Jaya College of Arts and Science, Thiruninravur-602024.

Department of Mathematics

Year : 2020-2021

Programme Offered :

- **B.Sc (Mathematics)**

Programme Objective :

PO 1:	To acquire the basic mathematical knowledge which will provide the students with a strong foundation for further study in Mathematics.
PO 2:	To develop fundamental mathematical skills and ability for independent mathematical learning and reasoning.
PO 3:	Acquire knowledge in functional areas of mathematics and apply in all the fields of learning.
PO 4:	Develop critical thinking , creative thinking , self-confidence for eventual success in carrier.
PO 5:	To meet the current problems in various areas of mathematics.
PO 6:	To provide students with an intensive and in-depth learning experiences in the field of mathematics.
PO 7:	Prepares students for post graduate studies by providing then with necessary knowledge and opportunities.
PO 8:	Engage students in Research projects.
PO 9:	Develop appropriate technology based teaching and learning opportunities.

Programme Outcome :

Programme Specific Outcomes	
PSO 1:	Ability to acquire knowledge of algebra, calculus, Differential Equations, Analysis(Real and Complex) and several other branches of Mathematics. Also it leads to study of related areas like computer science and physical sciences.
PSO 2:	Enabling students to develop a positive attitude towards Mathematics as an interesting and valuable subject of study.
PSO 3:	Acquire good knowledge and understanding in advance areas of mathematics and its application.
PSO 4:	Ability to pursue advanced studies and Research in pure and applied mathematical sciences.
PSO 5:	Acquire basic practical skills and technical knowledge along with domain knowledge different subject in science stream.

PSO 6:	Help students to enhance the employeability for jobs in public and private enterprises.
PSO 7:	Ability to analysis the problem, identify and define the computing requirements which may be appropriate to its solution.

S.NO.	PART	SUBJECT NAME	CREDITS	MAX. MARKS		
SEMESTER I				**EXTERNAL MARKS**	**INTERNAL MARKS**	**TOTAL**
1	I	Language Paper -I	3	75	25	100
2	II	**BP2-ENG01-Communicative English I**	3	50	50	100
3	III	BMA-CSC01: Algebra	4	75	25	100
4		BMA-CSC02: Differential Calculus	4	75	25	100
5		BMA-CSA01:Calculus of Finite differences and Numerical Analysis-I	5	75	25	100
6	IV	Basic Tamil/Adv. Tamil/NME –I*	2	75	25	100
7		**BP4-EPSC 01-English for Physical Sciences I**	4	50	50	100
		Total Credits	**25**			
SEMESTER II			**CREDITS**	**EXTERNAL MARKS**	**INTERNAL MARKS**	**TOTAL**
8	I	Language Paper –II	3	75	25	100
9	II	**BP2-ENG02-Communicative English II**	3	50	50	100
10	III	BMA-CSC03: Trigonometry	4	75	25	100
11		BMA-CSC04: Integral Calculus and Vector Analysis	4	75	25	100
12		BMA-CSA03:Calculus of Finite differences and Numerical Analysis-II	5	75	25	100
13	IV	Basic Tamil/Adv. Tamil/NME-II*	2	75	25	100
14		**BP4-EPSC 02-English for Physical Sciences II**	4	50	50	100
		Total Credits	**25**			
SEMESTER III			**CREDITS**	**EXTERNAL MARKS**	**INTERNAL MARKS**	**TOTAL**
15	I	Language Paper -III	3	75	25	100
16	II	**BP2-ENG03-Language Through Literature- I**	3	50	50	100
17	III	BMA-CSC05: Analytical Geometry	4	75	25	100
18		BMA-CSC06: Differential Equations	4	75	25	100
19		BMA-CSA02:Mathematical Statistics-I	5	75	25	100
20	IV	Soft Skills	3	50	50	100
21		Environmental Studies	Examination will be held in Semester IV			
		Total Credits	**22**			
SEMESTER IV			**CREDITS**	**EXTERNAL MARKS**	**INTERNAL MARKS**	**TOTAL**
22	I	Language Paper -IV	3	75	25	100

23	II	**BP2-ENG04-Language Through Literature- II**	3	50	50	100
24	III	BMA-CSC07: Transform Techniques	4	75	25	100
25		BMA-CSC08: Statics	4	75	25	100
26		BMA-CSA04:Mathematical Statistics-II	5	75	25	100
27	IV	Environmental Studies	2	75	25	100
28		Soft Skills	3	50	50	100
		Total Credits	**24**			
SEMESTER V			**CREDITS**	**EXTERNAL MARKS**	**INTERNAL MARKS**	**TOTAL**
29	III	BMA-CSC09: Algebraic Structures-I	4	75	25	100
30		BMA-CSC10: Real Analysis-I	4	75	25	100
31		BMA-CSC11: Dynamics	4	75	25	100
32		BMA-CSC12: Discrete Mathematics	4	75	25	100
33		BMA-DSEA1:Programming language 'C' with practicals	5	75	25	100
34	IV	Value Education	2	75	25	100
		Total Credits	**27**			
SEMESTER VI			**CREDITS**	**EXTERNAL MARKS**	**INTERNAL MARKS**	**TOTAL**
36	III	BMA-CSC13: Algebraic Structures-II	4	75	25	100
37		BMA-CSC14: Real Analysis-II	4	75	25	100
38		BMA-CSC15: Complex Analysis	4	75	25	100
39		BMA-DSEB2:Graph Theory	5	75	25	100
40		BMA-DSEB3:Operation Research	5	75	25	100
41	IV	Extension Activities	1			
		Total Credits	**23**			
		Total credits (Core, Elective, SBS)	**146**			

Semester: I

Course Name: ALGEBRA **Course Code: SM21A**

Course Objective

- The aim of teaching algebra in to help in expression of abstruct ideals.
- Teaching of Algebra should enable the students to use in the solution of some of the stiff problems in arithmetric.
- Graph linear, power root, reciprocal, absolute value, polynomial rational, exponential logarithmic functions using basic transformations.
- Use mathematical vocabulary and symbols in order to understand, interpret and represent mathematical informations.

Course OutCome

CO 1:	Students will acquire basic ideas in theory of equations, Matrices and theory of Numbers.
CO 2:	Knowledge to solve theoretiecal and applied problems.
CO 3:	Use algebra methods to solve a variety of problems involving exponential, logarithmic, polynomial and rational functions.
CO 4:	Graph solutions sets of systems of inequalities.

Syllabus

UNIT I

Theory of Equations :Polynomial equations with Imaginary and irrational roots- Relation between roots and coefficients- Symmetric functions of roots in terms of coefficients.
Chapter 6 : Section 9 to 12.

UNIT II

Reciprocal equations - Standard form-Increase or Decrease the roots of the given equation - Removal of terms Approximate solutions of roots of polynomials by Horner's method.
Chapter 6: section 16, 16.1, 16.2, 17, 30.

UNIT III

Summation of Series : Binomial- Exponential -Logarithmic series (Theorems without proof):
Chapter 3: Section 10, Chapter 4: Section 3, 3.1, 3.5, 3.6, 3.7 (omit 3.4)

UNIT IV

Symmetric- Skew Symmetric- Hermitian- Skew Hermitian- Orthogonal Matrices- Eigen values & Eigen Vectors- Similar matrices- Cayley - Hamilton Theorem.
Chapter 2: Section 6.1 to 6.3, 9.1, 9.2, 16, 16.1, 16.2, 16.3.

UNIT V

Prime number and Composite number - Divisors of a given number N- Euler's function (without proof) - Integral part of a real number - congruences.
Chapter 5: Section 1 to 13.

Contents and treatment as in

1. Algebra, Volume I by T. K. ManicavachagamPillay,T.Natarajan, K.S.Ganapathy, Viswanathan Publication 2007 - Unit – 1 and 2.
2. Algebra, Volume II by T. K. ManicavachagomPillay ,T.Natarajan ,K.S.Ganapathy, Viswanathan Publication 2008 - Unit – 3, 4 and 5.

Reference:-

1. Algebra by S. Arumugam (New Gama publishing house, Palayamkottai).
2. Algebra and Trigonometry, Volume I and II by P.R.Vittal, V.Malini (Margham Publishers).

e-Resources:

1. http://mathworld.wolfram.com
2. http://www.themathpage.com/

Course Name : DIFFERENTIAL CALCULUS **Course Code : SM21B**

Course Objective

- Differential calculus then enables us to find the limit of elasticity in the interval of rapid changes of deformation by using a derivative equation that describes the rate of change of a function.
- To provide students with an introduction to the theory of ordinary differential equations through applications, methods of solution.
- Compute limits, derivatives and integrals.
- Recognize the appropriate tools of calculus to solve applied problems.

Course OutCome

- Gain knowledge of fundamental concepts of real numbers.
- Introduction to sequences and series.
- Learn about check function is continuous the consequences of the intermediate value theorem for continuous functions.
- Introduction to Ordinary Differential Equations.

Syllabus

UNIT I

Successive differentiation - n^{th} derivative- standard results – Trigonometrical transformation – formation of equations using derivatives - Leibnitz's theorem and its applications

Chapter 3 section 1.1 to 1.6, 2.1 and 2.2

UNIT II

Total differential of a function – special cases – implicit functions - partial derivatives of a function of two functions - Maxima and Minima of functions of two variables- Lagrange's method of undetermined multipliers.

Chapter 8 : Section 1.3 to 1.5 and 1.7, Section 4, 4.1 and 5.

UNIT III

Envelopes – method of finding envelopes – Curvature- circle, radius and centre of curvature- Cartesian formula for radius of curvature – coordinates of the centre of curvature – evolute-and involute - radius of curvature and centre of curvature in polar coordinates – p-r equation

Chapter 10 Section 1.1 to 1.4 and Section 2.1 to 2.7

UNIT IV

Polar coordinates - angle between the radius vector and the tangent – slope of the tangent in the polar coordinates – the angle of intersection of two curves in polar coordinates- polar sub tangent and polar sub normal – the length of arc in polar coordinates.
Chapter 9 Section 4.1 to 4.6

UNIT V

Definition-Asymptotes parallel to the axes – special cases – another method for finding asymptotes - asymptotes by inspection – intersection of a curve with an asymptote.
Chapter 11 - Section 1 to 7.

Content and treatment as in

"Calculus", Volume - 1 by S. Narayanan and T.K. Manicavachagompillay - S.Viswanathanpublishers – 2

Reference:-

1.Calculus , Dr. P.R. Vittal&Dr. V. Malini, Margham Publications, Chennai.
2.Calculus by Thomas and Fenny, Pearson Publication.
3.Calculus by Stewart
4. Calculus , Dr. P.R. Vittal&Dr. V. Malini, Margham Publications, Chennai.

e-Resources:

1. http://www.themathpage.com/
2. http://mathworld.wolfram.com
3. http://www.univie.ac.at/future.media/moe/galerie.html
4. http://www.analyzemath.com/calculus

Course Name : CALCULUS OF FINITE DIFFIERENCE AND NUMERCIAL ANALYSIS-I
Course Code : SM3AB

Course Objective

- Decribe the solutions of simultaneous linear equations.
- Understand the finite differences.
- Illustrate the operators "E" and relation between them.
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Course OutCome

- To acquire knowledge about Numerical techniques.
- To understand the Linear algebraic formulae.
- To understand the transcendental equations.
- To analyze knowledge about interpolation using difference formula.
- Able to know the important of "E" operators.

Syllabus

UNIT I

Solutions of algebraic and transcendental equations: Bisection method- Iteration method- Regula-falsi method- Newton-Raphson method. - Chapter 1 :Section 1.1 - 1.4

UNIT II

Solutions of Simultaneous Linear Equations: Gauss-Elimination method, Gauss-Jordan method, Crout's method, Gauss-Seidel method. - Chapter 2 :Section 2.1 - 2.4 , 2.6

UNIT III

Finite Differences: E operators and relation between them- Differences of a polynomial-Factorial polynomials- inverse operator Δ^{-1} -Summation Series. - Chapter 3 :Section 3.1 to 3.4, 3.6, 3.7.

UNIT IV

Interpolation with Equal Intervals:Newton's Forward and Backward Interpolation formulae-

Central Differences Formulae: Gauss-Forward and Backward Formulae- Stirling's Formula and Bessel's Formula-Equidistant terms with one or more missing values.
Chapter 4 :Section 4.1- 4.3 (omit 4.1a, 4.4), 4.7 . - Chapter 5 :Section 5.1- 5.6.

UNIT V

Interpolation with Unequal Intervals: Divided Differences - Newton's Divided Differences Formula for Interpolation -Lagrange's Formula for Interpolation-Inverse Interpolation- Lagrange's method-Reversion of Series method. - Chapter 6 :Section 6.1, 6.2, 6.5, 6.7.

Content and Treatment as in

"Calculus of Finite Differences and Numerical Analysis" by P. Kandasamy and K. Thilagavathy, S. Chand and Co Pvt.Ltd.

Reference:

1. "Numerical Analysis " by B. D. Gupta, Konark Publishing.
2. "Numerical methods in Science and Engineering" by M. K. Venkataraman, National Publishing House, Chennai.

e-Resources:

1. https://nptel.ac.in

https://www.encyclopediaofmath.org/index.php/Finite-difference_calculus

Semester: II

Course Name: TRIGONOMETRY **Course Code :SM22A**

Course Objective :

- Discover the need for working with triangles.
- Understand the angles, slopes.
- The student is able to functions in teams.
- Evaluate the sin trigonometric functions for a given angle.
- Students will be recognize and use the angle.

Course OutCome:

TRIGONOMETRY	
CO 1:	About the expansion of Trigonometric functions, Hyperbolic functions and sum of Trigonometric series.
CO 2:	Convert between decimal degree, minute-seconds and radian measures of an angle.
CO 3:	Evaluate the 6 trigonometric functions using a calculators as well as determining exact values for some special angles without a calculator.
CO 4:	Solve triangle (right, acute, obtuse) given various angles and sides.
CO 4:	Demonstrate knowledge of several trigonometric Identities and use them to verify other Identities.

Syllabus

UNIT I

Expansions of powers of $\sin\theta$, $\cos\theta$ - Expansions of $\cos^n\theta$, $\sin^n\theta$,$\cos^m\theta\sin^n\theta$
Chapter 2, Section 2.1, 2.1.1, 2.1.2,2.1.3

UNIT II

Expansions of $\sin n\theta$, $\cos n\theta$, $\tan n\theta$ - Expansions of $\tan(\theta_1+\theta_2+ \ldots\ldots +\theta_n)$ - Expansions of sin x, Cosx, tanx in terms of x-Sum of roots of trigonometric equations – Formation of equation with trigonometric roots. Chapter 3, Section 3.1 to 3.6

UNIT III

Hyperbolic functions-Relation between circular and hyperbolic functions - Formulas in hyperbolic functions – Inverse hyperbolic functions Chapter 4, Section 4.1 to 4.7 .

UNIT IV

Inverse function of exponential functions – Values of Log (u+iv) - Complex index.

Chapter 5, Section 5.1 to 5.3

UNIT V

Sums of Trigonometric series – Applications of binomial, exponential, , logarithmic and Gregory's series - Difference method. Chapter 6, Section 6.1 to 6.6.3

Content and treatment as in

Trigonometry by P. Duraipandian and KayalalPachaiyappa, Muhil Publishers.

Reference:-

1. Trigonometry, Calculus , Dr. P.R. Vittal , Margham Publications, Chennai.
2. Trigonometry by T.K. Manickavachagam Pillay.S.Viswanathan (Printers and Publishers) Pvt.Ltd.

e-Resources:

1. http://mathworld.wolfram.com

http://ocw.mit.edu/courses/mathematics/

Course Name: INTERGAL CALCULUS AND VECTOR ANALYSIS Course Code : SM22B

Course Objective

- Students will acquire knowledge about integration and its geometrical application.
- Double, triple integral and improper integral.
- Vector differentiation and vector integration.
- Graphically obtain the surface of revolution of curves.

Course OutCome

- In calculus we use three main tools for analyzing and describing the behavior of functions limits derivation integrals.
- Students solve the applications problem in a variety of ways ranging compleives and limits, derivatives and integrals.
- Understand the nature of hyperbolic functions.
- Solve various limit problems using L'Hospital rule.

Syllabus

UNIT I

Reduction formulae– Types, $\int x^n e^{ax} dx$, $\int x^n cosaxdx$, $\int x^n sinaxdx$, $\int cos^n xdx$, $\int sin^n xdx$, $\int sin^m x cos^n xdx$, $\int tan^n xdx$,$\int cot^n xdx$,$\int sec^n xdx$,$\int cosec^n xdx$, $\int x^n (\log x)^m dx$- Bernoulli's formula.

Chapter 1 Section 13, 13.1 to 13.10,14,15.1.

UNIT II

Multiple Integrals- definition of the double integrals- evaluation of the double integrals- double integrals in polar coordinates – triple integrals – applications of multiple integrals – volumes of solids of revolution – areas of curved surfaces – change of variables – Jacobians.

Chapter 5 Section 1, 2.1, 2.2, 3.1, 4, 6.1, 6.2, 6.3, 7
Chapter 6 Section 1.1, 1.2, 2.1 to 2.4.

UNIT III

Beta and Gamma functions - infinite integral – definitions – recurrence formula of □ functions - properties of □-functions - relation between □ and □ functions.
Chapter 7 Sections 1.1 to 1.4 , 2.1, 2.3, 3, 4, 5.

UNIT IV

Introduction - directional derivative- Gradient- divergence- curl- Laplacian Differential Operator.

Chapter 2 Sections 2.1 - 2.13.

UNIT V

Line, surface and volume integrals - Integral Theorems - Gauss, Greens and Stokes (Without proof) – Problems.

Chapter 3 Sections 3.1 to 3.6 and Chapter 4 Sections 4.1 to 4.5.

Course Name : CALCULUS OF FINITE DIFFIERENCE AND NUMERCIAL ANALYSIS-2 **Course Code : SM3AF**

Course Objective

- To make students aware of the concepts of numerical methods necessary for solving complicated mathematical problems numerically
- Interpolation and approximation
- Numerical differentiation, Numerical Integration, Gauss quadrature.
- Initial and boundary value problem in ODE, Numerical solution of PDE by Finite difference method**.**

Course OutCome

CALCULUS OF FINITE DIFFIERENCE AND NUMERCIAL ANALYSIS-2	
CO 1:	Understand the concepts of finite difference, interpolation, extrapolation and approximation
CO 2:	Learn various techniques of getting numerical solution of system of linear equation and check the accuracy of the solution.

CO 3:	Obtain numerical solution of algebraic and transcendental equations.
CO 4:	Apply numerical methods to diverse situations in physics, engineering and in the other mathematical contexts.

Syllabus

UNIT I

Numerical Differentiation: Derivatives using Newton's forward and backward difference formulae- Derivatives using Stirling's formula- Derivatives using divided difference formula- Maxima and Minima using the above formulae.

Chapter 7 :Section 7.1- 7.4, 7.6.

UNIT II

Numerical Integration: General Quadrature formula- Trapezoidal rule-Simpson's one-third rule-Simpson's three-eighth rule- Weddle's rule- Euler-Maclaurin Summation formula-
Stirling's formula for n!. - Chapter 7 :Section 7.7- 7.9, 7.13- 7.15.

UNIT III

Difference equations:Linear homogenous and nonhomogenous difference equation with constant coefficients- particular integrals for $a^{u}x^{m}$, x^{m}, $sinkx$, $coskx$.

Chapter 8 :Section 8.1- 8.4, 8.6

UNIT IV

Numerical solution of Ordinary Differential Equations (I order only):
Taylor's series method- Picard's method- Euler's method- Modified Euler's method.

Chapter 9: Section 9.5-9.7, 9.9.

UNIT V

Numerical solution of Ordinary Differential Equations (I order only):
Runge-kuttamethod(fourth order only)- Predictor-Corrector method- Milne's method - Adams-Bashforth method.

Chapter 9 : Section 9.10 - 9.14.

Content and Treatment as in

"Calculus of Finite Differences and Numerical Analysis" by P. Kandasamy and K. Thilagavathy, S.Chand and Co. Pvt.Ltd.

Reference:

1) "Numerical Analysis " by B. D. Gupta, Konark Publishing.
2) "Numerical methods in Science and Engineering" by M. K. Venkataraman, National PublishingHouse, Chennai.

e-Resources:

1. https://nptel.ac.in
2. https://www.encyclopediaofmath.org/index.php/Finite-difference_calculus

Semester: III

Course Name: ANALYTICAL GEOMETRY Course Code :

Course Objective

- Describe the two dimensional shapes.
- Describe the three dimensional shapes.
- Illustrate the system of planes.
- Understand the representation of a line.

Course OutCome

CO 1:	Able to analyze characteristic and properties of two dimensional geometric shapes.
CO 2:	To analyze characteristics and properties of three dimensional geometric shapes.
CO 3:	To develop mathematical arguments.
CO 4:	To understand about geometric relationships.
CO 5:	Understand the geometry and its applications in real world.

Syllabus

UNIT I

Chord of contact – polar and pole,- conjugate points and conjugate lines – chord with (x_1, y_1) as its midpoint – diameters – conjugate diameters of an ellipse.- semi diameters- conjugate diameters of hyperbola

Chapter 7: Sections 7.1 to 7.3 , Chapter – 8 Section 8.1 to 8.5.

UNIT II

Polar coordinates: General polar equation of straight line – Polar equation of a circle on A_1A_2 as diameter, Equation of a straight line, circle, conic – Equation of chord, tangent, normal. Equations of the asymptotes of a hyperbola.

Chapter 10 : Sec 10.1 to 10.8.

UNIT III

Introduction – System of Planes - Length of the perpendicular – Orthogonal projection.

Chapter 2 Sec 2.1 to 2.10.

UNIT IV

Representation of line – angle between a line and a plane- co-planar lines- shortest distance 2 skew lines- Length of the perpendicular- intersection of three planes
Chapter 3 :Sec 3.1 to 3.8.

UNIT V

Equation of a sphere - general equation - section of a sphere by a plane - equation of the circle - tangent plane - angle of intersection of two spheres- condition for the orthogonality - radical plane.
Chapter 6 : Sec 6.1 to 6.8.

Contents and treatment as in

1. Analytical Geometry of 2D by P.Durai Pandian- Muhil publishers for Unit – 1 and 2
2. Analytical Solid Geometry of 3D by Shanthi Narayan and Dr.P.K. Mittal-S.Chand& Co. Pvt.Ltd.- for Unit – 3 to

Reference :

1. Analytical Geometry of Two Dimension by T. K. Manikavachakam Pillai and S. Narayanan.S.Viswanathan (Printers and Publishers) Pvt. Ltd.
2. Analytical Geometry of Three Dimension by T. K. Manikavachakam Pillai and S. Narayanan.S.Viswanathan (Printers and Publishers) Pvt. Ltd.

e-Resources:

1. http://mathworld.wolfram.com.

Course Name: DIFFERENTIAL EQUATIONS **Course Code : SM23B**

Course Objective

- To provide the students with an introduction to the theory of ODE through applications.
- Methods of solutions and Numerical approximation.
- Goal is to solve an ODE problems.
- To determine what function or functions satisfy the equations.J

Course OutCome

DIFFERENTIAL EQUATIONS	
CO 1:	Understand the mathematical principles on ordinary differential equations would provide then the ability of formulate.
CO 2:	Understand how to solve the given standard partial differential equations.
CO 3:	Solve differential equations, Using Lagranges analysis which plays a virul solve mathematical applications.
CO 4:	Appreciate the physical significance of differential equations one and two dimensional equations
CO 5:	Solve the given exact equation on a successful differention with such conditions.

Syllabus

UNIT I

Ordinary Differential Equations:Variable separable-Homogeneous Equation-Non-Homogeneous Equations of first degree in x and y-Linear Equation-Bernoulli's Equation-Exact differential equations.

Chapter 2: Section 1 to 6.

UNIT II

Equation of first order but not of higher degree: Equation solvable for dy/dx- Equation solvable for y-Equation solvable for x- Clairauts form-Linear Equations with constant coefficients- Particular integrals e^{ax}, sinax, cosax, x^m, Ve^{ax} where V is sinax or cosax or x^m .

Chapter 4: Section 1, 2.1, 2.2, 3.1.

Chapter 5: Section 4.

UNIT III

Simultaneous linear differential equations- Linear Equations of the Second Order -Complete solution in terms of a known integrals- Reduction to the Normal form- Change of the Independent Variable - Method of Variation of Parameters.

Chapter 6: Section- 6

Chapter 8:Section- 1,2,3,4.

UNIT IV

Partial differential equation: Formation of PDE by Eliminating arbitrary constants and arbitrary functions-complete integral-singular integral-General integral- Lagrange's Linear Equations Pp+Qq=R.

Chapter 12: Section- 1, 2, 3.1, 3.2, 4.

UNIT V

Special methods - Standard forms - Charpit's Methods - Related problemsChapter

12: Section-5.1, 5.2, 5.3, 5.4, 6.

Contents and treatment as in

"Differential Equations and its applications", by S.Narayanan, T.K.Manikavachagam Pillay –- S.Viswanathan (Printers and Publishers) Pvt. Ltd(2006).

Reference:

1.Mathematics for B.Sc-Branch-I Volume –III by P.Kandasamy ,K.Thilagavathy

S.Chand Publications.

2. Differential equations with applications and historical notes by George F.Simmons,

2nd Ed,TataMcgraw Hill Publications .

3. Differential Equations by ShepleyL.Ross, 3 rdEd ,JohnWiely and sons 1984.

4 .Differential Equations by N.P.Bali,Laxmi Publications Ltd,New Delhi-2004.

5. Ordinary and Partial differential Equation by Dr.M. D.Raisinghania ,S.Chand.

e-Resources:

1. http://mathworld.wolfram.com
2. http://www.analyzemath.com/calculus/Differential_Equations/applications. html.

Course Name: MATHEMATICAL STATSITICS-1 **Course Code : SM3AC**

Course Objective

- Understand the survey concepts and planning of a survey.
- Students should be familiar with terminology and special notations.
- Demonstrate completion of this course students will be able to properties of statistical models in common use.
- Sample, population, ratio discrete variable continuous correlation methods variable.

Course OutCome

MATHEMATICAL STATSITICS-1	
CO 1:	Demonstrate completion of this course students will be able to properties of statistical models in common use.
CO 2:	Understanding the survey concepts and planning of a survey.
CO 3:	Understanding knowledge of applicable large sample theory of estimators and tests.
CO 4:	Understand to construct tests and estimators, and derive their properties.
CO 5:	Understand the interpret the sign test and sm rank test.

Syllabus

UNIT I

Concept of sample space- Events- Definition of Probability (Classical,Statstical& Axiomatic)- Addition and Multiplication laws of Probability- Independence- Conditional Probability- Baye's theorem – Simple Problems.

UNIT II

Random Variables (Discrete and Continuous) Distribution function- Expected values and Moments- Moment generating function – Probability generating function- Examples.

UNIT III

Characteristic function- Uniqueness and Inversion theorems (Statements and applications only)- Cumulants - Chebychev's Inequality – Simple Problems.

UNIT IV

Concepts of bivariate distributions- Correlation and Regression- Linear Prediction- Rank Correlation coefficient-Concepts of partial and multiple correlation coefficients- Simple problems.

UNIT V

Standard Distributions – Binomial- Poisson- Normal- Uniform distributions- Geometric- Exponential-Gamma -Beta distributions- Inter relationship between distributions.

Reference:

- S.C.Gupta&V.K.Kapoor : Elements of Mathematical Statistics, Sultan Chand & Sons, NewDelhi.
- Hogg R.V. & Craig A.T. (1988) : Introduction to Mathematical Statistics, McMillan.
- Mood A.M. &Graybill F.A. &Boes D.G. (1974): Introduction to theory of Statistics, McGraw Hill.
- Snedecor G.W. & Cochran W.G(1967) : Statistical Methods, Oxford and IBH.

e-Resources:

1. https://nptel.ac.in
2. https://www.wikipedia.org.

SEMSTER-IV

Course Name: TRANSFORMS TECHNIQUES Course Code : SM24A

Course Objective:

- Express non periodic function to periodic functions using fourier series and fourier transforms.
- Apply Laplace Transforms and Z-transforms to solve differential equations.

Formulate and solve partial differential equations.

Course Outcomes:

- Learn how to use laplace Transforms methods to solve differential equations such as ode and pde
- Learn the required conditions for transforming variable or variables in functions by the laplace transforms
- To reduce a linear Differential equation to an algebraic equations which can then be solved by the formal rules of algebra.
- To understand fourier series representation of periodic singales.

Syllabus

UNIT I: The Laplace Transforms-Definitions-Sufficient conditions for the existence of the Laplace transform(without proof)-Laplace transform of periodic functions-some general theorems-evaluation of integrals using Laplace transform-Problems.

Chapter 5: Section-1 to 5.

UNIT II:The inverse Laplace Transforms- Applications of Laplace Transforms to ordinary differential equations with constant co-efficients and variable co-efficients, simultaneous equations and equations involving integrals-Problems. Chapter 5: Section-6 to 12.

UNIT III: Fourier series- Expansion of periodic functions of period 2π- Expansion of even and odd functions, Half range Fourier series-Change of intervals –Problems.

Chapter 6: Section-1 to 6.

UNIT IV: Fourier Transform- Infinite Fourier Transform(Complex form) – Properties of Fourier Transform – Fourier cosine and Fourier sine Tranform – Properties – Parseval's identity – Convolution theorem - Problems.

Chapter 6: Section-8 to 15.

UNIT V: Z Transforms: Definitionof Z-Transform and its properties - Z-Transforms of some basic functions- Examples and simple problems

Chapter 7: Sections -7.1 to 7.3.

Contents and treatment as in

1. "Calculus-Volume III" – S.Narayananand T.K.ManicavachagamPillai. (Ananda Book Depot)(**for Units I to IV**)
2. "Engineering Mathematics for Semester III- Third Edition – T.Veerarajan (Tata McGraw-Hill Publishing Company Ltd, New Delhi) **(for Unit-V**)

Reference Books

1. Engineering Mathematics Volume III – P.Kandasamy and others (S.Chand and Co.)

e-Resources:

1. http://mathworld.wolfram.com.
2. http://www.sosmath.com.

Course Name: STATICS **CourseCode : SM24B**

Course Objective

- The forces which acts on a body .
- Resultant of forces on a particle.
- An overview statics and an introduction to units and problem solving.
- An important geometry property of shapes and rigid bodies.

Course Outcomes:

STATICS	
CO 1:	Can illustrate the vectorial and scalar representation of forces and moments
CO 2:	Able to analysis the rigid body in equilibrium.
CO 3:	Can evaluate the properties of surface and solids.
CO 4:	Able to calculate the static forces exerted in rigid body.
CO 5:	Able to determine the friction and the effects by the laws of friction.

Syllabus

UNIT I
Force- Newtons laws of motion - resultant of two forces on a particle- Equilibrium of a particle
Chapter 2 - Section 2 .1 , 2.2 , Chapter 3 - Section 3.1.

UNIT II
Forces on a rigid body – moment of a force – general motion of a rigid body- equivalent systems of forces – parallel forces – forces along the sides of a triangle – couples
Chapter 4 - Section 4 .1 to 4.6.

UNIT III
Resultant of several coplanar forces- equation of the line of action of the resultant- Equilibrium of a rigid body under three coplanar forces – Reduction of coplanar forces into a force and a

couple.-problems involving frictional forces
Chapter 4 - Section 4.7 to 4.9,
Chapter 5 - Section 5.1, 5.2.

UNIT IV
Centre of mass – finding mass centre – a hanging body in equilibrium
Chapter 6 - Section 6.1 to 6.3.

UNIT V
Hanging strings- equilibrium of a uniform homogeneous string – suspension bridge
Chapter 9 - Section 9.1, 9.2.

Contents and treatment as in
"Mechanics" by P. Duraipandian ,LaxmiDuraipandian , MuthamizhJayapragasham, S. Chand and Co limited 2008 .

Reference:
1. Dynamics – K. ViswanathaNaik and M. S. Kasi, Emerald Publishers.
2. Dynamics – A. V. Dharmapadam, S. Viswanathan Publishers.
3. Mechanics – Walter Grenier.

e-Resources:
1. https://www.wikipedia.org/
2. https://physics.info

Course Name:MATHEMATICAL STATISTICS-II **Course Code:SM3AG**

Course Objective

- Students should be familiar with terminology and special notations.
- Sample, population, ratio discrete variable continuous correlation methods variable.
- Demonstrate completion of this course students will be able to properties of statistical models in common use.
- Understand the basic principles underlying statistical inference.
- Understand the survey concepts and planning of a survey.

Course Outcomes:

CO 1:	Calculate covariance and correlation and determine independence of random variables, obtain expectations and variances of linear combinations of random variable.
CO 2:	Construct point and interval estimators evaluate their goodness.
CO 3:	Summarize distribution of univariate data and compare multiple distributions.
CO 4:	Estimate population parameters using confidence intervals when appropriate.

CO 5:	Conduct tests of significance when appropriate.

Syllabus

UNIT I

Sampling theory – Sampling Distributions – Concept of Standard error – Sampling distribution based on normal distribution- t, Chi Square and F distributions.

UNIT II

Point estimation – Concepts of unbiasedness – consistency – efficiency and sufficiency- Cramer Rao inequality – Methods of estimation- Maximum likelihood- moments - minimum square and their properties (Statement only).

UNIT III

Test of significance – Standard error- Large sample test, Exact test based on normal, t, chi-square and F distribution with respect to population mean/means, proportion/proportions, variance and correlation coefficient. Test of independence of attributes based on contingency tables- Goodness of fit based on chi-square.

UNIT IV

Analysis of Variance: One way, two way classification concepts &Problems.Interval estimation – Confidence intervals for population mean/means- Proportion/proportions and variances basedon t, Chi-Square and F.

UNIT V

Test of hypothesis- Type I and II errors- Power of test – Neymann Pearson lemma- Likelihood ratio test-concepts of most powerful test- statements and results only-simple problems.

Reference:

- S.C.Gupta&V.K.Kapoor: Elements of Mathematical Statistics, Sultan Chand & Sons, NewDelhi.
- Hogg R.V. & Craig A.T. (1988): Introduction to Mathematical Statistics, McMillan.
- Mood A.M. &Graybill F.A. &Boes D.G. (1974): Introduction to theory of Statistics, McGraw Hill.
- Snedecor G.W. & Cochran W.G(1967) : Statistical Methods, Oxford and IBH.
- Hoel P.G. (1971) : Introduction to Mathematical Statistics, Wiley.
- Wilks S.S. Elementary Statistical Analysis, Oxford and IBH.

e-Resources:

1. https://nptel.ac.in
2. https://www.wikipedia.org.
3. http://ebooks.lpude.in.statistics.

Semester V

Course Name: ALGEBRAIC STRUCTURES-I **Course Code :**

Course Objective

- The objective of this course is introduce the fundamental theory of rings, integral domain and field, and their corresponding homomorphism.
- The focus of the course will be the study certain basic structures called groups and some related structures and in ring theory and field theory.
- Abstract algebra gives to student good mathematical maturity and enable to build mathematical thinking and skill.

Course Objective

ALGEBRAIC STRUCTURES-I	
CO 1:	Understand new concept kike group, cyclic group, lagrange theorem.
CO 2:	Get an idea of normal subgroup quotient group homomorphism and isomorphism of group.
CO 3:	Discuss sets, subsets, and partition and equivalence relations,
CO 4:	Known the fundamental concepts in ring theory such as the concepts of ideas, quotient ring, integral domain.
CO 5:	Learn in detail about field of quotient of an integral domain and Euclidean rings.

Syllabus

UNIT I

Introduction to groups- Subgroups- cyclic groups and properties of cyclic groups- Lagrange's Theorem- A counting principle.
Chapter 2 Section 2.4 and 2.5.

UNIT II

Normal subgroups and Quotient group- Homomorphism- Automorphism.
Chapter 2 Section 2.6 to 2.8.

UNIT III

Cayley's Theorem- Permutation groups.
Chapter 2 Section 2.9 and 2.10.

UNIT IV
Definition and examples of ring- Some special classes of rings- homomorphism of rings- Ideals and quotient rings- More ideals and quotient rings.
Chapter 3 Section 3.1 to 3.5.

UNIT V
The field of quotients of an integral domain- Euclidean Rings- The particular Euclidean ring.
Section 3.6to 3.8.

Contents and treatment as in
"Topics in Algebra" – I. N. Herstein, Wiley Eastern Ltd.

Reference:
1. Modern Algebra by M.L.Santiago, McGraw Hill Education India pvt Ltd.
2. Modern Algebra by S. Arumugam and others, New Gamma publishing House, Palayamkottai.
3. Modern Algebra by Visvanathan Nayak, Emerald Publishers, Reprint 1992.

e-Resources:
1. https://nptel.ac.in
2. http://garsia.math.yorku.ca/~sdenton/algstruct.

Course Name : REAL ANALYSIS-I **Course Code :**

Course Objective

- Have the knowledge of basic properties of the field of real numbers.
- Studying Bolzano-Weierstrass theorem and Cauchy criteria.
- Studying the basic topological properties of the real numbers.
- Have the knowledge of real functions-limits of functions and their properties.

Course Outcome:

REAL ANALYSIS-I	
CO 1:	Apply mathematical concepts and principles to perform numerical and symbolic computations.
CO 2:	Describe the fundamental properties of real numbers.
CO 3:	Understand about sequences and limit of sequences.
CO 4:	Understand about convergences and divergence sequences and their operations.
CO 5:	Explain the concepts of serious and the knowledge of their convergence and divergence.

Syllabus

UNIT I

Sets and Functions: Sets and elements- Operations on sets- functions- real valued functions- equivalence- countability - real numbers- least upper bounds.

Chapter 1 Section 1. 1 to 1.7

UNIT II

Sequences of Real Numbers: Definition of a sequence and subsequence- limit of a sequence- convergent sequences- divergent sequences- bounded sequences- monotone sequences-

Chapter 2 Section 2.1 to 2.6

UNIT III

Operations on convergent sequences- operations on divergent sequences- limit superior and limit inferior- Cauchy sequences.

Chapter 2 Section 2.7 to 2.10

UNIT IV

Series of Real Numbers: Convergence and divergence- series with non-negative terms- alternating series- conditional convergence and absolute convergence- tests for absolute convergence- series whose terms form a non-increasing sequence- the class l^2

Chapter 3 Section 3.1 to 3.4, 3.6, 3.7 and 3.10

UNIT V

Limits and Metric Spaces:Limit of a function on a real line-. Metric spaces - Limits in metric spaces.

Continuous Functions on Metric Spaces: Function continuous at a point on the real line- Reformulation- Function continuous on a metric space.

Chapter 4 Section 4.1 to 4.3 Chapter 5 Section 5.1-5.3

Contents and Treatment as in
"Methods of Real Analysis" : Richard R. Goldberg (Oxford and IBH Publishing Co.).

Reference:

1. Principles of Mathematical Analysis by Walter Rudin,TataMcGrawHill.
2. Mathematical Analysis Tom M Apostol, Narosa Publishing House.

e-Resources:

1. https://mathcs.org/analysis/reals/numseq/sequence.html.
2. http://www-groups.mcs.st-andrews.ac.uk/~john/analysis/index.html
3. http://www.phengkimving.com.

Course Name : DYNAMICS **Course Code :**

Course Objective

- Understand the fundamentals of the theory of kinematics and dynamics of machines.
- Understand techniques for studying motion of machines and their components.
- Use computer software packages in modern design of machines.
-

Course Outcomes:

DYNAMICS	
CO 1:	Distinguish kinematic and kinetic motion.
CO 2:	Determine the degress –of-freedom of a mechanism.
CO 3:	Apply vector mechanics as a tool for solving kinematic problems.
CO 4:	Create a schematic drawing of a real-world mechanism.
CO 5:	Design basic gear trains.

Syllabus

UNIT I
Kinematics -Basic units – velocity – acceleration- coplanar motion.
Chapter 1 - Section 1.1 to 1.4.

UNIT II Work, Energy and power – work – conservative field of force – power – Rectilinear motion under varying Force: Simple harmonic motion (S.H.M.) – S.H.M. along a horizontal line- S.H.M. along a vertical line
Chapter 11 - Section 11.1to 11.3, Chapter 12 - Section 12.1 to 12.3

UNIT III
Projectiles -Forces on a projectile- projectile projected on an inclined plane.
Impact: Impulsive force - impact of sphere - impact of two smooth spheres – impact of a smooth sphere on a plane – oblique impact of two smooth spheres
Chapter 13 - Section 13.1,13.2, Chapter 14 - Section 14.1, 14.5

UNIT IV
Circular motion – Conical pendulum – simple pendulum – central orbits -general orbits - central orbits- conic as centered orbit.
Chapter 15 - Section 15.1, 15.2, 15.6
Chapter 16 - Section 16.1 to 16.3

UNIT V
Moment of inertia, Perpendicular and parallel axes theorem.Chapter
17 -Section 17.1, 17.1.1

Contents and treatment as in
"Mechanics" – P. Duraipandian, LaxmiDuraipandian ,MuthamizhJayapragasham, S. Chand and Co limited 2008 .

Reference :

1. Dynamics – K. ViswanathaNaik and M. S. Kasi, Emerald Publishers.
2. Dynamics – A. V. Dharmapadam, S. Viswanathan Publishers.
3. Mechanics – Walter Grenier

e-Resources:

1. https://nptel.ac.in
2. https://www.wikipedia.org

Course Name : DISCRETE MATHEMATICS **Course Code :**

Course Objective

- Introduce concepts of mathematical logic for analyzing propositions and proving theorms.
- Work with relations and investigate their properties.
- Investigate functions as relations and their properties.
- Introduce basic concepts of graphs, digraphs and trees.

Course Objective

DISCRETE MATHEMATICS	
CO 1:	Understand the notion of ordered sets and maps between ordered sets.
CO 2:	Learn about lattices, modular and distributive lattices, sublattices and homomorphism between lattices.
CO 3:	Learn about basics of graph theory, including Eulerian graphs, Hamitonian graphs.
CO 4:	Become familiar with Boolean algebra, Boolean homomorphism, Karnaugh diagrams, switch circuits and their applications.
CO 5:	Learn about the applications of graph theory in the study of shortest path algorithms.

Syllabus

UNIT I

Integers:Set, some basic properties of integers, Mathematical induction, divisibility of integers, representation of positive integers

Chapter 1 - Sections 1.1 to 1.5

UNIT II

Boolean algebra &Applications: Boolean algebra, two element Boolean algebra, Disjunctive normal form, Conjunctive normal form

Chapter 5 - Sections 5.1 to 5.4

UNIT III

Application, Simplication of circuits, Designing of switching circuits, Logical Gates and Combinatorial circuits.

Chapter 5 - Section 5.5, 5.6

UNIT IV

Recurrence relations and Generating functions: Sequence and recurrence relation, Solving recurrence relations by iteration method, Modeling of counting problems by recurrence relations, Linear (difference equations) recurrence relations with constant coefficients, Generating functions, Sum and product of two generating functions, Useful generating functions, Combinatorial problems.

Chapter 6 - Section 6.1 to 6.6

UNIT V

Proportional logic and Predicate logic: Proportional logic, Adequate system of connectivies, Translation of sentences in a Natural Language into Statement Formula, Logical validity of arguments, Predicate Logic, Negation of a statement obtained by qualification of a predicate, Logical operations on predicates or quantified predicates, Symbolization of sentences by using

predicates, Quantifiers and connectives, Logical validity of arguments.
Chapter 8 - Sections 8.1, 8.5 to 8.8 (Omit Section 8.2 to 8.4)

Contents and treatment as in

"Introduction to Discrete Mathematics", 2nd edition, 2002 by M. K. Sen and B. C. Chakraborty, Books and Allied Private Ltd., Kolkata.

Reference:-

1. Discrete mathematics for computer scientists and mathematicians by J. L. Mertt,AbrahamKendel and T. P. Baker prentice-hall, India.
2. Discrete mathematics for computer scientists by John Truss-Addison Wesley.
3. Elements of Discrete Mathematics, C. L. Liu, New York Mcgraw-Hill, 1977.

e-Resources:

1. https://brilliant.org/wiki/discrete-mathematics/.

https://www.tutorialspoint.com/discrete_mathematics/.

SEMSTER-VI

Course Name: ALGEBRAIC STRUCTURES-II **Course Code :**

Course Objective

- The course is intended to prepare the students for mathematical theory and methods of linear algebra, in particular vector space over the real and complex numbers, dual spaces, innerproduct space, algebra of linear transformation and matrices of canonical forms and triangular forms.

Course Outcomes:

- Understand the concept of vector spaces, subspaces, bases, dimension and theory properties.
- Determine linear independence for vectors in R^n.
- For a linear transformation between vector spaces, discuss its matrix relative to give bases.
- Understand the relationship between a linear transformation and its matrix representation.
- Understand how to determine the angle between vectors and the orthogonality of vectors.

Syllabus

UNIT I
Vector spaces. Elementary basic concepts- linear independence and bases Chapter 4 Section 4.1 and 4.2.

UNIT II
Dual spaces
Chapter 4 Section 4.3.

UNIT III
Inner product spaces.
Chapter 4 Section 4.4.

UNIT IV
Algebra of linear transformations- characteristic roots.
Chapter 6 Section 6.1 and 6.2.

UNIT V
Matrices- canonical forms- triangular forms.
Chapter 6 Section 6.3 and 6.4.

Content and Treatment as in
"Topics in Algebra" – I. N. Herstein-Wiley Eastern Ltd.

Reference:

1. University Algebra – N. S. Gopalakrishnan – New Age International Publications, Wiley Eastern Ltd.
2. First course in Algebra – John B. Fraleigh, Addison Wesley.

3. Text Book of Algebra – R. Balakrishna and N. Ramabadran, Vikas publishing Co.
4. Algebra – S. Arumugam, New Gamma publishing house, Palayamkottai.

e-Resources:

1. https://nptel.ac.in.
2. http://ebooks.lpude.in.linearalgebra.

Course Name : REAL ANALYSIS-II Course Code :

Course Objective:

- To provide students with the specialist knowledge necessary for basic concepts in Real Analysis.
- It strives to enable students to learn basic concepts about functions of bounded variation grasp basic concepts about the total variation.
- Learn about Riemann-Stieltjes integrals, sequences and series of functions.
- Learn the theory of Riemann-Stieltjes intergrals, to be aquainted with the ideals of the total variation and to able to deal with functions of bounded variation.

Course Outcomes:

REAL ANALYSIS-II	
CO 1:	Understand many properties of the real line R, including completeness and Archimedean properties
CO 2:	Learn to define sequences in terms of functions from N to a subset of R
CO 3:	Recognize bounded, convergent, divergent, cauchy and monotonic sequence and to calculate their limits inferior and the limit superior and the limit of a bounded sequences.
CO 4:	Apply the ratio, root, alternating series and limi comparison tests for convergence and absolute convergence of an infinite series of real numbers

Syllabus

UNIT I

Continuous Functions on Metric Spaces: Open sets- closed sets- Discontinuousfunction on R^1. Connectedness, Completeness and Compactness :More about open sets- Connected sets. Chapter 5 Section 5.4 to 5.6
Chapter 6 Section 6.1 and 6.2

UNIT II

Bounded sets and totally bounded sets: Complete metric spaces- compact metric spaces, continuous functions on a compact metric space, continuity of inverse functions, uniform continuity.

Chapter 6 Section 6.3 to 6.8

UNIT III

Calculus:Sets of measure zero, definition of the Riemann integral, existence of the Riemann integral- properties of Riemann integral.
Chapter 7 Section 7.1 to 7.4

UNIT IV

Derivatives- Rolle's theorem, Law of mean, Fundamental theorems of calculus.Chapter 7 Section 7.5 to 7.8

UNIT V

Taylor's theorem- Pointwise convergence of sequences of functions, uniform convergence of sequences of functions.
Chapter 8 Section 8.5 Chapter 9 Section 9.1 and 9.2

Content and Treatment as in

"Methods of Real Analysis"- Richard R. Goldberg (Oxford and IBH Publishing Co)

Reference:-

1. Principles of Mathematical Analysis by Walter Rudin,TataMcGrawHill.
2. Mathematical Analysis Tom M Apostal,Narosa Publishing House.

e-Resources:

1. https://nptel.ac.in.
2. https://mathonline.wikidot.com.
3. https://en.wikipedia.org/wiki/Metric_space.

Course Name : COMPLEX ANALYSIS **Course Code :**

Course Objective:

- To study the functions with positive real parts.
- To understand and learn to use Argument principle.
- To understand the modules of a complex valued functions.
- To understand range of analytic functions and concerned results.

Course Outcomes:

COMPLEX ANALYSIS	
CO 1:	Learn the significance of differentiability of complex functions leading to the understanding of cauchy-riemann equations
CO 2:	Learn some elementary functions and valuate the contour integrals.
CO 3:	Understand the role of cauchy-Goursat theorem and the cauchy integral formula.
CO 4:	Expand some simple functions as their Taylor and Laurent series, classify the nature of sigulariries, find residues and apply cauchy residue theorem to evaluate integrals.

Syllabus

UNIT I

Analytic Functions:Functions of a Complex Variable – Limit- Theorems on Limits – Continuuous functions- Differentiability – Cauchy – Riemann equations – Analytic functions-Harmonic functions – Conformal mapping.
Chapter 1 – sec 2.1 to 2.9.

UNIT II

Bilinear Transformations:Elementary transformations – Bilinear transformations – Cross ratio-Fixed Points of Bilinear Transformations – Mapping by Elementary Functions - The Mapping $w = z^2$, z^n, n is a positive integer,$w = e^z$, sin z, cos z.
Chapter 3 – sec 3.1 to 3.4 , Chapter 5 – sec 5.1 to 5.5

UNIT III

Complex Integration – definite integral – Cauchy's Theorem – Cauchy's integral formula – Higher derivatives. Chapter 6 – sec 6.1 to 6.4

UNIT IV

Series expansions – Taylor's series – Laurent's Series – Zeroes of analytic functions-Singularities. Chapter 7 – 7.1 to 7.4

UNIT V

Residues – Cauchy's Residue Theorem – Evaluation of definite integrals.
Chapter 8 – 8.1 to 8.3.

Content and treatment as in

"Complex Analysis" byDr.S.Arumugam,Thangapandi Isaac, Dr.A.Somasundaram, SciTech publications(India) Pvt Ltd,2002.

Reference:

1. Complex variables and Applications (Sixth Edition) by James Ward Brown and RuelV.Churchill, Mc.Grawhill Inc.
2. Complex Analysis by P.Duraipandian,KayalakPachaiyappa,S.Chand& Co Pvt.Ltd.
3. Complex Analysis ,T.K.Manickavachagom Pillay, S.Viswanathan Publishers Pvt. Ltd.

e-Resources:

1. http://ebooks.lpude.in.complexanalysis.
2. https://nptel.ac.in.

Course Name : GRAPHY THEORY **Course Code :**

Course Objective:

- Understand the basic of graph theory and various properties.

- Model problems using graphs and to solve these problems algorithmically.
- Optimize the solutions to real problems like transport problems etc.
- Apply graph theory concepts to solve real world applications like routing,TSP/traffic control, etc.

OUTCOMES:

- Solve problem using basic graph theory
- To write precise and accurate mathematical definition of object in graph theory.
- Use definition in graph theory to identify and construct examples and to distinguish examples from non-examples
- Understand Eulerian and Hamiltonian graphs.
- Apply the knowledge of graphs to solve the real-life problem.
- Model real world problem using graph theory.

Syllabus

UNIT I

Graphs and Subgraphs: Introduction- Definition and examples, degrees, sub graphs, isomorphism, independent sets and coverings, intersection graphs and line graphs, matrices, operations on graphs
Chapter 2 Sections 2.0 – 2.9 (Omit section 2.5)

UNIT II

Degree sequences and Connectedness:Degree sequences and graphic sequences – simple problems. Walks, trails, paths, connectedness and components, blocks, connectivity – simple problems.
Chapter 3 Sections 3.0 – 3.2 , Chapter 4 Sections 4.0 – 4.4

UNIT III

Eulerian and Hamiltonian graphs - Chapter 5 Sections 5.0 – 5.2

UNIT IV

Trees : Characterisation of Trees, Centre of a Tree -simple problems. Planarity :
Definition and properties, characterization of planar graphs.Chapter 6 Sections
6.0 – 6.2 , Chapter 8 Sections 8.0 – 8.2

UNIT V

Directed Graphs: Definition and basic properties, paths and connections, digraphs and matrices, tournaments - Chapter 10 Sections 10.0 – 10.4

Content and treatment as in

"Invitation to Graph Theory", by S.Arumugam and S.Ramachandran, Scitech Publications(India) Pvt. Ltd., Chennai 17.

Reference:

1. A first look at graph theory by John Clark and Derek Allan Holton, Allied publishers.
2. Graph Theory by S.Kumaravelu and SusheelaKumaravelu,Publishers authors C/o 182 Chidambara Nagar, Nagarkoil.

e-Resources:

1.https://nptel.ac.in. 2.https://mathonline.wikidot.com. 3.http://ebooks.lpude.in.graphtheory

Course Name : OPERATION RESEARCH **Course Code :**

Course Objective:

- The course emphasizes the role of optimization in operations Research.
- Students will gain an overall perspective in the types of methodologies identified.
- Basic theory and computational strategies for exact and heuristic solutions of integer.
- With the projects assignments, the students will gain hands on experience in mathematical programming computation through the use of modeling language OPL and optimization software complex.

Course Outcomes:

- Identify and develop operational research models from the verbal description of the real world problems.
- Solve business problems and apply it's applications by using mathematical analysis.
- Develop the ideas of developing and analyzing mathematical models for decision problems, and their systematic solution.
- Understand the mathematical models that are needed to solve optimization problems.

Syllabus

UNIT I

Linear programming: Formulation – graphical solution. Simplex method. Big-M method. Duality-primal-dual relation.

Chapter 6 Sections 6.1 – 6.13, 6.20 – 6.31

UNIT II

Transportation problem: Mathematical Formulation. Basic Feasible solution. North West Corner rule, Least Cost Method, Vogel's approximation. Optimal Solution. Unbalanced Transportation Problems. Degeneracy in Transportation problems.

Assignment problem: Mathematical Formulation. Comparison with Transportation Model. Hungarian Method. Unbalanced Assignment problems

Chapter 9 Sections 9.1 – 9.12 ,Chapter 8 Sections 8.1 – 8.5

UNIT III

Sequencing problem: n jobs on 2 machines – n jobs on 3 machines – two jobs on m machines – n jobs on m machines.

Game theory : Two-person Zero-sum game with saddle point – without saddle point – dominance – solving 2 x n or m x 2 game by graphical method.

Chapter 10 Sections 10.1 – 10.6 ,Chapter 12 Sections 12.1 – 12.15

UNIT IV

Queuing theory: Basic concepts. Steady state analysis of M / M / 1 and M / M / S models withfinite and infinite capacities.

Chapter 5 Sections 5.1 – 5.18

UNIT V

Network: : Project Network diagram – CPM and PERT computations. (Crashing excluded)
Chapter 13
Sections 13.1 – 13.10

Content and treatment as in

Operations Research, by R.K.Gupta , Krishna Prakashan India (p),Meerut Publications.

Reference:

1. Gauss S.I. Linear programming , McGraw-Hill Book Company.
2. Gupta P.K. and Hira D.S., Problems in Operations Research ,S.Chand& Co.
3. KantiSwaroop, Gupta P.K and Manmohan , Problems in Operations Research,Sultan Chand & Sons.
4. Ravindran A., Phillips D.T. and Solberg J.J., Operations Research, John wiley & Sons.
5. Taha H.A. Operation Research, Macmillan pub. Company, New York.
6. Linear Programming, Transporation, Assignment Game by Dr.Paria, Books and Allied (P) Ltd.,1999.
7. V.Sundaresan,K.S. Ganapathy Subramaian and K.Ganesan, Resource Management Techniques, A.R Publications.

e-Resources:

1. http://ebooks.lpude.in.operationsresearch.
2. https://ocw.mit.edu.