B.Sc. Mathematics(Common for Aided and S.F. Programmes)

Courses Offered

Semester	Course	Subject Code	Paper	Hours / Week	Credits
I	Part I	TL1711 FL1711	Language: Tamil French	6	3
	Part II	GE1711 GE1712	General English: A Stream B Stream	6	3
	Part III	MC1711	Major Core I: Differential Calculus and Trigonometry	6	5
		MA1711	Allied I: Algebra and Calculus (for Physics and Chemistry)	6	5
	Part IV	AEC171	Ability Enhancement Compulsory Course (AECC): English Communication	2	2
		MNM171	Non Major Elective Course (NMEC): Mathematics for Life - I	4	2
		VEC172	Foundation Course I: Values for Life	-	-
	Part V	SDP172	Skill Development Programme (SDP) - Certificate Course	-	-
		STP174	Student Training Programme (STP) - Clubs & Committees / NSS	-	-
II	Part I	TL1721 FL1721	Language: Tamil French	6	3
	Part II	GE1721 GE1722	General English: A Stream B Stream	6	3
	Part III	MC1721	Major Core II: Classical Algebra and Integral Calculus	6	5
		MA1721	Allied II: Vector Calculus and Differential Equations (for Physics and Chemistry)	6	5
	Part IV	AEC172	Ability Enhancement Compulsory Course (AECC):Environmental Studies	2	2
		MNM172	Non Major Elective Course (NMEC): Mathematics for Life - II	4	2
		VEC172	Foundation Course I: Values for Life	-	1
	Part V	SDP172	Skill Development Programme (SDP): Certificate Course	-	1

		STP174	Student Training Programme (STP): Clubs & Committees / NSS	-	-
	Part I	TL1721 FL1721	Language: Tamil French	6	3
III	**Part II**	GE1721 GE1722	General English: A Stream B Stream	6	3
	Part III	MC1731	Major Core III: Differential Equations and Vector Calculus	6	4
		MC1732	Major Core IV: Sequences and Series	5	4
		MA1731	Allied III: Probability Theory and Distributions	5	5
	Part IV	SBC173/ SBC174	Skill Based Course (SBC): Meditation and Exercise / Computer Literacy	2	2
		VEC174	Foundation Course II: Personality Development	-	-
	Part V	STP174	Student Training Programme (STP): Clubs & Committees / NSS	-	-
		SLP173	Service Learning Programme (SLP): Extension Activity (RUN)	-	1
IV	**Part I**	TL1741 FL1741	Language: Tamil French	6	3
	Part II	GE1741 GE1742	General English: A Stream B Stream	6	3
	Part III	MC1741	Major Core V: Groups and Rings	6	5
		MC1742	Major Core VI: Analytical Geometry - 3 Dimensions	5	4
		MA1741	Allied IV: Applied Statistics	5	5
	Part IV	SBC173/ SBC174	Skill Based Course (SBC): Meditation and Exercise / Computer Literacy	2	2
		VEC174	Foundation Course II - Personality Development	-	1
	Part V	STP174	Student Training Programme (STP): Clubs & Committees / NSS	-	1
V	**Part III**	MC1751	Major Core VII: Linear Algebra	6	5
		MC1752	Major Core VIII: Real Analysis	6	5
		MC1753	Major Core IX: Mechanics	6	5
		MC1754	Project	5	5
		MC1755	Elective I: (a) Astronomy	5	4

		MC1756 MC1757	(b) Boolean Algebra (c) Web Designing with HTML		
	Part IV	MSK175	Skill Based Course (*SBC): Mathematics for Competitive Examination - I	2	2
		HRE175	Foundation Course III: Human Rights Education (HRE)	-	1

VI	**Part III**	MC1761	Major Core X: Complex Analysis	6	5
		MC1762	Major Core XI: Graph Theory	6	5
		MC1763	Major Core XII: Number Theory	5	5
		MC1764	Major Core XIII: Operations Research	5	5
		MC1765 MC1766 MC1767	Elective II: (a) Numerical Methods (b) Fuzzy Mathematics (c) Object Oriented Programming with C++	6	5
	Part IV	MSK176	Skill Based Course (*SBC): Mathematics for Competitive Examination-II	2	2
		WSC176	Foundation Course IV: - Women's Studies (WS)	-	1
			TOTAL	**180**	**140 + 3**

Semester I
Differential Calculus and Trigonometry
Sub. Code: MC1711

No. of hours per week	Credits	Total No. of hours	Marks
6	5	90	100

Objectives: **1.**To impart knowledge on applications of Differential Calculus and important concepts of Trigonometry.
2.To enhance problem solving skills.

Unit I

Curvature - Radius of curvature in Cartesian, parametric and polar co-ordinates - $p - r$ *e*quation of a curve - Formula for radius of curvature in $p - r$ co-ordinates.

Unit II

Co-ordinates of the centre of curvature - Circle of curvature - Evolute.

Unit III

Linear asymptotes - Asymptotes parallel to co-ordinate axes and inclined asymptotes - Intersection of a curve with its asymptotes - Asymptotes of polar curves.

Unit IV

Hyperbolic functions - Relations between hyperbolic functions - Inverse hyperbolic functions, Logarithm of complex quantities.

Unit V

Summation of trigonometric series - Method of differences - Sum of sines of n angles in A.P - Sum of cosines of n angles in A.P - Summation of series by using complex quantities.

Text Books:

1. Arumugam, S., & Issac, A. (2014). Calculus. Palayamkottai: New Gamma Publishing House.
   Chapter 3 : Sections 3.3 - 3.5, 3.11 of Part - I
2. Narayanan, S., & Manicavachagom Pillay, T. K. (2012). Trigonometry.
   S. V. Publications.
   Chapters : 4; Chapter 5 : Section 5; Chapter 6 (except sections 3.1, 3.2 and related Problems).

Reference Books:

1. Narayanan, S. & Manicavachagom Pillay, T. K. (2007). Calculus. (Volume I). Viswanathan Printers & Publishers.
2. Arumugam, S. & Thanga Pandi Issac, A. (2014). Sequences and Series & Trigonometry. New Gamma Publishing House.
3. Rawat, K. S. (2005). Trigonometry. Sarup & Sons.
4. Duraipandian, P. & Kayalal Pachaiappa. (2009). Trigonometry, Muhil Publishers.
5. Joseph A. Mangaladoss. (2005). Calculus. Persi - Persi Publications.

Semester I

Algebra and Calculus (Allied for Physics & Chemistry)

Sub. Code: MA1711

No. of hours per week	Credits	Total No. of hours	Marks
6	5	90	100

Objectives: 1. To impart knowledge in concepts related to Algebra

2.To solve problems in Physical Science.

Unit I

Theory of equations - Formation of equations - Relation between roots and coefficients - Symmetric functions of the roots in terms of coefficients.

Unit II

Transformation of equations - Formation of equation whose roots are multiplied by k and diminished by h - Approximate solutions of Numerical Equations - Newton's and Horner's method.

Unit III

Matrices - Characteristic matrix - Characteristic equation of a matrix - Cayley Hamilton theorem (Statement only) - Eigen values and Eigen vectors - Properties of Eigen values.

Unit IV

Beta and Gamma functions - Properties - Evaluation of integrals using Beta and Gamma Functions - Relation between Beta and Gamma functions.

Unit V

Fourier Series Expansion - Fourier coefficients - Half range Expansion - Sine Series, Cosine Series.

Text Books:

1. Arumugam, S., & Issac, A. (2012). Allied Mathematics (Paper - I). Palayamkottai, New Gamma Publishing House.
   Chapter 1 : Sections 1.1, 1.2, 1.4 and 1.5; Chapter 2 : Sections 2.3 and 2.4.
2. Arumugam, S., & Issac, A. (2007). Allied Mathematics (Paper - III). Palayamkottai, New Gamma Publishing House.
   Chapters 2 and 3.

Reference Books:

1. Manicavachagom Pillay, T. K. & Natarajan, T.,& Ganapathy, K. S. (2007). Algebra. (Volume I). Viswanathan Printers & Publishers.
2. Paul. K. Rees., & Fred W. Sparks. (1967). College Algebra. McGraw - Hill Book Company.
3. Narayanan, S., & Manicavachagom Pillay, T. K. (2007). Calculus. (Volume I). Viswanathan Printers & Publishers.
4. Joseph A. Mangaladoss. (2005). Calculus. Presi - Persi Publications.
5. Narayanan, S., & Manicavachagom Pillay, T. K. (2007). Calculus. (Volume II). S.Viswanathan Printers & Publishers PVT. Ltd.

Semester I

Mathematics for life I (NMEC)

Sub. Code: MNM171

No. of hours per week	Credits	Total No. of hours	Marks
4	3	60	100

Objectives: 1. To develop the quantitative aptitude of the students.

2.To solve problems required for various competitive examinations.

Unit I

Numbers - Face value and Place value of a Digit in a Number - Test of divisibility, Applications of Algebraic Formulae, Unit digit - Series

Unit II

H. C. F and L. C. M of numbers - Factorization method - Common division method, H.C.F and L.C.M of decimal fraction - Comparison of fractions.

Unit III

Decimal fraction - Conversion of decimal into vulgar fraction - Operations on decimal fractions - Comparison of fractions - Recurring decimal - Mixed recurring decimal.

Unit IV

Simplification - BODMAS rule - Modulus of a real number - Virnaculum - Some real life problems, Missing numbers in the expression.

Unit V

Square root and cube root - Finding square root by factorization method - Perfect square and perfect cube.

Text Book:

Aggarwal, R.S. (2014). Quantitative Aptitude. S. Chand and Company LTD.
Chapters : 1 to 5.

Reference Books:

1. Abhijit Guha. (2006). Quantitative Aptitude for Competitive Examination. (4^{th} Edition). Tata McGraw - Hill Education Private Limited.
2. Immaculate, M. (2009). Mathematics for Life. Nanjil offset Printers.
3. Arun Sharma. (2008). Objective Mathematics. (2^{nd} Edition). Tata McGraw - Hill Publishing Company Limited.
4. Chauhan, R.S. Objective Mathematics. (2011). Unique Publishers.
5. Goyal, J. K., & Gupta K. P. (2011). Objective Mathematics. (6^{th} Revised Edition). Pragati Prakashan Educational Publishers.

Semester II
Classical Algebra and Integral Calculus
Sub. Code: MC1721

No. of hours per week	Credits	Total No. of hours	Marks
6	5	90	100

Objectives: 1. To give a sound knowledge in Classical Algebra

2. To solve problems in applications of Integral Calculus.

Unit I

Preliminaries - Fundamental theorem of Algebra - Relations between roots and coefficients - Symmetric functions of the roots - Sum of r^{th} powers of the roots - Newton's theorem on the sum of the powers of the roots.

Unit II

Transformation of Equations - Roots with sign changed - Roots multiplied by a given number - Reciprocal equations - Increasing or decreasing the roots of a given equation by a given quantity - Removal of terms - Descarte's rule of signs – Rolle's theorem.

Unit III

Double integrals - Evaluation of double integrals - Changing the order of integration - Triple integrals.

Unit IV

Beta and Gamma functions - Definition and properties - Relation between Beta and Gamma functions - Evaluation of integrals using Beta and Gamma functions.

Unit V

Fourier series expansion - Fourier coefficients, Half range series expansion - Sine and cosine series - Fourier series and half range series expansion in an arbitrary interval.

Text Books:

1. Manicavachagom Pillay, T. K., & Natarajan, T., & Ganapathy, K. S. (2007). Algebra. (Volume I). S. Viswanathan Printers & Publishers.

   Chapter 6: Sections 6.1 to 6. 17, 6.19, 6.20, 6.24, 6.25.

2. Arumugam, S., & Issac, A. (2014). Calculus. Palayamkottai, New Gamma Publishing House..

   Chapter 3 : Sections 3.1 to 3.3; Chapters 4 & 5 of Part - II

Reference Books:

1. Arumugam, S., & Issac, A. (2003). Classical Algebra. Palayamkottai, New Gamma Publishing House,
2. Narayanan, S., & Manicavachagom Pillay, T. K. (2007). Calculus. (Volume II). S.Viswanathan Printers & Publishers PVT. Ltd.
3. Paul. K. Rees., & Fred W. Sparks. (1967). College Algebra. McGraw - Hill Book Company.
4. Sharma, A. K. (2005). Text Bok of Multiple Integrals. Discovery Publishing House.
5. Dhami, H. S. (2009). Integral Calculus. New Age International Publishers.

Semester II

Vector Calculus and Differential Equations

(Allied for Physics & Chemistry)

Sub. Code: MA1721

No. of hours per week	Credits	Total No. of hours	Marks
6	5	90	100

Objectives: 1. To introduce the concept of vector operators.

2. To impart the mathematical knowledge essential for solving problems in Physical Science.

Unit I

Vector differentiation - Gradient - Divergence and curl - Solenoidal, irrotational and harmonic vectors.

Unit II

Vector integration - Work done by a force - Evaluation of line integrals and surface integrals.

Unit III

Linear differential equation with constant coefficients - Particular integrals of the form $e^{ax}, \sin ax, \cos ax, x^n, e^{ax}f(x), x^n f(x)$, Homogeneous linear equations.

Unit IV

Partial differential equations of first order - Formation - Methods of solving the first order differential equation - Lagrange's Equation.

Unit V

Laplace Transformation - Properties, Inverse Laplace transform - Properties.

Text Books:

1. Arumugam, S., & Thangapandi Issac, A. (2011). Analytical Geometry 3D and Vector calculus. Palayamkottai, New Gamma Publishing House.
   Chapter 5; Chapter 7 : Sections 7.1 and 7.2.
2. Arumugam, S., & Issac, A. (2007). Allied Mathematics (Paper - II). Palayamkottai, New Gamma Publishing House.
   Chapter 5; Chapter 6 : Sections 6.1 to 6.4; Chapter 7 : Sections 7.1 to 7.3.

Reference Books:

1. Narayanan., & Manicavachagam Pillai, K. (1980). Vector Algebra & Analysis. S.Viswanathan Printers & Publishers PVT. Ltd.
2. Gupta, P. P., Malik, G. S, Gupta, R. K. (1985). Vector Analysis. Rastogi Publications.
3. Durai Pandian, P., & Laxmi Durai Pandian. (1986). Vector Analysis. Emerald Publishers.
4. Sankaranarayanan and others. (2006). Differential Equations and Applications. PRESI - PERSI Publishers.
5. Venkatachalapathy, S. G. (2012). Ordinary Differential Equations. Margham Publications.

Semester II
Mathematics for life - II (NMEC)
Sub. Code: MNM172

No. of hours per week	Credits	Total No. of hours	Marks
4	3	60	100

Objectives: 1. To develop the quantitative aptitude of the students

2. To solve problems needed for various competitive examinations.

Unit I

Average - Average of numbers, Average Speed, Some real life problems.

Unit II

Problems on Numbers - Framing and solving equations involving unknown numbers - Problems involving ratios and fractions.

Unit III

Problems on ages - Comparison on ages of two persons - Ratio of ages.

Unit IV

Surds and Indices - Application of laws of indices and surds - Missing numbers in the expression - Comparison of surds.

Unit V

Ratio and Proportion - Fourth, third and mean proportionals - Comparison of ratios, Compound ratio - Duplicate and sub-duplicate Ratio - Triplicate and sub-triplicate ratio - Variation.

Text Book:

Aggarwal, R.S. (2014). Quantitative Aptitude. (Revised Edition). S. Chand and Company LTD.
Chapters : 6 to 9 and 12.

Reference Books:

1. Abhijit Guha. (2006). Quantitative Aptitude for Competitive Examination. (4^{th} Edition). Tata McGraw - Hill Education Private Limited.
2. Immaculate, M. (2009). Mathematics for Life. Nanjil offset Printers.
3. Arun Sharma. (2008). Objective Mathematics. (Second Edition). Tata McGraw - Hill Publishing Company Limited.
4. Chauhan, R.S. (2011). Objective Mathematics. Unique Publishers.
5. Goyal, J. K., & Gupta, K. P. (2011). Objective Mathematics. (6^{th} Revised Edition). Pragati Prakashan Educational Publishers.

SEMESTER III

Major Core III: Differential Equations and Vector Calculus

Sub. Code: MC1731

No. of hours per week	Credits	Total No. of hours	Marks
6	6	90	100

Objectives:

1. To gain deeper knowledge in differential equations, differentiation and integration of vector functions.

2. To apply the concepts in higher mathematics and physical sciences.

Unit I:

Linear differential equation with constant coefficients - Particular integrals of functions of the form e^{ax}, $\sin ax$, $\cos ax$, $x^n, e^{ax}f(x)$, $x^n f(x)$, Homogeneous Linear equations.

Unit II:

Laplace Transformation - Properties, Inverse Laplace transform - Properties - Solving linear differential equations and simultaneous equations of first order using Laplace transform.

Unit III:

Formation of partial differential equations - First order partial differential equation - Methods of solving the first order partial differential equations - Lagrange's Equation. Charpit's method.

Unit IV:

Vector differentiation - Gradient - Equation of tangent plane and normal line - Unit normal - divergence and curl - Solenoidal, irrotational and harmonic vectors.

Unit V:

Vector integration - Line integrals & Surface integrals, Green's, Stoke's and Gauss divergence theorems (statement only). Verification of Green's, Stoke's and Gauss divergence theorems.

Text Books :

1. Arumugam, S., & Issac. (2011). Differential equations and applications. New Gamma Publishing House.
   Chapter 2: Sections 2.1 to 2.4, Chapter 3, Chapter 4: Sections 4.1 to 4.3 & 4.5.
2. Arumugam, S., & Thangapandi Issac. (2014). Analytical Geometry 3D and Vector calculus. Palayamkottai: New Gamma Publishing House.
   Chapters 5 and 7.

Reference Books :

1. Sankaranarayanan., & others. (2006). Differential equations and applications. PRESI- PERSI Publishers.
2. Narayanan., & Manicavachagampillai. (2009). Differential Equations. Vishwanathan S. Printers & Publishers Pvt. Ltd.
3. Venkatachalapathy, S. G. (2012). Ordinary Differential Equations. Margham Publications.
4. Narayanan., & Manicavachagampillai, K. (1980). Vector Algebra & Analysis. Viswanathan, S. Printers & Publishers Pvt. Ltd.
5. Durai Pandian, P., & Laxmi Durai Pandian. (1986). Vector Analysis. Emerald Publishers.

SEMESTER III

Major Core IV: Sequences and Series

Sub. Code: MC1732

No. of hours per week	Credits	Total No. of hours	Marks
5	5	75	100

Objectives:

1. To introduce the primary concepts of sequences and series of real numbers.

2. To develop problem solving skills.

Unit I:

Sequences - Range of a sequence - Limits - Bounded, monotonic, convergent, oscillating and divergent sequences.

Unit II:

Algebra of limits - Null Sequence - Behavior of monotonic sequences - Behavior of Geometric Sequence.

Unit III:

Subsequences - Limit Points - Cauchy sequences in R and Cauchy's general principle of convergence.

Unit IV:

Series - Convergence and divergence - Cauchy's general principle of

convergence - Comparison test - Alternative forms of the Comparison test - Behaviour of harmonic series.

Unit V:

Test of convergence of series with Kummer's test, D' Alembert's Ratio test, Raabe's test, Root test, Cauchy's condensation test (proof using comparison test).

Text Book:

Arumugam, S., & Issac. (2006). Sequences and series. Palayamkottai: New Gamma Publishing House.

Chapter 3: Sections 3.1 to 3.7, 3.9 - 3.11.

Chapter 4 : Sections 4.1, 4.2 (problems related to ratio and root tests from sections 4.3 and 4.4).

Reference Books:

1.Bali, N. B. (2005). Real Analysis. Laxmi Publications.

2.Somasundaram, D., & Choudhary, B. (2010). A first course in Mathematical Analysis. Narosa Publishing House Pvt. Ltd.

3. Singh, J. P. (2010). Real analysis. Ane Books Pvt. Ltd.

4. Gupta, S. L., & Nisha Rani. (2008). Fundamental Real Analysis. Vikas Publishing House Pvt. Ltd.
5.Balaji, G. (2014). Engineering Mathematics. I. Balaji Publisheres.

SEMESTER III

Allied III:Probability Theory and Distributions

Sub.Code: MA1731

No. of hours per week	Credits	Total No. of hours	Marks
5	5	75	100

Objectives:

1. To impart knowledge on the basic concepts of Probability theory and Probability distributions.

2. To apply the theory in real life situations.

Unit I:

Probability - Experiment - Sample space - Events - Conditional probability - Properties - independent events - Multiplication rule of probability - Baye's Theorem.

Unit II:

Random Variables - Discrete and continuous random variables - Probability density function - Distribution function - Mathematical expectations - Mean and variance.

Unit III:

Moment generating function - Properties - Cumulant generating function - Characteristic function - Poisson distribution - Recurrence formula for moments - Fitting of Poisson distribution.

Unit IV:

Binomial distribution - Moment generating function about origin and mean -Recurrence formula for moments - Mode of Binomial distribution - Fitting of Binomial distribution.

Unit V:

Normal Distribution - Properties of Normal curve - Moment generating function about origin and mean - Moments - Standard Normal distribution - Fitting of Normal distribution by area method and ordinate method.

Text Book:

Arumugam, S., & others. (2006). Statistics. New Gamma Publishing House.

Chapter 11 : 11.1 - 11.2; Chapter 12 : 12.1 - 12.6; Chapter 13: 13.1 - 13.3.

Reference Books:

1. Kapur, J.N., & Saxena. (1986). Mathematical Statistics. (12^{th} Edition). Chand & Company.

2. Pillai, R.S.N., & Bagavathi, V. (1989). Statistics. (12^{th} Edition). Chand & Company.

3. Mangaladoss., & others. (1994). Statistics and its application. Suja Publishing House.

4. Sharma, J.N., & Goyal, J. K. (1987). Mathematical Statistics. (11^{th} Edition). Krishna Bakashar Mandir.

5. Gupta, S.P. (2012). Statistical Methods. (42^{nd} Edition). Sultan Chand and Sons.

SEMESTER IV

Groups and Rings

Sub. Code: MC1741

No. of hours per week	Credits	Total No. of hours	Marks
6	6	90	100

Objectives: 1. To introduce the concepts of Group theory and Ring theory.

2. To gain more knowledge essential for higher studies in Abstract Algebra.

Unit I

Groups - Definition and examples - Permutations - subgroups - cyclic groups.

Unit II

Order of an element - Normal subgroups - Cosets and Lagrange's theorem.

Unit III

Quotient groups - Isomorphism - Fundamental theorem of homomorphism.

Unit IV

Rings - Definition and examples - Elementary properties of rings.

Isomorphism of rings - Types of rings - Characteristic of a ring.

Unit V

Subrings - Ideals - Ordered integral domain - Unique factorization domain.

Text Book:

Arumugam, S., & Thangapandi Issac, A. (2011). Modern Algebra. Scitech Publications.

Chapter 3: Sections 3.1, 3.4 - 3.11

Chapter 4 : Sections 4.1 to 4.10, 4.12, 4.13

Reference Books:

1. Surjeet Singh., & Qazi Zameeruddeen. (2006). Modern Algebra. (8^{th} Edition). Vikas Publishing House.
2. Santiago, M.C. (2011). Modern Algebra. (1^{st} Edition). Tata McGraw Publishing Company Limited.
3. Gopalakrishnan, N. S. (2015). University Algebra. (3^{rd} Edition). New Age International Publishers.
4. Vatsa, B. S., & Suchi Vatsa. (2010). Modern Algebra. (2^{nd} Edition). New Age International Publishers.
5. Joseph A. Gallian. (1999). Contemporary Abstract Algebra. (4^{th} Edition). Narosa Publishing House Pvt. Ltd.

SEMESTER IV

Analytical Geometry - 3 Dimensions

Sub. Code: MC1742

No. of hours per week	Credits	Total No. of hours	Marks
5	5	75	100

Objectives: 1. To gain deeper knowledge in three dimensional Analytical Geometry.

2. To develop creative thinking, innovation and synthesis of information.

Unit I

Distance between points - Angle between two lines - Projection on a line - Direction cosines - Direction ratios of the join of two points - Projection of the line joining two points - Cosines of the line joining the points - Conditions for perpendicularity and parallelism.

Unit II

Equation of a plane in different forms - Intercept form - normal form - Angle between the planes -The ratio in which the plane divides the line joining the points - A plane through the line of intersection of two given planes - length of perpendicular - Planes bisecting the angle between two planes.

Unit III

Equation of a line in different forms - The plane and the straight line - Angle between the lines-image of a line - plane and a line - Line of intersection of two planes - Angle between a line and a plane - Co-planarity of two lines.

Unit IV

Shortest distance between two lines - The equations of two skew lines in a simplified form - The Intersection of three planes - Volume of a tetrahedron.

Unit V

Equation of the sphere in its general form - Determination of the centre and radius of a sphere - The length of the tangent from the point to the sphere - Section of sphere by a plane - Intersection of two spheres - Tangent plane.

Text Book

Manicavachagom Pillay, T. K., & Natarajan. (2007). Analytical Geometry (Part II-Three dimensions).Viswanathan S. Printers & Publishers Pvt. Ltd.

Chapters : 1 - 4 (Except section 9 in chapter 3).

Reference Books

1. Arumugam, S., & Thangapandi Issac, A. (2014). Analytical Geometry 3D and Vector Calculus. New Gamma Publishing House.
2. Kar, B.K. (2012). Advanced Analytical Geometry and Vector Calculus. (Revised Edition). Books and Allied (p) Ltd.
3. Chatterjee, D. (2009). Analytical Geometry Two and Three Dimensions. New Delhi: Narosa Publishing House Pvt.Ltd.
4. Jain, P. K., Khalil Ahmad. (1999). Textbook of Analytical Geometry of Three Dimensions. (2^{nd} Edition). New Age International (p) Limited Publishers.
5. Arup Mukherjee., & Naba Kumar Bej. (2015). Analytical Geometry of Two and Three Dimensions. (Advanced Level). Books and Allied (p) Ltd.

SEMESTER IV

Applied Statistics (Allied)

Sub.Code: MA1741

No. of hours per week	Credits	Total No. of hours	Marks
5	5	75	100

Objectives: 1. To acquire the knowledge of correlation theory and testing hypothesis .

2. To solve research and application oriented problems.

Unit I

Correlation - Properties of correlation coefficient - Rank correlation – Regression - Equation of regression lines - Angle between regression lines.

Unit II

Test of significance - Sampling - Sampling distribution - Testing of hypothesis - Procedure for testing of hypothesis for large samples - Test of significance for proportions and percentages.

Unit III

Test of significance for means, difference of sample means, standard deviation and correlation coefficient.

Unit IV

Test of significance for small samples - Test of significance based on t-distribution - Test of significance based on F-test - Test of significance of an observed sample correlation.

Unit V

Test based on χ^2-distribution - χ^2test for population variance, goodness of fit and independence of attributes - Yate's Correction.

Text Book :

Arumugam, S., & Thangapandi Isaac, A. (2006). Statistics. New Gamma Publishing House. Palayamkotai.

Chapters : 6, 1, 15, 16.

Reference Books:

1. Kapur, J. N., & Saxena. (1986). Mathematical Statistics. (12^{th} Edition). Chand & Company.
2. Pillai, R. S. N., & Bagavathi, V. (1989). Statistics. (12^{th} Edition). Chand & Company.
3. Mangaladoss., & Others. (1994). Statistics and its Application. Suja Publishing House.
4. Sharma, J. N., & J. K. Goyal. (1987). Mathematical Statistics. (11^{th} Edition). Krishna Bakashar Mandir.
5. Robert,V., Hogg., Joseph., Mckean, W., Allen., & Craig, T. (2013). Introduction to Mathematical Statistics. (6^{th} Edition). Dorling Kindersley (India) Pvt. Ltd.

SEMESTER V

Linear Algebra

Sub. Code: MC1751

No. of hours per week	Credits	Total No. of hours	Marks
6	5	90	100

Objectives: 1. To introduce the algebraic system of Vector Spaces, inner product spaces.

2. To use the related study in various physical applications.

Unit I

Vector spaces - Definition and Examples - Subspaces - Linear transformation.

Unit II

Span of a Set - Linear Independence.

Unit III

Basis & Dimension - Rank & Nullity - Matrix of a Linear Transformation **.**

Unit IV

Inner Product Spaces - Definition and examples - Orthogonality - Orthogonal complement.

Unit V

Characteristic Equation and Cayley-Hamilton Theorem - Eigen values and Eigen vectors.

Text Book:

Arumugam, S., & Thangapandi Issac, A. (2011). Modern Algebra. Scitech Publications (India) Pvt. Ltd.

Chapter 5 : 5.1 t o 5.8; Chapter 6 : 6.1 to 6.3 & Chapter 7: 7.7 & 7.8

Reference Books:

1. Santiago, M. L. (2001). Modern Algebra. New Delhi: Tata McGraw Hill Publishing Company Ltd.
2. Krishnamoorthy, V., & Mainra, V. P. (1976). An Introduction to Linear Algebra. New Delhi: Affiliated East West Press Pvt. Ltd.
3. Gopalakrishnan, N. S. (2015). University Algebra. (3^{rd} Edition). New Age International Publishers.
4. Vatsa, B. S., & Suchi Vatsa. (2010). Modern Algebra. (2^{nd} Edition). New Age International Publishers.
5. Aloknath Chakrabarti. (2006). A First Course in Linear Algebra. Vijay Nicole Imprints Pvt .Ltd.

SEMESTER V

Real Analysis

Sub. Code: MC1752

No. of hours per week	Credits	Total No. of hours	Marks
6	5	90	100

Objectives: 1. To introduce Metric Spaces and the concepts of completeness, continuity, connectedness, compactness and uniform convergence.

2. To use these concepts in higher studies.

Unit I

Countable and Uncountable sets - Metric Space - definition and examples - Bounded sets - Open ball - Opens sets - Subspace.

Unit II

Interior of a set - Closed sets - Closure - Limit point - Dense sets - Complete metric space - Cantor's intersection theorem - Baire's Category theorem.

Unit III

Continuity of functions - Composition of continuous functions - Equivalent conditions for continuity - Homeomorphism - Uniform continuity - Discontinuous functions on R.

Unit IV

Connectedness - Definition and examples - Connected subsets of R - Connectedness and continuity - Intermediate value theorem.

Unit V

Compactness - Compact space - Compact subsets of R - Equivalent Characterisations for Compactness - Compactness and continuity.

Text Book:

S. Arumugam., & Issac. (2013). Modern Analysis. New Gamma Publishing House.

Chapter 1: Sections 1.2 and 1.3; Chapters 2 to 6.

Reference Books:

1. Bali, N. P. (2005). Real Analysis. Lakshmi Publications.
2. Richard., R. & Goldberg. (1973). Methods of Real Analysis. Oxford & IBH Publishing Co.
3. Sudhir., Ghorpade, R., Balmohan., & Limaye, V. (2006). A Course in Calculus and Real Analysis. Springer International Edition.
4. Protter, M. H., & Morrey, C. B. (1991). A First Course in Real Analysis. (2^{nd} Edition). Springer International Edition.
5. Norman., Haaser, B., & Joseph A. Sullivan. (1971). Real Analysis. Van Nostrand Reinhold Company.

SEMESTER V

Mechanics

Sub. Code: MC1753

No. of hours per week	Credits	Total No. of hours	Marks
6	4	90	100

Objectives: 1. To study the application of Mathematics in Physical Sciences.

2. To solve related problems.

Unit I

Lami's Theorem - Parallel Forces, like and unlike parallel forces - Equilibrium of three coplanar forces - Centre of two parallel forces - Moments - Varignon's theorem of moments - Generalised theorem of moments.

Unit II

Coplanar Forces - Reduction of any number of coplanar forces - Conditions for a system of forces to reduce to a single force or a couple - Change of the base point - Equation to the line of action of the resultant - Solution of problems.

Unit III

Friction - Statical, Dynamical and Limiting friction - Laws of friction - Coefficient of friction - Angle of friction - Cone of friction - Equilibrium of a body on a rough inclined plane - Problems on friction.

Unit IV

Projectiles - Equation of path - Characteristics of the motion of the projectile - Maximum horizontal range - Two directions of projection for a given velocity - Velocity of the projectile.

Unit V

Simple Harmonic Motion in a straight line - General solution of the SHM - Geometrical representation - Change of origin - Simple harmonic motion on a curve - Simple pendulum - Period of oscillation of a simple pendulum - Equivalent simple pendulum - Seconds pendulum.

Text Books:

1. Venkataraman, M. K. (2012). Statics. (15^{th} Edition). Agasthiar Publications.
   Chapter 2 : Section 2.9; Chapter 3: Sections 3.1 to 3.13; Chapter 6: Sections 6.1 to 6.3 (Analytical proof only), 6.5, 6.7, 6.8, 6.13 & Chapter 7 : Sections 7.1 to 7.13 (upto example 15).
2. Venkataraman, M. K. (2012). Dynamics. (15^{th} Edition). Agasthiar Publications.
   Chapter 6 : Sections 6.1 to 6.10
   Chapter 10 : Sections 10.1 to 10.5, 10.11 to 10.15.

Reference Books:

1. Durai Pandian, P., Lexmi Durai Pandian., & Muthamizh Jayapragasam. (2011). Mechanics. Chand S. & Company Ltd.
2. Rajeshwari, I. (2016). Mechanics. (1^{st} Edition). Saras Publication.
3. Chaudhry, K. R., & Aggarwal, A. C. (1983). Elements of Mechanics. Chand, S.& Company Ltd.
4. Mathur, D. S. (1985). Mechanics. S.Chand & Company Ltd.
5. John., Synge, L., Byron., & Griffith, A. (1970). Principles of Mechanics. (International Student Edition). McGraw - Hill Kogakusha Ltd.

SEMESTER V

Elective (a): Astronomy

Sub.Code: MC1755

No. of hours per week	Credits	Total No. of hours	Marks
5	5	75	100

Objectives: 1. To introduce space science and to familiarize the important features of the planets, sun, moon and stellar universe.

2. To predict lunar and solar eclipses and study the seasonal changes.

Unit I

Spherical trigonometry (only the four formulae) Celestial sphere - Four systems of coordinates - Diurnal motion - Sidereal Time - Hour angle and Azimuth at rising - Morning and Evening stars - Circumpolar stars - Diagram of Celestial sphere.

Unit II

The Earth - Zones of the earth - Perpetual Day and Perpetual night - Terrestrial latitude and longitude - Dip of Horizon - Twilight, Duration of Twilight, Twilight throughout night, Shortest Twilight.

Unit III

Refraction - Tangent formula, Constant of Refraction, Refraction on Horizontal and Vertical arcs, Refraction of any arc, Cassini's Formula, Horizontal Refraction. Geocentric parallax - Horizontal parallax - Effect of Geocentric parallax on Right Ascension and Declination - Angular diameter - Geocentric parallax and Refraction.

Unit IV

Kepler's laws - Eccentricity of Earth's orbit - Newton's Law of Gravitation - Newton's deductions from Kepler's laws.

Unit V

Eclipses - Lunar Eclipse - Solar Eclipse - Condition for a Lunar Eclipse - Synodic period of nodes Ecliptic limits - Maximum and minimum number of eclipses near a node in a year - Saros of Chaldeans - Duration of lunar and solar Eclipses.

Text Book:

Kumaravelu, S., & Susheela Kumaravelu. (2012). Astronomy. (10^{th} Edition).

Chapter 2 upto article 85; Chapter 3 : Art 93 & Art 106 to 116;

Chapters 4 , 5, 6 upto Art 154 & Chapter 13

Reference Books:

1. Subramanian, K., Subramanian, L. V.,Venkataraman., & Brothers. (1965). A text book of Astronomy. (1^{st} Edition). Educational Publishers.
2. Ramachandran, G. V. (1970). A text book of Astronomy. (7^{th} Edition). Theni Printers.
3. Daniel Fleish., Julia Kregenow. (2013). Mathematics of Astronomy. (1^{st} Edition). Cambridge University Press. NewYork.
4. Smart, W. M. (1949). Spherical Astronomy. (4^{th} Edition). Cambridge university press.
5. Jean Meeus. (2002). More Mathematical Astronomy morsels. (1^{st} Edition). Willmann Bell Publishing.

SEMESTER V

Elective (b): Boolean Algebra

Sub. Code: MC1756

No. of hours per week	Credits	Total No. of hours	Marks
5	5	75	100

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Objectives: 1. To introduce the algebraic structures like lattices and Boolean algebra.

2. To apply these concepts in various branches of Mathematics.

Unit I

Partially ordered sets - Chain - Upper and lower bounds - Least upper bound and greatest lower bound - Problems.

Unit II

Lattices - Complete lattice - Principle of duality - Sub lattices - Problems.

Unit III

Lattice homomorphism - Isomorphism theorem - Modular lattice - The chain conditions - Schreier's theorem - Problems.

Unit IV

Decomposition theory for lattices with Ascending chain conditions - Independence - Complemented modular lattice - Problems.

Unit V

Boolean Algebras - elementary properties of complements in Boolean Algebras -Stone's theorem - problems.

Text Books:

1. Jacobson, N. (1965). Lectures in Abstract Algebra. (1^{st} Edition). New Delhi:

   Affliated East- West Press Private Ltd.

   Chapter 7.

2. Arumugam, S. (2008). Modern Algebra. Scitech publications.

   Problems only.

Reference Books:

1. Vijay Khanna, K., Bhambri, S. K. (1994). Lattices and Boolean Algebra. Vikas Publishing House.
2. Sharma, J. K. (2011). Discrete Mathematics. (3^{rd} Edition). Macmillan Publishers India Ltd.
3. Goodstein, R.L. (2007). Boolean Algebra. Dover Publications Inc.
4. Bradford Henry Arnold. (2011). Logic and Boolean Algebra. Dover Publications Inc.
5. Steven Givant., & Paul halmos. (2009). Introduction to Boolean Algebras. Springer.

SEMESTER V

Elective (c): Web Designing with HTML

Sub.Code: MC1757

No. of hours per week	Credits	Total No. of hours	Marks
5	5	75	100

Objectives: 1. To understand the importance of the web as a medium of communication.

2. To create an effective web page with graphic design principles.

Unit I

Introduction to HTML - Designing a Home Page - History of HTML - HTML Generations - HTML Documents - Anchor Tag - Hyper Links - Sample HTML Documents .

Unit II

Head and Body Sections - Header Sections - Title - Prologue - Links - Colorful Web Page - Comment Lines - Some Sample HTML Documents .

Unit III

Designing the Body Section - Heading Printing - Aligning the Headings - Horizontal Rule - Paragraph - Tab Setting - Images and Pictures - Embedding PNG Format Images.

Unit IV

Ordered and Unorded Lists - Lists - Unordered Lists - Headings in a List - Ordered Lists - Nested Lists.

Unit V

Table Handling - Tables -Table Creation in HTML - Width of the Table And Cells - Cells Spanning Multiple Row/Columns Coloring Cells - Column Specification - Some Sample Tables.

Text Book:

Xavier, C. World Wide Web Design with HTML. Tata Mcgram Hill Publishing Company Limited.

Chapters 4: Sections 4.1 – 4.7 ; 5: 5.1 – 5.7; 6 : 6.1 - 6.7; 7: 7.1 – 7.5 ; 8 : 8.1 – 8.7

Reference Books:

1. Castro., Elizabeth., & Hyslop. (2013). HTML5, And CSS: Visual Quickstart Guide. (Eight Edition). Peachpit Press.
2. Devlin., & Ian. (2011). HTML5 Multimedia : Develop And Design. Peachpit Press.
3. Felke., & Morris. (2013). Basics of Web Design : HTML5 & CSS3. (2^{nd} Edition). Addition -Wesley.
4. Felke.,& Morris. (2014). -Web Development & Design Foundations With HTML5. (7^{th} Edition). Addition - Wesley.
5. John Duckett. (2011). HTML and CSS : Design and Build Website. (1^{st} Edition). John wiley and sons.

SEMESTER V

Skill Based Course

Mathematics for competitive Examinations - I

Sub.code: MSK175

No. of hours per week	Credits	Total No. of hours	Marks
2	2	30	100

Objectives: 1. To develop the quantitative aptitude of the students.

2. To solve problems needed for various competitive examinations.

Unit I

Percentage - Conversion of decimal into percentage and vice versa, Problems on Population and Depreciation.

Unit II

Partnership - Problems on ratio of division of gains, Working partners and sleeping partners.

Unit III

Pipes and Cistern - Problems related to inlet and outlet of the tank.

Unit IV

Time and Distance - Average speed, ratio of speeds.

Unit V

Boats and Streams - Speed of downstream, Speed of upstream, Speed of still water, Rate of stream - Alligation or Mixture.

Text Book:

Agarwal, R.S. (2014). Quantitative Aptitude. (Revised Edition). S. Chand & Company Pvt. Ltd.

Chapters **:** 10,13, 16, 17, 19 and 20.

Reference Books:

1. Guha, A. (2011). Quantitative Aptitude for Competitive Examinations. (4^{th} Edition). McGraw Hill Education. (India) Pvt. Ltd.
2. Immaculate, M. (2009). Mathematics for Life. Nanjil offset Printers.
3. Arun Sharma. (2008). Objective Mathematics. (2^{nd} Edition). Tata McGraw-Hill Publishing Company Limited.
4. Chauhan, R.S. (2011). Objective Mathematics. Unique Publisher.
5. Goyal, J. K., & Gupta, K. P. (2011). Objective Mathematics. (6^{th} Revised Edition). Pragati Prakashan Educational Publishers.

SEMESTER VI

Complex Analysis

Sub. Code: MC1761

No. of hours per week	Credits	Total No. of hours	Marks
6	5	90	100

Objectives: 1. To introduce the basic concepts of differentiation and integration of Complex functions.

2. To apply the related concepts in higher studies.

Unit I

Complex numbers - conjugation and modulus, inequalities, square root, geometrical representation, n^{th} roots of complex numbers, circles, straight lines, regions of the complex plane, the extended complex plane.

Unit II

Analytic functions - Differentiability, Cauchy Riemann equations, Analytic functions, Harmonic function. Bilinear transformations - Elementary transformations, Bilinear Transformations, Cross ratio.

Unit III

Complex integration - Definite Integral, Cauchy's theorem, Cauchy's integral formula.

Unit IV

Series Expansions - Taylor Series, Laurent's Series, Zeros of Analytic Functions, Singularities. (Definitions & examples only).

Unit V

Calculus of Residues - Residues, Cauchy's Residue Theorem, Evaluation of Definite Integrals (Type 1only).

Text Book:

Arumugam, S., Thangapandi Issac, A., & Somasundaram, A. (2018). Complex Analysis. Scitech publications.

Chapter 1: Sections 1.1 - 1.9; Chapter 2: Sections 2.5 - 2.8;
Chapter 3: Sections 3.1 - 3.3; Chapter 6: Sections 6.1 - 6.3;
Chapter 7: Sections 7.1- 7.4 & Chapter 8: Sections 8.1 - 8.3 (Type 1 only)

Reference Books:

1. Goyal., Gupta., & Pundir. (2012). Complex Analysis. (1^{st} Edition). Pragati Prakashan Educational Publishers.
2. Durai Pandian, P., Laxmi Durai Pandian., & Muhilan, D. (2001). Complex Analysis. Emerald Publishers.
3. Duraipandian, P., & Kayalal Pachaiyappa. (2014). Complex Analysis. (1^{st} Edition). S. Chand and Company Pvt. Ltd.
4. Ruel V. Churchill., & James Ward Brown. (1990). Complex Variables and Applications. McGraw-Hill International Edition.
5. Anuradha Gupta.(2011). Complex Analysis. Ane Books Pvt. Ltd.

SEMESTER VI

Graph Theory

Sub. Code: MC1762

No. of hours per week	Credits	Total No. of hours	Marks
6	5	90	100

Objectives: 1. To introduce graphs, directed graphs and the concepts of connectedness and labellings.

2. To apply these concepts in research.

Unit I

Graphs and Subgraphs - Definition and Examples - Degrees, Subgraphs, Isomorphism - Ramsey Numbers - Independent sets and coverings - Intersection graphs and line graphs - Matrices - Operations on graphs. Degree Sequences - Graphic Sequences.

Unit II

Connectedness - Walks, Trails and Paths - Connectedness and Components - Blocks - Connectivity. Eulerian Graphs - Hamiltonian Graphs.

Unit III

Trees - Characterisation of trees - Centre of a tree - Matchings - Matchings in bipartite graphs.

Unit IV

Planarity - Definition and properties - Colourability - Chromatic number and chromatic index - The five colour theorem - Four colour theorem - Chromatic polynomials.

Unit V

Directed Graphs - Definition and Basic Properties, Paths and Connections -EulerianTrail - Digraphs and Matrices - Tournaments.

Text Book:

1. Arumugam, S., & Ramachandran, S. (2017). Invitation to Graph Theory. Scitech Publications Pvt. Ltd.
   Chapters 2 to 7, 8 (8.1 only), 9 &10.

ReferenceBooks:

1. Kumaravelu, S., & Susheela Kumaravelu. (1999). Graph Theory. (1^{st} Edition). Printers Janki calendar corporation, Sivakasi.
2. Harary F. (1988). Graph Theory. Narosa Publishing House.
3. Balakrishnan, R., & Ranganathan, K. (2013). A Text book of Graph Theory. Springer International Edition.

4. Gary Chartrand., & Ping Zhang. (2006). Introduction to Graph Theory. McGraw-Hill Edition Pvt. Ltd.
5. Douglas B. West. (2003). Introduction to Graph Theory. (2^{nd} Edtion). Prentice - Hall of India private limited.

SEMESTER VI

Number Theory

Sub. Code: MC1763

No. of hours per week	Credits	Total No. of hours	Marks
5	5	75	100

Objectives: 1. To introduce the fundamental principles and concepts in Number Theory.

2. To apply these principles in other branches of Mathematics.

Unit I

Divisibility Theory in the Integers - The Division Algorithm -The greatest common divisor - The Euclidean Algorithm.

Unit II

The Diophantine Equation $ax + by = c$ - Primes and Their Distribution -The fundamental theorem of arithmetic - The Sieve of Eratosthenes.

Unit III

The Theory of Congruences - Basic properties of congruence - Linear congruences and the Chinese remainder theorem.

Unit IV

Fermat's Little theorem and Pseudo primes - Absolute pseudo primes - Wilsons theorem - Quadratic Congruence.

Unit V

Number Theoretic Functions - The sum and number of divisors -The Mobius Inversion formula - The greatest integer function.

Text Book

David .M. Burton. (2017). Elementary Number Theory. (7^{th} Edition). McGraw Hill Education (India) Private Limited.

Chapter 2: Sections 2.2 - 2.5 ; Chapter 3: Section 3.1 & 3.2

Chapter 4: Sections 4.2, 4.4; Chapter 5: Sections 5.2, 5.3 and

Chapter 6: Sections 6.1- 6.3

Reference Books

1. Ivan Niven., & Herbert S. Zucker man. (1976). An Introduction to the Theory of Numbers. Wiley Eastern limited.
2. Kumaravelu., & Sucheela Kumaravelu. (2002). Elements of Number Theory. Raja Sankar Offset Printers.
3. Hardy, G.H., & Wright, E.M. (1975). An introduction to the theory of Numbers. (4^{th} Edition). Oxford at the Clarendon Press.
4. Tom M. Apostel. (1998). Introduction to Analytic Number Theory. Narosa Publishing House.
5. John Sitillwell. (2009). Elements of Number Theory. Springer International Student Edition.

SEMESTER VI

Operations Research

Sub. Code: MC1764

No. of hours per week	Credits	Total No. of hours	Marks
5	5	75	100

Objectives: 1. To formulate real life problems into mathematical problems.

2. To solve life oriented and decision making problems by optimizing the objective function.

Unit I

Formulation of L.P.P - Mathematical Formulation of L.P.P - Solution of L.P.P - Graphical method.

Unit II

Simplex method - Big-M Method - Algorithm for Big-M Method - Two phase method - Phase I : Solving auxiliary LPP using Simplex method - Phase II : finding optimal basic feasible solution.

Unit III

Duality in L.P.P - Primal - Formation of dual L.P.P - Matrix form of primal and its dual - Fundamental theorem of duality - Dual simplex method - Dual Simplex Algorithm -Degeneracy and cycling in L.P.P.

Unit IV

Transportation problems - Mathematical formulation of Transportation Problems - Dual of a Transportation Problem - solution of a Transportation Problem - North-West corner rule - Row minima method - Column minima method - Least cost method - Vogel approximation method.

Unit V

Assignment Problems - Mathematical formulation - Solution to assignment problems - Hungarian Algorithm for solving Assignment Problem -Travelling Salesman Problem.

Text book:

Arumugam, S., & Thangapandi Issac, A. (2015). Operations Research (Linear Programming). (1^{st} Edition). New Gamma Publishing house.

Chapter 3: 3.1 - 3.7, 3.9, 3.10; Chapter 4 : 4.1 &

Chapter 5: 5.1, 5.2

Reference Books:

1. Gupta, P.K., & Hira, D.S. (1997). Operations Research. S.Chand and Co. Ltd.
2. Sankara Narayanan, T., & Joseph A. Mangaladoss. (2004). Operations Research. (5^{th} Edition). Persi - Persi Publications.
3. Handy, A. Taha. (1989). Operations Research - An Introduction. (3^{rd} Edition). Mac Millan Publishing Co. Inc.
4. Vittal, P. R., & Malini, V. (2013). Operations Research. Margham Publications.
5. Joseph A. Mangaladoss. (2004). Operations Research - I (Linear Programming). (5^{th} Edition). Persi - Persi Publications.

SEMESTER VI

Elective II: (a) Numerical Methods

Sub. Code: MC1765

No. of hours per week	Credits	Total No. of hours	Marks
6	5	90	100

Objectives: 1. To study Numerical differentiation and Numerical integration using different formulae.

2. To develop various methods for solving applied scientific problems.

Unit I

Solutions of algebraic and transcendental equations. Iteration method - Newton Raphson method - Finite difference - Difference operators - other difference operators.

Unit II

Newton's Interpolation formulae - Lagrange's Interpolation formula - divided difference - Newton's divided difference formula.

Unit III

Numerical differentiation - derivatives using Newton's forward difference formula - backward difference formula.

Unit IV

Numerical integration - Newton cote's - quadrature formula - Trapezoidal rule.

Unit V

Simpson's $(1/3)^{rd}$ rule - Simpson's $(3/8)^{th}$ rule **-** Numerical solution of differential equation - Taylor's series method - Picard's method.

Text Book:

Arumugam, S.,Thangapandi Issac, A., & Somasundaram, A. (2002). Numerical Methods. Scitech Publications Pvt. Ltd.
Chapter 3: Sections 3.0, 3.2 & 3.5;
Chapter 6: Sections 6.1 & 6.2;
Chapter 7: Sections 7.1, 7.3 - 7.5;
Chapter 8: Sections 8.1, 8.2 & 8.5 (except Weddle's rule, Boole's rule & Romberg's method) & Chapter 10: Sections 10.1 &10.2.

Reference Books:

1. Sastry, S.S. (2003). Introduction methods of numerical analysis. (3^{rd} Edition). Prentice Hall of India.
2. Scar Borough, J.N. (1966). Numerical mathematical analysis. (6^{th} Edition). Oxford and IBH Publishing Co.
3. Gupta, P. P., G.S.Malik., & Sanjay Gupta. (1992). Calculus of finite differences and numerical analysis. (16^{th} Edition). KRISHNA Prakashan Mandir.
4. Devi Prasad. (2010). An Introduction to Numerical Anaysis. Narosa Publishing House.
5. Bhupendra Singh. (2012). Numerical Analysis. (2^{nd} Edition). Pragati Prakashan Educational Publishers.

SEMESTER VI

Elective II: (b) Fuzzy Mathematics

Sub. Code: MC1766

No. of hours per week	Credits	Total No. of hours	Marks
6	5	90	100

Objectives: 1. To understand Fuzzy concepts of sets and operations.

2. To apply the Fuzzy concepts in image processing, machine learning and artificial intelligence.

Unit I

Crisp set - Operations on Crisp Set - Fuzzy Set -Types of Fuzzy set - Operations on Fuzzy Sets - Properties of operation on Fuzzy Sets - Product on Fuzzy Sets. Fuzzy Numbers Linguistic Variables - Fuzzy Arithmetic.

Unit II

Operation On Fuzzy Numbers, Fuzzy Equations - Lattice of Fuzzy Numbers - Classical Logic - Logical Connectives - Truth Values and Truth Tables - Algebra of Statements - Logical

Identies and implications - Fuzzy Logic - Fuzzy Logic Truth Tables -Fuzzy Connectives. Fuzzy Grammar - Properties of Modifier - Inference Rules.

Unit III

Relations on Fuzzy set - Composition of Fuzzy Relation - Fuzzy Equivalence Relation - Fuzzy ordering relation - operations on fuzzy Relation - Role of Fuzzy Relation Equation.

Unit IV

Fuzzy Data Mining - Fuzzy Systems Neural Network - Fuzzy Automata - Fuzzy Systems and Genetic Algorithm.

Unit V

Fuzzy Measure, Evidence Theory - Dempster Rule of Combination - Marginal Basic Assignment - Possibility Theory - Possibility Theory versus Probability Theory.

Text Book:

HoodaVivekRaich, D.S. (2015). Fuzzy Set Theory and Fuzzy Controller.
Narosa Publishing House.
Chapter 1: 1.2 - 1.6; Chapter 2: 2.2 - 2.7; Chapter 3: 3.2 - 3.12;
Chapter 4 : 4.2 - 4.7; Chapter 5: 5.2- 5.6 & Chapter 6: 6.2 - 6.7.

Reference Books:

1. Zimmermann, H. J. (2001). Fuzzy Set Theory And Its Applications. (4^{th} Edition). Springer International Edition.
2. Bhargava, A. (2013). Fuzzy Set Theory Fuzzy logic and their Application. S.Chand Publishing.
3. Ganesh, M. (2006). Fuzzy sets and Fuzzy logic. Prentice Hall India learning private limited.
4. Shinghal. (2012). Introduction to Fuzzy logic. Prentice Hall India learning private Limited.
5. Nanda, S.,& Das, N. R. (2015). Fuzzy Mathematical Concepts. Narosa Publishing House Pvt. Ltd.

SEMESTER VI

Elective II: (c) Object Oriented Programming with C++

Sub code: MC1767

No. of hours per week	Credits	Total No. of hours	Marks
6	5	90	100

Objectives: 1. To learn and write programmes in C++ Language.
2.To enhance job opportunities.

Unit I

Basic concepts of object - oriented programming - benefits of OOP - applications of C++ - simple program - more statements - structure of C++ program - creating the source file - compiling and linking.

Unit II

Tokens - keywords - identifiers and constants - basic data types - user defined data types - derived data types - symbolic constants - variables - operators - manipulators - expressions and their types - operator overloading - operator precedence - control structures.

Functions in C++ - main function - function prototyping - call by reference - return by reference - in line functions - default argument - function overloading - math library functions.

Unit III

Classes and objects - defining member functions - C++ program with class - member functions - arrays within a class - arrays of objects - objects as function arguments - returning objects - constant member functions - pointer to members.

Unit IV

Constructors - parametrized constructors - multiple constructors - constructors with default arguments - dynamic initialization - copy constructor - dynamic constructor - constructing two dimensionl arrays - destructors. Defining operator overloading - overloading unary operators - manipulation of string using operators.

Unit V

Defining derived class - single inheritance - multilevel inheritance - hierarchial inheritance - hybrid inheritance - virtual base classes - abstract classes - nesting classes - basic concepts in pointers.

Text Book:

Balagurusamy, E. (2011). Object oriented programming with C++. ($\mathbf{5}^{th}$ Edition). (TMH).TataMaGraw Hill Publication.

Chapter 1: Sections 1.5 - 1.8 ; Chapters 2 to 8 and Chapter 9: Sections 9.1, 9.2.

Reference Books:

1. Ravichandran, D. (2002). Programming with C^{++} .Tata MaGraw Hill Publication.
2. Paul Deitel.,& Harvey Deitel. (2013). C++ How to program. (8^{th} Edition).PHI Learning Private Limited Publication.
3. Stanley Hoffman. (2015). C++: For Beginners. Addison - Wesley professional.
4. BjarneStroustrup. (2014). Programming: Principles and practice using C++. (2^{nd} Edition).Addison - Wesley professional.
5. Scott Meyers, (2014). Effective C++. (1^{st} Edition). O 'Reilly Media.

SEMESTER VI

Skill Based Course

Mathematics for competitive Examinations - II

Sub. Code: MSK176

No. of hours per week	Credits	Total No. of hours	Marks
2	2	30	100

Objectives: 1. To develop the quantitative aptitude of the students.

2. To solve problems needed for various competitive examinations.

Unit I

Problems on Trains - Finding the time taken by the train to pass a pole or an object of length - Relative Speed - Crossing time of two trains.

Unit II

Compound Interest - Annual, Half-yearly and Quarterly Compound Interest - Present Worth.

Unit III

Volume and Surface Areas - Cuboid, Cube, Cylinder, Cone, Sphere, Hemisphere.

Unit IV

Calendar - Counting Odd Days - Day of the Week related to Odd Days. Clocks.

Unit V

Stocks and Shares - Face Value - Market Value - Brokerage. Banker's Discount - Banker's Discound - Banker's Gain.

Text Book:

Agarwal, R.S. (2014).Quantitative Aptitude. S. Chand & Company Pvt. Ltd.

Chapters: 18, 22, 25, 27, 28, 29 and 33

Reference Books:

1. Guha, A. (2011). Quantitative Aptitude for Competitive Examinations. (4^{th} Edition). McGraw Hill Education (India) Pvt. Ltd.
2. Immaculate, M. (2009). Mathematics for Life. Nanjil offset Printers.
3. Arun Sharma. (2008). Objective Mathematics. (2^{nd} Edition). Tata McGraw-Hill Publishing Company Limited.
4. Chauhan, R.S. (2011). Objective Mathematics. Unique Publishers.
5. Goyal, J. K., & Gupta, K. P. (2011). Objective Mathematics. (6^{th} Edition). Pragati Prakashan Educational Publishers.