**Sub Code : 16SCCMM12**

**ABSTRACT ALGEBRA**

1. To introduce the concept of Algebra from the basic set theory and Functions, etc.
2. To introduce the concept of Group theory and Rings.

### UNIT I

Groups : Definition and Examples – Elementary Properties of a Group – Equivalent Definitions of a Group.-Permutation Groups

### UNIT II

Subgroups - Cyclic Groups-Order of an Element – Cosets and Lagrange’s Theorem .

### UNIT III

Normal Subgroups and Quotient Groups - Isomorphism –Homomorphism

### UNIT IV

Rings: Definitions and Examples - Elementary properties of rings –Isomorphism - Types of rings.-Characteristic of a ring – subrings – Ideals - Quotient rings

### UNIT V

Maxi mal and Prime Ideals.-Homomorphism of rings – Field of quotient of an integral domain – unique factorization domain-Euclidean domain

### Textbook

1. S Arumugam and A Thangapandi Isaac, Modern Algebra, SciTech Publications, Chennai, 2003.

**Unit 1:** Chapter 3 Sections 3.1-3.4

**Unit 2:** Chapter 3 Sections3.5-3.8

**Unit 3:** Chapter 3 Sections 3.9-3.11

**Unit 4:** Chapter 4 Sections 4.1-4.8

**Unit 5:** Chapter 4 Sections 4.9- 4.11, 4.13-14

### References

1. N. Herstein, Topics in Algebra, John Wiley & Sons, Student 2nd edition, 1975.
2. Vijay, K. Khanna and S.K. Bhambri, A Course in Abstract Algebra, Vikas Publishing House Pvt. Ltd.

### Sub Code: 16SCCMM13

### COMPLEX ANALYSIS

**Objectives: To enable the students to**

1. Understand the functions of complex variables, continuity and differentiation of complex variable functions, C – R equations of analytic functions.
2. Learn about elementary transformation concepts in complex variable.
3. Know about complex Integral functions with Cauchy’s Theorem, power series expansions of Taylor’s and Laurant’s series.
4. Understand the singularity concepts and residues, solving definite integrals using the residue concepts.

### UNIT I

Functions of a Complex variable –Limits-Theorems on Limits –Continuous functions – Differentiability – Cauchy-Riemann equations – Analytic functions –Harmonic functions.

### UNIT II

Elementary transformations - Bilinear transformations – Cross ratio – fixed points of Bilinear Transformation – Some special bilinear transformations.

### UNIT III

Complex integration - definite integral – Cauchy’s Theorem –Cauchy’s integral formula

–Higher derivatives - .

### UNIT IV

Series expansions – Taylor’s series – Laurant’s Series – Zeroes of analytic functions – Singularities.

### UNIT V

Residues – Cauchy’s Residue Theorem –Evaluation of definite integrals.

### TEXT BOOK(S)

1. S.Arumugam, A.Thangapandi Isaac, & A.Somasundaram, Complex Analysis, New Scitech Publications (India) Pvt Ltd, 2002.

UNIT – I -Chapter 2 section 2.1 to 2.8 of Text Book

UNIT – II -Chapter 3 Sections 3.1 to 3.5 of Text Book

UNIT – III -Chapter 6 sections 6.1 to6.4 of Text Book

UNIT –IV -Chapter 7 Sections 7.1 to 7.4 of Text Book

UNIT – V -Chapter 8 Sections 8.1 to 8.3 of Text Book

### REFERENCE(S)

1. J.N. Sharma, Functions of a Complex variable, Krishna Prakasan Media(P) Ltd, 13th Edition, 1996-97.
2. T.K.Manickavachaagam Pillai, Complex Analysis, S.Viswanathan Publishers Pvt Ltc, 1994.

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### Sub Code: 16SCCMM14

### DYNAMICS

**OBJECTIVE:**

1. To provide a basic knowledge of the behavior of objects in motion.To develop a working knowledge to handle practical problems.

### UNIT I

Introduction-Kinematics: Velocity-Relative Velocity-Angular Velocity-Acceleration- Relative Acceleration-Motion in a straight line under uniform acceleration.

### UNIT II

Projectile: Projectile-Path of a projectile-Characteristics-Horizontal projection-Projectile up/down an inclined plane-Enveloping parabola.

### UNIT III

Collision of Elastic Bodies: Introduction-Definitions-Fundamental Laws of impact- Impact of a smooth sphere on a fixed smooth plane-Direct impact of two smooth spheres-Oblique impact of two smooth spheres-Dissipation of energy due to impact- Compression and Restitution-Impact of a particle on a rough plane.

### UNIT IV

Simple Harmonic Motion: Introduction-S.H.M. in straight line-Compositions of simple harmonic motions of the same period.

### UNIT V

Motion Under The action Of Central Forces: Velocity and acceleration in polar coordinates-Equiangular spiral-Differential Equation of central orbits-Pedal Equation of the central orbit-Two-fold problems in central orbits.

### TEXT BOOK:

1. Dr.M.K.VENKATARAMAN, Dynamics, Agasthiyar Publications, Thirteenth Edition, July 2009.

UNIT I -Chapter2, Chapter 3, Section 3.1-3.22

UNIT II -Chapter6, Sections 6.1-6.17

UNIT III -Chapter8, Sections 8.1-8.11

UNIT IV -Chapter 10, Sections 10.1-10.13

UNIT V -Chapter 11, Sections 11.1-11.13

### REFERENCE(S)

1. P. Duraipandian, Laxmi Duraipandian and Muthamizh Jayapragasam, Mechanics S.Chand &Company PVT, LTD, 2014
2. A.V.Dharmapadham, Dynamics, S, Viswanathan Publishers Pvt.Ltd. 2006.

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### Sub Code: 16SMBEMM2:1

### GRAPH THEORY

**Objectives**

1. To introduce the notion of graph theory and its applications.
2. To learn the techniques of combinatorics in Graph Theory.

### UNIT I

Introduction - The Konigsberg Bridge Problem - Graphs and subgraphs: Definition and Examples - Degrees - Subgraphs - Isomorphism. –independent sets and coverings.

### UNIT II

Matrices - Operations on Graphs - Walks, Trails and Paths – Connectedness and Components - Eulerian Graphs.

### UNIT III

Hamiltonian Graphs (Omit Chavatal Theorem) - Characterization of Trees - Centre of a Tree.

### UNIT IV

Planarity: Introduction - Definition and Properties - Characterization of Planar Graphs.

### UNIT V

Directed Graphs: Introduction - Definitions and Basic Properties – Some Applications: Connector Problem - Kruskal’s algorithm - Shortest Path Problem – Dijkstra’s algorithm.

### Textbook

1. S. Arumugam and S. Ramachandran, Invitation to Graph Theory, SciTech Publications (India) Pvt. Ltd., Chennai, 2006.

UNIT-I Chapter-1 Sec 1.0, 1.1 and Chapter -2 Sec 2.0, 2.1, 2.2, 2.3, 2.4.2.6

UNIT-II Chapter-2 Sec 2.8,2.9 ,Chapter-4 Sec 4.1,4.2 and Chapter-5 Sec 5.0,5.1

UNIT-III Chapter-5 Sec 5.2, Chapter-6 Sec 6.0, 6.1, 6.2.

UNIT-IV Chapter-8 Sec 8.0, 8.1, 8.2.

UNIT-V Chapter-10 Sec 10.0, 10.1 Chapter-11 Sec 11.0, 11.1, 11.2

### References

1. Narsingh Deo, Graph Theory with applications to Engineering and Computer Science, Prentice Hall of India, 2004.
2. Gary Chartrand and Ping Zhang, Introduction to Graph Theory, Tata McGraw-Hill Edition, 2004.

### Sub Code: 16SMBEMM3:1

**ASTRONOMY**

1. To introduce the exciting world of astronomy to the students.
2. To help the students to study spherical trigonometry in the field of astronomy.
3. To understand the movements of the celestial objects.

### UNIT I

Relevant properties of sphere and formulae in spherical trigonometry (no proof, no problems) - Celestial sphere and diurnal motion -Celestial coordinates-sidereal time.

### UNIT II

Morning and evening stars -circumpolar stars- diagram of the celestial sphere -zones of earth -perpetual day-dip of horizon-twilight.

### UNIT III

Refraction - laws of refraction -tangent formula-Cassini’s formula - horizontal refraction- geocentric parallax -horizontal parallax.

### UNIT IV

Kepler’s laws - verification of 1st and 2nd laws in the case of earth - Anomalies -Kepler’s equation - Seasons -causes -kinds of years.

### UNIT V

Moon-sidereal and synodic months - elongation - phase of moon - eclipses-umbra and penumbra - lunar and solar eclipses - ecliptic limits - maximum and minimum number of eclipses near a node and in a year - Saros.

### Book for Study:

1. Kumaravel, S. and Susheela Kumaravel, *Astronomy*, 8th Edition, SKV Publications, 2004.

Unit 1: Sec: 39-79

Unit 2: Sec: 80-90,106-116

Unit3: Sec: 117-144

Unit 4: Sec: 146-162,173-178

Unit 5: Sec: 229-241,256-275

### Book for Reference:

1. G V Ramachandran, Text Book of Astronomy, Mission Press, Palayamkott