SWAMI DAYANANDA COLLEGE OF ARTS & SCIENCE, MANJAKKUDI – 612 610.

DEPARTMENT OF MATHEMATICS

PROGRAMME OUTCOMES
PROGRAMME SPECIFIC OUTCOMES
COURSE OUTCOMES

FOR

B.Sc., MATHEMATICS DEGREE PROGRAMME

BHARATHIDASAN UNIVERSITY, TIRUCHIRAPPALLI - 620 024.
B.Sc. MathematicsCourse Structure under CBCS

(Applicable to the candidates admitted from the academic year 2016 -2017 onwards) **Updated on 09.07.2018**

Sem	Part	Course	Title	Ins. Hrs	Credit	Exam Hours	Int	Ext.	Total
I	I	Language Course – I (LC) – Tamil*/Other Languages +#		6	3	3	25	75	100
	II	English Language Course - I (ELC)		6	3	3	25	75	100
	III	Core Course – I (CC)	Differential Calculus and Trigonometry	5	5	3	25	75	100
		Core Course – II (CC)	Integral Calculus	4	4	3	25	75	100
		First Allied Course – I (AC)	Allied Physics - I	4	4	3	25	75	100
		First Allied Course – II (AP)	Allied Physics (P) – II	3	---	---	---	---	---
	IV	Value Education	Value Education	2	2	3	25	75	100
		TOTAL		**30**	**21**				**600**
II	I	Language Course – II (LC) - Tamil*/Other Languages +#		6	3	3	25	75	100
	II	English Language Course – II (ELC)		6	3	3	25	75	100
	III	Core Course – III (CC)	Differential Equations and Laplace Transforms	5	5	3	25	75	100
		Core Course – IV (CC)	Analytical Geometry 3D	4	3	3	25	75	100
		First Allied Course – II (AP)	Allied Physics - III	3	3	3	40	60	100
		First Allied Course – III (AC)		4	2	3	25	75	100
	IV	Environmental Studies	Environmental Studies	2	2	3	25	75	100
		TOTAL		**30**	**21**				**700**
III	I	Language Course – III (LC) Tamil*/Other Languages +#		6	3	3	25	75	100
	II	English Language Course - III (ELC)		6	3	3	25	75	100
	III	Core Course – V (CC)	Sequences and Series	5	4	3	25	75	100
		Core Course – VI (CC)	Classical Algebra and Theory of Numbers	4	4	3	25	75	100
		Second Allied Course – I (AC)	Programming in "C"	4	4	3	25	75	100
		Second Allied Course – II (AP)	Programming in "C" Practicals	3	---	---	---	---	---
	IV	Non Major Elective I – for those who studied Tamil under Part I a) Basic Tamil for other language students b) Special Tamil for those who studied Tamil upto 10th +2 but opt for other languages in degree programme	Quantitative Aptitude I	2	2	3	25	75	100
		TOTAL		**30**	**20**				**600**

IV	I	Language Course –IV (LC) Tamil*/Other Languages +#		6	3	3	25	75	100
	II	English Language Course – IV (ELC)		6	3	3	25	75	100
	III	Core Course – VII (CC)	Vector Calculus and Fourier Series	4	4	3	25	75	100
		Core Course – VIII (CC)	Linear Algebra	4	4	3	25	75	100
		Second Allied Course – II (AP)	Programming in "C"	3	3	3	40	60	100
		Second Allied Course – III	Introduction to Information Technology	3	2	3	25	75	100
	IV	Non Major Elective II – for those who studied Tamil under Part I a) Basic Tamil for other language students b) Special Tamil for those who studied Tamil upto 10th +2 but opt for other languages in degree programme	Quantitative Aptitude II	2	2	3	25	75	100
		Skill Based Elective - I	Skill Based Elective - I	2	2	3	25	75	100
	TOTAL			**30**	**23**				**800**
V	III	Core Course – IX (CC)	Numerical Methods with MATLAB Programming	5	4	3	25	75	100
		Core Course – X (CC)	Real Analysis	6	6	3	25	75	100
		Core Course – XI (CC)	Statics	6	5	3	25	75	100
		Core Practical – I (CP)	Numerical Methods with MATLAB Programming (P)	2	2	3	40	60	100
		Major Based Elective – I	Operations Research	5	5	3	25	75	100
	IV	Skill Based Elective – II	Skill Based Elective - II	2	2	3	25	75	100
		Skill Based Elective – III	Skill Based Elective - III	2	2	3	25	75	100
		Soft Skills Development	Soft Skills Development	2	2	3	25	75	100
	TOTAL			**30**	**28**				**800**
VI	III	Core Course – XII (CC)	Abstract Algebra	6	5	3	25	75	100
		Core Course – XIII (CC)	Complex Analysis	6	5	3	25	75	100
		Core Course - XIV (CC)	Dynamics	5	5	3	25	75	100
		Major Based Elective II	Graph Theory	6	5	3	25	75	100
		Major Based Elective III	Astronomy	6	5	3	25	75	100
	V	Extension Activities	Extension Activities	-	1	-	-	-	-
		Gender Studies	Gender Studies	1	1	3	25	75	100
	TOTAL			**30**	**27**				**600**
	GRAND TOTAL			**180**	**140**	**-**	**-**	**-**	**4100**

List of Allied Courses

Group I (Any one)
1. Physics
2. Mathematical Statistics
3. Financial Accounting

Group II (Any one)
1. Chemistry
2. Computer Science
3. Management Accounting

Language Part – I	-	4
English Part –II	-	4
Core Paper	-	14
Core Practical	-	1
Allied Paper	-	4
Allied Practical	-	2
Non-Major Elective	-	2
Skill Based Elective	-	3
Major Based Elective	-	3
Environmental Studies	-	1
Value Education	-	1
Soft Skill Development	-	1
Gender Studies	-	1
Extension Activities	-	1 (Credit only)

* for those who studied Tamil upto 10th +2 (Regular Stream)

+ Syllabus for other Languages should be on par with Tamil at degree level

those who studied Tamil upto 10th +2 but opt for other languages in degree level under Part I should study special Tamil in Part IV

** Extension Activities shall be out side instruction hours

Non Major Elective I & II – for those who studied Tamil under Part I

    a) Basic Tamil I & II for other language students
    b) Special Tamil I & II for those who studied Tamil upto 10th or +2 but opt for other languages in degree programme

Note:

	Internal Marks	External Marks
1. Theory	25	75
2. Practical	40	60

3. Separate passing minimum is prescribed for Internal and External marks

FOR THEORY

The passing minimum for CIA shall be 40% out of 25 marks [i.e. 10 marks]
The passing minimum for University Examinations shall be 40% out of 75 marks [i.e. 30 marks]

FOR PRACTICAL

The passing minimum for CIA shall be 40% out of 40 marks [i.e. 16 marks]
The passing minimum for University Examinations shall be 40% out of 60 marks [i.e. 24 marks]

SWAMI DAYANANDA COLLEGE OF ARTS & SCIENCE, MANJAKKUDI – 612 610.

DEPARTMENT OF MATHEMATICS

PROGRAMME OUTCOMES OF B.Sc., MATHEMATICS.

PO01:   The Bachelor's Degree in Mathematics is awarded to the students on the basis of knowledge, understanding, skills, attitudes, values and academic achievements sought to be acquired by learners at the end of this program.

PO02:   Mathematics is the study of quantity, structure, space and change. The key areas are Calculus, Algebra, Geometry, Analysis, Differential Equations and Mechanics.

PO03:   Students undergoing this programme learn to logically question assertions, to recognise patterns, to distinguish between essential and irrelevant aspects of problems.

PO04:   This programme will be able to present mathematics clearly and precisely, make vague ideas precise by formulating them in the language of mathematics, describe mathematical ideas from multiple perspectives and explain fundamental concepts or mathematics to non-mathematicians.

PO05:   Under graduate programme will help the learners to join teaching profession in primary and secondary school. To enhance their employability for government jobs, jobs in banking, insurance and investment sectors, data analyst jobs and jobs in various other public and private enterprises.

SWAMI DAYANANDA COLLEGE OF ARTS & SCIENCE, MANJAKKUDI – 612 610.

DEPARTMENT OF MATHEMATICS

PROGRAMME SPECIFIC OUTCOMES OF B.Sc., MATHEMATICS.

PSO01: Formulate and develop mathematical arguments in a logical manner and use suitable mathematical tool for analyzing, identify, locate and evaluate the problem in real life.

PSO02: Think in a critical manner, acquire good knowledge, understand, formulate and use quantitative models in advanced area of mathematics, statistics, social science, business and related sciences.

PSO03: To analyze, handle issues and encourage the students to develop a range of generic skills helpful for employment, internships and social activities.

<div align="center">

CORE COURSE I

DIFFERENTIAL CALCULUS AND TRIGONOMETRY

</div>

UNIT I

Methods of Successive Differentiation – Leibnitz's Theorem and its applications-
Increasing & Decreasing functions –Maxima and Minima of function of two variables.

UNIT II

Curvature – Radius of curvature in Cartesian and in Polar Coordinates – Centre of curvature–
Evolutes & Involutes

UNIT III

Expansions of sin (nx), cos (nx), tan (nx) – Expansions of sin ^{n}x, cos ^{n}x –Expansions of
sin(x), cos(x), tan(x) in powers of x.

UNIT IV

Hyperbolic functions – Relation between hyperbolic & Circular functions- Inverse
hyperbolic functions.

UNIT V

Logarithm of a complex number –Summation of Trigonometric series – Difference
method- Angles in arithmetic progression method –Gregory's series

TEXT BOOKS:

1. S.Narayanan and T.K.Manicavachagom Pillai, **Calculus Volume I**, S.Viswanathan
   (Printers&Publishers) Pvt Limited , Chennai -2011.
2. S.Arumugam & others, **Trigonometry and Fourier series**, New Gamma
   Publications -1999

UNIT – I - Chapter III	Sections 1.1 to 2.2 & Chapter IV Section 2.1, 2.2 and Chapter V 1.1 to 1.4 of [1]
UNIT – II - Chapter X Sections 2.1 to 2.6 of [1]	
UNIT – III - Chapter 1 Sections 1.2 to 1.4 of [2]	
UNIT – IV - Chapter 2 Sections 2.1& 2.2 of [2]	
UNIT – V - Chapter 3 & Chapter 4 Sections 4.1,4.2 & 4.4 of [2]	

REFERENCE(S)

1. S.Arumugam and Isaac, Calculus, Volume1, New Gamma Publishing House, 1991.
2. S. Narayanan, T.K. Manichavasagam Pillai, Trigonometry, S. Viswanathan Pvt
   Limited, and Vijay Nicole Imprints Pvt Ltd, 2004.

Semester: I	Core Course : I	Differential Calculus and Trigonometry	Credit : 5	Allotted hours per week: 5

CO01: Evaluate Maxima and Minima of function of two variables.

CO02: Determine the angle of intersection of two curves.

CO03: Find radius of curvature and centre of curvature.

CO04: Expand $\sin n\theta$, $\cos n\theta$, and $\tan n\theta$ by using terms Demoivre's theorems and in terms of θ.

CO05: Define hyperbolic and inverse hyperbolic functions.

PSO-PO-CO MAPPING MATRIX								
PO & PSO / CO	PO01	PO02	PO03	PO04	PO05	PSO01	PSO02	PSO03
CO01	1	3	-	-	2	-	-	-
CO02	-	3	-	2	1	-	-	-
CO03	-	3	-	-	-	-	-	-
CO04	-	3	-	2	-	-	-	-
CO05	-	3	-	2	-	-	-	-

CORE COURSE II

INTEGRAL CALCULUS

UNIT I

Revision of all integral models – simple problems -

UNIT II

Definite integrals - Integration by parts & reduction formula

UNIT III

Geometric Application of Integration-Area under plane curves: Cartesian co-ordinates -Area of a closed curve - Examples - Areas in polar co-ordinates.

UNIT IV

Double integrals – changing the order of Integration – Triple Integrals.

UNIT V

Beta & Gamma functions and the relation between them – Integration using Beta & Gamma functions

TEXT BOOK(S)

1. S.Narayanan and T.K.Manicavachagom Pillai, **Calculus Volume II**, S.Viswanathan (Printers & Publishers) Pvt Limited, Chennai -2011.

UNIT I   : Chapter 1 section 1 to 10
UNIT II   : Chapter 1 section 11, 12 & 13
UNIT III   : Chapter 2 section 1.1, 1.2, 1.3 & 1.4
UNIT IV   : Chapter 5 section 2.1, 2.2 & 4
UNIT V   : Chapter 7 section 2.1 to 2.5

REFERNECE(S)

1. Shanti Narayan, Differential & Integral Calculus.

Semester: I	Core Course : II	Integral Calculus	Credit : 4	Allotted hours per week: 4

CO01: Solve basic Integral Calculus problems and Explain properties of definite integrals.

CO02: Prove reduction formulae and solve some problems by using these formulae

CO03: Evaluate double and triple integrals and also find the value of double and triple integral by change of variable method.

CO04: Explain properties of Beta functions and derive relation between Beta and Gamma functions.

CO05: Evaluate integrals by using Beta and Gamma functions.

PSO-PO-CO MAPPING MATRIX								
PO & PSO CO	PO01	PO02	PO03	PO04	PO05	PSO01	PSO02	PSO03
CO01	1	3	-	-	-	-	-	1
CO02	-	3	-	-	-	2	-	-
CO03	1	3	1	2	1	-	1	-
CO04	-	3	-	1	-	-	-	-
CO05	-	3	-	1	-	-	-	-

CORE COURSE III

DIFFERENTIAL EQUATIONS AND LAPLACE TRANSFORMS

UNIT I

First order, higher degree differential equations solvable for x, solvable for y, solvable for dy/dx, Clairauts form – Conditions of integrability of M dx + N dy = 0 – simple problems.

UNIT II

Particular integrals of second order differential equations with constant coefficients - Linear equations with variable coefficients – Method of Variation of Parameters (Omit third & higher order equations).

UNIT III

Formation of Partial Differential Equation – General, Particular & Complete integrals – Solution of PDE of the standard forms - Lagrange's method - Solving of Charpit's method and a few standard forms.

UNIT IV

PDE of second order homogeneous equation with Constant coefficients – Particular integrals of the forms e^{ax+by}, Sin(ax+by), Cos(ax+by), $x^r y^s$ and $e^{ax+by}.f(x,y)$.

UNIT V

Laplace Transforms – Standard formulae – Basic theorems & simple applications – Inverse Laplace Transforms – Use of Laplace Transforms in solving ODE with constant coefficients.

TEXT BOOK

1. T.K.Manicavachagom Pillay & S.Narayanan, Differential Equations, S.Viswanathan Publishers Pvt. Ltd., 1996.
2. Arumugam & Isaac, Differential Equations, New Gamma Publishing House, Palayamkottai, 2003.

Unit : 1   Chapter IV – Sections 1,2 & 3, Chapter II – Section 6 [1]
Unit : 2   Chapter V – Sections 1,2,3,4 & 5, Chapter VIII – Section 4 [1]
Unit : 3   Chapter XII – Sections 1 – 6 [1]
Unit : 4   Chapter V [2]
Unit : 5   Chapter IX – Sections 1 – 8 [1]

Reference book:

1. M.D.Raisinghania , Ordinary and Partial Differential Equations, S.Chand & Co
2. M.K. Venkatraman, Engineering Mathematics, S.V. Publications, 1985 Revised Edition

Semester: II	Core Course : III	Differential equations & Laplace Transforms	Credit : 5	Allotted hours per week: 5

CO01: Extract the solution of differential equations of the first order and of the first degree by variables separable, Homogeneous and Non-Homogeneous methods.

CO02: find a solution of differential equations of the first order and of a degree higher than the first by using methods of solvable for p.x and y.

CO03: Compute all the solutions of second and higher order linear differential equations with constant coefficients, linear equations with variable coefficients.

CO04: Solve simultaneous linear equations with constant coefficients, total differential equations, Form partial differential equations and find the solution of First order partial differential equations for some standard types.

CO05: Use inverse Laplace transform to return familiar functions and Apply Laplace Transform to solve second order linear differential equation and simultaneous linear differential equations.

PSO-PO-CO MAPPING MATRIX								
PO & PSO CO	PO01	PO02	PO03	PO04	PO05	PSO01	PSO02	PSO03
CO01	1	3	-	1	-	2	-	1
CO02	-	3	-	1	1	-	-	-
CO03	-	3	-	1	2	-	-	-
CO04	-	3	-	1	2	-	-	-
CO05	-	3	-	1	-	-	-	-

CORE COURSE IV

ANALYTICAL GEOMETRY 3D

UNIT I

Coordinates in space-Direction consines of a line in space-angle between lines in space – equation of a plane in normal form. Angle between planes – Distance of a plane from a point.

UNIT II

Straight lines in space – line of intersection of planes – plane containing a line. Coplanar lines – skew lines and shortest distance between skew lines- length of the perpendicular from point to line.

UNIT III

General equation of a sphere-Section of sphere by plane-tangent planes –condition of tangency-system of spheres generated by two spheres - System of spheres generated by a sphere and plane.

UNIT IV

The equation of surface – cone – intersection of straight line and quadric cone – tangent plane and normal

UNIT V

Condition for plane to touch the quadric cone - angle between the lines in which the plane cuts the cone. Condition that the cone has three mutually perpendicular generators- Central quadrics – intersection of a line and quadric – tangents and tangent planes – condition for the plane to touch the coincoid

TEXT BOOKS

1. Shanthi Narayanan and Mittal P.K:Analytical Solid Geometry 16th Edition S.Chand & Co., New Delhi.
2. Narayanan and Manickavasagam Pillay, T.K. Treatment as Analytical Gementry S.Viswanathan (Printers & Publishers) Pvt. Ltd.,

Unit I   : Chapter I, Sec 1.5 to 1.9, Chapter II Sec 2.1 to 2.3, Pages : 10-
                    31, Chapter II Sec 2.4 to 2.8 pages : 32-47 of [1]
Unit II   : chapter III section 3.1-3.7, pages 55-89 of [1]
Unit III   : Chapter VI Sec. 6.1 to 6.6 pages : 121-143 of [1]
Unit IV   : Chapter V Sec.43 to 47 pages : 103-113 of [2]
Unit V   : Chapter V Sec.49 to 53, Pages:115-125 of [2]

Book for Reference

1. P.Duraipandian & others- Analytical Geometry 3 Dimensional – Edition.

Semester: II	Core Course : IV	Analytical Geometry 3D	Credit : 3	Allotted hours per week: 4

CO01: Describe the various forms of equation of a plane, straight line, Sphere, Cone and Cylinder.

CO02: Find the angle between planes, Bisector planes, Perpendicular distance from a point to a plane, Image of a line on a plane, Intersection of two lines.

CO03: Define coplanar lines and illustrate.

CO04: Compute the angle between a line and a plane, length of perpendicular from a point to a line.

CO05: Define skew lines and calculate the shortest distance between two skew lines.

PSO-PO-CO MAPPING MATRIX								
PO & PSO / CO	PO01	PO02	PO03	PO04	PO05	PSO01	PSO02	PSO03
CO01	-	3	-	2	1	-	-	-
CO02	1	2	-	1	1	2	-	-
CO03	-	3	-	1	-	-	-	-
CO04	1	2	-	1	1	2	-	-
CO05	-	2	-	1	1	-	-	-

CORE COURSE V

SEQUENCES AND SERIES

Unit I

Sequences – Bounded Sequences – Monotonic Sequences – Convergent Sequence – Divergent Sequences – Oscillating sequences

Unit II

Algebra of Limits – Behavior of Monotonic functions

Unit III

Some theorems on limits – subsequences – limit points : Cauchy sequences

Unit IV

Series – infinite series – Cauchy's general principal of convergence – Comparison – test theorem and test of convergence using comparison test (comparison test statement only, no proof)

Unit V

Test of convergence using D Alembert's ratio test – Cauchy's root test – Alternating

Series – Absolute Convergence (Statement only for all tests)

TEXT BOOK

1. Dr. S.Arumugam & Mr.A.Thangapandi Isaac Sequences and Series – New Gamma Publishing House – 2002 Edition.
Unit I   : Chapter 3 : Sec. 3.0 – 3.5 Page No : 39-55
Unit II   : Chapter 3 : Sec. 3.6, 3.7 Page No:56 – 82 Unit
III   : Chapter 3 : Sec. 3.8-3.11, Page No:82-102
Unit IV   : Chapter 4 : Sec. (4.1 & 4.2) Page No : 112-128.
Unit V   : Relevant part of Chapter 4 and Chapter 5: Sec. 5.1 & 5.2
                   Page No:157-167.

Book for Reference

1. Algebra – Prof. S.Surya Narayan Iyer
2. Algebra – Prof. M.I.Francis Raj

Semester: III	Core Course : V	Sequence and Series	Credit : 4	Allotted hours per week: 5

CO01: Define different types of sequences and discuss the behaviour of the geometric sequence. Prove properties of convergent and divergent sequence and verify the given sequence in convergent and divergent by using behaviour of Monotonic sequence.

CO02: Prove Cauchy's first limit theorem, Cesaro's theorem, and Cauchy's Second limit theorem.

CO03: Explain subsequence, upper and lower limits of a sequence.

CO04: Classify convergence, divergence and oscillating series.

CO05: Prove theorems on different test of convergence and divergence of a series of positive terms and Verify the given series is convergent or divergent by using different test.

<table>
<tr><td colspan="9" align="center">PSO-PO-CO MAPPING MATRIX</td></tr>
<tr><td>PO & PSO
CO</td><td>PO01</td><td>PO02</td><td>PO03</td><td>PO04</td><td>PO05</td><td>PSO01</td><td>PSO02</td><td>PSO03</td></tr>
<tr><td>CO01</td><td>1</td><td>2</td><td>-</td><td>1</td><td>2</td><td>-</td><td>2</td><td>-</td></tr>
<tr><td>CO02</td><td>-</td><td>2</td><td>-</td><td>1</td><td>-</td><td>-</td><td>-</td><td>-</td></tr>
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<tr><td>CO04</td><td>-</td><td>2</td><td>-</td><td>1</td><td>1</td><td>-</td><td>-</td><td>-</td></tr>
<tr><td>CO05</td><td>1</td><td>2</td><td>-</td><td>1</td><td>1</td><td>-</td><td>-</td><td>-</td></tr>
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CORE COURSE VI

CLASSICAL ALGEBRA AND THEORY OF NUMBERS

Unit I

Relation between roots & coefficients of Polynomial Equations – Symmetric functions – Sum of the rth Powers of the Roots

Unit II

Newtion's theorem on the sum of the power of the roots-Transformations of Equations – Diminshing, Increasing & Multiplying the roots by a constant - Reciprocal equations - To increase or decrease the roots of the equation by a given quantity.

Unit III

Form of the quotient and remainder – Removal of terms – To form of an equation whose roots are any power – Transformation in general – Descart's rule of sign

Unit IV

Inequalities – elementary principles – Geometric & Arithmetic means – Weirstrass inequalities – Cauchy inequality – Applications to Maxima & Minima.

Unit V

Theory of Numbers – Prime & Composite numbers – divisors of a given number N – Euler's Function (N) and its value – The highest Power of a prime P contained in N! – Congruences – Fermat's, Wilson's & Lagrange's Theorems.

Text Book(s)

1. T.K.Manickavasagam Pillai & others Algebra Volume I.S.V. Publications – 1985 Revised Edition.
2. T.K. Manickavasagam Pillai & others Algebra Volume II, S.V.Publications – 1985 Revised Edition.

Unit I	:	Chapter 6 Section 11 to 13 of (1)
Unit II	:	Chapter 6 Section 14 to 17 of (1)
Unit III	:	Chapter 6 Section 18- 21 & 24 of (1)
Unit IV	:	Chapter 4 of (2)
Unit V	:	Chapter 5 of (2)

References :

1. H.S.Hall and S.R. Knight, Higher Algebra, Prentice Hall of India, New Delhi.
2. H.S. Hall and S.R.Knight, Higher Algebra, McMillan and Co., London, 1948.

Semester: III	Core Course : VI	Classical Algebra & Theory of Numbers	Credit : 4	Allotted hours per week: 4

CO01: Describe the relation between roots and coefficients.

CO02: Find the sums of the power of the roots of an equation using Newton's Method. Transform the equation through roots multiplied by a given number, increase the roots and decrease the roots, removal of terms.

CO03: Solve the reciprocal equations. Analyze the location and describe the nature of the roots of an equation.

CO04: Obtain integral roots of an equation by using Newton's Method. Compute a real root of an equation by Horner's method and Describe the properties of prime numbers.

CO05: Find the Sum, Product of all the divisors of N and smallest number with N divisors. Prove Chinese Remainder Theorem, Fermat's and Wilson's theorem.

PSO-PO-CO MAPPING MATRIX								
PO & PSO / CO	PO01	PO02	PO03	PO04	PO05	PSO01	PSO02	PSO03
CO01	-	2	-	1	-	-	-	-
CO02	1	2	-	1	-	-	-	-
CO03	1	2	-	1	1	-	-	2
CO04	-	1	-	1	1	-	-	-
CO05	-	2	-	-	-	-	-	-

CORE COURSE VII

VECTOR CALCULUS AND FOURIER
SERIES

UNIT I

Vector differentiation –velocity & acceleration-Vector & scalar fields –Gradient of a vector- Directional derivative – divergence & curl of a vector solinoidal & irrotational vectors –Laplacian double operator –simple problems

UNIT II

Vector integration –Tangential line integral –Conservative force field –scalar potential-Work done by a force - Normal surface integral- Volume integral – simple problems.

UNIT III

Gauss Divergence Theorem – Stoke's Theorem- Green's Theorem – Simple problems & Verification of the theorems for simple problems.

UNIT IV

Fourier series- definition - Fourier Series expansion of periodic functions with Period $2\square$ and period 2a – Use of odd & even functions in Fourier Series.

UNIT V

Half-range Fourier Series – definition- Development in Cosine series & in Sine series Change of interval – Combination of series

TEXT BOOK(S)

1. M.L. Khanna, Vector Calculus, Jai Prakash Nath and Co., 8th Edition, 1986.
2. S. Narayanan, T.K. Manicavachagam Pillai, Calculus, Vol. III, S. Viswanathan Pvt Limited, and Vijay Nicole Imprints Pvt Ltd, 2004.

UNIT – I   - Chapter 1 Section 1 & Chapter 2 Sections 2.3 to 2.6 , 3 , 4 , 5 , 7 of [1]
UNIT – II   - Chapter 3 Sections 1 , 2 , 4 of [1]
UNIT – III   - Chapter 3 Sections 5 & 6 of [2]
UNIT – IV   - Chapter 6 Section 1, 2, 3 of [2]
UNIT – V   - Chapter 6 Section 4, 5.1, 5.2, 6, 7 of [2]

Reference:

1. P.Duraipandiyan and Lakshmi Duraipandian, Vector Analysis, Emarald publishers (1986).
2. Dr. S.Arumugam and prof. A.Thangapandi Issac, Fourier series, New Gamma publishing house (Nov 12)

Semester: IV	Core Course : VII	Vector Calculus & Fourier Series	Credit : 4	Allotted hours per week: 4

CO01: Find and interpret the gradient, curl and divergence for a function at a given point.

CO02: Interpret line, surface and volume integrals.

CO03: Evaluate integrals by using Green's theorem, Stokes theorem and Gauss's theorem.

CO04: Determine Fourier series expansions for given functions.

CO05: Find Cosine and Sine series, half range series for given functions.

PSO-PO-CO MAPPING MATRIX								
PO & PSO CO	PO01	PO02	PO03	PO04	PO05	PSO01	PSO02	PSO03
CO01	1	2	-	2	-	-	-	-
CO02	1	1	-	1	1	-	-	-
CO03	-	3	-	-	-	-	-	-
CO04	-	2	-	2	1	-	-	-
CO05	-	2	-	2	1	-	-	-

CORE COURSE VIII

LINEAR ALGEBRA

Unit I   Vector spaces:

Vector spaces – Definition and examples – Subspaces-linear transformation – Span of a set.

Unit II   Basis and Dimension:

Linear Independence – Basis and Dimension –Rank and Nullity.

Unit III   Matrix and Inner product space:

Matrix of a linear transformation -Inner product space – Definition and examples – Orthogonality – Gram Schmidt orthogonalisation process – Orthogonal Complement.

Unit IV   Theory of Matrices:

Algebra of Matrices - Types of Matrices – The Inverse of a Matrix – Elementary Transformations – Rank of a matrix.

Unit V   Characteristic equation and bilinear forms:

Characteristic equation and Cayley - Hamilton theorem – Eigen values and Eigen vectors

Textbook

1. Arumugam   S   and   Thangapandi   Isaac   A,   Modern   Algebra,   SciTech Publications (India) Ltd., Chennai, Edition 2012.

Unit1: Chapter 5, Sec 5.1 to 5.4
Unit2: Chapter 5, Sec 5.5 to 5.7
Unit3: Chapter 5,Sec 5.8, Chapter 6, Sec 6.1 to 6.3
Unit4: Chapter 7 Sec 7.1 to 7.5
Unit5: Chapter 7, Sec 7.7, 7.8

References

1. I. N. Herstein, Topics in Algebra, Second Edition, John Wiley & Sons (Asia), 1975.

Semester: IV	Core Course : VIII	Linear Algebra	Credit : 4	Allotted hours per week: 4

CO01: Define Vector Space, Quotient Space, and Direct sum. Linear span, Linear independence, Basis and inner product.

CO02: Discuss the linear transformations, rank and nullity.

CO03: Find the characteristic equation, Eigen values and Eigen vectors of a matrix.

CO04: Prove Cayley Hamilton theorem, Schwartz inequality and Gramschmidt orthogonalisation process.

CO05: Solve the system of simultaneous linear equations.

PSO-PO-CO MAPPING MATRIX								
PO & PSO CO	PO01	PO02	PO03	PO04	PO05	PSO01	PSO02	PSO03
CO01	1	2	1	-	-	-	-	-
CO02	-	2	1	1	1	-	-	-
CO03	-	2	1	1	1	-	-	-
CO04	-	1	1	1	1	-	-	-
CO05	-	2	1	2	1	-	-	-

CORE COURSE IX

NUMERICAL METHODS WITH MATLAB
PROGRAMMING

UNIT I

MATLAB Environment : Getting Started – Solving Problems in MATLAB – Saving you works – Predefined MATLAB Functions – Using Predefined Functions – Manipulating Matrices – Computational Limitations-Special Values and Functions.

UNIT II

Plotting : Introduction Two Dimensional Plots – Three Dimensional Plotting – Editing Plots from the Menu Bar – Creating Plots from the Workshop Window – Programming   in MATLAB : introduction – Problems with Two Variables – Input/Functions – Statement level Control Structures.

UNIT III

Numerical Techniques : Introduction – Curve   Fitting: Linear   and   Polynomial Regression – Using the Interactive Fitting Tools – Numerical Integration – Numerical Differentiation.

UNIT IV

Curve Fitting – Linear and parabolic curves by the method of least squares principle-Solving algebraic and transcendental equations-Bisection method, false position method and Newton Raphson method – Solving simultaneous algebraic equation – Guass – seidal method – Guass elimination method.

UNIT V

Interpolation – Newton's forward and backward difference formulae – Lagrange's interpolation formulae – Numerical integration using Trapezoidal and Simpson's one – third rules – solution of ODE's = Euler method and Runge – Kutta fourth order method.

Text Books :

1. Delores M.Etter, David C.Kuncicky, Holly Moore. Introduction to MATLAB, Published by Dorling Kindersley (india) Pvt. Ltd., licenses of Pearson Education in South Asia.
2. M.K.Venkatraman, Numerical methods in Science and Engineering, National Publisher Company, Fifth Edition, 2001 (For Units IV and V).
   Unit 1 : Chapter 2 & 3
   Unit 2 : Chapter 4 & 5
   Unit 3 : Chapter 8.
   Unit 4 : Chapter 2 section 1.7-1.8, Chapter 3, section 2, 4 and 5, Chapter 4,
           section 2, 6 of (2).
   Unit 5 : Chapter 6, sec 3, 4. Chapter 8, sec 4, Chapter 9, sec 8, 10, Chapter 11, sec
           10, 16.

Semester: V	Core Course : IX	Numerical Methods with MATLAB Programming	Credit : 4	Allotted hours per week: 5

CO01: Introduction to MATLAB, Define Predefined MATLAB functions, Manipulating Matrices and Special values and functions.

CO02: Classify two and three dimensional plots and explain the techniques of MATLAB programming.

CO03: Introduction to problems with two variables, statement level control structures and solve numerical problems using MATLAB programming. Construct a Linear and Parabolic curves by the method of least squares method.

CO04: Solve the transcendental equation by Bisection, False Position and Newton Raphson methods, simultaneous equation by Gaussseidal and elimination method and evaluate intermediate value using Newton forward, backward formula and interpolation formula

CO05: Evaluate the definite integral value by Simpson's one-third, three-eighth and trapezoidal rule and Solve the ordinary differential equation by Euler, Taylor and Runge-Kutta methods.

PSO-PO-CO MAPPING MATRIX								
PO & PSO / CO	PO01	PO02	PO03	PO04	PO05	PSO01	PSO02	PSO03
CO01	1	-	1	-	2	1	-	-
CO02	1	-	1	-	1	-	1	-
CO03	1	-	1	-	1	-	-	1
CO04	1	-	1	-	1	-	-	-
CO05	1	-	1	-	1	-	-	-

CORE COURSEX

REAL ANALYSIS

UNIT I

Real Number system – Field axioms –Order relation in R. Absolute value of a real number & its properties –Supremum & Infimum of a set – Order completeness property – Countable & uncountable sets.

UNIT II

Continuous functions –Limit of a Function – Algebra of Limits – Continuity of a function –Types of discontinuities – Elementary properties of continuous functions – Uniform continuity of a function.

UNIT III

Differentiability of a function –Derivability & Continuity –Algebra of derivatives – Inverse Function Theorem – Daurboux"s Theorem on derivatives.

UNIT IV

Rolle's Theorem –Mean Value Theorems on derivatives- Taylor's Theorem with remainder- Power series expansion .

UNIT V

Riemann integration –definition – Daurboux's theorem –conditions for integrability – Integrability of continuous & monotonic functions - Integral functions –Properties of Integrable functions - Continuity & derivability of integral functions – The Fundamental Theorem of Calculus and the First Mean Value Theorem.

TEXT BOOK(S)

1. M.K,Singhal & Asha Rani Singhal , A First Course in Real Analysis, R.Chand & Co., June 1997 Edition
2. Shanthi Narayan, A Course of Mathematical Analysis, S. Chand & Co., 1995

UNIT – I - Chapter 1 of [1]
UNIT – II - Chapter 5 of [1]
UNIT – III - Chapter 6 – Sec 1 to 5 of [1]
UNIT – IV - Chapter 8 – Sec 1 to 6 of [1]
UNIT – V - Chapter 6 – Sec 6.2, 6.3, 6.5, 6.7, 6.9 of [2]

REFERENCE(S)

1. Goldberge, Richard R, Methods of Real Analysis, Oxford & IBHP Publishing Co., New Delhi, 1970.

*****

Semester: V	Core Course : X	Real Analysis	Credit : 6	Allotted hours per week: 6

CO01: Explain the properties of the real line and countable concepts in real number system.

CO02: Estimate the continuity of a function at a point and on a set.

CO03: Differentiate the concept of continuity and uniform continuity and explain the concepts of Differentiation.

CO04: Focus on Rolle's theorem and apply the Rolle's theorem concepts.

CO05: Learn some of the properties of Riemann Integrable functions and the applications of the fundamental theorems of integration.

PSO-PO-CO MAPPING MATRIX								
PO & PSO / CO	PO01	PO02	PO03	PO04	PO05	PSO01	PSO02	PSO03
CO01	1	1	-	-	1	-	-	-
CO02	1	1	1	-	1	-	-	-
CO03	1	2	1	-	1	-	-	-
CO04	1	2	1	-	1	-	-	-
CO05	1	2	1	1	1	-	-	-

*****

CORE COURSEXI

STATICS

UNIT I

Introduction – Forces acting at a point: Triangle of forces – Resolution of force – Condition of equilibrium.

UNIT II

Parallel forces and Moments: Resultant of parallel forces – Theorems on Moments – Moment about an axis – couples.

UNIT III

Equilibrium of three forces acting on a rigid body: Conditions of equilibrium – Trigonometrical theorems and problems - Coplanar forces: Reduction of Coplanar forces – Equation of Line of action of the resultant – Conditions of equilibrium

UNIT IV

Friction: Introduction – Laws of Friction – Definitions – Equilibrium of a particle on a rough inclined plane.

UNIT V

Equilibrium of strings: Equation of the Common Catenary -Parabolic Catenary.

TEXT BOOK:

M.K.Venkataraman, Statics, Agasthiyar Publications, 17th edition, 2014.

UNIT I   -Chapter1, Chapter2.
UNIT II -Chapter 3, Chapter 4.
UNIT III -Chapter 5 (Section 1-6), Chapter 6 (Section 1-12).
UNIT IV -Chapter 7 (Section 1-13) Pages: 206 – 238.
UNIT V -Chapter 9 (Section 1- 8)

REFERENCE(S)

1. A.V.Dharmapadham, Statics, S.Viswanathan Publishers Pvt.Ltd, 2006.
2. P. Duraipandian, Laxmi Duraipandian and Muthamizh Jayapragasam, Mechanics S.Chand & Company PVT, LTD, 2014
3. S.L.Lony, Elements of Statics and Dynamics, Part-I, A.I.T.B.S.Publishers, 2007.

*****

Semester: V	Core Course : XI	Statics	Credit : 5	Allotted hours per week: 6

CO01: Define Resultant, Component of a force, Coplanar forces, like and unlike parallel forces, Moment of a force and couple with examples.

CO02: Prove the parallelogram of forces, triangle of forces, converse of the triangle of force, polygon forces and Lami's theorem.

CO03: find the resultant of coplanar couples, equilibrium of couples and the equation to the line of action of the resultant.

CO04: Discuss friction, forces of friction, and Laws of friction.

CO05: Define catenary and obtain the equation to the common catenary.

<table>
<tr><th colspan="9">PSO-PO-CO MAPPING MATRIX</th></tr>
<tr><th>PO & PSO
CO</th><th>PO01</th><th>PO02</th><th>PO03</th><th>PO04</th><th>PO05</th><th>PSO01</th><th>PSO02</th><th>PSO03</th></tr>
<tr><td>CO01</td><td>1</td><td>1</td><td>1</td><td>-</td><td>-</td><td>1</td><td>-</td><td>-</td></tr>
<tr><td>CO02</td><td>1</td><td>2</td><td>1</td><td>-</td><td>-</td><td>-</td><td>1</td><td>-</td></tr>
<tr><td>CO03</td><td>-</td><td>2</td><td>2</td><td>1</td><td>-</td><td>-</td><td>-</td><td>1</td></tr>
<tr><td>CO04</td><td>-</td><td>2</td><td>1</td><td>1</td><td>-</td><td>-</td><td>-</td><td>-</td></tr>
<tr><td>CO05</td><td>-</td><td>2</td><td>1</td><td>1</td><td>-</td><td>-</td><td>-</td><td>-</td></tr>
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NUMERICAL METHODS WITH MATLAB PROGRAMMING
(P)

LIST OF PRACTICALS

1. Linear Interpolation

2. Linear Regression

3. Curve Fitting

4. Trapezoidal rule of integration

5. Simpson's 1/3 rule of integration

6. Newton – Raphson method of solving equations

7. Gauss – elimination method of solving simultaneous equations

8. Gauss – Seidal method of solving simultaneous equations

9. R-K fourth order method of solving differential equations

10. Lagrange's method of interpolation.

Semester: V	Core Course Practical : I	Numerical Methods with MATLAB Programming Practical	Credit : 2	Allotted hours per week: 2

CO01: Understand the exciting world of programming to the students through numerical methods.

CO02: Learn the techniques of MATLAB programming.

CO03: Write the Program to Numerical problems by using MATLAB techniques.

CO04: Verify and Execute the Program in lab.

PSO-PO-CO MAPPING MATRIX								
PO & PSO / CO	PO01	PO02	PO03	PO04	PO05	PSO01	PSO02	PSO03
CO01	1	-	1	-	2	1	-	-
CO02	1	-	1	-	1	-	1	-
CO03	1	-	1	-	1	-	-	1
CO04	1	-	1	-	1	-	-	-
CO05	1	-	1	-	1	-	-	-

MAJOR BASED ELECTIVE - I
OPERATIONS RESEARCH

UNIT I

Linear programming problem - Mathematical formulation – Illustrations on Mathematical formulation on Linear Programming Problems – Graphical solution method - some exceptional cases - Canonical and standard forms of Linear Programming Problem - Simplex method.

UNIT II

Use of Artificial Variables (Big M method - Two phase method) – Duality in Linear Programming - General primal-dual pair - Formulating a Dual problem - Primal-dual pair in matrix form -Dual simplex method.

UNIT III

Transportation problem - LP formulation of the TP - Solution of a TP - Finding an initial basic feasible solution (NWCM - LCM -VAM) – Degeneracy in TP - Transportation Algorithm (MODI Method) - Assignment problem - Solution methods of assignment problem – special cases in assignment problem.

UNIT IV

Queuing theory - Queuing system - Classification of Queuing models - Poisson Queuing systems Model I (M/M/1)(∞/FIFO) only - Games and Strategies – Two person zero sum - Some basic terms - the maximin-minimax principle -Games without saddle points-Mixed strategies - graphic solution 2xn and mx2 games.

UNIT V

PERT and CPM – Basic components – logical sequencing - Rules of network construction- Critical path analysis - Probability considerations in PERT.

Text Books:

Kanti Swarup, P.K. Gupta and ManMohan, Operations Research, 13th edition, Sultan Chand and Sons, 2007.

Unit 1: Chapter 2 Sec 2.1 to 2.4, Chapter 3 Sec 3.1 to 3.5, Chapter 4 Sec 4.1 , 4.3
Unit 2: Chapter 4 Sec 4.4, Chapter 5 Sec 5.1 to 5.4, 5.9
Unit 3: Chapter 10 Sec 10.1, 10.2, 10.8, 10.9, 10.12, 10.13, Chapter 11 Sec11.1 to 11.4
Unit 4: Chapter 21 Sec 21.1, 21.2, 21.7 to 21.9, Chapter 17 Sec 17.1 to 17.6
Unit 5: Chapter 25 Sec 25.1 to 25.4, 25.6, 25.7

Book for Reference:

1. Sundaresan.V, Ganapathy Subramanian. K.S. and Ganesan.K, Resource Management Techniques, A.R. Publications, 2002.
2. Taha H.A., Operations Research: An introduction, 7th edition, Pearson Prentice Hall, 2002.

Semester: V	Major Base Elective Course : I	Operations Research	Credit : 5	Allotted hours per week: 6

CO01: Explain the concepts of basics, advantages, implications and formulation of an L.P.P and obtain the graphical solutions of an L.P.P.

CO02: Distinguish various methods of solving an L.P.P such as simplex, penalty, big M method and two phase simplex method.

CO03: Formulate study the concept of duality in an L.P.P, transportation problems and Assignment problems.

CO04: Define queue characteristics, transient and steady state. Define Kendal notation solution of queue models (M/M/1):(θ/FIFO), Two persons sum games, maximin – minimax principle and games without saddle points.

CO05: Estimate the graphical solution of 2×n and m×2 games. Define CPM and PERT. Identify the Basic components of network and find critical path.

<table>
<tr><td colspan="9" align="center">PSO-PO-CO MAPPING MATRIX</td></tr>
<tr><td>PO & PSO

CO</td><td>PO01</td><td>PO02</td><td>PO03</td><td>PO04</td><td>PO05</td><td>PSO01</td><td>PSO02</td><td>PSO03</td></tr>
<tr><td>CO01</td><td>1</td><td>1</td><td>1</td><td>1</td><td>1</td><td>2</td><td>-</td><td>-</td></tr>
<tr><td>CO02</td><td>1</td><td>-</td><td>1</td><td>1</td><td>1</td><td>-</td><td>-</td><td>-</td></tr>
<tr><td>CO03</td><td>1</td><td>1</td><td>1</td><td>1</td><td>2</td><td>-</td><td>2</td><td>-</td></tr>
<tr><td>CO04</td><td>1</td><td>1</td><td>1</td><td>-</td><td>2</td><td>-</td><td>-</td><td>-</td></tr>
<tr><td>CO05</td><td>1</td><td>-</td><td>1</td><td>1</td><td>1</td><td>-</td><td>-</td><td>2</td></tr>
</table>

CORE COURSE XII
ABSTRACT ALGEBRA

UNIT I

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

UNIT II

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

UNIT III

Normal Subgroups and Quotient Groups - Isomorphism –Homomorphism

UNIT IV

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

UNIT V

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

Textbook

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

Unit 1: Chapter 3 Sections 3.1-3.4
Unit 2: Chapter 3 Sections3.5-3.8
Unit 3: Chapter 3 Sections 3.9-3.11
Unit 4: Chapter 4 Sections 4.1-4.8
Unit 5: Chapter 4 Sections 4.9- 4.11, 4.13-14

References

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

Semester: VI	Core Course : XII	Abstract Algebra	Credit : 5	Allotted hours per week: 6

CO01: Explain Lagrange's , Euler's and Fermats theorem.

CO02: Define cyclic groups and prove a group has no proper subgroup if it is cyclic group of prime order, normal subgroups, quotient groups and index of a subgroup.

CO03: Explain the homomorphism, kernel of homomorphism and isomorphism.

CO04: Describe the Cayley's theorem and Fundamental theorem of homomorphism for group and rings.

CO05: Derive the rings, zero divisors of ring, integral domain, field and prove theorems among them.

PSO-PO-CO MAPPING MATRIX								
PO & PSO / CO	PO01	PO02	PO03	PO04	PO05	PSO01	PSO02	PSO03
CO01	1	2	1	-	-	-	-	-
CO02	-	2	1	1	1	-	-	-
CO03	-	2	1	1	1	-	-	-
CO04	-	1	1	1	1	-	-	-
CO05	-	2	1	2	1	-	-	-

CORE COURSE XIII
COMPLEX ANALYSIS

UNIT I

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

UNIT II

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

UNIT III

Complex integration - definite integral – Cauchy's Theorem –Cauchy's integral formula –Higher derivatives - .

UNIT IV

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

UNIT V

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

TEXT BOOK(S)

1. S.Arumugam, A.Thangapandi Isaac, & A.Somasundaram, Complex Analysis, New Scitech Publications (India) Pvt Ltd, 2002.
UNIT – I -Chapter 2 section 2.1 to 2.8 of Text Book
UNIT – II -Chapter 3 Sections 3.1 to 3.5 of Text Book
UNIT – III -Chapter 6 sections 6.1 to6.4 of Text Book
UNIT –IV -Chapter 7 Sections 7.1 to 7.4 of Text Book
UNIT – V -Chapter 8 Sections 8.1 to 8.3 of Text Book

REFERENCE(S)

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

Semester: VI	Core Course : XIII	Complex Analysis	Credit : 5	Allotted hours per week: 6

CO01: Describe the significance of differentiability for complex functions and be familiar with the Cauchy-Riemann equations. To verify that the given function is analytic.

CO02: Derive the relations among bilinear transformation, cross ratio and fixed points, and the standard form of bilinear transformation which maps real line, unit circle to unit circle and real line to unit circle.

CO03: Evaluate complex line integrals directly and line integral of complex functions by using Cauchy's integral theorem.

CO04: Transform the complex functions as Taylor, Power and Laurent series.

CO05: Classify singularities, poles and residues and evaluate complex integrals, real integrals using the residue theorem.

<table>
<tr><th colspan="9">PSO-PO-CO MAPPING MATRIX</th></tr>
<tr><th>PO & PSO
CO</th><th>PO01</th><th>PO02</th><th>PO03</th><th>PO04</th><th>PO05</th><th>PSO01</th><th>PSO02</th><th>PSO03</th></tr>
<tr><td>CO01</td><td>1</td><td>1</td><td>-</td><td>-</td><td>1</td><td>-</td><td>-</td><td>-</td></tr>
<tr><td>CO02</td><td>1</td><td>1</td><td>1</td><td>-</td><td>1</td><td>-</td><td>-</td><td>-</td></tr>
<tr><td>CO03</td><td>1</td><td>2</td><td>1</td><td>-</td><td>1</td><td>-</td><td>-</td><td>-</td></tr>
<tr><td>CO04</td><td>1</td><td>2</td><td>1</td><td>-</td><td>1</td><td>-</td><td>-</td><td>-</td></tr>
<tr><td>CO05</td><td>1</td><td>2</td><td>1</td><td>1</td><td>1</td><td>-</td><td>-</td><td>-</td></tr>
</table>

CORE COURSE XIV

DYNAMICS

UNIT I

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

UNIT II

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

UNIT III

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

UNIT IV

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

UNIT V

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

TEXT BOOK:

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

UNIT I	-Chapter2, Chapter 3, Section 3.1-3.22
UNIT II	-Chapter6, Sections 6.1-6.17
UNIT III	-Chapter8, Sections 8.1-8.11
UNIT IV	-Chapter 10, Sections 10.1-10.13
UNIT V	-Chapter 11, Sections 11.1-11.13

REFERENCE(S)

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

Semester: VI	Core Course : XIV	Dynamics	Credit : 5	Allotted hours per week: 5

CO01: Define Projectile, Impulse, Impact and laws of Impact.

CO02: Estimate the path of the Projectile and identify the path of the projectile is Parabola and the direct and oblique impact of smooth elastic spheres.

CO03: Define simple harmonic motion and find its geometrical representation.

CO04: Find the Composition of Simple harmonic motion and the differential equation of a central orbit.

CO05: Find the law of force if the orbit is given and vice versa.

PSO-PO-CO MAPPING MATRIX								
PO & PSO CO	PO01	PO02	PO03	PO04	PO05	PSO01	PSO02	PSO03
CO01	1	1	1	-	-	1	-	-
CO02	1	2	1	-	-	-	1	-
CO03	-	2	2	1	-	-	-	1
CO04	-	2	1	1	-	-	-	-
CO05	-	2	1	1	-	-	-	-

MAJOR BASED ELECTIVE - II

GRAPH THEORY

UNIT I

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

UNIT II

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

UNIT III

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

UNIT IV

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

UNIT V

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

Textbook

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

UNIT-I   Chapter-1 Sec 1.0, 1.1 and Chapter -2 Sec 2.0, 2.1, 2.2, 2.3, 2.4.2.6
UNIT-II   Chapter-2 Sec 2.8,2.9 ,Chapter-4 Sec 4.1,4.2 and Chapter-5 Sec 5.0,5.1
UNI-III   Chapter-5 Sec 5.2, Chapter-6 Sec 6.0, 6.1, 6.2.
UNIT-IV   Chapter-8 Sec 8.0, 8.1, 8.2.
UNIT-V   Chapter-10 Sec 10.0, 10.1 Chapter-11 Sec 11.0, 11.1, 11.2

References

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

Semester: VI	Major Base Elective Course : II	Graph Theory	Credit : 5	Allotted hours per week: 6

CO01: Explain the Konigsberg Bridge problem, graph, subgraph, degree of the graph and isomorphism.

CO02: Explain connectedness, components and some basic theorems.

CO03: Derive the Eulerian Graphs and the Hamiltonian graphs and characterization of trees.

CO04: Derive Planarity and its properties.

CO05: Explain basic properties of directed graph by using various algorithms.

PSO-PO-CO MAPPING MATRIX								
PO & PSO / CO	PO01	PO02	PO03	PO04	PO05	PSO01	PSO02	PSO03
CO01	1	-	-	2	1	-	-	-
CO02	1	1	1	1	-	1	-	-
CO03	1	1	1	1	1	-	1	-
CO04	1	-	1	-	1	-	-	-
CO05	-	-	1	2	2	-	-	-

MAJOR BASED ELECTIVE - III

ASTRONOMY

UNIT I

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

UNIT II

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

UNIT III

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

UNIT IV

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

UNIT V

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

Text Book :

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

Unit 1: Sec: 39-79
Unit 2: Sec: 80-90,106-116
Unit3: Sec: 117-144
Unit 4: Sec: 146-162,173-178
Unit 5: Sec: 229-241,256-275

Book for Reference:
1. G V Ramachandran, Text Book of Astronomy, Mission Press, Palayamkottai, 1965.

Semester: VI	Major Base Elective Course : III	Astronomy	Credit : 5	Allotted hours per week: 6

CO01: Introduction to astronomy and spherical trigonometry.

CO02: Explain relevant properties of sphere, celestial sphere and the movements of the celestial sphere.

CO03: Identify the morning and evening stars and its motions.

CO04: Derive the laws of refraction, Cassini's formula, the Kepler's laws and equation.

CO05: compare the solar and lunar eclipses.

PO & PSO CO	PO01	PO02	PO03	PO04	PO05	PSO01	PSO02	PSO03
CO01	1	-	-	2	1	-	-	-
CO02	1	1	1	1	-	1	-	-
CO03	1	1	1	1	1	-	1	-
CO04	1	-	1	-	1	-	-	-
CO05	-	-	1	2	2	-	-	-

ALLIED PHYSICS COURSE I

UNIT I   Properties of matter

Elasticity : Stress – Strain – Young's modulus – Behaviour of wire under progressive tension –Bending of beams – Expression for the bending moment – Measurement of Young's modulus by bending of a beam – Non- uniform bending and Uniform bending.

Viscosity: Streamline flow and Turbulent flow – critical velocity - Poiseuille's formula – Determination of coefficient of viscosity of a liquid (Variable pressure head).

Surface Tension: Drop weight method of determining the surface tension of   a Liquid – Experiment to determine the interfacial tension .

UNIT II   Mechanics

Centre of Gravity – Centre of Gravity of a solid hemisphere – Hollow hemisphere – Centre of Gravity of a solid cone – Centre of Gravity of a solid tetrahedron.

States of Equilibrium : Equilibrium of a rigid body – Stable, unstable and neutral equilibrium – Example.

Stability of Floating bodies – Metacenter – Determination of Metacentric height of a ship**.**

UNIT III   Thermal Physics

Thermodynamics : Laws of thermodynamics – Reversible and irreversible process – Heat engine – Carnot's theorem.

Radiation : Black body – Stefan's law – Newton's law of cooling – Newton's law of cooling from Stefan's law – Experimental determination of Stefan's constant – Wien's displacement law – Rayleigh – Jean's law – Planck's law.

Heat Conduction : Coefficient of Thermal Conductivity – Determination of Thermal Conductivity of a bad Conductor by Lee's disc method.

UNIT IV   Optics

Geometrical Optics : Spherical aberration of a thin lens – Methods of reducing spherical aberration – Coma – Aplanatic surface – Astigmatism – Curvature of the field – Distortion.

Interference : Introduction – Air wedge – Newton's rings – Colours of thin films.

Diffraction : Plane diffraction Grating – Theory of plane transmission Grating.

UNIT V   Electronics

Intrinsic and extrinsic semiconductor – PN Junction diode – Biasing of PN junction – V-I characteristics of junction diode – Rectifiers – Half wave – Full wave and bridge rectifiers –Zener diode – Characteristics of Zener diode – Voltage regulator – Transistor – Characteristics of transistor – CB, CE mode – Transistors as an amplifier.

Books for Study:

1. R. Murugeshan, *Properties of matter*, S. Chand & Co. Pvt. Ltd., Revised edition, 2012.
2. Narayanamoorthyand N. Nagarathinam , *Mechanics – Part II*,   The National Publishing Company , Chennai,2005.
3. Dr.N. Subramaniyam,Brijlal and Dr.M.N.Avathanulu,*Optics,* S. Chand &Co. Pvt.Ltd.—25 threvised edition, New Delhi, 2012.
4. V.Vijayendran,   S.Viswanathan,   *Digital   Fundamentals,*   Printers & Publishers Private Ltd, Chennai, 2004.

   Books for Reference:

1. Brijlal   and   Subramaniyan,   *Properties   of   Matter,*   S.   Chand   & Co.Pvt.Ltd.2005.
2. Brijlal and Subramaniyan., *Thermal Physics*, S. Chand & Co 2001.
3. Murugeshan and Kiruthiga Sivaprasath., *A Text Book of Optics*., S. Chand & Co. Pvt.Ltd.- 9 th revised edition Ramnagar 2014, Newdelhi-110055.
4. Mehta V.K., *Principles of Electronics*, S.Chand and company Ltd, 2014

Semester: I	Allied Course : I	Physics – I	Credit : 4	Allotted hours per week: 4

CO01: Understand the basic theories and properties of matter.

CO02: Learn about centre of gravity, state of Equilibrium and stability of floating bodies.

CO03: Derive the laws of thermodynamics, laws of radiation and heat conduction.

CO04: Learn and understand the properties optics and get knowledge of interference and diffraction.

CO05: Get knowledge about electronics and its components.

PO & PSO CO	PO01	PO02	PO03	PO04	PO05	PSO01	PSO02	PSO03
CO01	1	1	1	-	-	1	-	-
CO02	1	2	1	-	-	-	1	-
CO03	-	1	2	1	-	-	-	1
CO04	-	2	1	1	-	-	-	-
CO05	-	1	1	1	-	-	-	-

ALLIED PHYSICS PRACTICALS I

(Any 12 Experiments)

1. Non-Uniform bending – Pin and Microscope.
2. Uniform bending-scale and Telescope.
3. Surface tension and Interfacial Surface tension by Drop weight Method.
4. Surface tension by Capillary rise Method.
5. Coefficient of viscosity of liquid – Variable Pressure head Method.
6. Thermal conductivity of a bad conductor – Lee's disc Method.
7. Specific heat capacity of liquid – Newton's cooling Method.
8. Spectrometer – Refractive index of a solid prism.
9. Spectrometer – Grating – Normal incidence.
10. Newton's Rings – 'R' determination.
11. Air wedge – Thickness of the given thin wire.
12. Potentiometer – low range voltmeter.
13. Carry Foster's Bridge – Resistance Determination.
14. Meter bridge – Specific resistance.
15. Characteristics of a junction diode –Forward resistance and knee voltage.
16. Characteristics of a Zener diode-Break down voltage.
17. Basic logic gates – AND, OR and NOT gates using discrete components.
18. Verification of NAND and NOR as Universal gates
19. Verification of De Morgan's theorem
20. Verification of Boolean algebra (any five)

Books for Study :

1. Dr.S.Somasundaram, *Practical Physics,* Apsara publications, Tiruchirapalli, 2012.
2. R. Sasikumar, *Practical Physics*, PHI Learning Pvt. Ltd, New Delhi2011.

Books for Reference:

1. S.Srinivasan,*A Text Book of Practical physics*., S.Sultanch and publications.
2. Department of Physics, *Practical Physics*, (B.Sc Physics Main), St.Joseph's College, Tiruchirapalli 1998.

Semester: I	Allied Course : II	Physics Practical	Credit : 2	Allotted hours per week: 3

CO01: Acquire basic knowledge of handling of lab equipments.

CO02: Motivate the students in the field of physics.

CO03: Educate the students in laboratory activities.

CO04: Verify the physical laws and concepts by suitable equipments.

CO05: Verify the characteristics of electronics components.

PO & PSO CO	PO01	PO02	PO03	PO04	PO05	PSO01	PSO02	PSO03
CO01	1	1	1	-	-	1	-	-
CO02	1	2	1	-	-	-	1	-
CO03	-	1	1	1	-	-	-	1
CO04	-	2	1	1	-	-	-	-
CO05	-	1	1	1	-	-	-	-

ALLIED PHYSICS COURSE II

UNIT I   Electrostatics

Coulomb's inverse square law – Gauss theorem and its applications (Intensity at a point due to a charged sphere & cylinder) – Principle of a capacitor – Capacity of a spherical and cylindrical capacitors – Energy stored in a capacitor – Loss of energy due to sharing of charges - Capacitors in series and parallel – Types of capacitors.

UNIT II   Magnetism

Intensity of magnetization – Susceptibility – Types of magnetic materials – Properties of para, dia and ferromagnetic materials – Cycle of magnetization – Hysteresis – B-H curve – Applications of B-H curve – Magnetic energy per unit volume – Ferromagnets, ferrimagnets and their applications.

UNIT III   Atomic Physics

Atom Models : Sommerfield's and Vector atom Models – Pauli's exclusion Principle – Various quantum numbers and quantization of orbits.

X-rays : Continuous and Characteristic X-rays – Mosley's Law and importance – Bragg's law – Miller indices – Determination of Crystal Structure by Laue's Powder photograph method.

UNIT IV   Nuclear Physics

Introduction – Nucleus – Classification of Nuclei – Nuclear Size – Charge – Mass and Spin – Liquid drop model.Nuclear Radiations and their properties, particle accelerators – Betatron and Proton Synchrotron - Four types of reactions – Elementary particles and their classifications.

UNIT V   Digital Electronics

Decimal – Binary – Octal and Hexa Decimal number systems and their Mutual Conversions – 1's and 2's complement of a Binary number and Binary arithmetic (Addition, Subtraction, Multiplication and Division) – Binary Subtraction by 1's and 2's complement method – Basic logic gates – AND, OR, NOT, NAND, NOR and EX-OR gates – NAND and NOR as universal building gates – Boolean Algebra – Laws of Boolean Algebra – De Morgan's Theorems – Their verifications using truth tables.

Books for Study:

1. R. Murugesan., *Electricity and Magnetism.* S. Chand & Co, New Delhi, Third Revised edition,2001.
2. R. Murugeshan, Kiruthiga Sivaprasath,*Modern Physics.,*   S. Chand & Co, New Delhi, First edition, 1984,.
3. R. S. Sedha, *A text book of Digital Electronics,* S. Chand & Co, New Delhi, First edition ,2004.

Books for Reference:

1. Narayanamurthi, *Electricity and Magnetism*, The National Publishing Co, First edition,1988.
2. J. B. Rajam, *Atomic Physics.,* S. Chand & Company Limited, New Delhi, First edition, 1990.
3. B. N. Srivastava, *Basic Nuclear Physic,* Pragati Prakashan, Meerut, 2005.
4. Albert Paul Malvino, *Digital principles and Applications,* McGraw-Hill International Editions, New York, 2002.

Semester: II	Allied Course : III	Physics – II	Credit : 3	Allotted hours per week: 3

CO01: Get basic knowledge of Modern physics and digital electronics.

CO02: Understand the basic laws and properties in electrostatics.

CO03: Derive the principle of magnetism.

CO04: Learn the basic concepts in Atomic and Nuclear physics.

CO05: Understand the functions of digital electronics components and circuits.

PO & PSO / CO	PO01	PO02	PO03	PO04	PO05	PSO01	PSO02	PSO03
CO01	1	1	1	-	-	1	-	-
CO02	1	1	1	-	-	-	1	-
CO03	-	1	2	1	-	-	-	1
CO04	-	2	1	1	-	-	-	-
CO05	-	2	1	1	-	-	-	-

ALLIED COMPUTER SCIENCE FOR B.Sc. PROGRAMMES

(For the candidates admitted from the academic year 2016-2017 onwards)

Allied Paper I

Programming in C

Unit I

Introduction to Computers and their Applications. Computer System Characteristics – Hardware and Software – Types and Generations of Computers – Introduction to I/O and Storage Devices – Number Systems – Flowcharts – Algorithms.

Unit II

Evaluation and Applications of C Structure of a C programme - Data Types – Declarations – Operators – Expressions – Type Conversions – Built-in Functions – Data Input and Output Control Statements : IF, ELSE – IF, GOTO, SWITCH, WHILE – DO, DO – WHILE, FOR BREAK and CONTINUE.

Unit III

Functions – Defining and Accessing Functions – passing parameters to functions – Arguments – recursive functions – Storage Classes – Arrays : Arrays and functions – Arrays and Strings – String functions – String Manipulations.

Unit IV

Pointers – Pointer Declarations - operations on Pointers – pointers to functions – pointers and strings – pointers and arrays – array of pointers structures – structure and pointers – Unions.

Unit V

Data Files – Opening, Closing and Processing files – files with structures and unions- register variables – Bitwise operations – Macros Preprocessors.

Text Book :

1. Computer Today – S.K. Basandra – Galgotia Publications Unit II – V.
2. Programming in C – E.Balagurusamy – Tata McGraw Hill Publication.

Reference Books :

1. Programming with C - Byron S Gottfried – Schaum's Outline Series, Tata McGraw Hill Publications.
2. The Spirit of C – Mullish Cooper – Schaum's Outline Series – Tata McGraw Hill Publications.
3. Let Us C – Yeswant Kanetkar – BPB Publications.

Semester: II	Allied Course : I	Programming in 'C'	Credit : 4	Allotted hours per week: 4

CO01: Understand the difference of hardware and software. Introduction to input, output and storage device.

CO02: Get the basic knowledge in evaluation and application of C structure of a C programme.

CO03: Develop the idea in usage of various function, control statements and arrays in C programme.

CO04: Get the basic knowledge in Pointer, function, structure.

CO05: Understand the operations of data file, structure of data file and macros pre - processors.

PO & PSO CO	PO01	PO02	PO03	PO04	PO05	PSO01	PSO02	PSO03
CO01	1	1	1	-	-	1	-	-
CO02	1	2	1	-	-	-	1	-
CO03	-	1	1	1	-	-	-	1
CO04	-	1	1	1	-	-	-	-
CO05	-	2	1	1	-	-	-	-

Allied Paper II

C Programming Lab

1. Solution of a Quadratic Equation (all cases)

2. Sum of Series (sine, cosine, e^x)

3. Coversion of Number System (Decimal to Binary, Decimal to Octal)

4. Largest, Smallest among 'n' numbers (Also use it to find the number of occurrences of a given number)

5. Ascending and Descending order of numbers using Arrays.

6. Sorting of names in Alphabetical order

7. Matrix Operations (Addition, Subtraction, Multiplication – use Functions).

8. Finding factorials, generating Fibonacci Numbers using recursive functions.

9. String manipulations without using string function

10. ns

    (String length, String Comparison, String Concatenation, Palindrome Checking, Counting words and lines in String – use function Pointers).

Semester: II	Allied Course : II	'C' Programming Practical	Credit : 3	Allotted hours per week: 3

CO01: Understand the exciting world of programming to the students through C programme.

CO02: Learn the techniques of C programming.

CO03: Write the Program to given problem by using C programming techniques.

CO04: Verify and Execute the Program in lab.

PO & PSO CO	PO01	PO02	PO03	PO04	PO05	PSO01	PSO02	PSO03
CO01	1	1	1	-	-	1	-	-
CO02	1	2	1	-	-	-	1	-
CO03	-	2	-	1	-	-	-	1
CO04	-	1	1	1	-	-	-	-

Allied Paper III

Principles of Information Technology

Unit - I

Introduction to Computer – Classification of Digital Computer System – Computer Architecture – Memory Units – Auxiliary Storage Devices – Input and Output Devices.

Unit II

Introduction to Computer Software – Operating System – Programming Languages – General Software Features and trends.

Unit III

Database Management Systems – Data Processing – Introduction to Database Management System – database design.

Unit IV

Introduction to Telecommunication – Networking – Commmunication System – Distributed System – Internet – Intranet.

Unit V

Multimedia tools – Virtual Reality – E-Commerce – Data warehousing – Data Mining – Applications; Geographical Information System – Computer in Business, Industry, Home, Education and Training.

Text Book :

1. Fundamentals of Information Technology, Alexis Leon And Mathews Leon, Vikas Publishing House Pvt. Ltd, 2009

Reference :

1. Henry C.Lucas, Jr., Information Technology for Management – McGraw Hill (Part – III).
2. Williams, Sawyer, Hutchinson, Using Information Technology – McGraw Hill.

Semester: II	Allied Course : III	Principle of Information Technology	Credit : 2	Allotted hours per week: 3

CO01: Get the knowledge in Digital computer and computer architecture.

CO02: Understand the program language, software and its trends.

CO03: Get awareness in database management systems.

CO04: Develop the skills to use network, internet and intranet.

CO05: Get the knowledge in Multimedia tools, application of data mining in business, industry, education and training.

PO & PSO CO	PO01	PO02	PO03	PO04	PO05	PSO01	PSO02	PSO03
CO01	1	1	1	-	-	1	-	-
CO02	1	-	1	-	-	-	1	-
CO03	-	2	1	1	-	-	-	1
CO04	-	1	1	1	-	-	-	-
CO05	-	2	1	1	-	-	-	-