY AND COPLANAR FORCES **20 Hrs.**

Couples: Varignon's theorem on moments, couples, related theorems, Equilibrium of three forces acting on a rigid body: Trigonometrical Theorems (Statement only) and related problems, Coplanar forces: Reduction of coplanar forces, reduction of a system of forces to a single force or to a couple, equation to the line of action of the resultant and related problems

UNIT-III : FRICTION: **15 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: **18 Hrs.**

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

UNIT-V : COLLISION OF ELASTIC BODIES: **17 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), 6(6.1 – 6.13), 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.

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.

MATQ6401CM FUZZY SETS

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

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

- differentiate crisp and fuzzy sets
- perform standard fuzzy operations on fuzzy sets and fuzzy arithmetic operations on fuzzy numbers
- determine projections and cylindrical extensions of fuzzy relations

COURSE CONTENT:

UNIT I: FUZZY SETS **10 hrs.**

Crisp sets – fuzzy sets: Basic types and concepts – Characteristics and significance of the paradigm shift.

UNIT II: FUZZY SETS VERSUS CRISP SETS **10 hrs.**

Properties of α - cuts – representation of fuzzy sets.

UNIT III: OPERATIONS ON FUZZY SETS **15 hrs.**

Types of operations – fuzzy complements – fuzzy intersections – fuzzy unions.

UNIT IV: FUZZY ARITHMETIC **10 hrs.**

Fuzzy numbers – linguistic variables – arithmetic operations on intervals – arithmetic operations on fuzzy numbers.

UNIT V: FUZZY RELATIONS **15 hrs.**

Crisp versus fuzzy relations – projections and cylindric extensions – binary fuzzy relations – binary relations on a single set – fuzzy equivalence relations.

TEXT BOOK(S):

George J.Klir , Bo Yuan, (2000). *Fuzzy sets and Fuzzy logic theory and applications,* New Delhi: Prentice Hall of India, Print. Chapter 1, 2, 3(3.1 -3.4), 4(4.1 -4.4), 5(5.1-5.5).

REFERENCE BOOK(S):

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

John Yen, Reza Langari, (2003). *Fuzzy logic intelligence, control and information,* India: PearsonEducation, Print.

Kwang H. Lee, (2005). *First Course on Fuzzy Theory and Applications*, New Delhi: Springer International Edition, Print.

MATQ6402CM COMBINATORICS

(THEORY)

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

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

- develop abstract reasoning and apply enumeration techniques
- apply the concepts of permutations and combinations in solving practical problems
- interpret the problems in appropriate contexts and apply the principle of inclusion-exclusion and recurrence relations to particular situations

COURSE CONTENT:

UNIT I: THE PIGEONHOLE PRINCIPLE **12 hrs.**

Simple form – strong form – theorem of Ramsey.

UNIT II: PERMUTATIONS AND COMBINATIONS **12 hrs.**

Four basic counting principles – permutations of sets – combinations of sets – permutations of multisets – combinations of multisets.

UNIT III: THE PRINCIPLE OF INCLUSION AND EXCLUSION **12 hrs.**

The inclusion - exclusion principle – combinations with repetitions – derangements – permutations with forbidden positions – another forbidden position problem.

UNIT IV: RECURRENCE RELATIONS **15 hrs.**

Solution of finite order homogenous relations – solution of non-homogenous relations

UNIT V: GENERATING FUNCTIONS **9 hrs.**

Generating functions – recurrences and generating functions.

TEXT BOOK(S):

Richard A. Bruald, (2011). *Introductory Combinatorics*, (4th edition), Noida: Pearson Education, Print. Chapters: 2, 3, 6 (6.1 to 6.5), 7 (7.4, 7.5).

Venkataram, M. K., Sridharan. N., Chandrasekaran. N, (2001). *Discrete Mathematics*, Chennai: The National Publishing Company, Print. Chapters: Chapter 5 (Sections 3, 4, 5).

REFERENCE BOOK(S):

AlanTucker, (2010). *Applied Combinatorics,*(5th ed.),U.K: John Wiley and Sons, Print.

Apte D.P., (2007). *Probability and Combinatorics*, New Delhi: Anurag Jain for Excel Books, Print.

Balakrishnan, V.K, (1995). *Theory and Problems of Combinatorics,* Singapore: Schaum's outline series, McGraw Hill Inc, Print.

BhismaRao G.A.S, (2010). *Discrete Structures and Graph Theory*, Chennai: SciTech Publications, Print.

Geetha, P., (2007). *Discrete Mathematics,* Chennai: SciTech Publications, Print.

Sundaresan V, Ganapathy K, (2002). *Discrete Mathematics*, Sirkali: A.R. Publications, Print.

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, optimizationtechniques, 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.

CHMA6401DM APPLICATION OF GRAPH THEORY IN CHEMISTRY

LEARNING OUTCOME: **4hrs/wk**

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

- learn the terms linked to graph theory
- name the IUPACnomenclature of organic hydrocarbons
- relate the nomenclature and structure of compounds
- construct molecular graphs for chemical compounds
- predict the properties of chemical compounds using topological indices

UNIT I: INTRODUCTION TO GRAPH THEORY **12 Hrs**

Definitions and examples-vertices, edges, graphs, adjacent, incidence, degree, loop **Types of Graphs**-multiple graphs, pseudo graphs, complete graphs, disconnected graphs, bigraphs, complete bigraph, degree, isolated points, regular graphs, subgraphs, spanning subgraphs, induced subgraph, isomorphism, complementary graphs **Operation on graphs-**Union, sum, product, composition of graphs **Connectedness-** Walk, trials and paths **Connectedness & Components**- Cut points, bridges, blocks **Trees-** tree, eccentricity, radius, center

UNIT II: NOMENCLATURE, STRUCTURE AND ISOMERISM OF ORGANIC COMPOUNDS **12 Hrs**

IUPAC nomenclature and structure of hydrocarbons-alkanes, alkenes, alkynes (cyclic and acyclic), Aromatic compounds- substituted, fused, bridged and hetero aromatic compounds

Isomerism-Structural, positional and Geometrical isomers

UNIT III : CONSTRUCTION OF CHEMICAL GRAPHS **12 Hrs**

Molecular Graphs for alkanes, alkenes, alkynes (cyclic and acyclic) and Aromatic compounds-substituted, fused, bridged and hetero aromatic compounds-**Introduction to Reaction graphs**-Union of molecular graphs to give products (*eg* Diels-Alder reaction and Intramolecular rearrangements) - **Synthon graphs.**

UNIT IVPREDICTION OF PROPERTIES OF COMPOUNDS **12 Hrs**

Prediction of Properties of Compounds using topological indices- Definition and Calculation of Weiner Index, Randic and Hosaya index of chemical structures. Prediction of physical and chemical properties of organic compounds. Corelation between Isomorphism and type of isomers.

UNIT V: ENUMERATION OF ISOMERISM IN CHEMICAL COMPOUNDS **12 Hrs**

Enumeration of isomeric alkanes using enumeration of trees /rooted trees – poly enumeration theorem – planarity and chirality

REFERENCE BOOK(S)

Arumugam S. and Ramachandran S, **Invitation to Graph theory**Scitech Publication (India) Pvt. Ltd. Chennai, 2003 – Unit I

Alexandru T. Balaban **Applications of Graph Theory in Chemistry** J. Chem. Inf. Comput. Sci., 1985, 25, 334-343 Unit III and IV

Bhupinder Mehta, Manju Mehta, **Organic Chemistry**, I edition, PHI Learning Pvt. Ltd., 2005-Unit II

Bonchev, **Chemical Graph Theory: Introduction and Fundamentals** (Mathematical Chemistry, Vol 1, Taylor & Francis Ltd, 1991. Unit III and IV

Harary**Graph Theory**Narosa Publishing House, New Delhi- Unit I

Ivanciuc Ovidiu **, Graph Theory in Chemistry and Drug Design**, Taylor & Francis Ltd (United States), 2008. Unit III and IV

Johann Gasteiger**(ed.)**, Thomas Engel **(ed.)**, **Chemoinformatics: A Textbook, Wiley VCH,** Weinheim **2003. Unit III and IV**

BOMA6401DM MATHEMATICAL APPLICATIONS IN LIFE SCIENCES

(THEORY)

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

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

- apply the basic concepts of heredity and Fibonacci sequence
- interpret the association between the two attributes under consideration
- identify the degree of relationship between the two variables

COURSE CONTENT:

UNIT I: BASIC CONCEPTS OF HEREDITY AND FIBONACCI SEQUENCE **12 hrs.**

Phyllotaxy and inflorescence – application of Fibonacci sequence – cells – chromosomes – genes – alleles – genome – heritability of a given trait – selection – mass selection – family – pedigree selection – progeny test – Mating methods – random mating – positive assortive – negative assortive mating

UNIT II: POPULATON GENETICS **12 hrs.**

Mendelian population – gene pool – gene frequency – Hardy-Weinberg law – calculation of gene frequencies – factors influencing allele frequency – genetic polymorphism

UNIT III: CORRELATION AND REGRESSION **12 hrs.**

Correlation – Introduction – types of correlation – significance of correlation – measures of correlation – scatter diagram method – Karl Pearson's correlation coefficient – regression – Objectives – Types of regression – Regression – analysis – regression equations – regression coefficient. (biological examples)

UNIT IV: THEORY OF ATTRIBUTES **12 hrs.**

Introduction – notations – Dichotomy – classes – class frequencies – order of classes – class frequencies – relation between class frequencies – class symbols as operators – consistence of data – conditions of consistency of data – Independence of attributes – criterion of Independence – symbols $(AB)_0$ and δ association of attributes – Yule's coefficient of association – coefficient of colligation.

UNIT V: CHI-SQUARE TEST **12 hrs.**

Chi-square test – assumptions of validity – applications – Chi-square test as a test of independence – as a test of homogeneity – as a test of detect linkage. * Biological problems

TEXT BOOK(S):

Verma, P.S. and Agarwal, V. K., (2009). *Genetics*, (9th ed.), New Delhi: S. Chand and Company Ltd. Print. Chapter 2 and 5.

Gupta, S.C. and Kapoor, V.K., (2015). *Elements of Mathematical Statistics*, (3rd ed.), New Delhi: Sultan Chand and Sons. Print. Chapter 11.

Hartl, D.L. and Jones, E.W., (2000). *Genetics Analysis of Genes and Genomes*, (5th ed.), USA: Jones and Bartlett Publishers. Print. Chapter 11.

Khan and Khanum, (2004). *Fundamentals of Biostatistics*, (2nd ed.), Hyderabad: Ukaaz Publications. Print. Chapter 8.1- 8.4 (8.4.2 – 8.4.4).

Rastogi, V.B., (2011). *Ane's student edition, Fundamentals of Biostatistics*, (2nd ed.), New Delhi: Ane Books Private Ltd. Print. Chapter 10 (pages: 210 - 224, 231 – 236).

REFERENCE BOOK(S):

Arumugam, S. and Thangapandi Isaac, A, (2013). *Statistics,*Palayamkottai, India: New Gamma Publishing House. Print.

Rastogi, V.B, (2011). *Fundamentals of Biostatistics,* (2nd ed.), New Delhi, India: Ane Books Pvt. Ltd. Print.

Stansfield, D.W, (1986). *Theory and Problems of Genetics, (*2nd ed.), New Delhi, India: Tata McGraw Hill Publishing Company Limited. Print.

Sem II						
MAT0408CD	**DISCRETE MATHEMATICS**	**TH**	**ALLM**	**MAT**	**4**	**AZ2017**
Sem III						
MAT0406CD	**ASTRONOMY**	**TH**	**ALLM**	**MAT**	**4**	**AZ2017**
MAT0409CD	**FORMAL LANGUAGES AND AUTOMATA**	**TH**	**ALLM**	**MAT**	**4**	**BB2019**
SEM IV						
MAT4201CE	**ANNUAL e-ASSESSMENT**	**CE**	**AUMAT**	**MAT**	**2**	**AZ2017**
Sem VI						
MAT0401CD	**NUMBER THEORY**	**TH**	**ALLM**	**MAT**	**4**	**AU2013**
MAT0501PR	**ACADEMIC PROJECT**	**PR**	**AUMAT**	**MAT**	**5**	**AZ2017**
MAT6202CE	**ANNUAL e-ASSESSMENT**	**CE**	**AUMAT**	**MAT**	**2**	**AZ2017**

MAT0406CD ASTRONOMY
(Theory)

LEARNING OUTCOMES:

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

- appreciate the universe
- count the number of occurrences of solar and lunar eclipses in a year
- identify the durations of day and night at different zones

COURSEOUTLINE:

UNIT I : CELESTIAL SPHERE

Sphere – great circle – axis – distance between two points on the sphere – secondarys – angularradius – spherical triangle – sine formula – cosine formula – cotangent formula – 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 – visibleand invisible hemispheres – eclination circles – verticals – parallactic angle – rising and setting – transitor 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 trace the changes in theazimuth of a star in the course of a day – to find the duration of day time – morning and evening stars– circumpolar stars – diagram of a celestial sphere.

UNIT II : THE EARTH

The zones of the earth – to trace the variations in the duration of day and night during the year at different stations –Terrestrial Latitudes and Longitudes – definition and effects of Dip –Twilight – Refractio - Kepler′s laws of planetary motion.

UNIT III : THE MOON

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 –olden number – Epact – Sunday letter – Surface structure of Moon – Earth shine – tides.

UNIT IV: ECLIPSES

Lunar – solar eclipses – Penumbral regions – Ecliptic limits – maximum and Minimum number of eclipses in a year – Solar and lunar eclipses compared – occultation.

UNIT V: CALENDAR

Different kinds of years – civil year – Julian calendar – Gregorian calendar – Julian date – Standard times – I. S.T.= G.M.T. + 5h 30m – Recent developments in space research (self-study or assignment) and discussions

TEXT BOOK

Kumaravelu.S, &Kumaravelu, Susheela. (2004). Astronomy. Nagercoil: SKV Publications. Print. Chapters:-chap-I All definitions,chap-II All articles except 65, 84, 85,chap-III Section 1 (except art 90),Section 2 Definitions of terrestrial latitude &longitude, Section 5, section 6 (art 111, 112),chap-IV All articles except 127, 131, to 134,chap-VI (art. 146 to 151),chap-VII Section 3,chap-XII All articles except 243 to 249, 253,chap-XIII All articles except 260 to 268, 276 to 282.

REFERENCE BOOK

Patrick Moore Obe. (1970). The atlas of the universe. Bombay: The Tulsi Shah enterprises. Print

MAT0409CD FORMAL LANGUAGES AND AUTOMATA (THEORY)

LEARNING OUTCOME

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

• construct grammars for languages

• convert the grammar to the required normal form

• develop automata for languages

COURSE CONTENT:

UNIT I: FINITE AUTOMATA (FA)

Definition – representation of a finite automaton – acceptability of a string and language accepted by a finite automaton.

UNIT II: NON-DETERMINISTIC FINITE AUTOMATA (NFA)

Definition – acceptability of a string by NFA – equivalence of FA and NFA – procedure for finding a FA equivalent to a given NFA – properties of regular sets – decision algorithms for regular sets – finite state machines – monoid of a finite state machine – machine of a monoid.

UNIT III: PHRASE STRUCTURE GRAMMARS

Definition and examples – Chomsky hierarchy of languages – finite automata and regular languages – derivation trees for context free grammars – normal forms for context free grammars – ambiguity– parsing and polish notation – simple precedence grammar – algorithm.

UNIT IV: PUSHDOWN AUTOMATA (PDA)

Definition – instantaneous descriptions of a PDA – important properties of move relation –acceptance by PDA – equivalence of two types of acceptance by PDA – context free languages and PDA's.

TEXT BOOK(S):

Venkataraman M.K., Sridharan N. and Chandrasekaran N., (2001). Discrete Mathematics, Chennai: The National Publishing Company. Print. (Chapter XII (1-29)).

REFERENCE BOOK(S):

Sundaresan V., Ganapathy Subramanian K.S. and Ganesan K ., (2001). Discrete Mathematics,Sirkali: A.R. Publications. 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.

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.