RATHINAM COLLEGE OF ARTS & SCIENCE: COIMBATORE-21.
(AUTONOMOUS)

B.SC MATHEMATICS

SCHEME OF EXAMINATION: CBCS PATTERN

(WITH FOUR SEMESTER LANGUAGE PAPER)

(APPLICABLE TO STUDENTS ADMITTED FROM THE ACADEMIC YEAR 2013 – 2014)

PART	STUDY COMPONENTS	Ins. Hrs/ Week	Dur. Hrs	CIA	ESE	TOTAL	CREDIT
			EXAMINAIONS				
	SEMESTER-I						
I	LANGUAGE-I	6	3	25	75	100	4
II	ENGLISH-I	6	3	25	75	100	4
III	CORE PAPER I-CLASSICAL ALGEBRA	5	3	25	75	100	4
III	CORE PAPER II-CALCULUS	5	3	25	75	100	4
III	ALLIED I-STATISTICS FOR MATHEMATICS-I	6	3	25	75	100	4
IV	Environmental Studies*	2	2		50	50	2
	SEMESTER-II						
I	LANGUAGE-II	6	3	25	75	100	4
II	ENGLISH-II	6	3	25	75	100	4
III	CORE PAPER III-ANALYTICAL GEOMETRY	5	3	25	75	100	4
III	CORE PAPER IV-TRIGONOMETRY AND FOURIER SERIES	5	3	25	75	100	4
III	ALLIED II-STATISTICS FOR MATHEMATICS-II	6	3	25	75	100	4
IV	Value Education – Human Rights *	2	2		50	50	2
	SEMESTER-III						
I	LANGUAGE-III	6	3	25	75	100	4
II	ENGLISH-III	6	3	25	75	100	4
III	CORE PAPER V-DIFFERENTIAL EQUATIONS & LAPLACE TRANSFORMS	5	3	25	75	100	4
IV	Skill Based Subject: MS-OFFICE	3	3	25	75	100	3
IV	Skill Based Subject-MS-OFFICE PRACTICAL	2	3	40	60	100	3
III	ALLIED III-ACCOUNTANCY-I	6	3	25	75	100	4
IV	Tamil ** / Advanced Tamil ** (OR) Constitution of India*/Communicative English-I *	2	2		50	50	2
	SEMESTER-IV						
I	LANGUAGE-IV	6	3	25	75	100	4

II	ENGLISH-IV	6	3	25	75	100	4
III	CORE PAPER VI-STATICS	6	3	25	75	100	4
IV	Skill Based Subject-PROGRAMMING IN C	3	3	25	75	100	4
IV	Skill Based Subject-C-PRACTICAL	2	3	40	60	100	4
III	ALLIED IV-ACCOUNTANCY-II	5	3	25	75	100	4
IV	Tamil ** / Advanced Tamil ** (OR) Non-major elective - II General Awareness */Communicative English -II*	2	2		50	50	2
	SEMESTER-V						
III	CORE PAPER-VII-DYNAMICS	6	3	25	75	100	4
III	CORE PAPER VIII-REAL ANALYSIS	6	3	25	75	100	4
III	ELECTIVE-I	6	3	25	75	100	4
III	ELECTIVE-II	6	3	25	75	100	4
IV	Skill Based Subject-OPTIMIZATION TECHNIQUES-I	6	3	25	75	100	3
III	INDUSTRIAL REPORT @			20	80	100	2
	SEMESTER-VI						
III	CORE PAPER IX-COMPLEX ANALYSIS	6	3	25	75	100	4
III	CORE PAPER X-MODERN ALGEBRA	6	3	25	75	100	4
III	ELECTIVE-III	6	3	25	75	100	4
III	Skill Based Subject-OPTIMIZATION TECHNIQUES-II	6	3	25	75	100	3
III	PROJECT REPORT & VIVA VOCE	6	3	20	80	100	8
IV	ON LINE EXAMINATIONS		3	50	-	50	-
V	EXTENSION ACTIVITIY **		-	50	-	50	2
TOTAL			-	-	-	**3700**	**140**

* No Internal Examinations only External Examinations

** No External Examinations only Internals Examinations

@ Vocational Industrial Training

List of Elective Papers

Elective-I	A	Numerical Analysis
	B	C++ PROGRAMMING
	C	PARTIAL DIFFERENTIAL EQUATIONS
Elective-II	A	Number Theory
	B	FUZZY MATHEMATICS
	C	DISCRETE MATHEMATICS
Elective-III	A	GRAPH THEORY
	B	FLUID DYNAMICS
	C	LINEAR ALGEBRA

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Semester: I - Core Paper- I

Subject title: Classical Algebra   Credit hours-5
Subject description: This paper focuses on the convergence and divergence of different types of series, also discusses the standard methods of solving both polynomial and transcendental type equations.
Goal: To enable the students to learn about the convergence and divergence of the series and to find the roots for the different types of the equation.
Objectives: On successful completion of this paper the students should gain knowledge about the convergence of series and solving equations.
UNIT I:
Binomial, exponential theorems-their statements and proofs- their immediate application to summation and approximation only.
UNIT II:
Logarithmic series theorem-statement and proof-immediate application to summation and Approximation only. Convergency and Divergency of series –definitions, elementary results comparison tests-De Alemberts and Cauchy's tests.
UNIT III:
Absolute convergence-series of positive terms-Cauchy's condensation test-Raabe's test.
UNIT: IV
Theory of equations: Roots of an equation- Relations connecting the roots and coefficients- transformations of equations-character and position of roots-Descarte's rule of signs-symmetric function of roots-Reciprocal equations.
UNIT V:
Multiple roots-Rolle's theorem - position of real roots of f(x) =0 - Newton's method of approximation to a root - Horner's method.
Treatment as in
Algebra-T.K .Manicavachasam Pillai, T.Natarajan, K-S Ganapathy.
S. Viswanathan Printers & Publishers Private Ltd-2013
Reference:
1. Mathematics for B.Sc. Branch I -Vol. I- P. Kandasamy and K. Thilagavathy
(For B.Sc-I semester) S. Chand and Company Ltd, New Delhi, 2004.

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SEMESTER-I Core Paper- II
Subject title: CALCULUS   **Credit hours-5**
Subject description:
This paper presents the idea of curvatures, integration of different types of functions, its geometrical applications, double, triple integrals and improper integrals.
Goal:
To enable the students to geometrical applications.
Objectives:
On successful completion of paper the students should have gain about the evolutes and envelopes, different types of integrations, its geometrical application, proper and improper integration.
UNIT I:
Curvature-radius of curvature in Cartesian and polar forms-evolutes and envelopes- pedal equations- total differentiation- Euler's theorem on homogeneous functions.
UNIT II:
Integration of f'(x)/f(x), f'(x) $\sqrt{f(x)}$,(px+q)/$\sqrt{ax^2 + bx + c}$)], [√(x-a)/(b-x)],

[√(x-a)(b-x),1/[√(x-a)(b-x),1/(acosx+bsinx+c),1/(acos^{2}x+bsin^{2}x+c),Integration by parts
UNIT III:
Reduction formulae- problems- evaluation of double and triple integrals- applications to calculations of areas and volumes-areas in polar coordinates.
UNIT IV:
Change of order of integration in double integral- Jacobions.- change of variables in double and triple integrals.
UNIT V:
Notion of improper integrals, their convergence, simple tests for convergence simple problems, Beta and Gamma integrals-their properties, relation between them- evaluation of multiple integrals using Beta and Gamma functions.
Treatment as in
1. Calculus vol 1 and vol 2- S. Narayanan and T.K.M. Pillai. Viswanathan Publishers,2013.
Reference:
1. Mathematics for BSc – Vol I and. II - P. Kandasamy & K.Thilagarathy S.Chand and Co-2004

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SEMESTER-I   ALLIED PAPER-I

Subject title: Statistics for Mathematics-I   **credit hours**: 6

Subject description: This course introduces Statistical concepts and mathematical analysis.

Goal: To enable the students to understand mathematical aspects of statistics

Objective: on successful completion of the paper the students should have understood the concepts of probability, random variable, various discrete and continuous probability distributions and the concepts of correlation and regression.

UNIT-I:

Random variables- discrete and continuous random variables –distribution function properties- probability mass function, probability density function-mathematical expectation –addition and multiplication theorems on expectations

UNIT II:

Moment generating and cumulating generating & characteristic functions and their properties. Joint probability distributions-marginal and conditional probability distributions-independence of random variables-transformation of variables (one & two dimensional only).Tchebychev's inequality, weak law of large numbers and central limit theorem

UNIT III:

Probability distributions: Binomial, Poisson and Normal distributions and their properties and fitting of distributions. Chi-square, t and F Statistics, their probability functions and their properties.

UNIT IV:

Curve fitting and principle of least squares: fitting of curves of straight line, second degree parabola, power curve and exponential curves-correlation and regression analysis.

UNIT-V:

Simple problems related to the above units.

Books recommended for study:

1. Fundamentals mathematical Statistics by S.C Guptha & V.K. Kapoor, Sultan chand sons, revised edition 2002.

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Semester: II - Core Paper- III
Subject title: Analytical Geometry   Credit hours-5
Subject Description:
This paper gives emphasis to enhance student knowledge in two dimensional and three dimensional analytical geometry. Particularly about two dimensional conic sections in polar coordinates and the geometrical aspects of three dimensional figs, viz, sphere, cone and cylinder.
Goal:
To enable the students to learn and visualize the fundamental ideas about co-ordinate geometry.
Objectives:
On successful completion of the paper students should have gained knowledge above the regular geometrical figures and their properties.
UNIT I:
Analytical geometry of 2D-Polar Equations -directrix- chord tangent- normal- Problems.
UNIT II:
Analytical Geometry 3D-straight lines-co planarity of straight-line-shortest distance (S.D)
and equation of S.D between two lines.
UNIT III:
Sphere: standard equation of sphere-results based on the properties of a sphere-tangent plane to a sphere- equation of a circle.
UNIT IV:
Cone: Cone whose vertex is at the origin- enveloping cone of a sphere-right circular cone.
UNIT V:
Cylinder: equation of a cylinder- Enveloping cylinder−right circular cylinder.

Treatment as in
1. Analytical Geometry by P. Durai Pandian & Kayalal Pachaiyappa, 2009.
Reference:
1. Analytical Geometry of 2D by T.K. M. Pillai and Others – Viswanathan Publications-2010
2. Analytical Geometry of 3D by T.K. M. Pillai and Others – Viswanathan Publications-2009

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Semester II - Core Paper –IV
Subject Title: Trigonometry and Fourier Series

Credit Hours: 5

Subject Description : This paper presents the circular functions, hyperbolic functions, differentiation of functions in scalar.

Goals: To enable the students to learn about the expansion of trigonometrically functions

Objectives: On successful completion of this paper the students should have gained knowledge about expansion of trigonometric functions and Fourier series.

Unit I:
Expansion in Series – Expansion of $\cos n\ \theta$, $\sin n\ \theta$ in a series of cosines and sines of multiples of θ – Expansions of $\cos n\theta$ and $\sin n\theta$ in powers of sines and cosines .

Unit II:
Expansion of $\sin\ \theta$, $\cos\ \theta$ and $\tan\ \theta$ in powers of θ – hyperbolic functions and inverse hyperbolic functions.

Unit III:
Logarithm of complex quantities - summation of series – when angles are in arithmetic progression – $C + iS$ method of summation – method of differences.

Unit IV:
Fourier Series: Introduction to Fourier series - Definition – Examples of Fourier series – Even or odd functions – Fourier series for even and odd functions .

Unit V:
Periodic functions – Fourier series of periodicity 2π – half range series.

Treatment as in
1. Kandasamy. P, Thilagavathi. K " Mathematics for B.Sc. Branch I", Volume I II and IV, S.Chand and Company Ltd, New Delhi, 2004.
2. Calculus vol III-- S. Narayanan and T.K.M. Pillai. Viswanathan Publishers,Pvt,Ltd-2010.
References:
1. T.K. Manichavasagam Pillai and S.Narayanan, Trigonometry - Viswanathan Publishers and Printers Pvt. Ltd,2013.

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SEMESTER:II- ALLIED PAPER-II
Subject title: Statistics for mathematics-II   credit hours: 6
Subject description: This paper introduces Applied Statistical concepts and mathematical analysis.
Goal: To enable the students to understand mathematical aspects of applied statistics
Objectives: On successful completion of the paper the students should have understood the concepts of estimation, testing,   sampling, design of experiments

UNIT-I:
Concept of population, sample, statistic, parameter-point estimation-consistency, unbiasedness, efficiency- sufficiency- Cramer Rao inequality -Rao-Blackwell theorem.

UNIT-II:
Methods of estimation-maximum likelihood, moments, and minimum chi-square – properties

UNIT-III:
Test of hypothesis: Type-I error and II errors-power test –Neyman-Pearson Lemma-likelihood   ratio tests-concept of most powerful test.

UNIT-IV:
Exact Sample Test: t, Chi-square and F distributions .Relationship between t, F and Chi-square.

UNIT-V:
Large Sample Test: Sampling distributions – concept of standard error – sampling distribution based on Normal distributions .

Books recommended for study:
1. Fundamentals mathematical Statistics by S.C Guptha & V.K. Kapoor, Sultan chand sons, revised edition 2002.
2. Fundamentals of Applied statistics by S.C. Guptha, & V.K. Kapoor, Sultan chand   sons-2007.

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Semester: III - Core paper V
Subject Title: Differential Equations and Laplace Transforms   Credit Hours: 6

This paper presents the method of solving ordinary differential Equations of First Order and Second Order, Partial Differential equations. Also it deals with Laplace Transforms, its inverse and Application of Laplace Transform in solving ordinary Differential Equations with constant coefficients and Fourier series.
Goals:
It enables the students to learn the method of solving Differential Equations.
Objectives:
End of this paper, the students should gain the knowledge about the method of solving Differential Equations. It also exposes Differential Equation as a powerful tool in solving problems in Physical and Social sciences.
Unit-I :
First order higher degree equations- solvable for x, y, p-Clairaut's form- Simultaneous equations $F_1(D)x + F_2(D)y = F(t)$ and $G_1(D)x + G_2(D)y = G(t)$ F_1,F_2,G_1,G_2 are rational functions of $D = d/dt$ and F,G are explicit functions of t.
Unit-II:
Ordinary differential equations: General solution of Second order ODE with constant coefficient-Higher order equations where f(D) is easily factorizable.
Unit III :
Partial differential equations: Formation by elimination of arbitrary constants and arbitrary functions – general, particular and complete solutions .
Partial differential equations :Singular and general solutions of first order equations the standard form: $f(p, q) = 0$, $f(x, p, q) = 0$,$f(y, p, q) =0$,$f(z, p, q) = 0$, $f(x, p,) = g(y, q)$, $z = p(x) + q(y) + f(p ,q)$ and Lagrange's method of solving linear PDE $Pp + Qq = R$.
Unit-IV :
Laplace Transforms: Definition- Transform of e^{at} , cos at, sin at, and tan at – first shifting theorem- theorems for $L\{f\ '(t)\}$, $L\{f^{\ n}(t)\}$- Laplace transforms of e^{at} cos ht, e^{at} sinht , e^{at} t^n
Unit-V:
 Inverse Laplace Transforms -solving ordinary differential equations with constant co-efficient by using Laplace transforms.
Treatment as in
Kandasamy. P, Thilagavathi. K "Mathematics for B. Sc – Branch – I Volume III", S. Chand and Company Ltd, New Delhi, 2004.
References:
1) S. Narayanan and T.K. Manickavasagam Pillai, Calculus, S. Viswanathan (Printers and Publishers) Pvt. Ltd, Chennai 1991
2).N.P.Bali, Differential Equations, Lakshmi Publications Ltd, New Delhi, 10 [th] edition,2006.

SEMESTER III

Skill Based Subject : MS-Office   Credit hours: 2
 Subject Description: This paper provides the knowledge about Ms-Office
Goal: To enable students to acquire basic   knowledge on Computers.
Objective: On successful completion of this paper   the students gain the knowledge about MS-Word, excel, powerpoint, access.

UNIT-I
MS-WORD: Word processing overview-creating and editing documents-formatting document-working with header and footnotes.

UNIT-II
Creating report and news letter-creating table and merging document-creating web page-macros-keyboard shortcuts-menus-custom toolbars.

UNIT-III
MS-EXCEL:
Spread sheet overview-creating worksheet-managing and analyzing complex worksheet-creating charts form template-sharing data between applications.

UNIT-IV
MS-ACCESS:
Data base over view-creating data base – modifying table and creating form-filtering and quering tables-creating reports and mailing lables-sharing information between applications.

UNIT-V
MS-POWERPOINT:
Basics-using text-adding visual elements-charts and tables-drawing- clip art-sounds-animation-apply time transitions to slides.

Text Book:
Microsoft office 2003-Michael Desmond first edition, 2004.

Practical list for MS-OFFICE

Credit hours:2

MS-WORD:

1.Illustrate the mail merge concepts to apply for a suitable job for atleast 5 companies.

2.Using MS-Word perform the following:

a) Change the font size to 20.

b) Change the font type to Garamond.

c) align the text to left,right,justify and center.

d)Underline the text.

MS-EXCEL:

3. Built a worksheet to perform correlation and regression coefficients using formula and check the answer with built-in-functions.

4.Worksheet preparation for electricity bill preparation.

5. Draw graphs to illustrate class performance.

MS-POWERPOINT:

6.Prepare an organization chart for a college environment in powerpoint.

7.Perform frame movement by inserting clip arts to illustrate running of a car automatically.

8.Prepare a powerpoint presentation with all the slide translation facilities.

MS-ACCESS:

9.Perform sorting on name, place and pincode of students database and list them in the sorted order.

10.Create mailing lables for employee database.

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Semester: IV - Core Paper – VI

Subject title: Statics **Credit hours: 6**
Subject Description:
This paper contains the nature of forces acting on a surface, friction and center of gravity.
Goal:
To enable the students to realize the nature of forces and resultant forces when more than one force acting on a particle.
Objectives:
On successful completion of paper the students should realize the concept about the forces, resultant force of more than one force acting on a surface, friction and center of gravity. Also we can differentiate static and dynamic forces.
UNIT-I
Forces acting at a point – Parallelogram law of forces-triangle law of forces.
UNIT- II
(λ, μ) Theorem - Polygon law of forces-conditions of equilibrium.
UNIT – III
Parallel Forces- Moment and Couples composition of parallel forces(like and unlike) – Moment of a force about a point - Varignons theorem.
UNIT – IV
Co-planar forces acting on a rigid body – Theorem on three co-planar forces in equilibrium.
UNIT – V
Reduction of a system of co-planar forces to a single force and a couple - necessary & sufficient conditions of equilibrium only.

Treatment as in
M.K.Venkataraman, Statics, Agasthiar Publications, Trichy, 15th edition,2012.

References
1. A.V.Dharmapadam, Statics , S.Viswanathan Printers and Publishing Pvt., Ltd, 2011

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SEMESTER:IV

Skill Based Subject : PROGRAMMING IN C   Credit hours:3

Subject Description: This paper presents the importance of c language, its structure, Data types, Operators of C, Various control statements, Arrays, different types of functions and practical problems.

Goals: To enable the students to learn about the basic structure, Statements, arrays, functions   and various concepts of C language.

Objectives: On successful completion of the paper the students should have:
Learnt the basic structure, operators and statements of c language. Learnt the decision making statements and to solve the problems based on it. Learnt arrays, functions and solve the problems Regarding about it.

UNIT – I

Overview of C - Introduction - Character set - keyword & Identifiers -Constants - Variables - Data types - Defining Symbolic Constants – Expressions.

UNIT – II

Arithmetic operators - Relational operators - logical operators –assignment operators – increment and decrement operates –Conditional operators – Special operators – formatted input and output.

UNIT – III

Decision Making and Branching -The Switch statement - The GOTO statement - Decision Making and Looping -The WHILE statement - The DO statement - The FOR statement - Jumps in Loops .

UNIT – IV

Functions – User defined functions –function types - Need for user Defined functions – A Multi-function program –Structures

UNIT – V

Arrays – Character Arrays — Strings ,standard string function - One and Two Dimensional arrays - Multidimensional arrays.

TEXT BOOKS

1 Programming in ANSI C – E.Balagurusamy , 3rd edition– Tata McGraw hill publishing Company Ltd.,2005.

REFERENCE BOOK:

Programming with ANSI   and Turbo C – Ashok. N. N.Kamthane   – Pearson Education.

PRACTICAL LIST FOR- PROGRAMMING IN C

Credit hours:2

1. Write a C program to find the sum, average, standard deviation for a given set of numbers.

2. Write a C program to generate "n" prime numbers.

3. Write a C program to generate Fibonacci series.

4. Write a C program to print magic square of order n where n > 3 and n is odd.

5. Write a C program to sort the given set of numbers in ascending order.

6. Write a C program to print all possible roots for a given quadratic equation.

7. Write a C program to sort a set of numbers.

8. Write a C program to sort the given set of names.

9. Write a C program to find the product of two given matrix.

10. Write a C program to prepare pay list for a given data.

SEMESTER V - Core Paper – VII

Subject title: Dynamics   **Credit hours: 6**

Subject Description: This paper provides the knowledge about the field Kinematics, projectile, simple harmonic motion and impact of a particle on a surface.

Goal: To enable the students to apply Laws, Principles, Postulates governing the Dynamics in physical reality.

Objectives: End of this paper, the student understand the reason for dynamic changes in the body.

UNIT – I

Kinematics: Velocity – Relative Velocity – Acceleration – Coplanar Motion –Components of Velocity and Acceleration.

UNIT – II

Newton's Laws of Motion -Simple Harmonic motion – Simple Pendulum – Load suspended by an elastic string.

UNIT – III

Projectiles: Path of a projectile-Greatest height-time of filght-range on an inclined plane through the point of projection-Maximum range.

UNIT – IV

Impact on a fixed surface: Impulsive force-Impact on a smooth fixed plane –Direct and oblique impact of two smooth spheres

UNIT – V

Loss of Kinetic energy during direct and oblique impacts-moment of inertia.

Treatment as in

M.K. Venkataraman, Dynamics, 14th Ed. Agasthiar Publications, Trichy, 2011.

References

1. A.V.Dharamapadam , Dynamics, S.Viswanathan Printers and Publishers Pvt., Ltd, Chennai, 1st edition,2011.

2. K.Viswanatha Naik and M.S.Kasi, Dynamics, Emerald Publishers, 2004.

3. Naryanamurthi, Dynamics, National Publishers, New Delhi, 2008.

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SEMESTER V - Core Paper – VII

Subject title: Real Analysis   **Credit hours: 6**
Subject Description: This paper focuses on the Real and Complex number systems, set theory, point set topology and metric spaces.
Goal: To introduce the concepts which provide a strong base to understand and analysis mathematics.
Objective: On successful completion of this paper the students should gain the knowledge about real and complex numbers, sets and metric space.
UNIT I
Least upper bound, greatest lowest bound- the Cauchy Schwartz inequalities –Countable and uncountable sets- Uncountability of the real number systems- Set Algebra – Countable collections of countable sets..
UNIT II
Elements of point set topology: Euclidean space R^n –open balls and open sets in R^n. The structure of open Sets in R^n –closed sets and adherent points –The Bolzano –Weierstrass theorem –the Cantor intersection Theorem
 UNIT III
 Covering –Lindelof covering theorem –the Heine Borel covering theorem –Compactness in R^n –Metric Spaces –point set topology in metric spaces –compact subsets of a metric space –Boundary of a set
UNIT IV
 Convergent sequences in a metric space –Cauchy sequences –Completeness sequences – complete metric Spaces. Limit of a function –Continuous functions –continuity of composite functions. Continuous complex valued and vector valued functions - Bolzano's Theorem
  UNIT V
Roll's theorem –The mean value theorem for derivatives –Taylor's formula with remainder. Properties of monotonic functions –functions of bounded variation –total Variation –additive properties of total variation on (a, x) as a function of x – functions of bounded variation expressed as the difference of increasing functions –continuous functions of bounded variation
Treatment as in
Tom. M. APOSTOL, Mathematical Analysis, 2nd ed., Addison-Wisely. Narosa PublishingCompany, Chennai, 2002..
References
1. R.R.Goldberg, Methods of Real Analysis, Oxford &IBH Publishes Co. Pvt Ltd,1970.
2. G.F.Simmons, Introduction to Topology and Modern Analysis, McGraw – Hill, New York,2004.
3. J.N.Sharma and A.R.Vasistha, Real Analysis, Krishna Prakashan Media (P) Ltd,40 [th] edition,2012.

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Semester V
Skill Based Subject**- OPTIMIZATION TECHNIQUES**-I

Subject description: **Credit hours:6**
 This paper contains advantages, limitations and applications of O.R, formulation of Linear Programming Problems (L.P.P), methods to solve L.P.P. like simplex method, Charnes Penality Method and Two Phase Simplex method. Also it deals about duality in L.P.P, Transportation and Assignment Problems with applications
 Goal:
 It enables the students to use the mathematical knowledge in optimal use of resources.
 Objectives:
 On successful completion of this paper students should have gained knowledge about optimal use of resources.
 Unit I:
 O.R: Introduction – Characteristics of O.R - Scientific methods in O.R – Necessary of O.R in Industry – O.R and Decision Making – Uses and limitations of O.R.
Linear Programming Problem – Formulation of L.P.P – Graphical solutions of L.P.P.
Simplex Method – Charnes Penality Method (or) Big – M Method
 Unit II:
 Two Phase Simplex method – Problems. Duality in L.P.P– Duality and Simplex Method – Problems
 Unit III:
 The Transportation Problems – Basic feasible solution by L.C.M – NWC- VAM- optimum solutions – unbalanced Transportation problems
 Unit IV:
 The Assignment Problems – Assignment algorithm – optimum solutions – Unbalanced Assignment Problems.
 Unit V:
CPM /PERT – Introduction – Network and basic components – Rules of Network construction – Time calculation in Networks – CPM. PERT –Time calculations– Problems-Difference between CPM&PERT.
Text Book:
1. Operations Research – Kandiswarup, P. K. Gupta, Man Mohan, S. Chand & Sons Education Publications, New Delhi, 2008.
References:
1. Operations Research – Prem Kumar Gupta D. S. Hira, S. Chand & Company Ltd, Ram Nagar, New Delhi,2012.
2.Operations Research-Hamdy.A.Taha Published by Dorling Kindersley Pvt Ltd,8 [th] edition,2007.

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SEMESTER VI - Core Paper – IX
Subject title: Complex Analysis   **Credit hours: 6**
Subject Description: This paper provides the knowledge about complex number system and complex functions.
Goal: To enable the students to learn complex number system, complex function and complex integration.
Objectives: On successful completion of this paper   the students should gained knowledge about the origin, properties and application of complex numbers and complex functions.
UNIT I
Complex number system, Complex number –Field of Complex numbers – Conjugation – Absolute value -Argument –Simple Mappings.
i) w =z +α ii) w = a^z iii) w =1/z, w= e^z (iv) w = $z^{1/2}$; (v) w=sin z
invariance of cross-ratio under bilinear transformation – Conformal Mapping
UNIT II
Complex functions: Limit of a function –continuity –differentiability – Analytical function defined in a region –Conjugate Hamiltonian function-necessary conditions for differentiability –sufficient conditions for differentiability –Cauchy-Riemann equation in Cartesian polar coordinates –Definition of entire function.
UNIT III
Cauchy's integral   theorem- problem based on Cauchy's derivatives –Taylor's series – Laurent's series .
UNIT IV
 Singularities and Residues: Isolated singularities –Residues –Residue theorem. Meromorphic functions: Theorem on number of zeros minus number of poles –Principle of argument
UNIT V
Real definite integrals: Evaluation using the calculus of residues – Integration on the unit circle –Integral with - ∞ and + ∞ as lower and upper limits with the following integrals:
i) P(x) /Q(x) where the degree of Q(x) exceeds that of P(x) at least 2. Rouche's theorem – Fundamental Theorem of Algebra-Morera's theorem.
Treatment as in
P.Duraipandian and Laxmi Duraipandian, Complex Analysis, Emerald Publishers, Chennai –2,1986.
References
1. Santhinarayan , Theory of functions of Complex Variable, S.Chand and Company, Meerut, 1995.

SEMESTER VI - Core Paper – X
Subject title: Modern Algebra   **Credit hours: 6**
Subject description: This paper provides knowledge about sets, mappings, different types of groups, rings , matrices, vector spaces and linear transformations.
Goals: To enable the students to understand the concepts of sets, groups and rings. Also the linear transformations   and vector spaces.
Objective: On successful completion of paper the students should have concrete knowledge about the abstract thinking like sets, groups, rings and matrices by proving theorems.
UNIT I
Groups, Abelian group, Symmetric group: Definitions and Examples – Basic properties. Subgroups– Order of an element –A Counting Principle -Normal Subgroups and Quotient Groups.
UNIT II
 Rings: Definition and Examples –Some Special Classes of Rings – Commutative ring - Ideals and Quotient Rings- Field – Integral domain.
UNIT III
Hermitian and Skew-Hermitian Matrices – Orthogonal and Unitary Matrices – Rank of a
Matrix –Characteristic Roots and Characteristic Vectors of a Square Matrix.
UNIT IV
Vector space: Elementary Basic Concepts – Subspace of a Vector space – norm of a vector-orthogonal vectors-orthogonal complement of a subspace-orthonormal sets.
UNIT V
 Linear Transformations: Algebra of Linear Transformations – Regular, Singular
Transformations – Range of T – Rank of T - Characteristic Roots – Characteristic Vectors - Matrices.
Treatment as in
I.N. Herstein, Topics in Algebra, second edition, John Wiley & Sons, New York, 2005.
References
1. Surjeet Singh and Qazi Zameeruddin, Modern Algebra, Vikas Publishing house, 8 ᵗʰ edition 2006.
2. Seymour Lipschutz and Marc Lipson, Linear Algebra, 3rd Edition,
    McGraw Hill, 2012.

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Semester VI - Skill Based Subject

Subject title - OPTIMIZATION TECHNIQUES-II   **Credit hours: 6**

Subject Description:

This paper gives emphasis to enhance student knowledge in game theory, performance measures of queues, optimal use of Inventory and Network scheduling with application.

Unit I:

Game Theory – Two person zero sum game – The Maxmini – Minimax principle – problems - Solution of 2 x 2 rectangular Games – Domination Property – (2 x n) and (m x 2)graphical method – Problems.

Unit II:

Queueing Theory – Introduction – Queueing system – Characteristics of Queueing system – symbols and Notation – Classifications of queues – Problems in (M/M/1) : (∞/FIFO);(M/M/1) : (N/FIFO) Models.

Unit III:

Inventory control – Types of inventories – Inventory costs – EOQ Problem with no shortages – Production problem with no shortages – EOQ with shortages – Production problem with shortages.

Unit IV:

Non-linear Programming Problems – General NLPP – Lagrange multiplier – Hessian bordered Matrix – Kuhn Tucker Condition – Problems

Unit V:

Dynamic Programming Problem – Recursive equation approach – D.P.P Algorithm – Solution of L.P.P by D.P.P.

Text Book:

1. Operations Research – Kandiswarup, P. K. Gupta, Man Mohan, S. Chand & Sons Education Publications, New Delhi, 12th Revised edition

References:

1. Operations Research – Prem Kumar Gupta D. S. Hira, S. Chand & Company Ltd, Ram Nagar, New Delhi,2012.
2. Operations Research Principles and Problems: S. Dharani Venkata Krishnan, Keerthi publishing house Pvt Ltd,2007.
3.Operations Research-Hamdy.A.Taha Published by Dorling Kindersley Pvt Ltd,8 [th] edition,2007.

<div align="center">**ELECTIVE:I**</div>

Subject Title: NUMERICAL ANALYSIS   Credit hours:6
Subject Description:

This paper presents method to solve linear algebraic and transcendental equations and system of linear equations. Also Interpolation by using finite difference formulae.

Goal:

It exposes the students to study numerical techniques as powerful tool in scientific computing.

Objective:

On successful completion of this paper the student gain the knowledge about solving the linear equations numerically and finding interpolation by using difference formulae.

 Unit I: The solution of numerical algebraic and transcendental Equations:

Bisection method– Regula Falsi Method – Newton – Raphson method

Unit II:

Solution of simultaneous linear algebraic equations:

Gauss elimination method – Gauss Jordan method – Method of Triangularization –
 Gauss Jacobi method – Gauss Seidel method

 Unit III:

Finite Differences- operators – forward and backward difference tables

– Trapezoidal rule – Simpson's 1/3rd and 3/8th rules – two points and three points formulae

Unit IV:

Interpolation:

Newton's forward and backward formulae – Central differences – Gauss forward and backward formulae —Lagrange's formula.

Unit V:

Taylor series method – Euler's method – improved and modified Euler method – Runge Kutta method(fourth order Runge Kutta method only)

Treatment as in

Kandasamy. P, Thilagavathi. K and Gunavathi. K "Numerical methods" – S. Chand and Company Ltd, New Delhi – 2009.

References:

1. Venkataraman M. K.,"Numerical Methods in Science and Engineering" National Publishing company V Edition 1999.

2. Sankara Rao K., "Numerical Methods for Scientists and Engineers" 2
nd Edition Prentice Hall India 2004.

ELECTIVE-I: OBJECT ORIENTED PROGRAMMING WITH C++

Credit hours:6

Subject Description : This paper enriches the knowledge of students on the Applicability of OOPs concept with the help of C++

Goals : To promote the knowledge of OOPs Concepts through C++.

Objectives : After the successful completion of the paper the student must be able to construct an Application with C++

Unit – I

OOPs: A New Paradigm – Evaluation of Programming Paradigm – Objects – Classes — OOPs Languages –Application of OOPs.

Unit –II

Application of C++ - Structure of C++ Program – Tokens, Expression -Basic Data Types –Symbolic Constants – Operator in C++ - Function.

Unit – III

Array of Objects – Friend Function -Pointer to Members — Operator Overloading and Type Conversions – Overloading – Function Overloading – Special Features of Function Overloading.

Unit – IV

Inheritance – Single Inheritance –public - Private – Protected Inheritance – Multilevel Inheritance – Multiple Inheritance – Hierarchical Inheritance – Hybrid Inheritance – Polymorphism – Virtual Functions

Unit – V

C++ Streams – Stream Classes -Unformatted I/O Operation – Managing Console I/O Operations - Classes for File Stream Operations – Opening and Closing a file.

Text Books:

1. E.Balagurusamy - 'Object Oriented programming with C++', 3rd edition, McGraw Hill Publishing Company Limited, 2006.

Books for Reference:

1. Ashok N.Kamthane – 'Object Oriented Programming with ANSI and Turbo C++', Pearson

2. D.Ravichandran, "Programming with C++", Tata McGraw-Hill Publishing CompanyLimited, New Delhi, 2002.

PRACTICAL LIST-OOPS With C++

Credit hours:2

1. Program to calculate depreciation under Diminishing Balance method (Using class, defining member function inside the class)

2. Program to print the Employees' payroll statement (using control structures).

3. Program to calculate simple Interest and compound Interest(using nested class).

4. Program to calculate net income of a family(using friend function in two classes).

5. Program to print the book list of library(using array of objects).

6. Program to prepare cost sheet (using inheritance).

7. Program to calculate margin of safety (using multilevel inheritance).

8. Program for bank transaction (using constructor and destructor).

9. Program to calculate increase or decrease in working capital using operator overloading.

10. Program to create the student file and prepare the marks slip by accessin the file.

ELECTIVE-I: PARTIAL DIFFERENTIAL EQUATIONS
Credit hours:6

Unit I:
Mathematical Models: The Classical equation – The vibrating string – The vibrating membrane – Waves in elastic medium – Conduction of Heat in solids.

Unit II:
Classification of second order equations: Second order equations in two independent variables – Canonical forms – equations with constant coefficients – general solution

Unit III:
The Cauchy problem: The Cauchy problem – Cauchy – Kowlalewsky theorem – Homogeneous wave equation – Initial – Boundary value problems – Non-homogeneous boundary conditions – Finite string with fixed ends – Non-homogeneous wave equation.

Unit IV:
Methods of separation of variables: Seperation of variables – The vibrating string problem – Existence and Uniqueness of solution of the vibrating string problem.

Unit V:
Boundary value problems: Boundary value problems – Maximum and minimum principles – Uniqueness and continuity theorems – Dirichlet problems for a circle – Dirichlet problems for a circular annulus.

Treatment as in:
Partial Differential Equations for Scientists and Engineers, 3rd Edition, by Tyn Myint. U with Lokenath Debnath,1987.

References:
1.I.N.Sneddon, Elements of Partial Differential Equations, McGraw Hill, London, 1957.
2.L.C.Evans, Partial Differential Equations, AMS, Providence, R I, 2003

ELECTIVE-II: NUMBER THEORY

Credit hours:6

Unit I:
    Introduction, Divisibility, Primes.

Unit II:
    Congruences, solutions of congruences, Congruences of Degree 1. The functions $\emptyset(n)$, congruences of higher degree, Prime power moduli, Prime modulus.

Unit III:
    Congruences degree 2, prime modulus, POWER Residues, Number theory from an algebraic view point , Multiplicative groups, quadratic residues.

Unit IV:
    Quadratic   reciprocity – The Jacobi Symbol – Greatest integer function.

Unit V:
    Arithmetic functions – The Moebius Inversion formula – The multiplication of arithmetic functions .

Treatment as in:
1. An Introduction to Theory of Numbers by Ivan Nivan and Herberts Zucherman. Third Edition,   1972, Wiley Eastern Limited, New Delhi.

Reference:
1. T.M. Apostol, Introduction to Analytic Number Theory, Springer Verlag, 1976.
2. Kennath and Rosan, Elementary Number Theory and its Applications, Addison Wesley Pulishing Company, 1968.
3. George E. Andrews, Number Theory, Hindustan Publishing, New Delhi, 1989.

ELECTIVE-II-FUZZY MATHEMATICS

Credit hours:6

Objectives

1. To know the fundamentals of fuzzy Algebra.

2. To know the basic definitions of fuzzy theory

3. To know the applications of fuzzy Technology.

UNIT-I

Introduction- Fuzzy subsets-Lattices and Boolean Algebras- L fuzzy sets-operations on fuzzy – level sets – properties of fuzzy subsets of a set.

UNIT-II

Algebraic product and sum of two fuzzy subsets-properties satisfied by Addition and product-cartesian product of fuzzy subsets.

UNIT-III

Introduction- Algebra of fuzzy relations-logic-connectives.

UNIT-IV

Some more connectives-Introduction-fuzzy subgroup-homomorphic image and Pre-image of subgroupoid.

UNIT-V

Fuzzy invariant subgroups-fuzzy subrings.

Recommended Text:

S.Nanda and N.R.Das "Fuzzy Mathematical concepts, Narosa Publishing House, New Delhi,2012.

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ELECTIVE-II
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Subject Title: DISCRETE MATHEMATICS   **Credit Hours: 6**

Subject Description: This paper focuses on the mathematical logic, Relations& Functions, Formal languages and Automata, Lattices and Boolean Algebra and Graph Theories.

Goal: To enable the students to learn about the interesting branches of Mathematics.

Objectives: On successful completion of this paper should gain knowledge about the Formal languages Automata Theory, Lattices & Boolean Algebra and Graph Theory.

UNIT-I:

Mathematical logic: Connections well formed formulae, Tautology, Equivalence of formulae, Tautological implications.

UNIT-II:

Relations and functions: Composition of relations, Composition of functions, Inverse functions, one-to- one, onto, one-to-one& onto, onto functions, Hashing functions, Permutation function, Growth of functions.

UNIT-III:

Lattices and Boolean algebra: Partial ordering, Poset, Lattices, Boolean algebra, Boolean functions, Theorems, Minimization of Boolean functions

UNIT-IV:

Formal languages and Automata: Regular expressions, Types of grammar, Regular grammar and finite state automata, Context free and sensitive grammars

UNIT-V:

Graph Theories: Directed and undirected graphs, Paths, Reachability, Connectedness, Matric representation, Eular paths, Hamiltonean paths, Trees, Binary trees, simple theorems, and applications.

Text Books:

J.P Tremblay and R.P Manohar "Discrete Mathematical Structures with applications to computer science", Mc.Graw Hill, 1997.

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Elective Paper –III

Subject title: Graph Theory   **Credit hours-6**
Subject description: This paper focuses on the Basic concepts of graph theory, connectedness, Eulerian graphs, Konigsburg bridge problem and Hamiltonian graphs, also discusses the Characteristics of trees, Planarity Chromatic number and five colour theorem .
Goal: To enable the students to learn about the Basic concepts of graph theory, Konigsberg bridge problem and Hamiltonian graphs and five colour theorem.

Objectives: On successful completion of this paper the students should gain knowledge about the Basic concepts of graph theory, characteristics of trees.

Unit-I:
Definition of graphs and examples-incidence and degree-subgraphs- isomorphism-complement of graphs-operation of graphs.
Unit-II:
Walks, Trails and Paths –connectedness and components-cut points and bridges-blocks.
Unit-III:
 Eulerian graphs-Konigsberg bridge problem-hamiltonian graphs.
Unit-IV:
Trees-characteristics of trees-center of a tree- Definitions-basic concepts- properties.
Unit-V:
Planarity-colourability-chromatic number-five-colour theorem-four colour theorem.
Text books:
Invitation to graph theory by S.Arumugam and S.Ramachandran,new gamma publishing house,palayamkottai,1994.
Reference:
1.A First course in Graph Theory-S. A. Choudum, Macmillan Publishers india Ltd,2011.
2.Graph Theory with applications to Engineering & Computer Science-Narsingh DEO PHI Learning Pvt,Ltd,2011.
3. Harary: "Graph Theory" (Narosa Publishing HQCK).

ELECTIVE-II-: FLUID DYNAMICS

Credit Hours:6

Unit I:
Introductory Notions – Velocity – Stream Lines and Path Lines – Stream Tubes
and Filaments – Fluid Body – Density – Pressure..

Unit II:
Differentiation following the Fluid –Equation of continuity – Boundary conditions
– Kinematical and physical – Rate ofchange of linear momentum – Equation of
motion of an inviscid fluid.

Unit III:
Two Dimensional Motion– Complex Potential –basic singularities – source – sink
– Vortex – Circle theorem. Flow past a circular cylinder with circulation – Blasius
Theorem – Lift force. (Magnus effect)

Unit IV:
Viscous flows – Navier-Stokes equations – Steady flow through an arbitrary
cylinder under pressure – Steady Couettc flow between cylinders in relative motion
– Steady flow between parallel planes.

Unit V:
Laminar Boundary Layer in incompressible flow: Boundary Layer concept –
Boundary Layer equations – Displacement thickness, Momentum thickness –
Kinetic energy thickness – integral equation of boundary layer.

For Units I and II:
Treatment as in: Theoretical Hydro Dynamics by L.M. Milne Thomson,
McMillan Company, 5th Edition (1968).

For Units III, IV and V:
Treatment as in Modern Fluid Dynamics – (Volume I) by N. Curle aand H.J.
Davies, D Van Nostrand Company Limited., London (1968).

ELECTIVE-III LINEAR ALGEBRA

Credit hours:6

Subject description

This course provides knowledge about matrices, vector and dual spaces and linear transformation.

Goals

To enable the students to understand the concepts of matrices, vector and dual spaces and linear transformation.

Objectives

To introduce and develop abstract concepts and to understand the subject as a tool applicable to all other branches of Science, Engineering and Technology.

Unit I

Matrices-Characteristic roots of a matrix - Cayley Hamilton theorem statement and proof- verification.

Unit II

Quadratic Forms: Problems-Linear Transformation-Reduction of real Quadratic Form to Normal Form-Definite, Semi-Definite and Indefinite Real Quadratic Forms.

Unit III

Vector Spaces: Elementary basic concepts – Linear independence and Basis-Modules.

Unit IV

Dual Spaces – Inner Product Spaces.

Unit V

The algebra of   linear transformation -characteristic roots – Matrices. **(13 hours)**

Text Book

1. Theory of Matrices -B.S. Vatssa, Second Revised Edition-Wiley Eastern Limited 1995.

2. Topics in algebra I. N. Herstein ,Second Edition-John Wiley Sons (ASIA) Pvt Ltd 2004.