SWAMI DAYANANDA

COLLEGE OF ARTS & SCIENCE

Affiliated to Bharathidasan University,Tiruchirappalli.
Accredited by NAAC–'B++' Grade (With CGPA 2.99)(First Cycle)
UGC Recognized u/s 2(f) & 12 (B)
Dayananda Campus, Manjakkudi –612 610.Tamilnadu, India.

HANDBOOK

DEPARTMENT OF MATHEMATICS

INDEX

Profile of B.Sc., (Mathematics)

B.Sc Mathematics is a 3 year undergraduate academic degree course offered to those graduates who have successfully completed a program in mathematics. B.Sc in Mathematics course is one of the best courses for those who want to enhance their awareness regarding Mathematics concepts.

The B.Sc Mathematics syllabus includes Trigonometry, Algebra, Calculus, Vector Calculus, Differential Geometry, Graph Theory, Complex Analysis, Real Analysis, Differential Equations, Lap Lace, among many others.

• Bachelor of Science in Mathematics which is abbreviated as B.Sc Mathematics is a UG course aiming to help the students to foray in the business world.

• It is the study of quantity, structure, space, and change and the course offers in-depth knowledge of geometry, trigonometry, calculus and other theories to the students.

• The students can get to know more about the topics like Computer Science and Statistics and this course helps the students in building a good foundation base while continuing their studies.

• B.Sc Mathematics aims at preparing students to take up various fields in the Indian private and government sectors. Also, the graduates can become teachers and help the students in developing a better understanding about Mathematics and the concepts can be used in the modern world.

There are numerous advantages of pursuing B.Sc Mathematics out of which a few are mentioned below:

• The students will get relevant skills like data analysis, observation of patterns, deduction of conclusions, etc will be applied in their jobs as well.

• The other doing this will be able to develop problem-solving skills and will be able to use logical ways to formulate theories and apply the same to solve problems.

• The graduates post completing the course can work in the government sector as well as the government department looks for qualified professionals with detailed knowledge of Mathematics and Stats.

• It will further open new doors to thriving career opportunities.

Career & Jobs

- B.Sc in Mathematics graduates can get employed easily within the organizations immediately after completing their studies. Some of the most sought , working areas for the B.Sc Mathematics graduates in leading organizations include:
- • Banking
- • Finance
- • Insurance
- • Risk Management
- • Universities
- • Scientific Institutes

Besides the above mentioned sectors, there are many other sectors that hunt for the eligible who have completed B.Sc Mathematics.

BHARATHIDASAN UNIVERSITY **TIRUCHIRAPPALLI - 620 024.**

B.Sc. MATHEMATICS

CHOICE BASED CREDIT SYSTEM –

LEARNING OUTCOMES BASED CURRICULUM FRAMEWORK (CBCS - LOCF)

(Applicable to the candidates admitted from the academic year 2022-2023 onwards)

Sem.	Part	Course	Title	Ins. Hrs	Credi	Exam Hours	Marks Int.	Marks Ext.	Total
I	I	Language Course – I (LC) Tamil $ / Other Languages + #		6	3	3	25	75	100
	II	English 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 and Fourier Series	5	4	3	25	75	100
		First Allied Course – I (AC)	Computer Science / Physics / Financial Accounting	4	4	3	25	75	100
		First Allied Practical (AP)	Physics / Computer Science	2	-	-	-	-	-
		First Allied Course – II (AC)	Financial Accounting						
	IV	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 Course - II (ELC)		4	3	3	25	75	100
	III	Core Course – III (CC)	Differential Equations	5	5	3	25	75	100
		Core Course – IV (CC)	Analytical Geometry 3D	5	4	3	25	75	100
		First Allied Practical (AP)	Computer Science / Physics	2	2	3	40	60	100
		First Allied Course – II (AC)	Financial Accounting			3	25	75	
		First Allied Course – II (AC)	Computer Science / Physics	4	4	3	25	75	100
		First Allied Course – III (AC)	Financial Accounting						
		Add on Course – I ##	Professional English- I	*6	4	3	25	75	100
	IV	Environmental Studies		2	2	3	25	75	100
	VI	Naan Mudhalvan Scheme (NMS) @@	Language Proficiency for Employability - Effective English	-	2	3	25	75	100
	TOTAL			**30**	**29**	**-**	**-**	**-**	**900**

III	III	Language Course – III (LC) Tamil $ / Other Languages + #		6	3	3	25	75	100
		English Course – III (ELC)		6	3	3	25	75	100
		Core Course – V (CC)	Classical Algebra and Theory of Numbers	5	5	3	25	75	100
		Core Course – VI (CC)	Sequence and Series	5	4	3	25	75	100
		Second Allied Course – I (AC)	Chemistry / Mathematical Statistics / Management Accounting	4	4	3	25	75	100
		Second Allied Practical (AP)	Chemistry / Mathematical Statistics	2	-	-	-	-	-
		Second Allied Course – II (AC)	Management Accounting						
		Add on Course – II ##	Professional English - II	6*	4	3	25	75	100
	IV	Non-Major Elective I @ - Those who choose Tamil in Part I can choose a non-major elective course offered by other departments. Those who do not choose Tamil in Part I must choose either a) Basic Tamil if Tamil language was not studied in school level **or** b) Special Tamil if Tamil language was studied upto 10^{th} & 12^{th} std.	Quantitative Aptitude I	2	2	3	25	75	100
		TOTAL		**30**	**25**	**-**	**-**	**-**	**700**
IV	I	Language Course –IV (LC) Tamil $ / Other Languages + #		6	3	3	25	75	100
	II	English Course – IV (ELC)		6	3	3	25	75	100
	III	Core Course - VII (CC)	Vector Calculus and Laplace Transforms	5	5	3	25	75	100
		Core Course – VIII (CC)	Abstract Algebra	5	4	3	25	75	100
		Second Allied Practical (AP)	Chemistry / Mathematical Statistics	2	2	3	40	60	100
		Second Allied Course – II (AC)	Management Accounting			3	25	75	
		Second Allied Course – II (AC)	Chemistry / Mathematical Statistics	4	4	3	25	75	100
		Second Allied Course – III (AC)	Management Accounting	4	4	3	25	75	100
	IV	Non-Major Elective II @ - Those who choose Tamil in Part I can choose a non-major elective course offered by other departments. Those who do not choose Tamil in Part I must choose either Basic Tamil if Tamil language was not studied in school level **or** Special Tamil if Tamil language was studied upto 10^{th} & 12^{th} std.	Quantitative Aptitude II	2	2	3	25	75	100
	VI	Naan Mudhalvan Scheme (NMS) @@	Digital Skills for Employability	-	2	3	25	75	100
		TOTAL		**30**	**29**	**-**	**-**	**-**	**800**

V	III	Core Course -IX (CC)	Numerical Methods and MATLAB	5	5	3	25	75	100
		Core Course – X (CC)	Real Analysis	5	5	3	25	75	100
		Core Course – XI (CC)	Statics	5	5	3	25	75	100
		Core Practical – I (CP)	MATLAB Programming Lab	5	4	3	40	60	100
		Major Based Elective – I (Any one from Group - A)		5	4	3	25	75	100
	IV	Skill Based Elective I	Introduction to Latex	3	2	3	25	75	100
		Soft Skills Development		2	2	3	25	75	100
		TOTAL		**30**	**27**	**-**	**-**	**-**	**700**
VI	III	Core Course - XII (CC)	Linear Algebra	5	5	3	25	75	100
		Core Course - XIII (CC)	Complex Analysis	5	5	3	25	75	100
		Core Course - XIV (CC)	Dynamics	5	4	3	25	75	100
		Major Based Elective II (Any one from Group - B)		5	4	3	25	75	100
		Major Based Elective III (Any one from Group - C)		5	3	-	25	75	100
	IV	Skill Based Elective – II	Mathematics for Competitive Examinations	3	2	3	25	75	100
	V	Gender Studies		2	1	3	25	75	100
		Extension Activities **		-	1	-	-	-	-
	VI	Naan Mudhalvan Scheme (NMS) @@		-	2	3	25	75	100
		TOTAL		**30**	**27**	**-**	**-**	**-**	**800**
		GRAND TOTAL		**180**	**154**	**-**	**-**	**-**	**4500**

LIST OF ALLIED COURSES:

First Allied Course (Any one)

1. Computer Science
2. Physics
3. Financial Accounting

Second Allied Course (Any one)

1. Chemistry
2. Mathematical Statistics
3. Management Accounting

LIST OF MAJOR BASED ELECTIVE COURSES:

Group A (Any one)

1. Operations Research
2. Stochastic Processes

Group B (Any one)

1. Graph Theory
2. Introduction to Python Programming

Group C (Any one)

1. Astronomy
2. Number Theory

SUMMARY OF CURRICULUM STRUCTURE OF UG PROGRAMMES

Sl. No.	Part	Types of the Course	No. of Courses	No. of Credits	Marks
1.	I	Language Courses	4	12	400
2.	II	English Courses	4	12	400
3.	III	Core Courses	14	70	1400
4.		Core Practical	1	4	100
5.		Allied Courses I & II	4	16	400
6.		Allied Practical	2	4	200
7.		Major Based Elective Courses	3	6	300
8.		Add –on Course (Professional English I & II)	2	8	200
9.	IV	Non Major Elective Courses	2	4	200
10.		Skill Based Elective Courses	2	4	200
11.		Soft Skill Development	1	2	100
12.		Value Education	1	2	100
13.		Environmental Studies	1	2	100
14.	V	Gender Studies	1	1	100
15.		Extension Activities	1	1	0
16.	VI	Naan Mudhalvan Scheme	3	6	300
	Total		**46**	**154**	**4500**

PROGRAMME LEARNING OBJECTIVES:

- To have a comprehension of the instruments required to have the option to quantitatively examine and comprehend the common and social world,
- To be able to take care of issues, think scientifically, and reason quantitatively.
- To be able to get to and convey Mathematical data.
- To take an interest effectively in Mathematics related occasions in particular Conferences/Seminars/Workshops and Quiz programs.

PROGRAMME OUTCOMES:

Area information: Demonstrate information on essential ideas, standards and uses of the particular science discipline.

Logical and Technical Skills: Ability to deal with/utilize suitable apparatuses/strategies/gear with a comprehension of the standard working methods, wellbeing perspectives/impediments.

Basic reasoning and Problem settling: Identify and basically break down appropriate issues in the important order utilizing proper instruments and strategies just as ways to deal with coming to feasible end results/arrangements.

Individual and collaboration: Exhibit the possibility to successfully achieve assignments freely and as a part or pioneer in various groups, and in multidisciplinary settings.

Powerful Communication: Communicate successfully in spoken and composed structure just as through electronic media with mainstream researchers just as with society on the loose.

Society: Analyse the effect of logical and innovative advances on nature and society and the requirement for reasonable improvement.

Morals: Commitment to proficient morals and duties.

Deep-rooted learning: Ability to participate in long-lasting learning with regard to the fast advancements in the control.

PROGRAMME SPECIFIC OUTCOMES:

- Explicate the concepts of pure and applied Mathematics by demonstrating the knowledge and understanding of the mathematical principles in multidisciplinary environments.
- Demonstrate a computational ability in solving a wide array of mathematical problems.
- Utilize mathematical skills of the logical and scientific approach.
- Appreciate the beauty of Mathematics with the attainment of proficiency in problem solving, computational skills, critical thinking, technical and quantitative reasoning.

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First Year	CORE COURSE I DIFFERENTIAL CALCULUS AND TRIGONOMETRY	Semester I
Code:	(Theory)	Credit: 5

COURSE OBJECTIVES:

- To inculcate what a derivative is in terms of the idea of a tangent line to the graph of a function, how a derivative can be used to describe the rate of change of one quantity with respect to another, and how to relate the geometric ideas to the analytic ideas.
- To understand intuitive explanation of the process of taking a limit, to compute basic limits of functions and understand the importance of limits to the process of differentiation and be able to compute the derivative of a simple function.
- To know continuity as related to functions and able to relate an intuitive notion of continuity to the mathematical definition of continuity, to compare and contrast the ideas of continuity and differentiability.
- To recognize and use the vocabulary of angles (including standard position, initial and terminal sides, quadrantal angles, acute, right, and obtuse angles)
- To know the usage of right triangles to evaluate the six trigonometric functions
- To compute the six trigonometric functions of any angle and use the unit circle to define the six trigonometric functions for all real numbers.

UNIT – I:

Functions and Limits: Constants and variables – Functions – Classification of functions - Limits.

UNIT – II:

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

UNIT – III:

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

UNIT – IV:

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 – V:

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

UNIT – VI CURRENT CONTOUR (For Continuous Internal Assessment Only):

The Double angle formulas and The Half-angles identities.

REFERENCES:

1. S. Narayanan and T.K. Manicavachagam 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 I Sections 1 to 10 of [1]
   UNIT – II : Chapter III Sections 1.1 to 2.2, Chapter IV Section 2.1, 2.2 & Chapter V 1.1 to 1.4 of [1]
   UNIT – III : Chapter X Sections 2.1 to 2.6 of [1]
   UNIT – IV : Chapter 1 Section 1.2 to 1.4 of [2]
   UNIT – V : Chapter 2 Section 2.1 & 2.2 of [2]
3. S. Arumugam and Isaac, Calculus, Volume1, New Gamma Publishing House, 1991.
4. S. Narayanan, T.K. Manichavasagam Pillai, Trigonometry, S. Viswanathan Pvt. Limited, and Vijay Nicole Imprints Pvt. Ltd, 2004.

COURSE OUTCOME:

After completing this course, the students will be able to;

- Explain the relationship between the derivative of a function as a function and the notion of the derivative as the slope of the tangent line to a function at a point.
- Compare and contrast the ideas of continuity and differentiability.
- Find maxima, minima, critical points and inflection points of functions and to determine the concavity of curves.
- Convert angles from degrees to radians and vice versa.
- Compute the length of a circular arc given the radius and the interior angle.
- Understand the definitions of the inverse trigonometric functions, compute the domain and range of the hyperbolic and inverse trigonometric functions and to find exact values of composite functions with inverse trigonometric functions.

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First Year **CORE COURSE II** **Semester I**

INTEGRAL CALCULUS AND FOURIER SERIES

Code: **(Theory)** **Credit: 4**

COURSE OBJECTIVES:

- To get exposed to the concepts of reduction formulae and Fourier series.
- To apply double and triple integral to find the area and volume.
- To understand the concepts of Beta and Gamma functions and their applications.

UNIT – I:

Definite integrals - Integration by parts and reduction formulae.

UNIT – II:

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

UNIT – III:

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

UNIT – IV:

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

UNIT – V:

Fourier series- definition - Fourier Series expansion of periodic functions with Period 2π – Use of odd & even functions in Fourier Series. Half-range Fourier Series – Development in Cosine series – Development in Sine series.

UNIT – VI CURRENT CONTOUR (For Continuous Internal Assessment Only):

Chemical, Physical and Biomedical Applications of Fourier series.

REFERENCES:

1. S. Narayanan and T.K. Manicavachagam Pillai, Calculus Volume II, S. Viswanathan (Printers & Publishers) Pvt. Limited, Chennai -2011.
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 11, 12 & 13 of [1]
UNIT – II : Chapter 2 section 1.1, 1.2, 1.3 & 1.4 of [1]
UNIT – III : Chapter 5 section 2.1, 2.2 & 4 of [1]
UNIT – IV : Chapter 7 section 2.1 to 2.5 of [1]
UNIT – V - Chapter 6 Section 1, 2, 3, 4, 5.1, 5.2 of [2]

REFERENCES:

1. Shanti Narayan, Differential & Integral Calculus.
2. Dr. S. Arumugam and Prof. A. ThangapandiIssac, Fourier series, New Gamma Publishing house.

COURSE OUTCOMES:

After completing this course, the students will be able to:

- Derive reduction formula and thereby evaluate some standard integrals.
- Explain the properties of Beta and Gamma functions and apply it to compute the integral.
- Identify odd and even functions and determine Fourier series expansion of these given functions.
- Apply change of variable method to evaluate double integral.
- Utilize double and triple integral to compute area and volume of a solid.

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First Year **CORE COURSE III** **Semester II**

DIFFERENTIAL EQUATIONS

Code: **(Theory)** **Credit: 5**

COURSE OBJECTIVES:

- To know the order and degree of the ODE's.
- To study DEs and PDEs of first and second order.
- To identify some specific methods and solve them.
- To make difference between ODE and PDE.
- To know some standard methods.

UNIT – I:

Equations of the first order and first degree – Variable separable – Homogeneous, Non-homogeneous, Linear equations – Bernoulli's equation – Exact differential equations: Sufficient condition for exact differential equations – Practical rules for solving exact differential equations.

UNIT – II:

First order, higher degree differential equations– Equations solvable for dy/dx, solvable for y, solvable for x, Clairaut's form – Homogeneous equations in x and y– simple problems.

UNIT – III:

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 – IV:

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

UNIT – V:

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 – VI CURRENT CONTOUR (For Continuous Internal Assessment Only):

Moving Boundary Value Problems

REFERENCES:

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

   UNIT – I : Chapter II – Sections 1,2,3,4,5,6 of [1]
   UNIT – II : Chapter IV – Sections 1,2 & 3 of [1]
   UNIT – III : Chapter V – Sections 1,2,3,4 & 5, Chapter VIII – Section 4 of [1]
   UNIT – IV : Chapter XII – Sections 1 – 6 of [1]
   UNIT – V : Chapter V of [2]
3. M.D. Raisinghania , Ordinary and Partial Differential Equations, S. Chand & Co.
4. M.K. Venkatraman, Engineering Mathematics, S.V. Publications, 1985 Revised Edition.

COURSE OUTCOMES:

After completing this course, the students will be able to:

- Solve first-order ordinary differential equations.
- Solve higher order differential equations.
- Solve the Higher order differential equations using methods of variation of parameter.
- Solve partial differential equations using Lagrange's Method.

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First Year **CORE COURSE IV** **Semester II**

ANALYTICAL GEOMETRY 3D

Code: **(Theory)** **Credit: 4**

COURSE OBJECTIVES:

- To study three dimensional Cartesian Co-ordinates system.
- To enable the students to develop their skill in three dimensions

UNIT – I:

Symmetrical form of equation of a straight line – Equation of a straight line passing through two given points – Condition for a line to be parallel to a plane – Angle between a plane and a line – Condition for two straight lines to be coplanar – Shortest Distance between two given lines.

UNIT – II:

Sphere – Equation of a sphere when the centre and radius are given – Plane section of a sphere – Equation of a circle – Intersection of two spheres – The equation of a tangent plane to a sphere.

UNIT – III:

Equation of a surface – Cone – Right Circular cone – Intersection of a straight line and quadric cone – Tangent plane and normal.

UNIT – IV:

Condition for a plane to touch a quadric cone - angle between lines in which a plane cuts a cone – Condition that a cone has three mutually perpendicular generators.

UNIT – V:

Central quadrics – intersection of a line and a quadric – tangents and tangent planes – condition for a plane to touch a conicoid.

UNIT – VI CURRENT CONTOUR (For Continuous Internal Assessment Only):

An Introduction to Geo Gebra software.

REFERENCES:

1. T Manickavasagam Pillay, T.K. and Natarajan. T, A Text of Analytical Geometry – Part II – Three dimensions, S. Viswanathan (Printers & Publishers) Pvt. Ltd. 2005,

   UNIT – I : Chapter III – Sections 1 to 8
   UNIT – II : Chapter IV – Sections 1 to 8
   UNIT – III : Chapter V – Sections 1 to 4

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ALLIED MATHEMATICS for

B.Sc. Physics / Chemistry / Electronics / Geology Programmes

(Applicable to the candidates admitted from the academic year 2022-23 onwards)

ALLIED COURSE I
CALCULUS AND FOURIER SERIES

Code: **(Theory)** **Credit: 4**

COURSE OBJECTIVES:

1. To learn the basic Mathematics for their concepts.
2. To train the students in the basic Integrations.

UNIT – I:

Successive Differentiation – nth derivative of standard functions (Derivation not needed) simple problems only-Leibnitz Theorem (proof not needed) and its applications-Curvature and radius of curvature in Cartesian only (proof not needed)–Total differential coefficients (proof not needed) - Jacobians of two & three variables –Simple problems in all these.

UNIT – II:

Evaluation of integrals of types:

$$1)\int \frac{px+q}{ax^2+bx+c}dx \quad 2)\int \frac{px+q}{\sqrt{ax^2+bx+c}}dx \quad 3)\int \frac{dx}{(x+p)\sqrt{ax^2+bx+c}} \quad 4)\int \frac{dx}{a+b\cos x} \quad 5)\int \frac{dx}{a+b\sin x}$$

Integration by trigonometric substitution and by parts of the integrals

$$1)\int \sqrt{a^2-x^2}\,dx \quad 2)\int \sqrt{a^2+x^2}\,dx \quad 3)\int \sqrt{x^2-a^2}\,dx$$

UNIT – III:

General properties of definite integrals – Evaluation of definite integrals of types:

$$1)\int_a^b \frac{dx}{(x-a)(b-x)} \quad 2)\int_a^b \sqrt{(x-a)(b-x)}\,dx \quad 3)\int_a^b \sqrt{\frac{(x-a)}{(b-x)}}dx$$

Reduction formula (When n is a positive integer) for

$$1)\int_a^b e^{ax}x^n dx \quad 2)\int_a^b \sin^n x\,dx \quad 3)\int_a^b \cos^n x\,dx \quad 4)\int_0^x e^{ax}x^n dx \quad 5)\int_0^{\frac{\pi}{2}} \sin^n x\,dx$$

UNIT – IV:

Evaluation of Double and Triple integrals in simple cases – Changing the order and evaluation of double integral. (Cartesian only)

UNIT – V:

Definition of Fourier Series – Finding Fourier Coefficients for a given periodic function with period 2π - Use of Odd & Even functions in evaluating Fourier Coefficients - Half range sine & cosine series.

UNIT – VI CURRENT CONTOURS (For Continuous Internal Assessment Only):

Linear approximations of vector valued functions

REFERENCES:

1. T.K. Manickavasagam Pillai & others, Calculus, Volume I, S.V Publications, Reprint 2016 (Unit I).
2. T.K. Manickavasagam Pillai & others, Calculus, Volume II, S.V Publications, Reprint 2016 (Units II, III & IV).
3. S. Arumugam, Isaac and Somasundaram, Trigonometry & Fourier Series, New Gamma Publishers, Hosur, 1999 (Unit V).
4. M.L. Khanna, Differential Calculus, Jaiprakashnath and Co., Meerut-2004.

COURSE OUTCOMES:

After completing this course, the students will be able to

- Explain the relationship between the derivative of a function as a function and the notion of the derivative as the slope of the tangent line to a function at a point.
- Derive reduction formula and thereby evaluate some standard integrals.
- Identify odd and even functions. Use that to determine Fourier series expansion of the given functions.
- Apply change of variable method to evaluate double integral.

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ALLIED COURSE II
ALGEBRA, ANALYTICAL GEOMETRY (3D)
AND TRIGONOMETRY

Code: **(Theory)** **Credit: 2**

COURSE OBJECTIVES:

- To learn the basic concepts of Algebra
- To learn the basic needs Trigonometry

UNIT – I:

Binomial, Exponential and Logarithmic series (Formulae only) – summation & approximation related problems only.

UNIT – II:

Non-Singular, Symmetric, Skew symmetric, Orthogonal, Hermitian, Skew Hermitian and Unitary matrices – Characteristic equation, Eigen values, Eigen vectors – Cayley - Hamilton's Theorem (proof not needed) –Simple applications only.

UNIT – III:

Finding the Shortest distance between two skew lines and the equation of the plane containing them– Condition for Coplanarity – Equation of a Sphere – Tangent plane – Plane section of a sphere.- Finding the center & radius of the circle of intersection – Sphere through the circle of intersection (only problems in all the above)

UNIT – IV:

Expansion of $\sin n\theta$, $\cos n\theta$, $\tan n\theta$ (n being a positive integer) - Expansion of $\sin^n \theta$, $\cos^n \theta$, $\sin^n \theta \cos^m \theta$ in a series of sines & cosines of multiples of θ (θ - given in radians) - Expansion of $\sin \theta$, $\cos \theta$, $\tan \theta$ in terms of powers of θ (only problems in all the above).

UNIT – V:

Euler's formula for $e^{i\theta}$ - Definition of Hyperbolic functions –Formulae involving Hyperbolic functions -Relation between Hyperbolic & circular functions – Expansion of $\sinh x$, $\cosh x$, $\tanh x$ in powers of x - Expansion of Inverse hyperbolic functions $\sinh^{-1} x$, $\cosh^{-1} x$ and $\tanh^{-1} x$-Separation of real & imaginary parts of $\sin(x+iy)$, $\cos(x+iy)$, $\tan(x+iy)$, $\sinh(x+iy)$, $\cosh(x+iy)$, $\tanh(x+iy)$.

UNIT – VI CURRENT CONTOURS (For Continuous Internal Assessment Only):

An Introduction to SAGEMATH

REFERENCES:

1. T.K. Manickavasagam Pillai & others, Algebra, Volume I, S.V Publications, Reprint 2016 (Unit I).
2. T.K.Manicavachagam Pillai & others, Algebra, Volume II, S.V Publications, Reprint 2016 (Unit II).
3. T.K.Manickavasagom Pillai, Analytical Geometry (3D) and Vector Calculus, New Gamma Publishing House, 1991(Unit III).
4. S. Arumugam, Isaac and Somasundaram, Trigonometry & Fourier Series, New Gamma Publishers, Hosur, 1999(Units IV & V).
5. M.L. Khanna, Differential Calculus, Jaiprakashnath and Co., Meerut-2004.

COURSE OUTCOMES:

After completing this course, the students will be able to

- Applying the skills to solve problems in operative algebra.
- Gain knowledge about the regular geometrical figures and their properties.
- To Understand the definitions of the inverse trigonometric functions and to Compute the domain and range of the hyperbolic and inverse trigonometric functions and to find exact values of composite functions with inverse trigonometric functions

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ALLIED COURSE III
ODE, PDE, LAPLACE TRANSFORMS
AND VECTOR ANALYSIS

Code: **(Theory)** **Credit: 4**

COURSE OBJECTIVES:

- The Students will be able to apply the concepts and methods described in the syllabus they can solve problems using the ordinary and partial differential equation.
- They will know a number of applications The text and class discussion will introduce the concepts, methods, applications, and logical arguments
- Learn the application of Laplace transform in engineering analysis.
- Learn the required conditions for transforming variable or variables in functions by the Laplace transform.
- Learn the use of available Laplace transform tables for transformation of functions and the inverse transformation.
- Vector analysis is a mathematical shorthand and the vector form helps to provide the clear understanding of the physical laws. This makes the calculus of the vector functions the natural instrument for the physicist and engineers in solid mechanics, electromagnetism.

UNIT – I:

Ordinary Differential Equation of first order but of higher degree — Equations solvable for x solvable for Clairaut's form (simple cases only) — Linear equations with constant coefficients — Finding Particular integrals in the cases of e" , sin (kx) , cos (kx) (where k is a constant), x* where k is a positive integer , and e "' *f(x)* where f(x) is any function of x- (only problems in all the above —No proof needed for any formula).

UNIT – II:

Formation of Partial differential equations by eliminating constants and by elimination of arbitrary functions — definition of general, particular & complete solutions — Singular integral (geometrical meaning not required) — Solutions of first order eqnations in the standard forms- $f(p,q) = 0$, $f(x,p,q) = 0$, $f(y,p,q) = 0$, $f(z,p,q) = 0$, $f_1(x,p) = f_2(y,q)$, $z = xp + yq + f(p,q)$ - Lagrange's method of solving $Pp + Qq = R$,where P,Q,R are functions of x,y,z — (Geometrical Meaning is not needed)- (only problems in all the above — No proof needed for any formula).

UNIT – III:

Laplace Transform — Definition — Lee "') ,L(cos(at)) , L (sin (at)) L(t •) , where n is a positive integer. Basic theorems in Laplace Transforms (formula only)- L [e °" cos bt], L [e " sin bt], L |e '* f (t)] — L [f (t)], L[fi (t)], L [f " (t)]

UNIT – IV:

Inverse Laplace Transforms related to the above standard forms-Solving Second Order ODE with constant coefficients ii sing Laplace Transforms.

UNIT – V:

Gradient of a vector — directional derivative — unit normal vector tangent plane — Divergence-Curl — solenoidal & irrotational vectors — Double operators Properties connecting grad., div., and curl of a vector

UNIT – VI CURRENT CONTOURS (For Continuous Internal Assessment Only):

Introduction to Linear Systems of Differential Equations

REFERENCES:

1. S.Narayanan & T.K. Manicavachagam Pillay Differential Equation and its Applications, S. Viswanathan Publishers, 2015 (Units I, II, III & IV).
2. M.L. Khanna, Differential Calculus, Daiprakashnath and Co., Meerut-2004 (Unit V).

COURSE OUTCOME:

After completing this course, the students will be able to

- Solve differential equations using appropriate methods and to present mathematical solutions in a concise and informative manner.
- Develop a logical understanding of the subject with mathematical skills so that students are able to apply mathematical methods & principles in solving problems in engineering fields.
- Calculate Laplace transforms and inverses.
- Apply Laplace transforms to solution of differential and integral equations
- Explain the physical significance of vector calculus, parameterise curves and calculate line integrals,
- Use vector operators, calculate double and triple integrals and surface integrals, apply the Green's, Stokes and Divergence theorems and calculate complex integrals.

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BHARATHIDASAN UNIVERSITY, TIRUCHIRAPPALLI - 620 024.

ALLIED MATHEMATICS for

B.C.A., B.Sc. ARTIFICIAL INTELLIGENCE & MACHINE LEARNING, B.Sc. COMPUTER SCIENCE, B.Sc. CYBER SECURITY, B.Sc. INFORMATION TECHNOLOGY & B.Sc. SOFTWARE DEVELOPMENT PROGRAMMES

(Applicable to the candidates admitted from the academic year 2022-23 onwards)

ALLIED COURSE I
ALGEBRA AND CALCULUS

Code: **(Theory)** **Credit: 4**

COURSE OBJECTIVES:

- To train the students to solve the problems in theory of equations
- To provide knowledge about the matrix, differentiation and various methods for evaluation of integrals.

UNIT – I:

Theory of Equations: Relation between roots & coefficients – Transformations of Equations – Diminishing ,Increasing & multiplying the roots by a constant- Forming equations with the given roots –Rolle's Theorem, Descarte's rule of Signs(statement only) – simple problems.

UNIT – II:

Matrices : Singular matrices – Inverse of a non-singular matrix using adjoint method - Rank of a Matrix – Consistency - Characteristic equation, Eigen values, Eigen vectors – Cayley Hamilton's Theorem (proof not needed) –Simple applications only

UNIT – III:

Differentiation: Maxima & Minima – Concavity , Convexity – Points of inflexion - Partial differentiation – Euler's Theorem - Total differential coefficients (proof not needed) –Simple problems only.

UNIT – IV:

Integration : Evaluation of integrals of types:

$$1)\int \frac{px+q}{ax^2+bx+c}dx \quad 2)\int \frac{px+q}{\sqrt{ax^2+bx+c}}dx \quad 3)\int \frac{dx}{a+b\cos x} \quad 4)\int \frac{dx}{a+b\sin x}$$

Evaluation using Integration by parts – Properties of definite integrals – Fourier Series in the range $(0, 2\pi)$ – Odd & Even Functions – Fourier Half range Sine & Cosine Series

UNIT – V:

Differential Equations: Variables Separable – Linear equations – Second order of types $(aD^2 + bD + c)y = F(x)$ where a,b,c are constants and $F(x)$ is one of the following types

$(i)e^{Kx}$ $(ii)\sin(kx)$ or $\cos(kx)$ $(iii)x^n, n$ being an integer $(iv)e^{Kx}f(x)$

UNIT – VI CURRENT CONTOURS (For Continuous Internal Assessment Only):

Derivatives of Implicit and parametric Functions

REFERENCES:

1. T.K. Manickavasagam Pillai & others, Algebra, Volume I, S.V Publications , 1985 Revised Edition (Units I, II)
2. S. Narayanan, T.K. Manicavachagam Pillai, Calculus, Vol. II, S. Viswanathan Pvt Limited, 2003. (Units III, IV and V)
3. M.L. Khanna, Differential Calculus, Jaiprakashnath and Co., Meerut-2004.

COURSE OUTCOMES:

After completing this course, the students will be able to

- Train the students to solve the problems in theory of equations.
- Apply Cayley Hamilton theorem for finding the inverse of square matrices.
- Get exposed the basic concepts of differentiation and integration.
- Acquire the knowledge about differential equations.

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ALLIED COURSE II
NUMERICAL ANALYSIS AND PROBABILITY

Code: **(Theory)** **Credit: 2**

COURSE OBJECTIVES:

- To learn knowledge about an algebraic and transcendental equations.
- To make the students gain wide knowledge in probability which plays a main role in solving real life problems.

UNIT – I:

Algebraic & Transcendental equations: Bisection Method, Newton Raphson Method, Iteration method - Finite differences – Forward, Backward differences – Newton's forward & backward difference interpolation formulae – Lagrange's interpolating polynomial.

UNIT – II:

Numerical differentiation - Numerical Integration using Trapezoidal rule and Simpson's first & second rules (proof not needed) - Solutions to Linear Systems – Gaussian Elimination Method – Jacobi & Gauss Siedal iterative methods – Theory and problems.

UNIT – III:

Numerical solution of ODE: Solution by Taylor Series Method, Euler's Method, Runge - Kutta 2nd order method- Adam's Predictor Corrector Method and Milne's Predictor Corrector Methods.

UNIT – IV:

Arithmetic Mean – Geometric Mean – Harmonic Mean - Median, Mode , Standard Deviation - Quartile Deviation – Percentiles - Expectation – Variance and covariance.

UNIT – V:

Correlation and Regression –Properties of Simple Correlation and regression coefficients – Simple Numerical Problems only.

UNIT – VI CURRENT CONTOURS (For Continuous Internal Assessment Only):

An introduction to MATLAB

REFERENCES:

1. S.S. Sastry, Numerical Analysis (Unit 1 , 2 , 3)
2. Gupta. S.C & Kapoor, V.K, Fundamentals of Mathematical Statistics, Sultan Chand & sons, New Delhi -1994. (Units 4 & 5)

3. M.K. Jain, S.R.K. Iyengar and R.K. Jain, Numerical Methods for Scientific and Engineering Computation, New Age International Private Limited, 1999.
4. C.E. Froberg, Introduction to Numerical Analysis, II Edn., Addison Wesley, 1979.

COURSE OUTCOMES:

After completing this course, the students will be able to

- Solve algebraic and transcendental equations.
- Appreciate the importance of probability of random variables and understand the correlation and regression coefficients.

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ALLIED COURSE III
OPERATIONS RESEARCH

Code: **(Theory)** **Credit: 4**

COURSE OBJECTIVES:

- To learn the basic concepts about Linear Programming Problem, Transportation Problem Assignment Problem, Sequencing Problem and Network.
- To make students solve real life problems in Business and Management.

UNIT – I:

Operations Research: Introduction - Basics of OR – OR & decision making – Role of Computers in OR - Linear programming formulations & graphical solution of two variables – Canonical & standard forms of LPP

UNIT – II:

Simplex Method: Simplex Method for <, =, > constraints – Charne's method of penalties– Two phase Simplex method.

UNIT – III:

Transportation problem: Transportation algorithm –Degeneracy algorithm – Degeneracy in Transportation Problem, Unbalanced transportation problem- Assignment algorithm –Unbalanced Assignment problem

UNIT – IV:

Sequencing problem: Processing of n jobs through two machines – Processing of n jobs through 3 machines – processing of two jobs through m machines.

UNIT – V:

Networks: Network – Fulkerson's rule - measure of activity – PERT computation – CPM computation - Resource scheduling.

UNIT – VI CURRENT CONTOURS (For Continuous Internal Assessment Only):

Integer and Dynamic programming.

REFERENCES:

1. Manmohan & Gupta , Operations Research, Sultan Chand Publishers, New Delhi
2. Prem Kumar Gupta and D.S. Hira, Operations Research : An Introduction,
3. S. Chand and Co., Ltd. New Delhi,
4. Hamdy A. Taha, Operations Research (7th Edn.), McMillan Publishing Company, New Delhi, 1982.

COURSE OUTCOMES:

After completing this course, the students will be able to

- Acquire the basic concepts of LPP.
- Apply various methods for finding a solution of an LPP.
- Use the basic concepts of TP, AP and Network Problems to develop the problem solving skills.

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BHARATHIDASAN UNIVERSITY **TIRUCHIRAPPALLI - 620 024**

PART-IV VALUE EDUCATION COURSE

FOR ALL UG ARTS, SCIENCE, COMMERCE AND MANAGEMENT
CHOICE BASED CREDIT SYSTEM – LEARNING OUTCOMES BASED CURRICULUM FRAMEWORK (CBCS - LOCF)
(Applicable to the candidates admitted from the academic year 2022-2023 onwards)

First Year	**PART-IV**	**Semester-I**
	VALUE EDUCATION	
Code:	**(Theory)**	**Credit: 2**

OBJECTIVES:

- To understand the philosophy of life and values through Thirukural
- To analyse the components of values education to attain the sense of citizenship
- To understand different types of values towards National Integration and international understanding
- To learn yoga as value education to promote mental and emotional health
- To understand human rights, women rights and other rights to promote peace and harmony

UNIT I : PHILOSOPHY OF LIFE AND SOCIAL VALUES:

Human Life on Earth (Kural 629) -Purpose of Life (Kural 46) -Meaning and Philosophy of Life (Kural 131, 226) -Family (Kural 45), Peace in Family (Kural 1025) Society (Kural 446), The Law of Life (Kural 952), Brotherhood (Kural 807) Five responsibilities / duties of Man (a) to himself (b) to his family (c) to his environment (d) to his society, (e) to the Universe in his lives (Kural 43, 981).

UNIT-II – HUMAN VALUES AND CITIZENSHIP

Aim of education and value education: Evolution of value oriented education, Concept of Human values: types of Values- Character Formation – Components of Value education- A P J Kalam's ten points for enlightened citizenship- The role of media in value building

UNIT-III VALUE EDUCATION TOWARDS NATIONAL AND GLOBAL DEVELOPMENT:

Constitutional or national values: Democracy, socialism, secularism, equality, Justice, liberty, freedom and fraternity - Social Values: Pity and probity, self-control, universal brotherhood - Professional Values - Knowledge thirst, sincerity in profession, regularity, punctuality and faith -Religious Values: Tolerance, wisdom, character - Aesthetic Values- Love and appreciation of literature and fine arts and respect for the same- National Integration and International Understanding.

UNIT IV : YOGA AND HEALTH:

Definition, Meaning, Scope of Yoga - Aims and objectives of Yoga - Yoga Education with modern context - Different traditions and schools of Yoga - Yoga practices: Asanas, Pranayama and Meditation.

UNIT V : HUMAN RIGHTS:

Concept of Human Rights: Indian and international perspectives- Evolution of Human Rights- definitions under Indian and International documents -Broad classification of Human Rights and Relevant Constitutional Provisions: Right to Life, liberty ad Dignity- Right to equality- Right against exploitation- Cultural and Educational Right- Economic Rights- Political Rights- Social Rights - Human Rights of Women and Children – Peace and harmony.

UNIT - VI: CURRENT CONTOURS: (for continuous internal assessment only):

BOOKS FOR REFERENCES:

1. Thirukkural with English Translation of Rev. Dr. G.U. Pope, Uma Publication, 156, Serfoji Nagar, Medical College Road, Thanjavur 613 004
2. திருக்குறள் - ஜி.யு.போப் - ஆங்கில மொழியாக்கத்துடன் உமா நூல், வெளியீட்டகம், தஞ்சாவூர்,
3. Leah Levin, Human Rights, NBT, 1998
4. V.R. Krishna Iyer, Dialetics and Dynamics of Human Rights in India, Tagore Law Lectures.
5. Yogic Thearpy - Swami Kuvalayananda and Dr.S.L.Vinekar, Government of India, Ministry of Health, New Delhi.
6. SOUND HEALTH THROUGH YOGA - Dr.K.Chandrasekaran, Prem Kalyan Publications, Sedaptti, 1999.
7. Grose. D. N – "A text book of Value Education' New Delhi (2005)
8. Gawande . EN – "Value Oriented Education" – Vision for better living. New Delhi (2002) Saruptsons
9. Brain Trust Aliyar- "Value Education for Health, Happiness and Harmony" Erode (2004) Vethathiri publications

COURSE OUTCOMES: After completion of the course, the student will be able to:

- Apply the values in thirukural to be peaceful, dutiful and responsible in family and society
- Develop character formation and sense of citizenship
- Be secular, self-control, sincere, respectful and moral.
- Master yoga, asana and meditation to promote mental health
- Be attitudinal to follow the constitutional rights

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BHARATHIDASAN UNIVERSITY **TIRUCHIRAPPALLI - 620 024**

PART-IV ENVIRONMENTAL STUDIES COURSE

FOR ALL UG ARTS, SCIENCE, COMMERCE AND MANAGEMENT
CHOICE BASED CREDIT SYSTEM – LEARNING OUTCOMES BASED CURRICULUM FRAMEWORK (CBCS - LOCF)
(Applicable to the candidates admitted from the academic year 2022-2023 onwards)

First Year	**PART-IV**	**Semester-II**
	ENVIRONMENTAL STUDIES	
Code:	**(Theory)**	**Credit: 2**

COURSE OBJECTIVES:

- To appreciate the scope of Environmental Studies, Community ecology and the interdisciplinary nature of environmental issues
- To have a basic knowledge of Natural resources its classification, concepts, and natural resources of India.
- The course designed to gain knowledge on values of biodiversity and conservation on global, national, and local scales
- To study about sources and effects of environmental pollution like air, water, soil, thermal, marine, nuclear and noise
- To understand the concerns related to Sustainable Development on environment and health
- To introduce the students in the field of Law and Policies and Acts both at the national and international level relating to environment.

UNIT-1: The Multidisciplinary nature of environmental studies
Definition, scope and importance. (2 lectures)
Need for public awareness

UNIT-2: Natural Resources:
Renewable and non-renewable resources:
Natural resources and associated problems.

a) Forest resources: use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forests and tribal people.

b) Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams benefits and problems.

c) Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.

d) Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.

e) Energy resources: Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources. Case studies.

f) Land resources: Land as a resources, land degradation, man induced Landslides, soil erosion and desertification.

- Role of an individual in conservation of natural resources.
- Equitable use of resources for sustainable lifestyles.

(8 lectures)

Unit: 3 Ecosystems

- Concept of an ecosystem.
- Structure and function of an ecosystem.
- Producers, consumers and decomposers
- Energy flow in the ecosystem
- Ecological succession.
- Food chains, food webs and ecological pyramids
- Introduction, types, characteristic features, structure and function of the following ecosystem:-
- a. Forest ecosystem
- b. Grassland ecosystem
- c. Desert ecosystem
- d. Aquatic ecosystems, (ponds, streams, lakes, rivers, oceans, estuaries)

(6 lectures)

Unit: 4 Biodiversity and its conservation

- Introduction – Definition : Genetic, species and ecosystem diversity
- Biogeographical classification of India
- Value of biodiversity : consumptive use, productive use, social, ethical, aesthetic and option values
- Biodiversity at global, National and local levels
- India as a mega-diversity nation
- Hot-spots of biodiversity
- Threats to biodiversity : habitat loss, poaching of wildlife, man-wildlife conflicts.
- Endangered and endemic species of India
- Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.
- Biological Diversity Act 2002/ BD Rules, 2004

(8 lectures)

Unit: 5 Environmental Pollution

Definition

Causes, effects and control measures of :

a. Air Pollution
b. Water Pollution
c. Soil Pollution
d. Marine Pollution
e. Noise pollution
f. Thermal Pollution
g. Nuclear hazards

- Solid waste Management: Causes, effects and control measures of urban and industrial wastes.
- Role of an individual in prevention of pollution
- Pollution case studies
- Disaster management: floods, earthquake, cyclone and landslides.
- Ill-Effects of Fireworks: Firework and Celebrations, Health Hazards, Types of Fire, Firework and Safety

(8 lectures)

Unit: 6 Social Issues and the Environment

- From Unsustainable to Sustainable development.
- Urban problems related to energy.
- Water conservation, rain water harvesting, watershed management.
- Resettlement and rehabilitation of people; its problems and concerns.

Case studies

- Environmental ethics: Issues and possible solutions.
- Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case studies.
- Wasteland reclamation.
- Consumerism and waste products.
- Environment Protection Act.
- Air (Prevention and Control of Pollution) Act.
- Water (Prevention and Control of Pollution) Act.
- Wildlife Protection Act.
- Forest Conservation Act.
- Issues involved in enforcement of environmental legislation
- Public awareness.

(7 lectures)

Unit: 7 Human Population and the Environment

- Population growth, variation among nations.
- Population explosion – Family Welfare Programmes
- Environment and human health
- Human Rights - Value Education

- HIV/ AIDS - Women and Child Welfare
- Role of Information Technology in Environment and human health
- Case studies.

Unit: 8 Field Work

- Visit to a local area to document environmental assets-river / forest/ grassland/ hill / mountain

References:

1. Agarwal, K.C. 2001 Environmental Biology, Nidi Public Ltd Bikaner.
2. Bharucha Erach, The Biodiversity of India, Mapin Publishing Pvt ltd, Ahamedabad – 380013, India, E-mail: mapin@icenet.net(R)
3. Brunner R.C. 1989, Hazardous Waste Incineration, McGraw Hill Inc 480 p
4. Clark R.S. Marine Pollution, Clanderson Press Oxford (TB)
5. Cunningham, W.P.Cooper, T.H.Gorhani E & Hepworth, M.T. 2001.
6. De A.K. Environmental Chemistry, Wiley Eastern Ltd
7. Down to Earth, Centre for Science and Environment (R)
8. Gleick, H.P. 1993. Water in crisis, Pacific Institute for Studies in Dev., Environment & Security. Stockholm Env. Institute Oxford University, Press 473p.
9. Hawkins, R.E. Encyclopedia of India Natural History, Bombay Natural History Society, Bombay (R)
10. Heywood, V.H & Watson, R.T. 1995. Global Biodiversity Assessment. Cambridge University Press 1140 p.
11. Jadhav, H & Bhosale, V.M. 1995. Environmental Protection and Laws Himalaya Pub. House, Delhi 284 p.
12. Mckinney, M.L. & Schoch R.M. 1996. Environmental Science systems & Solutions, Web enhanced edition 639 p.
13. Mhaskar A.K. Matter Hazardous, Techno-Science Publications (TB)
14. Miller T.G. Jr. Environmental Science, Wadsworth Publishing Co. (TB)
15. Odum, E.P. 1971 Fundamentals of Ecology. W.B. Saunders Co. USA. 574 p
16. Rao MN & Datta, A.K. 1987 Waste Water treatment, Oxford & IBH Publication Co. Pvt Ltd 345 p.
17. Sharma B.K. 2001 Environmental chemistry Goel Publ House, Meerut.
18. Survey of the Environment, The Hindu (M).
19. Townsend C. Harper, J and Michael Begon, Essentials of Ecology, Blackwell science (TB)
20. Trivedi R.K. Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards, Vol. I and II, Enviro Media (R).
21. Trivedi R.K. and P.K. Goel, Introduction to air pollution, Techno-Science Publications (TB).
22. Wagner K.D. 1998 Environmental Management. W.B. Saunders Co. Philadelphia USA 499 p

    (M) Magazine (R) Reference (TB) Textbook

23. http://nbaindia.org/uploaded/Biodiversityindia/Legal/33%20Biological%20Diversity%20

Rules,%202004.pdf.

COURSE OUTCOMES:

- Understand the environmental importance including interactions across local to global scales.
- The learners to update and analyze environmental relationships and interactions of environmental components
- The student to gain knowledge on importance of natural resources in a systematic way.

- The course content is introduce the concept of renewable and non-renewable energy resources and its scenario in India and at global level
- The students will know the relationship between biodiversity and ecosystem functions, direct and indirect values of biodiversity resources and their bioprospecting opportunities.
- The learners can gain awareness related on environmental pollution, causes and pollution control with case studies.
- Student to obtain the environmental ethics and gain knowledge about the sustainable development.
- Learners should realize the environmental legislation and policies of national and international regime and know the regulations applicable to industries and other organizations with significant Environmental aspects

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PROFESSIONAL ENGLISH FOR PHYSICAL SCIENCES-I

OBJECTIVES:

- To develop the language skills of students by offering adequate practice in professional contexts.
- To enhance the lexical, grammatical and socio-linguistic and communicative competence of first year physical sciences students
- To focus on developing students' knowledge of domain specific registers and the required language skills.
- To develop strategic competence that will help in efficient communication
- To sharpen students' critical thinking skills and make students culturally aware of the target situation.

LEARNING OUTCOMES:

- Recognise their own ability to improve their own competence in using the language
- Use language for speaking with confidence in an intelligible and acceptable manner
- Understand the importance of reading for life
- Read independently unfamiliar texts with comprehension
- Understand the importance of writing in academic life
- Write simple sentences without committing error of spelling or grammar

(Outcomes based on guidelines in UGC LOCF – Generic Elective)

UNIT 1: COMMUNICATION

1. **Listening**: Listening to instructions

2. **Speaking**: Telephone etiquette and Official phone conversations

3. **Reading** short passages (3 passages, one from each – Physics, Chemistry, Mathematics/Computer Science)

5. **Writing:** Letters and Emails in professional context

6. **Grammar in Context:**
    - Wh and yes or no,
    - Q tags
    - Imperatives

7, **Vocabulary in Context:** Word formation - .
    i) Creating antonyms using Prefixes
    ii) Intensifying prefixes (E. g inflammable)

Changing words using suffixes

A) Noun Endings
B) Adjective Endings
C) Verb Endings

UNIT 2: DESCRIPTION

Listening – Listening to process description

Speaking - Role play

Formal: With faculty and mentors in academic environment, workplace communication

Informal: With peers in academic environment, workplace communication

Reading –Reading passages on products, equipment and gadgets

Writing – Writing sentence definitions (e.g. computer) and extended definitions (e.g. artificial intelligence)

Picture Description – Description of Natural Phenomena

Grammar in Context: Connectives and linkers.

Vocabulary – Synonyms (register) - Compare & contrast expressions.

UNIT 3: NEGOTIATION STRATEGIES

Listening - Listening to interviews of specialists / inventors in fields (Subject specific)

Speaking – Brainstorming. (mind mapping). Small group discussions (subject-specific)

Reading – longer Reading text. (Comprehensive passages)

Writing – Essay Writing (250 word essay on topics related to subject area, like pollution, use of pesticides in cultivation, merits and demerits of devices like mobile phones, merits and demerits of technology in development)

Grammar in Context: Active voice & Passive voice – If conditional - Collocations –Phrasal verbs

UNIT 4: PRESENTATION SKILLS

Listening - Listening to presentation. Listening to lectures. Watching – documentaries (discovery / history channel)

Speaking –Short speech

- Making formal presentations (PPT)

Reading – Reading a written speech by eminent personalities in the relevant field /Short poems / Short biography.

Writing - Writing Recommendations

Interpreting visuals - charts / tables/flow diagrams/charts

Grammar in Context – Modals

Vocabulary (register) - Single word substitution

UNIT 5: CRITICAL THINKING SKILLS

Listening - Listening to advertisements/news and brief documentary films (with subtitles)

Speaking – Simple problems and suggesting solutions.

Reading: Motivational stories on Professional Competence, Professional Ethics and Life Skills (subject-specific)

Writing Studying problem and finding solutions- (Essay in 200 words)

Grammar-Make simple sentences

Vocabulary -Fixed expressions

SUGGESTED ACTIVITIES

UNIT 1

Listening: Links for formal conversation can be given - Gap filling exercises – Multiple Choice questions – Making notes.

Speaking - Role play activity

Reading – Note making. Note-Taking.

Writing: Guided Writing (developing hints)

Email

Grammar: Vocabulary – Worksheets – Games.

UNIT 2

Listening-

Process Descriptions (Processes of Condensation and Evaporation./Process of Measuring the thickness of a wire using a Screw -Gauge./process of Exaction of sugar from sugarcane)

Speaking – Role Play

Reading – Multiple choice questions - Evaluative answers – Classifying and labeling

Writing - Picture description – Description of natural phenomena (rainbow, earthquake, volcanic eruption, erosion, natural disasters in 150 to 200 words).

Vocabulary: Expansion of compound nouns

UNIT 3

Listening- Gap fill exercises – Listening comprehension

Speaking -Debates

Reading -Reading comprehension

Writing – Essay Writing

Grammar - Vocabulary, Activities, Worksheets & Games.

UNIT 4

Listening - Note taking (of listening & viewing items) - Filling a table based on the listening item.

Speaking – JAM, Presentations. (PPT-TECHNICAL)

Reading-Reading comprehension

Writing– Difference between recommendations and instructions

Questions/MCQs based on graphs/flow diagrams/charts

Grammar: Vocabulary – Activities, Worksheets & Games.

UNIT 5

Listening – Radio News/ TV-News telecast /

Speaking - Watch or listen to documentaries and ask questions

Reading - Reading motivational stories (success stories in subject area)

Writing - Essay writing.

Grammar -Vocabulary –Activities, Worksheets & Games

Second Year **CORE COURSE V** **Semester III**

CLASSICAL ALGEBRA AND THEORY OF NUMBERS

Code: **(Theory)** **Credit: 5**

COURSE OBJECTIVES:

- To lay a good foundation for the study of Theory of Equations.
- To train the students in operative algebra.

UNIT – I:

Relation between roots & coefficients of Polynomial Equations – Symmetric functions – Sum of the r^{th} Powers of the Roots

UNIT – II:

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

UNIT – III:

Form of the quotient and remainder – Removal of terms – To form an equation whose roots are of any power – Transformation in general – Descarte'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 $\phi(N)$ and its value – The highest Power of a prime P contained in N! – Congruences – Fermat's, Wilson's & Lagrange's Theorems.

UNIT – VI CURRENT CONTOURS (For Continuous Internal Assessment Only):

Linear Diophantine equation

REFERENCES:

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)
3. H.S. Hall and S.R. Knight, Higher Algebra, Prentice Hall of India, New Delhi.

COURSE OUTCOMES: After completing this course, the students will be able to

- Know the foundation of Theory of Equations.
- Applying the skills to solve problems in operative algebra.

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Second Year **CORE COURSE VI** **Semester III**

SEQUENCES AND SERIES

Code: **(Theory)** **Credit: 4**

COURSE OBJECTIVES:

- Learn to work with infinite sequences and series.
- Learn to work with infinite bounded sequences.
- Learn to work with an infinite monotonic sequences.
- Learn to work with an infinite convergent or divergent sequences.
- Find the sequences of partial sums of an infinite series.
- Determine if a geometric series is convergent or divergent.
- Find the sum of a convergent geometric series.

UNIT – I:

Sequences – Bounded Sequences – Monotonic Sequences – Convergent Sequences – 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 dAlembert's ratio test – Cauchy's root test – Alternating Series – Absolute Convergence (Statement only for all tests).

UNIT – VI CURRENT CONTOURS (For Continuous Internal Assessment Only):

An introduction Power series.

REFERENCES:

1. Dr. S. Arumugam & Mr. A. Thangapandi Isaac Sequences and Series – New Gamma Publishing House, 2002 Edition.
   UNIT – I : Chapter 3 Sections 3.0 – 3.5 Page No : 39-55
   UNIT – II : Chapter 3 Sections 3.6, 3.7 Page No:56 – 82
   UNIT – III: Chapter 3 Sections 3.8-3.11, Page No:82-102
   UNIT – IV: Chapter 4 Sections (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.

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

Course Outcomes: After completing this course, the students will be able to

- Determine if an infinite sequence is bounded.
- Determine if an infinite sequence is monotonic.
- Determine if an infinite sequence is convergent or divergent.
- Find the sequence of partial sums of an infinite series.
- Determine if a geometric series is convergent or divergent.
- Find the sum of a convergent geometric series.
- Determine if an infinite series is convergent or divergent by selecting the appropriate test.
- Determine if an infinite series converges absolutely or conditionally.

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Second Year **NON MAJOR ELECTIVE I** **Semester III**

QUANTITATIVE APTITUDE I

Code: **(Theory)** **Credit: 2**

COURSE OBJECTIVES:

- To lean the problems solving techniques for aptitude problems
- To enable to students prepare themselves for various competitive examinations

UNIT – I:

Numbers – HCF – LCM – Problems on numbers

UNIT – II:

Decimal Fractions and Simplification

UNIT – III:

Surds and Indices – Percentage – Profit and Loss

UNIT – IV:

Ratio and Proportion – Partnership – Allegation or Mixture

UNIT – V:

Average – Problems on Age

UNIT – VI CURRENT CONTOURS (For Continuous Internal Assessment Only):

Theory of sets and puzzles

REFERENCES:

1. Scope and treatment as in "Quantitative Aptitude" by R.S. Aggarwal, S. Chand & Company Ltd., Ram Nagar, New Delhi (2007)
   UNIT – I : (Chapters 1, 2 & 7)
   UNIT – II : (Chapter 3 & 4)
   UNIT – III : (Chapters 9, 10 & 11)
   UNIT – IV : (Chapters 12, 13 & 20)
   UNIT – V : (Chapters 6 & 8)

COURSE OUTCOMES:

- Remembering the numbers.
- Define surds and indices. Recalling the various areas that is problems on ages, percentage, profit and loss and ratio and proportion.
- Solve the problems on ratio and proportion, partnership and average.

*****

Second Year **CORE COURSE VII** **Semester IV**

VECTOR CALCULUS AND LAPLACE TRANSFORMS

Code: **(Theory)** **Credit: 5**

COURSE OBJECTIVES:

- Understand the fundamental concepts of vector differentiation.
- Compute line, Surface & volume integral by using Green's, Stokes & Gauss Divergence theorem.
- Apply Laplace Transform to solve differential equations

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 and Verification of the theorems for simple problems.

UNIT –IV:

Laplace Transforms – Standard formulae – Laplace transform of Periodic functions – Some general theorems & simple applications.

UNIT – V:

Inverse Laplace Transforms – Use of Laplace Transforms in solving ODE with constant coefficients.

UNIT – VI CURRENT CONTOURS (For Continuous Internal Assessment Only):

Z Transforms

REFERENCES:

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 5 Section 1,2,3,4,5 of [2]
UNIT – V : Chapter 5 Section 6,7,8 of [2]

3. P. Duraipandiyan and Lakshmi Duraipandian, Vector Analysis, Emarald Publishers (1986).
4. Dr. S. Arumugam and Prof. A. Thangapandi Issac, Fourier series, New Gamma Publishing House (Nov 12).

COURSE OUTCOMES: After completing this course, the students will be able to

- Learn the basic knowledge of vector differentiation and vector integration
- Solve vector differentiation and integration problems.
- Introduce the basic concepts of Laplace Transforms.
- Solve a differential equation by using Laplace Transforms

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Second Year **CORE COURSE VIII** **Semester IV**

ABSTRACT ALGEBRA

Code: **(Theory)** **Credit: 4**

COURSE OBJECTIVES:

- To introduce the basic concepts of modern algebra.
- To introduce the concepts of group theory and rings.

UNIT – I:

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

UNIT – II:

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

UNIT – III:

Normal Subgroups and Quotient Groups - Isomorphism –Homomorphism.

UNIT – IV:

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

UNIT – V:

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

UNIT – VI CURRENT CONTOURS (For Continuous Internal Assessment Only):

Polynomial rings

REFERENCES:

1. S Arumugam and A. Thangapandi Isaac, Modern Algebra, SciTech Publications, Chennai, 2003.
   UNIT – I : Chapter 3 Sections 3.1-3.4
   UNIT – II : Chapter 3 Sections 3.5-3.8
   UNIT – III : Chapter 3 Sections 3.9-3.11
   UNIT – IV : Chapter 4 Sections 4.1-4.8
   UNIT – V : Chapter 4 Sections 4.9- 4.11, 4.13-14
2. N. Herstein, Topics in Algebra, John Wiley & Sons, Student 2nd edition, 1975.
3. Vijay, K. Khanna and S.K. Bhambri, A Course in Abstract Algebra, Vikas Publishing House Pvt. Ltd.

COURSE OUTCOMES: After completing this course, the students will be able to

- Demonstrate the abstract structures of algebra
- Prove standard theorems of groups and rings
- Check irreducibility of polynomial and verify whether a function is an isomorphism or not
- Determine cosets, automorphism, kernel, maximal and prime ideals
- Develop examples of groups and rings with specific criterions.
- Students will be able to determine whether a given group is abelian by checking the properties.
- Prove that a given subset of a group is a subgroup by applying the properties.
- Describe all elements in a cyclic subgroup by using generators.

*****

Second Year **NON MAJOR ELECTIVE II** **Semester IV**

QUANTITATIVE APTITUDE II

Code: **(Theory)** **Credit: 2**

COURSE OBJECTIVES:

- To learn the problems solving techniques for aptitude problems
- To enable to students prepare themselves for various competitive examinations

UNIT – I:

Chain Rule – Time and Work – Pipes and Cisterns

UNIT – II:

Time and Distance –Problems on Trains – Boats and Streams

UNIT – III:

Simple Interest – Compound Interest - Stocks and Shares.

UNIT – IV:

Clocks – Area – Volume and Surface Area.

UNIT – V:

Permutations and Combinations

UNIT – VI CURRENT CONTOURS (For Continuous Internal Assessment Only):

Mathematical riddles

REFERENCES:

1. Scope and treatment as in "Quantitative Aptitude" by R.S. Aggarwal, S. Chand & Company Ltd., Ram Nagar, New Delhi - 2015
   UNIT – I : Chapters 14, 15 & 16
   UNIT – II : Chapters 21, 22 & 29
   UNIT – III : Chapters 17, 18 & 19
   UNIT – IV : Chapters 24, 25 & 28
   UNIT – V : Chapters 30 & 31

COURSE OUTCOMES: After completing this course, the students will be able to

- Solve the problems on time and distance, work and wages, pipes and cisterns.
- Recalling simple interest, compound interest and logarithm.
- Improve the problem solving skill on areas, volumes and data interpretation

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Second Year **NON MAJOR ELECTIVE COURSE- I** **Semester-III**

TOUR OPERATIONS

Code: **(Theory)** **Credit: 2**

OBJECTIVES:

- To know the definition and concepts of tourism
- To understand the types of travel formalities
- To learn the Preparation of Tour Itinerary

UNIT- I TRANSPORT INDUSTRY:

Introduction to Transport Industry – Road Transport – Rail Transport - Cruise Liners Transportation - Reading of Railway Time Table – Railway Ticket Booking Procedures.

UNIT-II AIR TRANSPORT:

Development of Air Transport – Formation of IATA – Airline Industry (International and Domestic) - Role of Airlines in Tourism.

UNIT-III TRAVEL FORMALITIES:

Passport – VISA – Medical Certificates – Insurance – Customs - Foreign Exchange -Baggage allowance.

UNIT-IV TRAVEL AGENCY:

Evolution of Travel Agency – Departments and Functions of a Travel Agency - Source of income for Travel Agency.

UNIT-V TOURS OPERATIONS:

Origin of Tour Operations – Organising a Tour Program – Package Tours – Car Rentals – Tourist Guide Service -Preparation of Tour Itinerary – Tour Costing.

UNIT - VI CURRENT CONTOURS (For Continuous Internal Assessment Only):

Railway Ticket Booking Procedures - Baggage allowance - Organizing a Tour Program - Preparation of Tour Itinerary.

REFERENCE BOOKS:

1. Burkart and Melik, **Tourism -Past, Present and Future**, London, 1995.
2. R.M. Kaul, **Dynamics of Tourism** – **A Triology**, Vol.I., New Delhi, 1997.
3. Seth Pran Nath, Successful Tourism Practices, Vol.I., New Delhi, 1997.
4. Lonely Planet India, Guidebook, Travel literature

COURSE OUTCOME:

- Successful completion of this course will lead the students to appropriate knowledge in Tour operations.

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Second Year **NON MAJOR ELECTIVE COURSE-II** **Semester-IV**

CULTURAL TOURISM

Code: **(Theory)** **Credit: 2**

OBJECTIVES:

1. To gain the knowledge of Cultural Resources.
2. To understand the idea of Cultural Festivals
3. To get the knowledge of Cultural destinations.

UNIT- I CULTURAL TOURISM:

Definition - Meaning and Scope - Significance – Types of CulturalTourism Attractions - Culinary Traditions: North Indian - South Indian -Continental.

UNIT-II ARTS AND CRAFTS :

Music: Hindustani - Carnatic -Classical Dances: Kuchipudi, Odisi, Kathakali, Manipuri,Kadhak and Bharathanattiyam - Folk Dances.

UNIT-III CULTURAL RESOURCES OF NORTH INDIA :

Madura- Jaipur-Vaishnavadevi Temple Deccan Region: Konark – Amaravati- Somnathpur Temple -South India : Belur, Helibidu, Gurauvayur, Thiruppati- Madurai- Case studies: Darasuram, Velankanni.

UNIT-IV FESTIVALS:

Konark Festival in Odisha - Sarang Festival in Kolkata - Music Festival in Chennai- -Dance Festivals in Mamallapuram and Chidambaram - Music Festival in Thiruvaiyaru.

UNIT-V INDIAN CULTURAL DESTINATION – CULTURAL INSTITUTION IN INDIA:

Cultural Event Management – Preservation and Conservation of Monuments – Role of ASI, ICO, MOS -Mutts in India- Unique features of Tamil Culture: Chastity, Equality, Nobility, Charity , Justice.

UNIT - VI CURRENT CONTOURS (For Continuous Internal Assessment Only):

Hindustani Music - Culinary traditions of South India - Konark Festival–Role of ASI in heritage conservation.

REFERENCES :

1. V.s. Agarwal, the Heritage of Indian Art, Publications Divisions, Govt. of India, New Delhi.
2. A.L. Basham, The Wonder That was India, 3rd edition, London.
3. L. Basham, A Cultural History of India, Oxford University Press, New Delhi.
4. பண்டையநாகரிகங்கள் - எஸ்.எல். வி . மூர்த்தி
5. Art, Culture and Spirituality - Swami Atmaramananda&Dr.M.Sivaramkrishna.
6. The Book of Hindu Festivals and Ceremonies - Om Lata Bahadur.
7. Cultural Tourism In India- Luvkushmishra

COURSE OUTCOME:

- Successful completion of this course will lead the students to appropriate knowledge in Cultural Tourism.

Professional English [part-III -add on Course]

Weightage: 4 Credits Duration: 90hrs

Objectives:

The Professional Communication Skills Course is intended to help Learners in Arts and Science colleges

- Develop their competence in the use of English with particular reference to the workplace situation.
- Enhance the creativity of the students, which will enable them to think of innovative ways to solve issues in the workplace.
- Develop their competence and competitiveness and thereby improve their employability skills.
- Help students with a research bent of mind develop their skills in writing reports and research proposals.

Unit 1- Communicative Competence (18 hrs)

Listening – Listening to two talks/lectures by specialists on selected subject specific topics -(TED Talks) and answering comprehension exercises (inferential questions)

Speaking: Small group discussions (the discussions could be based on the listening and reading passages- open ended questions

Reading: Two subject-based reading texts followed by comprehension activities/exercises

Writing: Summary writing based on the reading passages.

Grammar and vocabulary exercises/tasks to be designed based on the discourse patterns of the listening and reading texts in the book. This is applicable for all the units.

Unit 2 - Persuasive Communication (18 hrs)

Listening: listening to a product launch- sensitizing learners to the nuances of persuasive communication

Speaking: debates – Just-A Minute Activities

Reading: reading texts on advertisements (on products relevant to the subject areas) and answering inferential questions

Writing: dialogue writing- writing an argumentative /persuasive essay.

Unit 3- Digital Competence **(18 hrs)**

Listening to interviews (subject related)

Speaking: Interviews with subject specialists (usingvideo conferencing skills)

Creating Vlogs (How to become a vlogger and use vlogging tonurture interests – subject related)

Reading: Selected sample of Web Page (subject area)

Writing: Creating Web Pages

Reading Comprehension: Essay on Digital Competence for Academic and Professional Life.

The essay will address all aspects of digital competence in relation to MS Office and how they can be utilized in relation to work in the subject area

Unit 4 - Creativity and Imagination **(18 hrs)**

Listening to short (2 to 5 minutes) academic videos (prepared by EMRC/ other MOOC videos on Indian academic sites – E.g. https://www.youtube.com/watch?v=tpvicScuDyo)

Speaking: Making oral presentations through short films – subject based

Reading: Essay on Creativity and Imagination (subject based)

Writing – Basic Script Writing for short films (subject based)

- Creating blogs, flyers and brochures (subject based)
- Poster making – writing slogans/captions(subject based)

Unit 5- Workplace Communication& Basics of Academic Writing (18 hrs)

Speaking: Short academic presentation using PowerPoint

Reading & Writing: Product Profiles, Circulars, Minutes of Meeting.

Writing an introduction, paraphrasing

Punctuation(period, question mark, exclamation point, comma, semicolon, colon, dash, hyphen, parentheses, brackets, braces, apostrophe, quotation marks, and ellipsis)

Capitalization (use of upper case)

Outcomes of the Course.

At the end of the course, learners will be able to,

- Attend interviews with boldness and confidence.
- Adapt easily into the workplace context, having become communicatively competent.
- Apply to the Research &Development organisations/ sections in companies and offices with winning proposals.

Instruction to Course Writers:

1. **Acquisition of subject-related vocabulary should not be overlooked**. Textboxes with relevant vocabulary may be strategically placed as a Pre Task or in Summing Up
2. Grammar may be included if the text lends itself to the teaching of a Grammatical item. However, testing and evaluation does not include Grammar.

Third Year **CORE COURSE IX** **Semester V**

NUMERICAL METHODS AND MATLAB

Code: **(Theory)** **Credit: 5**

COURSE OBJECTIVES:

- To introduce the exciting world of programming to the students through MATLAB.
- To introduce the techniques of Numerical methods.
- To solve numerical problems using MATLAB programming

UNIT – I:

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

UNIT – II:

Plotting: Introduction to Two Dimensional Plotting – 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 – Fitting Linear and parabolic curves by the method of least squares principles Solving algebraic and transcendental equations-Bisection method, false position method and Newton Raphson method – Solving simultaneous algebraic equations – Guass-seidal method – Guass elimination method.

UNIT – V:

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

UNIT – VI CURRENT CONTOURS (For Continuous Internal Assessment Only):

Error analysis of Numerical Methods

REFERENCES:

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 – I : Chapter 2&3 of [1]
   UNIT – II : Chapter 4&5 of [1]
   UNIT – III : Chapter 8 of [1]
   UNIT – IV : Chapter 1, Sections 1.7-1.8, Chapter 3, Sections 2, 4 and 5, Chapter 4, Sections 2, 6 of [2]
   UNIT – V : Chapter 6, Sections 3 & 4, Chapter 8 Section 4, Chapter 9 Sections 8 & 10, Chapter 11 Sections 10 & 16 of [2].
3. Yashavant. P. Kanetkar, Let us 'C', BPB Publications, 2002.
4. Rajaraman, Computer oriented numerical methods, Prentice-Hall of India, 1971.

COURSE OUTCOMES: After completing this course, the students will be able to

- Understanding the exciting world of programming through MATLAB.
- Know the techniques of Numerical Methods.
- Apply the MATLAB programming to solve numerical problems.

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Third Year	**CORE COURSE X REAL ANALYSIS**	**Semester V**
Code:	**(Theory)**	**Credit: 5**

COURSE OBJECTIVES:

- To understand the axioms of the real numbers, supremum, infimum, upper limits.
- To know open and closed sets in $\mathbb{R}$, continuity and differentiability of functions, L'Hôpital's Rule, Taylor's and the Mean Value Theorems and metric spaces.
- To develop in a rigorous and self-contained manner the elements of real variable functions.
- To enable students to learn functions of bounded variation, grasp basic concepts about the connectedness, compact metric spaces.

UNIT – I:

Introduction – Sets and functions – Countable and Uncountable sets – Inequalities of Holder and Minkowski – Metric spaces – Definition and Examples – Bounded sets in a metric space – Open Ball in a Metric space – Open sets.

UNIT – II:

Subspace – Interior of a set – Closed sets – Closure – Limit point – Dense sets – Completeness – Baire's Category theorem.

UNIT – III:

Continuity – Homeomorphism – Uniform Continuity.

UNIT – IV:

Connectedness – Definition and examples – Connected subsets of R – Connectedness & Continuity.

UNIT – V:

Compact Metric spaces – Compact subsets of R – Equivalent Characterization for Compactness – Compactness and Continuity.

UNIT – VI CURRENT CONTOURS (For Continuous Internal Assessment Only):

Introduction to Basic topology

REFERENCES:

1. Dr. S. Arumugam & Mr. A. Thangapandi Issac, Modern Analysis, New Gamma Publishing House, Palayamkottai, Fourth reprint 2021.
   UNIT – I : Chapter 1 Sections 1.1 to 1.4, Chapter 2 Sections 2.1 to 2.5
   UNIT – II : Chapter 2 Sections 2.6 to 2.11 & Chapter 3

UNIT – III : Chapter 4 Sections 4.1 to 4.4
UNIT – IV : Chapter 5
UNIT – V : Chapter 6

2. Ajit Kumar and S. Kumaresan, A Basic Course in Real Analysis, CRC Press, 2014.

COURSE OUTCOMES: After completing this course, the students will be able to

- Explain the concepts such as real valued functions, continuity, connectedness, compactness, etc.
- Prove standard theorems in real analysis
- Distinguish between upper bound and lower bound; continuity and uniform continuity of a function; limit point and interior point; and bounded and totally bounded.
- Characterize structures of connected sets, nowhere dense sets, continuity of a function, compact sets and category of sets.
- Generate sets and functions of required nature.

******

Third Year	**CORE COURSE XI STATICS**	**Semester V**
Code:	**(Theory)**	**Credit: 5**

COURSE OBJECTIVES:

- To provide the basic knowledge of equilibrium of a particle.
- To develop a working knowledge to handle practical problems.

UNIT – I:

Introduction – Forces acting at a point: Triangle of forces – Resolving of a 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.

UNIT – VI CURRENT CONTOURS (For Continuous Internal Assessment Only):

Introduction to Virtual work

REFERENCES:

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

COURSE OUTCOMES: After completing this course, the students will be able to

- The course deals the study of internal and external forces in a structure.
- Provide the basic knowledge of Equilibrium of a particle.
- Develop a working knowledge to handle practical problems.

*****

Third Year	**CORE PRACTICAL I**	**Semester V**
	MATLAB PROGRAMMING LAB	
Code:	**(Practical)**	**Credit: 4**

COURSE OBJECTIVES:

- To solve numerical problems using MATLAB programming.

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

COURSE OUTCOMES: After completing this course, the students will be able to

- Experience the programming skills through numerical methods.
- Know basic commands in MATLAB programming.
- Solve numerical problems using MATLAB programming.

*****

Third Year **MAJOR BASED ELECTIVE I** **Semester V**

1. OPERATIONS RESEARCH

Code: **(Theory)** **Credit: 4**

COURSE OBJECTIVES:

- The course aims at building capabilities in the students for analyzing different situations in the industrial/ business scenario involving limited resources and finding the optimal solution within constraints.
- This module aims to introduce students to use quantitative methods and techniques for effective decision–making; model formulation and applications that are used in solving business decision problems.
- To know Linear Programming (LP) and allocation of resources, LP definition, Linearity requirement
- To know and solve Maximization and Minimization problems.
- To know Graphical LP Minimization solution, Introduction, Simplex method definition, formulating the Simplex model.
- To learn Linear Programming – Simplex Method for Maximizing.

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 $(M/M/1)(\infty/FIFO)$ only - Games and Strategies – Two person zero sum - Some basic terms - the maximin-minimax principle -Games without saddle points-Mixed strategies - graphic solution $2 \times n$ and $m \times 2$ games.

UNIT – V:

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

UNIT – VI CURRENT CONTOURS (For Continuous Internal Assessment Only):

Applications of OR in Financial Management, Budgeting and Investments

REFERENCES:

1. Kanti Swarup, P.K. Gupta and Man Mohan, Operations Research, 13th edition, Sultan Chand and Sons, 2007.
   UNIT – I: Chapter 2 Sections 2.1 to 2.4, Chapter 3 Sections 3.1 to 3.5, Chapter 4 Sections 4.1 , 4.3
   UNIT – II: Chapter 4 Section 4.4, Chapter 5 Sections 5.1 to 5.4, 5.9
   UNIT – III: Chapter 10 Sections 10.1, 10.2, 10.8, 10.9, 10.12 & 10.13, Chapter 11 Sections 11.1 to 11.4
   UNIT – IV: Chapter 21 Sections 21.1, 21.2, 21.7 to 21.9, Chapter 17 Sec 17.1 to 17.6
   UNIT – V: Chapter 25 Sections 25.1 to 25.4, 25.6, 25.7
2. Sundaresan. V, Ganapathy Subramanian. K.S. and Ganesan. K, Resource Management Techniques, A.R. Publications, 2002.
3. Taha H.A., Operations Research: An introduction, 7th edition, Pearson Prentice Hall, 2002.

COURSE OUTCOMES: After completing this course, the students will be able to

- Demonstrate the basic concepts of LPP, game theory, queuing models and networks
- Make use of different methods to get optimality in LPP, TP, AP and games
- Check the existence of alternate / infeasible / unbounded solutions
- Evaluate the solution of primal using duality, optimal solution by characteristics of queuing system
- Convert possible real life problems into OR model.

*****

Third Year **MAJOR BASED ELECTIVE I** **Semester V**

2. STOCHASTIC PROCESSES

Code: **(Theory)** **Credit: 4**

COURSE OBJECTIVES:

- To know probability and distribution function
- To understand the concept of Stochastic Processes
- To identify Markov chains, Poisson Process and birth and death Process
- To know the concept of queuing theory with some examples

UNIT – I:

Generating function - Laplace transforms – Laplace transforms of a probability distribution function - Difference equations – Differential difference equations – Matrix analysis.

UNIT – II:

Stochastic Process - Notion – Specification – Stationary Process - Markov Chains – Definition and examples – Higher transition probabilities.

UNIT – III:

Classification of states and chains – Determination of higher transition probabilities – Stability of Markov system – Limiting behaviour.

UNIT – IV:

Poisson Process and related distributions – Generalization of Poisson Process – Birth and death process.

UNIT – V:

Stochastic Process in queuing and reliability – queuing systems – M/M/1 models – Birth and death process in queuing theory – Multi channel models – Bulk Queues.

UNIT – VI CURRENT CONTOURS (For Continuous Internal Assessment Only):

Branching Processes

REFERENCES:

1. J. Medhi, Stochastic Processes, Chapters 1,2,3 (Omitting 3.6,3.7,3.8), Chapter 4 (Omitting 4.5 and 4.6) and Chapter 10 (Omitting 10.6,10.7).
   UNIT – I : Chapter 1 – Sec 1.1, 1.2, 1.3, Appendix A 1, 2, 3, 4.
   UNIT – II: Chapter 2 – Sec 2.1, 2.2, 2.3 & Chapter 3 – Sec 3.1, 3.2.
   UNIT – III: Chapter 3 – Sec 3.4, 3.5, 3.6.
   UNIT – IV: Chapter 4 – Sec 4.1, 4.2, 4.3, 4.4
   UNIT – V: Chapter 10 – Sec 10.1, 10.2, 10.3, 10.4, 10.5

2. First Course in Stochastic Processes by Samuel Karlin.
3. Stochastic Processes by Srinivasan and Metha (TATA McGraw Hill).
4. Elements of Applied Stochastic Processes by V. Narayan.

COURSE OUTCOMES: After completing this course, the students will be able to

- State the defining properties of various stochastic process models.
- Identify appropriate stochastic process model(s) for a given research or applied problem.
- Provide logical and coherent proofs of important theoretic results.
- Apply the theory to model real phenomena and answer some questions in applied sciences.

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Third Year **SKILL BASED ELECTIVE I** **Semester V**

INTRODUCTION TO LATEX

Code: **(Theory)** **Credit: 4**

COURSE OBJECTIVES:

- To make the students learn the art of typing mathematics text on their own.
- To inculcate professional training required to become a scholar in mathematics.

UNIT – I:

Basic Structure of Latex 2e - Input file structure - Layout -Editors - Forward Search - Inverse Search - Compiling - Conversion to various formats.

UNIT – II:

Typesetting simple documents - sectioning - Titles- page layout - listing –enumerating - quote - letter formats.

UNIT – III:

Using package amsmath typing equations labeling and referring.

UNIT – IV:

Figure inclusion - Table inclusion.

UNIT – V:

Bibliography - Index typing - Beamer presentation Styles.

UNIT – VI CURRENT CONTOURS (For Continuous Internal Assessment Only):

Type a mathematical article using various journal style files

REFERENCES:

1. Leslie Lamport. LATEX: A Document Preparation System, Addison-Wesley, Reading, Massachusetts, second edition, 1994.
2. Tobias Oetiker, Hubert Partl, Irene Hyna and Elisabeth Schlegl., The (Not So) Short Introduction to LATEX2e, Samurai Media Limited (or available online at http://mirrors.ctan.org/info/lshort/english/lshort.pdf)
3. LATEX Tutorials - A Primer, Indian TeX Users Group, available online at https://www.tug.org/twg/mactex/tutorials/ltxprimer-1.0.pdf
4. H. J. Greenberg. A Simplified introduction to LATEX, available online at https://www.ctan.org/tex-archive/info/simplified-

latex/
5. Using Kile - KDE Documentation, https://docs.kde.org/trunk4/en/extragear_office/kile/quick-using.html
6. Amsmath and geometry package available in Ctan.org.

COURSE OUTCOMES: At the end of the course, students will be able to

1. Type their own mathematical article/notes/book/journal paper/project work.
2. Meticulously prepare their own mathematical notes.
3. Understand basic structure of Latex 2e and conversions of them to various formats.
4. Typeset and compile documents with titles, sectioning and enumeration etc.
5. Use various style files and in particular amsmath, amsfonts, amsthm.
6. Understand how to align math equations, matrices etc.
7. Include the figures in various formats into their latex document and compile it successfully.
8. Utilize bibtex feature of including bibliographies and indexes.

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Third Year	**CORE COURSE XII LINEAR ALGEBRA**	**Semester VI**
Code:	**(Theory)**	**Credit: 5**

COURSE OBJECTIVES:

To inculcate vector space, linear independence, linear transformations, matrix operations, determinants, Eigen values and Eigen vectors, and applications.

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

UNIT – VI CURRENT CONTOURS (For Continuous Internal Assessment Only):

The algebra of polynomials

REFERENCES:

1. Arumugam S and Thangapandi Isaac A, Modern Algebra, SciTech Publications (India) Ltd., Chennai, Edition 2012.
   UNIT – I : Chapter 5, Sec 5.1 to 5.4
   UNIT – II : Chapter 5, Sec 5.5 to 5.7
   UNIT – III : Chapter 5,Sec 5.8, Chapter 6, Sec 6.1 to 6.3
   UNIT – IV : Chapter 7 Sec 7.1 to 7.5
   UNIT – V : Chapter 7, Sec 7.7, 7.8
2. I.N. Herstein, Topics in Algebra, Second Edition, John Wiley & Sons(Asia), 1975

COURSE OUTCOMES: After completing this course, the students will be able to

- Define basic concepts of vector spaces, linear transformations, inner product spaces.
- Prove standard theorems in Linear Algebra
- Distinguish linear independence and dependence; singular and nonsingular linear transformations; quadratic and diagonal forms.
- Determine basis and dimension of vector space, orthogonal basis, eigen values, eigen vector and posets.
- Construct orthonormal basis from a given basis; to reduce a quadratic form to diagonal form.

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Third Year	CORE COURSE XIII COMPLEX ANALYSIS	Semester VI
Code:	(Theory)	Credit: 5

COURSE OBJECTIVES:

- To introduce the fundamental ideas of the functions of complex variables and developing a clear understanding of the fundamental concepts of Complex Analysis such as analytic functions.
- Understand the concepts of complex integration and series expansions such as Cauchy's integral formula and its derivative, Taylor's series, Laurent's series and singularities.
- To acquire the knowledge and develop manipulation skills in the use of Rouche's theorem.
- Understand and learn to use Argument Principle and the principal of Analytic Continuation and the concerned results.

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 an analytic functions – Singularities.

UNIT – V:

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

UNIT – VI CURRENT CONTOURS (For Continuous Internal Assessment Only):

Harmonic Functions

REFERENCES:

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
UNIT – II : Chapter 3 Sections 3.1 to 3.5
UNIT – III : Chapter 6 sections 6.1 to 6.4
UNIT –IV : Chapter 7 Sections 7.1 to 7.4
UNIT – V : Chapter 8 Sections 8.1 to 8.3

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

COURSE OUTCOMES: After completing this course, the students will be able to

- Becoming familiar with the concepts Complex numbers and their properties and operations with Complex number.
- Finding domain and range of complex functions and sketching their graphs.
- Evaluating limits and checking the continuity of complex function.
- Checking differentiability and Analyticity of functions.
- Evaluate Complex integrals and applying Cauchy integral.

*****

Third Year	CORE COURSE XIV DYNAMICS	Semester VI
Code:	(Theory)	Credit: 4

COURSE OBJECTIVES:

- Understand the fundamental concepts of velocity and acceleration.
- Understand the work done in stretching an elastic string Simple Harmonic motion.
- Study the motion of projectiles, impact of sphere and central orbits.

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 in an inclined plane.

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.

UNIT – VI CURRENT CONTOURS (For Continuous Internal Assessment Only):

Impulsive forces

REFERENCES:

1. Dr. M.K. Venkataraman, Dynamics, Agasthiyar Publications, Thirteenth Edition, July 2009.
   UNIT – I : Chapter 2, Chapter 3, Section 3.1-3.22
   UNIT – II : Chapter 6, Sections 6.1-6.16
   UNIT – III : Chapter 8, Sections 8.1-8.11
   UNIT – IV : Chapter 10, Sections 10.1-10.13
   UNIT – V : Chapter 11, Sections 11.1-11.11
2. P. Duraipandian, Laxmi Duraipandian and Muthamizh Jayapragasam, Mechanics S. Chand & Company Pvt. Ltd., 2014.
3. A.V. Dharmapadham, Dynamics, S. Viswanathan Publishers Pvt. Ltd. 2006.

COURSE OUTCOMES: After completing this course, the students will be able to

- Acquire knowledge about the basic concepts of kinematics.
- Analyze the motion of Projectiles and their results.
- Critique the concepts of Central Orbits, differential equation of a central orbit.

Third Year	**MAJOR BASED ELECTIVE II**	**Semester VI**
	1. GRAPH THEORY	
Code:	**(Theory)**	**Credit: 4**

COURSE OBJECTIVES:

- To introduce the notion of graph theory and its applications.
- To introduce some of the most important notions of Graph Theory and develop their skills and solving basic exercises.

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 PathProblem – Dijkstra's algorithm.

UNIT – VI CURRENT CONTOURS (For Continuous Internal Assessment Only):

Independent Sets and Matchings

REFERENCES:

1. S. Arumugam and S. Ramachandran, Invitation to Graph Theory, SciTech Publications (India) Pvt. Ltd., Chennai, 2006.
   UNIT – I : Chapter-1 Sec 1.0, 1.1 and Chapter -2 Sec 2.0, 2.1, 2.2, 2.3, 2.4.2.6
   UNIT – II: Chapter-2 Sec 2.8,2.9 ,Chapter-4 Sec 4.1,4.2 and Chapter-5 Sec 5.0,5.1
   UNIT – III: Chapter-5 Sec 5.2, Chapter-6 Sec 6.0,6.1,6.2.
   UNIT – IV: Chapter-8 Sec 8.0,8.1,8.2.
   UNIT – V: Chapter-10 Sec 10.0, 10.1 Chapter-11 Sec 11.0,11.1,11.2

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

COURSE OUTCOMES: After completing this course, the students will be able to

- To understand and apply the fundamental concepts in graph theory.
- To apply graph theory based tools in solving practical problems
- To understand the trees
- The students will be able to know the planarity.
- To explain the Kruskal's algorithm and Dijkstra's algorithm.

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Third Year **MAJOR BASED ELECTIVE II** **Semester VI**

2. INTRODUCTION TO PYTHON PROGRAMMING

Code: **(Theory)** **Credit: 4**

COURSE OBJECTIVES:

1. To learn the basics of scientific computing through Python Programming.
2. To inculcate professional training in algorithmic approach of Problem Solving.

UNIT – I:

Review of Linux commands; File management and permissions; Using VI editor; Introducing a programming language, syntax, basic tools, simple programmes, etc.

UNIT – II:

Basic Tools; First Program file; Handling complex numbers; Functions and loops; Standard math functions; Conditionals; Python keywords and function names; Defining Names.

UNIT – III:

Lists in Python; Defining and accessing lists; Loops with lists; Range function; for loop with lists for sorting; Built-in sort functions; else class in loops; slicing lists; lists as stacks; using lists as queues; new lists from old.

UNIT – IV:

Data types; Numeric Types; Tuples; Accepting tuple inputs; sorting iterables; the lambda function; Sets; Dictionaries; Input and output; Output formatting; Format specifiers; align, sign, width, precision, type; File operations; Functions from Numpy and Scipy libraries.

UNIT – V:

Math problems for practice which includes the following: (a) Finding GCD of two or more integers; (b) Primality checking; Finding primes upto a given integer; (c) Plotting curves; (d) Area of a triangle; (e) Angle between vectors; (f) Convert a number in decimal to a given base n. (g) Transpose of a matrix; Product of two matrices; (h) Finding the mean; median; mode; standard deviation etc., of a given data;

UNIT – VI CURRENT CONTOURS (For Continuous Internal Assessment Only):

Inheritance and Encapsulation

REFERENCES:

1. Real Python, A Practical introduction to Python, https://static.realpython.com/python-basics-sample-chapters.pdf
2. Qingkai Kon et all, Python Programming and Numerical Methods - A Guide for Engineers and Scientists, https://pythonnumericalmethods.berkeley.edu/notebooks/Index.html

COURSE OUTCOMES: After completing this course, the students will be able to

- Comprehend Python Programming and basic commands.
- Use basic tools, functions and loops.
- Get expertise in Standard math functions.

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Third Year **MAJOR BASED ELECTIVE III** **Semester VI**

1. ASTRONOMY

Code: **(Theory)** **Credit: 3**

COURSE OBJECTIVES:

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

UNIT – I:

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

UNIT – II:

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

UNIT – III:

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

UNIT – IV:

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

UNIT – V:

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

UNIT – VI CURRENT CONTOURS (For Continuous Internal Assessment Only):

Introduction to Astrophysics

REFERENCES:

1. Kumaravel, S. and Susheela Kumaravel, *Astronomy*, 8th Edition, SKV Publications, 2004.
   UNIT – I : Sections 39-79
   UNIT – II : Sections 80-90,106-116
   UNIT – III : Sections 117-144
   UNIT – IV : Sections 146-162,173-178
   UNIT – V : Sections 229-241,256-275
2. G V Ramachandran, Text Book of Astronomy, Mission Press, Palayamkottai, 1965.

COURSE OUTCOMES: After completing this course, the students will be able to

- The Learner will acquire basic knowledge about morning, evening stars, circumpolar stars.
- Solve the problems with scientific reasoning and critical thinking skills.
- Calculation to prepare calendar and conservation of time.

Third Year **MAJOR BASED ELECTIVE III** **Semester VI**

2. NUMBER THEORY

Code: **(Theory)** **Credit: 3**

COURSE OBJECTIVES:

- To highlight the niceties and nuances in the world of numbers.
- To prepare the students for coding through congruences.

UNIT – I:

Euclid's Division Lemma – Divisibility – The Linear Diophantine Equation – The Fundamental Theorem of Arithmetic.

UNIT – II:

Permutations and Combinations – Fermat's Little Theorem – Wilson's Theorem – Generating Functions.

UNIT – III:

Basic Properties of Congruences Residue Systems. Linear Congruences – The Theorems of Fermat and Wilson Revisited.

UNIT – IV:

The Chinese Remainder Theorem – Polynomial Congruences – Combinational Study of F(n).

UNIT – V:

Formulae for d(n) and s(n) – Multiplicative Arithmetic Function – The Mobius Inversion Formula.

UNIT – VI CURRENT CONTOURS (For Continuous Internal Assessment Only):

Prime number theorem and its applications.

REFERENCES:

1. Number Theory by George E. Andrews, Hindustan Publishing Corporation – 1984, Edition.
   UNIT – I : Chapter - 2 Sec. 2.1 – 2.4 pages 12-29
   UNIT – II: Chapter – 3 Sec. 3.1, 3.4 pages 30-44
   UNIT – III: Chapter – 4Sec. 4.1 – 4.2 Pages 49 – 55, Sec. 5.1- 5.2 Pages 58-65
   UNIT – IV: Chapter – 4 Sec. 5.3 – 5.4 pages 66-74, Sec. 6.1 Pages 75-81
   UNIT – V: Chapter – 5 Sec. 6.2 – 6.3 Pages 82-92
2. Basic Number Theory by S.B. Malik, Vikas Publishing House Pvt. Ltd.,
3. A First Course Theory of Numbers by K.C. Chowdhury. Asian Books Pvt. Ltd., I Edition (2004)

COURSE OUTCOMES: After completing this course, the students will be able to

- Understand the concepts of divisibility and fundamental theorem of arithmetic.
- The students will know about the Fermat's theorem and Wilson theorem.
- Understand the congruences.
- Solve using Chinese remainder theorem.
- Understand the Mobius inversion formula.

Third Year **SKILL BASED ELECTIVE II** **Semester VI**

MATHEMATICS FOR COMPETITIVE EXAMINATIONS

Code: **(Theory)** **Credit: 2**

COURSE OBJECTIVES:

- To gain quantitative aptitude required in the present scenario.
- To emphasize the right perceptive needed to crack such problems and understand the recurring pattern in those problems.

UNIT – I:

Problems on Numbers- Average-Problems on Ages.

UNIT – II:

Percentage-Profit & Loss-Simple Interest-Compound Interest.

UNIT – III:

Ratio & Proportion-Partnership-Calender-Clocks.

UNIT – IV:

Time and work-Pipes & Cistern.

UNIT – V:

Time & Distance-Problems on Trains-Boats and Streams.

UNIT – VI CURRENT CONTOURS (For Continuous Internal Assessment Only):

Simple problems using sets, functions, group theory etc.

REFERENCES:

1. Dinesh Khattar, The Pearson Guide to Quantitative Aptitude for Competitive Examinations, Pearson Education, 3 edition, 2015.

Course Outcomes: At the end of the course, students will be able to

- Face competitive examinations with confidence.
- Solve a lot of problems on numbers and averages and problems on ages.
- Get a lot of training on percentage, profit and loss.
- Crack problems on calculating simple interest and compound Interest.
- Work on a plenty of problems on time and work.
- Get working knowledge on ratios and proportions.
- Calculate time, distance, speed given the other two and solve lot of problems.
- Acquire problem solving ideas on trains, boats and streams.

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BHARATHIDASAN UNIVERSITY, TIRUCHIRAPPALLI - 620 024.

B.Sc. Mathematics

Course 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	Marks		Total
							Int	Ext.	
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)		4	4	3	25	75	100
		First Allied Course – II (AP)		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)		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)		4	4	3	25	75	100
		Second Allied Course – II (AP)		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)		3	3	3	40	60	100
		Second Allied Course – III		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 10^{th} +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 / Stochastic Processes	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 / Mathematical Modelling	6	5	3	25	75	100
		Major Based Elective III	Astronomy / Number Theory	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 10^{th} +2 (Regular Stream)

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

those who studied Tamil upto 10^{th} +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 10^{th} 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]

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CORE COURSE I

DIFFERENTIAL CALCULUS AND TRIGONOMETRY

Objectives

1. To inculcate the basics of differentiation and their applications.
2. To introduce the notion of curvatures, Evolutes & Involutes and polar co-ordinates.
3. To understand the basic concepts of Trigonometry

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.

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CORE COURSE II

INTEGRAL CALCULUS

Objectives

1. To inculcate the basics of integration and their applications.
2. To study some applications of definite integrals.
3. To understand the concepts of Beta, Gamma functions

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.

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CORE COURSE III

DIFFERENTIAL EQUATIONS AND LAPLACE TRANSFORMS

OBJECTIVES:

1. To know the order and degree of the ODE's
2. To identify some specific methods and solve them
3. To make difference between ODE and PDE
4. To solve some standard methods
5. To know the concept of Laplace transforms and its inverse with applications

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

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CORE COURSE IV

ANALYTICAL GEOMETRY 3D

OBJECTIVES :

1. To study 3 dimensional Cartesian Co-ordinates system
2. To enable the students to develop their skill in 3 dimensions

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 conicoid

Books for Study

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.

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CORE COURSE V

SEQUENCES AND SERIES

OBJECTIVES :

1. To lay a good foundation for classical analysis
2. To study the behavior of 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)

Book for Study

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

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CORE COURSE VI

CLASSICAL ALGEBRA AND THEORY OF NUMBERS

Objectives

1. To lay a good foundation for the study of Theory of Equations.
2. To train the students in operative algebra.

Unit I

Relation between roots & coefficients of Polynomial Equations – Symmetric functions – Sum of the r^{th} 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.

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NON-MAJOR ELECTIVE I

QUANTITATIVE APTITUDE I

Objectives :

1. To lean the problems solving techniques for aptitude problems
2. To enable to students prepare themselves for various competitive examinations

Unit I

Numbers – HCF – LCM – Problems on numbers

Unit II

Decimal Fractions and Simplification

Unit III

Surds and Indices – Percentage – Profit and Loss

Unit IV

Ratio and Proportion – Partnership – Allegation or Mixture

Unit V

Average – Problems on Age

Text Book:

Scope and treatment as in "Quantitative Aptitude" by R.S.Aggarwal, S.Chand & Company Ltd., Ram Nagar, New Delhi (2007)

Unit 1: (Chapters 1, 2 & 7)
Unit 2: (Chapter 3 & 4)
Unit 3: (Chapters 9, 10 & 11)
Unit 4: (Chapters 12, 13 & 20)
Unit 5: (Chapters 6 &8)

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CORE COURSE VII

VECTOR CALCULUS AND FOURIER SERIES

Objectives:

To provide the basic knowledge of vector differentiation & vector integration.
To solve vector differentiation & integration problems.

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 2π 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)

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CORE COURSE VIII

LINEAR ALGEBRA

Objectives

1. To facilitate a better understanding of vector space
2. To solve problems in 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.

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NON- MAJOR ELECTIVE II

QUANTITATIVE APTITUDE II

Objectives :

1. To learn the problems solving techniques for aptitude problems
2. To enable to students prepare themselves for various competitive examinations

Unit I

Chain Rule – Time and Work – Pipes and Cisterns

Unit II

Time and Distance –Problems on Trains – Boats and Streams

Unit III

Simple Interest – Compound Interest - Stocks and Shares.

Unit IV

Clocks – Area – Volume and Surface Area.

Unit V

Permutations and Combinations.

Text Book:

Scope and treatment as in "Quantitative Aptitude "by R.S.Aggarwal, S.Chand & company limited, Ram Nagar, New Delhi - 2015

Unit1: (Chapters 14, 15 & 16)
Unit 2: (Chapters 21, 22 & 29)
Unit 3: (Chapters 17, 18 & 19)
Unit 4: (Chapters 24, 25 & 28)
Unit 5: (Chapters 30 & 31)

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CORE COURSE IX

NUMERICAL METHODS WITH MATLAB PROGRAMMING

Objectives:

1. To introduce the exciting world of programming to the students through numerical methods.
2. To introduce the techniques of MATLAB programming.
3. To solve numerical problems using 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.

Books for Study

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.

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CORE COURSE X

REAL ANALYSIS

Objectives: To enable the students to

1. Understand the real number system and countable concepts in real number system
2. Provide a Comprehensive idea about the real number system.
3. Understand the concepts of Continuity, Differentiation and Riemann Integrals
4. Learn Rolle's Theorem and apply the Rolle's theorem concepts.

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.

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CORE COURSE XI

STATICS

OBJECTIVE:

1. To provide the basic knowledge of equilibrium of a particle.
2. To develop a working knowledge to handle practical problems.

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.

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CORE PRACTICAL I

NUMERICAL METHODS WITH MATLAB PROGRAMMING (P)

Objectives:

1. 1. To introduce the exciting world of programming to the students through numerical methods.
2. To introduce the techniques of MATLAB programming.
3. To solve numerical problems using MATLAB programming.

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.

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MAJOR BASED ELECTIVE I (A)

OPERATIONS RESEARCH

Objectives:

1. To introduce the various techniques of Operations Research.
2. To make the students solve real life problems in Business and Management

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.

Book for Study:

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 Sec 11.1 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.

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MAJOR BASED ELECTIVE I (B)

STOCHASTIC PROCESSES

OBJECTIVES

1. To know probability and distribution function
2. To understand the concept Stochastic Process
3. To identify Markov chains ,Poisson Process and Birth and death Process
4. To know the concept of queuing theory with some examples

UNIT I

Generating function - Laplace transforms – Laplace transforms of a probability distribution function - Difference equations – Differential difference equations – Matrix analysis.

UNIT II

Stochastic Process - Notion – Specification – Stationary Process - Markov Chains – Definition and examples – Higher transition probabilities.

UNIT III

Classification of states and chains – Determination of higher transition probabilities – Stability of Markov system – Limiting behaviour.

UNIT IV

Poisson Process and related distributions – Generalization of Poisson Process – Birth and death process.

UNIT V

Stochastic Process in queuing and reliability – queuing systems – M/M/1 models – Birth and death process in queuing theory – Multi channel models – Bulk Queues.

TEXT BOOK

J.Medhi, Stochastic Processes, Chapters 1,2,3 (Omitting 3.6,3.7,3.8), Chapter 4 (Omitting 4.5 and 4.6) and Chapter 10 (Omitting 10.6,10.7).
Unit 1: Chapter 1 – Sec 1.1, 1.2, 1.3, Appendix A 1, 2, 3, 4.
Unit 2: Chapter 2 – Sec 2.1, 2.2, 2.3 & Chapter 3 – Sec 3.1, 3.2.
Unit 3: Chapter 3 – Sec 3.4, 3.5, 3.6.
Unit 4: Chapter 4 – Sec 4.1, 4.2, 4.3, 4.4
Unit 5: Chapter 10 – Sec 10.1, 10.2, 10.3, 10.4, 10.5

REFERENCES

[1] First Course in Stochastic Processes by Samuel Karlin.
[2] Stochastic Processes by Srinivasan and Metha (TATA McGraw Hill).
[3] Elements of Applied Stochastic Processes by V.Narayan.

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CORE COURSE XII

ABSTRACT ALGEBRA

Objectives

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

UNIT I

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

UNIT II

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

UNIT III

Normal Subgroups and Quotient Groups - Isomorphism –Homomorphism

UNIT IV

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

UNIT V

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

Textbook

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

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

References

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

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CORE COURSE XIII

COMPLEX ANALYSIS

Objectives: To enable the students to

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

UNIT I

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

UNIT II

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

UNIT III

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

UNIT IV

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

UNIT V

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

TEXT BOOK(S)

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

UNIT – I -Chapter 2 section 2.1 to 2.8 of Text Book
UNIT – II -Chapter 3 Sections 3.1 to 3.5 of Text Book
UNIT – III -Chapter 6 sections 6.1 to6.4 of Text Book
UNIT –IV -Chapter 7 Sections 7.1 to 7.4 of Text Book
UNIT – V -Chapter 8 Sections 8.1 to 8.3 of Text Book

REFERENCE(S)

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

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CORE COURSE XIV

DYNAMICS

OBJECTIVE:

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

UNIT I

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

UNIT II

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

UNIT III

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

UNIT IV

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

UNIT V

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

TEXT BOOK:

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

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

REFERENCE(S)

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

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MAJOR BASED ELECTIVE II (A)

GRAPH THEORY

Objectives

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

UNIT I

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

UNIT II

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

UNIT III

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

UNIT IV

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

UNIT V

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

Textbook

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

UNIT-I Chapter-1 Sec 1.0, 1.1 and Chapter -2 Sec 2.0, 2.1, 2.2, 2.3, 2.4.2.6
UNIT-II Chapter-2 Sec 2.8,2.9 ,Chapter-4 Sec 4.1,4.2 and Chapter-5 Sec 5.0,5.1
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.

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MAJOR BASED ELECTIVE II (B)

MATHEMATICAL MODELLING

OBJECTIVES

1. To study the mathematical models through ode and difference equations
2. To train the students to develop mathematical models in real life problems

UNIT I

Mathematical Modelling through Ordinary Differential Equations of First order : Linear Growth and Decay Models – Non-Linear Growth and Decay Models – Compartment Models – Dynamic problems – Geometrical problems.

UNIT II

Mathematical Modelling through Systems of Ordinary Differential Equations of First Order : Population Dynamics – Epidemics – Compartment Models – Economics – Medicine, Arms Race, Battles and International Trade – Dynamics.

UNIT III

Mathematical Modelling through Ordinary Differential Equations of Second Order : Planetary Motions – Circular Motion and Motion of Satellites – Mathematical Modelling through Linear Differential Equations of Second Order – Miscellaneous Mathematical Models.

UNIT IV

Mathematical Modelling through Difference Equations : Simple Models – Basic Theory of Linear Difference Equations with Constant Coefficients – Economics and Finance – Population Dynamics and Genetics – Probability Theory.

UNIT V

Mathematical Modelling through Graphs : Solutions that can be Modelled Through Graphs – Mathematical Modelling in Terms of Directed Graphs, Signed Graphs, Weighted Digraphs and Unoriented Graphs.

TEXT BOOK(S)

1. J.N. Kapur, Mathematical Modelling, Wiley Eastern Limited, New Delhi, 1988.

Unit 1: Chap 2, Sec 2.1 – 2.6
Unit 2: Chap 3, Sec 3.1 – 3.6
Unit 3: Chap 4, Sec 4.1 – 4.4
Unit 4: Chap 5, Sec 5.1 – 5.5
Unit 5: Chap 7, Sec 7.1 – 7.5

REFERENCE(S)

1. J.N. Kapur, Mathematical Models in biology and Medicine, EWP, New Delhi, 1985.

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MAJOR BASED ELECTIVE III (A)

ASTRONOMY

Objectives:

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

UNIT I

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

UNIT II

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

UNIT III

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

UNIT IV

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

UNIT V

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

Book for Study:

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

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

Book for Reference:

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

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MAJOR BASED ELECTIVE III (B)

NUMBER THEORY

OBJECTIVES :

1. To highlight the niceties and nuances in the world of numbers.
2. To prepare the students for coding through congruences.

Unit I

Euclid's Division Lemma – Divisibility – The Linear Diophantine Equation – The Fundamental Theorem of Arithematic

Unit II

Permutations and Combinations – Fermat's Little Theorem – Wilson's Theorem – Generating Functions

Unit III

Basic Properties of Congruences Residue Systems. Linear Congruences – The Theorems of Fermat and Wilson Revisited.

Unit IV

The Chinese Remainder Theorem – Polynomial Congruences – Combinational Study of F(n).

Unit V

Formulae for d(n) and s(n) – Multiplicative Arithmetic Function – The Mobius Inversion Formula.

Books for Study

1. Number Theory by George E.Andrews, Hindustan Publishing Corporation – 1984, Edition.

Unit I : Chapter - 2 Sec. 2.1 – 2.4 pages 12-29
Unit II : Chapter – 3 Sec. 3.1, 3.4 pages 30-44
Unit III : Chapter – 4Sec. 4.1 – 4.2 Pages 49 – 55, Sec. 5.1- 5.2 Pages 58-65
Unit IV : Chapter – 4 Sec. 5.3 – 5.4 pages 66-74, Sec. 6.1 Pages 75-81
Unit V : Chapter – 5 Sec. 6.2 – 6.3 Pages 82-92

Books for Reference

1. Basic Number Theory by S.B.Malik, Vikas Publishing House Pvt. Ltd.,
2. A First Course Theory of Numbers by K.C.Chowdhury. Asian Books Pvt. Ltd., I Edition (2004)

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BHARATHIDASAN UNIVERSITY, TIRUCHIRAPPALLI- 620 024.

Applicable to the candidates admitted from the Academic year 2015-16 onwards

Part IV - VALUE EDUCATION (Revised syllabus)

Unit I Philosophy of Life and Social Values

Human Life on Earth (Kural 629) Purpose of Life (Kural 46) Meaning and Philosophy of Life (Kural 131, 226) Family (Kural 45), Peace in Family (Kural 1025) Society (Kural 446), The Law of Life (Kural 952), Brotherhood (Kural 807) Five responsibilities / duties of Man (a) to himself (b) to his family (c) to his environment (d) to his society, (e) to the Universe in his lives (Kural 43, 981).

Unit II Human Rights and Organisations

Definitions, Nature of Human Rights. Universal Declaration of Human Rights, International covenent on Civil and Political Rights - International covenent of Economic, Social and Cultural Rights. Amnesty International Red Cross.

Unit III Human Rights : Contemporary Challenges

Child labour - Womens Right - Bonded labour - Problems of refugees - Capital punishment. National and State Human Rights Commissions

Unit IV Yoga and Health

Definition, Meaning, Scope of Yoga - Aims and objectives of Yoga - Yoga Education with modern context - Different traditions and schools of Yoga - Yoga practices: Asanas, Pranayama and Meditation.

Unit V Role of State Public Service Commission

Constitutional provisions and formation - Powers and Functions - Methods of recruitment - Rules and notification, syllabi for different exams - written and oral - placement.

BOOKS FOR REFERENCES:

1. Thirukkural with English Translation of Rev. Dr. G.U. Pope, Uma Publication, 156, Serfoji Nagar, Medical College Road, Thanjavur 613 004
2. திருக்குறள் - ஜி.யு.போப் - ஆங்கில மொழியாக்கத்துடன் உமா நூல். வெளியீட்டகம், தஞ்சாவூர்.
3. Leah Levin, Human Rights, NBT, 1998
4. V.R. Krishna Iyer, Dialetics and Dynamics of Human Rights in India, Tagore Law Lectures.
5. Yogic Thearpy - Swami Kuvalayananda and Dr.S.L.Vinekar, Government of India, Ministry of Health, New Delhi.
6. SOUND HEALTH THROUGH YOGA - Dr.K.Chandrasekaran, Prem Kalyan Publications, Sedaptti, 1999.

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BHARATHIDASAN UNIVERSITY, TIRUCHIRAPPALLI- 620 024

ENVIRONMENTAL STUDIES

(Applicable to the candidates admitted from the Academic year 2019-20 onwards)

Unit: 1 The Multidisciplinary nature of environmental studies
Definition, scope and importance. (2 lectures)
Need for public awareness

Unit: 2 Natural Resources:
Renewable and non-renewable resources:
Natural resources and associated problems.

a) Forest resources: use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forests and tribal people.

b) Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams benefits and problems.

c) Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.

d) Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.

e) Energy resources: Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources. Case studies.

f) Land resources: Land as a resources, land degradation, man induced Landslides, soil erosion and desertification.

- Role of an individual in conservation of natural resources.
- Equitable use of resources for sustainable lifestyles.

(8 lectures)

Unit: 3 **Ecosystems**

- Concept of an ecosystem.
- Structure and function of an ecosystem.
- Producers, consumers and decomposers
- Energy flow in the ecosystem
- Ecological succession.
- Food chains, food webs and ecological pyramids
- Introduction, types, characteristic features, structure and function of the following ecosystem:-

- a. Forest ecosystem
- b. Grassland ecosystem
- c. Desert ecosystem
- d. Aquatic ecosystems, (ponds, streams, lakes, rivers, oceans, estuaries)

(6 lectures)

Unit: 4 Biodiversity and its conservation

- Introduction – Definition : Genetic, species and ecosystem diversity
- Biogeographical classification of India
- Value of biodiversity : consumptive use, productive use, social, ethical, aesthetic and option values
- Biodiversity at global, National and local levels
- India as a mega-diversity nation
- Hot-spots of biodiversity
- Threats to biodiversity : habitat loss, poaching of wildlife, man-wildlife conflicts.
- Endangered and endemic species of India
- Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.
- Biological Diversity Act 2002/ BD Rules, 2004

(8 lectures)

Unit: 5 Environmental Pollution

Definition

Causes, effects and control measures of :

a. Air Pollution
b. Water Pollution
c. Soil Pollution
d. Marine Pollution
e. Noise pollution
f. Thermal Pollution
g. Nuclear hazards

- Solid waste Management: Causes, effects and control measures of urban and industrial wastes.
- Role of an individual in prevention of pollution
- Pollution case studies
- Disaster management: floods, earthquake, cyclone and landslides.
- Ill-Effects of Fireworks: Firework and Celebrations, Health Hazards, Types of Fire, Firework and Safety

(8 lectures)

Unit: 6 Social Issues and the Environment

- From Unsustainable to Sustainable development.
- Urban problems related to energy.
- Water conservation, rain water harvesting, watershed management.
- Resettlement and rehabilitation of people; its problems and concerns.

Case studies

- Environmental ethics: Issues and possible solutions.
- Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case studies.
- Wasteland reclamation.
- Consumerism and waste products.
- Environment Protection Act.
- Air (Prevention and Control of Pollution) Act.
- Water (Prevention and Control of Pollution) Act.
- Wildlife Protection Act.
- Forest Conservation Act.
- Issues involved in enforcement of environmental legislation
- Public awareness.

(7 lectures)

Unit: 7 Human Population and the Environment

- Population growth, variation among nations.
- Population explosion – Family Welfare Programmes
- Environment and human health
- Human Rights - Value Education
- HIV/ AIDS - Women and Child Welfare
- Role of Information Technology in Environment and human health
- Case studies.

Unit: 8 Field Work

- Visit to a local area to document environmental assets-river / forest/ grassland/ hill / mountain

References:

1. Agarwal, K.C. 2001 Environmental Biology, Nidi Public Ltd Bikaner.
2. Bharucha Erach, The Biodiversity of India, Mapin Publishing Pvt ltd, Ahamedabad – 380013, India, E-mail: mapin@icenet.net(R)
3. Brunner R.C. 1989, Hazardous Waste Incineration, McGraw Hill Inc 480 p
4. Clark R.S. Marine Pollution, Clanderson Press Oxford (TB)
5. Cunningham, W.P.Cooper, T.H.Gorhani E & Hepworth, M.T. 2001.
6. De A.K. Environmental Chemistry, Wiley Eastern Ltd
7. Down to Earth, Centre for Science and Environment (R)
8. Gleick, H.P. 1993. Water in crisis, Pacific Institute for Studies in Dev., Environment & Security. Stockholm Env. Institute Oxford University, Press 473p.
9. Hawkins, R.E. Encyclopedia of India Natural History, Bombay Natural History Society, Bombay (R)
10. Heywood, V.H & Watson, R.T. 1995. Global Biodiversity Assessment. Cambridge University Press 1140 p.
11. Jadhav, H & Bhosale, V.M. 1995. Environmental Protection and Laws Himalaya Pub. House, Delhi 284 p.
12. Mckinney, M.L. & Schoch R.M. 1996. Environmental Science systems & Solutions, Web enhanced edition 639 p.
13. Mhaskar A.K. Matter Hazardous, Techno-Science Publications (TB)
14. Miller T.G. Jr. Environmental Science, Wadsworth Publishing Co. (TB)
15. Odum, E.P. 1971 Fundamentals of Ecology. W.B. Saunders Co. USA. 574 p
16. Rao MN & Datta, A.K. 1987 Waste Water treatment, Oxford & IBH Publication Co. Pvt Ltd 345 p.
17. Sharma B.K. 2001 Environmental chemistry Goel Publ House, Meerut.
18. Survey of the Environment, The Hindu (M).
19. Townsend C. Harper, J and Michael Begon, Essentials of Ecology, Blackwell science (TB)
20. Trivedi R.K. Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards, Vol. I and II, Enviro Media (R).
21. Trivedi R.K. and P.K. Goel, Introduction to air pollution, Techno-Science Publications (TB).
22. Wagner K.D. 1998 Environmental Management. W.B. Saunders Co. Philadelphia USA 499 p

    (M) Magazine (R) Reference (TB) Textbook

23. http://nbaindia.org/uploaded/Biodiversityindia/Legal/33%20Biological%20Diversity%20Rules,%202004.pdf.

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PROFESSIONAL ENGLISH FOR PHYSICAL SCIENCES-I

OBJECTIVES:

- To develop the language skills of students by offering adequate practice in professional contexts.
- To enhance the lexical, grammatical and socio-linguistic and communicative competence of first year physical sciences students
- To focus on developing students' knowledge of domain specific registers and the required language skills.
- To develop strategic competence that will help in efficient communication
- To sharpen students' critical thinking skills and make students culturally aware of the target situation.

LEARNING OUTCOMES:

- Recognise their own ability to improve their own competence in using the language
- Use language for speaking with confidence in an intelligible and acceptable manner
- Understand the importance of reading for life
- Read independently unfamiliar texts with comprehension
- Understand the importance of writing in academic life
- Write simple sentences without committing error of spelling or grammar

(Outcomes based on guidelines in UGC LOCF – Generic Elective)

UNIT 1: COMMUNICATION

1. **Listening**: Listening to instructions

2. **Speaking**: Telephone etiquette and Official phone conversations

3. **Reading** short passages (3 passages, one from each – Physics, Chemistry, Mathematics/Computer Science)

5. **Writing:** Letters and Emails in professional context

6. **Grammar in Context:**
    - Wh and yes or no,
    - Q tags
    - Imperatives

7, **Vocabulary in Context:** Word formation - .
    i) Creating antonyms using Prefixes
    ii) Intensifying prefixes (E. g inflammable)

Changing words using suffixes

A) Noun Endings
B) Adjective Endings
C) Verb Endings

UNIT 2: DESCRIPTION

Listening – Listening to process description

Speaking - Role play

Formal: With faculty and mentors in academic environment, workplace communication

Informal: With peers in academic environment, workplace communication

Reading –Reading passages on products, equipment and gadgets

Writing – Writing sentence definitions (e.g. computer) and extended definitions (e.g. artificial intelligence)

Picture Description – Description of Natural Phenomena

Grammar in Context: Connectives and linkers.

Vocabulary – Synonyms (register) - Compare & contrast expressions.

UNIT 3: NEGOTIATION STRATEGIES

Listening - Listening to interviews of specialists / inventors in fields (Subject specific)

Speaking – Brainstorming. (mind mapping). Small group discussions (subject-specific)

Reading – longer Reading text. (Comprehensive passages)

Writing – Essay Writing (250 word essay on topics related to subject area, like pollution, use of pesticides in cultivation, merits and demerits of devices like mobile phones, merits and demerits of technology in development)

Grammar in Context: Active voice & Passive voice – If conditional - Collocations –Phrasal verbs

UNIT 4: PRESENTATION SKILLS

Listening - Listening to presentation. Listening to lectures. Watching – documentaries (discovery / history channel)

Speaking –Short speech

- Making formal presentations (PPT)

Reading – Reading a written speech by eminent personalities in the relevant field /Short poems / Short biography.

Writing - Writing Recommendations

Interpreting visuals - charts / tables/flow diagrams/charts

Grammar in Context – Modals

Vocabulary (register) - Single word substitution

UNIT 5: CRITICAL THINKING SKILLS

Listening - Listening to advertisements/news and brief documentary films (with subtitles)

Speaking – Simple problems and suggesting solutions.

Reading: Motivational stories on Professional Competence, Professional Ethics and Life Skills (subject-specific)

Writing Studying problem and finding solutions- (Essay in 200 words)

Grammar-Make simple sentences

Vocabulary -Fixed expressions

SUGGESTED ACTIVITIES

UNIT 1

Listening: Links for formal conversation can be given - Gap filling exercises – Multiple Choice questions – Making notes.

Speaking - Role play activity

Reading – Note making. Note-Taking.

Writing: Guided Writing (developing hints)

Email

Grammar: Vocabulary – Worksheets – Games.

UNIT 2

Listening-

Process Descriptions (Processes of Condensation and Evaporation./Process of Measuring the thickness of a wire using a Screw -Gauge./process of Exaction of sugar from sugarcane)

Speaking – Role Play

Reading – Multiple choice questions - Evaluative answers – Classifying and labeling

Writing - Picture description – Description of natural phenomena (rainbow, earthquake, volcanic eruption, erosion, natural disasters in 150 to 200 words).

Vocabulary: Expansion of compound nouns

UNIT 3

Listening- Gap fill exercises – Listening comprehension

Speaking -Debates

Reading -Reading comprehension

Writing – Essay Writing

Grammar - Vocabulary, Activities, Worksheets & Games.

UNIT 4

Listening - Note taking (of listening & viewing items) - Filling a table based on the listening item.

Speaking – JAM, Presentations. (PPT-TECHNICAL)

Reading-Reading comprehension

Writing– Difference between recommendations and instructions

Questions/MCQs based on graphs/flow diagrams/charts

Grammar: Vocabulary – Activities, Worksheets & Games.

UNIT 5

Listening – Radio News/ TV-News telecast /

Speaking - Watch or listen to documentaries and ask questions

Reading - Reading motivational stories (success stories in subject area)

Writing - Essay writing.

Grammar -Vocabulary –Activities, Worksheets & Games

Professional English-Semester-II [part-III -add on Course]

Weightage: 4 Credits **Duration: 90hrs**

Objectives:

The Professional Communication Skills Course is intended to help Learners in Arts and Science colleges

- Develop their competence in the use of English with particular reference to the workplace situation.
- Enhance the creativity of the students, which will enable them to think of innovative ways to solve issues in the workplace.
- Develop their competence and competitiveness and thereby improve their employability skills.
- Help students with a research bent of mind develop their skills in writing reports and research proposals.

Unit 1- Communicative Competence (18 hrs)

Listening – Listening to two talks/lectures by specialists on selected subject specific topics -(TED Talks) and answering comprehension exercises (inferential questions)

Speaking: Small group discussions (the discussions could be based on the listening and reading passages- open ended questions

Reading: Two subject-based reading texts followed by comprehension activities/exercises

Writing: Summary writing based on the reading passages.

Grammar and vocabulary exercises/tasks to be designed based on the discourse patterns of the listening and reading texts in the book. This is applicable for all the units.

Unit 2 - Persuasive Communication (18 hrs)

Listening: listening to a product launch- sensitizing learners to the nuances of persuasive communication

Speaking: debates – Just-A Minute Activities

Reading: reading texts on advertisements (on products relevant to the subject areas) and answering inferential questions

Writing: dialogue writing- writing an argumentative /persuasive essay.

Unit 3- Digital Competence **(18 hrs)**

Listening to interviews (subject related)

Speaking: Interviews with subject specialists (usingvideo conferencing skills)

Creating Vlogs (How to become a vlogger and use vlogging tonurture interests – subject related)

Reading: Selected sample of Web Page (subject area)

Writing: Creating Web Pages

Reading Comprehension: Essay on Digital Competence for Academic and Professional Life.

The essay will address all aspects of digital competence in relation to MS Office and how they can be utilized in relation to work in the subject area

Unit 4 - Creativity and Imagination **(18 hrs)**

Listening to short (2 to 5 minutes) academic videos (prepared by EMRC/ other MOOC videos on Indian academic sites – E.g. https://www.youtube.com/watch?v=tpvicScuDyo)

Speaking: Making oral presentations through short films – subject based

Reading: Essay on Creativity and Imagination (subject based)

Writing – Basic Script Writing for short films (subject based)

- Creating blogs, flyers and brochures (subject based)
- Poster making – writing slogans/captions(subject based)

Unit 5- Workplace Communication& Basics of Academic Writing (18 hrs)

Speaking: Short academic presentation using PowerPoint

Reading & Writing: Product Profiles, Circulars, Minutes of Meeting.

Writing an introduction, paraphrasing

Punctuation(period, question mark, exclamation point, comma, semicolon, colon, dash, hyphen, parentheses, brackets, braces, apostrophe, quotation marks, and ellipsis)

Capitalization (use of upper case)

Outcomes of the Course.

At the end of the course, learners will be able to,

- Attend interviews with boldness and confidence.
- Adapt easily into the workplace context, having become communicatively competent.
- Apply to the Research &Development organisations/ sections in companies and offices with winning proposals.

Instruction to Course Writers:

1. **Acquisition of subject-related vocabulary should not be overlooked**. Textboxes with relevant vocabulary may be strategically placed as a Pre Task or in Summing Up
2. Grammar may be included if the text lends itself to the teaching of a Grammatical item. However, testing and evaluation does not include Grammar.

NON MAJOR ELECTIVES (ARTS)

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

SI. No.	DEPARTMENT OFFERING THE NON-MAJOR ELECTIVE COURSES	TITLE OF THE NON-MAJOR ELECTIVE COURSES
1.	Applied Tamil	I. தமிழ் நடைக்கூறுகள் II. சிந்தனையியல்
2.	B.Litt.	
3.	Pulavar Degree	
4.	Tamil	
5.	B.B.A. (Bachelor of Business Administration)	I. Management Principles **(or)** Stock Exchange Practices II. Banking Practices **(or)** International Business
6.	B.Com.	I. Personal Investment **(or)** Elements of Insurance II. Introduction to Accountancy **(or)** Salesmanship
7.	B.Com. (Applied)	
8.	B.Com. (Computer Applications)	
9.	B.Com. (Bank Management)	I. Banking Practices **(or)** Indian Banking System II. Rural Banking **(or)** Elements of Insurance
10.	B.Com (Corporate Secretaryship)	I. Elements of Company Law II. Stock Markets in India
11.	B.Com (Co-operation)	I. Fundamentals of Cooperation **(or)** Cooperative Finance and Banking II. Cooperatives in Foreign Countries **(or)** Cooperative Bookkeeping System
12.	Economics	I. Advertisement Management II. Economics of Transportation
13.	English	I. Presentation Skills II. Functional Skills
14.	History	I. Freedom Movement in India II. Working of Indian Constitution
15.	Journalism & Mass Communication	I. Basic Photography II. Freelance Journalism
16.	Public Administration	I. Public Administration for Civil Services II. Indian Government and Administration
17.	Sanskrit	I. Introduction to Early Sanskrit Literature **(or)** History of fables & Popular tales and Didactic Literature Pub. R.S. Vadhyer Pub. Palakad II. Scientific Literature **(or)** Indian Aesthetics
18.	Social Work	I. Human Rights II. Contemporary Social Issues and Problems
19.	Sociology	I. Dynamics of Society II. Women Empowerment
20.	Tourism And Travel Management	I. Basics of Tourism II. Cultural Tourism

NON MAJOR ELECTIVES (SCIENCE)

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

SI. No.	DEPARTMENT OFFERING THE NON-MAJOR ELECTIVE COURSES	TITLE OF THE NON-MAJOR ELECTIVE COURSES
1.	Apparel and Fashion Technology	I. Hand Embroidery (P) II. Jewellery Making (P)
2.	BCA	I. Working Principles of Internet II. Fundamentals of Information Technology
3.	Biochemistry	I. Health and diseases II. Hospital Management
4.	Biotechnology	I. Biotechnology for Human Welfare II. Food Processing
5.	Botany	I. Biofertilizers & Biopesticides II. Horticulture
6.	Chemistry	I. Chemistry in Everyday Life II. Health Chemistry
7.	Computer Science	I. Working Principles of Internet II. Fundamentals of Information Technology
8.	Electronics	I. Principles of Electronics II. Everyday Electronics
9.	Fashion Technology & Costume Designing	I. Fashion Accessories Designing II. Visual Merchandising
10.	Geography	I. Geography of Tourism II. Disaster Management
11.	Geology	I. Fundamentals of Geology II. Introduction to Minerals, Rocks and Fossils
12.	Home Science	I. Bakery and Food Preservation II. Apparel Designing
13.	Hospital Administration	I. Personal Hygiene II. Role of Hospital Services
14.	Hotel Management & Catering Science	I. Basic Tamil / Special Tamil II. Basic Tamil / Special Tamil
15.	Information Technology	I. Fundamentals of Information Technology II. Information Security : Principles and Practices
16.	Mathematics	I. Quantitative Aptitude I II. Quantitative Aptitude II
17.	Microbiology	I. Mushroom Technology II. Biofertilizer Technology
18.	Nutrition & Dietetics	I. Nutrition for Women II. Nutrition for Health and Fitness

19.	Physics	I. Energy Physics II. Laser Physics
20.	Software Development	I. Working Principles of Internet II. Fundamentals of Information Technology
21.	Textile Science	I. Management and Entrepreneurship II. Marketing and Merchandising
22.	Visual Communication	I. Basics of Communication II. Communication Personality Development
23.	Zoology	I. Public Health and Hygiene II. Ornamental fish farming

NON-MAJOR ELECTIVE - I

PUBLIC ADMINISTRATION FOR CIVIL SERVICES

Objectives :

1. Students studying other majors may get familiarize with the basic concepts of Public Administration
2. To expose the students to various basic theories in Public administration.

Unit I - Introduction Meaning, Nature, Scope and Significance of Public Administration - Comparative Public Administration - Public and Private Administration - New Public Management.

Unit II - Basic Concepts Organisation - Hierarchy - Unity of command - Span of control - Co-ordination - Centralization and Decentralization - Line and Staff.

Unit III - Theories of Administration Scientific Management (Taylor and the Scientific Management Movement) - Classical Theory (Fayol, Urwick, Gulick and others) - Bureaucratic Theory (Weber and his critics) - Behavoural Approach - Systems approach.

Unit IV - Administrative Behaviour Decision making - Communication and control, Leadership.

Unit V - Accountability and Control The concepts of Accountability and control : Legislative, Executive and Judicial control - Citizen and Administration : Role of civil society - People's Participation and Right to Information.

Reference :

1. Avasthi and S.R. Maheswari , " Public Administration', Lakshmi Navas, Agra, 2006
2. Rumki Basu, Concepts and Theories of Administration, Sterling Publication,New delhi2004.
3. Lakshmi Kanth P, Public Administration for UPSC McGraw Hill, New Delhi-2011.

NON-MAJOR ELECTIVE - II

INDIAN GOVERNMENT AND ADMINISTRATION

Objective : It facilitates the students to understand its various aspects of the subjects - evolution and constitutional frame work, salient features of Indian Administration, Union executive, State executive, District Administration.

Unit - I Evolution of Indian Administration - Constitutional Development Framework – Salient Feature of Indian constitution

Unit - II Union Administration – President - Prime Minister - Council of Ministers – Ministries and Departments – Supreme Court.

Unit - III State Administration – Executive – Council of Ministers – Departments and Directorate – State Public Service Commission – High Court – District Administration – Local Government.

Unit - IV Constitutional Authorities - Finance Commission - Union Public Service Commission - Election Commission - Comptroller and Auditor General of India

Unit - V Issues in Indian Administration - Generalists vs. Specialists - Centre-State relations Corruption – Lokpal, Lokayuktha - Administrative Reforms in India

References:

1. Dr.Vishnoo Bhagwan and Dr.Vidya Bhushan Indian Administration, S.Chand and Company Ltd., New Delhi, 2011.

2. M.Sharma ,Indian Administration ,Anmol Publications Pvt. Ltd., New Delhi, 2007.

3. S.R. Maheswari ,Indian Administration, S.Chand Co., New Delhi, 2010.

பாரதிதாசன் பல்கலைக்கழகம், திருச்சிராப்பள்ளி - 620 024

(2016-17ஆம் கல்வியாண்டு முதல் சேர்க்கை பெறும் மாணாக்கர்களுக்கு)

மூன்றாம் பருவம்

அடிப்படைத் தமிழ் - I
(Basic Tamil – I)

நோக்கம்: தமிழ்மொழியின் அடிப்படைகளை அறிந்துகொள்ளுதல். தமிழ் மொழியை எழுதவும் படிக்கவும் கற்றுக்கொள்ளுதல்.

அலகு 1

எழுத்துக்கள் அறிமுகம் - எழுத்துக்களின் வகைப்பாடு, எண்ணிக்கை - உயிரெழுத்துக்கள் - மெய்யெழுத்துக்கள் - உயிர்மெய்யெழுத்துக்கள் - ஆய்த எழுத்து - இனஎழுத்துக்கள் - வடமொழி எழுத்துக்கள்.

அலகு 2

எழுதும் பயிற்சி - தமிழ் எழுத்து வடிவங்களைக் காட்டி - அவற்றை இனங்காணவும் - வேறுபடுத்தி அறியவும் பயிற்சி தருதல் - ஒலிப்பு - பொருத்தமான எழுத்தைத் தேர்ந்தெடுக்கப் பரிசோதித்தல் - எழுத்துக்களை எழுதப் பயிற்றுவித்தல்.

அலகு 3

சொற்கள் கற்றல் - கோடிட்ட இடங்களை நிரப்புவதன் மூலம் எழுத்துகளையும் சொற்களையும் பயிற்றுவித்தல். வாசித்தல் - படம் ஒலிபெயர்ப்புச் சொல், இணையான ஆங்கிலச்சொல் முதலியவற்றைத் தந்து எழுத்துகளையும் சொற்களையும் பயிற்றுவித்தல்.

அலகு 4

சிறுதொடர் கற்றல் - எளிய தொடர்களை அறிமுகப்படுத்துதல் - சிறு தொடரின் உறுப்புகளைக் கற்றுத்தருதல் - அவ்வுறுப்புக்களைத் தொடரில் இனங்காணச்செய்தல் - சிறு தொடர்களை எழுதும் பயிற்சி தருதல்.

அலகு 5

மழலைப் பாடல்கள், அறநெறிக்கதைகள் - பாடல்களையும் கதைகளையும் பிழையின்றி வாசிக்கச் செய்தல் - பிழையின்றி எழுதச்செய்தல்.

பார்வை :

தமிழ் இணையப் பல்கலைக்கழகச் சான்றிதழ்க் கல்விப்பாடத்திட்டத்தில் உள்ள முதல் அலகான "அடிப்படைநிலை" (www.tamilvu.org)

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நான்காம்பருவம்

அடிப்படைத் தமிழ் - II
(Basic Tamil – II)

நோக்கம்: இப்பாடத்தில் கீழே தடித்த எழுத்துக்களில் தரப்பட்டுள்ள பாடங்களின் வழியாகத் தமிழ்மொழியை எழுதவும் வாசிக்கவும் பழக்குதல்.

அலகு 1

சந்தை - மலர்கள், காய்கறிகள், பழங்கள் முதலியன குறித்த செய்திகளை அறியச் செய்தல் - அவை தொடர்பான வாக்கியம் அமைக்கப் பழக்குதல் எங்கள் குடும்பம் - குடும்ப உறுப்பினர், குடும்ப உறவு முறைகள் பற்றி அறியச் செய்தல் - தொடர்பான சொற்கள், தொடர்கள் முதலியவற்றை வாசிக்கவும் எழுதவும் பழக்குதல்.

அலகு 2

விருந்தோம்பல் - உணவு பரிமாறும் முறை - உணவு வகைகள் முதலியன பற்றி விளக்கமாக அறியச் செய்தல் - ஆறு, குளம், கடல், வானம், மேகம், மலை, மழை முதலியன பற்றி அறியச் செய்தல் : இவை தொடர்பான சொற்கள், தொடர்கள் முதலியவற்றை வாசிக்கவும் எழுதவும் பழக்குதல்.

அலகு 3

பாரதியார் - பாரதியார் பற்றிய வரலாறு, அவரது ஓரிரு கவிதைகள் பற்றி அறியச்செய்தல் - கணைக்கால் இரும்பொறை - இம்மன்னனின் தன்மான உணர்வினை நாடகத்தின் வழியாக உணர்த்துதல். இப்பாடங்கள் தொடர்பான சொற்கள், தொடர்களை வாசிக்கவும் எழுதவும் பழக்குதல்.

அலகு 4

மாமல்லபுரம் - மாமல்லபுரம் அமைந்துள்ள இடம் மற்றும் கலைக்கோயில்கள் பற்றி விளக்குதல் - பயணம் - பேருந்தில் பயணம் செய்யும் முறையை விளங்க வைத்தல்இ வாசிக்கவும் எழுதவும் பழக்குதல்.

அலகு 5

மொழி - விளக்கம் - மொழிக்குடும்பங்கள் - உலகச் செம்மொழிகள் - இந்தியச் செம்மொழிகள் - செம்மொழித் தகுதிகள் - வரையறைகள் - வாழும் தமிழ்ச் செம்மொழி - தமிழின் தொன்மை - தமிழின் சிறப்புகள் - தமிழ்ச் செம்மொழி நூல்கள் - தமிழ்ச் செம்மொழி அறிந்தேற்பு பரிதிமாற்கலைஞர் அவர்கள் முதல் கலைஞர் திரு.மு.கருணாநிதி அவர்கள் வரை (அறிஞர்கள் - அமைப்புகள் - நிறுவனங்கள் - இயக்கங்கள் தொடர் முயற்சிகள் - அறப்போராட்டங்கள் - உலகத் தமிழ்ச் செம்மொழி மாநாடு, கோவை 2010)

பார்வை :

தமிழ் இணையப் பல்கலைக்கழகச் சான்றிதழ்க் கல்வி பாடத்திட்டத்தில் உள்ள இரண்டாம் அலகு மற்றும் மூன்றாம் அலகுகளான முறையே இடைநிலை, மேல்நிலை ஆகியவை (www.tamilvu.org).

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பாரதிதாசன் பல்கலைக்கழகம், திருச்சிராப்பள்ளி - 620 024
(2016-17ஆம் கல்வியாண்டு முதல் சேர்க்கை பெறும் மாணாக்கர்களுக்கு)

மூன்றாம் பருவம்

சிறப்புத் தமிழ் - தாள் I
(Special Tamil – I)

(பத்து அல்லது பன்னிரண்டாம் வகுப்பு வரை தமிழ் படித்திருந்து **இளநிலைப் பட்டப்படிப்பில் (UG) பகுதி I இல் இதர மொழிப்பாடங்கள் படிக்கின்ற மாணவ / மாணவியர்** படிக்க வேண்டிய **சிறப்புத் தமிழ் முதலாம் தாளுக்குரியபாடத்திட்டம்.** இப்பாடத்திட்டப் பகுதிகள் பல்கலைக்கழக இளங்கலை முதலாமாண்டு செய்யுள் திரட்டு நூலை அடிப்படையாகக் கொண்டது.)

அலகு - I

பாரதியார் 1. செந்தமிழ்நாடு 2. புதுமைப்பெண்
பாரதிதாசன் 1. அழகு 2. தமிழனுக்கு வீழ்ச்சியில்லை
கவிமணி தேசிகவிநாயகம் பிள்ளை 1. சுகாதாரக்கும்மி
சுரதா 1. கலப்பை

அலகு - II

கவி காமு ஷெரீப் 1. நிலவே சொல் 2. அறிய முயல்
கண்ணதாசன் 1. நட்பு
வாணிதாசன் 1. வாழ்க இளம்பரிதி

அலகு - III

நாட்டுப்புறப்பாடல்கள் 1. தாலாட்டுப் பாடல் 2. ஒப்பாரிப் பாடல்

புதுக்கவிதைகள்
1. அப்துல் ரகுமான் - வெற்றி
2. அறிவுமதி - நட்புக்காலம்
3. ஆண்டாள் பிரியதர்ஷினி - நிலாச்சோறு
4. சிற்பி - ஓடு ஓடு சங்கிலி
5. தாமரை - தீர்ப்பு
6. மீரா - தலைகுனிவு
7. மேத்தா.மு - வெளிச்சம் வெளியே இல்லை
8. வைரமுத்து – ருசி

ஐக்கூ கவிதைகள்
1. அமுதபாரதி 2. அரிமதி இளம்பரிதி 3. அரிமதி தென்னகன்
4. அன்பாதவன் 5. இராசன்.எ.மு. 6. உயிர்வேலி ஆலா
7. கார்முகில் 8. செந்தமிழன் 9. புதுவை இளவேனில்
10. புதுவை தமிழ் நெஞ்சன்

அலகு - IV

சிறுகதை 1. **கைவண்ணம்...(தேர்ந்தெடுக்கப்பட்டசிறுகதைகள்)**
தொகுப்பாசிரியர் முனைவர் தங்க. செந்தில்குமார்
அய்யா நிலையம்,கதவு எண், 1603,
ஆரோக்கிய நகர்,ஐந்தாம் தெரு,E.B. காலனி,
நாஞ்சிக்கோட்டைச் சாலை, தஞ்சாவூர் - 613 006
விலை ரூ.70/-

அலகு - V

இலக்கிய வரலாறு 1. மரபுக் கவிதை 2. புதுக்கவிதை 3. சிறுகதை

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நான்காம்பருவம்

சிறப்புத் தமிழ் - தாள் II
(Special Tamil – II)

(பத்து அல்லது பன்னிரண்டாம் வகுப்பு வரை தமிழ் படித்திருந்து பகுதி I இல் இதர மொழிப்பாடங்கள் படிக்கின்ற மாணவ / மாணவியர் படிக்க வேண்டிய **சிறப்புத் தமிழ் இரண்டாம் தாளுக்குரிய பாடத்திட்டம்.** இப்பாடத்திட்டப் பகுதிகள் பல்கலைக்கழக இளங்கலை இரண்டாமாண்டு செய்யுள் திரட்டு நூலை அடிப்படையாகக் கொண்டது.)

அலகு – I

புறநானூறு
1. 'வள்ளியோர் படர்ந்து' எனத் தொடங்கும் பாடல் (பாடல் எண். 47)
2. 'நின்னயந்துறைஞர்க்கும்' எனத் தொடங்கும் பாடல் (பாடல் எண். 163)

குறுந்தொகை
1. 'வில்லோன் காலன கழலே' எனத் தொடங்கும் பாடல் (பாடல் எண். 07)
2. 'அகவன் மகளே! அகவன் மகளே' எனத் தொடங்கும் பாடல் (பாடல் எண். 23)

அலகு – II

சிறுபாணாற்றுப்படை (முழுவதும்)

அலகு – III

திருக்குறள்
1. புறங்கூறாமை (அதிகாரம் 19) 2. மானம் (அதிகாரம் 97)

நாலடியார்
1. 'அரும்பெறல்' எனத் தொடங்கும் பாடல் (பாடல் எண். 34)
2. 'கல்லாதுபோகிய நாளும்' எனத் தொடங்கும் பாடல் (பாடல் எண். 169)

அலகு – IV

சிலப்பதிகாரம் - அடைக்கலக் காதை **(பல்கலைக்கழக செய்யுள் திரட்டில் உள்ள பகுதி மட்டும்)**

கம்பராமாயணம் - குகப் படலம் **(பல்கலைக்கழக செய்யுள் திரட்டில் உள்ள பகுதி மட்டும்)**

அலகு – V

இலக்கிய வரலாறு - அற இலக்கியம்,
சங்க இலக்கியம்
காப்பிய இலக்கியம்

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SKILL BASED ELECTIVE PAPERS

(2016 onwards)

Updated on 19.02.2018

Sl. No.	Skill Based Elective Paper	Paper	Semester	Title of the Paper
1.	Clinical Microbiology	I	IV	Clinical Bacteriology
		II	V	Clinical Mycology and Virology
		III	V	Clinical Parasitology
2.	Computer Application	I	IV	Hardware Troubleshooting
		II	V	Ruby on Rails
		III	V	Web Services
3.	Customer Relationship Management	I	IV	Overview of Customer Relationship Management (CRM)
		II	V	CRM in Services Marketing & its Tools
		III	V	E – CRM (Virtual Marketing)
4.	Desktop Publishing	I	IV	Page Maker
		II	V	Corel Draw
		III	V	Dream weaver
5.	Herbal Medicine	I	IV	Ethno Medicine
		II	V	Pharmacognosy
		III	V	Herbs and Drug Action
6.	Journalism and Public Relations	I	IV	Journalism and Mass Media
		II	V	Reporting and Editing
		III	V	Public Relations
7.	Office Management	I	IV	Introduction to Office Management
		II	V	Office Management Tools
		III	V	Communication & Interpersonal Skills
8.	Sales and Marketing Management	I	IV	Introduction to Marketing Management
		II	V	Sales Management
		III	V	Retail Management
9.	Tourism and Travel Management	I	IV	Tourism and Travel Agency
		II	V	Cultural Tourism in India
		III	V	Tourism Product – 3
10.	Yoga and Stress Management	I	IV	Fundamentals of Yogic Practices
		II	V	Stress Management Through Yoga
		III	V	Asanas and Pranayamas – Practical
11.	அச்சு ஊடகங்கள்	I	IV	தமிழ் இதழியல் வரலாறு
		II	V	நாளிதழ் உருவாக்கமும் வடிவமைப்பும்
		III	V	இலக்கிய இதழ்கள்
12.	**Biotechnology**	I	IV	Aqua Culture
		II	V	Biofertilizer
		III	V	Mushroom Cultivation and Value Addition
13.	**Chemistry**	I	IV	Food and Nutrition
		II	V	Agricultural Chemistry
		III	V	Dyeing Techniques and Water Treatment

14.	**Electronics**	I	IV	Home Appliance Maintenance and Servicing
		II	V	Computer Hardware and Networking
		III	V	Mobile Servicing
15.	**Hotel Management and Catering Science**	I	IV	Hospitality Marketing
		II	V	Information Technology in Hotel Industry
		III	V	Information Technology in Hotel Industry (P)
16.	**Microbiology**	I	IV	Microbial Nanotechnology
		II	V	Diagnostic Microbiology
		III	V	Antimicrobial agents
17.	**Zoology**	I	IV	Apiculture
				Aquaculture
		II	V	Sericulture
				Poultry Farming
		III	V	Vermiculture
				Dairy farming

SKILL BASED ELECTIVE PAPERS
(2016 onwards)

Sl. No.	Skill Based Elective Paper	Paper	Semester	Title of the Paper
1.	அச்சு ஊடகங்கள்	I	IV	தமிழ் இதழியல் வரலாறு
		II	V	நாளிதழ் உருவாக்கமும் வடிவமைப்பும்
		III	V	இலக்கிய இதழ்கள்
2.	**Biotechnology**	I	IV	Aqua Culture
		II	V	Biofertilizer
		III	V	Mushroom Cultivation and Value Addition
3.	**Chemistry**	I	IV	Food and Nutrition
		II	V	Agricultural Chemistry
		III	V	Dyeing Techniques and Water Treatment
4.	Clinical Microbiology	I	IV	Clinical Bacteriology
		II	V	Clinical Mycology and Virology
		III	V	Clinical Parasitology
5.	Computer Application	I	IV	Hardware Troubleshooting
		II	V	Ruby on Rails
		III	V	Web Services
6.	Customer Relationship Management	I	IV	Overview of Customer Relationship Management (CRM)
		II	V	CRM in Services Marketing & its Tools
		III	V	E – CRM (Virtual Marketing)
7.	Desktop Publishing	I	IV	Page Maker
		II	V	Corel Draw
		III	V	Dream weaver
8.	**Electronics**	I	IV	Home Appliance Maintenance and Servicing
		II	V	Computer Hardware and Networking
		III	V	Mobile Servicing
9.	Herbal Medicine	I	IV	Ethno Medicine
		II	V	Pharmacognosy
		III	V	Herbs and Drug Action
10.	**Hotel Management and Catering Science**	I	IV	Hospitality Marketing
		II	V	Information Technology in Hotel Industry
		III	V	Information Technology in Hotel Industry (P)
11.	Journalism and Public Relations	I	IV	Journalism and Mass Media
		II	V	Reporting and Editing
		III	V	Public Relations
12.	**Microbiology**	I	IV	Microbial Nanotechnology
		II	V	Diagnostic Microbiology
		III	V	Antimicrobial agents

13.	Office Management	I	IV	Introduction to Office Management
		II	V	Office Management Tools
		III	V	Communication & Interpersonal Skills
14.	Sales and Marketing Management	I	IV	Introduction to Marketing Management
		II	V	Sales Management
		III	V	Retail Management
15.	Travel and Tourism Management	I	IV	Tourism and Travel Agency
		II	V	Cultural Tourism in India
		III	V	Tourism Product – 3
16.	Yoga and Stress Management	I	IV	Fundamentals of Yogic Practices
		II	V	Stress Management Through Yoga
		III	V	Asanas and Pranayamas – Practical
17.	**Zoology**	I	IV	Apiculture
				Aquaculture
		II	V	Sericulture
				Poultry Farming
		III	V	Vermiculture
				Dairy farming

YOGA AND STRESS MANAGEMENT

Skill Based Elective I (Semester-IV)

FUNDAMENTALS OF YOGIC PRACTICES

Unit I

Meaning and definition of Yoga – aims & objectives of yoga – misconception about yoga. Historical perceptive on yoga – yoga before the time of Patanjali (Indus valley civilization, Vedas, Brahmnas, Upanishads, Epics, Puranas). Contributions of Patanjali and Thirumular to yoga. Yoga practices and other systems of exercises.

Unit II

Schools of Yoga: Bhakthi Yoga, Jnana Yoga, Karma Yoga, Kundalini Yoga, Mantra Yoga, Hatha Yoga, Raja Yoga. Eight Limbs of Yoga: Yama, Niyama, Asana, Pranayama, Pratyahara, Dharana, Dhyana & Samathi. General principles of practicing Asana, Pranayama, Meditation, Kriyas Bandhas and Mudra.

Unit III

Classification of Asanas - Meditative Asanas – Relaxative Asanas – Cultural Asanas. - safety measure and precautions while performing asanas. Pranayama – different phases in Pranayama practices: Puraka (Inhalation), Kumbhaka (Retention) and Recaka (Exhalation), - safety measures and precautions while performing pranayama. Meditation - Its techniques & benefits. Practicing methods and benefits of Kriyas, Bandha and Mudra.

Unit IV

Impact of Yoga on Muscular system, Respiratory System, Circulatory system, Nervous system, Digestive system and Endocrine system

Unit V

Yoga and development of Social qualities of personality – Co-operation – Simplicity – Tolerance – Social adjustments – Yoga and personal efficiency. Improvement of personal efficiency through yoga.

Reference

Author's guide, (2003). Yoga – The Science of Holistic living. Chennai: Vivekananda Kendra Prakashana trust

Chandrasekaran, K., (1999) Sound Health through Yoga. Sedapatti: Prem Kalyan Publications.

Maguire, Imelda., (2005) Yoga for a Healthy Body. London: Greenwich Editions.

Mariayyah, P., (2000). Suriyanamaskar. Perunthurai: Jaya Publishing House.

Tummers, Nanette. E., (2009) Teaching Yoga for Life. Champaign: Human Kinetics.

Skill Based Elective II (Semester V)

STRESS MANAGEMENT THROUGH YOGA

Unit I

Meaning and Definition of Stress. Types: Eutress, Distress, Anticipatory Anxiety, Intense Anxiety and Depression. Meaning of Management – Stress Management.

Unit II

Concept of Stress according to Yoga: Patanjali aphorism (PYS II - 3) Avidya Asmita. Bhagavad – Gita (Gita II 62-63) Dhayato Visayam Punsah … Yoga Vasistha and Upanishad.

Unit III

Physiology of Stress on: Autonomic Nervous System (ANS), Endocrine System, Hypothalamus, Cerebral Cortex and Neurohumours.

Unit IV

Mechanism of Stress related diseases: Psychic, Psychosomatic, Somatic and Organic phase. Role of Meditation & Pranayama on stress – physiological aspect of Meditation. Constant stress & strain, anxiety, conflicts resulting in fatigue among Executive. Contribution of Yoga to solve the stress related problems of Executive.

Unit V

Meaning and definition of Health – various dimensions of health (Physical, Mental, Social and Spiritual) – Yoga and health – Yoga as therapy. Physical fitness. Stress control exercise – Sitting meditation, Walking meditation, Progressive muscular relaxation, Gentle stretches and Massage.

Reference

Andrews, Linda Wasmer., (2005). Stress Control for peace of Mind. London: Greenwich Editions

Lalvani, Vimla., (1998). Yoga for stress. London: Hamlyn

Nagendra, H.R., and Nagarathana, R., (2004). Yoga perspective in stress management. Bangalore: Swami Vivekananda Yoga Prakashana.

Nagendra, H.R., and Nagarathana, R., (2004). Yoga practices for anxiety & depression. Bangalore: Swami Sukhabodhanandha Yoga Prakashana.

Sukhabodhanandha, Swami., (2002). Stress Management. Banglore: Prasanna trust.

Udupa, K.N., (1996). Stress management by Yoga. NewDelhi: Motilal Banaridass Publishers Private Limited.

Skill Based Elective III (Semester V)

ASANAS AND PRANAYAMAS – PRACTICAL

UNIT I

Meditative Asanas: 1. Sukhasana, 2. Siddhaasana (or) Siddhayoniasana, 3.Ardha Padmasana (or) Padmasana 4.Vajrasana **Relaxative Asanas** 5. Makarasana 6. Advasana 7. Matsya Kridasana 8. Shavasana,9. Jyestikasana

UNIT II

Cultural Asanas: 10.Tadasana, 11.Ardha Katti Chakarasana, 12. Pada Hastasana, 13. Utkattasana 14. Parivruthu Trikonasana, 15. Garudasana, 16. Bakasana, 17. Sithilai Tadasana 18. Ardha Chakrasana 19. Vrksasana 20. Trikonasana, 21. Natarajasana, 22. Virabhadrasana

Sitting Postures: 23. Machiyasana, 24. Sasangasana 25. Parvatasana, 26. Dandasana, 27. Janu Sirshasana 28. Ardha Padma Pachimottasana, 29. Ustrasana, 30. Baddha Padmasana,31.Tolasana 32. Tolangulasana, 33. Supta Vajrasana, 34. Vakrasana, 35. Ardha Sirsasana, 36. Baddha Konasana 37.Sithilai Dandasana, 38. Pachimottasana, 39. Ardha Ustrasana, 40. Yoga Mudra, 41. Saithalyasana 42. Gomukasana, 43. Veerasana, 44. Baddha Padmasana.

UNIT III

Prone Postures: 45. Bhujangasana, 46. Salabhasana, 47. Naukasana, 48 Ardha Salabasana, 49. Dhanurasana, 50.Sarpasana.

Supine Postures:

51. Navasana
52. Viparitha Karani
53. Uttana Padasana
54. Chakrasana
55. Tolangulasana
56. Matsyasana
57. Ardha Padma Halasana
58. Sethu Bandhasana
59. Pawanamuktasana
60. Padma sarvangasana
61. Halasana
62. Marjariasana
63. Sarvangasana
64. Ardha Hanlasana
65. Uttana Padasna

UNIT IV

Pranayamas

1.Suha Pranayama
2.Chandra Bhedana Pranayama
3.Sitkari Pranayama
4.Surya Bhedana Pranayama
5.Sitali Pranayama
6.Chandra Anuloma Viloma
7.Nadi Shodhana
8.Surya Anuloma Viloma Pranayama
9.Bharamari Pranayama

UNIT V

Preparation for Meditation, (sitting in meditative Asanas with Concentration on Tip of the Nose and Centre of eye brow) pranadarana (Body awareness) - Yoga Nidra.

Reference

Iyengar, BKS., (2003). The Art of Yoga. New Delhi: Harper Collins Publishers.

Maguire, Imelda., (2005). Yoga for a Healthy Body. London: Greenwich Editions.

Ravishankar.N.S., (2001). Yoga for Health. New Delhi: Pustak Mahal.

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Yogendra, Hansa Jayadeva and Desai, Armaiti Neriosand., (1991) Yoga for back and joint disorders. Mumbai: Dr.Jayadeva Yogendra for the yoga institute.

BHARATHIDASAN UNIVERSITY, TIRUCHIRAPPALLI - 24.
UNDER GRADUATE DEGREE PROGRAMMES

SOFT SKILLS DEVELOPMENT

Learning Objective

Today's world is all about relationship, communication and presenting oneself, one's ideas and the company in the most positive and impactful way. This course intends to enable students to achieve excellence in both personal and professional life.

Unit I
Know Thyself/ Understanding Self
Introduction to Soft skills-Self discovery-Developing positive attitude-Improving perceptions-Forming values

Unit II
Interpersonal Skills/ Understanding Others
Developing interpersonal relationship-Team building-group dynamics-Net working-Improved work relationship

Unit III
Communication Skills / Communication with others
Art of listening-Art of reading-Art of speaking-Art of writing-Art of writing e-mails-e mail etiquette

Unit IV
Corporate Skills / Working with Others
Developing body language-Practising etiquette and mannerism-Time management-Stress management

Unit V
Selling Self / Job Hunting
Writing resume/cv-interview skills-Group discussion- Mock interview-Mock GD – Goal setting - Career planning

TEXT BOOKS:

Meena.K and V.Ayothi (2013) A Book on Development of Soft Skills (Soft Skills : A Road Map to Success), P.R. Publishers & Distributors, No, B-20 & 21, V.M.M. Complex, Chatiram Bus Stand, Tiruchirappalli- 620 002.
(Phone No: 0431-2702824: Mobile No: 94433 70597, 98430 74472)

Alex K. (2012) Soft Skills – Know Yourself & Know the World, S.Chand & Company LTD, Ram Nagar, New Delhi- 110 055.
Mobile No : 94425 14814 (Dr.K.Alex)

REFERENCE BOOKS:

(i) Developing the leader within you John c Maxwell
(ii) Good to Great by *Jim Collins*
(iii) The seven habits of highly effective people Stephen Covey
(iv) Emotional Intelligence Daniel Goleman
(v) You can win Shive Khera
(vi) Principle centred leadership Stephen Covey

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Bharathidasan University, Tiruchirappalli – 24

Gender Studies

Objectives

- To make boys and girls aware of each others strengths and Weakness.
- To develop sensitivity towards both genders in order to lead an ethically enriched life.
- To promote attitudinal change towards a gender balanced ambience and women empowerment .

Unit – I

Concepts of Gender: Sex – Gender – Biological Determinism – Patriarchy – Feminism – Gender Discrimination – Gender Division of labour – Gender Stereotyping – Gender Sensitivity – Gender Equity – Equality – Gender Mainstreaming - Empowerment.

Unit – II

Women's Studies vs Gender Studies : UGC's Guidelines – VII to XI Plans – Gender Studies : Beijing Conference and CEDAW – Exclusiveness and Inclusiveness.

Unit – III

Areas of Gender Discrimination : Family – Sex Ratio – Literacy – Health – Governance – Religion Work Vs Employment – Market – Media – Politics – Law – Domestic Violence – Sexual Harassment – State Policies and Planning .

Unit – IV

Women Development and Gender Empowerment : Initiatives – International Women's Decade – International Women's Year – National Policy for Empowerment of Women – Women Empowerment Year 2001 – Mainstreaming Global Policies .

Unit – V

Women's Movements and Safeguarding Mechanism : In India National /State Commission for Women(NCW) – All Women Police Station – Family Court – Domestic Violence Act – Prevention of Sexual Harassment at Work Place Supreme Court Guidelines – Maternity Benefit Act – PNDT Act – Hindu Succession Act 2005 – Eve Teasing Prevention Act – Self Help Groups – 73rd and 74th Amendment for PRIS

பாலின சமத்துவம்

அலகு - I

பாலினம் தொடர்பான கோட்பாடுகள் :பாலியல் - பாலினம் - உடற்கூறுரீதியாக நிர்ணயித்தல் - ஆணாதிக்கம் - பெண்ணியம் - பாலின பாகுபாடு – பாலின வேலைப்பாகுபாடு – பாலின ஒருபடித்தானவைகள் - பாலின உணர்வூட்டல் - பாலின சமவாய்ப்பு – பாலின சமத்துவம் - பாலின மையநீரோட்டமாக்கல் - அதிகாரப்படுத்துதல்

அலகு -II

மகளிரியல் Vs பாலின சமத்துவக்கல்வி – பல்கலைக்கழக மானியக்குழுவின் வழிக்காட்டுதல்கள் - ஏழாவது ஐந்தாண்டுதிட்டம் முதல் பதினோராவது ஐந்தாண்டுதிட்டம் - பாலின சமத்துவக்கல்வி : பெய்ஜிங் மாநாடு மற்றும் பெண்களுக்கு எதிரான அனைத்து வன்முறைகளையும் ஒழிப்பதற்கான சர்வதேச உடன்படிக்கை - இணைத்தல் /உட்படுத்துதல் - ஒதுக்கல் -

அலகு – III

பாலியல் பாகுபாட்டிற்கான தளங்கள் : குடும்பம் - பாலின விகிதாச்சாரம் - கல்வி – ஆரோக்கியம் - ஆளுமை –மதம் - வேலை Vs வேலை வாய்ப்பு – சந்தை – ஊடகங்கள் - அரசியல் - சட்டம் -குடும்ப வன்முறை –பாலியல் துன்புறுத்தல் - அரசு கொள்கைகள் மற்றும் திட்டங்கள் .

அலகு – IV

பெண்கள் மேம்பாடு மற்றும் பாலின சமத்துவ மேம்பாடு : முயற்சிகள் - சர்வதேச பெண்களுக்கான தசாப்தம் - சர்வதேச பெண்கள் ஆண்டு – பெண்களின் மேம்பாட்டிற்கான தேசிய கொள்கை – பெண்கள் அதிகார ஆண்டு 2001 – சர்வதேச கொள்கைகளை மைய நீரோட்டமாக்கல்

அலகு – V

பெண்கள் இயக்கங்கள் மற்றும் பாதுகாப்பு நிறுவன ஏற்பாடுகள் : தேசிய மற்றும் மாநில மகளிர் ஆணையம் - அனைத்து மகளிர் காவல் நிலையங்கள் - குடும்ப நீதி மன்றங்கள் - குடும்ப வன்முறையிலிருந்து பெண்களைப் பாதுகாக்கும் சட்டம் 2005 – பணியிடங்களில் பெண்கள் மீதான பாலியல் துன்புறுத்தல்களை தடுப்பதற்கான உச்சநீதிமன்ற வழிகாட்டுதல்கள் - தாய்சேய் சேமநலச்சட்டம் - பெண்சிசுவை கருவிலேயே கண்டறியும் தொழில் நுட்பம் (முறைப்படுத்துதல் மற்றும் தவறாக பயன்படுத்துதலை தடை செய்திடும்) சட்டம் - ஈவ்டீசிங் (பெண்களை தொல்லை செய்தல்) தடுப்புச்சட்டம் - சுய உதவிக் குழுக்கள் - பஞ்சாயத்து அமைப்புகளுக்கான 73வது மற்றும் 74வது சட்டத்திருத்தம்.

References

1. Bhasin Kamala, Understanding Gender : Gender Basics , New Delhi : Women Unlimited , 2004
2. Bhasin Kamala, Exploring Masculinity: Gender Basics , New Delhi: Women Unlimited ,2004
3. Bhasin Kamala , What is Patriarchy? : Gender Basics, New Delhi :Women Unlimited ,1993
4. Pernau Margrit, Ahmad Imtiaz, Reifeld Hermut (ed.,)Family and Gender : Changing Values in Germany and India ,New Delhi :Sage Publications,2003
5. Agarwal Bina, Humphries Jane and Robeyns Ingrid(ed.,) Capabilities , Freedom , and Equality: Amartya Sen's Work from a Gender Perspective,New Delhi : Oxford University Press ,2006
6. Rajadurai. S.V,Geetha.V,Themes in Caste Gender and Religion, Tiruchirappalli : Bharathidasan University ,2007
7. Misra Geetanjali, Chandiramani Radhika (ed.,) Sexuality , Gender and Rights: Exploring Theory and Practice in South and Southeast Asia, New Delhi : Sage Publication ,2005
8. Rao Anupama (ed.,) Gender &Caste : Issues in Contemporary Indian Feminism, New Delhi : Kali for Women, 2003
9. Saha Chandana , Gender Equity and Gender Equality : Study of Girl Child in Rajasthan , Jaipur: Rawat Publication ,2003.
10. Krishna Sumi, (ed.,),Livelihood and Gender : Equity in Community Resource Management, New Delhi : Sage Publication ,2004
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12. Wharton .S Amy , The Sociology of Gender : An Introduction to Theory and Research , USA : Blackwell Publishing ,2005
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14. Arya Sadhna Women ,Gender Equality and the State ,New Delhi :Deep &Deep Publication, 2000
15. பாலியலை புரிந்து கொள்வோம், மதுரை :ஏக்தா,……..
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17. Chari Leelavathi ,Know Your Rights ,Madras; Tamilnadu Social Welfare Board,1987
18. Bhattacharya Malini , Sexual Violence and Law ,Kolkata; West Bengala Commission for Women ,2002
19. Sexual Harassment at the Workplace – A Guide , New Delhi ;Sakshi,1999
20. அஜிதா, குடும்ப வன்முறையிலிருந்து பெண்களை பாதுகாக்கும் சட்டம் 2005, மதுரை : ஏக்தா 2005
21. கு.சாமிதுரை& இராதாகிருட்டிணன், பெண்கள் நலன் காக்கும் சட்டங்கள், மதுரை: Account Test Center:2007
22. பொன்.கிருஷ்ணசாமி,ஜே.பால் பாஸ்கர்&ஆ.ஜான் வின்சென்ட், பெண்களும் உச்ச நீதிமன்றமும், மதுரை :சோக்கோ வாசகர் வட்டம், 2004
23. வனஜா &சியாமா சுந்தரி, பெண்களுக்கான சட்டங்கள், செகந்திராபாத் : உலகத்தோழமை மையம்
24. க.உமாசங்கர், பி.பாலசந்தர், க.சசிகலா, செ.பழனிச்சாமி, சூரியன் (பெண்கள் தொடர்பான சட்டங்கள் குறித்த தொடக்கநிலை கையேடு: செகந்திராபாத்: உலகத்தோழமை மையம்,2006
25. குடும்ப வன்முறையிலிருந்து பெண்களை பாதுகாக்கும் சட்டம் 2005- கையேடு, திருச்சி:
26. Women's Integrated National Development Trust
27. ரவீந்திரநாத். ஜி.ஆர்., 'ராகிங் ஒழிப்போம்!' 'ஈவ்டிசிங்' ஒழிப்போம், சென்னை I.D.P.D.வெளியீடு

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CODE OF CONDUCT FOR STUDENTS

1. Students should not leave the College premises during class hours without written permission of the Principal / Competent authority.
2. Students should be punctual in attending classes and other co-curricular and extra-curricular activities. Late comers will not be allowed in the class.
3. Students will be responsible for all equipment entrusted to them. Students should not cause any damage to any property, equipment, instruments, tools etc., of the College. An amount of Rs.150 towards General maintenance, is payable by each Student at the end of the Academic Year, prior to Examinations. In case of any damage, the actual cost will be recovered from the student along with a fine.
4. Students should take care of their belongings while within the campus. The College will not be responsible for any loss of such belongings.
5. Use of Mobile phones, Pagers, Cameras, etc., are prohibited inside the campus, during College hours, from 10am to 4pm. If found in contravention, they will be confiscated.

   Smoking and consumption of pan is prohibited inside the campus. Consumption of any intoxicants or drugs is totally prohibited, and will lead to immediate dismissal from the College.
6. Students should display their Identity Card prominently, while they are within the campus and while travelling in the College bus. The security staff will not permit any student inside the campus without their identity card.
7. All Students should dress in a presentable manner. T-shirts and sleeveless dresses are not permitted.
8. The management reserves the right to modify the class timings and schedule.
9. Students should not hold any meetings or collect any money from other students without proper permission from the Principal / HOD.
10. Students should not involve themselves in any political or religious activity inside the Campus.

    Ragging in any form is totally banned and is punishable as per the Government Order. If any student is found to be indulging in any sort of ragging or harassment to juniors or other fellow students, inside or outside the campus, bus, he/she will be dismissed immediately from the College, and criminal action will be taken against them as per the rules.
11. The following acts of misconduct will result in immediate dismissal from the College:

    (i) Assault of any person
    (ii) Willful damage to College property
    (iii) Intimidation, coercion and/or interference with other students
    (iv) Misbehavior with other students and/or Staff

12. The decision of the Principal decision is final and binding on all the students, in all matters pertaining to the College.
13. All other rules, regulations and guidelines prescribed by University / Government agencies will be implemented.
14. Attendance
    1. Absence from class without proper reason and without prior permission from the HOD is tantamount to breach of discipline and such absence will attract punishment and should be avoided. One period of absence in the forenoon or afternoon session will be treated as half a day of absence.
    2. Absence for more than 10 days without prior permission from the HOD may lead to removal from the nominal roll.
    3. Students appearing for the University examinations must have at least 80% of attendance as per the rules of the University. A minimum of 70% attendance is required to appear for examinations.

RULES OF CONDUCT AND DISCIPLINE

1. All students should conduct themselves with DECENCY, DECORUM and DIGNITY at all times and in all places.
2. Students must co-operate in protecting and taking care of all college property and equipments. They are expected to keep the building, playfield and their rooms neat and tidy.
3. Difficulties experienced by the students and suggestions for improving their welfare may be brought to the notice of the principal or any other staff member for consideration and necessary action.
4. Students who want to participate in matches and competitions not conducted by the college can do so only after getting the permission of the principal.
5. Students are forbidden from taking any part in political activities of any kind particularly those directed against the authority of the government.
6. Students who are found damaging college property will be expelled from the college. If any damage to the college property is caused by the student who is not identified minimum collective fine of Rs.100/- per student will be levied at the end of the year.

RULES REGARDING ATTENDANCE & LEAVE OF ABSENCE

1. A Candidates other then private one shall be required to put in seventy five percent to qualify for admission to any prescribed examination of the university.
2. If a student is absent for one or more hours during a session (Forenoon or afternoon) he/she will lose the attendance for half-a-day.
3. The Principal of the college shall have a power to condone shortage of attendance of students to be admitted for university examinations upto a maximum of a 10 percent, ie., nine days each semester on valid reasons as ill health etc., on payment of the prescribed condonation fee of Rs.500/-.

4. Statement of attendance of the students shall be displayed in the college notice board every month.
5. In case the shortage of attendance of a student exceeds the limit prescribed for purpose of condonation of attendance, he/she will not be presented to the University examinations.
6. A student will be given only one opportunity to carry forward the deficiency in attendance of one semester to the next semester during the degree course, failing which he/she will have to re-do the course.

DISCIPLINE REGULATIONS

The following rules shall be on force in the college as per the Tamilnadu Educational rules.

1. No Student who has been convicted of any offence in a criminal court will be allowed to continue his studies in the college.
2. Students should abstain from active participation in party or communal politics.
3. Students who indulge in political propaganda or who organize fellow students in to political factions in the premises of the college or who otherwise engage themselves in party politics are liable to be expelled from the college.
4. Principal or other constituted college authorities may frame and issue from time to time disciplinary rules of a permanent or temporary nature relating to the conduct, inside and outside the college premises, of students.
5. Principal and other constituted college authorities shall have full powers to inflict the following punishments in the interest of the students or of the institution concerned fine, denial of attendance, denial of terms certificates, suspensions and expulsion.
6. Students should not indulge in any activity leading to the disruption of peace and discipline and dislocation of normal work in the college premises. Those who are guilty of violation of this rule will be severely dealt with.
7. Ragging is strictly forbidden. Anyone who is guilty of ragging will be severely punished.
8. Students who are guilty of (a) rude language towards the staff of the college or (b) assault or attempt to assault the staff or fellow students of the college, will be expelled from the institution.

RAGGING – WARNING

- Ragging of any sort is banned.
- Ragging is illegal and punishable.
- Ragging in any form at any place in the college campus or outside is strictly prohibited.
- Ragging is punishable with imprisonment upto 7 years with a fine of Rs.25,000. Strict disciplinary action will be taken against any student found indulging in an act of ragging.

- Any complaint about ragging has to be reported to the respective HODs or authorities.
- Ragging of any sort will be informed to the Police authorities.

IDENTITY CARD

Every student will be provided with an identity card with his photo duly attested by the principal. Students are required to keep their identity card with them always.