ARULMIGU PALANIANDAVAR ARTS COLLEGE FOR WOMEN, PALANI.

(Autonomous)

(Re-accredited With B^{++}grade by NAAC in 3rd Cycle)

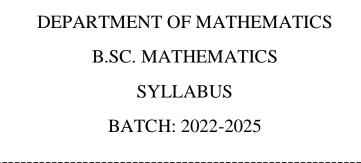DEPARTMENT OF MATHEMATICS

Choice Based Credit System(CBCS)

(2022-2023 onwards)

BACHELOR OF SCIENCE

SYLLABUS

2022 – 2025

(Based on Syllabus recommended by TANSCHE)

DEPARTMENT OF MATHEMATICS

B.SC. MATHEMATICS

SYLLABUS

BATCH: 2022-2025

Faculty Members of Mathematics Department

Dr.K,Meena M.Sc., M.Phil., PGDCA., Ph.D. Assistant Professor and Head
Dr.V.P.AnujaM.Sc., M.Phil., Ph.D., Assistant Professor
Dr.R.Vasanthi M.Sc.,M.Phil., B.Ed., PGDCA., Ph.D., Assistant Professor

ARULMIGU PALANIANDAVAR ARTS COLLEGE FOR WOMEN

(Affiliated to Mother Teresa Women's University, Kodaikanal)

Nationally Reaccredited with B[++] Grade by NAAC in 3rd Cycle

Chinnakalayamputhur, Palani - 624 615.

ARULMIGU PALANIANDAVAR ARTS COLLEGE
FOR WOMEN, PALANI

PREAMBLE

The Department of Mathematics was established in 1971. Our Department pursues a mission of excellent service with the vision of imparting quality teaching, developing sound mind and sound body inculcating social responsibilities and helping in the blossoming of human values for moral excellence.

COLLEGE VISION

- Enlightenment and. Empowerment of Rural Women

COLLEGE MISSION

- Providing high quality teaching learning environment with practical exposure
- Imbibing research culture and collaborate programs with local communities
- Imparting strong and supportive education to promote employability
- Encouraging questioning spirit and self – reliance

ARULMIGU PALANIANDAVAR ARTS COLLEGE
FOR WOMEN, PALANI

DEPARTMENT OF MATHEMATICS

VISION

- To continue innovative practices for academic excellence.
- To make rural women students best academicians.
- Imparting education towards the upliftment of the individual of the society.
- Providing employable opportunities.
- Motivating the students in pursuing rich values & richer traditions.

MISSION

- Moulding the overall personality of the students.
- Paying greater attention to the low achievers drawn from rural area.
- Including first generation learners and from the lower socio economic strata.
- Providing job oriented papers.
- Conducting coaching classes for employment opportunities encouragement.
- To faculty and students to update their knowledge in the latest science and technology.

ARULMIGU PALANIANDAVAR ARTS COLLEGE

FOR WOMEN, PALANI

DEPARTMENT OF MATHEMATICS

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

The B.Sc. Mathematics program describe accomplishments that graduates are expected toattain within five to seven years after graduation

PEO1	Acquire knowledge in functional areas of Mathematics and apply in all the fields oflearning.
PEO2	Recognize the need for lifelong learning and demonstrate the ability to explore somemathematical content independently.
PEO3	The graduates will become successful professionals through logical and analyticalthinking abilities.
PEO4	Employ mathematical ideas encompassing logical reasoning, analytical, numericalability, theoretical skills to model real-world problems and solve them.
PEO5	Analyze , interpret solutions and to enhance their Entrepreneurial skills, Managerialskill and leadership

PROGRAM SPECIFIC OUTCOMES (PSOs)

PSO1	Graduates will acquire a comprehensive knowledge and sound understanding of fundamentals of Mathematics.
PSO2	Graduates will develop numerical, analytical and mathematical skills.
PSO3	Graduates will be prepared to acquire a range of general skills, to solve problems, to evaluate information using computers productively to develop software programming and analog to communicate with the society effectively and learn independently.
PSO4	Graduates will acquire a job efficiently in diverse fields such as Science and Engineering, Education, Banking, Public Services, Business etc.,
PSO5	Graduates will identify the different roles in an organizational structure of the work place and carry out multiple roles in social responsibilities.

Department of Mathematics - Outcome Based Education Syllabus 2022-2025

ARULMIGU PALANIANDAVAR ARTS COLLEGE
FOR WOMEN, PALANI

DEPARTMENT OF MATHEMATICS

B.Sc., Mathematics

PROGRAM OUTCOME

PO 1	To develop important analytical skills and problem solving strategies to assess a broad range of issues in real life.
PO 2	To expose a wide range of modern mathematical ideas from pure and applied mathematics to graduate with both technical and quantitative skills that are in demand in the modern world.
PO 3	To formulate and develop mathematical arguments in a logical manner.
PO 4	To acquire a core of mathematical knowledge and understanding in advanced areas of mathematics from the given courses that provides a solid foundation for future learning
PO 5	To meet the global challenges and accomplish various rewarding positions in the society..

Department of Mathematics -Outcome Based Education Syllabus 2022-2025

DEPARTMENT OF MATHEMATICS
B.Sc. MATHEMATICS PROGRAMME
SCHEME OF EXAMINATIONS (2022-2023 onwards)

Part no.	Course Code	Title of the paper	Hours	Credits	Duration of Exam Hrs	Marks/Grade		
						CIA	CE	Total
SEMESTER-I								
I		Tamil Paper -I	6	3	3	25	75	100
II		English Paper -I	6	3	3	25	75	100
III		Core Paper I-Calculus	5	4	3	25	75	100
		Core Paper II-Theory of equations Trigonometry &Fourier Series	5	4	3	25	75	100
		Allied : Physics Paper-I Theory Practical	3 2	3 -	3 -	25 -	75 -	100 -
IV		Skill Based Course: Quantitative Aptitude-I	2	2	3	25	75	100
		Skill Based Course: Value Education(theory - practical)	1	2	3	25	75	100
		Total	30	21				700
SEMESTER-II								
I		Tamil Paper -II	6	3	3	25	75	100
II		English Paper -II	6	3	3	25	75	100
III		Core Paper III-Analytic Geometry	6	4	3	25	75	100
		Core Paper IV- Vector Calculus and Infinite Series	5	4	3	25	75	100
		Allied Physics Paper-II Theory Practical	3 2	3 4	3 3	25 40	75 60	100 100
IV		Skill Based Course: Quantitative Aptitude-II	2	2	3	25	75	100
		Total	30	23				700

Department of Mathematics -Outcome Based Education Syllabus 2022-2025

Part No.	Course Code	Title of the paper	Hours	Credits	Duration of	Marks/Grade		
						CIA	CE	Total

						Exam Hrs			
		SEMESTER-III							
I		**Tamil Paper –III**	6	3	3	25	75	100	
II		**English Paper –III**	6	3	3	25	75	100	
III		**Core Paper V- Modern Algebra-I**	5	4	3	25	75	100	
		Core Paper VI-Statics	4	4	3	25	75	100	
		Allied Paper III : Statistics -I	5	5	3	25	75	100	
IV		**Non Major Elective-I: Operations Research**	2	2	3	25	75	100	
		Skill Based Course: Quantitative Aptitude-III	2	2	3	25	75	100	
		Total	30	23				700	
		SEMESTER-IV							
I		**Tamil Paper –IV**	6	3	3	25	75	100	
II		**English Paper –IV**	6	3	3	25	75	100	
III		**Core Paper VII- Differential Equations and It's Applications**	6	5	3	25	75	100	
		Core Paper VIII-Dynamics	5	4	3	25	75	100	
		Allied Paper IV : Statistics -II	5	5	3	25	75	100	
IV		**Skill Based Course: Quantitative Aptitude-IV**	2	2	3	25	75	100	
V		**Extension Activities**	-	1	-	100	-	100	
		Total	30	23				700	

Department of Mathematics -Outcome Based Education Syllabus 2022-2025

	Course	**Title of the paper**	**Hours**	**Credits**			**Marks/Grade**		

Part no.	Code				Duration of Exam Hrs	CIA	CE	Total
		SEMESTER-V						
III		**Core Paper IX : Modern Analysis**	6	5	3	25	75	100
		Core Paper X- Modern Algebra-II	6	4	3	25	75	100
		Core Paper X1- Programming in'C' **Theory** **Practical**	4 2	3 1	3 3	25 -	50 25	75 25
		Elective-I: Operations Research-I / Theory of Numbers/ Any MOOC Course*	5	5	3	25	75	100
		Elective –II : Numerical Methods / Discrete Mathematics/ Any MOOC Course*	5	5	3	25	75	100
IV		**Skill Based Course: Practical- Numerical Problems Using C- Programming.**	2	2	3	40	60	100
		Total	30	25				600
		SEMESTER-VI						
III		**Core Paper XII: Complex Analysis**	7	5	3	25	75	100
		Core Paper XIII Graph Theory	6	5	3	25	75	100
		Core Paper XIV: Object Oriented Programming with C++ **Theory** **Practical**	4 2	3 1	3 3	25 -	50 25	75 25
		Elective-III: Operations Research-II / Astronomy/Any MOOC Course*	5	5	3	25	75	100
IV		**Skill Based Course: Project**	2	2	-	75	25	100
		Skill Based Course: Environmental Studies	2	2	3	25	75	100
		Non Major Elective-II: Numerical Methods	2	2	3	25	75	100
		Total	30	25				700

Extra Credit Papers

Course Code	Title of the paper	Credits	Duration of Exam Hrs	Marks/Grade		
				CIA	CE	Total
Semester-I						
	Extra Credit Paper-I: Mathematical Aptitude for competitive Examinations	2	3	-	100	100
Semester-III						
	Extra Credit Paper-II: Solar System and Stellar Universe	2	3	-	100	100
Semester-V						
	Extra Credit Paper-III: Set Theory and Logic	2	3	-	100	100

Value Added Courses

	Title of the paper	Duration of Exam Hrs	Marks/Grade		
			CIA	CE	Total
I Year	Vedic Mathematics	3	100	-	100
II Year	Coding Theory	3	100	-	100
III Year	Mathematics for Environmental Studies	3	100	-	100

*Students can take one 4 credit course in MOOC as elective with the approval of Department committee

➢ **Field Trip/ Internship/ Industrial Training preferably relevant to the course should be undertaken.**

Bloom's Taxonomy in fixing the Learning Objectives:

K1 / Knowledge = Remember

K2 / Comprehension = Understand

K3 / Application = Apply

K4 / Analysis = Analyze

K5 / Evaluation = Evaluate

K6 / Synthesis = Create

Bloom's Taxonomy Action Verbs:

K1 / Knowledge: Arrange, Define, Describe, Duplicate, Identify, Label, List, Match, Memorize, Name, Order, Outline, Recognize, Relate, Recall, Repeat, Reproduce, Select, State

K2 / Comprehension: Classify, Convert, Defend, Describe, Discuss, Distinguish, Estimate, Explain, Express, Extend, Generalize, Give example(s), Identify, Indicate, Infer, Locate, Paraphrase, Predict, Recognize, Rewrite, Review, Select,
Summarize, Translate

K3 / Application: Apply, Change, Choose, Compute, Demonstrate, Discover, Dramatize, Employ, Illustrate, Interpret, Manipulate, Modify, Operate, Practice, Predict, Prepare, Produce, Relate, Schedule, Show, Sketch, Solve, Use, Write

K4 / Analysis: Analyze, Appraise, Breakdown, Calculate, Categorize, Compare, Contrast, Criticize, Diagram, Differentiate, Discriminate, Distinguish, Examine,
Experiment, Identify, Illustrate, Infer, Model, Outline, Point out, Question,
Relate, Select, Separate, Subdivide, Test

K5 / Evaluation: Appraise, Argue, Assess, Attach, Choose, Compare, Conclude, Contrast, Defend, Describe, Discriminate, Estimate, Evaluate, Explain, Judge, justify, Interpret, Relate, Predict, Rate, Select, Summarize, Support, Value

K6 / Synthesis: Arrange, Assemble, Categorize, Collect, Combine, Comply, Compose, Construct, Create, Design, Develop, Devise, Explain, Formulate, Generate, Plan, Prepare, Rearrange, Reconstruct, Relate, Reorganize, Revise, Rewrite, Set up, Summarize, Synthesize, Tell, Write

Department of Mathematics -Outcome Based Education Syllabus 2022-2025

Bloom's Taxonomy Based Assessment Pattern

K1-Remember; K2- Understanding; K3- Apply; K4-Analyze; K5 – Evaluate; K6 -Create

Internal Question pattern Part III

Knowledge Level	Section	Marks	Total
K1	A (Answer all) MCQ -Q.No. 1 to 6	6x1	6
K2 and K3	B (Either or Pattern) Q.No. 7 and 8	2x4	8
K4	C (Either or Pattern) Q. No. 9 and 10	2x8	16
		Total	30

Components of Continuous Assessment(Part III)

Components		Calculation	CIA Total
CA1	30 Marks	$\frac{30+30}{4}=15$	
CA2	30 Marks		25 Marks
Assignment	5 Marks	5	
Seminar	5 Marks	5	

Internal and External Question pattern Part IV (Practical)

Internal Question pattern		External Question pattern	
Lab performance	20 Marks	Programme and Output	40 Marks
Model Practical	10 Marks	Viva	20 Marks
Record	10 Marks	Total	60 Marks
Total	40 Marks		

Internal Question pattern Part IV (Theory)

Knowledge Level	Section	Marks	Total
K1	A (Answer all) Q. No. 1 to 3	3x1	3
K2 and K3	B (Either or Pattern) Q. No. 4 and 5	2x3	6
K4	C (Either or Pattern) Q. No. 6	1x6	6
		Total	15

Department of Mathematics -Outcome Based Education Syllabus 2022-2025

Components of Continuous Assessment (Part IV)

Components		Calculation	CIA Total
CA1	15 Marks	$\frac{15+15}{2}=15$	
CA2	15 Marks		25 Marks
Assignment	5 Marks	5	
Seminar	5 Marks	5	

External Question Paper pattern Part III (Theory)(except core paper XI and XIV)

Max. Marks: 75   Time: 3 Hrs.

S.No.	Part	Type	Marks
1	A	10x1=10 Multiple Choice Questions(MCQs): 2 questions from each Unit	10
2	B	5x7=35 Two questions from each Unit with Internal Choice (either / or)	35
3	C	3x10=30 Open Choice: Any three questions out of 5 : one question from each unit	30
		Total Marks	75

External Question pattern Part III (Theory core paper XI and XIV)

Max. Marks: 50   Time: 3 Hrs.

S.No.	Part	Type	Marks
1	A	5x1=5 Multiple Choice Questions(MCQs): one question from each Unit	5
2	B	5x3=15 Two questions from each Unit with Internal Choice (either / or)	15
3	C	3x10=30 Open Choice: Any three questions out of 5 : one question from each unit	30
		Total Marks	50

External Question pattern Part III (Practical)

Record	10 Marks
Programme and Output	10 Marks
Viva	5 Marks
TOTAL	25 Marks

External Question pattern Part IV (Theory)

Section	Pattern	Marks	Total
A	1-8 (any five out of eight)	5x3	15
B	9-16 (any five out of eight)	5x6	30
C	17-21 (any three out of five)	3x10	30
		TOTAL	75

Internal and External Question pattern Part IV (Project)

Internal Question pattern		External Question pattern	
Project Report	60 Marks	Viva Voce	25 Marks
Regularity	15 Marks		
Total	75 Marks		

Department of Mathematics -Outcome Based Education Syllabus 2022-2025

Programme Code	B.Sc.,	Programme Title	Mathematics
Batch	2022 - 2025	Semester	I
Course Code		Title:	CALCULUS
Hours/week	5	Credits:	4

Course Objective

This paper enables the students to gain the ability to solve the problems related to multiple integrals, Beta and Gamma functions. It also provides the basic knowledge of differentiation.

Course Outcomes (COs)

On completion of this course, the students will be able to

K1	CO1	acquire knowledge in solving the double integrals on both Cartesian and polar co-ordinates.
K2	CO2	understand the concepts of Beta and Gamma functions
K2	CO3	understand the concepts of Radius of Curvature, Cartesian Form, p - r equations
K3	CO4	demonstrate the use of leibnitze formula finding the nth differential equations.
K4	CO5	analyze the concept of differential equations and use various methods of finding the radius of curvature

UNIT 1

Successive Differentiation – n^{th} derivative - Standard Results- Examples - Trigonometrical transformation - formation of equations involving derivatives- Leibnitz Formula for the nth derivative of a product- Maxima and Minima of Functions of two Variables . [15 Hours]

UNIT 2

Curvature : Circle, Radius and Centre of Curvature – Cartesian formula for the radius of curvature - The coordinates of the centre of curvature–Evolutes and Involutes - Radius of Curvature in Polar Coordinates- P-r equation ; Pedal equation of a curve.. [15 Hours]

UNIT 3

Definite Integral: Properties of Definite Integral –Integration by Parts –Reduction Formulae $Sin^{n}x$, $Cos^{n}x$,$Tan^{n}x$,$Cot^{n}x$, $Sec^{n}x$, $Cosec^{n}x$, $Sin^{m}xCos^{n}x$ -Bernoulli's Formula. .

[15 Hours

UNIT 4

Definition of the Double integral – Evaluation of Double integral - Double integral in Polar Co-ordinates - Triple integral– Change of Variables : Jacobian- Important results regarding Jacobians - Transformation from Cartesian to polar co-ordinates -Transformation from Cartesian to Spherical polar co-ordinates.[15 Hours]

UNIT 5

. Beta and Gamma functions : Definitions–Convergence of ʃ(n)-Recurrence formula of Gamma functions-Properties of Beta functions-Relation between Beta and Gamma functions-Applications of Gamma functions to multiple integrals. [15 Hours]

Prescribed Text Books:

 1 . "CALCULUS –VOL I" byK.S.Narayanan and T.K.ManicavachagomPillay,

S.Viswanathan (Printers & Publishers) PVT Ltd., Chennai ,2011 .

 2 . "CALCULUS –VOL II" byK.S.Narayanan and T.K.ManicavachagomPillay,

S.Viswanathan (Printers & Publishers) PVT Ltd., Chennai,2011.

  UNIT 1   TB 1 :Chapter 3 : 1.1 to1.6 , 2.1 and 2.2

Chapter 7: 1.2 to 1.4 and   Chapter 8: 4.1

  UNIT 2   TB 1 : Chapter 10 : 2.1 to 2.8

  UNIT 3   TB 2 :Chapter 1: 11, 12, 13.1 to 13.10, 14 and 15.1

  UNIT 4   TB 2 :Chapter 5 : 2.1 , 2.2, 3.1 , 3.2 and 4

Chapter 6 : 1.1 , 1.2 , 2.3 and 2.4

  UNIT 5   TB 2 : Chapter 7 : 2.1 to 2.3, 3, 4, 5 and 6

Reference books:

1. P.Kandasamy and K.Thilagavathi,Mathematics for Branch I: Vol I and Vol

II"-S.Chand and Company Ltd., - New Delhi - 2004.

2. ArumugamIssac – ―Calculus‖ – New Gamma Publishing House – Jan 2011

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
1	https://www.brainkart.com/article/Introduction-to-Binomial,-Exponential-and-Logarithmic series_35107/
2	http://www.jjernigan.com/172/ConvergenceDivergenceNotes.pdf
3	http://home.iitk.ac.in/~psraj/mth101/lecture_notes/Lecture11-13.pdf https://maths4uem.files.wordpress.com/2015/09/1028-infinite-series.pdf https://ocw.mit.edu/high-school/mathematics/exam-prep/concept-of-series/series convergence-divergence/

Mapping

PO CO	PO1	PO2	PO3	PO4	PO5
CO1	S	S	S	S	S
CO2	S	S	S	S	S
CO3	S	S	S	S	S
CO4	S	S	S	S	S
CO5	S	S	S	S	S

S - Strong; M- Medium; L- Low

Programme Code	B.Sc	Programme Title	Mathematics
Batch	2022 - 2025	Semester	I
Course Code		Title:	**THEORY OF EQUATIONS, TRIGONOMETRY AND FOURIER SERIES**
Hours/week	5	Credits:	4

Course Objectives:

This paper enables the students to provide basic knowledge of Theory of Equations, Trigonometry and Fourier series

Course Outcomes (COs):

On successful completion of the course, the students will be able to

K1	CO1	acquire knowledge of trigonometric functions, the nature of hyperbolic functions, Fourier Series and Vector point functions.
K2	CO2	understand how to find the Fourier co-efficient for Periodic functions
K3	CO3	apply the concepts of Roots multiplied by a given number Standard forms to increase and decrease the roots of given equation by a given quantity in Reciprocal equations.
K4	CO4	analyze different methods like Descartes Method, Cardan's method, Ferrari's method in theory of equations
K4	CO5	analyze the relation between roots and coefficients of the polynomial equations

UNIT 1

Theory of equations - Imaginary roots- Rational roots - Relation between the roots and co-efficient of equation - Symmetric functions of the roots - Sum of the power of the roots of an equation - Newton's theorem. [15 hours]

UNIT 2

Transformation of equations - Roots multiplied by a given number - Reciprocal roots-Reciprocal equations - Standard forms to increase and decrease the roots of given equation by a given quantity.   [15 hours]

UNIT 3

Descarte's rule of signs - Numerical solution by Horner's method and Newton's method -Solution of cubic-Cardon's method and Trigonometry method and bi-quadratic equations-Ferrari's method.   [15 hours]

UNIT 4

Expansion of functions – sinnx, cosnx, tannx, $\sin^n x$, $\cos^n x$, series of sinx, cosx, tanx – Hyperbolic functions - Logarithm of complex numbers. [15 hours]

UNIT 5

Definition – Even and odd functions – Half range Fourier series – Expansion in any interval. [15 hours]

Prescribed Text Books:

1."ALGEBRA VOL I" by T.K.ManickavachagomPillay, T.Natarajan and
   K.S. Ganapathy. S. Viswanathan (printers & publishers) PVT, Ltd.,Chennai. 2010

2."TRIGONOMETRY & FOURIER SERIES" by Dr. S. Arumugam& others,
Gamma Publishing House, Palayamkottai.

UNIT 1   TB 1 (Chapter 6 : 1 to 14).
UNIT 2   TB 1 (Chapter 6 : 15, 16, 17)
UNIT 3   TB 1 (Chapter 6 : 24, 30, 34, 35)
UNIT 4   TB 2 (Chapter 1 : 1.2, 1.3, 1.4 , Chapter 2 and Chapter 3)
UNIT 5   TB 2 (Chapter 5)

Reference Book

"THEORY OF EQUATIONS AND TRIGONOMETRY" by
   Dr. S. Arumugam& others, Gamma Publishing House, Palayamkottai.2006

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
1	https://www.brainkart.com/article/Introduction-to-Binomial,-Exponential-and-Logarithmic series_35107/
2	http://www.jjernigan.com/172/ConvergenceDivergenceNotes.pdf
3	http://home.iitk.ac.in/~psraj/mth101/lecture_notes/Lecture11-13.pdf https://maths4uem.files.wordpress.com/2015/09/1028-infinite-series.pdf https://ocw.mit.edu/high-school/mathematics/exam-prep/concept-of-series/series convergence-divergence/

Mapping

PO CO	PO1	PO2	PO3	PO4	PO5
CO1	S	S	M	S	S
CO2	S	S	S	M	S
CO3	S	S	M	S	S
CO4	S	M	S	S	S
CO5	S	S	S	S	S

S - Strong; M- Medium; L- Low

Programme Code	B.Sc	Programme Title	Mathematics
Batch	2022 - 2025	Semester	I
Course Code		Title:	Quantitative Aptitude-I
Hours/week	2	Credits:	2

Course Objective

The objective of this syllabus is to make the students to clear competitive examination like Banking recruitment, Postal recruitment, Railway recruitment and TNPSC exams.

Course Outcomes (COs)

On successful completion of the course, the students will be able to

K1	CO1	remember the meaning of HCF and LCM of numbers.
K2	CO2	understand the basic concepts of Quantitative ability
K2	CO3	understand the basic concepts of logical reasoning
K3	CO4	apply the concepts of percentage in profit & loss in real life problems..
K4	CO5	analyze the concepts of problems on ages

Unit 1:

H.C.F and L.C.M of numbers : Problems on H.C.F and L.C.M of numbers. Decimal Fractions: Decimal Fractions –Conversion of a Decimal into Verbal Fraction-Operations on Decimal Fractions –Comparison of Fractions -Recurring Decimal -[6 Hours]

Unit2 :

Simplification: Introduction - BODMAS rule - Modulus of a real number - Simple problems. Square Roots and Cube Roots : Square Roots -Cube Roots -Simple problems [6 Hours]

Unit 3:

Average : Simple Problems. Problems on numbers: Simple problems on numbers[6 Hours]

Unit 4:

Problems on ages: Problems on ages - Simple problems. [6 Hours]

Unit 5:

Percentage : Simple Problems. Profit and loss: Introduction - Cost price - Selling price - Profit and loss – Simple Problems. [6 Hours]

Prescribed Text Book:

"Quantitative Aptitude byR. S.Aggarwal, S. Chand & Company Ltd, Ram Nagar, New Delhi, 2013.

Unit 1   Chapter 2 & Chapter 3
Unit 2   Chapter 4 &Chapter 5
Unit 3   Chapter 6 & Chapter 7
Unit 4   Chapter 8
Unit 5   Chapter 11& Chapter 12

Reference Books:

"Test of Reasoning for competitive examinations" by EdgarThorpe.Third
    Edition   Tata McGraw-Hill Publishing Company Limited,New Delhi.

Mapping

PO CO	PO1	PO2	PO3	PO4	PO5
CO1	S	S	S	M	S
CO2	S	S	S	S	S
CO3	S	S	S	S	S
CO4	S	M	S	S	S

S - Strong; H- High; M- Medium; L- Low

Programme Code	B.Sc	Programme Title	Mathematics
Batch	2022 - 2025	Semester	II
Course Code		Title:	**ANALYTICAL GEOMETRY**
Hours/week	5	Credits:	4

Course Objective

This course enables the student to gain fundamental ideas about co-ordinate geometry and gives clear knowledge about regular geometrical aspects and their properties in two dimensional and three dimensional analytical geometry.

Course Outcomes (COs)

On completion of this course, the students will be able to:

K1	CO1	recollect the properties of circle, sphere and can able to gain a deep knowledge in it.
K1	CO2	identify different forms of equations of plane
K2	CO3	Understand the relation between polar and rectangular Cartesian co-ordinates.
K3	CO4	acquire the knowledge of coplanar lines, skew lines and its properties.
K4	CO5	apply concept of a sphere and circle to determine their equations.

Unit-I:

     Rectangular Cartesian Coordinates: Direction cosines of the line – Coordinates-Distance between points–Angle between the lines – Projections – Direction cosines-Relation between the direction cosines of a straight lines- Direction ratios- The. Projection of the line on any other line with direction cosines-Conditions for perpendicularity and parallelism. [15 hours]

Unit-II:

     The Plane: The General equation of the first degree in x,y,z, represents a plane-The equation of the plane making intercepts a,b,c on the axes OX,OY,OZ respectively-The equation of the plane passing through the three given points – Angle between planes – Equation of plane through the intersection of two given planes –Length of the perpendicular. [15 hours]

Unit-III:

    Straight line: A straight line in the intersection of two planes – Symmetric form of the equations of a line- Equation of a straight line passing through two given points – Equation of Plane and straight line- The condition for the line perpendicular to the plane – Shortest distance between two given lines.-Coplanar lines. [15 hours]

Unit-IV:

      Sphere: Definition-The equation of a sphere when the centre and radius are given– Length of the tangent – Plane section of a sphere – Equation of circle on sphere- Equation of a sphere passing through a given circle – Intersection of two spheres in a circle– Equation of the tangent plane to the sphere and examples. [15 hours]

Unit-V:

     Cone: Equation of a Cone with its vertex at the origin - equation of a quadratic cone with given vertex and given guiding curve - necessary condition for general equation of second degree to represent a cone - circular cone - equation of circular cone with given vertex -axis and semi vertical angle –Cylinder –Equation –Enveloping cylinder. [15 hours]

Text book:

    1. T.K.Manickavachagom Pillay and T.Natarajan,―A Text Book of Analytical Geometry

      – part II - Three dimensions, Viswanathan Printers and Publishers, 2011.

          Unit I - Chapter 1
          Unit II - Chapter 2
          Unit III - Chapter 3
          Unit IV - Chapter 4
          Unit V - Chapter 5 – Sec. 1 to 8

Reference books:

1. H.K.Dasse, H.C.Saxena and M.D.Raisinghania, ―Simplified Course in Solid Geometry (3D)‖, S.Chand and Company, 2009
2. P.Duraipandian, ―Analytical Geometry – 3 Dimensional‖, Emerald publishers – 1998

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
1	http://www.brainkart.com/article/Three-Dimensional-Analytical-Geometry_6453/
2	http://egyankosh.ac.in/bitstream/123456789/11990/1/Unit-2.pdf

Mapping

PO CO	PO1	PO2	PO3	PO4	PO5
CO1	S	S	M	M	S
CO2	S	S	S	S	S
CO3	S	S	S	M	S
CO4	S	S	S	S	S
CO5	S	S	S	M	S

S - Strong; M- Medium; L- Low

Programme Code	B.Sc	Programme Title	Mathematics
Batch	2022 - 2025	Semester	II
Course Code		Title:	**VECTOR CALCULUS AND INFINITE SERIES**
Hours/week	5	Credits:	4

Course Objectives:

To acquire an in-depth knowledge in theory of vectors and apply the concepts in solving problems.

Course Outcomes (COs)

On completion of this course, the students will be able to:

K1	CO1	acquire the basic knowledge of convergence and divergence
K2	CO2	apply the concept of skew lines in evaluating the shortest distance between them and apply the concepts of Gradient, Divergence and Curl in solving vector differentiation problems.

K4	CO3	calculate line, surface, double and triple integrals and use Green's theorem in the plane, Gauss' divergence theorem and Stokes' theorem
K3	CO4	apply various tests to find the limit of a series
K4	CO5	analyze the behavior of convergence of series by using tests

UNIT 1

Differentiation – Gradient – Divergent- Curl and Connected Identities. [15 hours]

UNIT 2

Vector Integration – Line integeral – Surface integrals – Volume integerals – Green's theorem – Gauss's theorem- Stoke's theorem (proof not expected) – Simple problems.
[15 hours]

UNIT 3

Sequences – Bounded sequences – Monotonic sequences – Convergent sequences – Divergent and Oscillating sequences --Some theorems on Limits –- Definition of subsequences – Limit points – Cauchy sequences. [15 Hours]

UNIT 4

Infinite series- Definition – Cauchy's general Principle of convergence – comparison test – Kummer's Test – D' Alembert's ratio test- Solved problems in D' Alembert's ratio test – Raabe's Test – Solved problems in Raabe's Test- De Morgan and Bertrand's test , Gauss's test solved problems. [15 Hours]

UNIT 5

Cauchy's root test – Cauchy's Condensation test – Cauchy's Integral test – Series of arbitrary terms: Alternating series – Leibnitz's test – Absolute Convergence – Test for Convergence of Series of Arbitrary terms – Dirichlet's test – Abel's test – solved problems.
[15 Hours].

Prescribed Text Book:
1."ANALYTICAL GEOMETRY OF 3D AND VECTOR CALCULUS" by
  Dr.S. Arumugam & Others, Gamma Publishing House, Palayamkottai.2008
2. "SEQUENCES AND SERIES" by Dr.S.Arumugam ISSAC,
Gamma publishing house, Palayamkottai.December 2015 and reprint 2017

UNIT 1   TB 1   Chapter 7
UNIT 2   TB 1   Chapter 8.
UNIT 3   TB 2   Chapter 3 : 3.2 to 3.6 (Pg.No : 42 to 60) ;
                    3.9, 3.10 ,3.11, 3.12 (Pg.No : 94 to 117)
UNIT 4   TB 2   Chapter 4 : 4.1, 4.3
UNIT 5   TB 2   Chapter 4 : 4.4 and 4.5, Chapter 5 : 5.1 , 5.2

Reference Book:

1. "MATHEMATICAL ANALYSIS"byS.C.Malik ,SavitaArora., New Age
   International Private Limited.

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
1	http://www.math.odu.edu/~jhh/Volume-2.PDF http://www-math.mit.edu/~djk/18_01/chapter20/section03.html https://www.whitman.edu/mathematics/calculus_online/chapter16.html http://www.mecmath.net/calc3book.pdf
2	http://www.nptelvideos.in/2012/11/mathematics-iii.html
3	https://nptel.ac.in/courses/111107108/1

Mapping

PO CO	PO1	PO2	PO3	PO4	PO5
CO1	H	S	M	M	S
CO2	S	H	H	H	H
CO3	S	M	S	M	H
CO4	H	H	S	S	S
CO5	H	H	S	S	S

S - Strong; H- High; M- Medium; L- Low

Programme Code	B.Sc	Programme Title	Mathematics
Batch	20122-2025	Semester	II
Course Code		Title:	SBC: QUANTITATIVE APTITUDE -II
Hours/week	2	Credits:	2

Course Objective

The objective of this syllabus is to make the students to clear competitive examination like Banking recruitment, Postal recruitment, Railway recruitment and TNPSC exams.

Course Outcomes (COs)

On completion of this course, the students will be able to:

K1	CO1	remember the meaning of partnership
K2	CO2	understand the basic concepts of Quantitative ability
K2	CO3	understand the basic concepts of logical reasoning

K3	CO4	Apply the concepts of time and work on real life problems
K4	CO5	analyze the concepts of boats and streams

Unit 1

Partnership: Partnership-Ratio of Division of Gains-Working and Sleeping Partners

[6 Hours]

UNIT 2

Chain Rule: Direct Proportion- indirect Proportion   [6 Hours]

Unit 3

Time and Work :Time and Work - Simple problems [6 Hours]

Unit 4

Time and Distance: Time and Distance- Simple problems [6 Hours]

Unit 5

Boats and Streams: Speed downstream- Speed upstream   [6 Hours]

Prescribed Text Book:

Quantitative Aptitude byR. S.Aggarwal, S. Chand & Company Ltd, Ram Nagar, New Delhi, 2013.

Unit 1   Chapter 14
Unit 2   Chapter 15
Unit 3   Chapter 17
Unit 4   Chapter 18
Unit 5   Chapter 19

Reference Books:

"Test of Reasoning for competitive examinations" by EdgarThorpe.Third Edition   Tata McGraw-Hill Publishing Company Limited,New Delhi.

Mapping

PO CO	PO1	PO2	PO3	PO4	PO5
CO1	S	S	S	S	S

CO2	S	S	S	M	S
CO3	S	S	S	S	S
CO4	S	S	M	S	M
CO5	S	S	S	S	S

S - Strong; M- Medium; L- Low

Programme Code	B.Sc	Programme Title	Mathematics
Batch	2022 - 2025	Semester	III
Course Code		Title:	MODERN ALGEBRA-I
Hours/week	5	Credits:	4

Course Objective

This course promotes a better understanding of algebra and provides an adequate foundation for further study in abstract algebra and its applications in various branches of mathematics

Course Outcomes (COs)

On successful completion of the course the students will be able to

K1	CO1	acquire the basic knowledge and the structure of Group, Subgroup and Cyclic Groups
K2	CO2	describe the characteristics of a ring, quotient rings and Ideals

K2	CO3	Use appropriate techniques and reasoning to prove the properties of groups.
K3	CO4	apply the concepts of homomorphism and isomorphism for groups and rings
K4	CO5	analyze and demonstrate examples of subgroups, normal subgroups and quotient groups

UNIT 1

Subgroup-Examples-Centre-normalize-Intersection and union of subgroups-Permutations-Cycles and transposition-Permutations as a product of disjoint cycles and transpositions-Even and odd permutations-S_n and A_n –Cyclic groups-Examples- properties-Number of generators of cyclic groups.   [15 Hours]

UNIT 2

Cosets and their properties – Congruence relation modulo a subgroup – Lagrange's theorem and its consequences – Euler's theorem – Fermat's theorem – Normal subgroups – Centre is a normal subgroup – Quotient groups. [15 Hours]

UNIT 3

Homomorphism – Kernel of a homomorphism – Isomorphism, Automorphism – Cayley's theorem – Fundamental theorem of homomorphism. [15 Hours]

UNIT 4

Rings – Definition and examples – Elementary properties of rings – Division rings and fields – Zero divisors of a ring – Zero divisors of Z_n – Integral domain – Cancellation laws – Any field is an integral domain – Any finite integral domain is a field – Characteristic of a ring – Characteristic of integral domain is either zero or a prime number.
[15 Hours]
UNIT 5

Ideals – Quotient rings – Maximal and prime ideals – Homomorphism of rings – Field of quotients of an integral domain.   [15 Hours]

Prescribed Text Book:

"MODERN ALGEBRA" by Dr.S.Arumugam& Others,
Gamma Publishing House, Palayamkottai. 2003
UNIT 1   Chapter 3 : 3.4, 3.5, 3.6
UNIT 2   Chapter 3 : 3.8, 3.9
UNIT 3   Chapter 3 : 3.10, 3.11
UNIT 4   Chapter 4 : 4.1, 4.2, 4.4, 4.5
UNIT 5   Chapter 4 : 4.7, 4.11

Reference Books:

1. A.R.Vasishtha, "Modern Algebra", Krishna Prakashan Mandir, Meerut, 1994 – 95

2. T.K.Manickavasagampillai and Narayanan, "Modern Algebra‖ volume II Viswanathan printers and publishers Pvt Ltd., Edition 1982.

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
1	https://nptel.ac.in/courses/106/104/106104149/
2	https://nptel.ac.in/courses/111/106/111106113/
3	https://www.classcentral.com/course/swayam-modern-algebra-14201

Mapping

PO CO	PO1	PO2	PO3	PO4	PO5
CO1	S	S	S	S	S
CO2	S	M	S	S	S
CO3	S	M	S	S	S
CO4	S	S	S	S	M
CO5	S	S	S	S	M

S - Strong; M- Medium; L- Low

Programme Code	B.Sc	Programme Title	Mathematics
Batch	2022 - 2025	Semester	III
Course Code		Title:	STATICS
Hours/week	4	Credits:	4

Course Objective

This course enables a deep knowledge about the concept of Forces, Moments, Friction and resultant of more than one force acting on a surface. It also includes simple problems in each topic which develops the application skills of the students in solving them.

Course Outcomes (COs)

On completion of this course, the students will be able to:

K1	CO1	acquire the basic knowledge of Laws of friction and deploy them in solving the respective problems.
K2	CO2	understand the concepts of forces and moments.

K3	CO3	apply the concepts of forces in finding the resultant of more than one force acting on a surface.
K2	CO4	understand the concept of friction
K4	CO5	analyze the basics of coplanar forces and equilibrium of three forces acting on a rigid body and can solve the simple problems related to it.

UNIT 1

Forces acting a point – Parallelogram law – Triangle law of forces - Polygon law of forces - Lami's Theorem –Resolution of a force – conditions of equilibrium.
[12 Hours]

UNIT 2

Forces action on a rigid body parallel forces- Moment of forces – Varigon's theorem - Couples- Equilibrium of two couples-Equivalence of two couples - Resultant of a couple and a force.   [12 Hours]

UNIT 3

Three equilibrium forces acting on a rigid body – Three coplanar forces theorem – Two trigonometrically theorems – problems on parallel forces.[12 Hours]

UNIT 4

Laws of friction – Co-efficient of friction - Angle of friction – Cone of friction -Equilibrium of a particle on a rough inclined plane- Equilibrium of a body on a rough inclined plane under a force parallel to the plane.   [12 Hours]

UNIT 5

Equilibrium of a body on a rough inclined plane under any force Problems on Frictions.   [12 Hours]

Prescribed Text Book:

"STATICS" by M.K. Venkataraman, Eleventh edition, Agasthiar Publications.2010

UNIT 1 Chapter 2 : §1 to §9 , §11 to §16
UNIT 2 Chapter 3 : § 1 to § 13 & Chapter 4
UNIT 3 Chapter 5 : §1 to §7
UNIT 4 Chapter 7: §1 to §11
UNIT 5 Chapter 7 : §12 , §13

Reference Books:

1. A.V.Dharmapadam, ―Statics‖, S Viswanathan Printers and Publishing
Pvt.,Ltd. 1993
2. P.Duraipandian and Lakshmi Duraipandian, ―Mechanics‖, S.Chand
and Company Ltd,New Delhi - 1985.
3. Dr.P.P.Gupta, ―Statics‖, KedalNath Ram Nath, Meerut,1983-1984

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
1	https://nptel.ac.in/courses/112/105/112105164/
2	https://nptel.ac.in/courses/122/102/122102004/
3	https://www.khanacademy.org/science/ap-physics-1

Mapping

PO CO	PO1	PO2	PO3	PO4	PO5
CO1	S	S	S	S	S
CO2	S	S	M	S	S
CO3	S	S	S	M	S
CO4	S	S	M	S	S
CO5	S	S	S	S	S

S - Strong; M- Medium; L- Low

Programme Code	B.Sc	Programme Title	Mathematics
Batch	2022 - 2025	Semester	III
Course Code		Title:	STATISTICS – I
Hours/week	5	Credits:	5

Course Objective

The aim of this course is to introduce the concept of Correlation and its types ,discrete and continuous random variables, probability functions, expectations, moment generating functions and some discrete and continuous distributions and should have developed skills to apply them to various real life situations.

Course Outcomes (COs)

On successful completion of the course, the students will be able to

K1	CO1	calculate mean, median and mode

K1	CO2	acquire the knowledge by using Binomial distribution, Poisson distribution etc..
K2	CO3	understand random variables and probability distributions.
K3	CO4	Use the different methods of finding the correlation coefficient.
K4	CO5	compute expected value and variance of discrete and continuous random variables.

UNIT 1

Skewness - Definition of skewness -Tests of Skewness - Measure of Skewness - Karl Pearson's Coefficient of Skewness – Bowleys coefficient of skewness - - Moments-Moments about mean - Moments about arbitrary origin – moments about zero –Measure of skewness based on moments- Measure of kurtosis - Simple problems only. [15 Hours]

UNIT 2

Correlation - Karl Pearson's coefficient of correlation – Direct method of finding out correlation coefficient-Calculation of correlation coefficient when change of scale and origin is made-Deviations are taken from an assumed mean-Correlation of grouped data- Rank correlation coefficient- Regression : Regression equation of Yon X - Regression equation of X on Y-Deviations taken from Arithmetic means of X and Y-Deviations taken from assumed mean. [15 Hours]

UNIT 3

Theorems of Probability – Addition Theorem – Multiplication Theorem - Conditional Probability - Baye's theorem - Mathematical Expectation - Random Variables and Probability distribution - Simple problems only. [15 Hours]

UNIT 4

Binomial Distribution - Properties of Binomial Distribution - Mean, Mode, Variance, Moment, Moment Generating Function - Fitting a Binomial Distribution [15 Hours]

UNIT 5

Poisson Distribution-Mean & Variance - Role of the Poisson Distribution - Fitting a Poisson Distribution - Poisson Distribution as an Approximation of the Binomial Distribution. [15 Hours]

Prescribed Text Book:

"STATISTICAL METHODS" by S.P.GuptaS.Chand& sons. 2002

UNIT 1   Vol I - Chapter 9 : Page No.332 to 352
UNIT 2   Vol I - Chapter 10 : Page No. 386 to 390 : 394 to 398 ; 404 to 411 ;
                Chapter 11 : Page No : 439 t0 451
UNIT 3   Vol II - Chapter 1 : Page No : 765 to 774
UNIT 4   Vol II - Chapter 2 : Page No : 809 to 824
UNIT 5   Vol II - Chapter 2 : Page No : 826 to 835

Reference Books:
 1. Veerarajan .T, Fundamentals of Mathematical Statistics, Yes Dee Publishing Pvt.Ltd, 2017.
2. P.R.Vittal, ―Mathematical Statistics, Margham Publications -2002- Reprint 2012.
3. S.C.Gupta and V.K.Kapoor,‖Funtamentals of Mathematical Statistics‖, 10th
    edition,Sulton Chand Publications, 2002.

Mapping

PO CO	PO1	PO2	PO3	PO4	PO5
CO1	S	S	M	M	S
CO2	S	S	S	S	S
CO3	S	S	S	M	S
CO4	S	S	M	S	S
CO5	S	S	M	S	S

S - Strong; M- Medium; L- Low

Programme Code	B.Sc	Programme Title	Mathematics
Batch	2022 - 2025	Semester	III
Course Code		Title:	OPERATIONS RESEARCH
Hours/week	2	Credits:	2

Course Objective

To impart the basic concepts and applications of linear programming.
The leaner will analyze the different aspects of transportation problems,
assignment problems and also sequencing problem.
The leaner will develop, organize, evaluate short, long term processes and solve
problems
The leaner will acquire the knowledge of basics in game theory

Course Outcomes (COs)

On successful completion of the course, the students will be able to

K1	CO1	remember various techniques to solve real life problems
K2	CO2	understand the basics in the field of game theory
K3	CO3	Analyze pure and mixed strategy games
K3	CO4	find the replacement period of equipment that fails suddenly/gradually
K4	CO5	obtain the optimal solution for Sequencing problem and Game Theory

UNIT 1
Sequencing problem – Basic terms – Processing n jobs through 2 machines processing n jobs through 3 machines [6 Hours]

UNIT 2
Games - Strategies – Introduction – Two person zero – Sum games   [6 Hours]

UNIT 3
The Maxmin – Miinimax Principle – Games without Saddle Point – Mixed strategies.
[6 Hours]

UNIT 4
Graphical solution of 2xn and mx2 games-Dominance Property.   [6 Hours]

UNIT 5
Replacement of equipment / Asset that Deteriorates gradually – Replacement of equipment that fails suddenly.   [6 Hours]

Prescribed Text Book:
"OPERATIONS RESEARCH "by KantiSwarup, P.K. Gupta&Manmohan,
Sixteenth Edition, Sultan Chand & Sons.Edition - 2017
        Note: Problems only.

UNIT 1   Chapter 10 : 10.1 to 10.4
UNIT 2   Chapter 17 :17.1 to 17.3
UNIT 3   Chapter 17 : 17.4&17.5
UNIT 4   Chapter 17 : 17.6 & 17.7
UNIT 5   Chapter 18 : 18.2,18.3

Reference Books:

1.P.R.Vittal and V.Malini, ―Operations Research― Margham Publishers – 2002.

2.Taha, ―Operation Research‖, Printice Hall, New Delhi,2011

3. Kalavathy, ―Operations Research‖, Vikas Publishing House Pvt .Ltd. 2003

4. Gupta P.K &Hira D.S ,‖Problems in Operations Research‖, S.Chand& Co, Delhi , 2006

5.V.Sundaresan, K.S. Ganapathy Subramanian, &K.Ganesan, ―Resource Management

Techniques‖ (Operations Research), A.R. Publications, Nagapattinum District

Mapping

PO CO	PO1	PO2	PO3	PO4	PO5
CO1	S	S	S	S	S
CO2	S	S	S	S	S
CO3	S	S	S	S	S
CO4	S	S	S	S	S
CO5	S	S	S	S	S

S - Strong; M- Medium; L- Low

Programme Code	B.Sc	Programme Title	Mathematics
Batch	20122-2025	**Semester**	III
Course Code		**Title:**	**SBC: QUANTITATIVE APTITUDE – III**
Hours/week	2	**Credits:**	2

Course Objective

The objective of this syllabus is to make the students to clear competitive examination like Banking recruitment, Postal recruitment, Railway recruitment and TNPSC exams.

Course Outcomes (COs)

On successful completion of the course, the students will be able to

K1	CO1	Acquire the basic knowledge of area and volume
K2	CO2	understand the basic concepts of Quantitative ability

K2	CO3	understand the basic concepts of logical reasoning
K3	CO4	Apply the problems on train with solved examples
K4	CO2	Analyze the concepts of simple and compound interest in real life

Unit 1

Problems on trains: Problems on trains with solved examples [6 Hours]

Unit 2

Simple Interest and Compound Interest : Problems on Simple and Compound interest.
[6 Hours]

Unit 3

Area: Area of four walls of room- Area of parallelogram and Semicircle [6 Hours]

Unit 4

Volume and Surface Areas :Cubiod – Cube – Cylinder- Cone

Volume and Surface Areas : Frustum of Cone – Sphere-Hemisphere – Pyramid.[6 Hours]

Unit 5

Calendar: Calendar-Odd Days-Leap year – Ordinary Year – Counting of Odd days [6 Hours]

Prescribed Text Book:

Quantitative Aptitude byR. S.Aggarwal, S. Chand & Company Ltd, Ram Nagar, New Delhi,
2013.

Unit 1: Chapter 20

Unit 2: Chapter 22 & Chapter 23

Unit 3: Chapter 24

Unit 4: Chapter 25

Unit 5: Chapter 27

Reference Books:

"Test of Reasoning for competitive examinations" by EdgarThorpe.Third
Edition   Tata McGraw-Hill Publishing Company Limited,New Delhi.

Mapping

PO CO	PO1	PO2	PO3	PO4	PO5
CO1	S	S	S	S	S
CO2	S	S	S	S	S
CO3	S	S	S	S	S
CO4	S	S	S	S	S
CO5	S	S	S	S	S

S - Strong; M- Medium; L- Low

Programme Code	B.Sc	Programme Title	Mathematics
Batch	2022 - 2025	Semester	IV
Course Code		Title:	**DIFFERENTIAL EQUATIONS AND ITS APPLICATIONS**
Hours/week	6	Credits:	5

Course Objectives:

To expose differential equation as powerful tool in solving problem in physical, social and Managerial Sciences.

Course Outcomes (CO)

On successful completion of the course, the students will be able to

K1	CO1	identify and obtain the solution of Clairaut's equation
K2	CO2	understand the basic knowledge of complimentary function , particular integral, Laplace Transform and its inverse and solving method of Partial differential equations.
K3	CO3	apply Laplace Transforms to Solve ordinary differential equations with constant co-efficient and simultaneous linear equations
K4	CO4	analyze the application of differential equations in the field of Science
K4	CO5	create real life problems into ordinary differential equations.

UNIT 1

Exact differential equations – equations of the first order but of higher degree – equations solvable for p, x and y – Clairaut's form – equation that do not contain x, y explicitly – equation homogeneous in x and y.   [18 Hours]

UNIT 2

Linear equations with variable co-efficient – removal of the first derivative – variation of parameters – simultaneous linear differential equation. [18 Hours]

UNIT 3

     Partial differential equations – formation of partial differential equations – classification of integrals – standard form Pp + Qq = R – standard types – Charpit's method.
[18 Hours]

UNIT 4

   Laplace transform – theorems – problems – inverse Laplace transforms – results – problems – Solving ordinary differential equations with constant co-efficient and simultaneous linear equations by using Laplace transform.   [18 Hours]

40

UNIT 5

Applications of differential equations –growth, decay and chemical reactions – falling bodies and other rate problems – simple electric circuits – dynamical problems with variable mass – Newton's law of gravitation and motion of planets.

[18 Hours]

Prescribed Text Book:
- DIFFERENTIAL EQUATIONS AND ITS APPLICATIONS
  Dr.S. Arumugam& others, Gamma Publishing House, Palayamkottai. 1999.

UNIT 1   Chapter 1: 1.2(TYPE-b), 1.3, 1.7)
UNIT 2   Chapter II: 2.5 (TYPE- A, B, D), 2.6
UNIT 3   Chapter IV: 4.0, 4.1, 4.2, 4.3, 4.4 (TYPE-1, 2, 3, 4), 4.5
UNIT 4   Chapter III: 3.0, 3.1, 3.2, 3.3
UNIT 5   Chapter VI: 6.2, 6.6, 6.7, 6.11, 6.12

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
1	https://**nptel**.ac.in/courses/111105035/
2	http://www.nptelvideos.in/2012/11/mathematics-iii.html https://www.digimat.in/nptel/courses/video/111108081/L02.html
3	https://www.math.ust.hk/~machas/differential_equations.pdf. https://www.ijsr.net/archive/v2i1/ijsron2013331.pdf https://www.whitman.edu/mathematics/calculus_online/chapter17.html

Mapping

PO CO	PO1	PO2	PO3	PO4	PO5
CO1	S	S	S	M	S
CO2	S	M	M	S	S
CO3	S	S	S	S	S
CO4	S	S	M	S	M
CO5	S	S	S	S	S

S - Strong; M- Medium; L- Low

Programme Code	B.Sc	Programme Title	Mathematics
Batch	**2022 - 2025**	**Semester**	**IV**
Course Code		**Title:**	**DYNAMICS**
Hours/week	**5**	**Credits:**	**4**

Course Objective

This course provides a thorough knowledge about the characteristics of Projectiles, Energies during impact and Collision. Each topic involves problems to solve which develops the application skills and thinking process of the students.

Course Outcomes (COs)

On completion of this course, the students will be able to

K1	CO1	remember the notions which were studied under Simple harmonic motion and seconds pendulum
K2	CO2	understand the concept of projectiles and its properties by solving some simple problems related to it..
K2	CO3	understand the concept of enveloping parabola.
K3	CO4	Apply the newtons law in their real life.
K4	CO5	analyze the concept of impulse, impulsive forces and the collision of elastic bodies and able to solve the simple problems regarding it.

UNIT 1

Newton laws of motion and applications.   [15 Hours]

UNIT 2

Projectiles – Equation of path of a projectile – Characteristics – Maximum horizontal range – Two possible directions of projections to obtain a given horizontal range – Range of a particle projected on an inclined plane – Maximum range on an inclined plane. [15 Hours]

UNIT 3

Impulses – Impact in a fixed plane – Direct and oblique impacts – Loss in kinetic energy.   [15 Hours]

UNIT 4

Simple harmonic motion: Equation of motion – Composition of two simple harmonic motions – Simple Pendulum.   [15 Hours]

UNIT 5

Central orbits – Component of velocity and accelerations along and perpendicular to the radius vector – Differential equations of a central orbit - Pedal equation. [15 Hours]

Prescribed Text Book:
"DYNAMICS" by M.K. Venkataraman.Twelth Edition, Agasthiar Publications. 1997.

UNIT 1 Chapter 4 : 4.1 to 4.36
UNIT 2 Chapter 6 : 6.1 to 6.8, 6.12 to 6.16
UNIT 3 Chapter 7 : 7.1 & 7.2.Chap 8: 8.1 to 8.9
UNIT 4 Chapter 10 : 10.1 to 10.7 & 10.12 to 10.16
UNIT 5 Chapter 11 : 11.1 to 11.11

Reference Books:

1. A.V.Dharmapadam, ―Dynamics‖,S.Viswanathan Printers and Publisher Pvt.,Ltd.,Chennai 1993.
2. K.Viswanntham Naik and M.S.Kasi, ―Dynamics‖, Emerald Publishers, 1999
3. Narayanamurthy and N.Nagarathnam , ―Dynamics‖, National Publishers, New Delhi,1991.

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
1	https://nptel.ac.in/courses/111/102/111102012/
2	https://nptel.ac.in/courses/111/104/111104027/

Mapping

PO CO	PO1	PO2	PO3	PO4	PO5
CO1	S	S	S	M	S
CO2	S	M	M	S	S
CO3	S	S	S	S	S
CO4	S	S	M	S	M

S - Strong; M- Medium; L- Low

Programme Code	B.Sc	Programme Title	Mathematics
Batch	2022 - 2025	Semester	IV
Course Code		Title:	STATISTICS - II
Hours/week	5	Credits:	5

Course Objective

To make students experts in data collections, classifications, tabulation, analysis and interpretation of numerical data to arrive at reasonable conclusions.

Course Outcomes (COs)

On completion of this course, the students will be able to

K1	CO1	acquiring knowledge of continuous random variables and testing hypothesis
K2	CO2	understand the concepts of t, F, z-distributions and its applications and acquire the knowledge by using Normal distribution.
K3	CO3	demonstrate the use of chi-square distribution
K4	CO4	analyze the concepts of sampling techniques and procedure for testing of hypothesis for large samples.
K4	CO5	analyze the association between two or more groups and populations.

UNIT 1

Normal distribution - Importance of Normal Distribution -Properties of Normal Distribution - Condition for normality - Area under the normal curve - Fitting of normal distribution (Method of Ordinates and Method of Areas).

[15 Hours]

UNIT 2

Hypothesis Testing - Procedure of Testing Hypothesis - Standard Error and Sampling Distribution - Tests of Significance for Attributes - Test of Significance for Large Samples. [15 Hours]

UNIT 3

Test of Significance for Small Samples - Student's t-Distribution and its Applications - To Test the significance of Single Mean Difference of two Means for both Dependent and Independent Samples - Testing the Significance of an Observed Correlation Coefficient –The Variance Ratio Test-F-test. [15 Hours]

UNIT 4

Uses of Chi-Square Test-1-Chi-Square test as of Independence - 2.Chi-square test as a test of goodness of fit - 3.Chi-square test as a test of Homogeneity - Chi-Square test for Specified value of Population Variance.

[15 Hours]

UNIT 5

Analysis of Variance-One Way Classification-Two Way Classification -Latin Squares. [15 Hours]

Prescribed Text Book:

"STATISTICAL METHODS" by S.P.GuptaS.Chand& sons. 2009.
UNIT 1 Chapter 2 : Page No: 836 to 858
UNIT 2 Chapter 3 : Page No: 882 to 890 & 895 to 910
UNIT 3 Chapter 3 : Page No: 910 to 923
UNIT 4 Chapter 4 : Page No: 960 to 972
UNIT 5 Chapter 5 Page No: 1009 to 1038 & Chapter 6 : Page No: 1044 to 1048

Reference Books :

1. Veerarajan .T, Fundamentals of Mathematical Statistics, Yes Dee Publishing Pvt.Ltd, 2017.
2. Vital P. R, Mathematical Statistics, Margham publications, 2012
3. Arumugam and Thangpandi "Probability and Statistics‖, New Gamma Publishing House, 2006.

Mapping

PO CO	PO1	PO2	PO3	PO4	PO5
CO1	S	S	M	M	S
CO2	S	S	S	S	S
CO3	S	S	S	S	S
CO4	S	S	M	S	S
CO5	S	S	M	S	S

S - Strong; M- Medium; L- Low

Programme Code	B.Sc	Programme Title	Mathematics
Batch	**20122-2025**	**Semester**	**IV**

Course Code		Title:	QUANTITATIVE APTITUDE - IV
Hours/week	2	Credits:	2

Course Objective:

objective of this syllabus is to make the students to clear competitive examination like Banking recruitment, Postal recruitment, Railway recruitment and TNPSC exams.

Course Outcomes (COs)

On completion of this course, the students will be able to

K1	CO1	remember the concepts of heights and distances
K2	CO2	understand the concepts of odd man out & series.
K2	CO2	understand the basic concepts of Quantitative ability
K2	CO3	understand the basic concepts of logical reasoning
K4	CO4	analyze the concepts of Banker's discount

Unit 1

Clocks : Clocks Simple Problems   [6 Hours]

Unit 2

        Stocks and Shares : Stocks and Shares Simple Problems   [6 Hours]

 Unit 3

        True Discount : True Discount Simple Problems
 [6 Hours]

Unit 4

    Heights and Distances :Trigonometrical Identities – Values of T – ratios – Angle of elevation – Angle of depression. [6 Hours]

Unit 5

Odd man out and Series: Directions for odd man out and series. [6 Hours]

Prescribed Text Book:

        Quantitative Aptitude byR. S.Aggarwal, S. Chand & Company Ltd, Ram Nagar,
                                                                        New Delhi, 2013.

Unit 1:   Chapter 28

Unit 2: Chapter 29
Unit 3: Chapter 32
Unit 4: Chapter 34
Unit 5: Chapter 35

Reference Books:

"Test of Reasoning for competitive examinations" byEdgarThorpe.Third
Edition   Tata McGraw-Hill Publishing Company Limited,New Delhi**.**

Mapping

PO CO	PO1	PO2	PO3	PO4	PO5
CO1	S	M	M	S	M
CO2	S	S	M	S	S
CO3	M	S	S	M	M
CO4	M	S	S	S	S

S - Strong; M- Medium; L- Low

Programme Code	B.Sc	Programme Title	Mathematics
Batch	**2022 - 2025**	**Semester**	**V**

Course Code		Title:	MODERN ANALYSIS
Hours/week	**6**	**Credits:**	**5**

Course Objective

To introduce the basic concepts in analysis. To make the students understand fundamental ideas and theorems on metric spaces.

Course Outcomes (COs)

On successful completion of the course the students will be able to

K1	CO1	Identify the relation between completeness and compactness sets in metric space.
K2	CO2	Classify the countable, uncountable, open, closed and compact sets.
K3	CO3	apply the properties of real numbers.
K4	CO4	analyze the nature of sets under limits and continuity.

UNIT 1

Introduction – Countable and uncountable sets – Inequalities of Holder&Minkowski – Metric space – Definition and examples – Open sets – Equivalent metric.
[18 Hours]

UNIT 2

Closed sets – Closure – Limit point – Dense sets – Completeness – Definition and examples – Cantor's intersection theorem – Baire's category theorem.
[18 Hours]

UNIT 3

Continuity : Definition and examples – Uniform continuity – Homeomorphism
[18 Hours]

UNIT 4

Connectedness – Definition and examples – Connected subsets of R – Connectedness and continuity – Intermediate value theorem.   [18 Hours]

UNIT 5

Compactness – Definition and examples – Compact subsets of R-equivalent characterization for compactness, continuity and compactness. [18 Hours]

Prescribed Text Book:

"MODERN ANALYSIS" by Dr.S. Arumugam&Issac**,** Gamma Publishing House, Palayamkottai. 2013.

UNIT 1   Chapter 1, Chapter 2: Section 2.1 to 2.4
UNIT 2   Chapter 2: Section 2.7 to 2.10 &, Chapter 3
UNIT 3   Chapter 4: Section 4.1 to 4.3
UNIT 4   Chapter 5
UNIT 5   Chapter 6

Reference Books:

1. Walter Rudin, ―Principles of Mathematical Analysis‖, McGraw-Hill International.
Editions (3rd) – 1976.
2. V.Karunakaran, ―Real Analysis‖, Pearson Publications, Edition-2012.
3. Appostol, ―Mathematical Analysis‖, Narosa Publishing House-Second Edition-2002.

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
1	https://nptel.ac.in/courses/111/105/111105069/#
2	https://nptel.ac.in/courses/111/101/111101134/
3	https://www.digimat.in/nptel/courses/video/111105098/
4	https://nptel.ac.in/courses/111/106/111106053/

Mapping

PO CO	PO1	PO2	PO3	PO4	PO5
CO1	S	S	M	S	M
CO2	M	M	S	S	S
CO3	M	S	S	M	S
CO4	S	S	M	S	M

S - Strong; M- Medium; L- Low

Programme Code	B.Sc	Programme Title	Mathematics
Batch	2022 - 2025	Semester	V
Course Code		Title:	MODERN ALGEBRA-II
Hours/week	6	Credits:	4

Course Objective

This course will enable the students to study how to solve system of linear algebraic equations, basic concepts of an algebraic structure namely vector space and its properties of linear transformations on vector spaces and their relation between matrices.

Course Outcomes (COs)

On successful completion of the course, the students will able to

K1	CO1	understand the basic ideas of vector spaces and the concepts of span, linear independence basis dimension and to apply these concepts to vector spaces and subspaces .
K2	CO2	solve systems of linear equations and to reduce the augmented matrix and Compute the characteristic polynomial, eigenvalues and eigenvectors
K3	CO3	Compute inner products and determine orthogonality on vector spaces, including Gram-Schmidt orthogonalization.
K4	CO4	apply the principles of matrix algebra to linear transformations
K4	CO5	apply the linear transformations, rank, nullity.

UNIT 1

Vector spaces:

Linear Transformation – Definition and examples – Subspaces - Span of a set.

[18 Hours]

UNIT 2

Basis and Dimension:

Linear Independence – Basis and Dimension – Rank and Nullity.

[18 Hours]

UNIT3

Matrix and Inner product space:

Matrix of a linear transformation – Inner product space – Definition and examples – Orthogonality - Orthogonal Complement.   [18 Hours]

UNIT 4

Theory of Matrices:

Algebra of Matrices - Types of Matrices – The Inverse of a Matrix – Elementary Transformations – Rank of a matrix.   [18 Hours]

UNIT 5

Characteristic equation and bilinear forms: Characteristic equation and Cayley Hamilton-bilinear forms

[18 Hours]

Prescribed Text Book:
1. Arumugam S and Thangapandi Isaac A, Modern Algebra, SciTech
Publications (India) Ltd., Chennai, Edition 2012.
UNIT 1   Chapter 5, Sec 5.1 to 5.4
UNIT 2   Chapter 5, Sec 5.5 to 5.7
UNIT 3   Chapter 5, Sec 5.8, Chapter 6, Sec 6.1 to 6.3
UNIT 4   Chapter 7 Sec 7.1 to 7.5
UNIT 5   Chapter 7, Sec 7.7, 7.8 Chapter 8, Sec 8.1, 8.2

References Books:
1. I. N. Herstein,Topics in Algebra, Second Edition, John Wiley & Sons (Asia), 1975.
2. S.Kumaresan, Linear Algebra-A Goemetric Approach.
3..T.K.Manickavasagampillai and Narayanan, "Modern Algebra‖ volume II
Viswanathan printers and publishers Pvt Ltd., Edition 1982.
4. A.R.Vasishtha, "Modern Algebra", Krishna PrakashanMandir, Meerut, 1994 – 95

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
1	https://nptel.ac.in/courses/111/106/111106135/
2	https://nptel.ac.in/courses/115/105/115105097/
3	https://nptel.ac.in/courses/111/101/111101115/
4	https://nptel.ac.in/courses/111/108/111108066/

Mapping

PO CO	PO1	PO2	PO3	PO4	PO5
CO1	S	S	M	S	M
CO2	S	S	S	S	M
CO3	S	S	S	S	M
CO4	S	S	S	S	M
CO5	S	S	S	S	S

S - Strong; M- Medium; L- Lo

Programme Code	B.Sc	Programme Title	Mathematics
Batch	2022 - 2025	Semester	V
Course Code		Title:	**PROGRAMMING IN C**
Hours/week	6	Credits:	4

Course Objective

C is a general- purpose structured programming language that is powerful, efficient and compact. The programming language C finds a wide variety of applications in the development of software. This course provides the students with all the fundamental concepts of the C language with some practical experience. Also helps the students to develop their programming skills and to build large programs.

Course Outcomes (COs)

On successful completion of the course, the students will be able to

K1	CO1	understand the use of structured program development in C as applied to small programming projects.
K2	CO2	understand the concepts and Programming
K2	CO3	analyze the use of decision making statement and loop structures.
K3	CO4	gain a high level understanding of the structure of 'C' functions.
K4	CO5	acquire knowledge about arrays & pointers.

UNIT 1

Constants, Variables and Data Types : Introduction – Character Set – C tokens – Keywords and identifiers – Constants – Variables – Data types – Declaration of variables – Assigning values to variables – Defining symbolic constants-Declaring a variable as constant-Declaring a variable as Volatile - Overflow and underflow of data.   [18 Hours]

UNIT 2

Operators and Expression : Introduction – Arithmetic of operators – Relational operators – Logical operators – Assignment operators – Increment and decrement operators – Conditional operators – Bitwise operators – Special operators – Arithmetic expressions – Evaluation of expressions – Precedence of arithmetic operators – Some Computational Problems – Types conversions in expressions – Operator precedence and associativity – Mathematical functions. Managing input and output operators: Reading a character – Writing a character – Formatted input – Formatted output.
[18 Hours]

UNIT 3

Decision Making and Branching : Decision making with IF statement – simple IF statement – The IF ELSE statement – Nesting of IF……ELSE statement – The ELSE IF ladder – The Switch statement – The   ? : Operator – The GOTO statement. Decision Making and Looping : The WHILE statement – The DO statement – The FOR statement – Jumps in loops-Concise Test Expressions .

[18 Hours]

UNIT 4

Arrays : One- dimensional arrays – Two – dimensional arrays – Initialization of one – dimensional arrays and two – dimensional arrays – Multidimensional arrays-Dynamic Arrays-More about Arrays. Character Arrays and Strings : Introduction-Declaring and initializing string variables – Reading strings from terminal – Writing strings to screen .   [18 Hours]

UNIT 5

User – defined functions : Need for user – defined functions – A multi-function program – The form of C functions – Return values and their types – Calling a function – category of functions- No arguments and no return values – handling of non–-Accessing the address of a variable – declaring and initializing pointers – Accessing a variable through its pointers – Pointer expressions.   [18 Hours]

Prescribed Text Book:

"PROGRAMMING IN ANSIC" by E. Balagurusamy, Seventh Edition.
        Tata McGraw - Hill Publishing company limited , New Delhi, 2017.

UNIT 1   Chapter 2
UNIT 2   Chapter 3 and Chapter 4
UNIT 3   Chapter 5 and Chapter 6
UNIT 4   Chapter 7 and Chapter 8 : 8.1 to 8.4
UNIT 5   Chapter 9 and Chapter 11 :11.1 to 11.8

Reference Books

1. Kris A. Jamsa, Programming in C, Gazlgotia Publication, New Delhi 1990.
2. V. Rajaraman, Computer Programming in C, Prentice Hall of India, New Delhi, 1994.
3. Stephen .G Kochan, Programming in C, CBS Publishers, New Delhi, 1991.
4. Programming In C - Kris A.Jamsa(Galgotia Publications Pvt.ltd. 1992)

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
1	https://nptel.ac.in/courses/106/104/106104128/
2	https://nptel.ac.in/courses/106/105/106105171/

Mapping

PO CO	PO1	PO2	PO3	PO4	PO5
CO1	S	S	S	M	S
CO2	S	S	S	S	S
CO3	S	S	S	M	S
CO4	S	S	S	S	S
CO5	M	S	S	S	S

S - Strong; M- Medium; L- Low

PROGRAMMING LAB IN C

1. Write a program to calculate the Simple Interest.

2. Write a program to find the mean and S.D. of n values

3. Write a program to find Correlation coefficients.

4. Check whether the given number is prime or not.

5. Write a program to find the roots of the quadratic equation.

6. Write a program to find L.C.M. and G.C.D. of two numbers

7. Write a program to find Fibonacci sequence

8. Write a program to find the nc_r value using functions.

9. Write a program to sort the numbers (Ascending & Descending)

1. Write a program to add &subtract the two given matrices.

2. Write a program to multiply the two given matrices.

3. Write a program to find the determinant of the given matrix.

4. Write a programme to find angle between two lines.

Programme Code	B.Sc	Programme Title	Mathematics
Batch	2022 - 2025	Semester	V
Course Code		Title:	OPERATIONS RESEARCH – I
Hours/week	5	Credits:	5

Course Objective

The prime objective of this paper is to introduce certain OR techniques such as LPP, Transportation problems, Assignment problems, to help the students to develop logical reasoning for applying mathematical tools to managerial and real life oriented problems.

Course Outcomes (COs)

On successful completion of the course, the students will able to

K1	CO1	acquire the knowledge of Transportation and Assignment problems.
K2	CO2	understand duality theorems and dual simplex method.
K3	CO3	use the Simplex Method or the Big M Method to solve linear programming problems.
K4	CO4	analyze and interpret results of transportation and problem using appropriate method
K4	CO5	analyze the concept of complementary slackness and its role in solving primal / dual problem.

UNIT 1

Mathematical formulation of a LPP – Graphical solution to a LPP – extreme points – Convex sets simplex method.   [15 Hours]

UNIT 2

Artificial variables – Big M method – Two phase method. [15 Hours]

UNIT 3

Duality – Formulation of primal – Dual pairs – Duality and simplex method – Dual simplex method – Fundamental theorem of duality.   [15 Hours]

UNIT 4

Mathematical formulation of transportation problem – Finding initial basic feasible solution – Degeneracy in LPP – Optimum solution – Modi method – Unbalanced transportation problem.   [15 Hours]

UNIT 5

   Mathematical formulation of Assignment problem – Assignment algorithm – Travelling salesman problem.   [15 Hours]

Prescribed Text Book:

"OPERATIONS RESEARCH" by Kantiswaroop, P.K. Gupta &Manmohan.
   Sixteenth Edition ,Sultan Chand & Sons. New Delhi, 2014.
UNIT 1 Chapter 2 : Sec 2.1 to 2.4, Chapter 3: Sec 3.1 to 3.5,
           Chapter 4: Sec 4.1 and 4.3
UNIT 2 Chapter 4: Sec 4.4 and 4.5
UNIT 3 Chapter 5: Sec 5.1 to 5.7, 5.9
UNIT 4 Chapter 10: Sec 10.1 to 10.13
UNIT 5 Chapter 11: Sec 11.1 to 11.4 and 11.7

Reference Book

Taha H. A, Operation Research - An introduction, Prentice Hall of India Pvt. Ltd, New Delhi, 2006.

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
1	https://nptel.ac.in/courses/111/102/111102012/
2	https://nptel.ac.in/courses/111/104/111104027/

Mapping

PO CO	PO1	PO2	PO3	PO4	PO5
CO1	S	S	S	S	S
CO2	S	S	S	S	S
CO3	S	S	S	S	S
CO4	S	S	S	S	S
CO5	S	S	S	S	S

   S - Strong; M- Medium; L- Low

Programme Code	B.Sc	Programme Title	Mathematics	
Batch	2022 - 2025	Semester	V	
Course Code		Title:	THEORY OF NUMBERS	
Hours/week	5	Credits:	5	

Course Objective

The learner will acquire knowledge of basic concepts of number theory

The learner will become proficient in various types of functions

The learner will be know the primitive roots

Apply the theorems to study the numbers.

Course Outcomes (COs)

On successful completion of the course, the students will able to

K1	CO1	understand factual knowledge including the mathematical notation and terminology of number theory.
K2	CO2	construct mathematical proofs of statement and find counter examples to false statements in Number Theory.
K3	CO3	apply theoretical knowledge to problem of computer security
K4	CO4	analyze the logic and methods behind the major proofs in number theory
K5	CO5	determine multiplicative inverses , modulo n and use to solve linear congruences

UNIT 1

Principle of Finite Induction: Well – Ordering Principle(WOP)- Principle of Finite Induction- The Division Algorithm – Basis Representation Theorem- Binomial Coefficients- Divisibility Theory : Greatest Common Divisor-Least common Multiple- Linear Diophantine Equations- Fundamental Theorem of Arithmetic - Some Question Regarding Primes.

[15 Hours]

UNIT 2

Congruencies:– Residue System – Test of Divisibility – Linear congruence's - Solving Polynomial congruence's– An Application of Congruence's to Diophantine Equations - Fermat's Little theorem –Euler'sGeneralization of .. [15 Hours]

UNIT 3

Functions and Theorem: Wilson's Theorem- Euler's Φ-Function- Arithmetic Functions:-The Function τ and σ – The Möbius Function- Multiplicative Arithmetic Functions- Inversion Formula- Greatest Integer Function.   [15 Hours]

UNIT 4

Primitive Roots: Exponents – Primitive roots Modulo a Prime – Determination of Integers having Primitive roots –Indices – Euler's Criterion – Legendre Symbol and its Properties – Gauss Lemma.   [15 Hours]

UNIT 5
Quadratic Reciprocity Law and its applications: Jacobi Symbol – Perfect Numbers – Mersenne Primes-Fermat Numbers - PhythagoreanTriplesFermat's Last Theorem. [15 Hours]

Prescribed Text Book:
        1. S.B.Malik ,"Basic Number Theory‖,Second Revised Edition, Vikas Publishing House PVT LTD, 2009
                Unit I – Chapter: 1&2
                Unit II – Chapter: 3, Chapter: 4 – 4.1, 4.2
                Unit III – Chapter: 4 – 4.3, 4.4 & Chapter: 5
                Unit IV – Chapter: 6, 7- 7.1 to 7.3
                Unit V – Chapter: 7- 7.4 to 7.6, Chapter : 8

 Reference Books:
    1. Ivan Niven and Herbert S Zuckerman, ―An Introduction to the theory of
       Numbers‖, 3rd Edition, Wiley Eastern Ltd., New Delhi, 2000.
    2. David M.Burton, Elementary Number Theory‖, W.M.C.Brown Publishers,
  ,   Dubuque, Lawa, 1989.

Mapping

PO	PO1	PO2	PO3	PO4	PO5

CO					
CO1	S	S	S	S	S
CO2	M	S	S	M	S
CO3	S	S	S	M	S
CO4	M	S	S	S	S
CO5	M	S	S	S	S

S - Strong; M- Medium; L- Low

Programme Code	B.Sc	Programme Title	Mathematics	
Batch	2022 - 2025	Semester	V	
Course Code		Title:	NUMERICAL METHODS	
Hours/week	5	Credits:	5	

Course Objective

This course helps the students to have an in-depth knowledge of various advanced methods in numerical analysis. The students to use numerical techniques to get numerical solutions of equations like transcendental and non linear differential equations when ordinary analytical methods fail

Course Outcomes (COs)

On successful completion of the course the students will be able to

K1	CO1	acquire knowledge about the basic concepts of numerical algorithms using appropriate technology.
K2	CO2	understand the numerical methods for approximating the solution of the problems of algebraic and transcendental equations, ordinary differential equations.
K3	CO3	solve the ordinary differential equations by using the methods like Euler's, RungeKutta, Modified Euler and Improved Euler.
K3	CO4	apply various interpolation methods and finite different concepts
K4	CO5	compare the viability of different approaches to the numerical solution of problems arising in roots of solution of non-linear equations, interpolation and approximation, numerical differentiation and integration, solution of linear systems.

UNIT 1

Solution of algebraic and transcendental equations – Iteration method – Newton Raphson method – method of false positions – solutions of simultaneous linear equations – Direct method – Gauss elimination method, Gauss Jordan method – Iteration method – Jacobi method , Gauss – Seidel method. [15 Hours]

UNIT 2

Newton's forward and backward interpolation formula – Central Difference Interpolation Formulae(For equal intervals) – Gauss's forward and backward formula – Stirling's formula. [15 Hours]

UNIT 3

Interpolation with unequal intervals – Divided differences – Lagrange's formula – Numerical differentiation up to second order– Maxima and minima. [15 Hours]

UNIT 4

Numerical integration – Quadrature (Cote's) formula – Trapezoidal rule – Simpson's one-third rule – Three-eight rule – Weddle's rule. [15 Hours]

UNIT 5

Numerical solution of differential equation – Taylor series method – Euler's method – Modified Euler's method – Runge –Kutta method - second and fourth order Runge -Kutta - method. [15 Hours]

Prescribed Text Book

"NUMERICAL METHODS" byDr.P.Kandasamy , Dr.K.Thilagavathy andDr.K.GunavathiS.Chand& Company LTD, 2012.

UNIT 1   Chapter 3 & Chapter 4:4.2, 4.7 to 4.9

UNIT 2   Chapter 6: 6.2 to 6.6 and Chapter 7: 7.3 to 7.5

UNIT 3   Chapter 8 & Chapter 9: 9.2 to 9.6

UNIT 4   Chapter 9: 9.7 to 9.15

UNIT 5   Chapter 11: 11.5, 11.9   to 11.15

Books for Reference

1. Arumuga, Issac, Somasundaram,‖Numerical Analysis‖, New Gamma Publishing House,PalayamKottai 2003

2. G. Balaji, ―Numerical Methods‖, G.Balaji Publishers, Chennai 2007.

3. Venkataraman M. K, Numerical Methods in Science and Engineering, The National Publishing Company, Madras, 2009.

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
1	http://www.simumath.com/library/book.html?code=Alg_Equations_Examples
2	http://jupiter.math.nctu.edu.tw/~smchang/9602/NA_lecture_note.pdf http://www.iosrjournals.org/iosr-jm/papers/Vol6-issue6/J0665862.pdf
3	https://nptel.ac.in/courses/122/102/122102009/ https://nptel.ac.in/courses/111/107/111107105/

Mapping

PO CO	PO1	PO2	PO3	PO4	PO5
CO1	S	S	S	S	S

CO2	S	S	S	S	S
CO3	S	S	S	S	M
CO4	S	S	M	S	S
CO5	S	S	S	S	S

S - Strong; M- Medium; L- Low

Programme Code	B.Sc	Programme Title	Mathematics	
Batch	2022 - 2025	Semester	V	
Course Code		Title:	**DISCRETE MATHEMATICS**	
Hours/week	5	Credits:	5	

Course Objectives:

To enrich the knowledge in the field of functions, Boolean algebra and the normal forms

Course Outcomes (COs)

On successful completion of the course the students will be able to

K1	CO1	acquire knowledge about the basic concepts of Discrete Mathematics and its applications.
K2	CO2	understand abstract algebra, posets, lattices, Boolean algebra and their applications in the field of engineering and computer science.
K2	CO3	Understand the concept of properties of lattices
K3	CO4	apply logically valid forms of arguments to avoid logical errors by studying mathematical logic.
K4	CO5	analyze the concepts of mathematical logic and relation.

UNIT 1   **15 hours**
Statement and notation – Connectives – Negative – Conjunctive – Disjunctive – Statement Formulae and Truth tables – Conditional and Bi-conditional statements – Well defined formulae – #Tautologies# – Contradictions – Other connectives.

UNIT 2   **15 hours**
Normal forms – Disjunctive Normal forms – Conjunctive Normal forms – Principal Conjunctive Normal forms - Ordering and uniqueness of Normal forms.

UNIT 3　　　　　　　　　　　　　　　　　　　　　　　15 hours

Predicate calculus – Inference theory of the predicate calculus - Binary and
n-ary operations – Characteristic function of a set – Hashing functions – Recursive functions.

UNIT 4　　　　　　　　　　　　　　　　　　　　　　　15 hours

Lattice as partially ordered set – Some properties of lattices – Lattices as algebraic systems –
Sub lattice, Direct product and homomorphism – #Some special lattices#.

UNIT 5　　　　　　　　　　　　　　　　　　　　　　　15 hours

Boolean algebra – Boolean functions – Boolean forms and free Boolean algebras – Values of
Boolean expressions and Boolean functions.

\#　# Self-study portion.

Text Book:

J.P. Tremblay and R. Manohar, Discrete mathematical Structures with applications to
computer science, Tata McGraw Hill, Thirty-ninth reprint (2011).

UNIT I　　　Chapter I　Sections 1.1 - 1.2.14
UNIT II　　　Chapter I　Section 1.3
UNIT III　　　Chapter I　Sections 1.5, 1.6 and Chapter II Sections 2.4.4 - 2.4.6, 2.6.1
UNIT IV　　　Chapter IV Section 4.1
UNIT V　　　　Chapter IV Sections 4.2 and 4.3

Books for Reference:

1. RakeshDube, AdeshPandey and Ritu Gupta, Discrete Structures and Automata
Theory, Narosa Publishing House (2000).
2. John E. Hopcroft, Jeffery D. Ullman, Introduction to Automata Theory,
Languages and Computation, Narosa Publishing House, New Delhi (1995).

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
1	https://nptel.ac.in/courses/106/106/106106094/
2	https://nptel.ac.in/courses/111/107/111107058/

Mapping

PO CO	PO1	PO2	PO3	PO4	PO5

CO1	S	S	S	M	S
CO2	M	S	S	S	M
CO3	S	S	S	S	M
CO4	M	S	M	S	S
CO5	S	S	M	S	S

S - Strong; M- Medium; L- Low

Programme Code	B.Sc	Programme Title	Mathematics
Batch	2022 - 2025	Semester	V
Course Code		Title:	SBC: PRACTICAL-NUMERICAL PROBLEMS USING C- PROGRAMMING
Hours/week	2	Credits:	2

Course Outcomes:

The students learn to write C programs to solve numerical, algebraic and transcendental equations and to solve simultaneous linear equations using numerical methods.
The students learn to write C programs for numerical Integration.
 The students learn to write C programs to Solve Ordinary Differential Equations numerically and Interpolation.
Learning to rectify the errors in 'C' Programming**.**

LIST OF PROGRAMS

 1. Find the root of the equation using Bisection method
 2. Find the root of the equation using Regula-Falsi method
 3. Find the root of the equation using Newton-Raphson method
 4. Solve the equation using Gauss-Elimination method
 5. Solve the equation using Gauss-Jacobi method
 6. Solve the equation using Gauss-Seidal method
 7. Find the mission term using Newton's Forward Interpolation formula
 8. Find the mission term using Newton's Backward Interpolation formula
 9. Find the mission term using Newton's Divided Difference Interpolation formula

10. Find the mission term using Lagrange's Interpolation formula
11. Problem solving using Trapezoidal rule.
12. Problem solving using Simpson $1/3^{rd}$ rule.
13. Problem solving using Euler's method
14. Problem solving using Runge-Kutta method

Programme Code	B.Sc	Programme Title	Mathematics
Batch	2022 - 2025	Semester	VI
Course Code		Title:	COMPLEX ANALYSIS
Hours/week	7	Credits:	5

Course Objective

To provide the students an introduction to Complex Analysis of on variable.

To introduce the theory of analytic function, complex integration and some bilinear transformations**.**

Course Outcomes (COs)

On successful completion of this paper, the students will be able to

K1	CO1	identify the isolated singularities of a function and determine whether they are removable, poles, or essential.
K2	CO2	understand the significance of differentiability for complex functions and be familiar with the Cauchy-Riemann equations.
K3	CO3	apply the concept and consequences of analyticity and the Cauchy-Riemann equations and of results on harmonic and entire functions including the fundamental theorem of algebra.
K3	CO4	find residues and evaluate complex integrals using the residue theorem.
K4	CO5	analyze functions as Taylor, power and Laurent series, classify singularities and poles.

UNIT 1

Cauchy-Riemann equations – Definition of Analytic functions- Sufficient conditions –Harmonic functions – Cauchy- Riemann equations in polar co-ordinates – Theorems and exercise in this method- Milne Thomson's method. - Conformal Mapping.

[21Hours]

UNIT 2

    Circles and straight lines – Elementary transformations – Bilinear transformation – Cross ratio – Fixed points-Special bilinear Transformations

[21Hours]

UNIT 3

   Introduction of Complex integration Cauchy's integral theorem – Cauchy's integral formula –Derivatives of analytic functions – Morera's theorem – Cauchy's inequality – Liouville's theorem – Fundamental theorem of algebra. [21Hours]

UNIT 4

    Expansion of functions in power series –Introduction about Taylor's theorem – Taylor's theorem- Taylor's series – Maclarins' series – Laurent's Theorem - Laurent's series.– zeros of an analytic function –Singularity definition- singular points – removable singularity - essential singularity – poles - study of the function for the infinite value of Z - Argument Principle – Rouche's theorem - Fundamental theorem of algebra.. [21Hours]

UNIT 5

Introduction about Calculus of Residues - Residues - Cauchy's Residue Theorem – Application of Cauchy's Residue Theorem -Argument theorem – Rouche's theorem – Fundamental theorem of algebra - evaluation of definite integrals.[21Hours]

Prescribed Text Book:

 "COMPLEX ANALYSIS" by Dr. S. Arumugam.Scitech Publication (India) PVT Ltd., Chennai 2021.

 UNIT 1 Chapter 2 : 2.1 to 2.9

 UNIT 2 Chapter 1: 1.7 & Chapter 3: 3.1 to 3.5

 UNIT 3 Chapter 6

 UNIT 4 Chapter 7

 UNIT 5 Chapter 8: 8.1,8.2,8.3 Type 1 only

References:

1. S. Narayanan and T.K.ManickavasagamPillai, Complex Analysis, S.Viswanatha printers and publishers Pvt.Ltd., 2007.

2. P.Duraipandian, LaxmiDuraipandian, D.Muhilan, Complex Analysis,

Emerald Publishers, Revised Edition, 2001.

3. Santhinarayan, ―Theory of functions of Complex Variable ―, S.Chand and Company, Meerut, 1995

4. T.K.M.Pillay, Dr.S.P.Rajagopalan&Dr.R.S. Sattanathan, Complex Analusis, S.Viswanathan (Printers &Publisers),Pvt.Ltd. Revised Edition 2007 Reprint 2013

5.Lars V Ahlfors―Complex Analysis‖ , McGraw – Hill Kogakusha, Ltd. 3rd Edition, 1999.

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
1	https://nptel.ac.in/courses/111/103/111103070/
2	https://nptel.ac.in/courses/111/107/111107056/
3	https://nptel.ac.in/courses/122/103/122103012/

Mapping

PO CO	PO1	PO2	PO3	PO4	PO5
CO1	S	S	M	S	S
CO2	S	S	M	S	S
CO3	M	S	S	S	S
CO4	S	S	S	S	S
CO4	S	S	S	S	S

S - Strong; M- Medium; L- Low

Programme Code	B.Sc	Programme Title	Mathematics
Batch	2022 - 2025	Semester	VI
Course Code		Title:	GRAPH THEORY
Hours/week	6	Credits:	5

Course Objectives:

To enable the students to acquire the general techniques of Graph Theory.
To make them understand its applications to a wide variety of subjects.

Course Outcomes (COs)

On successful completion of this paper, the students will be able to

K1	CO1	identify vertices, edges and paths with specific properties such as cut vertices, bridges, Eulerian, etc
K2	CO2	remember and understand the theoretical knowledge of graph theory to solve problems.
K2	CO3	understand the Concept of Eulerian graphs , Hamiltonian graphs and Planar graph.
K3	CO4	identify trees and their properties.
K4	CO5	illustrate the fundamental applications of Graph Theory in different walks of life

UNIT 1

Graphs – Pictorial representation –Sub graphs – Isomorphism and Degree –Connectedness: Walks Trails and paths –Cycle –Connectedness and Components – Cutpoint and Cutedge. [18 Hours]

UNIT 2

Blocks - Connectivity– Eulerian graphs – Fleury's algorithm. [18 Hours]

UNIT 3:

Hamiltonian graphs –Matching- Matching in Bipartite graphs – Marriage problem. [18 Hours]

UNIT 4

Trees- Characterisation of Trees-Centre of a Tree-– Planar graphs – Euler formulas. [18 Hours]

UNIT 5

Director graphs – Connectivity in Digraphs strong orientation of graphs
– Eulerian Digraphs.   [18 Hours]

Prescribed Text Book

"Invitation to Graph theory" by S.Arumugam& OthersScitech Publishers, India PVT.Ltd, Chennai, Reprint 2021.

UNIT 1   Chapter 2: Sec 2.1 to 2.4, chapter 4: Sec 4.1 and 4.2

UNIT 2   Chapter 4: Sec 4.3,4.4 and Chapter 5: Sec 5.1

UNIT 3   Chapter 5: Sec 5.2, and Chapter 7: Sec 7.1, 7.2

UNIT 4   Chapter 6: Sec 6.1, 6.2 and Chapter 8: Sec 8.1

UNIT 5   Chapter 10: Sec 10.1 and 10.2

References Book
1. NarsinghDeo, Graph Theory with applications to Engineering and Computer Science, Prentice Hall of India, 2004.

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
1	https://nptel.ac.in/courses/111/106/111106102/
2	https://www.digimat.in/nptel/courses/video/106104170/L19.html

Mapping

PO CO	PO1	PO2	PO3	PO4	PO5
CO1	S	S	M	S	S
CO2	S	S	M	S	S
CO3	M	S	S	S	S
CO4	S	S	S	S	S
CO5	S	S	S	S	S

S - Strong; M- Medium; L- Low

Programme Code	B.Sc	Programme Title	Mathematics
Batch	2022 - 2025	Semester	VI
Course Code		Title:	**OBJECT ORIENTED PROGRAMMING WITH C++**
Hours/week	6	Credits:	4

Course Objective

The aim of this course is to know all needed about C++ and object oriented programming and also to meet the global requirements in software industries.

Course Outcomes (COs)

On successful completion of the course, the students will able to

K1	CO1	identify the concept of classes and objects.
K2	CO2	understand the practice of object oriented programming in the construction of robust maintainable programs which satisfy the requirements.
K3	CO3	apply the concepts of object-oriented programming
K3	CO4	apply C++ programming and program development within an integrated development environment.
K4	CO5	analyze the use of operator overloading and type conversions.

UNIT 1

Object oriented programming paradigm – Basic concept of Object - oriented programming – Benefits of OOP – Object Oriented Languages – Applications of OOP.

Fundamentals of C++ - Structure of C++ program – Creating of source file – Compiling and linking.   [18 Hours]

UNIT 2

The main function – Function prototyping – Inline – Inline functions – Function overloading – Friend and virtual function.   [18 Hours]

UNIT 3

Specifying a class – Defining member functions – Marketing an outside function inline – Nesting of member functions – Private member functions arrays within a class-Memory allocation for objects – Static data members static member functions arrays of objects – Objects as function – Arguments friendly functions – Returning objects constant member functions – Pointers to members.   [18 Hours]

UNIT 4

Constructors – Parameterized constructors – Multiple – Constructors in a class – Constructors with default arguments – Dynamic initialization of objects – Copy constructor – Constructing two dimensional arrays – Destructors - Defining operator overloading – Overloading unary operators – Overloading binary operators – overloading binary operators using friends – Manipulation of strings using operators – rules for overloading operators – Type conversions .   [18 Hours]

UNIT 5

Inheritance: Defining derived classes – Single inheritance – Making a private member inheritable – Multilevel inheritance – Multiple inheritance – Hierarchical inheritance – Hybrid inheritance-Virtual base classes-Abstract classes-Constructors in derived classes-Nesting of classes .   [18 Hours]

Prescribed Text Book

  "OBJECT ORIENTED PROGRAMMING WITH C++"

by E. Balagurusamy. Sixth Edition, Tata McGraw - Hill Publishing company limited Tenth Reprint 2010

UNIT 1 Chapter 1: Section- 1.4 to 1.8 and Chapter 2: Section 2.1 to 2.8

UNIT 2 Chapter 4

UNIT 3 Chapter 5

UNIT 4 Chapter 6 and Chapter 7

UNIT 5 Chapter 8

Reference Books

1.The C++ programming language- Bjarne Stroutstrup(II Edition, Addision Wesley, 1991.)

2.Programming with C++ -D.Ravi Chandran (Tata McGraw-Hill publishing company
   limited, New Delhi 1996)

3.Object Oriented Programming with ANSI and Turbo C++-AshokN.Kamthane(Pearson
   Education publishers 2003)

4.Programming with C++ -John R.Hubbard(2nd Edition, TMH publishers2002).

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]

#	
1	https://nptel.ac.in/courses/106/105/106105151/
2	https://nptel.ac.in/courses/106/101/106101208/
3	https://www.classcentral.com/course/swayam-programming-in-c-6704

Mapping

PO CO	PO1	PO2	PO3	PO4	PO5
CO1	S	S	S	M	S
CO2	S	S	S	M	S
CO3	S	S	S	S	S
CO4	M	S	S	M	S
CO2	S	S	S	S	S

S - Strong; M- Medium; L- Low

PROGRAMMING LAB IN C++

1. Write a program to convert temperature Fahrenheit into Celsius.

2. Write a program to print the following output using for loops.
    > 1
    > 2 2
    > 3 3 3
    > 4 4 4 4 and so on.

3. Write a program to calculate variance and standard deviation of n numbers.

4. Write a macro that obtains the largest of three numbers.

5. Write a program to maintain the stock details using class.

6. Write a program to add complex numbers using operator overloading.

7. Write a program to multiply complex numbers using operator overloading.

8. Write a program to the unary minus operator is overloaded.

9. Write a program to maintain the employees information using inheritance.

10. Write a program to find the largest value of two numbers using nesting of member function.

11. Write a program for shopping list using classes and objects.

12. Write a program to maintain the library details using constructor and destructor.

13. Write a program to overloading operators using friends

Programme Code	B.Sc	Programme Title	Mathematics
Batch	2022 - 2025	Semester	VI
Course Code		Title:	OPERATIONS RESEARCH-II
Hours/week	5	Credits:	5

Course Objective

The prime objective of this course is to introduce certain OR techniques such as game theory, sequencing and networking models to help the students to develop logical reasoning for applying mathematical tools to managerial and other life oriented problems

Course Outcomes (COs)

On successful completion of the course the students will be able to

K1	CO1	remember various techniques to solve real life problems
K2	CO2	understand the theory of games for solving simple games..
K3	CO3	apply the fundamental concept of inventory control and some of the Queuing models.
K4	CO4	analyze distinction between PERT & CPM

UNIT 1

Sequencing problem – Problems with n jobs 2 machines – n jobs 3 machines – #n jobs m machines# – Replacement problem – Replacement of items whose maintenance cost

increase with time (with/without change in the value of money) – Replacement of items which fail completely – Individual and group replacement.   [15 Hours]

UNIT 2

Game theory- two person zero -sum game – Maxmin – Minimax principle – Games without Saddle points –Mixed strategies-Graphic solution of 2xn and mx2 games-General solution of mxn Rectangular games.   [15 Hours]

UNIT 3

Queuing theory – Introduction – Types of Queue discipline – Steady state probabilities in each classification of queuing problem.

1) $(M/M/1) : (\infty/FIFO)$
2) $(M/M/1) : (N/FIFO)$
3) $(M/M/C) : (\infty/FIFO)$
4) $(M/M/C): (N/FIFO)$.- Simple Problems.   [15 Hours]

UNIT 4

Introduction- Definition – Need for inventory Various Cost in : Inventory Control -Types of Inventories – The inventory decisions -Economic order quantity – Deterministic Inventory Problems: EOQ Problem with no shortages – EOQ Problem with price break – EOQ Problem with two price break – EOQ Problem with n price break.   [15 Hours]

UNIT 5

Network-Basic components-Logical sequencing –Rules of Network construction-Concurrent activities-Probability consideration in PERT-Distinction between PERT and CPM.
[15 Hours]

 #   # Self-study portion

Prescribed Text Books:

1. "OPERATIONS RESEARCH" by Kantiswarup, P.K Gupta &Manmohan
   Sixteenth Edition , Sultan Chand & Sons. New Delhi, 2014

UNIT 1   Chapter 12: 12.1 to 12.5 and Chapter 18: 18.1 to 18.3
UNIT 2   Chapter 17: 17.1 to 17.9
UNIT 3 Chapter 21: 21.1 to 21.4, 21.9 (Model I , Model III, Model V and Model VI)
UNIT 4   Chapter 11
UNIT 5 Chapter 25: 25.1 to 25.8

Reference Book

1.Taha H. A, Operation Research - An introduction, Prentice Hall of India Pvt.
Ltd, New Delhi, 2006.

2. "OPERATIONS RESEARCH" by DharaniVenkatakrishnan
3. Prem Kumar Gupta, D.S. Hijra, ―Operations Research, S. Chand & Company Ltd,2002.
4. P.R.Vittal, ―Operations Research, Margham Publications, 2002.
5. J.K.Sharma, ―Operations Research,Macmillan India Ltd. 1997

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
1	https://nptel.ac.in/courses/111/102/111102012/
2	https://youtu.be/zADj0k0waFY https://youtu.be/xvDdrswAj8M https://www.youtube.com/watch?v=xVPoWkkQTrQ https://www.youtube.com/watch?v=7kDtTAnvuww https://www.youtube.com/watch?v=IfLsPHKk51w
3	https://nptel.ac.in/courses/109/103/109103021/
4	https://nptel.ac.in/courses/110/105/110105082/ https://nptel.ac.in/courses/110/106/110106045/

Mapping

PO CO	PO1	PO2	PO3	PO4	PO5
CO1	S	S	S	M	S
CO2	S	S	S	S	M
CO3	S	S	S	S	S
CO4	S	M	S	S	S
CO5	S	M	S	S	S

S - Strong; M- Medium; L- Low

Programme Code	B.Sc	Programme Title	Mathematics
Batch	2022 - 2025	Semester	VI
Course Code		Title:	ASTRONOMY
Hours/week	5	Credits:	5

Course Objective

This paper enables the learners to learn about the Moon and Ellipses.

Course Outcomes (COs)

On successful completion of the course the students will be able to

K1	CO1	identify the basic knowledge of the Moon.
K2	CO2	understand the concept of solar and lunar ellipses.
K3	CO3	apply the concept of Kepler's laws of planetary motion
K4	CO4	analyze the variation in duration of day and night in various zones of earth.
K4	CO5	categorize various means in solving Time

UNIT 1

Celestial sphere and diurnal motion – Celestial coordinates - Sidereal time.

[15 Hours]

UNIT 2

Morning and evening stars – circumpolar stars - zones of earth - perpetual

day -twilight..   [15 Hours]

UNIT 3

    Refraction – laws of refraction – tangent formula - horizontal refraction -
geocentric parallax – horizontal parallax..   [15 Hours]

UNIT 4

Kepler's laws - Anomalies – Kepler's equation - Calendar.   [15 Hours]

UNIT 5

    Moon - sidereal and synodic months – elongation – phase of moon – eclipses
-umbra and penumbra – lunar and solar eclipses – maximum and minimum
number of eclipses in a year.   [15 Hours]

Prescribed Text Book:
   S. Kumaravelu and SusheelaKumaravelu, Astronomy, SKV Publications,2004.

UNIT 1   Art. 39 – 76.
UNIT 2   Art. 80 – 83, 87 – 89, 111 – 116.
UNIT 3   Art. 117 – 128, 135 - 144.
UNIT 4   Art. 146 – 149, 156 – 159, 175 – 179.
UNIT 5   Art. 229 – 241, 256 – 263, 267, 268, 271 – 275.
References:
   G V Ramachandran, Text Book of Astronomy, Mission Press, Palayamkottai, 1965.

Mapping

PO CO	PO1	PO2	PO3	PO4	PO5
CO1	S	M	S	M	S
CO2	M	S	M	S	S
CO3	S	M	M	S	M
CO4	S	S	S	S	S
CO5	S	S	S	S	S

S - Strong; M- Medium; L- Low

Programme Code	B.Sc	Programme Title	Mathematics
Batch	20122-2025	Semester	VI
Course Code		Title:	**NUMERICAL METHODS**
Hours/week	2	Credits:	2

Course Objective:

The learner will analyze the different aspects of numerical solution of algebraic and transcendental equations.

The learner will understand the several methods to solve the simultaneous equations.

The leaner will derive numerical methods for various mathematical operations and tasks on interpolation.

Course Outcomes (COs)

On successful completion of the course the students will be able to

K1	CO1	understand the fundamentals in finding the roots of the equation using bisection method and iteration method.
K2	CO2	approximate solutions of algebraic and transcendental equations.
K2	CO3	analyze and evaluate the accuracy of numerical methods
K2	CO4	evaluate numerical solution to a system of linear equation by Gauss-Seidal method.
K4	CO5	evaluate the problems in interpolation.

Unit 1

Solution of Algebraic and Transcendental Equations: Introduction and advantages of solution of algebraic and Transcendental Equations- Bisection
Method – Iteration Method – Condition for Convergence.   [6 Hours]

Unit 2

Solution of Algebraic and Transcendental Equations:
Deviation and advantage of Solution of Algebraic and Transcendental Equations-Regular Folsi Method -Newton's Raphson Method[6 Hours]

Unit 3

Solutions of Simultaneous Linear Algebraic Equations:
Method of elimination in Simultaneous Linear Algebraic Equations- Gauss Elimination Method for Solutions of Simultaneous Linear Algebraic Equations – Gauss Jordan Method Solutions of Simultaneous Linear Algebraic Equations [6 Hours]

Unit 4

Solutions of Simultaneous Equations: Introduction of Jacobi methods of Simultaneous Equations - Algorithm - Gauss Jacobi – Gauss Seidel Method.
                              [6 Hours]

Unit 5

Finite Differences: Introduction of forward and backward Difference of Finite difference: First and Higher Order Differences –Forward and Backward Differences. [6 Hours]

Prescribed Text Book:
1. P.Kandasamy, K.Thilagavathi and K. Gunavathi, ―Numerical Methods‖, S.Chand and Company Ltd , New Delhi 2013.
Unit 1 – Chapter 3 -3.1 to 3.2
Unit 2 – Chapter 3 -3.3 to 3.4
Unit 3 – Chapter 4 -4.1- 4.2
Unit 4– Chapter 4 - 4.8 - 4.9
Unit 5 – Chapter 5 – 5.1 – 5.2

Reference Books:
  1. Arumugam , Issac, Somasundaram, Numerical Analysis, New Gamma Publishing
   House, PalayamKottai 2003.
  2. G. Balaji, ―Numerical Methods, G.Balaji Publishers, Chennai 2007.

Mapping

PO CO	PO1	PO2	PO3	PO4	PO5
CO1	S	S	S	S	M
CO2	S	S	M	S	S
CO3	M	S	S	S	M
CO4	S	S	S	S	S
CO5	S	S	S	S	S

S - Strong; M- Medium; L- Low

Programme Code	B.Sc	Programme Title	Mathematics
Batch	2022 - 2025	Semester	I
Course Code		Title:	**ALLIED MATHEMATICS (B.Sc., Physics & Chemistry) THEORY OF EQUATIONS, MATRICES, FINITE DIFFERENCES,TRIGONOMETRY AND DIFFERENTIAL CALCULUS**
Hours/week	5	Credits:	5

Course Objective

To understand the fundamental concepts of Algebra & Finite Differences.

To introduce the fundamental concepts of Trigonometry & Differential Calculus

Course Outcomes (COs)

On successful completion of the course, the students will be able to

K1	CO1	remember numbers, sequences, series, basic summaries from partial fraction, equations, matrices
K2	CO2	understand trigonometric values and Interpolations
K3	CO3	solve problems by using theorems
K3	CO4	analyze homogeneous and non-homogeneous linear equations

| K4 | CO5 | analyze and Evaluate inverse functions. |

UNIT 1

   Theory of equations : Fundamental theorem of algebra - Symmetric function of the roots – formation of equation – certain standard transformation – To diminish the roots of equation by h - Reciprocal equations –Geometrical meaning of Newton - Raphson Method – Sufficient condition of the convergent of the sequence of approximate roots.

UNIT 2

   Matrices : Fundamental Concepts – Special types of Matrices – Properties of matrices in addition - Properties of matrices in multiplication - Properties of identity matrix - Inverse of the Matrices – Rank of Matrices – Invariance of the rank of matrix – Linear equations – Homogeneous and Non- Homogeneous linear equations.

UNIT 3

Interpolation : Introduction – Extrapolation – Linear interpolation or method of proportional parts – Gregory Newton's forward interpolation – Gregory Newton's backward interpolation(for equal intervals)- Error in polynomial interpolation – Error in Newton forward interpolation formula - Error in Newton forward interpolation formula – Equidistant terms with one or more missing values - Lagrange's interpolation(for unequal intervals)

UNIT 4

   Trigonometry : Exponential series – Periodicity – Circular functions interms of exponential functions - Hyperbolic functions – Periods of Hyperbolic functions –Relations connecting Hyperbolic functions and circular function - Inverse hyperbolic Functions.

UNIT 5

Differential Calculus :Jacobians - Solved problems – Polar curves - Polar coordinates – Transformation of Cartesian to polar and vice versa - Curvature – Radius of curvature in Cartesians – Parametric Form.

Prescribed Text Book:
 "ALLIED MATHEMATICS"PAPER-IFirst semester by P .Kandasamy ,
                              KThilagavathyS.ChandEdition 2013
UNIT 1 Theory of equations (Chapter : I, II, III)
UNIT 2 Matrices (Chapter : I, II, III)
UNIT 3   Interpolation (Chapter : II,III)
UNIT 4   Trigonometry (Chapter : II,III)
UNIT 5 Differential Calculus :Jacobians (Chapter : II,III ,IV)

Reference Books:
1.G.C.Sharma and Madhu Jain, Algebra and Trigonometry, 1st Edition, Galgotia
Publications Pvt.Ltd.2003
2.Dr.S.Arumugam, A.Thangapandi Isaac and A.Somasundaram, Numerical
Methods, 2nd reprint, Scitech Publication India Pvt, Ltd., 2004.

Mapping

PO CO	PO1	PO2	PO3	PO4	PO5
CO1	S	S	S	S	S
CO2	S	S	S	S	S
CO3	S	S	S	S	S
CO4	S	S	S	S	S
CO5	S	S	S	S	S

S - Strong; M- Medium; L- Low

Programme Code	B.Sc	Programme Title	Mathematics
Batch	**2022 - 2025**	**Semester**	**II**
Course Code		**Title:**	**ALLIED MATHEMATICS (B.Sc., Physics & Chemistry)** INTEGRAL CALCULUS,DIFFERENTIAL EQUATIONS, LAPLACE TRANSFORMS & VECTOR ANALYSIS.
Hours/week	**5**	**Credits:**	**5**

Course Objective

To acquaint the students become familiar with tools in Mathematics to understand problems.

Course Outcomes (COs)

On successful completion of the course, the students will be able to

K1	CO1	understand the I and II integrals
K2	CO2	understand properties of integrals, Laplace transform.
K3	CO3	understand first order differential equations.
K3	CO4	analysis Theorems and proves.
K4	CO5	evaluate the importance of shifting properties

UNIT 1

Integral calculus : Methods of integration-Definite integrals of the form
$\int \frac{f'(x)}{f(x)}$ dx , $\int \frac{f'(x)}{\sqrt{f(x)}}$ dx $\int \frac{acosx+bsinx}{\alpha cosx+\beta sinx}$dx , $\int e^x$ [f(x)+f '(x) dx] only - Integration by parts-Properties
of Definite Integrals - Reduction formulae Sin^nx, Cos^nx only.

UNIT 2

Fourier series – Definition of Fourier Series – Standard results in integrals- Definition- Dirchlet's conditions - Fourier series of periodicity 2π and $2l$ - Odd and even functions –Root mean square value of a function Half range series: Introduction- Half range series – Cosine series - sine series

UNIT 3

Ordinary differential equations: Equations solvable for p, Equations solvable for x, Equations solvable for y, Clairauts equation, Equations of first order and of degree higher than one –Total Differential Equation-Necessary and sufficient condition for inerrability of Pdx+Qdy+Rdz=0 – General method of solving Pdx+Qdy+Rdz=0 by taking one variable as constant - Partial Differential equations- By elimination of arbitrary constants - By elimination of arbitrary function

UNIT 4

Laplace Transforms- Definition – Laplace Transform of standard functions (e^{at}, cosat,sinat, coshat, sinhat,t^n ,na positive integer)– Linearity property – First shifting theorem – piecewise continuity- exponential order - Inverse Laplace Transform of standard functions –Problems using partial fraction - LaplaceTransform of derivatives of integrals.

UNIT 5

Vector Analysis : Differentiation of Vectors –scalar and vector fields – derivative of vectors - Gradient ,- Definition –Directional derivative – directional derivative of scalar point function along any line – level surface- formulae involving ∇ - second order differential operators - Divergence and Curl .

Prescribed Text Book:

"ALLIED MATHEMATICS" PAPER-II second semester by
P .Kandasamy , K . ThilagavathyS.Chand 2008.

UNIT 1 [Chapter : 1 Pg.No : 1 to 19 & 46 to 51] ; [Chapter : 2 Pg.No : 53 to 60];
    [Chapter : 3 Pg.No : 61 to 64]
UNIT 2   [Chapter : 6 Pg.No : 140 to159]
UNIT 3   [ODE - Chapter : 1,2 Pg.No:160 to 179]
        [PDE- Chapter : 1 (1.1 to 1.4)Pg.No:186 to 195]
UNIT 4   [Chapter : 1 Pg.No : 234 to272]
UNIT 5 [Chapter : 1,2   Pg.No:299 to320]

References Book:

1.P. Kandasamy and K.Thilagavathy, ―Mathematics, Vol Iv‖, S.Chand And Company Ltd.,- 2004
2.Shanti Narayan, ―Differential Calculus, Shyamlal Charitable Trust, New Delhi, 2004.
3.P.N.Chatterji, Vector Calculus ―, 1st Edition, RajhansPrakahan Publishers, Chennai, 1998.

Mapping

PO CO	PO1	PO2	PO3	PO4	PO5
CO1	S	S	S	S	S
CO2	S	S	S	S	S
CO3	S	S	S	S	S
CO4	S	S	S	S	S
CO5	S	S	S	S	S

S - Strong; M- Medium; L- Low

SEMESTER I: EXTRA CREDIT PAPER – I
Batch :2022-2025   Contact Hours: 30 Hours   Credit: 2
MATHEMATICAL APTITUDE FOR COMPETITIVE EXAMINATIONS

UNIT 1

Non – verbal Reasoning Tests – Completion of series, Classification, Non- verbal analogy.   (TB 1)

UNIT 2

Verbal Reasoning tests – Series completion- verbal classification – Verbal analogy.   (TB 1)

UNIT 3

Coding and decoding .   (TB 1)

UNIT 4

Blood relationshipand Permutation and Combinations. (TB 2)

UNIT 5

Banker's Discount : Banker's Discount Simple Problems (TB 2)

Reference Books:
1."Test of Reasoning for competitive examinations" by Edgar Thorpe.

Third Edition Tata McGraw-Hill Publishing Company Limited,New Delhi.
2."Quantitative Aptitude" by R.S. Aggarwal. Seventh Edition.S.Chand &Company LTD.

SEMESTER III: EXTRA CREDIT PAPER – II
Batch :2022-2025 Contact Hours: 30 Hours Credit: 2
SOLAR SYSTEM AND STELLAR UNIVERSE

UNIT 1: Sun and Planets.

UNIT 2: Comets – Asteroids – Meteors – Zodiacal light.

UNIT 3: Eclipses – causes – conditions – comparison – different kinds of Eclipses.

UNIT 4: The Stellar Universe.

UNIT 5: Constellations – Zodiacal Constellations.

Prescribed Text Book:

   Astronomy: Kumaravelu&SuseelaKumaravelu.

Books for Reeferences:

1. Astronomy: G.V. Ramachandran.

2. Why the sky is blue? – Scientific publications.

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SEMESTER V: EXTRA CREDIT PAPER - III
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Batch :2022-2025   Contact Hours: 30 Hours   Credit: 2
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SET THEORY AND LOGIC
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UNIT 1:
Basic set operations – Union – Intersection – Difference – Complement.

UNIT 2:
Reflexive – Symmetric – Transitive – Equivalence relation.

UNIT 3:
Logic – statements – conjunction – disjunction – negation – conditional – bi-conditional.

UNIT 4:
Propositions and truth table – Tautology and Contradiction.

UNIT 5:
Logical Equivalence, Algebra of Propositions, logically true and logically Equivalent statement.

Prescribed Text Book:
        DISCRETE MATHEMATIC   By   B.S. Vatssa.
Reference Book:
        DISCRETE MATHEMATICS

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2000 Solved Problems by Shyam series

Note:

    5X20=100 marks(Two Questions from each unit)
       5 out of 10 questions

DEPARTMENT OF MATHEMATICS
VALUE ADDED COURSES, OFFERED SINCE 2019 – 2020

Programme: UG   Subject: MathematicsBatch :2022-2025

Course Type: Value Added Course - I   Course: Vedic Mathematics

Contact Hours: 30 Hours   **CIA:** 100

Course Outcomes:

S.No	Description	Blooms' Taxonomy Level
1	understand the concept of High Speed Multiplication and Faster Division	Knowledge (Level 1)
2	apply the speed method to calculate the Square Roots, Cube Roots and Digital Roots	Evaluation (Level 5)
3	Solve Maths problems faster and more efficient	Knowledge (Level 1)
4	Sharpen mind, increases mental agility and intelligence	Application (Level 3)

COURSE CONTENT

UNIT 1

High Speed Multiplication-Faster Division-Algebra: Linear, Simultaneous, Quadratic Equations

UNIT 2

Accelerated Addition-Instant Subtractions-Squares-Cubes.

UNIT 3

Square Roots-Cube Roots-Digital Roots

UNIT 4

Math Meditation -Divisibility-Calendars-Pythagoras Theorem
UNIT 5
Recurring Decimals-Determinants
Book for Reference:
ShankaracharyaMotilalBanarasidass, Vedic
Mathematics,IndologlcalPubl~shers&Booksellers Delhi,Varanasi.

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Question Pattern

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Section – A:
Eight questions will be given. Five questions are to be answered. 5 x 20 =100 marks

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Programme: UG   Subject: MathematicsBatch :2022-2025
Course Type: Value Added Course - IICourse: Coding Theory
Contact Hours: 30 HoursCIA: 100
Course Outcomes:

S.No	Description	Blooms' Taxonomy Level
1	understand the concept of Error detection, correction and decoding	Knowledge (Level 1)
2	apply the concept of Linear Codes , Hamming weight and Bases for linear codes	Application (Level 3)
3	get a clear idea about the concepts of Finite Fields	Analysis (Level 4)
4	understand the concept of Generator matrix and Check matrix	Knowledge (Level 1)

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COURSE CONTENT

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Unit 1

Error detection, correction and decoding: Communication channels – Maximum Likelihood decoding

Unit 2

Hamming distance – Nearest neighbour / minimum distance decoding – Distance of a code.

Unit 3

    Finite Fields: Finite fields – Polynomial rings – Structure of finite fields - Minimal Polynomials.

Unit 4

Linear codes: Vector spaces over finite fields - codes. Linear Codes - Hamming weight – Bases for linear

Unit 5

Bases for linear- Generator matrix and parity - Check matrix – Equivalence of linear codes .

Prescribed Text Books:

San Ling and ChaopingXing,*Coding Theory* **, A first course, Cambridge University Press, 2004.**

Question Pattern

Section – A:

Eight questions will be given. Five questions are to be answered. 5 x 20 =100 marks

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Programme: UG   Subject: MathematicsBatch :2022-2025

Course Type: Value Added Course - III **Course:** Mathematics for Environmental Studies

Contact Hours: 30 Hours**CIA:** 100

Course Outcomes:

S.No	Description	Blooms' Taxonomy Level
1	Understand the concept of Fibonacci numbers in nature	Knowledge (Level 1)
2	Study the Different types of Fibonacci and Lucas numbersand its applications.	Application (Level 3)
3	apply the concepts of golden ratio	Application (Level 3)
4	Analyze the concept of Gattei's discovery of golden ratio	Analysis (Level 4)

COURSE CONTENT

UNIT 1

Fibonacci Numbers in nature The rabbit problem, Fibonacci numbers, recursive definition, Lucas numbers, Different types of Fibonacci and Lucas numbers.

UNIT 2

Fibonacci numbers in nature : Fibonacci and the earth, Fibonacci 29 and flowers, Fibonacci and sunflower, Fibonacci, pinecones, artichokes and pineapples, Fibonacci and bees, Fibonacci and subsets, Fibonacci and sewage treatment, Fibonacci and atoms, Fibonacci and reflections

UNIT 3

Fibonacci, paraffins and cycloparaffins, Fibonacci and music, Fibonacci and compositions with 1's and 2's.

UNIT 4

Golden Ratio (10Hrs) The golden ratio, mean proportional, a geometric interpretation, ruler and compass construction, Euler construction, generation by Newton's method.

UNIT 5

The golden ratio revisited, the golden ratio and human body, golden ratio by origami, Differential equations, Gattei's discovery of golden ratio, centroids of circle.

Prescribed Text Books:

Thomas Koshy, Fibonacci and Lucas numbers with applications, John Wiley & Sons, Inc 2001.

Question Pattern

Section – A:

Eight questions will be given. Five questions are to be answered. 5 x 20 =100 marks

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