Year: III Year   Subject Code :   U15MMA501   Semester :   V

Major - 7   Title: **Abstract Algebra**

Credits: 4   Max. Marks. 75

UNIT-I: Groups
Definition of a Group - Examples – Subgroups.

UNIT-II: Groups (Contd.)
Counting Principle - Normal Subgroups - Homomorphisms.

UNIT-III: Groups (Contd.)
Automorphisms - Cayley's Theorem - Permutation Groups.

UNIT-IV: Rings
Definition and Examples - Integral Domain - Homomorphism of Rings - Ideals and Quotient Rings.

UNIT-V: Rings (Contd.)
Prime Ideal and Maximal Ideal - The field of quotients of an Integral domain – Euclidean rings.

Recommended Text

I.N.Herstein. (1989) Topics in Algebra, (2nd Edn.) Wiley Eastern Ltd. New Delhi

Chapter-2: Sections 2.1-2.10 (Omit Applications 1 and 2 of 2.7)

Chapter-3: Sections 3.1, 3.2, 3.3, 3.4, 3.5, 3.6, 3.7

Reference Books

1. S.Arumugam. (2004) Modern Algebra. Scitech Publications, Chennai.

2. J.B.Fraleigh (1987). A First Course in Algebra (3rd Edition) Addison Wesley, Mass. (Indian Print)

3. Lloyd R.Jaisingh and Frank Ayres,Jr. (2005) Abstract Algebra, (2nd Edition), Tata McGraw Hill Edition, New Delhi.

4. M.L.Santiago (2002) Modern Algebra, Tata McGraw Hill, New Delhi.

5. Surjeet Singh and Qazi Zameeruddin. (1982) Modern Algebra. Vikas Publishing House Pvt. Ltd. New Delhi.

C. Abdul Hakeem College (Autonomous), Melvisharam.

Syllabus for B.Sc., Mathematics effective from the Batch 2015-2016

Year: III Year   Subject Code :   U15MMA502   Semester : V

Major - 8   Title: **Real Analysis - I**

Credits: 4   Max. Marks. 75

UNIT-I: Functions & Sequences
Functions – Real valued functions – Equivalence – Countability and Real Numbers – Least Upper Bound – Definition of Sequence and Subsequence – Limit of a Sequence – Convergent Sequence
Ch. 1.4 to 1.7, 2.1 to 2.3 of Goldberg.

UNIT-I: Sequences [Contd...]
Divergent Sequences – Bounded Sequences – Monotone Sequence – Operations on Convergent Sequences – Operations on Divergent Sequences – Limit Superior and Limit Inferior – Cauchy Sequences
Ch. 2.4 to 2.10 of Goldberg.

UNIT-III: Series of Real Numbers
Convergence and Divergence – Series with non negative terms – Alternating series – conditional convergence and Absolute convergence – Test for Absolute convergence.
Ch. 3.1 to 3.4 and 3.6 of Goldberg.

UNIT-IV: Series of Real Numbers [Contd...]
Test for Absolute convergence – The class ℓ^2 – Limit of a function on the real line – Metric spaces – Limits in Metric spaces.
Ch. 3.7, 3.10, 4.1 to 4.3 of Goldberg.

UNIT-V: Continuous Functions on Metric Spaces
Functions Continuous at a point on the real line – Reformulation – Functions Continuous on a Metric Spaces – Open Sets – Closed Sets.
Ch. 5.1 to 5.5 of Goldberg

Recommended Text

R.Goldberg [2000] Methods of Real Analysis. Oxford & IBH Publishing Co., New Delhi.

C. Abdul Hakeem College (Autonomous), Melvisharam.

Reference Books

1. Tom M.Apostol [1974] Mathematical Analysis, 2nd Edition, Addison-Wesley New York.

2. Bartle, R.G. and Shebert [1976] Real Analysis, John Wiley and Sons Inc., New York.

3. Malik, S.C. and Savita Arora [1991] Mathematical Analysis, Wiley Eastern Limited, New Delhi.

4. Sanjay Arora and Bansi Lal [1991], Introduction to Real Analysis, Satya Prakashan, New Delhi.

Year: III Year   Subject Code :   U15MMA503   Semester : V

Major - 9   Title: **Complex Analysis**

Credits: 4   Max. Marks. 75

UNIT-I: Analytic functions
Definitions of function of a complex variable- Limits -Continuity-Derivatives and Differentiation formula-Cauchy-Riemann equations in Cartesian and polar Co ordinates -properties of Analytic functions-Necessary and Sufficient conditions for Analytic functions- Harmonic functions -Determination of Harmonic conjugate and Analytic functions.

UNIT-II: Mappings
Conformal mapping- The transformations $w = z + d$, $w = \frac{1}{z}$, $w = z^2$, $w = \sqrt{z}$, $w = e^z$, $w = \sin z$ - Bilinear Transformation and special Bilinear Transformation.

UNIT-III: Integrals
Contours - Line Integrals - Cauchy - Goursat's Theorem (with out proof) - Cauchy's Integral Formula - Derivatives of Analytic Functions – Maximum modulus Theorem.

UNIT-IV: Power Series
Taylor's and Laurent's Theorem – Singularities and classification – Problems.

UNIT-V: Residues and Poles
Residues – Cauchy's Residues Theorem – Evaluation of real improper integrals – improper integrals involving sine and cosine.

Recommended Text

R.V.Churchill and J.W.Brown, (1984) Complex Variables and Applications. McGraw Hill International Book Co., Singapore. (Third Edition).

Reference Books

1. P. Duraipandian and Laxmi Duraipandian (1976) Complex Analysis: Emerald Publishers, Chennai.
2. S. Ponnusamy. (2000) Foundations of Complex Analysis, Narosa Publishing House, New Delhi.
3. Murray R. Spiegel. (2005) Theory and Problems of Complex Variable. Tata-Mcgraw Hill Edition, New Delhi.

Year: III Year   Subject Code :   U15MMA504   Semester :   V

Major - 10   Title: **STATICS**

Credits: 4   Max. Marks. 75

UNIT- I

Forces, Type of forces- Resultant of three forces related to triangle acting at a point -
Resultant of several forces acting on a particle - Equilibrium of a particle under three
forces -Equilibrium of a particle under several forces - Limiting Equilibrium of a
particle on an inclined plane.
Chapter: 2 & 3

UNIT- II

Moment of a forces- General motion of a Rigid body- Equivalent system of forces –
Parallel forces- Forces along the sides of the triangle – Couples- Resultant of several
coplanar forces – Equation of line of action of the resultant – Equilibrium of a rigid
body under three coplanar forces.
Chapter: 4

UNIT- III

Reduction of coplanar forces into a force and a couple – Friction – laws of friction –
cone of friction and angle of friction – Applications involving frictional forces.
Chapter: 5 (Omit:5.2.1)

UNIT - IV

Center of mass – Center of mass not using integration: triangular lamina – Three
particles of same mass - Three particles of certain masses – uniform rods forming a
triangle – lamina in the form of a trapezium and solid tetrahedron – Center of mass
using integration: circular arc – circular lamina – elliptic lamina – solid hemisphere –
solid right circular cone – hemispherical shell – hollow right circular cone – cardiodal
lamina – Center of mass of a non-homogeneous solid.
Chapter: 6 (Omit 6.2.4 & 6.3)

UNIT- V

Equilibrium of a uniform homogeneous string - Equation of the shape of the strings
hanging under gravity in Cartesian form – Equation of the shape of the string hanging
under gravity in parametric form – Sag – Suspension bridge.
Chapter: 9

C. Abdul Hakeem College (Autonomous), Melvisharam.

Recommended Text

P. Duraipandian, Laxmi Duraipandian , Muthamizh Jayapragasam, Mechanics, 6-e, S. Chand and Company Ltd, 2005.

Reference Books

1. S. Narayanan, R. Hanumantha Rao, K. Sitaraman, P. Kandaswamy, *Statics*, S. Chand and Company Ltd, New Delhi.

2. S. L. Loney, *An Elementary Treatise on Statics*, Combridge University Press, 1951

3. A.V. Dharmapadam(1991) *Mechanics*. S. Viswanathan Printers & Publishers. Chennai.

4. M.K. Venkataraman (1990) *Statics*. A Rajhans Publications. (16th Edn), Meerut.

5. Joseph F. Shelley (2005) Vector Mechanics for Engineers Vol-I: Statics, Tata McGraw Hill Edition, New Delhi.

Year: III Year   Subject Code :   U15EMA501   Semester :   V

Elective - 1   Title: **A. Graph Theory (Elective)**

Credits: 4   Max. Marks. 75

UNIT-I
Graphs, subgraphs, Degree of a vertex, Isomorphism of graphs, independent sets and coverings, Intersection graphs.
Chapter: 2 (2.0 – 2.7)

UNIT-II
Adjacency and incidence of matrices; Operations on graphs – Walks; trails; paths.
Chapter:2 (2.8 – 2.9)
Chapter: 4 (4.0 - 4.1)

UNIT-III
Connectedness and components; cut point, bridge, block. Connectivity theorems and simple problems.
Chapter:4 (4.2 – 4.4)

UNIT-IV
Eulerian graphs and Hamiltonian graphs; simple problems. Trees, theorems, and simple problems.
Chapter:5 (5.0 – 5.2)
Chapter:6 (6.0 – 6.2)

UNIT-V
Planarity – definition and properties- characterization of planar graph, colourability, chromatic number.
Chapter:8 (8.0 – 8.2)
Chapter:9 (9.0 – 9.1)

Recommended Text

S.Arumugam and S.Ramachandran, "Invitation to Graph Theory", SITECH Publications India Pvt. Ltd., 7/3C, Madley Road, T.Nagar, Chennai - 17

Reference Books
1. S.Kumaravelu, Susheela Kumaravelu, Graph Theory, Publishers, 182, Chidambara Nagar, Nagercoil-629 002.

2. S.A.Choudham, A First Course in Graph Theory, Macmillan India Ltd.

3. Robin J.Wilson, Introduction to Graph Theory, Longman Group Ltd.

4. J.A.Bondy and U.S.R. Murthy, Graph Theory with Applications, Macmillon, London.

Year: III Year   Subject Code :   U15SMA501   Semester :   V

Skill Based - 3   Title: **Quantitative Techniques (SBS - III)**

Credits: 3   Max. Marks. 60

UNIT-I: Statistical Techniques: Statistical Quality Control:
Introduction – basis of control charts – control charts for variables – control charts for attributes – control charts for mean and variance.

UNIT-II: Index Numbers:
Introduction – construction of index number – classification of index number – wholesale index number – cost of living index numbers (Importance to be given only to simple problems)

UNIT-III: Time series analysis:
Introduction – components of time series – analysis of time series – measurement of trends (Importance to be given only to simple problems).

UNIT-IV: Sequencing problem:
Sequencing problem - n jobs through 2 machines, n jobs through 3 machines - two jobs through m machines – n jobs through m machines.

UNIT-V: Z-Transform Techniques
Z-transform – elementary properties – Inverse Z – transforms – solution of difference equations using Z-transforms.

Recommended Text

1. S.C. Gupta and V.K.Kapoor, Fundamentals of Applied Statistics, S.Chand & Co., Delhi.

2. Gupta P.K. and Hira D.S. (2000) Problems in Operations Research, S.Chand & Co. Delhi.

3. A.Singaravelu-[2007] – Engineering mathematics III, Meenakshi agency, Che.

Reference Books

1. P.R.vittal, Business Statistics & Operations Research, Margham Publications, Chennai.

2. P.Kandasamy and others, Probability statistics and queuing theory, Sultan Chand & Sons.

3. V.Sundaresan, K.S. Ganapathy Subramanian and K.Ganesan, Resource management techniques, Meenakshi Pub., Arapakkam-609111.

4. Arumugam & Issac, Linear programming, New Gamma Pub., House Palayamkottai.

Syllabus for B.Sc., Mathematics effective from the Batch 2015-2016

Year: III Year   Subject Code :   U15MMA601   Semester :   VI

Major - 11   Title: **Linear Algebra**

Credits: 4   Max. Marks. 75

UNIT-I: Vector Spaces
Definition and examples-Linear dependence and independence.

UNIT-II: Vector Spaces (Contd.)
Dual space - Inner Product spaces.

UNIT-III: Linear Transformation
Algebra of linear transformations - Characteristic roots

UNIT-IV: Linear Transformation (Contd)
Matrices, Canonical forms; Triangular forms.

UNIT-V: Linear Transformation (Contd)
Trace and Transpose, Determinants

Recommended Text

I.N.Herstein. (1989) Topics in Algebra. Wiley Eastern Ltd. New Delhi.
Chapter-4: Sections 4.1, 4.2, 4.3, 4.4,
Chapter-6: Sections 6.1, 6.2, 6.3, 6.4, 6.8, 6.9

Reference Books

1. S.Arumugam. (2004) Modern Algebra. Scitech Publications, Chennai.

2. J.B.Fraleigh (1986) A First Course in Algebra (3rd Edition) Addison Wesley. Mass. (IndianPrint)

3. S.Lipschutz (2005) Beginning Linear Algebra, Tata McGraw Hill Edition, New Delhi.

4. M.L.Santiago. (2002) Modern Algebra, Tata McGraw Hill, New Delhi.

5. Surjeet Singh and Qazi Zameeruddin. (1982) Modern Algebra. Vikas Publishing House Pvt.Ltd., New Delhi, 1982.

C. Abdul Hakeem College (Autonomous), Melvisharam.

Syllabus for B.Sc., Mathematics effective from the Batch 2015-2016

Year: III Year   Subject Code :   U15MMA602   Semester : VI

Major - 12   Title: **Real Analysis - II**

Credits: 5   Max. Marks. 75

UNIT-I: Connectedness, Completeness
Open Sets – Connected Sets – Bounded Sets and Totally Bounded Sets – Complete Metric Spaces.
Ch. 6.1 to 6.4 of Goldberg

UNIT-II: Compactness
Compact Metric Space – Continuous Functions on Compact Metric Spaces - Continuity of Inverse Functions – Uniform Continuity.
Ch. 6.5 to 6.8 of Goldberg

UNIT-III: Riemann Integration
Sets of measure zero - Definition Riemann Integral – Properties of Riemann Integral – Derivatives.
Ch. 7.1, 7.2 7.4, 7.5 of Goldberg.

UNIT-IV: Riemann Integration [Contd...]
Rolle's Theorem – The law of mean – Fundamental theorems of calculus – Taylor's theorem.
Ch. 7.6 to 7.8 and 8.5 of Goldberg.

UNIT-V: Sequences and Series of Functions
Pointwise convergence of sequences of functions – Uniform convergence of sequences of functions – consequences of uniform convergence – Convergence and uniform convergence of series of functions.
Ch. 9.1 to 9.4 of Goldberg.

Recommended Text

R.Goldberg Methods of Real Analysis Oxford & IBH Publishing Co., New Delhi.

Reference Books

1. Tom M.Apostol [1974] Mathematical Analysis, 2nd Edition, Addison-Wesley Publishing Company Inc. New York.
2. Bartle, R.G. and Shebert [1976] Real Analysis, John Wiley and Sons Inc., New York,
3. Malik, S.C. and Savita Arora [1991] Mathematical Analysis, Wiley Eastern Limited, NewDelhi.

4. Sanjay Arora and Bansi Lal [1991] Introduction to Real Analysis, Satya Prakashan, NewDelhi

Year: III Year   Subject Code :   U15MMA603   Semester :   VI

Major - 13   Title: **Dynamics**

Credits: 4   Max. Marks. 75

UNIT- I
Velocity: Relative Velocity, Angular Velocity.

Acceleration: Rectilinear motion, Rectilinear motion with constant acceleration.

Coplanar motion: Velocity and acceleration in a coplanar motion, angular velocity and relative angular velocity.

Chapter: 1.2 to 1.4

UNIT- II
Forces on a projectile- Projectile projected on an inclined plane – Enveloping parabola.

Chapter: 13.1 to 13.3

UNIT -III
Impulsive force, Conservation of linear momentum, Impact of a sphere, Laws of impact, Impact of two smooth spheres: Direct impact and Oblique impact, Direct impact of a smooth sphere on a plane, Oblique impact of a smooth sphere on a plane. Simple problems.

Chapter: 14

UNIT- IV
Central force and Central Orbit, Equation of central orbit, finding law of force and speed for a given orbit, Determination of the orbit when law of force is given, Kepler's Laws on planetary motion. Simple Problems.

Chapter: 16

UNIT -V
Moment of Inertia of simple bodies, Theorems of parallel and perpendicular axes, Moment of inertia of triangular lamina, circular lamina, circular ring, right circular cone, sphere. Simple problems.

Chapter: 17

C. Abdul Hakeem College (Autonomous), Melvisharam.

Recommended Text

P. Duraipandian, Laxmi Duraipandian ,Muthamizh Jayapragasam, Mechanics,

6-e, S.Chand and Company Ltd, 2005**.**

Reference Books

1. S. Narayanan, R. Hanumantha Rao, K. Sitaraman, P. Kandaswamy, Statics, S. Chand and Company Ltd, New Delhi.
2. S. L. Loney, An Elementary Treatise on Statics, Combridge University Press, 1951
3. A.V. Dharmapadam(1991) Mechanics. S. Viswanathan Printers & Publishers. Chennai.
4. M.K. Venkataraman (1990) Statics. A Rajhans Publications. (16th Edn), Meerut.
5. Joseph F. Shelley (2005) Vector Mechanics for Engineers Vol-I: Statics, Tata McGraw Hill Edition, New Delhi.

Year: III Year   Subject Code :   U15MMA604   Semester :   VI

Major - 14   Title: **Programming in C Language**

Credits: 3   Max. Marks. 60

UNIT-I
C Constants, variables, Data-type, Declaration of variables, assigning values to variables.

UNIT-II: Operators
Arithmetic, Relational, Logical, Assignment, Increment and decrement, Conditional, Arithmetic Expressions, Evaluation of Expressions, Precedence of Arithmetic operators, Formatted input and output.

UNIT-III: Operators and Arrays
Decision making and branching If, simple if, If else, Nesting of if - else, Else - If ladder, Switch statement, the?: operator, Go to statement. Decision making with looping: While, Do, For statement, Jumps in loops.

Arrays: 1 - dimensional array, 2 - dimensional array, Initializing 2 - dimensional array, Multi - dimensional arrays.

UNIT-IV: User-Defined Function
Need for User-defined function, Multi-function program, the form of C-Function, Return Value and their types.
Structures and Unions:
Structure definition, Structure initialization, Comparison of structure variables, union**.**

UNIT-V: Pointers
Understanding Pointers, Accessing the address of a variable, Declaring and initializing of pointers, accessing a variable through its pointer, Pointer expression. Pointers and arrays, Pointers and structures.

Recommended Text
E.Balagurusamy. (1996) Programming in ANSI C. Tata McGraw Hill, New Delhi.

Chapters:
2.5 to 2.9, 3.2 to 3.7, 3.10 to 3.12, 4.4 to 4.5
5.2 to 5.9, 6.2 to 6.5, 7.2 to 7.5, 9.2 to 9.5
10.2, 10.4, 10.5, 10.10, 11.2 to 11.6, 11.8, 11.11

Reference Books
1. V.Rajaraman. (1995) Computer Programming in C. Prentice Hall. New Delhi
2. H. Schildt, Obsborne. (1994) Teach Yourself C McGraw Hill. New York.
3. Mullish Cooper. The Spirit of C- An Introduction to Modern Programming. Jaico Publishing House. Delhi. 1998.
4. Yashavant kanetkar, let us C, 16TH edition BPB publication.

Year: III Year   Subject Code :   U15EMA601   Semester :   VI

Elective - 2   Title: **A. Calculus of Finite Differences and Numerical Methods (Elective - II)**

Credits: 4   Max. Marks. 75

(Note: All the Formulae without Proof - Units I to V)
UNIT-I: Finite differences & Interpolation
Forward difference operator ▲ and Backward difference operator ▼ and shifting operator E, Relation between ▲, ▼and E - Interpolation - Newton - Gregory forward & backward formulae, Estimating the missing terms- Lagrange's and Newton's divided difference Formula for unequal intervals. Only Problems.

Chapter: 2 (2.1) page: 7 - 28

Chapter: 3 (3.1 – 3.3) page: 53 – 86

Chapter: 3(3.5) Page: 91 – 111.

UNIT-II: Solutions of simultaneous linear equations
Gauss elimination method - matrix inversion method - Gauss-Jordan Method, Gauss – Seidal method. Only Problems.

Chapter: 12 (12.6) Page: 394-405

Chapter: 13 (13.1 – 13.4) Page: 406-416.

UNIT-III: Numerical Differentiation
Newton's forward and backward differences formulae to compute derivatives - using Gauss forward and backward formulae.

Chapter: 5 Page: 151- 165.

UNIT-IV: Numerical Integration
General Quadrature formula - Trapezoidal rule - Simpson's one third rule - Simpson's three eight rule – Weddle's Rule.

Chapter: 6 (6.1) Page: 174 – 206.

UNIT-V: Solution of Algebraic and Transcendental Equations:
Bisection method - Regula - falsi method (False Position method) - Newton-Raphson method. Numerical solution of ordinary Differential equation (First order only): Euler's method modified Euler's method, Picard's method, Runge - Kutta method.

Chapter: 15 (15.4 – 15.5 & 15.8)
Chapter: 16 (16.1, 16.2, 16.4, 16.6, 16.7).

C. Abdul Hakeem College (Autonomous), Melvisharam.

Recommended Text

B.D. Gupta. (2001) Numerical Analysis. Konark Pub. Ltd., Delhi.

Reference Books

1. H.C.Saxena, Calculus of finite differences and Numerical Analysis, S.Chand & Co., New Delhi. IX Edition.

2. M.K.Venkataraman. (1992) Numerical methods for Science and Engineering National Publishing Company, Chennai.

3. S. Arumugam (2003) - Numerical Methods, New Gamma Pub., for Palayamkottai.

   A.Singaravelu, Numerical Methods, Meenakshi Publications-First Edition 1992.

Year: III Year Subject Code : U15SMA601 Semester : VI

Skill Based - 4 Title: **Fundamentals of Applied Mathematics (SBS - IV)**

Credits: 3 Max. Marks. 60

UNIT-I: Recurrence Relations and Generating Functions
Recurrence - Polynomials and their Evaluations - Recurrence Relations - Solution of Finite Order Homogeneous [linear] Relations - Solutions of Non-homogeneous Relations.
Chapter: V (1 – 5).

UNIT-II: Mathematical Logic
TF Statements - Connectives - Atomic and Compound Statements - Well-formed [Statement Formulae] - Parsing Trees- The Truth Table of a Formula - Tautology - Tautological Implications and Equivalence of Formulae.
Chapter: IX (1 - 8).

UNIT-III: Mathematical Logic [Contd..]
Replacement process - Functionally complete sets of connectives and Duality law – Normal Forms - Principal Normal Forms.
Chapter: IX (9 - 12).

UNIT-IV: Lattices
Lattices (omit example 15 Pp No.10.6) - Some properties of Lattices - New Lattices (omit remark Pp 10.14) - Modular and Distributive Lattices (omit theorem 10 and 17, Example 4 - Pp 10.23, Example 11 - Pp 10.24)
Chapter: X (1 - 4).

UNIT-V: Boolean Algebra
Boolean Algebra (omit theorem 25) – Boolean Polynomials – Karnaugh Maps (omit K–map for 5 and 6 variables)
Chapter: X (5 - 7).

Recommended Text

M.K.Venkataraman, N.Sridharan and N.Chandrasekaran, [2003] Discrete Mathematics, The National Publishing Company, Chennai.

Reference Books

1. R.Johnsonbaugh [2001] Discrete Mathematics [5th Edn.] Pearson Education, Asia.,

2. C.L.Liu, [1985] elements of Discrete Mathematics, McGraw Hill, New York,

3. J.Truss. [2000] Discrete Mathematics for Computer Scientists [2nd Edn.] Pearson Education, Asia.

4. M.K.Sen and B.C.Chakraborthy [2002] Discrete Mathematics [2nd Edition,] Books and allied private Ltd., Kolkata.