



SHREE H. N. SHUKLA COLLEGE OF I.T. & MGMT.

(AFFILIATED TO SAURASHTRA UNIVERSITY)

3- Vaishalinagar
Nr. Amrapali Railway Crossing
Raiya Road, Rajkot – 360001
Ph. No–(0281)2471645

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Nr. Amrapali Railway Crossing
Raiya Road, Rajkot - 360001
Ph.No–(0281)2440478, 2472590

M. Sc. MATHEMATICS SEMESTER – 3

1	CMT – 3001	Prog. In C & Numerical Methods
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Name of the Course :Prog. In C & Numerical Methods

Course credit :04

Teaching Hours :70 (Hours)

Total marks :70+30

Objectives :

To solve problems in the field of Applied Mathematics, Theoretical Physics and Engineering which requires computing of numerical results using certain raw data.

To deal with various topics like finding roots of equations, solving systems of linear algebraic equations, interpolation and regression analysis, numerical integration & differentiation, solution of differential equation, boundary value problems, solution of matrix problems.

Unit	Content	No. of Lectures
1	Constants, variables, C tokens, keywords, identifiers, declaration of variables, operations and expressions, managing input and output operations and formatted output.	15
2	Decision making and branching statements like – if then else, if then switch, go to and loops, jump in loops	15
3	One or two dimensional array and their initialization, handling of character strings, User defined functions, structure, unions, pointers and file management in C.	15
4	Iterative methods introduction, beginning an iterative method, method of successive bisection, method of false position, Newton-Raphson iterative method, secant method, method of successive approximation, comparison of iterative methods, solution of polynomial equation	15
5	Solution of simultaneous algebraic equations introduction, Gauss elimination method, ill conditioned equations, refinement of the solution obtained by	10



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	Gaussian elimination, Gauss-Seidel iterative method, comparison of direct and iterative methods, Interpolation introduction, Lagrange interpolation, difference tables.	
	Total Lectures	70

Important instructions for paper setter –

Set University examination question paper for regular and external candidates as per the following instruction:

UNIVERSITY EXAMINATION

(All questions are compulsory for all student candidates)

Sr. No.	Particulars	Marks
1	QUESTION - 1 Short question. 07/10	14
2	QUESTION - 2 Long answer question 02/03	14
3	QUESTION - 3 (A) Long answer question 02/02 OR (B) Long answer question 02/02	14
4	QUESTION - 4 Long answer question 02/02	14
5	QUESTION - 5 Long answer question 02/03	14
	Total Marks for candidates	70

Recommended Reading:

- Introductory methods of Numerical analysis by S S Sastry, Prentice Hall of India, 1998.
- Computer Oriented Numerical Methods by V. Rajaraman, Prentice Hall of India, 1994.
- Programming in C, by E. Balagurusami units 2 to 12

2	CMT – 3002	Functional Analysis
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Name of the Course :Functional Analysis

Course credit :04

Teaching Hours :80 (Hours)

Total marks :70+30

Objectives:

In functional Analysis we learn the extension of the theory of measures, integration and probability to infinite dimensional spaces.

Unit	Content	No. of Lectures
1	Normed linear spaces, Banach spaces, Quotient space of a normed linear spaces and its completeness, bounded linear transformations, normed linear spaces of bounded linear transformations, dual spaces with examples.	20
2	Weak convergence in normed linear spaces, equivalent norms, Riesz lemma, Basic properties of finite dimensional normed linear spaces and compactness, weak convergence in normed linear spaces, reflexive spaces.	15
3	Uniform Boundedness theorem and its consequences, open mapping theorem, closed graph theorem, Hahn-Banach theorem for normed linear spaces, compact operations, solvability of linear equations in Banach spaces, the closed range theorem.	20
4	Inner product space, Hilbert space, orthonormal sets, Bessel's inequality, complete orthonormal sets, Parseval's identity, structure of Hilbert spaces, projection theorem, Riesz representation theorem for bounded linear functional on Hilbert spaces, reflexivity of Hilbert spaces.	15
5	Adjoint of an operator on a Hilbert space, self – adjoint, Normal, Unitary, Positive and Projection operators on Hilbert spaces, abstract variation boundary – value problem, the generalized Lax-Milgrem theorem.	10
Total Lectures		80

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4	QUESTION - 4 Long answer question 02/02	14
5	QUESTION - 5 Long answer question 02/03	14
Total Marks for candidates		70

Recommended Reading:

This course is covered by relevant portions from the text “Introductory Functional Analysis with Applications”, John Wiley and Sons, Newyork, 1978.

- Bachman G. and Warici L, Functional Analysis, Academic Press, 1966.
- Conway J. B., A Course in Functional Analysis, Springer-verlag, Newyork, 1990.
- Krishnan V. K. , Text Book of Functional Analysis; A Problem oriented approach, Printice Hall of India, 2001.
- Limaye B. V., Functional Analysis, New Age International Pvt. Ltd., 2001.
- Simmons G. F., Introduction to Topology and Modern Analysis, McGraw – Hill book company, Newyork, 1963.
- Taylor A. E., Introduction to Functional analysis, John Wiley and Sons, Newyork, 1958.

3	CMT – 3003	Number Theory-1
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Name of the Course :Number Theory-1

Course credit :04

Teaching Hours :70 (Hours)

Total marks :70+30

Objectives:

Understand the concept of divisibility and properties of prime numbers. Understand primitive rules, Largest Integer functions and Arithmetic Functions.

Unit	Content	No. of Lectures
1	Divisibility, Prime Numbers	15
2	Congruences, Linear Congruences and their solutions, Chinese Remainder Theorem, Degree of a Congruence relation and related theorems.	20
3	Primitive rules and related Theorems and Examples, Related Congruences and their solutions.	20
4	Largest Integer functions and related results, Arithmetic Functions.	15
Total Lectures		70

Important instructions for paper setter –

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Total Marks for candidates	70
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Recommended Reading:

- THE THEORY OF NUMBERS (Authors: Ivan Niven, Herbert S. Zuckerman, Hugh L. Montgomery).
- NUMBER THEORY (Authors: Z. I. Borevich and I. R. Shafarevich)
- AN INTRODUCTION TO THE GEOMETRY OF NUMBERS (Authors: J. W. S. Cassels)
- HISTORY OF THE THEORY OF NUMBERS (Authors: L. E. Dickson) .

4	CMT – 3004	Discrete Mathematics
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Name of the Course :Discrete Mathematics

Course credit :04

Teaching Hours :95 (Hours)

Total marks :70+30

Objectives:

Concepts and notations from discrete mathematics are useful in studying and describing objects and problems in branches of computer science, such as computer algorithms, programming languages, cryptography, automated theorem proving, and software development.

Unit	Content	No. of Lectures
1	Semigroups and Monoids, Homomorphism of Semigroups and Monoids, Products and Quotients of semigroups, Fundamental theorem of Homomorphism of Semigroups, Subsemigroups and submonoids. Relations, Transitive Closure and Warshall's Algorithm	30
2	Lattices as partially ordered sets, Properties of Lattices, Lattices as algebraic systems, Sublattices, Direct product and Homomorphisms of Lattices, Some Special Lattices, Finite Boolean Algebras, Functions on Boolean Algebras, Karnaugh Map Method.	20



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3	Languages and Grammars, Finite State Machines, Semigroups, Machines and Languages, Moore Machines, Simplification of Machines, Moore Machines and Regular Languages, Kleene's Theorem, Pumping Lemma, Nondeterministic Finite State Automata.	30
4	Propositions and Logical operations, Truth tables, Conditional statements and Logical Equivalence, Quantifiers, Rules of Inference. Unit 5 Elements of Coding Theory, The Hamming Metric, The Parity-Check and Generator Matrices, Group Codes: Decoding with Coset Leaders, Hamming Matrices.	15
Total Lectures		95

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4	QUESTION - 4 Long answer question 02/02	14
5	QUESTION - 5 Long answer question 02/03	14
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Recommended Reading:

- Grimaldi, R.P, Discrete and Combinatorial Mathematics, 3rd Edition, Addison-Wesley Publishing Company, 1994.



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- Johnsonbaugh,R., Discrete Mathematics, Pearson Education,First Indian Reprint,2001.
- Kolman,B, Busby,R.C., Ross,S.C., Discrete Mathematical Structures, 5th Edition, Pearson Education,2006.
- Lawson,M.V., Finite Automata, Chapman and Hall/CRC Press,2004.
- Tremblay, J.P., Manohar,R., Discrete Mathematical Structures with Applications to Computer Science, Tata-McGraw Hill Publishing Company Limited, New Delhi,21st Reprint, 2004.

5	EMT – 3011	Differential Geometry
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Name of the Course :Differential Geometry

Course credit :04

Teaching Hours :70 (Hours)

Total marks :70+30

Objectives:

Differential geometry used to analyze and describe geologic structures.

Unit	Content	No. of Lectures
1	Local theory of curves, space curves, examples. Planar curves, Helices, Frenet – Serret apparatus. Existence of space curves, involutes and evolutes of curves.	15
2	Local theory of surfaces – parametric patches on surface. First Fundamental form and arc length.	15
3	Normal curvature, Geodesic curvature and Gauss formulae, Shape operator L_p of a surface at a point, vector field a curve.	15
4	Second and third fundamental forms of a surface, Weingarten map, principal curvatures, Gaussian curvature, mean and normal curvatures.	15
5	Riemannian curvatures, Gauss theorem of Egregium, isometry groups and fundamental existence theorem for	10



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surfaces	
Total Lectures	70

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4	QUESTION - 4 Long answer question 02/02	14
5	QUESTION - 5 Long answer question 02/03	14
Total Marks for candidates		70

Recommended Reading:

- R. S. Milman and G. D. Parker, Elements of Differential Geometry, Prentice – Hall, 1977.
- B. O' Neil, Elements of Differential Geometry, Academic Press, 1966.
- M. Docarmo, Differential Geometry of curves and surfaces, Prentice – Hall, 1976.
- J. A. Thorpe, Introduction to Differential Geometry, Springer – Verlag.
- S. Sternberg, Lecture notes on Differential Geometry, Prentice – Hall, 1964.