MANONMANIAM SUNDARANAR UNIVERISTY,
TIRUNELVELI-12

SYLLABUS

UG - COURSES – AFFILIATED COLLEGES

Course Structure for B. Sc. Mathematics
(Choice Based Credit System)
(with effect from the academic year 2021-2022 onwards)

Semester-V				
Part	**Subject Status**	**Subject Title**	**Subject Code**	**Credit**
III	**Core**	LINEAR ALGEBRA	CMMA51	4
III	**Core**	REAL ANALYSIS	CMMA52	4
III	**Core**	STATICS	CMMA53	4
III	**Core**	INTEGRAL TRANSFORMS AND Z TRANSFORMS	CMMA54	4
III	**Elective**	1. PROGRAMMING IN C 2. DISCRETE MATHEMATICS 3. COMBINATORIAL MATHEMATICS	CEMA51/ CEMA52/ CEMA53	4
III	**Elective**	1. OPERATIONS RESEARCH - I 2. STOCHASTIC PROCESS 3. MATH TYPING USING LATEX	CEMA54/ CEMA55/ CEMA56	4
IV	**Common**	PERSONALITY DEVELOPMENT/EFFECTIVE COMMUNICATION	CCSB51/ CCSB52	2

Total Marks: 100 Internal Exam: 25 marks + External Exam: 75 marks

A. **Scheme for internal Assessment**:
Maximum marks for written test: **20 marks**
3 internal tests, each of **I hour** duration shall be conducted every semester.
To the average of the **best two** written examinations must be added the marks scored in. The **assignment** for 5 marks.

The break up for internal assessment shall be:
Written test- 20 marks; Assignment -5 marks Total - 25 marks

B. Scheme of External Examination
3 hrs. examination at the end of the semester
A – Part : 1 mark question two - from each unit
B – Part : 5 marks question one - from each unit
C – Part : 8 marks question one - from each unit

- **Conversion of Marks into Grade Points and Letter Grades**

S.No	Marks	Letter Grade	Grade point (GP)	Performance
1	90-100	O	10	Outstanding
2	80-89	A+	9	Excellent
3	70-79	A	8	Very Good
4	60-69	B+	7	Good
5	50-59	B	6	Above Average
6	40-49	C	5	Pass
7	0-39	RA	-	Reappear
8	0	AA	-	Absent

- **Cumulative Grade Point Average (CGPA)**

$$\mathbf{CGPA} = \frac{\mathbf{\Sigma\,(GP \times C)}}{\mathbf{\Sigma C}}$$

- **GP** = Grade point, **C** = Credit
- CGPA is calculated only for Part-III courses
- CGPA for a semester is awarded on cumulative basis

- **Classification**
  a) First Class with Distinction : CGPA $\geq$ 7.5*****
  b) First Class : CGPA $\geq$ 6.0
  c) Second Class : CGPA $\geq$ 5.0 and $<$ 6.0
  d) Third Class : CGPA$<$ 5.0

LINEAR ALGEBRA

Objective:

- To acquire knowledge about vectors spaces, Inner product space and linear transformations. Also to solve problems in Matrices

UNIT–1:

Vector spaces: Definition and examples–Elementary properties–subspaces–linear transformations–Fundamental theorem of homomorphism.

UNIT–2:

Spanofaset–linear dependence and independence–basis and dimension.

UNIT–3:

Rank - Nullity theorem – Matrix of a linear transformation – Inner product space – Definition and examples–orthogonality –orthogonal complement–Gram Schmidt orthogonalization process.

UNIT–4:

Matrices –Elementary transformation–Inverse and power of a matrix using Cayley Hamilton's theorem–Inverse and rank of a matrix using elementary transformations.

UNIT–5:

Eigen values and Eigen vectors – Properties and problems – Bilinear forms – Quadratic forms –Reduction of quadratic form to diagonal form.

Text Book:

1. S. Arumugan & Thangapandi Issac ,Modern Algebra-Scitech Publication, Reprint(2008).

Books for Reference:

1. Sharma J.N and Vashistha A. R.LinearAlgebra-KrishnaPrakashNandir1981.
2. John B. Fraleish– A first Course in Abstract Algebra 7thedition, Pearson, 2002.
3. N. Ramabhadran & R. Balakrishnan, Text book of algebra –Vikas Publishing Co. Revised Edition1985.
4. Ward Cheney and David Kincaid, Linear Algebra-Theory and Applications. Jones and Barlett India PVT Ltd, New Delhi -First Edition(2010)

REAL ANALYSIS

Objective:

- To acquire knowledge about the real number system and metric spaces.Also to study the concepts of connectedness and compactness.

UNIT–1:

Metric spaces –Examples –bounded sets –open ball–open sets –subspaces–interior of a set.

UNIT–2:

Closed sets–closure–limit points–dense set–complete metric space–Cantor's intersection theorem–Baire's category theorem.

UNIT–3:

Continuity– Homeomorphism– Uniform Continuity

UNIT–4:

Connectedness–Connected subsets of R–Connectedness and continuity–Contraction mapping theorem.

UNIT–5:

Compactness–Compact metric spaces–Compact subsets of R–Heine Borel theorem–Equivalent characterizations for compactness–Compactness and Continuity.

Text Book:

1. Dr. S. Arumugan, Modern Analysis–Yes Dee Publishing Pvt. Ltd. Reprint (2019).

Books for Reference:

1. Richard R. Goldberg–Methods of Real Analysis-Oxford and IBH Publishing Co. New Delhi, Indian edition 1985.
2. R Visvanathan Nayak, Real Analysis- Emerald Publishers, Reprint 1992.
3. Dr. B.S. Vatsa, Introduction to Real Analysis, CBS Publishers and Distributors, New Delhi.

STATICS

Objective:

- To provide the basic knowledge of equilibrium of a particle and to develop a working knowledge to handle practical problems.

UNIT–1:

Forces acting at a point–Parallelogram law of forces–Triangle law of forces–Lami's theorem

UNIT–2:

Parallel forces and moments–resultant of two parallel forces resultant oftwoun like unequal parallel forces–Varigon's theorem

UNIT–3:

Equilibrium of three forces acting on a rigid body–three coplanar forces theorem.

UNIT–4:

Friction–Laws of friction–angle of friction–equilibrium of a particle (i)onaroughinc lined plane(ii)under a force parallel to the plane (iii)under any force

UNIT–5:

Equilibrium of strings–equation of the common catenary–tension at any point–geometrical properties of common catenary

Text Book:

1. M.K. Venkatraman–Statics, Agasthiar Publications, Trichy(2020).

Books for reference:

1. S.Narayanan, Statics S.Chand and Company, NewDelhi (1985).
2. K.Viswanatha Naik and M.Kari, Statics ,Emerald Publishers, Chennai.
3. Rajeswari–Mechanics-Saras Publication, Nagercoil (2016).

INTEGRAL TRANSFORMS AND Z TRANSFORMS

Objective:

- To develop the knowledge of transforms and to solve problems in Fourier transforms and Z transforms.

UNIT–1:

Fourier Transforms–Properties of Fourier Transforms.

UNIT–2:

Infinite Fourier Cosine and Sine Transforms–Properties.

UNIT–3:

Finite Fourier Transforms.

UNIT–4:

Z-transforms–Properties.

UNIT–5:

Inverse Transforms- Introduction to difference equations and find solution using inverse Z transforms

Text Book:

1. Singaravelu. A–Eingineering mathematics (volumeIII) –Meenakshi Agency, Chennai (2019).

Books for Reference:

1. Muthu Kumaraswamy. R- Transforms and Partial Differential Equation Equations–Yes Dee Publications –Second Edition (2019).
2. Gangatharan, Engineering Mathematics (volume I) –Prentice Hall of India Pvt. Ltd. (2007).
3. Dr.C.Muthulakshmi @ Saisikala and R.Ponraj- Transforms and their applications, Charulatha Publication(2020).

PROGRAMMING IN C

Objective:

- To study the basic concepts and structure of C program and to train the students to write simple C programs.

UNIT–1:

Introduction – Character set, C tokens, keywords and identifiers, Constants ,Variables and Data types.

UNIT–2:

Operators – Arithmetic, relational, logical assignment, increment and decrement, Conditional, Bitwise special operators, Precedence of operators, Managing input and output operators – getchar(), putchar(),scanf() and printf().

UNIT–3:

Decision making and branching-Simple if, if else, nested if and the else if ladder statements, The switch statement,The ?: operator, The goto statement. Decision making and looping-while, Dowhile and for statement, jumpsinloops.

UNIT–4:

One dimensional and two dimensional arrays–declaration, initialization of arrays, Multidimensional arrays, Character arrays and strings: Declaring and initializing string variables, Reading and writing of strings, string handling functions.

UNIT–5:

User defined functions–Definition of function, return values and their types, function calls, function declaration, Category of functions, Nesting of functions, recursion.

Text Book:

1. E. Balaguruswamy - Programming in ANSI C –Tata McGraw Hill Publishing company limited –III Edition (2017).

Books for references:

1. Reema Thareja, Programming in C- Oxford University Press(2018).
2. Ramasamyet.al.-Programming in C-Scetech Publication (INDIA)Pvt. Ltd. IIEdition (2015).
3. Ashok N. Kamathane- Programming with Ansi and TurboC–Dorling Kindersley (India) Pvt. Ltd, (2009).

DISCRETE MATHEMATICS

Objective:

- To study concepts of mathematical logics and to understand the basics of Lattices and Boolean Algebra.

UNIT–1:

Mathematical logic – Statements and notation, Connectives, Negation, Conjunction, Disjunction, Statement formula and truth table, Conditional and biconditional statements. Well defined formulae, tautologies.

UNIT–2:

Normal forms - The theory of interference for the statement calculus, The Predicate, Theory of inference for the Predicate Calculus.

UNIT–3:

Algebraic structures - Groups and monoids, Simple properties, Group codes.

UNIT–4:

Lattices and Boolean algebra -Lattices asposets, Properties of lattices, special lattices, Boolean algebra, Gating networks, Minimal sums of products.

UNIT–5:

Number system and codes - Decimal, Binary, Octal, Hexadecimal–Conversion from one to another–Binary addition, subtraction, multiplication and division, BCD, Weighted excess time, Gray code.

Text Book:

1. J.P. Tremblay and Manohar- Discrete mathematical structures with application to Computer Science(Tata McGraw Hill)New Delhi, 43rd edition 2013.

Books for Reference:

1. M. K. Venkataraman and others –Discrete mathematics- The National Publishing Pvt. Ltd.(2000).
2. G. Balaji– Discrete mathematics– Balaji Publishers Chennai(2013).
3. T. Veerarajan–Discrete mathematics Tata McGraw Hill –2009.
4. Garett Birkh off-Lattice Theory, American Mathematical Soceity(1948).
5. M.K. Sen, B.C.Chakraborty, Introduction to Discrete Mathematics, Books and Allied (P) Ltd (2009).

COMBINATIONAL MATHEMATICS

Objective:

- To know the basic concepts of pairings and to understand relations

Course Content

UNIT–1:

Selections and Binomial coefficients–Permutations–Ordered selections–unordered selections–Miscellaneous Problems.

UNIT–2:

Parings Problems–Pairings within a set–Pairing between sets.

UNIT–3:

Recurrence–Fibonacci–type relations using generating functions–Miscellaneous methods.

UNIT–4:

The Inclusion–Exclusion Principles.

UNIT–5:

Block designs–square block designs.

Text Book:

1. Ian C. Andersen–A first course in combinatorial mathematics –Clarendon Press, Oxford (1989).

Books for Reference

1. Ralph P. Grimaldi, B.V. Ramona –Discrete and combinatorial mathematics–an applied introduction (IV edition).

OPERATIONS RESEARCH -I

Objective:

- To introduce the various techniques of operations research

UNIT–1:

Linear Programming Problem: Mathematical formulation of LPP–Graphical method, Simplex method–Artificial variable technique.

UNIT–2:

Concept of Duality–Primal and Dual problems–Duality–Dual Simplex method.

UNIT–3:

Transportation Problem: North-west Corner rule–Matrix-Minima method–Vogel's approximation method–MODI method–Degeneracy and unbalanced Transportation problem.

UNIT–4:

Assignment Problem: Hungarian method –Unbalanced assignment problems.

UNIT–5:

Sequencing Problem: n jobs and two machines – n jobs and three machines – 2 jobs and m machines.

Text Book:

1. Kanti Swarup, P. K. Gupta and Manmohan – Operations Research – Sultan Chand and sons, (New Delhi)12th edition (2006)

Books for Reference:

1. GuptaP.K and D.S.Hira–Operations Research– S.Chand & Sons Reprint (2012).
2. J.Ranganath and A. S.Srikantappa–Operations Research–YesDee Publishing House, Chennai (2017).
3. Hamdy A.Taha –Operations research, An introduction- 8thEdition Prentice–Hall India (2006).
4. A.C.S. Kumar, Operation Research, Yes Dee Publications, Chennai, 3rd Reprint 2019.

STOCHASTIC PROCESS

Objective:

- To understand the concepts of stochastic process and understand the generalization of Poisson process

UNIT–1:

Generating functions–Laplace transform of probability distribution, Classification of distribution, Stochastic process, specification of stochastic process.

UNIT–2:

Markov chains – Definition and examples , Higher transition probabilities, Generalisation of independent Bernoulli Trails, classification of states and chains, Determination of Higher Transition Probabilities–stability of Markov systems.

UNIT–3:

Markov chain with Denumerable number states – Reducible chains, Statistical inference for Markov chains, Markov chain with continuous state space, Non homogeneous chains.

UNIT–4:

Markov process with discrete state space–Poisson process, Poisson process and related distributions, Generalisation of Poisson process, Birth and Death process.

UNIT–5:

Markov process with Discrete state space–Derived Markov chains, Erlang Process.

Text Book:

1. J.Medhi–Stochastic Process–New Age International Publishers Pvt. Ltd. Third Edition. 2009.

Books for Reference:

1. Suddhendu Biswas – Applied Stochastic Process – New Central Agency Pvt. Ltd., Kolkatta (2012).
2. Paul G. Hoel, Sidney Port & Charles J. Stone–Introduction to Stochastic process–Waveland Press– Boston (1987).
3. V.Thangaraj, Stochastic Process and their applications, New Age International Publishers, New Delhi, First Edition (1995).

PERSONALITY DEVELOPMENT

UNIT I: INTRODUCTION

Concept of personality - Dimensions of personality – Significance & Stages of personality development - Elements of Success

UNIT II POSITIVE ATTITUDE & SELF-MOTIVATION

Attitude - Concept - Significance - Factors affecting attitudes - Positive attitude – Advantages –Negative attitude- Disadvantages - Ways to develop positive attitude - Differences between personalities having positive and negative attitude. Concept of motivation - Significance – Internal and external motives - Importance of self-motivation-Factors leading to de-motivation

UNIT III SELF DEVELOPMENT SKILLS

Emotional Adjustment - Self-Awareness – Self-esteem - Self-Confidence - Stress CopingAbility – Time Management

UNIT IV SOCIAL SKILLS DEVELOPMENT

Assertiveness - Interpersonal Relationship – Problem Solving - Decision Making - ConflictResolution

UNIT V SERVICE ORIENTATION & EMPLOYABILITY QUOTIENT

Social Concern - Value System and Culture; Resume building- Developing Group DiscussionSkills – Facing the Mock Interview Sessions

Text Books:

1. Hurlock, E.B (2006). Personality Development, 28th Reprint. New Delhi: Tata McGraw Hill.
2. Bhatia, R. C. (2010). Personality Development, Ane Books Pvt. Ltd., Chennai.
3. Aurther, J. (2006). Personality Development. Lotus Press, New Delhi.

Reference Books:

1. Andrews, Sudhir. How to Succeed at Interviews. 21st (rep.) New Delhi.Tata McGraw-Hill 1988.
2. Stephen P. Robbins and Timothy A. Judge (2014), Organizational Behavior 16th Edition: Prentice Hall.
3. Hindle, Tim. Reducing Stress. Essential Manager series. Dk Publishing, 2003
4. Mile, D.J Power of positive thinking. Delhi. Rohan Book Company, (2004).
5. Pravesh Kumar. All about Self- Motivation. New Delhi. Goodwill Publishing House.2005.
6. Seven Habits Of Highly Effective People – Stephen Covey
7. You Can Win – Shiv Khera

EFFECTIVE COMMUNICATION

Objectives:

- To impart effective communication skills to enrich students' personality development and self confidence
- To enhance the students' employability skills
- The courses will help to bridge the gap between the skill requirements of the employer or industry and the competency of the students

Teaching Methodology:

Lectures, Practical classes, Video, Public speaking, Group Discussion and Case Studies

Unit – I Introduction

Introduction to Communication, Flow of Communication, Elements of Communication and their characteristics - Models of Communication - Barriers to Communication, How to overcome barriers of communication.

Unit – II Understanding Human Communication

Types of Communication transactions, Culture and communication- Signs, symbols and codes in communication, Tools of communication (Oral, written, one way, two way, verbal and nonverbal, vertical and horizontal and lateral) Business communication-Body language.

Unit – III Effective Communication

Concept, nature and relevance to communication process: - Empathy - Persuasion - Perception - Listening - Learning and Audio-Visual Aids- concept and classification

Unit – IV Language and Communication

Listening skills– Etiquette (Personal, social, telephone, email and global), Types of Listening, Barriers to Effective Listening & Traits of a Good Listener, Language for Communication: Language and Communication; General Principles of Writing; Improving Writing Skills, Essentials of good style, Expressions and words to be avoided

Unit – V Employment Communication

Soft Skills: Empathy - Intrapersonal skills - Interpersonal skills - Problem solving – Reflective thinking - Critical thinking - Negotiation skills, Employment Communication – Resume:Contents of Good Resume; Job Interview- Job Interview Techniques- Manners and etiquettes tobe maintained during an interview; and Presentation skills.

References:

- SOFT SKILLS, 2015, Career Development Centre, Green Pearl Publications.
- Barker, L. (1990). "Communication", New Jersey: Prentice Hall, Inc; 171.
- Devito, J. (1998) Human Communication. New York: Harper & Row.
- Patri and Patri (2002); Essentials of Communication. Greenspan Publications