



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

2 – Vaishalinagar
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Ph.No–(0281)2440478, 2472590

M. Sc. MATHEMATICS SEMESTER – 2

1	CMT – 2001	Algebra-2
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Name of the Course :Algebra-2

Course credit :04

Teaching Hours :85 (Hours)

Total marks :70+30

Objectives :

List and understand advance concepts of Algebra. Identify, define and perform operations on modules & define and verify homomorphism of modules.

Unit	Content	No. of Lectures
1	Division ring and Field, Extension fields, algebraic and transcendental extensions, Splitting fields, Normal extensions, Multiple roots, Finite fields, Separable extensions.	25
2	Automorphism fixed fields, Galois extension, Fundamental theorem of Galois Theory, Fundamental theorem of Algebra.	25
3	Modules (Definitions and examples), Submodules and Operation on modules	15
4	Homomorphisms of modules and quotient modules, completely reducible modules, finitely generated modules.	20
Total Lectures		85

Important instructions for paper setter –

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



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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:

- P. B. Bhattacharya, S. K. Jain and S. R. Nagpaul, Basic Abstract Algebra, Second Edition, Cambridge University Press, 1995.
- M. Artin, Algebra, Prentice-Hall of India Private Ltd., New Delhi, 1994.
- J. A. Gallian, Contemporary Abstract Algebra, Fourth Edition, Narosa Publishing House, New Delhi, 1999.
- N. S. Gopalakrishnan, University Algebra, New Age International Private Ltd. Publishers, New Delhi, Sixth Reprint, 1998.
- I. N. Herstein, Topics in Algebra, Second Edition, Wiley Pub. , New York, 1975.

2	CMT – 2002	Complex Analysis
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Name of the Course :Complex Analysis
Course credit :04
Teaching Hours :60 (Hours)
Total marks :70+30



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Objectives:

To understand the concept of complex plane and concept of stereographic projection. Determine continuity/differentiability/analyticity of a complex function and find the derivative of a function.

Unit	Content	No. of Lectures
1	The extended complex plane and its spherical representation, analytic functions, bilinear transformations, their properties and classifications, Branches of many valued functions with special reference to $\arg z$, $\log z$ and z^a , elementary Riemann surfaces, definition and properties of conformal mapping.	20
2	Riemann – Steiltjes integral and its properties, line integral and its properties, fundamental theorem of calculus for line integral, Leibnitz rule, Taylor's theorem, Cauchy's integral formula and Cauchy's theorem for analytic functions on an open disc, winding number of a closed rectifiable curve with respect to a point outside the curve and its properties, Cauchy's integral formula first version and second version, Cauchy's theorem first version, second version, third version and fourth version.	20
3	Cauchy – Goursat theorem, Moreras theorem, Cauchy's inequality, entire functions, Liouville's theorem, identity theorem, fundamental theorem of algebra, maximum modulus theorem and minimum modulus theorem.	12
4	Schwartz lemma, meromorphic functions, argument principle, Rouché's theorem, Open Mapping Theorem, Inverse function theorem.	5
5	Isolated singularities, classifications of singularities, Laurent's series, residue theorem, evaluation of integrals.	3
Total Lectures		60

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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:

This course is covered by relevant portions from the text

“Functions of One Complex Variable”

by John B. Conway,

Third Edition, Springer International Student Edition, Narosa Publishing House.

- Complex Analysis by L. V. Ahlfors, International Student Edition, Mc Graw – Hill Book Company, 1979.
- Complex Analysis by Karunakaran, Second Edition, Narosa Publishing House, 2006.
- A First Course in Complex Analysis with Applications by Dennis G. Zill and Patrik D. Shanahan, Second Edition, Jones & Bartlett Student Edition, 2010.
- Complex Analysis by S. Lang, Addison-Wesley, 1977.
- Foundations of Complex Analysis by S. Ponnusamy, Narosa Publishing House, 1977.
- Fundamentals of Complex Analysis with Applications to Engineering and Science by E. B. Saff and A. D. Snider, Third Edition, Pearson Education.
- Notes on Complex Function Theory by D. Sarasan, Hindustan Book Agency, 1994.



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3	CMT – 2003	Topology-2
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Name of the Course :Topology-2

Course credit :04

Teaching Hours :45 (Hours)

Total marks :70+30

Objectives:

Compare and classify the separation axioms of topological spaces. Understand, define Compact spaces and prove Tychonoff's theorem and Understand Sequentially compact and complete spaces.

Unit	Content	No. of Lectures
1	Separation Axioms: T1 – Spaces, T2 – Spaces (Hausdorff Spaces).	10
2	Separation Axioms: Regular Spaces, Completely Regular Spaces, Normal Spaces.	12
3	Compact Spaces, Locally Compact Spaces, Limit Point Compact Spaces.	13
4	Sequentially Compact Spaces, Compact Metric Spaces.	06
5	Complete Metric Spaces.	04
Total Lectures		45

Important instructions for paper setter –

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	OR (B) Long answer question 02/02	
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:

- Topology – A First Course, J.R.Munkres, Prentice Hall of India (2000). Chapter 3 (Article no. 26 to 29), Chapter 4 (Article no. 31,32,33 and 35) and Chapter 7 (Article no. 43)
- General Topology by S.Willard, Addison – Wesley Publishing Company (1970).
- Introduction to Topology & Modern Analysis, G.F.Simons, Tata Mcgraw Hill (2004).

4	CMT – 2004	Methods in Partial Differential Equations
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Name of the Course :Methods in Partial Differential Equations

Course credit :04

Teaching Hours :80 (Hours)

Total marks :70+30

Objectives:

Identify and understand surfaces in three dimensions and partial differential equations. Understand and utilize the methods to solve the given partial differential equations & understand and solve the given Boundary value problems and Equipotential surfaces.

Unit	Content	No. of Lectures
1	Surfaces and Curves in three dimensions, Simultaneous differential equations of the first order and the first degree in three 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	20



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	equations, Solution of Pfaffian differential equations in three variables, and Miscellaneous problems.	
2	Partial differential equations, Origins of First-order partial differential equations, Linear equations of the first order, Integral Surfaces passing through a given curve, Surfaces orthogonal to a given system of surfaces.	20
3	Non-linear partial differential equations of the first order, Charpit's method, Special types of first order equations, Solutions satisfying the given conditions, Jacobi's method, and Miscellaneous problems.	15
4	The origin of second order equations, Linear partial differential equations with constant coefficients, and Equations with variable coefficients.	25
Total Lectures		80

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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:

This course is covered by the relevant portions from the book 'Elements of Partial Differential Equations' by Ian Sneddon, McGraw-Hill Book Company.

□ Partial Differential Equations by F. John, Narosa Publishing Company, New Delhi, 1979.



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- Elementary Course in Partial Differential Equations by Amarnath, Narosa Publishing House, New Delhi, 1997.

5	EMT – 2001	Classical Mechanics-2
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Name of the Course :Classical Mechanics-2

Course credit :04

Teaching Hours :60 (Hours)

Total marks :70+30

Objectives:

Understand, define and verify Rigid Body Equations of Motion & understand and compare theory of relativity in classical mechanics.

Unit	Content	No. of Lectures
1	The Rigid Body Equations of Motion Angular momentum and kinetic energy of motion about a point, the inertia tensor and moment of inertia, the heavy symmetrical top with one point fixed.	15
2	Special Relativity in Classical Mechanics The basic program of special relativity, The Lorentz transformation, Lorentz transformations in real four dimensional spaces, Further descriptions of the Lorentz transformation, Covariant four – dimensional formulations, The force and energy equations in relativistic mechanics.	15
3	Hamilton's equation of Motion Derivation of Hamilton's equation of motion, Routh's procedure, derivation of Hamilton's equation from Hamilton's Principle, principle of least action, problem related to above topics.	15
4	Canonical transformations and Generating functions Poisson's brackets and their properties, Hamilton-Jacobi theory, problem related to above topics.	15
Total Lectures		60

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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:

- Classical Mechanics** by H. Goldstein, 2nd Edition, Narosa Publishing House
- Classical Mechnaics** by C. R. Mondal, Prentice Hall of India Pvt. Ltd.