DHANRAJ BAID JAIN COLLEGE (Autonomous) Thoraipakkam, Chennai – 600097

Affiliated to the University of Madras

DEPARTMENT OF MATHEMATICS B.Sc. (Mathematics)



SYLLABUS (Choice Based Credit System)

Total No. of Semesters: 6

Total No. of Credits: 140

SCHEME OF EXAMINATIONS

FIRST SEMESTER

Course Components	Course Code	Category	Subjects	L	Т	Р	С
Part – I	14L11AA	G	Language Paper - I	4	2	-	4
Part – II	14E11AA	G	English Paper - I	4	2	-	3
Part – III	14M241A	МС	Core 1 : Algebra & Analytical Geometry of 2D	5	1	-	4
Part – III	14M241B	МС	Core 2 : Calculus and Trigonometry – I	5	1	I	4
Part – III	16C241A	AS	Allied : Financial Accounting – I	5	1	-	4
Part – IV	14N624A	SE	Non major: Functional Mathematics – I	2	-	-	2
Part - IV	14S61AA	SK	Skill Based Course - I	2	-	-	2
Total No. of Credits			27	7	-	23	

SECOND SEMESTER

Course Components	Course Code	Category	Subjects	L	Т	Р	C
Part – I	14L12AB	G	Language Paper – II	4	2	-	4
Part – II	14E12AB	G	English Paper – II	4	2	-	3
Part – III	14M242C	MC	Core 3 : Algebra & Analytical Geometry of 3D	5	1	-	4
Part – III	14M242D	МС	Core 4 : Calculus, Differential Geometry and Trigonometry – II	5	1	-	4
Part – III	16C242B	AS	Allied : Financial Accounting – II	5	1	-	4
Part – IV	14N624B	SE	Non major: Functional Mathematics – II	2	-	-	2
Part - IV	14S62AB	SK	Skill Based Course - II	2	-	-	2
Total No. of Credits			27	7	-	23	

Course Components	Course Code	Category	Subjects	L	Т	Р	C
Part – I	14L13AC	G	Language Paper – III	5	1	-	4
Part – II	14E13AC	G	English Paper – III	5	1	-	3
Part – III	14M243E	МС	Core 5 : Differential Equations and Laplace Transforms	4	2	-	4
Part – III	14M243G	МС	Core 6 : Mathematical Statistics	4	1	1	4
Part – III	14C243C	AS	Allied : Cost and Management Accounting – I	5	1	-	4
Part – IV	14S63AC	SK	Skill Based Course - III	2	-	-	2
Total No. of Credits			25	6	1	21	

THIRD SEMESTER

FOURTH SEMESTER

Course Components	Course Code	Category	Subjects	L	Т	Р	С
Part – I	14L14AD	G	Language Paper – IV	4	2	-	4
Part – II	14E14AD	G	English Paper – IV	4	2	-	3
Part – III	14M244H	МС	Core 7 : Vector Calculus, Fourier Series and Fourier Transforms	5	1	-	4
Part – III	14M244J	MC	Core 8 : Mechanics	5	1	-	4
Part – III	14C244D	AS	Allied : Cost and Management Accounting – II	4	2	-	4
Part – IV	14E64AA	VC	Environmental Studies	1	-	1	2
Part - IV	14S64AD	SK	Skill Based Course - IV	2	-	-	2
Total No. of Credits			25	8	1	23	

Course Components	Course Code	Category	Subjects	L	Т	Р	С
Part – III	14M245K	МС	Core 9 : Algebraic Structures – I	5	1	-	5
Part – III	14M245L	MC	Core 10: Real Analysis - I	5	1	-	5
Part – III	14M245M	MC	Core 11: Complex Analysis – I	5	1	-	5
Part – III	14M245N	MC	Core 12: Discrete Mathematics	5	1	-	5
Part – III	14A245A	МС	Core 13: Elective – Operations Research - I	5	1	-	4
Part – IV	14V66AG	VC	Value Education	2	-	-	1
Total No. of Credits			27	5	-	25	

FIFTH SEMESTER

SIXTH SEMESTER

Course Components	Course Code	Category	Subjects	L	Т	Р	C
Part – III	14M246P	MC	Core 14 : Algebraic Structures – II	5	1	-	5
Part – III	14M246Q	MC	Core 15 : Real Analysis – II	5	1	-	5
Part – III	14M246R	MC	Core 16 : Complex Analysis – II	5	1	-	5
Part – III	14M246S	MC	Core 17 : Graph Theory	5	1	-	5
Part – III	14A246B	MC	Core 18 : Elective – Operations Research - II	4	2	-	4
Part – V		Extension	Extension Activities: NSS/NCC/Rotract/Red Cross	-	-	-	1
Total No. of Credits			24	6	-	25	

COURSE CODE	COURSE TITLE	L	Т	Р	С
14M241A	CORE-1 ALGEBRA AND ANALYTICAL	5	1		4
	GEOMETRY (2D)	5	1	-	4

UNIT	SYLLABUS
UNIT 1	Theory of Equations: Polynomial Equations – Imaginary and irrational roots – Symmetric functions of roots in terms of coefficients – Sum of rth powers of roots – Reciprocal Equations
UNIT 2	Transformations of Equations: Descarte's rule of signs – Approximate solutions of rates of polynomials by Newton – Raphson method – Horner's method; Cardon's Method of solutions of a cubic polynomial.
UNIT 3	Summation of Series: Summation of Series using Binomial, Exponential and Logarithmic Series
UNIT 4	Parabola – Ellipse
UNIT 5	Hyperbola, Rectangular Hyperbola and Conjugate Hyperbola

- 1) Manickavasagam Pillai T.K. & Others, Algebra, Vol.2, S.Viwanathan (Printers and Publishers) Pvt. Ltd, 2008
- 2) Duraipandian P, Analytical Geometry (2D), Emerald Printing house Pvt. Ltd, Chennai, 1983.
- 3) Vittal P.R and V.Malini, Algebra and Trigonometry, Margham Publications, Chennai
- 4) Sudha S, Algebra, Analytical Geometry (2D) and Trigonometry, Emerald Publishers.
- 5) Manickavasagam Pillai T.K & T.Natarajan, A textbook of analytical Geometry (part I 2 Dimension), S.Viwanathan (Printers and Publishers) Pvt. Ltd, 2006

COURSE CODE	COURSE TITLE	L	Т	Р	С
14M241B	CORE-2 CALCULUS AND TRIGONOMETRY – I	5	1	I	4

UNIT	SYLLABUS
UNIT 1	Successive differentiations, Leibnitz Theorem (without proof) and its applications – Partial differentiation – Total differentiation – Jacobians – Maxima and Minima of two independent variables – necessary and sufficient conditions (without proof) – Simple Problems on these concepts
UNIT 2	Introduction to integration - Methods of Integration – Integration by parts – Bernoulli's formula
UNIT 3	Properties of definite integrates – Reduction formulae for standard integrals
UNIT 4	Expansion of cosnx, sinnx, tannx, con^nx , sin^nx – Expansion of sinx, cosx, tanx in terms of x.
UNIT 5	Hyperbolic functions and Inverse Hyperbolic functions.

- 1. Narayanan S & others, Calculus, Vol.I, S.Viwanathan (Printers and Publishers) Pvt. Ltd, 1983.
- 2. Sudha S, Calculus.
- 3. A.Singaravelu and R.Ramaa, Algebra and Trigonometry, Meenakshi Agency, 2003.
- 4. Duraipandian P, Calculus.

COURSE CODE	COURSE TITLE	L	Т	Р	С
14N624A	NON MAJOR: FUNCTIONAL MATHEMATICS – I	2	I	I	2

UNIT	SYLLABUS
UNIT 1	Ratio and Proportion
UNIT 2	Percentage
UNIT 3	Profit and Loss
UNIT 4	Simple Interest and Compound Interest
UNIT 5	Solutions of simultaneous equations problems on ages and two digit number (Simple Problems from all Units)

Text Book:

1. Agarwal R.S, Quantitative Aptitude, Revised Ed., S.Chand & Co, Ltd., New Delhi.

Unit I: Pages: 294 – 310 Units II: Pages: 208 – 250 Unit III: Pages: 251 – 293 Unit IV: Pages: 445 – 486 Unit V: Pages: 161 – 194

Reference Books:

1. Agarwal R.S, Quantitative Aptitude, Revised Ed., S.Chand & Co, Ltd., New Delhi.

COURSE CODE	COURSE TITLE	L	Т	Р	С
14M242C	CORE – 3: ALGEBRA AND ANALYTICAL GEOMETRY (3D)	5	1	-	4

UNIT	SYLLABUS
UNIT 1	Matrices – Symmetric, Skew-Symmetric; Hermitian, Skew-Hermitian, Orthogonal and Unitary Matrices – Rank of a Matrix – Consistency of Linear Equations and Solutions.
UNIT 2	Cayley Hamilton theory - Eigen Values – Eigen Vectors – Similar Matrices – Diagonalization of Matrix
UNIT 3	Plane – general equation of a Plane – equation of a Plane Passing through three points – Coplanar plane – intercept form – normal form – angle between two planes – condition of perpendicularity and parallelism – Perpendicular distance from a point to a given plane – equation of a plane passing through the line of intersection of two planes – ratio in which the plane divides the line joining the two points – Simple problems.
UNIT 4	Straight line – General equation of a straight line – symmetric form – transformation – angle between a plane and line – Conditions of a line parallel to a plane and to lie in a plane – Coplanar lines – Intersection of two given lines – Skew lines – Shortest distance between the lines – Simple problems.
UNIT 5	Sphere – equation of a sphere – section of a Sphere by a plane – Equation of a circle – Equation of a Sphere through a given circle – Intersection of a Sphere and a line – Equation of a tangent plane – Angle of intersection of two spheres – condition for the orthogonality of two spheres – Radical Plane, line and centre – Coaxial system of spheres – Simple problems.

- Manickavasagam Pillai T.K & Others, Algebra, Vol 2, S.Viswanathan (Printers & Publishers) Pvt. Ltd, 2008
- Venkataraman M.K, Engineering Mathematics, Vol. 3, 3rd ed., National Publishing Co, Madras, 1995
- Kandhasamy P & Others, Engineering Mathematics, Vol. 3, S.Chand& Co, New Delhi, 1996.
- 4) Shanti Narayan, Analytical Solid Geometry, S.Chand & Co. Ltd, 1990.

COURSE CODE	COURSE TITLE	L	Т	Р	С
14M242D	CORE – 4: CALCULUS, DIFFERENTIAL	5	1	-	1
	GEOMETRY AND TRIGONOMETRY II	5			-

UNIT	SYLLABUS
UNIT 1	Beta and Gamma functions – Properties – Recurrence formula for gamma function, Relation between beta and gamma functions – Simple problems.
UNIT 2	Double integrals – Changing the order of integration – triple integrals – Application to area, surface area and volumes – simple problems.
UNIT 3	Curvature – Cartesian formula for radius of curvature – The coordinates of the centre of curvature – Evolute and involute – Simple problems.
UNIT 4	Radius of curvature in polar coordinates – p-r equation – Envelopes (definition and problems only) – Linear asymptotes (definitions and simple problems only)
UNIT 5	Logarithms of Complex Numbers: Sums of Sines and Cosines of n angles which are in A.P. Summation of Series using telescopic and C+iS method.

- Narayanan S & Others, Calculus, Revised Ed., S.Viswanathan (Printes & Publishers) Pvt. Ltd, Chennai, 1984.
- 2) Sharma H.S and S.S.Seth, Text book of Trigonometry, Shiva Lal Agarwala & Co, educational publishers, Agra.

COURSE CODE	COURSE TITLE	L	T	Р	С
14N624B	NON MAJOR: FUNCTIONAL MATHEMATICS – II	2	-	-	2

UNIT	SYLLABUS
UNIT 1	Time and Work
UNIT 2	Time and Distance
UNIT 3	Area
UNIT 4	Volumes and surface area
UNIT 5	Stocks and Shares (Sample problems from all units)

Reference Books:

R.S. Agarwal, Quantitative Aptitudes, Revised ed, S.Chand & Co, Ltd, New Delhi.

Unit I: Pages: 341-370 Unit II: Pages: 384-404 Unit III: Pages: 499-548 Unit IV: Pages: 549-587 Unit V: Pages: 605-612

COURSE CODE	COURSE TITLE	L	Т	Р	С
14M243E	CORE – 5: DIFFERENTIAL EQUATIONS AND	4	4 2	-	4
	LAPLACE TRANSFORMS	4			4

UNIT	SYLLABUS
UNIT 1	First order but of higher degree equations – solvable for p, solvable for x, solvable for y, Clairaut's form – Simple Problems Second Order Equations with constant coefficients with Particular integrals for e ^{ax} , x ^m , e ^{ax} sinmx, e ^{ax} cosmx.
UNIT 2	Second order differential equations with variable coefficients of the type $ax^{2} \frac{d^{2}y}{dx} + bx \frac{dy}{dx} + cy = q(x)$ Method of variation of parameters; Total differentialdx ² dx equations, simple problems.
UNIT 3	Formation of P.D.E. by eliminating arbitrary constants and arbitrary functions; Complete integral; Singular Integral; General Integral; Charpit's Method and the standard types $f(p,q)=0$, $f(x,p,q) = 0$, $f(y,p,q) = 0$, $f(z,p,q) = 0$, f(x,p) = f(y,q); Clairaut's form and Lagranges Equation Pp+Qq = R – Simple Problems
UNIT 4	Laplace Transforms; Inverse Laplace Transform (Usual types)
UNIT 5	Applications of Laplace transform to solution of first and second order Linear differential equations with Constant Co-efficients and simultaneous linear differential equations – Simple Problems

- Narayanan and Others, Calculus, Revised 15th ed., S.Viswanathan (Printes & Publishers) Pvt. Ltd, Chennai, 1984.
- Kandasamy P and others, Engineering Mathematics Volume 3, 4th Ed., S.Chand & Co, New Delhi, 2008
- M.K.Venkataraman, Engineering Mathematics Volume 3, 3rd Ed., National Publishing Co, Madras, 1995.
- 4. Deepak Chatterjee , Integral Calculus and differential equations, Tata Mc.Graw Hill Publishing Co Ltd.
- Erwin Kreyszig, Advanced Engineering Mathematics, 5th Ed., New Age International Pvt. Ltd, New Delhi, 1996

COURSE CODE	COURSE TITLE	L	Т	Р	С
14M243G	CORE – 6: MATHEMATICAL STATISTICS	4	1	1	4

UNIT	SYLLABUS					
UNIT 1	Concept of sample space – Events – Definition of probability (Classical, Statistical & Axiomatic) – Addition and Multiplication laws of Probability for 2 events – Extension of Addition and Multiplication laws of events (Statement only) – Independence – Conditional Probability – Baye's theorem – Simple problems					
UNIT 2	Binomial, Poission, Normal distributions – Simple Problems					
UNIT 3	Correlation – Rank Correlation – Regression – Simple problems					
UNIT 4	Large Samples – Z Test - Test of significance of a single mean, difference of two means, Single proportion and difference of proportions. Small samples – t test – Test for a single mean, difference of means, Paired t-test.					
UNIT 5	Small Samples – F test – Test for equality of population variance – Analysis of Variance – One-way classification – Two-Way Classification – simple Problems Chi-Square Test – Goodness of Fit – Independence of attributes – Simple Problems					

Text Book:

Vittal P.R, Mathematical Statistics, Margham Publishers, Chennai.

Unit I : Chapter 1

Unit II : Chapter 12,13,16

Unit III: Chapter 8,9

Unit IV: Chapter 24,25

Unit V: Chapter 26,27

- Gupta S.C & V.K.Kapoor, Elements of Mathematical Statistics, 3rd Ed., Sultan Chand & Sons, 2002.
- 2. Gupta S.P, Statistical Methods, 7th Ed., Sultan Chand & Sons, 1976.

COURSE CODE	COURSE TITLE	L	Т	Р	С
14M244H	CORE – 7: VECTOR CALCULUS, FOURIER SERIES AND FOURIER TRANSFORMS	5	1	I	4

UNIT	SYLLABUS	
	Vector Differentiation, Gradient, Divergence, Curl, Dire	ectional
UNIT 1	Derivative, Unit normal to the Surface (simple problems)	
	Vector Integration, line surface and volume integrals; theorems of	Gauss,
UNIT 2	Stokes and Green (without proof) – Simple Problems	
UNIT 3	Expansions of periodic function with period 2π	
UNIT 4	Expansion of Even and Odd functions; half range series	
UNIT 5	Infinite Fourier transform (Complex form, no derivation); sine and transforms; simple properties of Fourier Transforms	cosine

- Duraipandian P and Laxmi Duraipandian , Vector Analysis, Emerald Publishers, 2005.
 Murray Spiegel, Vector Analysis, 2nd ed., Schuam Publishing Company, New York, 1959.
- 3) Venkataraman M.K, Engineering Mathematics Volume 3, 3rd ed., National Publishing Co., Madras, 1995.
- 4) Kandasamy P and others, Engineering Mathematics Volume 3, S.Chand & Co, New Delhi, 1996.

COURSE CODE	COURSE TITLE	L	Τ	Р	С
14M244J	CORE – 8: MECHANICS	5	1	-	4

UNIT	SYLLABUS
UNIT 1	Types of forces, Magnitude and direction of the resultant of two forces acting on a particle, Lami's theorem, resultant of several coplanar forces acting on a particle – Simple problems
UNIT 2	Forces on a rigid body – Moment of a force, Parallel force, Couple- Simple problems
UNIT 3	Kinematics – Resultant Velocity, relative velocity, rectilinear motion with constant acceleration, angular velocity, relative angular velocity, Simple problems
UNIT 4	Projectiles – time of flight, horizontal range, range in an inclined plane – simple problems
UNIT 5	Moment of inertia – Moment of inertia of simple bodies, theorems of parallel and perpendicular axes, moment of inertia of triangular lamina, circular lamina, circular ring, hollow and solid right circular cone, hollow and solid sphere (Book work only)

Text Books:

Duraipandian P and others, Mechanics, S.Chand & Co., New Delhi, 1987.

- **Unit I:** Chapter 2, Sections 2.1.2, to 2.2.2.
- Unit II : Chapter 4, Sections 4.1, 4.4, 4.5, 4.6, 4.7, 4.9 (omit 4.2, 4.3, 4.8)
- Unit III: Chapter 1: Sections 1.1 to 1.4
- **Unit IV:** Chapter 13: Sections 13.1, 13.2 (omit 13.3)
- Unit V: Chapter 17: Sections 17.1.1.

- 1. Venkataraman M.K, Statics and Dynamics, Agasthiyar Publishers, Trichy, 1999.
- 2. Dharmapadam A.V, Statics and Dynamics, S.Viswanathan Pvt. Ltd, Madras, 1983.
- 3. Viswanatha Naik K and M.S.Kasi, Statics and Dynamics, Emerald Publishers, Madras, 1992.

COURSE CODE	COURSE TITLE	L	Т	Р	С
14M245K	CORE – 9: ALGEBRAIC STRUCTURES - I	5	1	-	5

UNIT	SYLLABUS
UNIT 1	Group Theory: Definition at a group – Some examples of Groups – some preliminary hemmas – Subgroups – Lagrange's theorem – A counting principle. Chapter 2 : Section 2.1 50 2.5
UNIT 2	Group theory: Normal subgroups and Quotient Groups – Homomorphisms – Automorphisms. Chapter 2: Section 2.6 to 2.8
UNIT 3	Group Theory: Cayley's Theorem – Permutation Groups – Simple problems. Chapter 2: Section 2.9 to 2.10
UNIT 4	Ring theory: Definition and examples of Rings – Some special classes of Rings – Homomorphisms – Ideas and Quotient Rings. Chapter 3: Section 3.1 to 3.4
UNIT 5	Ring Theory: More ideals and Quotient Rings – The Field of Quotients of an Integral Domain. Chapter 3: Section 3.5 to 3.6

Text Book:

Herstein I.N, Content and Treatment in "Topics in Algebra", 2nd Ed., Wiley Eastern Ltd, 2010.

- 1. Arumugam S, Algebra, 1st Ed, New gAmma Publishing Hosue, Palayamkottai.
- 2. John B. Fraleigh, A First Course in Algebra, 1st Ed., Additon Wesley, 1970.
- 3. Gopalakrishnan N S, University Algebra, New Age International publications, Wiley Eastern Ltd.
- Balakrishnan N and N.Ramabadran, Text book of Algebra, 3rd Ed., Vikas publishing Co, New Delhi, 1979

COURSE CODE	COURSE TITLE	L	Т	Р	С
14M245L	CORE – 10: REAL ANALYSIS - I	5	1	-	5

UNIT	SYLLABUS
UNIT 1	Sets and functions: Sets and elements - Operations on sets – Function - Real valued functions - Equivalence, countability - Real numbers - Least upper bounds. Chapter 1: Section 1.1 to 1.7
UNIT 2	Sequences of Real Numbers: Definition of sequence and subsequence - Limit of a sequence - Convergent sequences - Divergent sequences - Bounded sequences - Monotone sequences operations on convergent sequences - Operations on divergent sequences - Limit superior and limit inferior - Cauchy sequences. Chapter 2: Section 2.1 to 2.10
UNIT 3	Series of Real Numbers: Convergence and divergence - series with non- negative terms - Alternating series - conditional convergence and absolute convergence. Chapter 3: Section 3.1 to 3.4
UNIT 4	Series of Real Numbers: Test for absolute convergence - series whose terms form a non increasing sequence - The class ℓ^2 . Chapter 3: Section 3.6, 3.7, 3.10
UNIT 5	Limits and Metric Spaces: Limit of a function on the real line - Metric spaces - Limits in metric spaces. Chapter 4: Section 4.1 to 4.3

Text Books:

Richard R.Goldberg, Treatment as in "Methods of Real Analysis", Oxford & IBH Publishing Co.

Pvt. Ltd, New Delhi, 1963.

- 1. Gupta S.L and Nisha Rani, Principles of Analysis, Vikas publishing house Pvt. Ltd, 1994.
- 2. Chandrasekhara Rao K and K.S.Narayanan, Real Analysis, Vol. 1 & 2, S.Viswanathan Printers & Publishers Pvt. Ltd, 2008.
- 3. Walter Rudin, Transforms and Partial Differential Equations, 5th Ed, McGraw Hill International edition, 1976.
- 4. Shanti Narayanan, M.D. Raisinghania, Elements of Real Analysis, 12th Ed., S.Chand & Co, 2011.
- 5. Kenneth A Ross, Modern Analysis: The Theory of Calculus, Springer, 2010.

COURSE CODE	COURSE TITLE	L	Т	Р	С
14M245M	CORE – 11: COMPLEX ANALYSIS – I	5	1	-	5

UNIT	SYLLABUS
UNIT 1	Point at infinity – Stereographic projection – Analytic functions: Function of complex variables – Mappings – Limits – Theorems on limits – continuity
UNIT 2	Derivatives – Differentiation formulas – Cauchy Riemann equations – sufficient conditions – Cauchy Riemann equations in polar form
UNIT 3	Analytic functions – Harmonic functions Definite integrals – contours – Line integrals – Examples – Cauchy's theorem (proof based upon Greens theorem) – Cauchy – Goursat theorem (Statement only)
UNIT 4	Mapping by elementary functions: Linear functions: Linear fractional transformations – Cross ratios – fixed points – special linear fractional transformations
UNIT 5	The function $1/z$ – The function $w=z^2$ – The transformation $w=e^z$ – The transformation $w=\sin z$ and $w=\cos z$ -conformal mapping: Basic Properties

Text Book:

Ruel V. Churchill/ James Ward Brown, Treatment as in Complex variables and applications, 4th Ed.

Unit 1: Chapter 1, Section 8, Chapter 2: Section 9-13

Unit 2: Chapter 2: Sections 14-18

Unit 3: Chapter 2: Sections 19 and 20, Chapter 4: Sections 29-33

Unit 4: Chapter 7: Sections 63,65 and 66

Unit 5: Chapter 7: Sections 64,67,70-72, Chapter 8: Section 74

Reference Books:

1. Manicavachagam Pillay T.K, S.P.Rajagopalan and R.Sattanathan, Complex analysis, 4th Ed., S.Viswanathan Pvt. Ltd, Chennai, 1995.

2. Duraipandian P and Laxmi Duraipandian, Complex analysis, 2nd Ed., Emerald Publishers, Chennai, 1995.

COURSE CODE	COURSE TITLE	L	Т	Р	С
14M245N	CORE – 12: DISCRETE MATHEMATICS	5	1	Ι	5

UNIT	SYLLABUS
UNIT 1	Integers – Sets – Basic Properties of integers – Mathematical Induction. Chapter 1: Section 1.1 to 1.3
UNIT 2	Divisibility of Integers – Representation of positive integers – Linear Diophantine Equation in two variables Chapter 1: Section 1.4 to 1.6
UNIT 3	Boolean algebra – Two Element Boolean Alebra Disjunctive Normal form Chapter 5: Section 5.1 to 5.3
UNIT 4	Conjuctive normal form – Application – Switching Circuits – Designing of Switching Circuits Chapter 5: Section 5.4
UNIT 5	Recurrence relations and generating functions – Sequence and Recurrence relation – Linear (difference equations) Recurrence relations with constant coefficients – Generating Functions. Chapter 6: Section 6.1 to 6.3

Text Books:

Sen N.K and B.C.Chakraborthy, "Contents and Treatment in Introduction to Discrete Mathematics", 2nd Ed., Books & Allied Pvt. Ltd, Kolkatta.

- 1. Mertt L, Abraham Kendel and T.P.Baker, Discrete mathematics for computer Science and Mathematics, Prentice Hall, India
- 2. John Truss, Discrete mathematics for computer science, Addison Wesley
- 3. Liu C.U, Elements of Discrete Mathematics, New York, McGraw Hill, 1977
- 4. Tremblay J.T and R.P.Manohar, Discrete Mathematical structures with applications to Computer Science, Newyork, McGraw Hill, 1975
- 5. Bernard Kolman, Robert C.Busby, Shron Ross, Discrete Mathematical Structures, 3rd Ed, Prentice Hall of India, New Delhi, 1988.

COURSE CODE	COURSE TITLE	L	Т	Р	С
14A245A	CORE – 13: OPERATIONS RESEARCH – I	5	1	I	4

UNIT	SYLLABUS
UNIT 1	Linear Programming: Formulation and Graphical method – Mathematical formulation of L.P.P – graphical method of the solution of L.P.P – Simplex methods Chapter 2 Chapter 3: 3.1
UNIT 2	Artificial Variables Techniques – Big M method – Two phase method – Duality in L.P.P and Dual simplex method Chapter 3: 3.2 Chapter 5
UNIT 3	Transportation Model – Mathematical formulation of a transportation problem – Methods for finding initial basic feasible solution – Modified distribution method (MODI) – Degeneracy in Transportation problems – Unbalanced transportation problem. Chapter 7
UNIT 4	Assignment problem – Mathematical formulation of an assignment problem – Assignment Algorithm – Unbalanced assignment problem – Restrictions in Assignment – Travelling Salesman problem. Chapter 8
UNIT 5	Sequencing problems – Processing n jobs on two Machines – Processing n jobs on three machines – Graphical method Chapter 14

Text Books:

Sundaresan V and K.S.Ganapathy Subramanian, Contents and Treatment in Resource Management Techniques, 4th Ed., A.R.Publications, Chennai.

- Kanti Swarup, P.K.Gupta, Man Mohan, Operations Research, 15th Ed., Sultan Chand & Sons, New Delhi, 2010.
- Prem Kumar Gupta, D.S. Hira, Problems in Operations Research, 1st Ed., S.Chand, New Delhi, 2009.

COURSE CODE	COURSE TITLE	L	Т	Р	С
14M246P	CORE – 14: ALGEBRAIC STRUCTURES – II	5	1	-	5

UNIT	SYLLABUS
UNIT 1	Ring Theory: Euclidean Rings – Polynomial rings – polynomial over the
	rational field
	Chapter 3: section 3.7 to 3.10 (Omit 3.8)
	Vector Spaces: Elementary Basic concepts - Linear independence and
UNIT 2	Bases – Simple problems.
	Chapter 4: Section 4.1 and 4.2
	Dual spaces – Inner product spaces
UNIT 3	Chapter 4: Section 4.3 and 4.4
	Chapter 6: Section 6.1
	Linear Transformations: The Algebra of Linear transformations
UNIT 4	Chapter 6: Section 6.1
	Linear Transformations: Characteristic Roots and vectors – Matrices
UNIT 5	– Simple problems
	Chapter 6 : Section 6.2 and 6.3

Text Book:

Herstein I.N, Content and Treatment in "Topics in Algebra", 2nd Ed., Wiley Eastern Ltd, 2010.

- 1. Arumugam S, Algebra, 1st Ed, New Gamma Publishing Hosue, Palayamkottai.
- 2. John B. Fraleigh, A First Course in Algebra, 1st Ed., Additon Wesley, 1970.
- 3. Gopalakrishnan N.S, University Algebra, New Age International publications, Wiley Eastern Ltd.
- Balakrishnan R and N.Ramabadran, Text book of Algebra, 3rd Ed., Vikas publishing Co, New Delhi, 1979.

COURSE CODE	COURSE TITLE	L	Т	Р	С
14M246Q	CORE – 15: REAL ANALYSIS – II	5	1	I	5

UNIT	SYLLABUS
UNIT 1	Continuous functions on metric spaces: Functions continuous at a point on the real line - Reformulation - functions continuous on a metric space - open sets - closed sets Chapter 5: Section 5.1 to 5.5
UNIT 2	Connectedness, Completeness and Compactness: More about open sets – Connected sets – Bounded sets and totally bounded sets – Complete metric spaces. Chapter 6: Section 6.1 to 6.4
UNIT 3	Connectedness, Completeness and Compactness: Compact metric spaces – Continuous functions on compact metric spaces – Continuity of the inverse function - Uniform Continuity Chapter 6: Section 6.5 to 6.8
UNIT 4	Calculus: Sets of measure zero - Definition of the Riemann integral - Existence of the Riemann integral (Statement only) - properties of the Riemann integral Chapter 7: Section 7.1 to 7.4
UNIT 5	Calculus and Taylor Series: D erivatives - Rolle's theorem - The Law of the mean – Fundamental Theorem of calculus – Taylor's Theorem. Chapter 7: Section 7.5 to 7.8 Chapter 8: Section 8.5 Chapter 6 : Section 6.2 and 6.3

Text Book:

Richard R.Goldberg, Treatment as in "Methods of Real Analysis", Oxford & IBH Publishing Co., Pvt. Ltd, New Delhi, 1963

- 1. Gupta S.L and Nisha Rani, Principles of Analysis, Vikas publishing house Pvt. Ltd, 1994.
- 2. Chandrasekhara Rao K and K.S.Narayanan, Real Analysis, Vol. 1 & 2, S.Viswanathan Printers & Publishers Pvt. Ltd, 2008.
- 3. Walter Rudin, Transforms and Partial Differential Equations, 5th Ed, McGraw Hill International edition, 1976.
- 4. Shanti Narayanan, M.D. Raisinghania, Elements of Real Analysis, 12th Ed., S.Chand & Co, 2011.
- 5. Kenneth A Ross, Modern Analysis: The Theory of Calculus, Springer, 2010.

COURSE CODE	COURSE TITLE	L	Т	Р	С
14M246R	CORE – 16: COMPLEX ANALYSIS – II	5	1	I	5

UNIT	SYLLABUS
UNIT 1	Simply and Multiply connected domain – Cauchy – Goursat theorem on multiply connected domains. Antiderivatives and independence of path- Cauchy's integral formula.
UNIT 2	Derivatives of analytic functions – Morera's theorem, Maximum moduli functions – Liouville's theorem and Fundamental theorem of algebra.
UNIT 3	Taylor series – Observations and examples – Laurent series – Examples – Zeros of analytic functions – Poles and zeors – essential singular points.
UNIT 4	Number of zeors and poles – Argument principle – Rouche's theorem Residues and poles: residues – residue theorem – Principal part of a function – Residue at poles.
UNIT 5	Evaluation of improper Real integrals: Integrals of the form (i) $\int_{-\infty}^{\infty} \frac{p(x)}{q(x)} dx$ (ii) $\int_{-\infty}^{\infty} \frac{p(x)}{q(x)} \sin x dx$, $\int_{-\infty}^{\infty} \frac{p(x)}{q(x)} \cos x dx$ (iii) $\int_{-\infty}^{2\pi} F(\sin \theta, \cos \theta) d\theta$

Text Book:

Ruel V. Churchill and James Ward Brown, Treatment as in: Complex variables and applications, 4th ed.

Chapter 4: Sections 36-38

Chapter 4: Sections 39-42

Chapter 5: Sections 44-46, 52 and 53

Chapter 12: Sections 106-107

Chapter 6: Sections 54-57

Chapter 12: Sections 108-109

Chapter 6: Sections 59-61

- 1) Manicavachagam Pillay T.K , S.P. Rajagopalan and R. Sattanathan Complex Analysis, 4th Ed., S.Viswanathan Pvt. Ltd., Chennai, 1995.
- 2) Duraipandian P and Laxmi Duraipandian, Complex Analysis, 2nd Ed., Emerald Publishers, Chennai, 1995.

COURSE CODE	COURSE TITLE	L	Т	Р	С
14M246S	CORE – 17: GRAPH THEORY	5	1	I	5

UNIT	SYLLABUS
UNIT 1	Graphs and Sub Graphs: Definition and Examples – Degrees – Subgraphs – Isomorphism – Independent Sets and Coverings – Intersection Graphs and line graphs – matrices – Operations on Graphs. Chapter 1: Section 2.1 to 2.9 (omit 2.5)
UNIT 2	Degree Sequences – Graphic Sequences Chapter 3: Section 3.1 and 3.2
UNIT 3	Connectedness: Walks – Trials and Paths – Connectedness and Components - Blocks – Connectivity – Simple Problems Chapter 4: Section 4.1 to 4.4
UNIT 4	Eulerian and Hamiltonian Graphs – Eulerian graphs – Hamiltonian graphs Chapter 5: Section 5.1 to 5.2
UNIT 5	Trees and Planarity: Trees - Definition and Properties – Simple Problems. Chapter 6: Section 6.1, 6.2 and 8.1

Text Books:

Arumugam S and S.Ramachandran, Content and treatment as in Invitation to Graph Theory Scitech Publications (India) Pvt. Ltd., Chennai, 2001

Reference Books:

1. John Clark, A first book at graph theory, Allied Publishers.

3. Choudum S.A, A first course in Graph theory, Macmillan India Ltd, 1987.

4. Robin J. Wilson, Introduction to Graph Theory, Pearson Education, 4th Ed., 2004, Indian Print.

COURSE CODE	COURSE TITLE	L	Т	Р	С
14A246B	CORE – 18: ELECTIVE - OPERATIONS	4			4
	RESEARCH – II	4	2	-	4

UNIT	SYLLABUS
	PERT and CPM - Ford and Fulkerson's Rule Network computations -
UNIT 1	Floats – PERT procedure – Crashing
	Chapter 15
	Queuing Models - Queuing System transient and steady states - Kendal's
	Notation for representing Queuing models –
UNIT 2	Model I: $(M/M/1)$; $(\infty/FCFS)$ - Birth and Death model
	Chapter 13: Section 13.1 to 13.6
	Queuing Models
	Model II: $(M/M/S)$: $(\infty/FCFS)$
UNIT 3	Model III: (M/M/1):(N/FCFS)
	Model IV: (M/M/S):(FCFS/N)
	Chapter 13: Section 13.7 to 13.9
	Inventory models - Costs involved in Inventory Models - Deterministic
	Inventory models –
	Model I - Purchasing model with no shortages
UNIT 4	Model II – Manufacturing model with no shortages
	Model III – Purchasing model with shortages
	Model IV - Manufacturing model with shortages
	Chapter 12: Section 12.1 to 12.7
	Game theory – Two person zero Sum game - Maxmin – Minmax principle
	- Saddle point and value of the Game - Game without saddle point, Mixed
UNIT 5	strategies - Matrix oddment method for nxn game Dominance property
	Graphical method for 2xn and mx2 games
	Chapter 16: Section 16.1 to 16.7

Text Books:

Sundaresan V and K.S.Ganapathy Subramanian, Contents and Treatment in Resource Management Techniques, 4th Ed., A.R.Publications, Chennai.

- 1. Kanti Swarup, P.K.Gupta, Man Mohan, Operations Research, 15th ed., Sultan Chand & Sons, New Delhi, 2010.
- 2. Prem Kumar Gupta, D.S. Hira, Problems in Operations Research, 1st Ed., S.Chand & Co, New Delhi, 2009.