

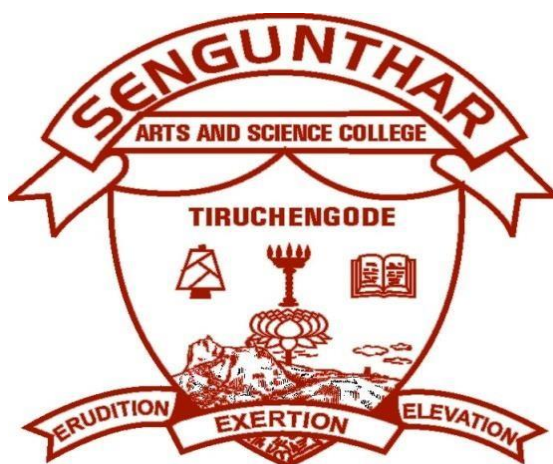
SENGUNTHAR ARTS AND SCIENCE COLLEGE

(Autonomous)

**(Affiliated to Periyar University, Salem and Approved by AICTE, NewDelhi)
An ISO 9001:2015 Certified Institutions. Recognised under section 2(f)
and 12(B) of the UGC Act, 1956 and Accredited by NAAC with A⁺**

TIRUCHENGODE-637205, NAMAKKAL DT., TAMILNADU

Website: www.senguarts.edu.in Email id: info@senguarts.co.in



SYLLABUS MATHEMATICS (Allied Papers) (CBCS –LOCF)

(With Effect From the Academic Year 2024-25 onwards)

Chairman

CDC

Principal

Correspondent

INTRODUCTION

B.Sc.,Mathematics is a UG Degree program based on the foundation of logical reasoning, critical thinking, and problem-solving across diverse fields, ranging from science and engineering to economics and technology. At the undergraduate level, mathematics serves as a gateway to understanding complex structures and patterns that govern the natural world, as well as the theoretical underpinnings of various disciplines.

The Mathematics Department plays a pivotal role in shaping students' intellectual growth, offering a wide range of courses that emphasize both theoretical knowledge and practical applications. Undergraduate mathematics programs typically cover fundamental topics such as algebra, calculus, geometry, and statistics, as well as more advanced subjects like linear algebra, differential equations, and numerical methods. These courses not only build a strong foundation in mathematical principles but also develop skills in logical analysis, abstract thinking, and quantitative reasoning.

Beyond classroom learning, the Mathematics Department often encourages students to participate in mathematical competitions, and collaborate on interdisciplinary projects. This approach fosters a deep understanding of mathematical concepts and their real-world applications, preparing students for diverse careers in academia, industry, finance, and technology.

The department also emphasizes a supportive and inclusive learning environment, where students can seek guidance from experienced faculty, access modern resources, and connect with peers who share a passion for mathematics. Whether pursuing a career in mathematics or using it as a tool to advance in other fields, the Mathematics Department provides a solid foundation for lifelong learning and success.

AIM

The syllabus of this program is aimed at preparing the students with the latest developments and put them on the right track to fulfill the present requirements.

ELIGIBILITY FOR ADMISSION:

A Pass in the Higher Secondary Examination of the Tamil Nadu Higher Secondary Board or some other Board accepted as equivalent there to with Mathematics (other than Business Mathematics) as one of the subjects.

PROGRAMME OUTCOMES

REGULATIONS ON LEARNING OUTCOMES-BASED CURRICULUM FRAME WORK (CBCS) FOR UNDER GRADUATE	
Programme	B.Sc., MATHEMATICS
Programme Code	24UMA
Duration	3 years [UG]
Programme Outcomes (POs)	PO1: Disciplinary Knowledge: Capable of demonstrating comprehensive knowledge and understanding of one or more disciplines that form a part of an Undergraduate programme of study. PO2: Critical Thinking: Capability to apply analytic thought to a body of knowledge; analyze and evaluate evidence, arguments, claims, beliefs on the basis of empirical evidence; identify relevant assumptions or implications; formulate coherent arguments; critically evaluate practices, policies and theories by following Scientific approach to knowledge development. PO3: Problem Solving: Capacity to extrapolate from what one has learned and apply their competencies to solve different kinds of non-familiar problems, rather than replicate curriculum content knowledge; and apply one's learning to real life Situations. PO4: Analytical Reasoning: Ability to evaluate the reliability and relevance of evidence; identify logical flaws and holes in the arguments of others; analyze and synthesize data from a variety of sources; draw valid conclusions and support them With evidence and examples and addressing opposing view points. PO5: Scientific Reasoning: Ability to analyse, interpret and draw conclusions from quantitative/ qualitative data; and critically evaluate ideas, evidence, and experiences from an open minded and reasoned perspective PO6: Self-directed & Lifelong Learning: Ability to work independently, identify and manage a project. Ability to acquire knowledge and skills, including "learning how to learn", through self-placed and self- directed learning aimed at personal development, meeting economic, social and cultural objectives

Programme Specific Outcomes (PSO)

Programme Specific Outcomes (PSOs)	PSO1: Acquire good knowledge and understanding, to solve specific theoretical & applied problems in different area of mathematics & statistics. PSO2: Understand, formulate, develop mathematical arguments, logically and use quantitative models to address issues arising in social sciences, business and other context /fields. PSO3: To prepare the students who will demonstrate respectful engagement with other's ideas, behaviours, beliefs and apply diverse frames of references to decisions and actions. To create effective entrepreneurs by enhancing their critical thinking, problem solving, decision making and leadership skill that will facilitate startups and high potential organizations.
---	--

	POs										PSOs				
	P01	P02	P03	P04	P05	P06	P07	P08	P09	P10	PS01	PS02	PS03	PS04	PS05
CO1	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
CO2	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
CO3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
CO4	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
CO5	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3

Level of Correlation between POs and PSOs (*Suggested by UGC as per Six Sigma Tool – Cause and Effect Matrix*);

1 – Low, 2 – Medium, 3 – High, 0 – No Correlation

SEMESTER – I

ELECTIVE/ALLIED MATHEMATICS

ALLIED MATHEMATICS-I: ALGEBRA AND CALCULUS

(For B.Sc., Physics/ B.Sc., Chemistry/ B.Sc., Computer Science /
B.Sc., Computer Science (AI&DS) / BCA)

Subject Code	Subject	Category	L	T	P	Hours	Credit
24S1UMAA01	Allied Mathematics-I	Theory	Y	-	-	6	4

Learning Objectives

- ❖ To learn the basic concepts and problem solving in Theory of equations.
- ❖ Develop the ability of solving the Integrals.

Course Outcomes		
Course Outcomes	On completion of this course, students will able to	Programme Outcomes
CO1	Explain in detail about Imaginary roots, irrational roots and formation of equations and Descartes's rule of sign.	PO1,PO3
CO2	Explain Characteristic equation and roots of the matrix and Eigen values and Eigenvector of the matrix and Verification of Cayley Hamilton theorem.	PO3
CO3	Explain Formula for Radius of curvature in Cartesian coordinates and Parametric coordinates and Polar coordinates	PO1,PO3
CO4	Explain Formation of Partial Differential Equations by eliminating the arbitrary constant and arbitrary functions	PO1,PO3
CO5	Explain Simple properties of definite Integrals and Bernoulli's Formula and Integration by parts.	PO1,PO3

ALLIED MATHEMATICS-I: ALGEBRA AND CALCULUS

Unit	Details	No. of Hours
I	Theory of Equations : Imaginary roots – Irrational roots – Formation of equations – Solutions of equations – Diminishing the roots of an equation & solutions – Removal of the second term of an equation & solutions – Descarte’s rule of sign – Problems only. (Chapter6: Sections 4,9,10 & 11).	18
II	Matrices: Definition of Characteristic equation of a matrix – Characteristic roots of a matrix - Eigen values and the Corresponding Eigen vectors of matrix – Cayley Hamilton theorem (Statement only) – Verifications of Cayley Hamilton Theorem – Problems only. (Chapter 5)	18
III	Radius of Curvature: Formula of Radius of Curvature in Cartesian coordinates, Parametric coordinates and Polar coordinates (no proof for formulae) – Problems only. (Chapter11)	18
IV	Partial Differential Equations: Formation of Partial Differential Equations by eliminating the arbitrary constant and arbitrary functions – Lagrange’s Linear Partial Differential Equations – Problems only. (Chapter26) * Power point presentation: Applications of Partial differential Equations	18
V	Integration: Definite Integral : Simple properties of definite Integrals (Chap -15) –Bernoulli’s Formula - Integration by parts - Simple problems - Reduction formula for $\int_0^{\frac{\pi}{2}} \sin^n x \, dx$, $\int_0^{\frac{\pi}{2}} \cos^n x \, dx$, $\int_0^{\infty} e^{-x} \, dx$, $\int x^n e^{ax} \, dx$. - simple problems. (Chapter16).	18
	Total	90
* Model preparation and Power Point Presentation – Related to the above topics are to be considered for Internal Exam only		

Text Book :

- ❖ Dr.P.R. Vittal, Allied Mathematics , Margham publication, Chennai – 17, Reprint 2016.

Reference Books:

- ❖ S.G Venkatachalapathi, Allied Mathematics, Margham publication, Chennai – 17, Reprint 2011
- ❖ P. Kandasamy, K.Thilagavathy, Allied Mathematics Volume I, S.Chand publication, July 2012

- ❖ P. Kandasamy, K.Thilagavathy Allied Mathematics Volume II, S.Chand publication, December2010.

Web Resources

- ❖ <https://nptel.ac.in>.

Mapping with Programme Outcomes: 3 Strong, 2 – Medium, 1 – Low

	PO1	PO2	PO3	PO4	PO5	PO6
CO1	3	1	3	-	-	-
CO2	2	1	3	1	-	-
CO3	3	1	3	1	-	-
CO4	3	1	3	-	-	-
CO5	3	1	3	-	-	-

Mapping with Programme: Specific Outcomes:

CO/PO	PSO1	PSO2	PSO3
CO1	3	2	1
CO2	3	2	1
CO3	3	2	1
CO4	3	2	1
CO5	3	2	1
Weightage	15	10	5
Weighted percentage of Course Contribution to Pos	3	2	1

Course Coordinator

BOS Chairman

**NON MAJOR ELECTIVE COURSES
(For Other Departments)**

MATHEMATICS FOR COMPETITIVE EXAMINATION – I

Subject Code	Subject	Category	L	T	P	Hours	Credit
24S1UMAN01	NME - I	Theory	Y	-	-	2	2

Learning Objectives

- ❖ Remembering the meaning of HCF and LCM of numbers.
- ❖ Understanding the concept of percentage on simple problems.
- ❖ Analyzing the concepts of ratio and proportion.

Course Outcomes		
Course Outcomes	On completion of this course, students will able to	Programme Outcomes
CO1	Perform basic mathematics in Numbers.	PO1,PO3
CO2	Understand Decimal Fractions and Simplification.	PO1,PO3
CO3	Develop basic concept of Square Roots and Cube Roots and Average.	PO1,PO3
CO4	Explain Problems on Numbers - Problems on Ages.	PO1,PO3
CO5	Critique and evaluate quantitative arguments that utilize mathematics, statistical and quantitative informations.	PO1,PO3

MATHEMATICS FOR COMPETITIVE EXAMINATION – I

Unit	Details	No. of Hours
I	Numbers- Operations on Numbers - H.C.F and L.C.M. of Numbers. (Chapter – 1 & 2) *Group Discussion : History of Numbers	6
II	Decimal Fractions - Operations on Decimal Fractions – Simplification (Chapter – 3 & 4)	6
III	Square Roots and Cube Roots – Average. (Chapter – 5 & 6)	6
IV	Problems on Numbers - Problems on Ages. (Chapter – 7 & 8)	6
V	Surds & Indices- Laws of Surds- Laws of Indices - Percentage. (Chapter – 9 & 10) *Preparing formula Sheet Preparation using Excel: Percentage	6
	Total	30
Question Paper Pattern: 75 Objective type questions each carrying 1 Mark.		
* Model preparation and Power Point Presentation – Related to the above topics are to be considered for Internal Exam only		

Text Book :

- ❖ R.S. Aggarwal, Quantitative Aptitude for Competitive Examinations, S.Chand co Ltd., 152. Anna Salai, Chennai, 2010.

Reference Books :

- ❖ Quantitative Aptitude “by Abhijit Guha, Tata McGraw Hill Publishing Company Limited, New Delhi (2005).

Web resource:

- ❖ <http://nptel.ac.in>.

Mapping with Programme Outcomes: 3 Strong, 2 – Medium, 1 – Low

	PO1	PO2	PO3	PO4	PO5	PO6
CO1	3	1	3	-	-	-
CO2	2	1	3	1	-	-
CO3	3	1	3	1	-	-
CO4	3	1	3	-	-	-
CO5	3	1	3	-	-	-

Mapping with Programme: Specific Outcomes:

CO/PO	PSO1	PSO2	PSO3
CO1	3	2	1
CO2	3	2	1
CO3	3	2	1
CO4	3	2	1
CO5	3	2	1
Weightage	15	10	5
Weighted percentage of Course Contribution to Pos	3	2	1

Course Coordinator

BOS Chairman

NON MAJOR ELECTIVE COURSES
(For Other Departments)
MATRIX ALGEBRA

Subject Code	Subject	Category	L	T	P	Hours	Credit
24S1UMAN02	NME - II	Theory	Y	-	-	2	2

Learning Objectives

- ❖ To provide students with a fundamental understanding of matrices and their operations, enabling them to apply these concepts to solve mathematical problems and analyze real-world scenarios.

Course Outcomes		
Course Outcomes	On completion of this course, students will able to	Programme Outcomes
CO1	Demonstrate the ability to perform basic operations on matrices, such as addition, subtraction, and multiplication, and apply these operations to solve related problems.	PO1, PO3
CO2	Compute the transpose, adjoint, and inverse of a matrix and use these operations in problem-solving scenarios.	PO1, PO3, PO4
CO3	Identify and classify matrices as symmetric, skew symmetric, Hermitian, and skew Hermitian, and solve problems related to these types of matrices.	PO1, PO2, PO4
CO4	Determine the rank of matrices and apply this concept to solve relevant mathematical problems involving matrices.	PO1, PO2, PO3
CO5	Understand the characteristic equation of a matrix, and verify the Cayley-Hamilton theorem through simple problems.	PO1, PO3, PO5

MATRIX ALGEBRA

Unit	Details	No. of Hours
I	Definition of matrices - Addition, Subtraction, and Multiplication of matrices - problems only.	6
II	Transpose of a matrix - Adjoint of a matrix - Inverse of a matrix - problems only.	6
III	Definitions of Symmetric, Skew Symmetric, Hermitian, and Skew Hermitian matrices - problems only.	6
IV	Rank of a matrix: Definition - Finding the rank of a matrix - problems up to 3x3 matrix only.	6
V	Characteristic equation of matrix - Cayley Hamilton Theorem (statement only) - Verification of Cayley Hamilton Theorem - simple problems only.	6
	Total	30

Text Books

- ❖ Dr. P.R. Vittal, Allied Mathematics, Margham publication, Chennai-17, Reprint 2012

Reference books

- ❖ S.G. Venkatachalapathi, Allied Mathematics, Margham publication, Chennai-17, Reprint 2011
- ❖ H.K. Dass, Advanced Engineering Mathematics, S. Chand & Company Ltd, 2008
- ❖ B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 44th Edition, 2017

Web Resources

- ❖ <https://nptel.ac.in>.

Mapping with Programme Outcomes: 3 Strong, 2 – Medium, 1 – Low

	PO1	PO2	PO3	PO4	PO5	PO6
CO1	3	1	3	1	1	1
CO2	3	1	3	2	1	1
CO3	3	2	1	3	1	1
CO4	3	2	3	1	1	1
CO5	3	1	3	1	3	1

Mapping with Programme: Specific Outcomes:

CO/PO	PSO1	PSO2	PSO3
CO1	3	2	2
CO2	1	2	1
CO3	3	3	1
CO4	2	3	2
CO5	3	2	2
Weightage	12	12	8
Weighted percentage of Course Contribution to Pos	2.4	2.4	1.6

Course Coordinator

BOS Chairman

SEMESTER – II

ALLIED MATHEMATICS-II
DIFFERENTIAL EQUATIONS AND LAPLACE TRANSFORMS
(For B.Sc., Physics/ B.Sc., Chemistry/ B.Sc., Computer Science /
B.Sc., Computer Science (AI&DS) / BCA)

Subject Code	Subject	Category	L	T	P	Hours	Credit
24S2UMAA02	Allied Mathematics II	Theory	Y	-	-	4	4

Learning Objectives

- ❖ Develop the basic concepts of Maxima and Minima of two variables and Numerical methods problems.
- ❖ To learn the second order differential equation with constant coefficients.
- ❖ To learn the basic concepts of Laplace Transforms, Inverse Laplace Transforms & Applications.

Course Outcomes		
Course Outcomes	On completion of this course, students will able to	Programme Outcomes
CO1	Explain Jacobian of two variables and three variables and Maxima and Minima functions of two variables	PO1,PO2,PO3
CO2	Explain Finite difference and Higher differences and Construction of difference table and Newton's Forward Backward difference formula and Lagrange's Interpolation formula.	PO1,PO2
CO3	Explain Second Order Differential Equation with constant coefficients and Particular Integral	PO1,PO2,PO3
CO4	Explain definition of Laplace Transforms and standard formula and linearity property and shifting property and Change of Scale property and Laplace Transforms of derivatives.	PO1,PO3
CO5	Explain standard formula and elementary theorems and Applications to solutions of second order differential equations with constant coefficients.	PO1,PO3

ALLIED MATHEMATICS-II
DIFFERENTIAL EQUATIONS AND LAPLACE TRANSFORMS

Unit	Details	No. of Hours
I	Jacobian and Maxima & minima : Jacobian of two variables and three variables – Maxima and Minima functions of two variables – Problems only. (Chapter9: Sections 3 & 4).	12
II	Finite Differences: Finite difference – Higher differences – Construction of difference table – Interpolation of missing value – Newton's Forward and Newton's Backward difference formula (no proof) – Lagrange's Interpolation formula (no proof) - simple problems only. (Chapter7) *Group activity formulas on Finite Differences	12
III	Second Order Differential Equations: Second Order Differential Equation with constant coefficients – Complementary function – Particular Integral and Solution of the type : a^x , x^n , $\cos ax$ (or) $\sin ax$, $e^{as}x^{bs}$, $e^{as}\sin bx$, $e^{as}\cos bx$ –Problems only. (Chapter23)	12
IV	Laplace Transforms: Definition of Laplace Transforms – Standard formula – Linearity property – shifting property – Change of Scale property – Laplace Transforms of derivatives – Problems. (Chapter27)	12
V	Inverse Laplace Transforms : Standard formula- Elementary theorems (no proof) – Applications to solutions of second order differential equations with constant coefficients – simple problems. (Chapter27)	12
	Total	60
* Model preparation and Power Point Presentation – Related to the above topics are to be considered for Internal Exam only		

Text Book:

- ❖ Dr.P.R.Vittal, Allied Mathematics , Margham publication, Chennai – 17, Reprint 2016.

Reference books:

- ❖ S.G Venkatachalapathi, Allied Mathematics, Margham publication, Chennai – 17, Reprint 2011.
- ❖ P. Kandasamy, K.Thilagavathy Allied Mathematics Volume I, S.Chand publication, July 2012.
- ❖ P. Kandasamy, K.Thilagavathy Allied Mathematics Volume II, S.Chand publication, December 2010.

Web References:

❖ <https://nptel.ac.in>

Mapping with Programme Outcomes: 3 Strong, 2 – Medium, 1 – Low

	PO1	PO2	PO3	PO4	PO5	PO6
CO1	3	1	3	-	-	-
CO2	2	1	3	1	-	-
CO3	3	1	3	1	-	-
CO4	3	1	3	-	-	-
CO5	3	1	3	-	-	-

Mapping with Programme: Specific Outcomes:

CO/PO	PSO1	PSO2	PSO3
CO1	3	2	1
CO2	3	2	1
CO3	3	2	1
CO4	3	2	1
CO5	3	2	1
Weightage	15	10	5
Weighted percentage of Course Contribution to Pos	3	2	1

Course Coordinator

BOS Chairman

ALLIED MATHEMATICS PRACTICAL

Subject Code	Subject	Category	L	T	P	Hours	Credit
24S2UMAAP01	Allied Mathematics Practical	Practical	-	-	Y	2	2

Learning Objectives

- ❖ Acquire knowledge about Matrices and Cayley – Hamilton Theorem.
- ❖ Understand the concepts of differentiation and Vector point function.

Course Outcomes		
Course Outcomes	On completion of this course, students will able to	Programme Outcomes
CO1	Explain in detail about Rank of Matrix and Characteristics equation of a Matrix and CayleyHamilton Theorem and Problems to verify Cayley Hamilton.	PO1,PO3
CO2	Explain Leibnitz formula for n^{th} derivative.	PO3
CO3	Explain Euler 's theorem on homogeneous function and Problems to verify Euler's Theorem and Partial derivative.	PO1,PO3
CO4	Explain Scalar and Vector point functions and Gradient of scalar point functions.	PO1,PO3
CO5	Explain Divergence and Curl of vector point functions and Solinoidal vector and Irrotational vector.	PO1,PO3

ALLIED MATHEMATICS PRACTICAL

Unit	Details	No. of Hours
I	Matrices: Rank of Matrix – Problems upto (3x3) Matrix – Characteristic equation of a Matrix – Cayley Hamilton Theorem (statement only) – Problems to verify Cayley Hamilton Theorem. (Chapter5)	6
II	Leibnitz formula for n^{th} derivative : Leibnitz formula (without proof) for n^{th} derivative – Problems. (Page no: 8.23 to 8.39 of the Text book)(Chapter8)	6
III	Partial Differentiation : Euler ‘s theorem on homogeneous function (without proof) – Problems to verify Euler’s Theorem – Partial derivative – problems. (Page no. 9.1 to 9.13 and 9.18 to 9.27 of the Text Book)(Chapter9)	6
IV	Vector Differentiation : Scalar and Vector point functions – Gradient of scalar point functions– Problems only. (Chapter28)	6
V	Divergence and Curl of Vector point functions : Divergence and Curl of vector point functions – Solenoidal vector Irrotational vector – Problems only.(Chapter28)	6
	Total	30

Text Books

- ❖ Dr.P.R. Vittal, Allied Mathematics , Margham publication, Chennai – 17, Reprint 2016

Reference books

- ❖ S.G Venkatachalapathi, Allied Mathematics, Margham publication, Chennai – 17, Reprint 2011
- ❖ P. Kandasamy, K.Thilagavathy Allied Mathematics Volume I, S.Chand publication, July2012
- ❖ P. Kandasamy, K.Thilagavathy Allied Mathematics Volume II, S.Chand publication, December 2010.

Web References:

- ❖ <https://nptel.ac.in>.

Mapping with Programme Outcomes: 3 Strong, 2 – Medium, 1 – Low

	PO1	PO2	PO3	PO4	PO5	PO6
CO1	3	1	3	-	-	-
CO2	2	1	3	1	-	-
CO3	3	1	3	1	-	-
CO4	3	1	3	-	-	-
CO5	3	1	3	-	-	-

Mapping with Programme: Specific Outcomes:

CO/PO	PSO1	PSO2	PSO3
CO1	3	2	1
CO2	3	2	1
CO3	3	2	1
CO4	3	2	1
CO5	3	2	1
Weightage	15	10	5
Weighted percentage of Course Contribution to Pos	3	2	1

Course Coordinator

BOS Chairman

NON MAJOR ELECTIVE COURSES**(For Other Departments)****MATHEMATICS FOR COMPETITIVE EXAMINATION – II**

Subject Code	Subject	Category	L	T	P	Hours	Credit
24S2UMAN03	NME-III	Theory	Y	-	-	2	2

Learning Objectives

- ❖ Understanding the concepts of chain rule.
- ❖ Applying the concept of time and distance.
- ❖ Analyzing the problem on trains with solved examples.

Course Outcomes		
Course Outcomes	On completion of this course, students will able to	Programme Outcomes
CO1	Explain in detail about Profit & Loss and Ratio & Proportion.	PO1,PO3
CO2	Explain Partnership and Chain Rule.	PO1,PO3
CO3	Explain Time & Work and Pipes & Cistern.	PO1,PO3
CO4	Explain Time & Distance and Problems on Trains.	PO1,PO3
CO5	Explain Boats & Streams and Alligation or Mixture.	PO1,PO3

MATHEMATICS FOR COMPETITIVE EXAMINATION – II

Unit	Details	No. of Hours
I	Profit & Loss – Ratio & Proportion. (Chapter – 11 & 12).	6
II	Partnership – Chain Rule. (Chapter – 13 & 14)	6
III	Time & Work – Pipes & Cistern. (Chapter – 15 & 16)	6

IV	Time & Distance – Problems on Trains. (Chaper – 17 &18)	6
V	Boats& Streams – Alligation or Mixture. (Chaper – 19 &20)	6
	Total	30

Text Book:

- ❖ R.S. Aggarwal, Quantitative Aptitude for Competitive Examinations, S.Chand co Ltd., 152. Anna Salai, Chennai,2010

Reference Book:

- ❖ Quantitative Aptitude “by Abhijit Guha, Tata McGraw Hill Publishing Company Limited, New Delhi (2005)

Web Resources

- ❖ <http://nptel.ac.in>.

Mapping with Programme Outcomes: 3 Strong, 2 – Medium, 1 – Low

	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3
CO1	3	2	3	1	2	1	3	2	2
CO2	3	2	3	1	1	1	1	2	1
CO3	3	2	1	3	1	1	3	3	1
CO4	3	2	3	1	1	1	2	3	2
CO5	3	2	3	1	3	1	3	2	2
Weightage	15	10	13	7	8	5	12	12	8
Weighted percentage of Course Contribution to Pos	3	2	2.6	1.4	1.6	1	2.4	2.4	1.6

Course Coordinator

BOS Chairman

NON MAJOR ELECTIVE COURSES**(For Other Departments)****NUMERICAL METHODS**

Subject Code	Subject	Category	L	T	P	Hours	Credit
24S2UMAN04	NME-IV	Theory	Y	-	-	2	2

Learning Objectives

- ❖ To develop students' ability to solve algebraic equations
- ❖ apply numerical methods for interpolation and finite differences to solve mathematical problems.

Course Outcomes		
Course Outcomes	On completion of this course, students will able to	Programme Outcomes
CO1	Apply the Bisection and Newton Raphson methods to find solutions to algebraic equations.	PO1,PO2,PO3, PO5
CO2	Understand finite differences and construct difference tables to solve problems involving missing values.	PO1,PO2,PO4, PO5
CO3	Utilize Newton's Forward Difference Formula for interpolation and solve related problems.	PO1,PO3,PO4, PO5
CO4	Apply Newton's Backward Difference Formula to interpolation problems and construct relevant difference tables.	PO1,PO3,PO4, PO5
CO5	Implement central difference formulas such as Gauss's Forward and Backward and Stirling's formulas to solve interpolation problems.	PO1,PO2,PO3, PO5

NUMERICAL METHODS

Unit	Details	No. of Hours
I	Solutions to Algebraic equations only: By (i) Bisection Method (no proof) and (ii) Newton Raphson's Method (no proof) - Simple Problems only.	6
II	Finite Differences: Definition - First difference - Higher differences - Construction of difference Table - Operator Δ , and E only - Interpolation of missing value - Expression of any value of y in terms of the initial value - Simple problems.	6
III	Newton's Forward difference Formula (without proof) - Construction of difference Table - Simple problems only.	6
IV	Newton's Backward difference Formula (without proof) - Construction of difference Table - Simple problems only.	6
V	Central difference Formula: Gauss's Forward and Gauss's Backward difference formula (without proof) - Stirling formula (without proof) - Simple problems only.	6
	Total	60

Text Books

- ❖ P. Kandasamy, K. Thilagavathi, Calculus of Finite Differences and Numerical Analysis, S. Chand & Company Pvt. Ltd., New Delhi, 2003.

Reference books

- ❖ M.K. Jain, S.R.K. Iyengar, R.K. Jain, Numerical Methods for Scientific and Engineering Computation, New Age International Private Limited, 1999.
- ❖ C.E. Froberg, Introduction to Numerical Analysis, 2nd Edition, Addison Wesley, 1979.

Web Resources

- ❖ <https://nptel.ac.in>.

Mapping with Programme Outcomes: 3 Strong, 2 – Medium, 1 – Low

	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3
CO1	3	2	3	1	3	2	3	2	2
CO2	3	2	3	1	3	2	1	2	2
CO3	3	2	3	3	3	2	3	2	2
CO4	3	2	3	1	3	2	2	2	2
CO5	3	2	3	1	3	2	3	2	2
Weightage	15	10	15	7	15	10	12	10	10
Weighted percentage of Course Contribution to Pos	3	2	3	1.4	3	2	2.4	2	2

Course Coordinator

BOS Chairman

SEMESTER - III
BUSINESS MATHEMATICS & STATISTICS
(For B.COM , B.COM(CA) & B.COM(PA))

Subject Code	Subject	Category	L	T	P	Hours	Credit
24S3USTA03	ELECTIVE	Theory	Y	-	-	4	3

Learning Objectives:

- ❖ To impart knowledge on the basics of ratio, proportion, indices and proportions
- ❖ To learn about simple and compound interest and arithmetic, geometric and harmonic progressions.
- ❖ To familiarise with the measures of central tendency
- ❖ To conceptualise with correlation co-efficient
- ❖ To gain knowledge on time series analysis

Course Outcomes		
Course Outcomes	On completion of this course, students will able to	Programme Outcomes
CO1	Learn the basics of ratio, proportion, indices and logarithm	PO1,PO3
CO2	Familiarise with calculations of simple and compound interest and arithmetic, geometric and harmonic progressions.	PO1,PO3,PO5
CO3	Determine the various measures of central tendency	PO1,PO3
CO4	Calculate the correlation and regression co-efficient.	PO2,PO3
CO5	Assess problems on time series analysis	PO2,PO3

BUSINESS MATHEMATICS & STATISTICS

Unit	Details	No. of Hours
I	Ratio: Ratio, Proportion and Variations, Indices and Logarithms.	12
II	Interest and Annuity: Banker's Discount: Simple and Compound Interest - Arithmetic, Geometric and Harmonic Progressions. Annuity - Meaning - Annuity Applications.	12
III	Business Statistics Measures of Central Tendency Arithmetic Mean, Geometric Mean - Harmonic Mean - Mode and Median – Quartiles – Deciles - Percentiles. Measures of Variation – Range - Quartile Deviation and Mean Deviation - Variance and Standard Deviation & Co-efficient.	12
IV	Correlation and Regression Correlation - Karl Pearson's Coefficient of Correlation – Spearman's Rank Correlation – Regression Lines and Coefficients.	12
V	Time Series Analysis and Index Numbers Time Series Analysis : Secular Trend – Seasonal Variation – Cyclical variations - Index Numbers – Aggregative and Relative Index – Chain and Fixed Index – Wholesale Index – Cost of Living Index.	12
	Total	60

Textbook:

- ❖ Dr. B.N. Gupta, Business Mathematics & Statistics, Shashibhawan publishing house, Chennai
- ❖ Asim Kumar Manna, Business Mathematics & Statistics, McGraw hill education, Noida
- ❖ A.V. Rayarikar and Dr. P.G. Dixit, Business Mathematics & Statistics, NiraliPrakashan Publishing, Pune
- ❖ Dr.S. Sachdeva, Business Mathematics & Statistics, Lakshmi NarainAgarwal, Agra
- ❖ P.R. Vittal, Business Mathematics & Statistics, Margham Publications, Chennai

Reference books:

- ❖ J.K. Sharma, Fundamentals of business statistics, Vikas publishing, Noida
- ❖ Peter Waxman, Business Mathematics & Statistics, Prentice Hall, New York
- ❖ Andre Francis, Business Mathematics & Statistics, Cengage Learning EMEA, Andover
- ❖ Aggarwal B M, Business Mathematics & Statistics, Ane Book Pvt. Ltd., New Delhi
- ❖ R.S. Bhardwaj, Business Mathematics & Statistics, Excel Books Publisher, New Delhi

Web Resources:

- ❖ <https://corporatefinanceinstitute.com/resources/data-science/central-tendency/>
- ❖ <https://www.expressanalytics.com/blog/time-series-analysis>

Mapping with Programme Outcomes: 3Strong,2–Medium,1–Low

	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3
CO1	3	2	3	2	2	2	3	2	2
CO2	3	2	3	2	3	2	3	2	2
CO3	3	2	3	2	2	2	3	2	2
CO4	2	3	3	2	2	2	3	2	2
CO5	2	3	3	2	2	2	3	2	2
Weightage	13	12	15	10	11	10	15	10	10
Weighted percentage of CourseContribution to Pos	2.6	2.4	3	2	2.2	2	3	2	2

Course coordinator

BOS Chairman

BUSINESS STATISTICS

(For B.B.A)

Subject Code	Subject	Category	L	T	P	Hours	Credit
24S3USTA04	ELECTIVE	Theory	Y	-	-	4	3

Learning Objectives

- ❖ To Apply the Measures of Central Tendency in Business
- ❖ To Understanding the Measures of Variation
- ❖ To Analysis of Time Series
- ❖ To Understanding Index Numbers and Statistical Quality Control
- ❖ To Testing of Hypothesis

Course Outcomes		
Course Outcomes	On completion of this course, students will able to	Programme Outcomes
CO1	Measures of Central Tendency	PO1,PO2,PO4, PO6
CO2	Measures of Variation	PO1,PO2,PO6
CO3	Analyze of Time Series	PO1,PO2,PO6
CO4	Understand Index Numbers	PO1,PO2,PO6
CO5	Test Hypothesis	PO2,PO8

Unit	Details	No. of Hours
I	Introduction – Meaning and Definition of Statistics – Collection and Tabulation of Statistical Data – Presentation of Statistical Data – Graphs and Diagrams- Measures of Central Tendency– Arithmetic Mean, Median and Mode–Harmonic Mean and Geometric Mean.	12
II	Measures of Variation – Standard Deviation –Mean deviation– Quartile deviation-Skewness and kurtosis– Lorenz Curve – Simple Correlation– Scatter Diagram– Karl Pearson’s Correlation – Rank Correlation –Regression.	12
III	Analysis of Time Series–Methods of Measuring Trend. And Seasonal Variations.	12
IV	Index Numbers– Consumer Price Index–Cost of Living Indices.	12
V	Testing of hypothesis–Chi-Square test ,T Test, F Test ,ANOVA.	12
	Total	60

Textbooks:

- ❖ P.R. Vittal (2004), Business Mathematics and Statistics, Margham Publications, Chennai.
- ❖ S.P. Gupta (2007), Statistical Methods, Sultan Chand & Sons, New Delhi.
- ❖ S.P. Gupta (2007), Elements of Business Statistics, Sultan Chand & Sons, New Delhi.
- ❖ J.K. Sharma (2007), Business Statistics, Pearson Education, New Delhi.
- ❖ Dr. S.P. Rajagopalan, Business Statistics and Operations Research, Tata McGraw-Hill.

Reference Books:

- ❖ David M. Levine, David F. Stephan, et al. (7th Edition), Business Statistics: A First Course.
- ❖ Dina NathPandit, Statistics: A Modern Approach, Hindustan Publishing Corporation.
- ❖ PadmalochanHazarika, A Textbook of Business Statistics, S. Chand Publications.
- ❖ N.D. Vohra (2021), Business Statistics: Text and Problems – With Introduction to Business Analytics, McGraw Hill.
- ❖ Alexander Holmes, Barbara Illowsky, and Susan Dean (2017), Introductory Business Statistics, 12th Media Services.

Web Resources:

- ❖ <https://theintactone.com/2019/09/01/ccsubba-204-business-statistics/>
- ❖ <https://ug.its.edu.in/sites/default/files/Business%20Statistics.pdf>
- ❖ <http://www.statisticshowto.com>

- ❖ <https://statisticsbyjim.com/basics/measures-central-tendency-mean-median-mode/>
- ❖ <https://www.toppr.com/guides/business-mathematics-and-statistics/index-numbers/>

Mapping with Programme Outcomes: 3Strong,2–Medium,1–Low

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO 1	3	3	2	3	3	3	2	3	1	1
CO 2	3	3	2	3	2	3	2	3	2	1
CO 3	3	3	2	2	3	3	2	3	2	2
CO 4	3	3	2	2	2	3	2	3	2	2
CO 5	3	3	2	3	3	3	2	3	2	2
Total	15	15	10	12	13	15	10	15	9	8
Average	3	3	2	2.4	2.6	3	2	3	1.8	1.6

Mapping with Programme :Specific Outcomes:

CO/PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of CourseContributiontoPos	3.0	3.0	3.0	3.0	3.0

Course coordinator

BOS Chairman

ALLIED : BIOSTATISTICS
(For B.Sc ., Biotechnology and Bio – Chemistry)

Subject Code	Subject	Category	L	T	P	Hours	Credit
24S3USTA05	ELECTIVE	Theory	Y	-	-	4	4

Learning Objective:

- ❖ The students will be able to understand and apply the statistical methods like measures of location, dispersion and the relationship between two variables in bio-statistics.
- ❖ To understand large and small samples in laboratory study to apply it in real life problems.

CourseOutcomes		
Course Outcomes	On completion of this course, students will able to	Programme Outcomes
CO1	Understand the statistical methods measures of location	PO1,PO3
CO2	Understand the statistical methods measures of dispersion	PO3
CO3	Apply the statistical methods of dispersion and location	PO1,PO3
CO4	understand the relationship between two variables in bio statistics	PO1,PO3
CO5	Understand large and small samples in laboratory study to apply it in real life problems.	PO1,PO3

ALLIED : BIOSTATISTICS

Unit	Details	No. ofHours
I	Collection and Presentation of Statistical Data Biostatistics Definition – Types of data – Primary and secondary data – Methods of Collection of data – Sources of data in life science – Limitations and Uses of Statistics – Classification and Tabulation of data – Diagrammatic and Graphical representation of data.	12
II	Measures of Central Tendency Definitions – Mean – Median – Mode – Geometric mean – Harmonic mean – Characteristics of a good average – Merits and demerits	12
III	Measures of Dispersion Range Quartile deviation – Mean deviation and their co-efficients – Standard deviation – Co-efficient of variation – Merits and demerits.	12
IV	Correlation and Regression Definitions – Types and Methods of Correlation –Karl Pearson's coefficient of correlation – Spearman's Rank correlation coefficient Regression: Simple regression equations (two variables) – Simple Problems.	12
V	Test of Significance Sampling distribution Standard error – Test of Hypothesis: Simple hypothesis, Null hypothesis and Alternative Hypothesis – Test of significance: Large sample tests based on Mean, Differences of Means, Proportion and Difference of Proportions - Small sample test based on Mean, Difference of Means, Paired t-test - F-test - Chi- square test.	12
	Total	60

Reference Books:

- ❖ Gupta S. P. (2001), Statistical Methods, Sultan Chand & Sons, New Delhi.
- ❖ Pillai R. S. N. And Bagavathi. V. (2005), Statistics, S. Chand & Company Ltd., New Delhi.
- ❖ P.S.S. SundarRao, J. Richard (2012). Introduction to Bio-Statistics and Research methods, Prentice Hall of India Pvt Ltd, New Delhi.
- ❖ Gurumani. N (2005), An introduction to Bio-Statistics, 2nd Revised Edition, MJP Publishers.
- ❖ Daniel. W. W, (1987), Bio-Statistics, John Wiley and Sons, New York.
- ❖ Beth Dawson, Robert G Trapp (2004), Basic and Clinical Biostatistics, McGraw Hill, New Delhi.
- ❖ Zar J, Bio Statistical Analysis, Prentice Hall, India.
- ❖ Bernard Rosner, Fundamentals of Biostatistics, (8th edition), Cengage Learning, USA.
- ❖ Rossi R. J (2010), Applied Biostatistics for Health Science, John Wiley, New York.

- ❖ Rao C. R, Advanced Statistical Methods in Biometric Research, John Wiley, New York

Web Resources:

- ❖ <https://www.tutorialspoint.com/statistics>

Mapping with Programme Outcomes: 3Strong,2–Medium,1–Low

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	2	3	2	2	2	3	2
CO2	3	2	3	2	3	2	3	2
CO3	3	2	3	2	2	2	3	2
CO4	2	3	3	2	2	2	3	2
CO5	2	3	3	2	2	2	3	2

Mapping with Programme: Specific Outcomes:

CO/PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of CourseContributiontoPos	3	3	3	3	3

Course Coordinator

BOS Chairman

SEMESTER – IV

OPERATIONS RESEARCH (For B.Com and B.Com (PA))

Subject Code	Subject	Category	L	T	P	Hours	Credit
24S4UMAE03	ELECTIVE	Theory	Y	-	-	3	3

Learning Objectives:

- ❖ To introduce the students to operations research and linear programming.
- ❖ To impart knowledge about transportation and assignment problems.
- ❖ To get acquainted with game theory and simulation.
- ❖ To develop abilities to analyse and manage inventories using various methods.
- ❖ To acquire knowledge on network analysis.

Course Outcomes		
Course Outcomes	On completion of this course, students will able to	Programme Outcomes
CO1	Frame a linear programming problem for quantitative decisions in business planning.	PO1,PO3
CO2	Optimise economic factors by applying transportation and assignment problems.	PO3
CO3	Apply the concept of game theory and simulation for optimal decision making.	PO1,PO3
CO4	Analyse and manage inventories to meet the changes in market demand.	PO1,PO3
CO5	Construct networks including PERT, CPM for strategic management of business projects.	PO1,PO3

OPERATIONS RESEARCH

Unit	Details	No. ofHours
I	Introduction to Operations research and Linear Programming Problem Operations research – Origin and development - Role in decision making - Phases and approaches to OR - Linear programming problem – Applications and limitations - Formulation of LPP - Optimal Solution to LPP - Graphical method - Simplex Method	9
II	Transportation and Assignment problem Transportation Problem – methods - North West corner method - Least cost method - Vogel's approximation method - Stepping stone & MODI methods - Assignment problem	9
III	Game Theory and Simulation Game Theory- different strategies followed by the players in a game - Optimal strategies of a game using maxi-min criterion - Dominance property - Graphical method – Simulation	9
IV	Inventory Management Introduction to inventory systems, inventory classification. Economic order quantity (EOQ) model, Single period probabilistic inventory models with discrete and continuous demand, determination of reorder point for deterministic and probabilistic Inventory System. Basic concepts of Just-in- Time (JIT) and Material Requirement Planning (MRP)	9
V	Network Analysis Network models- CPM and PERT Determination of Critical Path Method (CPM)- PERT cost- Crashing a project- Scheduling of a project- Application of PERT and CPM.	9
	Total	45

Textbooks:

- ❖ C.R.Kothari, - Quantitative Techniques, Vikas Publications, Noida.
- ❖ V.K. Kappor, "Operations Research - Problems and Solutions", Sultan Chand & Sons Publisher, New Delhi 3.
- ❖ Anand Sharma, Operation Research, Himalaya Publishing House, 2014, Mumbai.
- ❖ M Sreenivasa Reddy, Operation Research, CENGAGE, New Delhi.
- ❖ S. Gurusamy, Elements of Operation Research, Vijay Nicole Imprints Private Limited.

Reference Books:

- ❖ S Kalavathy, Operations Research, Vikas Publications, Noida
- ❖ S.P. Gupta, —Statistical Methods, S.Chand& Sons Publisher, New Delhi. 2019
- ❖ Sarangi, SK Applied Operations Research and Quantitative Methods, Himalaya Publishing House, 2014, Mumbai.
- ❖ ND Vohra, Quantitative Techniques in Management, McGraw Hill, 6th Edition, New Delhi 2021

❖ P.R.Vittal - Operations Research, Margham Publications, Chennai.

WebResources:

❖ <https://nptel.ac.in>

Mapping with Programme Outcomes: 3Strong,2–Medium,1–Low

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	2	3	2	2	2	2	2
CO2	3	2	3	2	2	2	2	2
CO3	3	2	3	2	3	2	2	2
CO4	3	1	3	2	3	2	2	2
CO5	3	3	3	2	3	2	2	2

Mapping with Programme: Specific Outcomes:

CO/PO	PSO1	PSO2	PSO3
CO1	3	2	2
CO2	3	2	2
CO3	3	2	2
CO4	3	2	2
CO5	3	2	2
Weightage	15	10	10
Weighted percentage of CourseContributiontoPos	3	2	2

Course Coordinator

BOS Chairman

(For B.Sc., Computer Science / B.Sc., Computer Science (AI&DS) / BCA)

INTRODUCTION TO LINEAR ALGEBRA

Subject Code	Subject	Category	L	T	P	Hours	Credit
	Elective	Theory	Y	-	-	6	4

Learning Objectives

- ❖ Develop the ability of solving the Partial fraction, Binomial Series, Exponential series and Logarithms Series
- ❖ Acquire knowledge about Matrices and Cayley – Hamilton Theorem.

Course Outcomes		
Course Outcomes	On completion of this course, students will able to	Programme Outcomes
CO1	Define Partial Fraction and Binomial Series and examples	PO1, PO3
CO2	Define Exponential Series and Logarithms Series and examples	PO3
CO3	Define matrix and simple problems	PO1, PO3
CO4	Define Rank of matrix and problems	PO1, PO3
CO5	Describe Cayley Hamilton Theorem	PO1, PO3

INTRODUCTION TO LINEAR ALGEBRA

Unit	Details	No. of Hours
I	Partial Fraction and Binomial Series: Partial Fraction-Resolution into partial fraction-Binomial theorem for a positive integral index- Binomial theorem for a rational index- Simple problems. (Chapter-1 and 2)	18
II	Exponential Series and Logarithms Series: Exponential series-Standard result for exponential series- Logarithms Series-Simple problems. (Chapter-3 and 4)	18
III	Matrices: Introduction- Type of matrix-Matrix Operations-Transpose of a matrix-Determinant of a matrix-Inverse of a matrix-symmetric and skew symmetric-Conjugate of a matrix-Hermitian and skew Hermitian matrix-Simple problems (Chapter-5 (Page No:5.1 to 5.17).	18
IV	Rank of a Matrix: Orthogonal and Unitary matrix – Rank of a matrix- Test for consistency of linear equation-Condition for consistency Chapter-5 (Page No:5.18 to 5.49)	18
V	Cayley Hamilton Theorem: Definition of Characteristic equation of a matrix –Characteristic roots of a matrix - Eigen values and the Corresponding Eigen vectors of matrix– Cayley Hamilton theorem (Statement only) –Verifications of Cayley Hamilton Theorem – Problems only. (Chapter 5) (Page No:5.50- 5.74)	18
	Total	90

Text Books:

- ❖ Dr.P.R. Vittal, Allied Mathematics ,Margham publication, Chennai– 17, Reprint 2016.

Reference Books:

- ❖ S.G.Venkatachalapathi, Allied Mathematics, Marghampublication, Chennai – 17, Reprint 2011
- ❖ P. Kandasamy, K.Thilagavathy Allied Mathematics Volume I, S.Chand publication, July2012.
- ❖ P. Kandasamy, K.Thilagavathy Allied Mathematics Volume II, S. Chand publication, December 2010.

Web References:

- ❖ <https://nptel.ac.in>.

Mapping with Programme Outcomes: 3 Strong, 2 – Medium, 1 – Low

	PO1	PO2	PO3	PO4	PO5	PO6
CO1	3	2	2	3	3	-
CO2	2	3	3	3	3	-
CO3	3	3	3	3	3	-
CO4	2	3	3	2	3	-
CO5	2	3	3	3	3	-

Mapping with Programme: Specific Outcomes:

CO/PO	PSO1	PSO2	PSO3
CO1	2	3	3
CO2	2	3	3
CO3	2	3	3
CO4	2	3	3
CO5	2	3	3
Weightage	10	15	15
Weighted percentage of Course Contribution to Pos	2	3	3

Course Coordinator

BOS Chairman

DISCRETE MATHEMATICS – I
(For B.Sc., Computer Science / B.Sc., Computer Science (AI&DS) / BCA)

Subject Code	Subject	Category	L	T	P	Hours	Credit
	Elective	Theory	Y	Y	-	4	4

Learning Objectives

- ❖ Mathematical Logic
- ❖ Truth Table
- ❖ Relations and Ordering

Course Outcomes		
Course Outcomes	On completion of this course, students will able to	Programme Outcomes
CO1	Define Mathematical Logics and few examples	PO1,PO4,PO5
CO2	Define Normal Forms and The theory of inference for the statement calculus	PO2,PO3,PO4, PO5
CO3	Describe The Predicate Calculus and Inference theory of the predicate calculus	PO1,PO2,PO3, PO4,PO5
CO4	Define Some Basic Set Identities, and Cartesian products	PO1,PO3,PO4, PO5
CO5	Describe Relation and ordering and Functions	PO2,PO3,PO4, PO5

DISCRETE MATHEMATICS – I

Unit	Details	No. of Hours
I	Mathematical Logic: Statement and Notation-Connectives- Negation Conjunction – Disjunction-Statement Formulas and Truth Tables – Conditional and Biconditional – Well-formed Formulas – Tautologies. Chapter: 1 (Section: 1.1, 1.2(1.2.1 to 1.2.8))	12
II	Normal Forms: Disjunctive Normal Forms – Conjunctive Normal Forms –Principal Disjunctive Normal Forms – Principal Conjunctive Normal Forms –Ordering and Uniqueness of Normal Forms- The theory of inference for the statement calculus: Validity Using Truth Tables - Rules of Inference – Consistency of Premises and Indirect Method of Proof. Chapter-1 (section: 1.3, 1.3.1 to 1.3.5 & 1.4, 1.4.1 to 1.4.3)	12
III	The Predicate Calculus: Predicates – The Statement Function, Variables, and Quantifiers – Predicate Formulas – Free and Bound Variables – The Universe of Discourse. Inference theory of the predicate calculus: Valid Formulas and Equivalences – Some Valid Formulas Over Finite Universes – Special Valid Formulas Involving Quantifiers – Theory of Inference for the Predicate Calculus – Formulas Involving More Than One Quantifiers. Chapter-1 (section: 1.5, 1.5.1 to 1.5.5 & 1.6.1 to 1.6.5).	12
IV	Set Theory: Notation – Inclusion and Equality of Sets – The Power Set – Some Operations on Sets –Venn Diagrams – Some Basic Set Identities – The Principle of Specification – Ordered Pairs and n-tuples – Cartesian Products. Chapter-2 (section: 2.1.1 to 2.1.9)	12
V	Relation and ordering: Relations – Properties of Binary Relations in a Set – Relation Matrix and the Graph of a Relation – Partition and Covering of a Set – Functions: Definition and Introduction – Composition of Function – Inverse Function – Binary and n-ary Operations – Characteristic Function of a Set – Hashing Functions-Peano Axioms and Mathematical Introduction – Cardinality.	12
	Total	60

Text Book :

- ❖ Discrete mathematics structures with application to computer science –J.P.Tremblay and R. Manohar .

Reference books :

- ❖ Discrete Mathematics - Dr.S.P.Rajagopalan and Dr.R.Sattanathan.
- ❖ Discrete Mathematics - Dr.G.Balaji.
- ❖ Discrete Mathematics and its applications - Kenneth.H.Rosen.

Web References:

- ❖ <https://nptel.ac.in>.

Mapping with Programme Outcomes: 3 Strong, 2 – Medium, 1 – Low

	PO1	PO2	PO3	PO4	PO5	PO6
CO1	3	2	2	3	3	3
CO2	2	3	3	3	3	2
CO3	3	3	3	3	3	3
CO4	2	3	3	2	3	2
CO5	2	3	3	3	3	2

Mapping with Programme: Specific Outcomes:

CO/PO	PSO1	PSO2	PSO3
CO1	3	2	1
CO2	3	2	1
CO3	3	2	1
CO4	3	2	1
CO5	3	2	1
Weightage	15	10	5
Weighted percentage of Course Contribution to Pos	3	2	1

Course Coordinator

BOS Chairman

DISCRETE MATHEMATICS – II

Subject Code	Subject	Category	L	T	P	Hours	Credit
	Elective	Theory	Y	Y	-	4	4

Learning Objectives :

- ❖ Mathematical Logic
- ❖ Truth Table
- ❖ Relations and Ordering

Course Outcomes		
Course Outcomes	On completion of this course, students will able to	Programme Outcomes
CO1	Define Algebraic system - definitions and examples.	PO1, PO3
CO2	Define Groups and The application of the residue arithmetic to Computers	PO3
CO3	Define Latex and Boolean algebra and problems	PO1, PO3
CO4	Define Boolean functions and examples	PO1, PO3
CO5	Define graph theory and some basic definitions	PO1, PO3

DISCRETE MATHEMATICS – II

Unit	Details	No. of Hours
I	Algebraic Systems: Examples and General Properties-Definition and Examples-Some Simple Algebraic Systems and General Properties. Semigroups and Monoids: Definitions and Examples- Homomorphism of Semigroups and Monoids-Sub semigroups and Sub monoids. Grammars and languages: Discuss of Grammars-Formal definition of a Language-Notion of Syntax Analysis. (Chapter-3: Sections 3.1 to 3.3)	12
II	Groups: Definitions and Examples-Subgroups and homomorphisms- Cosets and Language's Theorem-Normal Subgroups- Algebraic systems with Two Binary operations- The application of the residue arithmetic to computers: Introduction to number system- residue arithmetic. (Chapter 3: Sections 3.5(3.5.1 - 3.6.2)	12
III	Latex and Boolean algebra: Lattices as partially ordered sets-definition and examples-some properties of lattices-lattices as algebraic system-sublattices, Direct product, and homomorphism-some special lattices -Boolean algebra- definition and examples-subalgebra, direct product, and homomorphism.(Chapter 4: Sections 4.1.1 to 4.2.2)	12
IV	Boolean function: Boolean forms and free Boolean algebras-values of Boolean expressions and Boolean functions- Representation and minimization of Boolean functions: representation of Boolean functions-minimization of Boolean functions(Chapter 4: Sections 4.3.1 to 4.4.2)	12
V	Graph theory: Basic concepts of graph theory-basic definitions-paths, reachability and connectedness-matrix representation of graphs-trees-storage representation and manipulation of graphs-Trees: their representation and operations-List: structures and graphs (Chapter 5: Sections 5.1.1 to 5.2.2)	12
	Total	60

Text Books

- ❖ Discrete mathematics structures with application to computer science – J.P.Tremblay and R. Manohar

Reference books

- ❖ Discrete Mathematics - Dr.S.P.Rajagopalan and Dr.R.Sattanathan.
- ❖ Discrete Mathematics - Dr.G.Balaji.

- ❖ Discrete Mathematics and its applications - Kenneth.H.Rosen.

Web References:

- ❖ <https://nptel.ac.in>.

Mapping with Programme Outcomes: 3 Strong, 2 – Medium, 1 – Low

	PO1	PO2	PO3	PO4	PO5	PO6
CO1	3	2	2	3	3	3
CO2	2	3	3	3	3	2
CO3	3	3	3	3	3	3
CO4	2	3	3	2	3	2
CO5	2	3	3	3	3	2

Mapping with Programme: Specific Outcomes:

CO/PO	PSO1	PSO2	PSO3
CO1	3	2	1
CO2	3	2	1
CO3	3	2	1
CO4	3	2	1
CO5	3	2	1
Weightage	15	10	5
Weighted percentage of Course Contribution to Pos	3	2	1

Course Coordinator

BOS Chairman

NUMERICAL METHODS

Subject Code	Subject	Category	L	T	P	Hours	Credit
	Elective	Theory	Y	Y	-	6	4

Learning Objectives

- ❖ Numerical methods is a mathematical tool designed to solve numerical problems.
- ❖ It is the study of numerical methods that attempt at finding approximate solutions of problems rather than the exact ones.
- ❖ Apply Numerical differentiation and Numerical integration.

Course Outcomes		
Course Outcomes	On completion of this course, students will able to	Programme Outcomes
CO1	Solve Algebraic methods and problems	PO1, PO3
CO2	Define Interpolation with equal intervals and problems	PO3
CO3	Define Interpolation with unequal intervals and problems	PO1, PO3
CO4	Define Numerical Differentiation and Integration, problems	PO1, PO3
CO5	Define Solution of Simultaneous linear Algebraic equations and problems	PO1, PO3

NUMERICAL METHODS

Unit	Details	No. of Hours
I	Solution of Algebraic: Introduction -The Bisection Method - The Iteration method – The method of false position - Newton Raphson Method - Generalized Newton's Method.(Chapter 2: Sections 2.1 to 2.5)	18
II	Interpolation with equal intervals: Finite Difference - Forward Differences -Backward Differences - Central Differences - symbolic relations and separation of symbols - Newton's formulae for interpolation - Central Differences interpolation formulae - Gauss Central difference formulae - Stirling Formulae (Chapter 3: Sections 3.3(3.3.1 - 3.3.4), 3.6, 3.7(3.7.1 - 3.7.2))	18
III	Interpolation with unequal intervals: Lagrange's Interpolation Formulae – Divided differences - Divided differences table - Newton's Divided Difference formulae - Inverse Interpolation. (Problems only)(Chapter 3: Sections 3.9.1, 3.11.1, 3.12)	18
IV	Numerical Differentiation and Integration: Numerical Differences - Maximum and minimum values of Tabulated function - Numerical Integration - Trapezoidal Rule - Simphson 1/3 Rule - Simphson 3/8 Rule.(Chapter 5: Sections 5.2, 5.3, 5.4 (5.4.1 - 5.4.3))	18
V	Solution of Simultaneous linear Algebraic equations: Direct method - Gauss elimination Method – Gauss Jordan Method - Modification of Gauss Method to compute the inverse - Method of Factorization - Iterative Methods -Gauss Jacobi method - Gauss seidel Method. (Problems only) (Chapter 6: Sections 6.3(6.3.2 - 6.3.4), 6.4)	18
	Total	90

Text Book:

- ❖ S.S. Sastry – Introductory methods of numerical Analysis 3rd Edition, Prentice Hall of India Private Ltd., New Delhi.

Reference Book:

- ❖ P. Kandasamy, K. Thilagavathy, K. Gunavathy -Numerical Methods, Third Revised Edition, S.Chand&Companyy Ltd.,Ram Nagar, New Delhi.

Web References:

- ❖ <https://nptel.ac.in>.

Mapping with Programme Outcomes: 3 Strong, 2 – Medium, 1 – Low

	PO1	PO2	PO3	PO4	PO5	PO6
CO1	3	2	2	3	3	3
CO2	2	3	3	3	3	2
CO3	3	3	3	3	3	3
CO4	2	3	3	2	3	2
CO5	2	3	3	3	3	2

Mapping with Programme: Specific Outcomes:

CO/PO	PSO1	PSO2	PSO3
CO1	3	2	1
CO2	3	2	1
CO3	3	2	1
CO4	3	2	1
CO5	3	2	1
Weightage	15	10	5
Weighted percentage of Course Contribution to Pos	3	2	1

Course Coordinator

BOS Chairman

OPTIMIZATION TECHNIQUES

Subject Code	Subject	Category	L	T	P	Hours	Credit
	Elective	Theory	Y	Y	-	6	4

Learning Objectives

- ❖ To know the concepts of Mathematical formulation and solving L.P.P
- ❖ To find the solutions of Transportation and Assignment models.
- ❖ To teach the techniques for converting the real life problems as Mathematical problems and solving them.

Course Outcomes		
Course Outcomes	On completion of this course, students will able to	Programme Outcomes
CO1	Formulate and solve real life problems through LPP.	PO1, PO3
CO2	Compute the optimum Transportation schedule	PO3
CO3	Find the Optimum assignment model	PO1, PO3
CO4	Solve the Sequencing problem	PO1, PO3
CO5	Use the Techniques for planning and scheduling of projects	PO1, PO3

OPTIMIZATION TECHNIQUES

Unit	Details	No. of Hours
I	Linear Programming Formulation and Graphical Method: Introduction - Requirements for employing LPP technique – Mathematical Formulation of L.P.P. - Basic assumptions - Graphical method of the Solution of a L.P.P. – Some more cases – Advantage of Linear Programming – Limitations of Linear Programming. Chapter 2 (Sections 2.1 – 2.8)	18
II	Transportation Model: Introduction - Mathematical formulation of a transportation problem - Methods for finding initial basic feasible solution – Transportation algorithm or MODI method – Degeneracy in Transportation problems – Unbalanced Transportation Problems – Maximization case in Transportation problems. Chapter 7 (Sections 7.1 – 7.5).	18
III	Assignment Problem: Introduction – Mathematical formulation of an Assignment Problem – Difference between the Transportation Problem and Assignment Problem – Assignment Algorithm or Hungarian Method – Unbalanced Assignment Models – Maximization case in Assignment Problems. Chapter 8 (Sections 8.1 – 8.2, 8.4 - 8.7)	18
IV	Sequencing Problems: Introduction – Assumptions of solving a sequencing Problem - Definition - Procedure for finding Optimum Sequence (n jobs on 2 machines) – Processing n jobs on three machines– Processing n jobs on m machines. Chapter 14 (Sections 14.1 – 14.6).	18
V	Scheduling by PERT and CPM: Introduction – Basic Terminologies – Rules for constructing a project network – Network computations – Floats – Programme Evaluation Review Technique (PERT) – Basic differences between PERT and CPM. Chapter 15 (Sections 15.1 – 15.7)	18
	Total	90

Text Book:

- ❖ Sundaresan,V., Ganapathy Subramanian, K.S. and Ganesan, K.Resource Management Techniques. [Seventh Edition]. AR.Publication, Chennai.2013.

Reference Books:

- ❖ Kantiswarup., Gupta, P.K. and Man Mohan. Operations Research.[Seventeenth Edition]. Sultan Chand and Sons, NewDelhi.2020.
- ❖ Gupta, P.K. and Hira,D.S. OperationsResearch. [EighthEdition].Sulthan Chand and Company, New Delhi .2020.
- ❖ Kalavathy.S. Operations Research [Fourth Edition],Vikas Publishing House,Chennai.2012.

Web References:❖ <https://nptel.ac.in>.**Mapping with Programme Outcomes: 3 Strong, 2 – Medium, 1 – Low**

	PO1	PO2	PO3	PO4	PO5	PO6
CO1	2	3	3	2	1	3
CO2	2	3	3	2	1	3
CO3	2	3	3	2	1	3
CO4	2	3	3	2	1	3
CO5	2	3	3	2	1	3

Mapping with Programme: Specific Outcomes:

CO/PO	PSO1	PSO2	PSO3
CO1	2	3	3
CO2	2	3	3
CO3	2	3	3
CO4	2	3	3
CO5	2	3	3
Weightage	10	15	15
Weighted percentage of Course Contribution to Pos	2	3	3

Course Coordinator

BOS Chairman

GRAPH THEORY AND ITS APPLICATION

Subject Code	Subject	Category	L	T	P	Hours	Credit
	Elective	Theory	Y	-	-	6	4

Learning Objectives :

- ❖ Graphs and subgraphs
- ❖ Walks, Trails and Paths
- ❖ Applications

Course Outcomes		
Course Outcomes	On completion of this course, students will able to	Programme Outcomes
CO1	Define Graphs, Subgraphs and Operation on Graphs.	PO1, PO3
CO2	Define Walk, Trails and Paths.	PO3
CO3	Define Eulerian Graphs and Hamiltonian graphs. Explain the concept of Konigsberg Bridge problem and Fleury's Algorithms.	PO1, PO3
CO4	Explain Characterization of Trees and Theorems.	PO1, PO3
CO5	Explain Applications of Connector problem and shortest path problem.	PO1, PO3

GRAPH THEORY AND ITS APPLICATION

Unit	Details	No. of Hours
I	Introduction – Definition – Examples – Degrees – Definition – Theorem 1, 2 – Problems – Subgraphs – Definition – Theorems – Operations on graphs – Definition theorem-1 – Problems. Chapter 2 (Sections 2.1 to 2.3, 2.9).	18
II	Introduction – Walks, Trails and Paths – Definitions Theorem – 1, 2, 3 – Connectedness and components – Definitions – Theorems – Definition – Distance – Theorems – Cut point – Bridge – Blocks – Connectivity. Chapter 4 (Sections 4.1 to 4.4).	18
III	Introduction – Eulerian Graphs – Definition – Lemmas – Theorem – Konigsberg Bridge problem – Fleury's Algorithms – Hamiltonian graphs – Definitions – Theorems – Lemma – Closure – Theorems. Chapter 5 (Sections 5.1, 5.2).	18
IV	Introduction – Characterization of Trees – Theorems –Centre of a tree – Definition – Theorem. Chapter 6 (Sections 6.1, 6.2).	18
V	Introduction - Applications – Connector problem – shortest path problem – Transformation and kinematic Graph. Chapter 11 (Sections 11.1 to 11.3).	18
	Total	90

Text Book:

- ❖ S.Arumugam, S. Ramachandran, Invitation to graph theory, Scitech Publications, Chennai, 2001.

Reference Books:

- ❖ John clark and Derek Allan Holton, A first book at graph theory, Allied publishes.
- ❖ S. Kumaravelu and SusheelaKumaravelu, Graph theory, Publishers Authors C/O.182, Childambara Nagar, Nagarkoil – 629 002.

Web References:

- ❖ <https://nptel.ac.in>.

Mapping with Programme Outcomes: 3 Strong, 2 – Medium, 1 – Low

	PO1	PO2	PO3	PO4	PO5	PO6
CO1	3	2	3	2	1	1
CO2	3	2	3	2	1	1
CO3	3	2	3	2	1	1
CO4	3	2	3	2	1	1
CO5	3	2	3	2	1	1

Mapping with Programme: Specific Outcomes:

CO/PO	PSO1	PSO2	PSO3
CO1	3	3	2
CO2	3	3	2
CO3	3	3	2
CO4	3	3	2
CO5	3	3	2
Weightage	15	15	10
Weighted percentage of Course Contribution to Pos	3	32	2

Course Coordinator

BOS Chairman

NUMERICAL METHODS-I

Subject Code	Subject	Category	L	T	P	Hours	Credit
	Elective	Theory	Y	-	-	6	4

Learning Objectives

- ❖ Numerical methods is a mathematical tool designed to solve
- ❖ Numerical problems.
- ❖ To study of numerical methods that attempt at finding.
- ❖ Approximate solutions of problems rather than the exact ones.
- ❖ Apply Numerical differentiation and Numerical integration.

Course Outcomes		
Course Outcomes	On completion of this course, students will able to	Programme Outcomes
CO1	Define Algebraic methods and problems	PO1, PO3
CO2	Define Newtons methods and Root squaring methods and Problems	PO3
CO3	Define finite differences and problems	PO1, PO3
CO4	Define Interpolation methods and problems	PO1, PO3
CO5	Define divided differences and inverse interpolation and Problems	PO1, PO3

NUMERICAL METHODS-I

Unit	Details	No. of Hours
I	The Bisection Method - The Iteration method - The method of false position - Newton Raphson Method (Chapter 2: Sections 2.1 to 2.5).	18
II	Generalized Newton's Method - Ramanujan's Method-The Secant Method - Muller's Method-Graeffe's Root squaring Method (Chapter 2: Sections 2.6 to 2.9))	18
III	Finite Difference - Forward Differences -Backward Differences - Central Differences - symbolic relations and separation of symbols-Detection of Errors by Use of Difference Tables. (Chapter 3: Sections 3.3(3.3.1 - 3.3.4),3.4)	18
IV	Differences of Polynomial- Newton's formulae for interpolation – Central Differences interpolation formulae - Gauss Central difference formulae - Stirling Formulae - Bessel's Formulae -Everett's formulae (Problems only). (Chapter 3: Sections 3.5,3.6.3.7(3.7.1 - 3.7.4))	18
V	Lagrange's Interpolation Formulae - Divided differences - Divided differences table - Newton's Divided Difference formulae - Inverse Interpolation. (Problems only) (Chapter 3: Sections 3.9.1, 3.11.1, 3.12).	18
	Total	90

Text Book:

- ❖ S.S. Sastry - Introductory methods of numerical Analysis 3rd Edition, Prentice Hall of India Private Ltd., New Delhi.

Reference Book:

- ❖ P. Kandasamy, K. Thilagavathy, K. Gunavathy - Numerical Methods, Third Revised Edition, S.Chand&Companyy Ltd., Ram Nagar, New Delhi.

Web References:

- ❖ <https://nptel.ac.in>.

Mapping with Programme Outcomes: 3 Strong, 2 – Medium, 1 – Low

	PO1	PO2	PO3	PO4	PO5	PO6
CO1	3	2	2	3	3	-
CO2	2	3	3	3	3	-
CO3	3	3	3	3	3	-
CO4	2	3	3	2	3	-
CO5	2	3	3	3	3	-

Mapping with Programme: Specific Outcomes:

CO/PO	PSO1	PSO2	PSO3
CO1	3	3	2
CO2	3	3	2
CO3	3	3	2
CO4	3	3	2
CO5	3	3	2
Weightage	15	15	10
Weighted percentage of Course Contribution to Pos	3	32	2

Course Coordinator

BOS Chairman

NUMERICAL METHODS-II

Subject Code	Subject	Category	L	T	P	Hours	Credit
	Elective	Theory	Y	-	-	6	4

Learning Objectives

- ❖ Numerical methods is a mathematical tool designed to solve
- ❖ To study of numerical methods that attempt at finding.
- ❖ Approximate solutions of problems rather than the exact ones.
- ❖ Apply Numerical differentiation and Numerical integration.

Course Outcomes		
Course Outcomes	On completion of this course, students will be able to	Programme Outcomes
CO1	Define Numerical differentiation and problems	PO1, PO3
CO2	Define Numerical Integration and problems	PO3
CO3	Define direct methods and number of arithmetic operations related problems	PO1, PO3
CO4	Define Method of factorization and problems	PO1, PO3
CO5	Define solution by Taylor's Series and problems	PO1, PO3

NUMERICAL METHODS-II

Unit	Details	No. of Hours
I	Introduction-Numerical Differentiation - Maximum and minimum values of Tabulated function. (Chapter 5: Sections 5.1, 5.2,5.3)	18
II	Numerical Integration-Trapezoidal Rule - Simphson 1/3 Rule - Simphson 3/8 Rule -Boole's and Weddle's rule. (Problems only) (Chapter 5: Sections 5.4 (5.4.1 - 5.4.4))	18
III	Direct method –Matrix Inversion Method-Gauss elimination Method – Gauss Jordan Method - Modification of Gauss Method to compute the inverse -Number of Arithmetic Operations-LU Decomposition-LU Decomposition from Gauss Elimination (Chapter 6: Sections 6.3(6.3.1- 6.3.7))	18
IV	Method of Factorization - Iterative Methods -Gauss Jacobi method - Gauss seidel Method. (Problems only) (Chapter 6: Sections 6.4)	18
V	Solution by Taylor's Series-Picard's Method of Successive Approximations-Eluler's Method-Runge-Kutta Method. (Chapter 7 : Sections 7.2 to 7.5) .	18
	Total	90

Text Books:

- ❖ S.S. Sastry - Introductory methods of numerical Analysis 3rd Edition, Prentice Hall of India Private Ltd., New Delhi.

Reference Books:

- ❖ P. Kandasamy, K. Thilagavathy, K. Gunavathy - Numerical Methods, Third Revised Edition, S.Chand&Companyy Ltd., Ram Nagar, New Delhi.

Web References:

- ❖ <https://nptel.ac.in>.

Mapping with Programme Outcomes: 3 Strong, 2 – Medium, 1 – Low

	PO1	PO2	PO3	PO4	PO5	PO6
CO1	3	2	2	3	3	-
CO2	2	3	3	3	3	-
CO3	3	3	3	3	3	-
CO4	2	3	3	2	3	-
CO5	2	3	3	3	3	-

Mapping with Programme: Specific Outcomes:

CO/PO	PSO1	PSO2	PSO3
CO1	3	3	2
CO2	3	3	2
CO3	3	3	2
CO4	3	3	2
CO5	3	3	2
Weightage	15	15	10
Weighted percentage of Course Contribution to Pos	3	32	2

Course Coordinator

BOS Chairman

INTRODUCTION TO LINEAR ALGEBRA – PRACTICAL

Subject Code	Subject	Category	L	T	P	Hours	Credit
	Elective	Practical	-	-	Y	2	2

Learning Objectives

- ❖ Acquire knowledge about Matrices and Cayley– Hamilton Theorem.
- ❖ Understand the concepts of symmetric and Skew symmetric.
- ❖ Understand the concepts of differentiation and Vector point function.

Course Outcomes		
Course Outcomes	On completion of this course, students will able to	Programme Outcomes
CO1	Define Partial Fraction and Binomial Series and examples	PO1, PO3
CO2	Define Exponential Series and Logarithms Series and examples	PO3
CO3	Define matrix and simple problems	PO1, PO3
CO4	Define Rank of matrix and problems	PO1, PO3
CO5	Describe Cayley Hamiltan Theorem	PO1, PO3

INTRODUCTION TO LINEAR ALGEBRA – PRACTICAL

Unit	Details	No. of Hours
I	Definition of matrices – Addition , subtractions and multiplication of matrices – Problems only.	6
II	Transpose of a Matrix- Adjoint of a matrix – Inverse of a matrix- problems only.	6
III	Definition of symmetric, skew symmetric, hermitian and skew hermitian matrices - Problems only.	6
IV	Rank of a Matrix : Definition – Finding the rank of matrix – Problems upto 3x3 matrix only.	6
V	Characteristic equation of matrix – Cayley Hamilton Theorem- Verification of cayley Hamilton theorem- simple Problems only.	6
	Total	30

Text Book:

- ❖ Dr.P.R. Vittal, Allied Mathematics , Margham publication, Chennai – 17, Reprint 2012.

Reference Book:

- ❖ S.G Venkatachalapathi, Allied Mathematics, Margham publication, Chennai – 17, Reprint 2011.

Mapping with Programme Outcomes: 3 Strong, 2 – Medium, 1 – Low

	PO1	PO2	PO3	PO4	PO5	PO6
CO1	3	2	2	3	3	-
CO2	2	3	3	3	3	-
CO3	3	3	3	3	3	-
CO4	2	3	3	2	3	-
CO5	2	3	3	3	3	-

Mapping with Programme: Specific Outcomes:

CO/PO	PSO1	PSO2	PSO3
CO1	3	3	2
CO2	3	3	2
CO3	3	3	2
CO4	3	3	2
CO5	3	3	2
Weightage	15	15	10
Weighted percentage of Course Contribution to Pos	3	32	2

Course Coordinator

BOS Chairman

OPTIMIZATION TECHNIQUES – PRACTICAL

Subject Code	Subject	Category	L	T	P	Hours	Credit
	Elective	Practical	-	-	Y	2	2

Learning Objectives

- ❖ Acquire knowledge about LPP and Graphical Method.
- ❖ Understand the concepts of Rules for constructing a project network.

Course Outcomes		
Course Outcomes	On completion of this course, students will able to	Programme Outcomes
CO1	Formulate and solve real life problems through LPP.	PO1, PO3
CO2	Compute the optimum Transportation schedule	PO3
CO3	Find the Optimum assignment model	PO1, PO3
CO4	Solve the Sequencing problem	PO1, PO3
CO5	Use the Techniques for planning and scheduling of projects	PO1, PO3

OPTIMIZATION TECHNIQUES – PRACTICAL

Unit	Details	No. of Hours
I	Linear Programming Problem – Graphical Method	6
II	Transportation Problem - Finding initial basic feasible solution only by using North - West Corner Rule, Least Cost Method – Vogel's Approximation Method.	6
III	Assignment Problems – Finding optimal solution by using Hungarian Method.	6
IV	Sequencing Problem – N jobs to be operated on Two Machines.	6
V	Network – Rules for constructing a project network – Floats.	6
	Total	30

Text Book:

- ❖ Sundaresan. V., Ganapathy Subramanian K.S. and Ganesan.K, Resource Management Techniques. [seventeenth Edition]. Sultan Chand and Sons, New Delhi.2020.

Reference Books:

- ❖ Kantiswarup., Gupta, P.K. and Man Mohan. Operations Research [seventeenth Edition]. Sultan Chand and Sons, New Delhi.2020.
- ❖ Gupta, P.K. and Hira., D.S. Operations Research [Eighth Edition]. Sultan Chand and Sons, New Delhi.2020

Mapping with Programme Outcomes: 3 Strong, 2 – Medium, 1 – Low

	PO1	PO2	PO3	PO4	PO5	PO6
CO1	3	2	2	3	3	-
CO2	2	3	3	3	3	-
CO3	3	3	3	3	3	-
CO4	2	3	3	2	3	-
CO5	2	3	3	3	3	-

Mapping with Programme: Specific Outcomes:

CO/PO	PSO1	PSO2	PSO3
CO1	3	3	2
CO2	3	3	2
CO3	3	3	2
CO4	3	3	2
CO5	3	3	2
Weightage	15	15	10
Weighted percentage of Course Contribution to Pos	3	32	2

Course Coordinator

BOS Chairman

NUMERICAL METHODS – PRACTICAL

Subject Code	Subject	Category	L	T	P	Hours	Credit
	Elective	Practical	-	-	Y	2	2

Learning Objectives

- ❖ Acquire knowledge about LPP and Bisection Method and Iteration Method .
- ❖ Understand the concepts of Gauss Jacobi Method and Seidel Method.

Course Outcomes		
Course Outcomes	On completion of this course, students will able to	Programme Outcomes
CO1	Explain in detail about Rank of Matrix and Characteristics equation of a Matrix and CayleyHamilton Theorem and Problems to verify Cayley Hamilton.	PO1,PO3
CO2	Explain Leibnitz formula for n^{th} derivative.	PO3
CO3	Explain Euler 's theorem on homogeneous function and Problems to verify Euler's Theorem and Partial derivative.	PO1,PO3
CO4	Explain Scalar and Vector point functions and Gradient of scalar point functions.	PO1,PO3
CO5	Explain Divergence and Curl of vector point functions and Solinoidal vector and Irrotational vector.	PO1,PO3

NUMERICAL METHODS – PRACTICAL

Unit	Details	No. of Hours
I	The Bisection Method – The Iteration Method	6
II	Newton's Interpolation Formula for Forward and Backward difference	6
III	Lagrange's Interpolation Formula.	6
IV	Gauss elimination Method – Gauss Jordan Method	6
V	Gauss Jacobi Method and Seidel Method.	6
	Total	30

Text Books:

- ❖ S.S.Sastry – Introductory Methods of numerical analysis 3rd edition, Prentice Hall of India Private Ltd., New Dehli.

Reference Books:

- ❖ P.Kandasamy, K.Thilagavathy, K.Gunavathy – Numerical Methods, Third Revised Editions, S. Chand & Company Ltd., Ram Negar, New Delhi.

Mapping with Programme Outcomes: 3 Strong, 2 – Medium, 1 – Low

	PO1	PO2	PO3	PO4	PO5	PO6
CO1	3	2	2	3	3	-
CO2	2	3	3	3	3	-
CO3	3	3	3	3	3	-
CO4	2	3	3	2	3	-
CO5	2	3	3	3	3	-

Mapping with Programme: Specific Outcomes:

CO/PO	PSO1	PSO2	PSO3
CO1	3	3	2
CO2	3	3	2
CO3	3	3	2
CO4	3	3	2
CO5	3	3	2
Weightage	15	15	10
Weighted percentage of Course Contribution to Pos	3	32	2

Course Coordinator

BOS Chairman

DISCRETE MATHEMATICS – PRACTICAL

Subject Code	Subject	Category	L	T	P	Hours	Credit
	Elective	Practical	Y		Y	2	2

Learning Objectives

- ❖ Acquire knowledge about Negation and Conjunction.
- ❖ Understand the concepts of Characteristic equation and Characteristic roots.

Course Outcomes		
Course Outcomes	On completion of this course, students will able to	Programme Outcomes
CO1	Define Mathematical Logics and few examples	PO1,PO4,PO5
CO2	Define Normal Forms and The theory of inference for the statement calculus	PO2,PO3,PO4, PO5
CO3	Describe The Predicate Calculus and Inference theory of the predicate calculus	PO1,PO2,PO3, PO4,
CO4	Define Some Basic Set Identities, and Cartesian products	PO1,PO3,PO4, PO5
CO5	Describe Relation and ordering and Functions	PO2,PO3,PO4, PO5

DISCRETE MATHEMATICS – PRACTICAL

Unit	Details	No. of Hours
I	Negation – Conjunction – Disjunction – Tautologies.	6
II	Conditional – Biconditional.	6
III	Boolean Algebra – Boolean functions.	6
IV	Characteristic equation of matrix – Characteristic roots.	6
V	Cayley Hamilton Theorem – Rank of Matrix	6
	Total	30

Text Books:

- ❖ Discrete Mathematics Structures with application to computer science – J.P. Tremblay and R.Manohar
- ❖ Discrete Mathematics – B.S.Vatssa, Suchi Vatssa

Reference Books:

- ❖ Discrete Mathematics – Dr.S.P.Rajagopalan and Dr.R.Sattanathan
- ❖ Discrete Mathematics – Dr.G.Balaji
- ❖ Discrete Mathematics and its applications –Kenneth.H.Rosen

Mapping with Programme Outcomes: 3 Strong, 2 – Medium, 1 – Low

	PO1	PO2	PO3	PO4	PO5	PO6
CO1	3	2	2	3	3	-
CO2	2	3	3	3	3	-
CO3	3	3	3	3	3	-
CO4	2	3	3	2	3	-
CO5	2	3	3	3	3	-

Mapping with Programme: Specific Outcomes:

CO/PO	PSO1	PSO2	PSO3
CO1	3	3	2
CO2	3	3	2
CO3	3	3	2
CO4	3	3	2
CO5	3	3	2
Weightage	15	15	10
Weighted percentage of Course Contribution to Pos	3	32	2

Course Coordinator

BOS Chairman

GRAPH THEORY AND ITS APPLICATION – PRACTICAL

Subject Code	Subject	Category	L	T	P	Hours	Credit
	Elective	Practical	Y		Y	2	2

Learning Objectives

- ❖ Acquire knowledge about Graphs and Subgraphs.
- ❖ Understand the concepts of Walks, Trails and Paths.

Course Outcomes		
Course Outcomes	On completion of this course, students will able to	Programme Outcomes
CO1	Define Graphs, Subgraphs and Operation on Graphs.	PO1, PO3
CO2	Define Walk, Trails and Paths.	PO3
CO3	Define Eulerian Graphs and Hamiltonian graphs. Explain the concept of Konigsberg Bridge problem and Fleury's Algorithms.	PO1, PO3
CO4	Explain Characterization of Trees and Theorems.	PO1, PO3
CO5	Explain Applications of Connector problem and shortest path problem.	PO1, PO3

GRAPH THEORY AND ITS APPLICATION – PRACTICAL

Unit	Details	No. of Hours
I	Graphs – Subgraphs – Operations on Graphs.	6
II	Connected Graphs – Disconnected Graphs and Components.	6
III	Walks, Trails and Paths.	6
IV	Eulerian Graphs – Hamiltonian Graphs.	6
V	Trees – Characterization of Trees – Centre of a Tree.	6
	Total	30

Text Book:

- ❖ S.Arumugam, S.Ramachandran, Invitation to graph theory, Scitech Publications, Chennai, 2001.

Reference Books:

- ❖ John clark and Derek Allan Hoton, A first book at graph theory , Allied publishes.
- ❖ Harray, Graph Theory, Narosa Publications, New Delhi.

Mapping with Programme Outcomes: 3 Strong, 2 – Medium, 1 – Low

	PO1	PO2	PO3	PO4	PO5	PO6
CO1	3	2	2	3	3	-
CO2	2	3	3	3	3	-
CO3	3	3	3	3	3	-
CO4	2	3	3	2	3	-
CO5	2	3	3	3	3	-

Mapping with Programme: Specific Outcomes:

CO/PO	PSO1	PSO2	PSO3
CO1	3	3	2
CO2	3	3	2
CO3	3	3	2
CO4	3	3	2
CO5	3	3	2
Weightage	15	15	10
Weighted percentage of Course Contribution to Pos	3	32	2

Course Coordinator

BOS Chairman