

SRI VENKATESWARA UNIVERSITY::TIRUPATI
S.V.U.COLLEGE OF SCIENCES
DEPARTMENT OF MATHEMATICS

(Syllabus common for SV University College and affiliated colleges offered P.G.Courses in SVU Area)
(Revised Scheme of Instruction and Examination, Syllabus etc., with effect from the
Academic Years 2016-17 for I and II Semesters and 2017-18 for III and IV Semesters)

M.Sc. APPLIED MATHEMATICS
SCHEME OF INSTRUCTION AND EXAMINATION

Semester	Code	Title of the course	Hr s/ we ek	No. of Cre dits	Core/ Elective	Uni. Exam s (Hour	IA	Seme- ster end exam	Total Mark s
FIRST	AM 101	Methods of Applied Mathematics	6	5	Core	3	20	100	120
	AM 102	Real Analysis	6	5	Core	3	20	100	120
	AM 103	Ordinary Differential Equations	6	5	Core	3	20	100	120
	AM 104	Complex Analysis	6	5	Core	3	20	100	120
	AM 105	Human Values and Professional Ethics- I	6	5	Compuls Foundati	3	20	80	100
	AM 106	Computer Oriented Numerical Methods	6	5	Elective Foundati	3	20	100	120
		TOTAL		30					700
SECON D	AM 201	Mathematical Modeling	6	5	Core	3	20	100	120
	AM 202	Partial Differential Equations	6	5	Core	3	20	100	120
	AM 203	Topology	6	5	Core	3	20	100	120
	AM 204	a. Advanced Complex Analysis b. Semi group Theory c. Nonlinear Analysis	6	5	Core	3	20	100	120
	AM 205	Human Values and Professional Ethics- II	6	5	Compuls Foundati	3	20	80	100
	AM 206	Measure and Integration	6	5	Elective Foundati	3	20	100	120
				30					700

Semester	Code	Title of the course	Hr s/ we ek	No. of Cre dits	Core/ Electi ve	Uni. Exa ms (Hou rs	IA	Seme -ster end exam	Tota l Mar ks
THIRD	AM 301	Continuum Mechanics	6	4	Core	3	20	100	120
	AM 302	Functional Analysis	6	4		3	20	100	120
	AM 303	Classical Mechanics	6	4		3	20	100	120
	AM 304	a.Differential Geometry	6	4	Generic Elective	3	20	100	120
		b.Cryptography							
		c.Fuzzy sets and Fuzzy logics							
		d.Discrete Mathematics	6	4		3	20	100	120
AM 305	a.Business Mathematics	6	4	Open Elective	3	20	80	100	
	b. Basic Mathematics for Social Sciences								
		TOTAL	36	24					700
FOURTH	AM 401	Number Theory	6	4	Core	3	20	100	120
	AM 402	Fluid Dynamics	6	4		3	20	100	120
	AM 403	Graph Theory	6	4		3	20	100	120
	AM 404	a.Mathematical Statistics	6	4	Generic Elective	3	20	100	120
		b.Approximation Theory							
		c. Finite Element Method							
		d.Operations Research	6	4		3	20	100	120
AM 405	a.Theoretical Computer Science	6	4	Open Elective	3	20	80	100	
	b. Biomechanics								
		TOTAL	36	24					700

SEMESTER-I

AM 101. METHOD OF APPLIED MATHEMATICS

(A) FOURIER TRANSFORMS:

UNIT I:

Fourier Transforms : Dirichlet conditions – Fourier integral formula –The (Complex) Fourier transform – Fourier sine and cosine transforms-Relationship of Fourier and Laplace transforms –Some useful results for direct applications-Linearity property of Fourier transforms –Change of scale property –Shifting property—Modulation theorem –Convolution or Falting-The convolution or Falting theorem for Fourier transforms –Parseval’s identity for Fourier transforms Rayleigh’s theorem of Plancherel’s theorem – Relation between the Fourier transforms of the derivatives of a function –Multiple Fourier transforms-Applications of Fourier transforms to Boundary value problems. (Chapter 4)

UNIT-II

Finite Fourier Transforms: Fourier Series –The finite Fourier sine transform-The finite Fourier cosine transforms –Relation between the finite Fourier transforms of the derivations of a function –Multiple finite Fourier transforms –Applications of finite Fourier transforms to boundary value problems-Special case of boundary value problem (Chapter 5)

Scope and standard as in “ Integral Transforms” by Raisinghanian, published by S. Chand & Co., New Delhi, 1995 Editon.

(B) ALGEBRA:

UNIT: III

Structure Theory of Groups : Conjugacy and G-Sets, Normal series, Solvable groups, Simplicity of A_n , Sylow theorems.

(Sections 4 of Chapter 5, Sections 1 and 2 of Chapter 6, Section 3 of Chapter 7 and Sections 4 of Chapter 8)

UNIT IV : UNIQUE FACTORIZATION AND EUCLIDEAN DOMAINS:

Unique factorization domains-Principal ideal domains-Euclidean domains-Polynomial rings over UFD(chapter 11)

Scope and standard as in “ Basic Abstract Algebra” by Bhattacharya , P.B. Jain, S.K. and Nagpul S.R, Cambridge University Press, 1997 Reprint

References : 1. Topics in Algebra – I.N. Herstein

AM 102 Real Analysis

(Common with the paper MA 102 of Branch 1(A) Mathematics)

UNIT –I :

The Riemann –Stieltjes Integral : Definition and Existence of the integral properties of the integral, integration and Differentiation, Integration of vector valued function, Rectifiable curves.

UNIT – II:

Sequence and series of functions : Discussions of main problem, uniform convergence, uniform convergence and continuity, Uniform convergence and Integration, Uniform convergence and Differentiation, Equicontinuous families of functions, The stone – Weierstrass theorem .

Scope and standard as in Chapters 6, sections 7.1 to 7.26 of chapter 7 of Walter Rudins’ Principles of Mathematical Analysis” 3rd edition 1976, Nc. Graw hill International student edition.

UNIT – III:

Improper Integrals: Introduction, Integration of unbounded functions with finite limit of Integration, comparison tests for convergence at a ∞ , infinite Range of Integration, Integral as a product of functions.

Fourier series : Trigonometrically series, some preliminary theorems, the Main theorem intervals other than $[-\Pi, \Pi]$

UNIT-IV:

Functions of Several Variables : Explicit and Implicit functions, Continuity, Partial derivations, differentiability, partial derivatives of higher order, differentials of higher order, function of functions, change of variables, Taylor's theorem, Extreme values, Maxima and Minima, functions of several variables.

Scope and standard as in chapters 11, 12 and 15 of Mathematical Analysis by "S.C. Malik 1994" Wiley Eastern limited

Reference :

- (1) Mathematical Analysis- A modern Approach to Advanced Calculus Narosa Book Distributors Pvt LTD- New Delhi
- (2) Real Analysis - Golden Math Series By N.P. Bali.
- (3) A course of Mathematical Analysis by Shanti Narayan -.K. Mittal, S-Chand & Company LTD-New Delhi

AM 103 : ORDINARY DIFFERENTIAL EQUATIONS (Common with paper MA 103 of Branch I(A) Mathematics)

UNIT –I :

Oscillation Theory and boundary value problems: Qualitative properties of solutions –The Sturm comparison theorem-Eigen values, Eigen functions and the vibrating string.

UNIT – II:

Power series solutions: Series solutions of first order equations –Second order linear equations-Ordinary points-Regular singular points- Gauss's hyper geometric equation.

UNIT – III:

Some special functions of Mathematical Physics : Legendre polynomials – properties of Legendre polynomials –Bessel functions –The gamma function- Properties of Bessel functions.

UNIT-IV:

The method of successive approximations-Picard's theorem-systems. The second order linear equations.

Scope and standard as in sections 22 to 24 of Chapter 4 (excluding Appendix A), Sections 26 to 30 of Chapter 5, Sections 32 to 35 of Chapter 6 (Excluding Appendices) and sections 55 to 57 of Chapter 11 of "Differential Equations with Applications and Historical notes" by George F. Simmons, (1992) Tata Mc Graw Hill Publications

Ref : 1. Advanced Differential Equations, M.D. Raisinghania, S. Chand Publications

2. "Differential Equations" Ross, Shepley L Wiley India Pvt LTD.

3. Engineering Mathematics y Bali NP, Satyanarayana Bhavanari, kelkar, University Science Press, New Delhi 2012.

AM 104 : COMPLEX ANALYSIS
(Common with paper MA 104 of Branch I(A) Mathematics)

UNIT –I :

Differentiation: Analytic Functions : Derivative Rules for Differentiating Complex Functions- The Cauchy-Riemann Equations –Analytic Functions-Geometrical Interpretation of Arg $f^1(z)$ and $|f^1(z)|$ - Conformal Mapping –The Mapping $w = \frac{az+b}{cz+d}$ -Conformal Mapping of the Extended Plane.

UNIT – II:

Mobius Transformations: The Group Property of Mobius Transformations – The Circle – Preserving Property of Mobius Transformations-Fixed points of a Mobius Transformation-Invariance of Cross Ratio-Mapping of a circle onto a Circle –Symmetry Transformations.

UNIT – III:

Complex Integrals: Cauchy Integral Theorem: Rectifiable Curves-Complex Integrals-The Case of Smooth Curves-Cauchy's Integral Theorem-The Key Lemma proof of Cauchy's Integral Theorem-Application to the Evaluation of Definite Integrals Cauchy's Integral Theorem for a system of Contours. Cauchy's Integral Formula –Morera's Theorem – Cauchy's Inequalities.

UNIT-IV:

Power Series: The Cauchy-Hadamard Theorem – Taylor Series. The Uniqueness Theorem for Power series-Expansion of an Analytic Function in a power series –Liouville's Theorem. The Uniqueness Theorem for Analytic functions-A Points and Zeros-Weirstrass' Double Series Theorem-Substitution of One Power Series into Another- Division of Power series. Scope and Standard as in Chapters 3,5,7,8 and 10 of “ Introductory Complex Analysis” by Richard A. Silverman Dover Publications, Inc. (1972). New York

References : 1 Complex Variables - . Schaum outline series, 2/E by Spiegel

2. An Introductions to Complex Analysis, by C.L. Siegel :North Holland, (1989)

AM 105 : Human Values and Professional Ethics – I

Unit – I

Definition and Nature of Ethics- Its relation to Religion, Politics, Business, Legal, Medical and Environment. Need and Importance of Professional Ethics - Goals - Ethical Values in various Professions.

Unit- II

Nature of Values- Good and Bad, Ends and Means, Actual and potential Values, Objective and Subjective Values, Analysis of basic moral concepts- right, ought, duty, obligation, justice, responsibility and freedom, Good behavior and respect for elders.

Unit- III

Ahimsa (Non-Violence), Satya (Truth), Brahmacharya (Celibacy), Asteya(Non possession) and Aparigraha(Non- stealing). Purusharthas(Cardinal virtues)-Dharma (Righteousness), Artha(Wealth), Kama(Fulfillment Bodily Desires), Moksha(Liberation).

Unit – IV

Bhagavad Gita- (a) Niskama karma. (b) Buddhism- The Four Noble Truths - Arya astanga marga, (c) Jainism- mahavratas and anuvratas. Values Embedded in Various Religions, Religious Tolerance, Gandhian Ethics.

Unit – V

Crime and Theories of punishment- (a) Reformative, Retributive and Deterrent. (b) Views on manu and Yajnavalkya.

Books for study:

1. John S Mackenjie: A manual of ethics.
2. "The Ethics of Management" by Larue Tone Hosmer, Richard D. Irwin Inc.
3. "Management Ethics - integrity at work" by Joseph A. Petrick and John F. Quinn, Response Books:New Delhi.
4. "Ethics in Management" by S.A. Sherlekar, Himalaya Publishing House.
5. Harold H. Titus: Ethics for Today
6. Maitra, S.K: Hindu Ethics
7. William Lilly : Introduction to Ethics
8. Sinha: A Manual of Ethics
9. Manu: Manu Dharma Sastra or the Institute of Manu: Comprising the Indian System of Duties: Religious and Civil(ed.) G.C.Haughton.
10. Susruta Samhita: Tr.Kaviraj Kunjanlal, Kunjalal Brishagratha, Chowkamba Sanskrit series, Vol I,II and III, Varnasi, Vol I OO, 16-20, 21-32 and 74-77 only.
11. Caraka Samhita :Tr. Dr.Ram Karan Sarma and Vaidya Bhagavan Dash, Chowkambha Sanskrit Series office, Varanasi I, II, III Vol I PP 183-191.
12. Ethics, Theory and Contemporary Issues., Barbara Mackinnon, Wadsworth/Thomson Learning, 2001.
13. Analyzing Moral Issues, Judith A. Boss, Mayfield Publishing Company, 1999.
14. An Introduction to Applied Ethics (Ed.) John H.Piet and Ayodhya Prasad, Cosmo Publications.
15. Text book for Intermediate logic, Ethics and Human Values , board of Intermediate
16. Education & Telugu Academic Hyderabad
17. I.C Sharma Ethical Philosophy of India. Nagin&co Julundhar.

AM 106 : COMPUTER ORIENTED NUMERICAL METHODS (Common with paper MA 106 of Branch I(A) Mathematics)

UNIT –I : Interpolation with Cubic Splines-Derivation of the Governing Equations-End Conditions –Minimzing Property of Cubic Splines- Numerical solutions of Ordinary Differential Equations: Taylor series method – Runge-kutta 4th order method, Predictor-Corrector methods: Adams –Moulton and Milne’s methods- Boundary value problems: Finite difference method-The Shooting Method-The Cubic Spline Method.

UNIT-II: : Finite difference approximations to derivatives –Laplace’s equation: Jacobi’s method, Gauss-Seidel method, Successive over-Relaxation method, The ADI method-Parabolic equations-Iterative methods for the solution of equations-Hyperbolic equations. Scope and standard as in sections 3.14, 3.15, of Chapter 3 and 7.1 , 7.2, 7.5,7.6,7.7, and 7.10 of Chapter 7, 8.1 to 8.6 of Chapter 8 of “ Introductory methods of Numerical Analysis” by S.S.Sastry (Thirty six Printing (Fourth Edition) July 2005, Published by Prentice –Hall of India Pvt. Ltd., Delhi

Fundamentals of C language

UNIT-III:

Constants, Variables, and Data Types: Introduction-Character set-C Tokens-Key words and Identifiers-Constants–Variables-Data types – Declaration of variables-Declaration of storage class – Assigning Values to Variables- Defining Symbolic Constants – Declaring a Variables as Constant- Declaring a Variable as Volatile- Overflow and Underflow of Data.

Operators and Expressions : Introduction - Arithmetic operators –Relational operators – Logical operators –Assignment operators- Increment and decrement operators –Conditional operators- Bitwise Operators-Special Operators – Arithmetic Expressions- Evaluation of Expressions-Precedence of Arithmetic Operators – Some Computational Problems-Type Conversions in Expressions –Operator Precedence and Associativity- Mathematical Functions .

Decision making and Branching : Introduction – Decision making with if Statement-Simple if Statement-The if...Else Statement –Nesting of if... Else Statements-The Else if Ladder-The Switch Statement – The ?: Operator- The Goto Statement

UNIT-IV:

Decision Making and Looping: - Introduction-The While Statement – The do Statement-The for Statement-Jumps in Loops-Concise Test Expressions.

Arrays

Introduction - One Dimensional Arrays – Declaration of One-Dimensional Arrays- Initialization of One Dimensional Arrays-Two Dimensional Arrays – Initializing Two – Dimensional Arrays- Multi-Dimensional Arrays- Dynamic Arrays-More about Arrays. Scope and Standard as in sections 2.1 to 2.14 of Chapter 2, 3.1 to 3.16 of Chapter 3, 5.1 to 5.9 of Chapter 5, 6.1 to 6.6, of Chapter 6, 7.1 to 7.9 of Chapter 7, of “ Programming in ANSI C” by E. Balaguruswamy(Sixth edition) Mc. Graw Hill Edition, India.

- Ref :** 1. Numerical Methods : Problems and solutions, M.K. Jain, R.K. Jain, SRK Iyengar- New age International Publications
2. Let us “C”- Kanetkar BPB Publications
3. The “C” Programming Language- Kerghan, Brian W, Riechie Dennis M PHI Publisher

SEMESTER -II

AM 201 : MATHEMATICAL MODELLING

UNIT –I

Mathematical modeling through ordinary differential equations of first order .

UNIT-II

Mathematical Modeling through system of ordinary differential equations of first order

UNIT: III

Mathematical Modeling through ordinary differential equations of second order

UNIT IV :

Mathematical Modeling through difference equations : Basic Theory of Linear Difference Equations with constant coefficients- Mathematical Modeling through difference equations in Economics and Finance- Mathematical Modeling through difference Equations in Population Dynamics and Genetics.

Mathematical Modeling Through partial Differential Equations : mass-Balance Equations – Momentum Balance Equations.

Scope and standard as in Chapter 2, Chapter 3, Chapter 4, sections 5.2 to 5.4 Chapters 5 and Sections 6.2 and 6.3 of Chapters 6 in “ Mathematical Modelling” by J.N. Kapur, Wiley Eastern Limited(1988)

- References :** 1. Mathematical Modeling –Applications, Issues and analysis – by Vimal K Mishra, ANE Book Publishers –New Delhi
2. Mathematical Modeling by Meerscharet M. Elsevier India Pvt Ltd.

AM 202 : PARTIAL DIFFERENTIAL EQUATIONS (Common with paper MA 202 of Branch I(A) Mathematics)

UNIT –I :

Ordinary Differential Equations in more than two variables : Methods of solutions of $dx/P = dy/Q = dz/R$ -Orthogonal trajectories of a system of curves on a surface-Pfaffian differential forms and equations in Three variables . (Sections 3,4,5 and of Chapter 1)

UNIT – II:

Partial Differential Equations of the First order: Partial Differential equations-Origins of first order partial differential equations-Cauchy’s problems for first order equations-Linear equations of first order-Integral surfaces passing through a given curve –Surfaces orthogonal to a given system of surfaces-Charpit’s method.(Sections 1,2,3, 4,5,6 and 10 of Chapter 2)

UNIT – III:

Partial Differential Equations of the Second order: The Origin of second order equations – Linear partial differential with constant coefficients-Equations with variable coefficients.(Sections 1,4 and 5 of Chapter 3)

UNIT-IV:

Laplace's Equations : Elementary solution of Laplace's equation-Families of equipotential surfaces-Boundary value problems – Separation of variables.(Sections 2,3,4 and 5 of Chapter 4)

Scope and Standard as in “ Elements of Partial Differential Equations” by IAN Sneddon Chapter 1: Section 1 to 6, Chapter 2: Sections 1,2,4,5,6,10 Chapter 3: Sections 1,4,5, chapter 4: Sections 2,3,4,5, Chapter 5: Sec2, Chapter 6: Section 3 and 4.

Reference : 1. Ordinary and Partial Differential Equations by M.D. Raisinghanian.

AM 203 : : TOPOLOGY

(Common with paper MA 203 of Branch I(A) Mathematics)

UNIT –I :

Metric spaces-open sets-closed sets- convergence-completeness and Baire's theorem-Continuous mappings spaces of continuous functions-Euclidean and Unitary Spaces

UNIT – II:

Topological Spaces, definition & examples-open bases and open sub bases weak topologies.

UNIT – III:

Compact spaces- product spaces-Tychonoff's theorem and locally compact spaces-compactness in Metric spaces- Acoli's Theorem.

UNIT-IV:

Separation – T_1 Spaces and Hausdorff spaces –completely regular spaces and Normal

spaces –Urysohn's lemma- Urysohn's imbedding theorem –Stone –Cech compactification Connected spaces-Components of a space.

Standard and treatment as in chapters 2, articles 16-19 of Chapter III, Articles 21-25 of Chapter IV, Chapter 26-30 of Chapter V and articles 31 and 32 Chapter VI of : Introduction to Topology and Modern Analysis” by G.M. Simmons of MC Graw Hill Book company, inc. International student edition.

Reference : 1. 'Topology' by K.Chandra Sekhara Rao, Narosa Publications
2. "Topology" by J.P. Chauhan, J.N. Sharma, Krishna Publications
3. "General Topology" by M.G. Murdeshwar, new age International publications

AM 204 : (A) ADVANCED COMPLEX ANALYSIS

(Common with paper MA 204 of Branch I(A) Applied Mathematics)

UNIT –I :

Laurent Series-Singular Points: Laurent Series-Laurent's Theorem-Poles and Essential Singular points-Behavior at an Essential Singular point. Picard's Theorem-Behavior at infinity.

UNIT – II:

The Residue Theorem and its Applications: The Residue Theorem-Residues at infinity-Jordan's Lemma-Evaluation of Definite Integrals – The Argument principal-The Theorems of Rouché and Hurwitz-Local Behavior of Analytic Mappings-The Maximum Modulus principle and Schwarz's Lemma.

UNIT – III:

Harmonic Functions: Laplace's Equations-Conjugate Harmonic Functions-Poisson's integral. Schwarz's Formula-The Dirichlet problem.

Conformal Mapping: General Principles of Conformal Mapping –Mapping of the Upper Half-Plane onto a Rectangle –The Schwarz-Christoffel Transformation.

UNIT-IV:

Infinite product and Partial Fraction Expansions: Preliminary Results- Infinite Products-Weierstrass' Theorem –Mittage – Leffer's Theorem – The gamma Functions –Cauchy's Theorem on Partial Fraction Expansions.

Scope and Standard as in “ Introductory Complex Anlaysis” by Richard A. Silverman, Dover Publications, Inc. New York (1972) Chapter 11 to 15.

Ref: 1. Fundamentals of Complex Analysis- Edward B. Saff, Arthur David Snider, Pearson Education

2. Foundations of Complex Analysis by S. Ponnusamy- Narosa Publications

AM 204 : (B): SEMIGROUP THEORY

(Common with paper MA 204 (B) of Branch I(A) Mathematics)

UNIT-I

Basic definitions – Homogenic Semigroups – Ordered sets- Semi lattices and lattices – Binary relations- Equivalences- Congruences.

UNIT-II

Free Semi groups Ideals and – Rees Congruences. Lattices of equivalences and congruences – Green's equivalences. The structure of D.Classes – regular semigroups.

UNIT-III

Simple and Q-Simple semi groups. Principle factors, Rees's Theorem, Primitive idempotents.

UNIT-IV

Congruences on completely O-Simple semi groups. The Lattice of Congruences on a completely O-Simple semi groups. Finite Congruences, free semi groups.

Text Book :

An Introduction to Semi group Theory by J.M. Howie (1976), Academic Press, (Content of the Syllabus : Chapters-I, II and III).

AM 204 : (C): NON LINEAR ANALYSIS

(Common with paper MA 204 (C) of Branch I(A) Mathematics)

UNIT-I

Fixed point theory and Applications : Banach's Contraction principle (Theorem 4.1.1 of text Book 1) – its applications (Theorem 8.1.1 and Theorem 8.2.4 of text book 1. Schavder's fixed point theorem (Theorem 4.3.10 of text book 1)- its application (Theorem 8.1.3 of text book 1). Krasnoselskii's fixed point theorem (Theorem 4.3.16 of text book 1) – its application to integral equations (theorem 8.2.3 of text book 1)

UNIT-II

Approximation Theory : Approximation in Normed spaces- Uniqueness, strict convexity-uniform approximation- chebyshev polyamines- Approximation in Hilbert space-splines. (Chapter 6 of text book 2)

UNIT-III

Spectral Theory of Linear Operators in Normed Spaces : Spectral Theory in Finite Dimensional Normed Spaces- Basic concepts spectral properties of Bounded linear operators-Further properties of Resolvent and spectrum- Use of Complex Analysis in spectral Theory – Banach algebras –Further properties of Banach algebras. (Chapter 7 of text book 2)

UNIT-IV

Compact Linear operators in Normed spaces and their Spectrums : Compact linear operators on Normed Spaces- Further of Compact linear operators –Spectral properties of compact linear operators on normed spaces – Further spectral properties of compact linear operators – Operator equations involving compact linear operators –Further theorems of fredholm type – Fredholm alternative (Chapter 8 of text book 2)

Text Book :

1. Mohan C. Joshi and Remendar K. Bose – Some topics in Nonlinear functional Analysis, Wiley Eastern Limited 1985, New Delhi.
2. Ervin Kreyszig:- Introductory Functional Analysis with Applications, John Wiley & sons. Inc., 1978, New York.

AM 205 : HUMAN VALUES AND PROFESSIONAL ETHICS – II

(Common with paper MA 205 of Branch I(A) Mathematics)

(With effect from 2015-16)

(effective from the batch of students admitted from the academic year 2014-15)

Unit – I

Value Education – Definition – relevance to present day - Concept of Human Values – self introspection – Self esteem, Family values –Components, structure and responsibilities of family- Neutralization of anger – Adjustability – Threats of family life – Status of women in family and society – Caring for needy and elderly – Time allotment for sharing ideas and concerns.

Unit – II

Medical ethics – Views of Charaka, Sushruta and Hippocrates on moral responsibility of medical practitioners. Code of ethics for medical and health care professionals, Euthanasia, Ethical obligation to animals, Ethical issues in relation to health care professionals and patients. Social justice in health care, human cloning, problems of abortion. Ethical issues in genetic engineering and Ethical issues raised by new biological technology or knowledge.

Unit -III.

Business ethics – Ethical standards of business-Immoral and illegal practices and their solutions. Characteristics of ethical problems in management, ethical theories, causes of unethical behavior, ethical abuses and work ethics

Unit - IV.

Environmental ethics-Ethical theory man and nature-Ecological crisis, Pest control, Pollution and Waste,Climate change, Energy and Population, Justice and Environmental health.

Unit - V

Social ethics-Organ trade, Human trafficking, Human rights violation and social disparities, Feminist ethics, Surrogacy/Pregnancy. Ethics of media-Impact of Newspapers, Television, Movies and Internet.

Books for study:

1. John S Mackenjie: A manual of ethics.
2. “The Ethics of Management” By Larue Tone Hosmer, Richard D. Irwin Inc.
3. “Management Ethics – integrity at work’ by Joseph A. Petrick and John F. Quinn,Response Books: New Delhi.
4. “Ethics in Management: by S.A. Sherlekar, Himalaya Publishing House.
5. Harold H. Titus: Ethics for Today
6. Maitra, S.K: Hindu Ethics
7. William Lilly: Introduction to Ethics

8. Sinha: A Manual of Ethics
9. Manu: Manu Dharma Sastra or the Institute of Manu: Comprising the Indian System of Duties: Religious and Civil (ed.) G.C.Haughton.
10. Susruta Samhita: Tr.Kaviraj Kunjanlal, Kunjalal Brishagratha, Chowkamba Sanskrit series, Vol I, II and III, Varnasi, Vol I OO, 16-20, 21-32 and 74-77 only.
11. Caraka Samhita: Tr.Dr.Ram Karan Sarma and Vaidya Bhagavan Dash, Chowkambha Sanskrit Series office, Varanasi I, II, III Vol I PP 183-191.
12. Ethics, Theory and Contemporary Issues, Barbara Mackinnon, Wadsworth/Thomson Learning, 2001.
13. Analyzing Moral Issues, Judith A. Boss, Mayfield Publishing Company, 1999.
14. An Introduction to Applied Ethics (Ed.) John H.Piet and Ayodhya Prasad, Cosmo Publications.
15. Text book for Intermediate logic, Ethics and Human Values, board of Intermediate Education & Telugu Academic Hyderabad.
16. I.C Sharma Ethical Philosophy of India. Nagin & co Julundhar.

AM 206 : MEASURE AND INTEGRATION
(Common with paper MA 206 of Branch I(A) Applied Mathematics)

UNIT –I :

Lebesgue Measure: Introduction, Outer measure, Measurable sets and Lebesgue measure, a non measurable set, Measurable functions, Little wood's three principles

UNIT – II:

The Lebesgue Integral: The Riemann integral, the Lebesgue integral of a bounded function over a set of finite measure, the integral of a non negative function, the general Lebesgue integral, convergence in measure.

UNIT – III:

Differentiation and Integration: Differentiation of Monotone functions –Functions of bounded variations-Differentiation of an integral – Absolute continuity –Convex functions.

UNIT-IV:

The Classical Banach Spaces: The L^p Spaces, The MinKowski and Holder inequalities, Convergence and completeness, Approximation in L^p , Bounded linear functional on the L^p Spaces

Syllabus and Scope and Standard as in “ Real Analysis” by H.L. Royden, Prentice Hall of India private limited, New Delhi, 2001-Third edition. Chapter 3, Chapter 4, Chapter 5, and Chapter 6.

Reference : 1. Principles of Mathematical Analysis, Third Edition by Walter Rudin.

SEMESTER –III

AM 301. CONTINUUM MECHANICS

UNIT I:

Kinematics of Fluids in motion (Chapter 2).

UNIT-II

Equations of motion of a Fluid (Chapter 3)

UNIT: III

Some Three –Dimensional Flows(Chapter 4)

UNIT IV :

Some two –Dimensional Flows. (Sections 5.1 to 5.9 of Chapter 5) Scope and standard as in the book “ Text Book of Fluid Dynamics” by F. Chorlton, C.B.S Publishers and Distributors , Delhi, 1985

- References :**
1. D.S. Chandrasekharaiah and L. Debnatha Continuum Mechanics – Academic Press -1994
 2. A.J.M. Speneer : Continuum Mechanics Long Man, 1980
 3. Y. C. Feng, A first Course in Continuum Mechanics – Prentice Hall (2nd Edition) 1997

AM 302 : FUNCTIONAL ANALYSIS
(Common with paper MA 302 of Branch I(A) Mathematics)

UNIT –I :

The definitions and some examples –continuous –linear transformations-the Hahn-Banach Theorem.

UNIT – II:

Natural imbedding of N in N^{**} -Open mapping theorem –Conjugate of an Operator.

UNIT – III:

Definition and Simple Properties –Orthogonal Complements- Orthonormal sets –Conjugate spaces-Adjoint of an Operator.

UNIT-IV:

Self adjoint operators –Normal and Unitary Operators-Projection –Spectral theorem. Scope and Standard as in Sections 46 to 51 of Chapter 9, section 52 to 59 of chapter 10, section 62 of chapter 11 of “ Introduction to Topological and Modern analysis by G.F. Simmons Mc Graw Hill Book Company.

- References :**
1. “ Foundations of Functional Analysis” by S. Ponnyusamy- Narosa Publications
 2. “ Text book of Functional Analysis – A Problem oriented Approach” by V.K. Krishnan-Prentice Halls of India Publishers
“ Functional Analysis” by B.V. Limaye New age International Publishers

AM 303 CLASSICAL MECHANICS
(Common with paper MA 303 of Branch I(A) Mathematics)

UNIT –I :

D’Alembert’s Principle and Lagrange’s Equations: Some Definitions-Classification of Dynamical System-Some Examples of Constraints Virtual Displacement-Principle of Virtual Work –Generalised Force in Holonomic System-Mathematical Expression for the principle of Virtual work-D’Alembert’s principle-Lagrange’s Equations for a Holonomic system-Velocity-dependent potential –Lagrange’s Equations of Motion for conservative , Non-holonomic system-physical Significance of 1 –Harmonic Oscillator.

UNIT – II:

Variational Principle and Lagrange’s Equations: Variational Principle-Calculus of Variations-Hamilton Principle-Derivation of Hamilton’s Principle from Lagrange’s Equations-Derivation of Lagrange’s Equations from Hamilton’s Principle –Extension of Hamilton’s Principle –Hamilton’s Principle for Non-conservative, Non-holonomic System –Generalised Force in Dynamic system-Hamilton Principle for Conservative-Non holonomic System -Lagrange’s Equations for Non –conservative –Holonomic System –Cyclic or Ignorable Coordinates –Conservation Theorem-Conservation of Linear Momentum in Lagrangian Formulation-Conservation of Angular Momentum in Lagrangian Formulation –Conservation of Angular Momentum –Conservation of Energy in Lagrangian Formulation.

UNIT – III:

Hamilton's Equations of Motion: Derivation of Hamilton's Equations of Motion (using Lagrange's Equations)-Routh's Procedure-Equations of Motion-Derivation of Hamilton's Equations from Hamilton's Principle –Principle of Least Action-Distinction between Hamilton's Principle and Principle of Least Action.

UNIT-IV:

Canonical Transformations: Canonical Coordinates and Canonical Transformations –The necessary and Sufficient Condition for a Transformation to be Canonical –Examples of Canonical Transformations-Properties of Canonical Transformations- Infinitesimal Contact Transformation-Relation between Infinitesimal Contact Transformation and Poisson's Bracket-Hamilton Jacob Theory –Hamilton-Jacobi equations for Hamilton's Principle Function.

Syllabus and treatment as in the Book “ Classical Mechanics” by C.R. MONDAL Prentice Hall of India Private Limited, New Delhi, 110001,2001, Chapter 1,2,4 and 5.

References: 1. Classical Mechanics by Goldstein Herbert, Charles P Poole, John Safko-Pearson India

2. Introduction to Classical Mechanics by Takwale R. Puranik P, Mc. Graw Hill Education

Generic Elective

AM 304 : (A) DIFFERENTIAL GEOMETRY
(Common with paper MA 304 (A) of Branch I(A) Mathematics)

UNIT –I :

The Theory Space Curves: Introductory remarks about space curves –Definitions –Arc length-Tangent, normal, and binormal –Curvature and torsion of a curve given as the intersection of two surfaces –Contact between curves and surfaces-Tangent surface, involutes and evolutes.(Sections 1 to 7 of Chapter 1).

UNIT – II:

The Metric: Local Intrinsic Properties of a Surface: Definitions of a Surface- Curves on a surface-Surfaces of revolution –Helicoids- Metric-Direction Coefficients-Families of curves –Isometric correspondence –Intrinsic properties. (Sections 1 to 9 of Chapter 11).

UNIT – III:

Geodesics-Canonical Geodesic Equations-Normal Property of geodesics –Existence theorems-Geodesic parallels-Geodesic curvature-Gauss-Bonnet theorem –Gaussian curvature-Surfaces of constant curvature –Conformal mapping-Geodesic mapping (Sections 10 to 20 of Chapter 11).

UNIT-IV:

The second Fundamental Form: Local non – intrinsic properties of a surface: The second fundamental form-principal curvatures –Lines of curvature -Developables associated with space curves-Developables associated with curves on surfaces –Minimal surfaces-Ruled surfaces-The fundamental equations of surface theory –Parallel surfaces. (Sections 1 to 10 Chapter III).

Scope and Standard as in Sections and chapters as specified above of the book " An Introduction to Differential Geometry" of T.J Willmore, Oxford University Press, Thirteenth Impression, 1997.

References : 1. A first course in Differential Geometry- D. Soma sundaram – Narosa Publications

AM 304 : (B) CRYPTOGRAPHY
(Common with paper MA 304 (B) of Branch I(B) Mathematics)

UNIT –I : Definition, Cryptography

Encryption Schemes- Symmetric and asymmetric Cryptosystems- Cryptanalysis – Alphabets and Words- Permutations- Block Ciphers-Multiple Encryption- The use of Block Ciphers - Stream Ciphers- The Affine Cipher-Matrices and Linear Maps- Affine Linea Block Ciphers -Vigenere, Hill and Permutation Ciphers – Cryptanalysis of Affine Linear Block Ciphers – Secure Cryptosystems

UNIT – II: DES

Feistel Ciphers-DES Algorithm-An Example-Security of DES-Exercises

UNIT – III: AES

Notation-Cipher-Key Expansion- AN Example- Invcipher- Exercises

UNIT-IV: Public Key Encryption

Public –Key Encryption: Idea- Security-RSA Cryptosystem-Rabin Encryption-Diffie-Hellman Key Exchange-ElGamal Encryption- Exercises.

Scope and Standard as in Sections 3.1 to 3.15 of chapter 3, 5.1 to 5.5 of Chapter 5, and 6.1 to 6.6 of chapter 6, and 8.1 to 8.7 of chapter 8 above of the book " Introduction to Cryptography: " of Johannes A. Buchmann, Springer Publishers.

References : 1. Cryptography and Network Security- authors Forozedan, Behrouz A. Mukhopadhyay Debdeep- MC Graw hill Education PVT Ltd
2. Cryptography : Theory and Practice , Douglas Stinson, Stinson- CRC Publishers

AM 304 (C) FUZZY SETS AND FUZZY LOGIC
(Common with the paper MA 304 (C)of Branch I(A) Mathematics)

UNIT –I :

Fuzzy Sets : An overview –Basic Types and Concepts-Characteristics and significance of the Paradigm-Properties of –Cuts-Representation of Fuzzy sets-Extension Principle for Fuzzy Sets.

UNIT – II:

Operations on Fuzzy Sets: Types of Operations –Fuzzy complements –t-norms-conorms-Combinations of operations-Aggregation of Operations-Fuzzy Arithmetic –Fuzzy Numbers-Linguistic Variables-Arithmetic Operations on Intervals-Arithmetic Operations on Fuzzy Numbers-Lattice of Fuzzy Numbers –Fuzzy Equations.

UNIT – III:

Fuzzy Relations : Crisp versus Fuzzy Relations –Projections and Cylindric Extensions-Binary Fuzzy Relations-Binary Relations on a Single Set-Fuzzy Compatibility Relations –Fuzzy Ordering Relations – Fuzzy Morphisms-Sup –i Compositions of Fuzzy Relations –inf-wi Compositions of Fuzzy Relations – Fuzzy Relation Equations –General Discussion –

Problem partitioning-Solution Method-Fuzzy Relation Equations Based on sup-i Compositions
Fuzzy Relation Equations Based on inf –wi Compositions –Approximate Solutions –The use
of Neural Networks.

UNIT-IV:

Possibility Theory –Fuzzy Measures-Evidence Theory –Possibility Theory-Fuzzy sets and
possibility Theory Versus-Probability Theory-Fuzzy logic –Classical Logic-Multivalued
Logics- Fuzzy propositions – Fuzzy Quantifiers –Linguistic Hedges-Inference from
Conditional Fuzzy Propositions – Inference from quantified propositions.

Scope and standard as in chapters 1 to 8 “ Fuzzy sets and Fuzzy logic Theory and
Applications” by George J. Klir/ Bo Yuan, PH, 2001.

References : 1. Introduction to Fuzzy sets and Fuzzy Logic –M. Ganesh –Phi Learning Pvt
Ltd.

2. Fuzzy logic with Engineering Applications , Timothy J. Ross Wilely students
Edition

**AM 304 (D) : DISCRETE MATHEMATICS
(Common with paper MA 305 of Branch I(A) Mathematics)**

UNIT –I :

Normal Forms-Disjunctive-Conjunctive Principal Disjunctive, Principal Conjunctive Normal
Forms –Ordering and Uniqueness of Normal Forms. The theory of Inference for the
statement Calculus-Rules of inferences – Consistency of Premises-Automatic Theorem
proving(Sections 1.3 and 1.4 of Chapter 1)

UNIT – II:

The predicate calculus-Inference Theory of the Predicate Calculus(Sections 1.5 and 1.6 of
Chapter 1)

UNIT – III:

Lattices and Boolean Functions: Lattices as partially Ordered sets-Lattices as Algebraic
Systems –Boolean Algebra-Boolean Functions- Minimization. (Sections 4.1 , 4.2,4.3 and 4.4
of Chapter 4)

UNIT-IV:

Finite – State Machines-Basic Concepts of Graph Theory –Basic Definitions-Paths-Reach
ability, and Connectedness-Matrix Representation of Graphs-Trees (Section 4.6 of Chapter 4
and Section 5.1 of Chapter)

Scope and Standard as in the book “ Discrete Mathematical Structures With Applications To
Computer Science” by Tremblay, J.P& Manohar, R-Published by McGraw-Hill International
Edition -1987 Edition

References : 1. Discrete Mathematics & Graph Theory by Bhavanari Satyanarana &
Kuncham Syam Prasad, PHI Publications, New Delhi, Second Edition, 2014.

2. Mathematical Foundation of Computer Science, by Bhavanari Satyanarayana, TV
Pradeep

Kumar, SK. Mohiddin Shaw, BS Publications, Hyderabad.2016.

Open Elective

**AM 305 (A) : BUSINESS MATHEMATICS
(Common with paper MA 305 (B) of Branch I(A) Mathematics)**

Unit - I

Number - H.C.F. and L. C.M. of Numbers - Decimal Fractions.

Unit - II

Surds and Indices – Percentage - Profit and loss. P

Unit - III

Linear Equations in Two Variables – Ratio and Proportion- Variation.

Unit -IV

Number System:

Types of Number Systems – Conversion of Decimal Number to Binary Number and Vice versa -Conversion of Decimal numbers to Octal numbers and Vice versa - Conversion of Hexadecimal number into Decimal number and Vice versa - Binary Airthmetic.

Scope and Standard Treatment as in Chapters 1,2,3,9,10,11,31,12

of“OBJECTIVEARITHMETIC” , by R.S.AGGARWAL , S.Chand and Company.

Scope and Standard Treatment as in Chapter 1 of “BUSINESS MATHEMATICS” , by P.R.VITTAL , MARGHAM PUBLICATIONS.

AM 305 (B) : BASIC MATHEMATICS FOR SOCIAL SCIENCES (Common with paper MA 305 (C) of Branch I(A) Mathematics)

UNIT –I :

Linear Algebra : Matrices-Rank of a matrix, Elementary transformations of a matrix, Inverse of a Matrix, System of linear equations, Linear transformations, Eigen values and Eigen vectors. Vector Analysis-Definition of a vector, Vector addition, Vector manipulation – Scalar product, Vector ; Orthogonal components manipulation-Scalar product, Vector product; Orthogonal components of a vector, Differentiation of vectors.

UNIT – II:

Differential Calculus : Limits and Continuity, Differentiation of functions, Successive differentiation, Leibnitz’s theorem for nth derivative, Taylor’s and Maclaurin’s series, Applications to maxima and minima of functions, partial differentiation, Euler’s theorem.

UNIT – III:

Integral Calculus: Introduction, Integration –by substitution, by parts, by partial fractions: Definite integrals, Applications to areas, length, and volumes.

Differential Equations: Equations of 1st order and 1st degree.

UNIT-IV:

Numerical Methods –I Computer arithmetic, Representation of numbers, computer errors in representing numbers, Finding roots of equations-Bisection, Newton, and Secant methods; Interpolation and Numerical differentiation- Polynomial interpolation, Newton-Gregory forward interpolation, Backward differences; Numerical integration-Trapezoidal and Simpson’s rules Elements of matrix algebra-elementary operations – rank of matrix-inverse of a matrix-solutions of linear equations by matrix method and Cramer’s rule .

Text Books :

1. Grewal B.S. Elementary Engineering Mathematics, 10th edition, Khanna publishers
2. Cheney W. and Kincaid D, Numerical Mathematics and Computing, vikas Publications, 2003.

References:

1. Lipschutz S, and Lipson M, Schaum’s Out line of Linear Algebra, McGraw-Hill, 2000.
2. Ayres F, and Mendelson E, Schaum’s Outline of Calculus, 4th edition, Mc.Graw-Hill, 1999.
3. Rajaraman V, Computer Oriented Numerical Mehtods, 3rd edition, PHI 1993.

SEMESTER IV

AM 401 : NUMBER THEORY (Common with the paper MA 401 of Branch (A) Mathematics)

UNIT –I :

Arithmetical Functions and Dirichlet Multiplication: Introduction-The Mobius function μ (n)-The Euler totient function ϕ (n) –A relation connection ϕ and μ -A product formula for ϕ (n) - The Dirichlet product of arithmetical functions –Dirichlet inverses and the Mobius inversion formula-The Mangoldt function Λ (n) –Multiplicative functions-Multiplicative

functions and Dirichlet multiplication-The inverse of a completely multiplicative function-Liouville's Function $\lambda(n)$ -the divisor functions $\sigma_\alpha(n)$ – Generalized convolutions –Formal power series –The Bell series of an arithmetical function –Bell series and Dirichlet multiplications –Derivatives of arithmetical functions-The Selberg identity .

UNIT – II:

Averages of Arithmetical Functions : Introduction –The big oh notation Asymptotic equality of functions-Euler's summation formula –Some elementary asymptotic formulas-The average order of $d(n)$ -The average order of the divisor functions $\sigma_\alpha(n)$ -The average order of $\phi(n)$ -An application to the distribution of lattice points visible from the origin-The average order of $\mu(n)$ and of $\Lambda(n)$ - Another identity for the partial sums of a Dirichlet product.

UNIT – III:

Congruences: Definition and basic properties of congruences-Residue classes and complete residue systems-Linear congruences –Reduced residue systems and the Euler-Fermat theorem- Polynomial congruences modulo p .Langrange's theorem-Applications of Lagrange's theorem-Simultaneous linear congruences – The Chinese remainder theorem – Applications of the Chinese remainder theorem –Polynomial congruences with prime power moduli- The Principle of cross-classification- A decomposition property of reduced residue systems.

UNIT-IV:

Quadratic Residues and the Quadratic Reciprocity Law: Quadratic residues-Lengendre's symbol and its properties –Evaluation of $(-1|p)$ and $(2|p)$ –Gauss' lemma-The quadratic reciprocity law –Applications of the reciprocity law –The Jacobi symbol

Primitive Roots: The exponent of a number mod m . Primitive roots –Primitive roots and reduced residue systems –The nonexistence of primitive roots mod 2^α for $\alpha \geq 3$.

Scope and Standard as in chapter 2, Chapter 3, Chapter 5, Sections 9.1 to 9.7 of Chapter 9 and Sections 10.1 to 10.3 of chapter 10 by Tom. M. Apostol , “ Introduction to Analytical Number Theory” Springer International Student Edition .

AM 402 FLUID DYNAMICS

UNIT –I

Dynamics of Real fluids- Introduction-Equations of motion for viscous flow .

UNIT-II

Some exact solutions of the Navier –Stokes Equations –Very slow motion

UNIT- III

The Laminar Boundary Layer in incompressible flow -Introduction - The Boundary layer equations.

UNIT IV :

Analytic solutions of the Boundary layer equations

Scope and standard as in chapter 5, sections 6.1,6.2, 6.3.1 to 6.3.4 of Chapter 6 of “ Modern Fluid Dynamics” (Volume I, Incompressible Flow) by N. Curle and H.J Davies, D. Van Nostrand Company Ltd., London, 1968

References : 1. Foundations of Fluid Mechanics by S.W. Yuan – Prentice Hall of India PVT Ltd, New Delhi.

2. An Introduction to Fluid Dynamics by Batchelor G.K., Cambridge Mathematical Library

AM 403 GRAPH THEORY
(Common with the paper MA 403 of Branch (A) Mathematics)

UNIT –I :

Graphs & Subgraphs: Graphs and simple Graphs-Isomorphism-Incidence and adjacency Matrices-Sub graphs-Vertex Degrees-Paths and connection –Cycles-Shortest path-Problem-Sperner's Lemma

UNIT – II:

Trees: Trees-Edges and Bonds-Cut vertices, Cayley's Formula –Applications-Connected problem

UNIT – III:

Connectivity-Connectivity –Blocks-Application Construction of Reliable communications Networks.

UNIT-IV:

Euler Tours and Hamiltonian Cycles: Euler Tours – Hamilton cycles Application –Chinese Postman Problem –Travelling Salesman Problem .

Scope and standard as in chapters 1 to 4 “ Graph Theory with application” J.A. Bondy and U.S.R. Murthy, M.C. Millan Press

References : 1. Discrete Mathematics & Graph Theory, by Satyanarayana Bhavanari, K.

Syam Prasad, PHI Pvt Ltd, New Delhi Second Edition, 2014

2. Mathematical Foundation of Computer Science by Satyanarayana Bhavanari, T. V. Pradeep Kumar, Sk. Mohiddin Shaw, BS Publications, Hyderabad, 2016.

3. Graph Theory with applications to Engineering and Computer Science – Narsingh Deo

4. First look at Graph Theory- John Clark Derek Allaw Holton.

5. Introduction to Graph Theory- Robin . J. Wilson

6. Introduction to Graph Theory- Douglas B. West

Generic Elective

MA 404 (A) MATHEMATICAL STATISTICS

(Common with the paper AM 404 (A) of Branch I(A) Mathematics)

UNIT –I :

The probability set function –Random variables –The probability density function –The distribution function-Mathematical expectations-Some special mathematical expectations –Chebyshev inequality. Conditional probability –Marginal and conditional distributions-The Correlation coefficient-Stochastic Independence.

UNIT – II:

The Binomial, Poisson, Gamma, chi-square normal distribution. Distributions of functions of Random variables –Sampling theory- Transformation of Variables of Discrete type-Transformation of Variables of the continuous type.

UNIT – III:

The t and F Distributions – Distribution of order statistics –The moment –generating function Technique-The Distribution of X and Limiting distribution –Stochastic convergence-Limiting moment generating function-The central limit theorem –Some theorems on Limiting Distribution.

UNIT-IV:

Point estimation-Measures of quality of estimations-confidence intervals for means-confidence intervals for difference of Means-confidence intervals for variances.

A Sufficient statistics for a parameters- The Rao –Blackwell theorem-The Rao Cramer’s inequality.

Syllabus and Scope as in “ Introduction to Mathematical Statistics” by Robert V. Hogg Allen T. Craig, Macmillan publishing co., Inc., New York -1978, section

1.4,1.5,1.6,1.7,1.9,1.10,1.11, of chapter 1, chapter 2, sections 3.1 to 3.4 of chapter 3, sections 4.1 to 4.4, 4.6 to 4.8 of chapter 4, chapter 5, sections 6.1 to 6.5 of chapter 6, section 10.1, 10.2 chapter 10, section 11.1 of chapter 11.

References : 1. Mathematical Statistics by J.N. Kapur, H.C. Saxena- S. Chand Publications
2.Introduction to Mathematical Statistics Robert V Hogg, Allencraig, Joseph W Mekean , Pearson Publishers

AM 404 (B) APPROXIMATION THEORY (Common with the paper MA 404 (B)of Branch I(B) Mathematics)

UNIT –I :

Nomenclature-Metric spaces-Normed linear space-Inner product spaces-convexity

UNIT – II:

Existence and Unicity of Best approximation-Convex functions-System of Equations with one unknown –Characterization of the solution –The special case $n=n+1$.

UNIT – III:

Polya’s Algorithm-Ascent Algorithm –Descent Algorithm –Interpolation-Weierstrass Theorem.

UNIT-IV:

General linear Families –The Unicity Problem –Discretization Errors: General and Algebraic Polynomials-Markoff and Bernstein inequalities –Remes Algorithm. Scope and standard as in sections 1 to 7 of chapter 1, sections 1 to 8 of chapter 2, sections 1 to 8 of chapter 3 of “ Introduction to Approximation Theory, E.W. Cheney, “McGraw Hill Book Company.

References : 1. Fundamentals of Approximation Theory by H.N. Mhaskar-Narosa Publications
2. Approximation theory and methods, M.j.d. Powell , Cambridge University Press

AM 404 (C) FINITE ELEMENT METHOD

UNIT –I :

Integral formulations and Variational Methods : Need for Weighted-Integral forms- some mathematical concepts and formulae-Boundary, initial and Eigenvalue problems-Integral relations-Functionals-The Variational symbol Weak formulation of Boundary Value problems –Weighted-Integral and Weak formulations- Linear and Bilinear forms and Quadratic Functionals - examples.

UNIT – II:

Variational methods of approximation : The Rayleigh-Ritz Method- The method of Weighted residuals.

UNIT – III:

Finite element analysis of one-dimensional problems : Introduction-Basic steps of Finite element analysis-Model Boundary Value Problem-Discretization of the domain-Derivation of element equations-Connectivity of elements-Imposition of boundary conditions-Solution of equations-Post processing of the solution- Radially Symmetric problems.

UNIT-IV:

Applications of Finite element Analysis –Heat transfer –Fluid Mechanics- Solid Mechanics. STANDARD AND TREATMENT AS IN

Chapters 2 and 3 of “ INTRODUCTION TO THE FINITE ELEMENT MEHTOD”
By J. N. Reddy, McGraw-Hill Inc. (Second Edition)

AM 404 (D) OPERATIONS RESEARCH FOR INDUSTRY AND COMMUNITY DEVELOPMENT

(Common with the paper 405 (A) of Branch Mathematics)

UNIT –I :

Linear programming: Graphical Method-Simplex Method-Big M Method-Two phase method –Duality in LP-Transportation Problem- Assignment problem- (Sections 2.4, 2.5 and 2.7 of chapter 2, sections 3.2, 3.3 and 3.4 of chapter 3, sections 4.3 and 4.4 of chapter 4.

UNIT – II:

Inventory Control : Models of Inventory-Operation of Inventory Systems –Quantity Decisions-Implementation of Purchase Inventory Model-Multiple Item Model with shortage limitation . (Sections 7.1 to 7.6 of Chapter 7)

Queuing Theory (Sections 9.1 , 9.2, 9.3.1, to 6.3.4 of chapter 9)

UNIT – III:

Dynamic programming : Introduction –Capital Budgeting problem –Reliability improvement problem –Stage coach problem –Optimal subdividing problem –Solution Linear programming Problem through Dynamic Programming (Chapter 8)

UNIT-IV:

Game Theory : Introduction -Game with Pure Strategies-Game with Mixed Strategies – Dominance property-Graphical Methods for $2 \times n$ and $m \times 2$ Games –Linear programming approach to Game Theory (Chapter 12)

Project Management: Guidelines for Network Construction –Critical Path Method (CPM) – Program Evaluation and Review Technique (PERT)(Sections 10.3,10.4 and 10.6 of Chapter 10)

Scope and standard as “ OPERATIONS RESEARCH” By pannerselvam, R. published by Prentice Hall of India, New Delhi, 2002Edition,

References : 1. Introduction to Management Sceicne “ Operation Research” by Manmohan . P, P.K.

Gupta, Kantiswarup, Sultan Chand & Sons Publishing house.

2. Operations Research –Theory and Applications by J.K. Sharma- Macmillan Publishers, India.

3. Operations Research –by Gupta, Prem Kumar, Hira S. Chand Publishers

Open Elective

AM 405 (A) THEORETICAL COMPUTER SCIENCE

(Common with the paper MA 405 (B) of Branch I(B) Mathematics)

UNIT –I :

The Theory of Automata : Definition of an Automaton-Description of a Finite Automaton0Transition Systems-Properties of Transition Functions-Acceptability of a String by a Finite Automation- Nondeterministic Finite State Machines-The Equivalence of DFA and NFDA-Mealy and Moore models- Minimistion of Finite Automata(Chapter 2)

UNIT – II:

Formal Lanquages: Basic Definitions and Examples –Chomsky Classification of Languages- Languages and Their Relation –Recursive and Recursively Enumerable Sets- Languages and Automata

Regular Sets and Regular Grammars: Regular Expressions-Finite Automata and Regular Expressions-Pumping Lemma for Regular sets-Application of Pumping Lemma-Closure properties of Regular sets Regular Sets and Regular Grammars (Chapter 40.

UNIT – III:

Context- Free languages : Context –free Languages and Derivations Trees –Ambiguity in Context-Free Grammars –Simplification of context –free grammars- normal forms for Context-Free Grammars –Pumping lemma for Context –free Languages-Decision algorithms for Context-Free Languages(Chapter 5)

UNIT-IV:

Pushdown Automata : Basic Definitions-Acceptance by pda-Pushdown Automata and Context Free Languages (Sections 6.11 6.2 and 6.3 of chapter 6)

Turing Machines: Turing Machine model-Representation of Turing Machines-Language acceptability by Turing machines-Design of Turing Machines. (Sections 7.1 7.2, 7.3 and 7.4 of Chapter 7).

Scope and standard as in : Theory of Computer Science (Automata, Languages and Computation)” by Mishra, K.L.P and Chandrasekharan, N. Published by Prentice Hall of India, Second Edition (4th Printing), August 1998.

References : 1. Theoretical Computer Sciences – Juraj Hromkovic Springer Publications
2. Discrete Mathematics & Graph Theory, by Satyanarayan Bhavanari, K. Syam Prasad, PHI PVT. Ltd, New Delhi, Second Edition, 2014.

AM 405 (B) BIOMECHANICS

(Common with the paper MA 405 (C) of Branch I(B) Mathematics

UNIT –I :

Introduction –Circulatory Biofluid Mechanics

UNIT – II:

Blood Rheology-Properties of flowing

UNIT – III:

Models of Biofluid flows

UNIT-IV:

Non-Newtonian fluids.

Scope and standard as in Chapters 1 to 5 of of “ Biofluids Mechanics” by Jagan N.

Muzumdar (1992), Published by World Scientific, Singapore.

References : 1. Text book of Bio Mechanics –Subrata Pal –Viva Publishers
2. Biofluid Mechanics by Rubenstein, Weiyin, Mary D. Frame Elsevier Edition

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

First semester

M.Sc.Degree Examination

Branch I (A)-Mathematics

Paper V-COMPLEX ANALYSIS

(Common to Branch-I(B) Applied Mathematics)

(CBCS from 2016-17)

Time: 3 hours

Max.Marks:100

PART – A (Marks:4x5=20)

Answer any four questions

Each question carries 5 marks

1.

- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.

PART -B (Marks:4X20=80)

Answer any four questions, Choosing ONE from each unit
Each question carries 20 marks

9. **Unit-I**
10. Or
11. **Unit-II**
12. Or
13. **Unit-III**
14. Or
15. **Unit-IV**
16. Or
