

SEETHALAKSHMI RAMASWAMI COLLEGE

(Autonomous & Affiliated to Bharathidasan University)

(Accredited with “A+” grade (4th cycle) by NAAC)

TIRUCHIRAPPALLI – 620 002

CHOICE BASED CREDIT SYSTEM



PG & RESEARCH DEPARTMENT OF MATHEMATICS

SYLLABUS FOR B.Sc., Mathematics

(For Students admitted from June 2021 onwards)



SEETHALAKSHMI RAMASWAMI COLLEGE

(Autonomous)

Affiliated to Bharathidasan University

Tiruchirappalli

Accredited with A+ by NAAC (4th Cycle)



B.Sc. Mathematics

Revised CBCS - OBE - BASED Curriculum Structure

(For students admitted from 2021 onwards)

SEM	PART	COURSE	COURSE CODE	COURSE TITLE	HRS	CRD	INT/EXT	CIA	SE	TOT
I	I	Language - I		Course - I	6	3	EXT	25	75	100
	II	English - I		Course - I	6	3	EXT	25	75	100
	III	Core Course - I		Calculus	5	5	EXT	25	75	100
	III	Core Course - II		Theory of equations and Vector Analysis	5	5	EXT	25	75	100
	III	First Allied Course - I		Offered by the Department of Commerce/Physics	4	3	EXT	25	75	100
	III	First Allied Practical		Practical: Offered by the Department of Commerce/Physics	2*	-	-	-	-	-
	IV	VBE		Value Based Education	2	2	EXT	25	75	100
	TOTAL					30	21			

* Practical Examinations will be conducted at the end of the II Semester

SEM	PART	COURSE	COURSE CODE	COURSE TITLE	HRS	CRD	INT/EXT	CIA	SE	TOT
II	I	Language - II		Course - II	6	3	EXT	25	75	100
	II	English - II		Course - II	6	3	EXT	25	75	100
	III	Core Course - III		Analytical geometry of three dimensions	5	5	EXT	25	75	100
	III	Core Course - IV		Numerical Methods	5	5	EXT	25	75	100
	III	First Allied Course - II		Offered by the Department of Commerce/Physics	4	3	EXT	25	75	100
	III	First Allied Practical		Practical: Offered by the Department of Commerce/Physics	2	3	INT	40	60	100
	IV	EVS		Environmental Studies	2	2	EXT	25	75	100
	TOTAL					30	24			

SEM	PART	COURSE	COURSE CODE	COURSE TITLE	HRS	CRD	INT/EXT	CIA	SE	TOT
III	I	Language - III		Course - III	6	3	EXT	25	75	100
	II	English - III		Course - III	6	3	EXT	25	75	100
	III	Core Course - V		Modern Algebra-I	5	5	EXT	25	75	100
	III	Core Course - VI		Programming in C	5	5	EXT	25	75	100
	III	Second Allied Course-I		Mathematical Statistics-I	4	3	EXT	25	75	100
	IV	NME - I		Offered by other Departments	2	2	EXT	25	75	100
	IV	SBE - I		Combinatorics	2	2	EXT	25	75	100
	TOTAL					30	23			

SEM	PART	COURSE	COURSE CODE	COURSE TITLE	HRS	CRD	INT/EXT	CIA	SE	TOT
IV	I	Language - IV		Course - IV	6	3	EXT	25	75	100
	II	English - IV		Course - IV	6	3	EXT	25	75	100
	III	Core Course -VII		Modern Algebra - II	6	5	EXT	25	75	100
	III	Second Allied Course - II		Mathematical Statistics - II	4+2	3	EXT	25	75	100
	III	Second Allied Practical		Practical: Excel Lab for Mathematical Statistics	2	3	INT	40	60	100
	IV	NME -II		Offered by other Departments	2	2	EXT	25	75	100
	IV	SBE - II		Financial Mathematics	2	2	EXT	25	75	100
	TOTAL					30	21			

SEM	PART	COURSE	COURSE CODE	COURSE TITLE	HRS	CRD	INT/EXT	CIA	SE	TOT
V	III	Core Course - VIII		Real Analysis - I	5+2	5	EXT	25	75	100
	III	Core Course - IX		Statics	5+2	5	EXT	25	75	100
	III	Core Course - X		Differential Equations and Fourier Transforms	5+2	5	EXT	25	75	100
	III	MBE - I		Graph Theory	5	4	EXT	25	75	100
	IV	SBE - III		Practical: MAT LAB	2	2	INT	40	60	100
	IV	SSD		Soft Skill Development	2	2	INT	25	75	100
	TOTAL					30	23			

SEM	PART	COURSE	COURSE CODE	COURSE TITLE	HRS	CRD	INT/EXT	CIA	SE	TOT
VI	III	Core Course - XI		Real Analysis - II	6	5	EXT	25	75	100
	III	Core Course - XII		Complex Analysis	5	5	EXT	25	75	100
	III	Core Course - XIII		Dynamics	5	5	EXT	25	75	100
	III	MBE - II		Operations Research	5	4	EXT	25	75	100
	III	MBE - III		Number Theory	5	4	EXT	25	75	100
	III	Project		Group Project	3	3	EXT	-	-	100
	V	GS		Gender Studies	1	1	INT	25	75	100
	V	Extension		Extension Activity	-	1	INT	-	-	100
				Total	30	28				800
	Grand Total					180	140			

ALLIED COURSES

(Offered to the Students of Commerce)

SEM	PART	COURSES	COURSE CODE	COURSE TITLE	HRS	CREDIT	INT /EXT	CIA	SE	TOT
I	III	First Allied Course-I		Course-I: Business Mathematics	4	3	EXT	25	75	100
		First Allied Practical		Practical : Practical Mathematics for Commerce	2	-	-	-	-	-
II	III	First Allied Course-II		Course-II: Business Statistics	4	3	EXT	25	75	100
		First Allied Practical		Practical: Practical Mathematics for commerce	2	3	INT	40	60	100
TOTAL					12	9				300

(Offered to the Students of Chemistry and Physics)

SEM	PART	COURSES	COURSE CODE	COURSE TITLE	HRS	CREDIT	INT /EXT	CIA	SE	TOT
III	III	Second Allied Course-I		Course-I: Allied Mathematics-I	4	3	EXT	25	75	100
		Second Allied Practical		Practical: Practical Mathematics	2	-	-	-	-	-
IV	III	Second Allied Course-II		Course-II: Allied Mathematics-II	4	3	EXT	25	75	100
		Second Allied Practical		Practical: Practical Mathematics	2	3	INT	40	60	100
TOTAL					12	9				300

(Offered to the Students of Computer Science Both Aided and S.F.)

SEM	PART	COURSES	COURSE CODE	COURSE TITLE	HRS	CREDIT	INT /EXT	CIA	SE	TOT
III	III	Second Allied Course-I		Course-I: Numerical and statistical methods	4	3	EXT	25	75	100
		Second Allied Practical		Practical: Practical Mathematics for Computer Science	2	-	-	-	-	-
IV	III	Second Allied Course-II		Course-II: Operations Research	4	3	EXT	25	75	100
		Second Allied Practical		Practical: Practical Mathematics for Computer Science	2	3	INT	40	60	100
TOTAL					12	9				300

(Offered to the Students of Commerce S. F.)

SEM	PART	COURSES	COURSE CODE	COURSE TITLE	HRS	CREDIT	INT /EXT	CIA	SE	TOT
I	III	First Allied Course-I		Course-I: Business Mathematics/ Foundation Mathematics	4	3	EXT	25	75	100
		First Allied Practical		Practical : Practical Mathematics for Commerce	2	-	-	-	-	-
II	III	First Allied Course-II		Course-II: Business statistics/ Foundation Statistics	4	3	EXT	25	75	100
		First Allied Practical		Practical: Practical Mathematics for Commerce	2	3	INT	40	60	100
TOTAL					12	9				300

(Offered to the Students of Electronics)

SEM	PART	COURSES	COURSE CODE	COURSE TITLE	HRS	CREDIT	INT /EXT	CIA	SE	TOT
I	III	First Allied Course-I		Course-I: Mathematical Techniques-I	4	3	EXT	25	75	100
		First Allied Practical		Practical: Practical Mathematics for Electronics	2	-	-	-	-	-
II	III	First Allied Course-II		Course-II: Mathematical Techniques-II	4	3	EXT	25	75	100
		First Allied Practical		Practical: Practical Mathematics for Electronics	2	3	INT	40	60	100
TOTAL					12	9				300

(Offered to the Students of BCA)

SEM	PART	COURSES	COURSE CODE	COURSE TITLE	HRS	CREDIT	INT /EXT	CIA	SE	TOT
I	III	First Allied Course-I		Course-I: Ancillary Mathematics -I	4	3	EXT	25	75	100
		First Allied Practical		Practical: Practical Mathematics for Computer Applications	2	-	-	-	-	-
II	III	First Allied Course-II		Course-II: Ancillary Mathematics-II	4	3	EXT	25	75	100
		First Allied Practical		Practical: Practical Mathematics for Computer Applications	2	3	INT	40	60	100
TOTAL					12	9				300

(Offered to the Students of BBA)

SEM	PART	COURSES	COURSE CODE	COURSE TITLE	HRS	CREDIT	INT /EXT	CIA	SE	TOT
I	III	First Allied Course-I		Course-I: Business Mathematics and Statistics	4	3	EXT	25	75	100
		First Allied Practical		Practical: Practical Mathematics for Business Administration	2	-	-	-	-	-
II	III	First Allied Course-II		Course-II: Operations Research	4	3	EXT	25	75	100
		First Allied Practical		Practical: Practical Mathematics for Business Administration	2	3	INT	40	60	100
TOTAL					12	9				300

MAJOR BASED ELECTIVE COURSES

SEM	PART	GROUP	COURSE CODE	COURSE TITLE	HRS	CRD	INT/E XT	CIA	SE	TOT
V	III	Group – I (Graph Theory/Discrete Mathematics)		Course-I: Graph Theory	5	4	EXT	25	75	100
VI	III	Group – II (Operations Research / Astronomy)		Course–II: Operations Research	5	4	EXT	25	75	100
VI	III	Group – III (Number Theory /Mathematical Modelling)		Course–III: Number Theory	5	4	EXT	25	75	100
TOTAL					15	12				300

SKILL BASED ELECTIVE COURSES

SEM	PART	GROUP	COURSE CODE	COURSE TITLE	HRS	CRD	INT/ EXT	CIA	SE	TOT
III	IV	Group – I (Combinatorics / Design and Analysis of Algorithm)		Course–I: Combinatorics	2	2	EXT	25	75	100
IV	IV	Group – II (Financial Mathematics / Applications of Geometry)		Course–II: Financial Mathematics	2	2	EXT	25	75	100
V	IV	Group – III (MAT LAB/Applications of Graph Theory)		Course–III: Practical: MAT LAB	2	2	EXT	40	60	100
TOTAL					6	6				300

NON MAJOR BASED ELECTIVE COURSES

SEM	PART	COURSE CODE	COURSE TITLE	HRS	CRD	INT/ EXT	CIA	SE	TOT
III	IV		NME–I: General Skills in Mathematics-I	2	2	EXT	25	75	100
IV	IV		NME–II: General Skills in Mathematics-II	2	2	EXT	25	75	100
TOTAL				4	4				200

TOTAL DISTRIBUTION OF HOURS, CREDITS & MARKS FOR UG PROGRAMME

SEMESTER	HOURS	CREDITS	TOTAL MARKS
I	30	21	600
II	30	24	700
III	30	23	700
IV	30	21	700
V	30	23	600
VI	30	28	800
TOTAL	180	140	4100

UG PROGRAMME – 2021 ONWARDS

PART	DETAILS	NO. OF COURSES	CREDIT	TOTAL CREDIT
I	Language	4	3	12
II	English	4	3	12
III	Core Courses	13	5	65
	Allied Course	4	3	12
	Allied Practical	2	3	6
	MBE	3	4	12
IV	SBE	3	2	6
	NME	2	2	4
	EVS	1	2	2
	VBE	1	2	2
	SOFT SKILL DEVELOPMENT	1	2	2
V	GS	1	1	1
	EXTENSION	1	1	1
	Group Project	1	3	3
TOTAL CREDITS				140



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Programme	Semester	Course Code	Course Title
B.Sc. Mathematics	I		Calculus
Part :III	Core Course- I	Credit: 5	Hours per week:5
CIA	25 Marks	SE	75 Marks

SYLLABUS

(For Students admitted from 2021 onwards)

OBJECTIVES :

- To introduce the notion of envelopes, curvatures and polar coordinates.
- To introduce the properties of definite integrals and methods of solving multiple integrals.

On Completion of this course the students will be able to

Course Outcomes:(CO)	Knowledge Level	Units
CO 1: Calculate radius of curvature in Cartesian and polar Forms and explain evolute and involute concepts.	K1, K2, K4	I
CO 2: Apply the properties of definite integrals to obtain reduction formulae.	K2,K3	II
CO 3: Evaluate of double integrals both in Cartesian and polar forms.	K1,K2,K3,K4,K5	III
CO 4: Examine the notions of Jacobian and change of variables to evaluate double integrals.	K2,K3,K4	IV
CO5: Determine Beta and Gamma functions and discuss their properties	K1,K2,K3,K4	V

UNIT I **Curvature:** Curvature – Circle, radius and centre of curvature – Cartesian formula for the radius of curvature – The co-ordinates of the centre of curvature – Evolute and Involute – Radius of Curvature when the curve is given in polar

co-ordinates.

UNIT II **Integration:** Properties of definite integrals– Integration by parts -Reduction formulae- Integration of $e^{ax}\cos bx$ - Bernoulli's formula.

UNIT III **Multiple Integrals:** Introduction-Definition of the double integral – Evaluation of the double integral – Double integral in polar co-ordinates-Triple Integrals.

UNIT IV **Change of Variables :** Introduction- Jacobian – Two important results regarding Jacobians - Change of variable in case of two variables – Change of variables in case of three variables Transformation from Cartesian to polar co-ordinates- Transformation from Cartesian to spherical polar co-ordinates.

UNIT V **Beta and Gamma functions:** Beta and Gamma functions-Definitions – convergence of $\Gamma(n)$ -Recurrence formula of Gamma functions – Properties of Beta functions – Relation between Beta and Gamma functions – Evaluation of certain definite integrals by using Gamma functions.

UNIT VI **Dynamic component meant for experiential learning**

- Envelopes
- Method of finding the envelope
- Another definition of the envelope of a family of curves
- Elimination of parameter
- Relation of two parameters.

TEXT BOOKS

BOOK 1 **S.Narayanan , T.K. Manicavachagom Pillay**, Calculus Volume I (Differential Calculus), S.Viswanathan (Printers& Publishers), Pvt., Ltd., 2007.

BOOK 2 **S.Narayanan, T.K. Manicavachagom Pillay**, Calculus Volume II (Integral Calculus), S. Viswanathan (Printers & Publishers) Pvt., Ltd.,2007.

UNIT I	Book 1: Chapter X	Sections:	2.1 to 2.6
UNIT II	Book 2: Chapter 1	Sections:	11 to 14, 15.1
UNIT III	Book 2: Chapter 5	Sections:	1, 2.1 ,2.2, 3.1 and 4
UNIT IV	Book 2: Chapter 6	Sections:	1.1, 1.2, 2.1 to 2.4
UNIT V	Book 2: Chapter 7	Sections	2.1 to 2.3, 3 to 5
UNIT VI	Book 1: Chapter X	Sections	1.1 to 1.4

REFERENCE BOOKS

- 1. S.Sudha**, Calculus, Edition 1, Emerald Publications, 1998.
- 2. Shanti Narayan and P.K.Mittal**, Integral Calculus, S.Chand and Company Ltd.

E BOOK

- 3. Ulrich L. Rohde, G.C. Jain , Ajay K. Poddar and A.K.Ghosh**, Introduction to Integral Calculus , **Wiley**.



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Programme	Semester	Course Code	Course Title
B.Sc.Mathematics	I		Theory of equations and Vector Analysis
Part :III	Core Course - II	Credit: 5	Hours per week:5
CIA	25 Marks	SE	75 Marks

SYLLABUS

(For Students admitted from 2021 onwards)

OBJECTIVES :

- To learn the relation between the roots and co-efficients of a polynomial and nature of the roots.
- To introduce the basic concepts of vector calculus

On Completion of this course the students will be able to

Course Outcomes:(CO)	Knowledge Level	Units
CO 1: Explain the relation between roots and coefficients of algebraic equations and describe the method of solving reciprocal equations.	K2,K3	I
CO2: Explain the method of finding quotient and remainder when a polynomial is divided by a binomial.	K3,K4&K5	II
CO 3: Analyze vector identities using the differential operator ∇	K2,K3&K4	III
CO4: Explain line, surface, volume integrals using vector functions	K2, K5	IV
CO 5: Apply integral theorems like Gauss's divergence theorem, Stoke's theorem and Green's theorem to solve problems	K3,K4	V

UNIT I **Theory of Equations:** Relations between the roots and coefficients of equations – Symmetric function of the roots – Sum of the powers of the roots of an equation – Newton’s theorem on the sum of the powers of the roots – Transformations of equations – Reciprocal equation.

UNIT II **Theory of Equations(Continued):** To increase or decrease the roots of a given equation by a given quantity – Form of the quotient and remainder when a polynomial is divided by a binomial –Removal of terms – To form an equation whose roots are any power of the roots of a given equation–Transformation in general – Descartes’ Rule of signs.

UNIT III **Vector analysis -Differential operators:** Vector differential operator ∇ – Gradient –Divergence– Curl– Vector Identities.

UNIT IV **Vector Analysis (Continued): Integration of vectors:** Integration of vector functions – Line integrals – Surface Integrals–Volume Integrals

UNIT V **Vector Analysis (Continued): Integral theorems:** Gauss’s divergence theorem (Statement only) – Green’s theorem (Statement only) – Stokes’ theorem(Statement only) – Simple Problems only.

UNIT VI **Dynamic component meant for experiential learning**

- Theory of Equations
- Rolles’ theorem
- Multiple roots
- Strum’s theorem.

TEXT BOOKS

BOOK 1 **T.K. ManicavachagomPillay, T. Natarajan, K. S. Ganapathy,**

Algebra Volume I, S. Viswanathan (Printers&Publishers) Pvt. Ltd.,

Reprint 2012.

BOOK 2 **K.Viswanatham and S.Selvaraj,** Vector Analysis, Emerald publishers,

Reprint 1999

UNIT I Book 1: Chapter 6 Sections: 11 to 16

UNIT II Book 1: Chapter 6 Sections: 17 to 21 and 24

UNIT III Book 2: Chapter 2

UNIT IV Book 2: Chapter 3

UNIT V Book 2: Chapter 4 Sections: 4.2 to 4.4

UNIT VI Book 1: Chapter 6 Sections: 25 to 27

REFERENCE BOOKS

1. **S. Sudha**, Calculus, Edition 1, Emerald Publications, 1998.
2. **P. Duraipandian, LaxmiDuraipandian**, Vector Analysis, Emerald Publishers, 1998.

E BOOK

3. **Murray R.Spiegel**, Vector Analysis and an introduction to Tensor Analysis.



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Programme	Semester	Course Code	Course Title
B.Sc. Mathematics	II		Analytical Geometry of Three Dimensions
Part :III	Core Course - III	Credit: 5	Hours per week:5
CIA	25 Marks	SE	75 Marks

SYLLABUS

(For Students admitted from 2021 onwards)

OBJECTIVES :

- To introduce the concepts of Three Dimensional Cartesian Co-ordinate system.
- To introduce the basic concepts of sphere and cylinder.

On Completion of this course the students will be able to

Course Outcomes:(CO)	Knowledge Level	Units
CO 1: Explain the method of finding projections and direction cosines of a line in three dimensional analytical geometry	K1,K2,K3,,K4	I
CO 2: Analyze various forms of plane equations and straight line equations	K1,K2,K3,,K4	II
CO 3: Illustrate the concepts of straight lines skew lines and shortest distance	K1,K2,K3,,K4	III
CO 4: Determine the equation of a sphere and - Condition for orthogonality of Two Spheres.	K1,K2,K3,,K4	IV
CO 5: Construct the equation of a Cylinder with a given generator and a given Guiding Curve.	K1,K2,K3,,K4,K5	V

UNIT I **Three Dimension:** Rectangular coordinate axes – Formula for distance between two points – Section formula – Centroid of a triangle – Centroid of tetrahedron – Direction cosines – Direction ratios.

UNIT II **Plane:** Introduction – General equation of a plane – General equation of a plane passing through a given point – Equation of a plane in intercept form – Equation of a plane in normal form – Angle between two planes – Perpendicular distance from a point on a plane – Plane passing through three given points-To find the ratio in which the plane joining the points (x_1, y_1, z_1) and (x_2, y_2, z_2) is divided by the plane $ax + by + cz + d = 0$ - Plane passing through the intersection of two given planes.

UNIT III **Straight line:** Introduction – Equation of a straight line in symmetrical form –Equations of a straight line passing through two given points – Equations of a straight line determined by a pair of planes in symmetrical form – Angle between a plane and a line – Condition for a line to be parallel to a plane – Conditions for a line to lie on a plane – To find the length of the perpendicular from a given point on a line - Coplanar lines – Skew lines.

UNIT IV **Sphere:** Definition of a sphere – The Equation of a sphere with centre at (a, b, c) and Radius r -Equation of the sphere on the line joining the points (x_1, y_1, z_1) and (x_2, y_2, z_2) as Diameter – Length of the tangent from $P(x_1, y_1, z_1)$ to the sphere $x^2 + y^2 + z^2 + 2ux + 2vy + 2wz + d = 0$ - Equation of the tangent plane at (x_1, y_1, z_1) to the sphere $x^2 + y^2 + z^2 + 2ux + 2vy + 2wz + d = 0$ - Section of a sphere by a plane – Equation of a circle – Intersection of two spheres .

UNIT V **Cylinder:** Definition – Equation of a Cylinder with a Given Generator and a Given Guiding Curve- Enveloping Cylinder-Right Circular Cylinder.

UNIT VI **Dynamic component meant for experiential learning**

- Definition of Cone
- Equation of a Cone with a Given Vertex and a Given Guiding Curve
- Equation of a Cone with its Vertex at the Origin
- Condition for the General Equation of the Second Degree to Represent a Cone-Right circular cone.

TEXT BOOK

1. **P. R. Vittal** , Analytical Geometry 2D and 3D, Darling Kindersley(India) Private limited.

UNIT I Chapter 11 Sec 11.1 to 11.5

UNIT II Chapter 12 Sec 12.1 to 12.10

UNIT III Chapter 13 Sec 13.1 to 13.10

UNIT IV Chapter 14 Sec 14.1 to 14.8

UNIT V Chapter 16 Sec 16.1 to 16.4

UNIT VI Chapter 15 Sec 15.1 to 15.5

REFERENCE BOOKS

1. **P. Duraipandian, Laxmi Duraipandian and Jayamala Paramasivan** Analytical Geometry 3D, (Revised), 1990, Emerald Student Edition.
2. **Shanthi Narayan, Dr.P.K.Mittal**, Analytical solid geometry, S.Chand& companyLTD, 2013(Reprint)

E BOOK

3. **Shanti Narayan** , Analytical Solid Geometry, S. Chand and company limited, New Delhi.



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Programme	Semester	Course Code	Course Title
B.Sc. Mathematics	II		Numerical Methods
Part :III	Core Course - IV	Credit: 5	Hours per week:5
CIA	25 Marks	SE	75 Marks

SYLLABUS

(For Students admitted from 2021 onwards)

OBJECTIVES :

- To introduce different numerical techniques to solve Algebraic and Differential Equations.
- To develop skills in solving problems using Numerical Techniques.

On Completion of this course the students will be able to

Course Outcomes:(CO)	Knowledge Level	Units
CO 1: Analyze the methods to find the solution of Algebraic and Transcendental equations.	K2,K3,K4	I
CO 2: Explain interpolation and use Newton's formulae, to solve problems.	K1,K2,K3	II
CO 3 : Apply Lagrange's formula for unevenly spaced points	K1,K2,K3	III
CO 4: Apply Trapezoidal, Simpson's 1/3 rule and Simpson's 3/8 rule to evaluate integrals.	K1,K3,K4	IV
CO 5: Evaluate the numerical solution of ordinary differential equations.	K1,K4,K5	V

- UNIT I** **Solutions of Algebraic and Transcendental equations :**
Introduction - The Bisection Method –The Method of False Position -
The Iteration Method -Newton-Raphson Method.
- UNIT II** **Interpolation:** Introduction – Finite Differences – Forward, Backward
Differences – Central Differences – Symbolic relations and separation of
symbols- Differences of a Polynomial – Newton’s Formulae for
interpolation-
- UNIT III** **Interpolation(continued):**Central Difference Interpolation Formulae-
Gauss central Difference formulae-Stirling’s-Bessel’s-Everett’s-Relation
between Bessel’s and Everett’s formulae.
- Interpolation with unevenly spaced points:** Lagrange’s interpolation
formula
- UNIT IV** **Numerical Differentiation and Integration:** Introduction-Numerical
Differentiation – Numerical Integration: Trapezoidal Rule – Simpson’s
1/3 Rule – Simpson’s 3/8 Rule – Boole’s and Weddle’s Rules- Romberg
Integration .
- UNIT V** **Numerical Solution of Ordinary Differential Equations:**
Introduction- Solution by Taylor’s Series – Picard’s Method of
Successive Approximations – Euler’s Method – Modified Euler’s
Method - Runge – Kutta Methods
- UNIT VI** **Dynamic component meant for experiential learning**
- Predictor-Corrector Method
 - Adams-Moulton-Milne’s Method
 - Boundary-value problems-Finite
 - Difference method.

TEXT BOOK

Introductory Methods of Numerical Analysis, **S.S. Sastry**, Edition 5, Prentice Hall of India Pvt. Ltd., New Delhi.

UNIT I	Chapter 2	Sections	2.1 to 2.5
UNIT II	Chapter 3	Sections	3.1,3.3, 3.5, 3.6,
UNIT III	Chapter 3	Sections	3.7, 3.9:3.9.1

UNIT IV Chapter 6 Sections 6.1, 6.2 –Pages 207 to 211
6.4 : 6.4.1 to 6.4.4, 6.4.6

UNIT V Chapter 8 Sections 8.1, 8.2,8.3, 8.4:8.4.2 , 8.5

UNIT VI Chapter 8 Sections 8.6,8.10(8.10.1 only)

REFERENCE BOOKS

1. **P.Kandasamy,K.Thilagavathy,K.Gunavathy**, Numerical methods, S.Chand & Co., Ltd., New Delhi, First edition 1997, Reprint 2001.
2. **Dr. B.S. Goel and Dr. S.K. Mittal**, Numerical Analysis, Pragati Prakashan Publishers, Tenth edition, 1994.

E BOOK

3. **James F. Epperson** ,An introduction to Numerical methods and Analysis, second edition, Published by John Wiley & Sons, Inc., Hoboken, New Jersey.



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Programme	Semester	Course Code	Course Title
B.Sc.Mathematics	III		Modern Algebra - I
Part :III	Core Course - V	Credit: 5	Hours per week:5
CIA	25 Marks	SE	75 Marks

SYLLABUS

(For Students admitted from 2021 onwards)

OBJECTIVES :

- To introduce the concept of groups and rings.
- To solve problems in groups and rings.

On Completion of this course the students will be able to

Course Outcomes:(CO)	Knowledge Level	Units
CO 1: Analyze and apply the knowledge of basic abstract systems.	K3, K4	I
CO 2: Classify the concepts and properties of groups.	K2	II
CO 3: Apply and discuss group concepts in Lagrange's theorem.	K2, K3	III
CO 4: Summarize the importance of homomorphism and isomorphism in groups	K2, K4, K5	IV
CO 5: Explain and use the concepts of rings.	K3, K4	V

UNIT I **Relations and Mappings:** Relations – Equivalence Relations – Partial Order – Functions – Binary Operations.

UNIT II **Groups:** Definition and examples – Elementary properties of a Group – Equivalent Definitions of a Group – Permutation groups.

UNIT III **Groups (Continued):** Subgroups–Cyclic Groups – Order of an Element – Cosets and Lagrange’s theorem.

UNIT IV **Groups (Continued):** Normal subgroups and Quotient Groups – Isomorphism – Homomorphisms.

UNIT V **Rings:** Definitions and Examples – Elementary properties of rings – Isomorphism – Types of rings – Characteristic of a ring – Subrings – Ideals – Quotient rings.

UNIT VI **Dynamic component meant for experiential learning**

- Maximal and prime ideals
- Homomorphism of rings
- Field of quotients of an integral domain
- Ordered integral domain.

TEXT BOOK

S.Arumugam and A.Thangapandi Isaac, Modern Algebra, ScitechPuplications IndiaPvt. Ltd., Chennai, August 2003.

UNIT I Chapter 2: Sections: 2.1 to 2.5

UNIT II Chapter 3: Sections: 3.1 to 3.4

UNIT III Chapter 3: Sections: 3.5 to 3.8

UNIT IV Chapter 3: Sections: 3.9 to 3.11

UNIT V Chapter 4: Sections: 4.1 to 4.8

UNIT VI Chapter 4: Sections: 4.9 to 4.12.

REFERENCE BOOKS

1. **R. Balakrishnan** and **N.Ramabhadran**, A Text book of Modern Algebra, Edition 3, Vikas Publishing House Pvt. Ltd.
2. **A. R.Vasistha**, Modern Algebra, Edition 23, Krishna Prakashan Mandir.

E Book

3. **Ramji Lal**, Algebra 1, Springer, Infosys Science Foundation series in Mathematical Sciences.



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Programme	Semester	Course Code	Course Title
B.Sc.Mathematics	III		Programming in C
Part :III	Core Course -VI	Credit: 5	Hours per week:5
CIA	25 Marks	SE	75 Marks

SYLLABUS

(For Students admitted from 2021 onwards)

OBJECTIVES :

- To give practical knowledge of programming in C

On Completion of this course the students will be able to

Course Outcomes:(CO)	Knowledge Level	Units
CO 1: Analyse and Discuss the concepts of Constants, Variables and Data types.	K2,K3	I
CO 2: Analyse and Explain Operators and Expressions.	K3,K4	II
CO 3 :Illustrate and Explain managing input and output operations with examples.	K2,K3, K4	III
CO 4: Analyse and classify Decision making and branching.	K3,K4	IV
CO 5: Describe Decision making and Looping.	K1,K2,K3	V

UNIT I

Constants, Variables and Data types:

Introduction-Character set-C tokens-Key words and Identifiers-Constants-Variables-Data types-Declaration of variables-Declaration of storage class-Assigning values to variables

- UNIT II Operators and Expressions:**
Arithmetic operators-Relational operators-Logical operators-Assignment operators-Increment and decrement operators-Conditional operators-Bitwise operators-Special operators-Arithmetic expressions-Evaluation of expressions.
- UNIT III Managing input and output operations:**
Introduction-Reading a character-writing a character-formatted input-formatted output
- UNIT IV 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.
- UNIT V Decision making and Looping:**
Introduction-The WHILE statement- The do statement-The for statement. Arrays: Introduction-One dimensional array-Declaration of One dimensional array- Initialization of One dimensional array-Two dimensional arrays-Initializing Two dimensional array.
- UNIT VI Dynamic component meant for experiential learning**
- C programme to Arrange Numbers in ascending and descending orders.
 - C programme to check a prime number.
 - C programme to form a Fibonacci Series.
 - C programme to Arrange words in alphabetical order.
 - C programme to find roots of a Quadratic equation.

TEXT BOOK:

Programming in ANSI C, by **E. Balagurusamy**, 6th edition, Tata McGraw – Hill, Publishing Company, New Delhi.

UNIT I	Chapter 2	Sections	2.1 to 2.10
UNIT II	Chapter 3	Sections	3.2 to 3.11
UNIT III	Chapter 4		
UNIT IV	Chapter 5	Sections	5.1 to 5.7

UNIT V	Chapter 6	Sections	6.1 to 6.4
	Chapter 7	Sections	7.1 to 7.6

REFERENCE BOOKS

1. **K.R. Venugopal and Sudeep R. Prasad**, Programming with C , Tata McGraw Hill Publishing Company.
2. **Smarajit Ghosh**, Programming in C , Prentice –Hall of India Pvt. Ltd., New Delhi.

E BOOK

3. **Tim Baiey** ,An introduction to the C programming language and Software Design , 2005



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Programme	Semester	Course Code	Course Title
B.Sc.Mathematics	IV		Modern Algebra II
Part :III	Core Course - VII	Credit: 5	Hours per week:6
CIA	25 Marks	SE	75 Marks

SYLLABUS

(For Students admitted from 2021 onwards)

OBJECTIVES :

- To facilitate a better understanding of vector space.
- To solve problems in algebra

On Completion of this course the students will be able to

Course Outcomes:(CO)	Knowledge Level	Units
CO 1: Identify subspaces, linear transformation and span of a set.	K1,K2,K3,K4	I
CO 2: Analyze Linear independence and dimension of vector spaces	K1,K2,K3,K4	II
CO 3: Classify the types of matrices and algebra of matrices.	K1,K2,K3,K4	III
CO 4:Apply Cayley-Hamilton theorem to solve simultaneous linear equations	K1,K2,K3,K4	IV
CO 5: Examine the concepts of Lattices and Boolean Algebra.	K1,K2,K3,K4	V

UNIT I **Vector Spaces:** Definition and examples–Subspaces–Linear Transformation–Span of a set.

UNIT II **Vector Spaces (continued):** Linear Independence–Basis and Dimension–Rank and Nullity–Matrix of a Linear Transformation.

- UNIT III** **Theory of Matrices:** Algebra of Matrices–Types of Matrices–The Inverse of a Matrix–Elementary Transformations–Rank of a Matrix.
- UNIT IV** **Theory of Matrices (continued):** Simultaneous Linear Equations–Characteristic Equation and Cayley Hamilton Theorem–Eigen Values and Eigen vectors.
- UNIT V** **Lattices:** Introduction – Partially ordered sets – Lattices– Distributive Lattices– Modular Lattices – Boolean Algebras.
- UNIT VI** **Dynamic component meant for experiential learning**
- Inner Product Spaces
 - Definitions and Examples
 - Orthogonality
 - Orthogonal complement.

TEXT BOOK

S.Arumugam and A.Thangapandi Isaac, Modern Algebra, Scitech Publications IndiaPvt. Ltd., Chennai, August 2003.

- | | | | |
|-----------------|------------|-----------|------------|
| UNIT I | Chapter 5: | Sections: | 5.1 to 5.4 |
| UNIT II | Chapter 5: | Sections: | 5.5 to 5.8 |
| UNIT III | Chapter 7: | Sections: | 7.1 to 7.5 |
| UNIT IV | Chapter 7: | Sections: | 7.6 to 7.8 |
| UNIT V | Chapter 9: | Sections: | 9.0 to 9.5 |
| UNIT VI | Chapter 6: | Sections: | 6.0 to 6.3 |

REFERENCE BOOKS

1. **R. Balakrishnan and N.Ramabhadran**, A Text book of Modern Algebra, Edition 3, Vikas Publishing House Pvt. Ltd.,
2. **A.R.Vasistha**, Modern Algebra, Edition 23, Krishna PrakashanMandir.

E Book

3. **Seymour Lipschutz, Marc Lars Lipson**, Linear Algebra, Fourth edition, Schaum's outline series, Mc Graw Hill.



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Programme	Semester	Course Code	Course Title
B.Sc.Mathematics	V		Real Analysis - I
Part :III	Core Course - VIII	Credit: 5	Hours per week:5
CIA	25 Marks	SE	75 Marks

SYLLABUS

(For Students admitted from 2021 onwards)

OBJECTIVES :

- To lay a strong foundation for the real numbers system.
- To understand the concepts of continuity, derivability and Riemann integral

On Completion of this course the students will be able to

Course Outcomes:(CO)	Knowledge Level	Units
CO 1: Analyse field axioms, countable sets and uncountable sets	K3,K1	I
CO 2: List the neighbourhoods, open sets, closed sets and limit points.	K3,K4	II
CO 3: Analyze convergence of sequences, divergence of sequences and Cauchy sequences.	K4,K3	III
CO 4: Apply Cauchy's nth root test and D'Alembert's ratio test to check the convergence of the series.	K3,K2	IV
CO 5: Summarize the concepts of continuity and Uniform continuity	K2,K3,K1	V

UNIT I

Real numbers: Introduction- The Field axioms - Theorems about field properties- order in \mathbb{R} - Absolute value- Completeness- Some important subsets of \mathbb{R} – Representation of real numbers as a point on a straight line- Intervals – Countable and Uncountable sets.

UNIT II **Neighbourhoods and Limit points :** Neighbourhoods - Open sets – Closed sets - Limit points- Closure and interior of a set.

UNIT III **Sequences:** Introduction – Convergent Sequences – Divergent Sequences – Oscillatory Sequences – Bounded Sequences – Some important limit theorems – Cauchy sequences - Monotonic sequences – Cluster points of a sequence – Limit superior and limit inferior of a sequence – Subsequences.

UNIT IV Infinite Series: Introduction – Sequence of partial sums of a series – Convergent series – Cauchy’s general principle of convergence for series – A necessary condition for convergence – Series of positive terms – A fundamental result for series of positive terms – Geometric series – Comparison test – An important comparison series - Cauchy’s nth Root Test – D’Alembert’s Ratio Test

UNIT V Limits and Continuity: Continuous Functions – Types of Discontinuities- Algebra of continuous functions- Boundedness of continuous functions – Intermediate Value theorem – Inverse function theorem- Uniform continuity.

UNIT VI **Dynamic component meant for experiential learning**

- Infinite Series
- Alternating series
- Absolute convergence
- Conditional convergence
- Some tests for series of arbitrary terms
- Limits and Continuity: Limits

TEXT BOOK

1. **M. K. Singal & Asha Rani Singal**, A First Course in Real Analysis, R. Chand & Co, New Delhi, 24th Edition, 2006.

UNIT I	Book1	Chapter 1	Sections 1 to 10
UNIT I	Book1	Chapter 2	Sections 1 to 7
UNIT III	Book1	Chapter 3	Sections 1 to 11
UNIT IV	Book1	Chapter 4	Sections 1 to 12
UNIT V	Book1	Chapter 5	Sections 2 to 8
UNIT VI	Book1	Chapter 4 Chapter 5	Sections 21 to 24 Section 1

REFERENCE BOOKS

1. **S. C. Malik**, Principles of Real Analysis, Third Edition, New Age International Publishers, 2011.
2. **Shanti Narayan**, A Course of Mathematical Analysis, Edition 12, (Revised), 1979, S.Chand & Company Ltd.

E BOOK

3. Introduction to Real Analysis, ROBERT G BARTLE , DONALD R SHERBERT, Third Edition.



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Programme	Semester	Course Code	Course Title
B.Sc.Mathematics	V		Statics
Part :III	Core Course - IX	Credit: 5	Hours per week:5
CIA	25 Marks	SE	75 Marks

SYLLABUS

(For Students admitted from 2021 onwards)

OBJECTIVES :

- To provide a basic knowledge the behavior of various types of forces.
- To give enough work in knowledge to handle practical problems

On Completion of this course the students will be able to

Course Outcomes:(CO)	Knowledge Level	Units
CO 1: Analyse and illustrate the concept of parallel forces and moments	K2,K4	I
CO2: Define couples,Analyse Equilibrium of three forces acting on a rigid body	K1,K3,K4	II
CO 3: Analyse and Explain about the coplanar forces with examples.	K2,K4	III
CO 4: Demonstrate laws of friction ,angle of friction with examples	K2,K3	IV
CO 5: Explain centre of gravity of different geometrical structures like triangle, quadrilateral etc., Analyse equilibrium of strings.	K2,K4	V

UNIT I

Forces acting at a point: Parallelogram of forces - Perpendicular Triangle of forces - The Polygon of forces - Lami's Theorem - Resolution of a force - Conditions of equilibrium.

Parallel forces and Moments : Like and unlike parallel forces – Conditions of equilibrium of three coplanar parallel forces – Moment of a force – Varignon's Theorem of Moments.

- UNIT II** **Couples :** Equilibrium of two couples - Resultant of coplanar couples.
Equilibrium of Three Forces Acting on a Rigid body: Three coplanar Forces – Conditions of Equilibrium – Two trigonometrical theorems.
- UNIT III** **Coplanar forces:** Introduction – Reduction of any number of coplanar forces – Change of the base-point – Equation to the line of action of the resultant – Conditions of equilibrium of a system of coplanar forces.
- UNIT IV** **Friction:** Introduction – Statical, Dynamical and limiting Friction - Laws of Friction –Friction a passive force – Coefficient of Friction – Angle of Friction – Cone of Friction – equilibrium of a particle on a rough inclined plane under a force parallel to the plane – Equilibrium of a body on a rough inclined plane under any force.
- UNIT V** **Centre of Gravity:** Centre of like parallel forces – Centre of Mass or Centre of Inertia – Centre of Gravity – Determination of the centre of gravity in simple cases – Centre of Gravity by symmetry- C. G. of a uniform triangular lamina.
Equilibrium of strings: Uniform string under the action of gravity - Equation of the Common Catenary – Tension at any point -Geometrical properties of the common catenary.
- UNIT VI** **Dynamic component meant for experiential learning**
- Centre of Gravity C.G. of a uniform solid tetrahedron
 - C.G. of a uniform solid pyramid on a plane polygonal base
 - C.G. of solid right circular cone
 - C.G. of a hollow right circular cone without base
 - Centre of Gravity by integration.

TEXT BOOK

Dr.M.K. Venkataraman, Statics, Eighteenth Edition, August 2016, Agasthiar Publications, Trichirappalli.

UNIT I	Chapter 2		(Page No.6 to 51)
	Chapter 3	Section 1 to 13	(Page No. 52 to 71)
UNIT II	Chapter 4		(Page No. 84 to 97)
	Chapter 5	Section 1 to 6	(Page No. 98 to 117)

UNIT III	Chapter 6	Section 1 to 13	(Page No. 143 to 179)
UNIT IV	Chapter 7	Section 1 to 13	(Page No. 206 to 234)
UNIT V	Chapter 8 Chapter 11	Section 1 to 13 Section 1 to 6	(Page No. 270 to 292) (Page No. 375 to 389)
UNIT VI	Chapter 8	Section 14 to 18	(Page No. 292 to 302)

REFERENCE BOOKS

1. **M. L. Khanna**, Statics, Jai Prakash Nath & Co.
2. **K. Viswanatha Naik and M.S. Kasi**, Statics, Emerald Publishers.

E BOOK

3. **J.L.Meriam, L.G.Kraige**, Statics, Seventh edition, John Wiley & Sons.

Instruction to Question paper setter:

Equal weightage may be given to theorems and Problems.



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Programme	Semester	Course Code	Course Title
B.Sc. Mathematics	V		Differential Equations and Fourier Transforms.
Part :III	Core Course - X	Credit: 5	Hours per week:5
CIA	25 Marks	SE	75 Marks

SYLLABUS

(For Students admitted from 2021 onwards)

OBJECTIVES :

- To introduce differential equations and partial differential equations of first and second order.
- To introduce the techniques of finding Laplace transforms and inverse Laplace transforms of real functions and their application in solving ordinary differential equations.
- To learn to express periodic functions as a Fourier series.

On Completion of this course the students will be able to

Course Outcomes:(CO)	Knowledge Level	Units
CO 1: Apply practical rule for solving exact differential equation and rules for finding integrating factor.	K2,K3,K4	I
CO 2: Explain the method of solving linear Differential equations with constant coefficients and simultaneous Differential equations with examples.	K2,K3	II
CO 3: Analyze the method of forming Partial differential equations for various situations and solving partial differential equations.	K3, K4	III
CO 4: Determine the condition for existence of Laplace Transforms and to obtain Laplace transforms of various functions.	K1,K3,K4	IV
CO 5: Classify the Fourier series and Fourier Transforms for different functions.	K2,K3,K4	V

- UNIT I** **Differential Equations of the First Order:** Exact differential equations – Sufficient condition – Practical Rule for solving an exact differential equation – Rules for finding integrating factors.
Linear Differential Equations with Constant Co-efficients: The operators D and D⁻¹- Particular integral – Special methods of finding particular integral – Linear equations with variable co-efficients – Equations reducible to the linear homogeneous equation.
- UNIT II** **Linear Differential Equations with Constant Coefficients (Continued):** Variation of Parameters.
Simultaneous Differential Equations : Simultaneous equations of the first order and first degree – Solutions of $\frac{dx}{P} = \frac{dy}{Q} = \frac{dz}{R}$ -Methods for solving $\frac{dx}{P} = \frac{dy}{Q} = \frac{dz}{R}$ - Geometrical interpretation of $\frac{dx}{P} = \frac{dy}{Q} = \frac{dz}{R}$ - Simultaneous Linear differential equations with constant co-efficients – Total differential equations.
- UNIT III** **Partial Differential Equations:** Derivations of partial differential equations- Elimination of arbitrary constants – Eliminations of arbitrary functions – Different integrals of partial differential equations – standard types of first order equations – Lagrange’s equation – Charpit’s method.
- UNIT IV** **The Laplace Transforms :** Definitions – sufficient conditions for the existence of the Laplace transform – Laplace transform of periodic functions- Some general theorems – The inverse transforms – solutions of ordinary differential equations and evaluation of certain integrals using Laplace transforms.
- UNIT V** **Fourier Transforms :** Complex form of Fourier Integral Formula – Fourier Integral Theorem- Properties of Fourier transform –Fourier Cosine transform-Fourier sine transform-Properties of F_C and F_S– Convolution - Parsival’s Identity.
- UNIT VI** **Dynamic component meant for experiential learning**
- Fourier Series
 - Even and odd functions
 - Properties of odd and even functions
 - Half range Fourier series
 - Development in cosine series
 - Development in sine series.

TEXT BOOK

S. Narayanan, T.K. Manicavachagam Pillay, Calculus Volume III: Differential equation & Fourier Series and Fourier Transforms, S. Viswanathan, Private Ltd. 2007.

UNIT I	Chapter 1	Sections	3.1 to 3.3 and 4
	Chapter 2	Sections	1 to 4 , 8 and 9
UNIT II	Chapter 2	Section	10
	Chapter 3	Sections	1 to 7
UNIT III	Chapter 4	Sections	1 to 7 (Omitting Sections 5.5 and 7.1)
UNIT IV	Chapter 5	Sections	1 to 12
UNIT V	Chapter 6	Sections	9 to 15
UNIT VI	Chapter 6	Sections	1 to 5

REFERENCE BOOKS

1. **M. D. Raisinghania**, Integral Transforms, Edition 2, S. Chand and Company Ltd.
2. **S. Narayanan and T.K. Manickavachagom Pillay**, Differential Equations and its Applications, Viswanathan Pvt.,Ltd.,2006.

E BOOK

3. **M. D. Raisinghania**, Ordinary and partial Differential Equations, Edition 5, S. Chand and Company Ltd, 1997.



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Programme	Semester	Course Code	Course Title
B.Sc.Mathematics	VI		Real Analysis - II
Part :III	Core Course - XI	Credit: 5	Hours per week:6
CIA	25 Marks	SE	75 Marks

SYLLABUS

(For Students admitted from 2021 onwards)

OBJECTIVES :

- To lay a strong foundation for the real numbers system.
- To understand the concepts of continuity, derivability and Riemann integrals.

On Completion of this course the students will be able to

Course Outcomes:(CO)	Knowledge Level	Units
CO 1: Describe partial sum, convergent series and explain Cauchy's general principle of convergence of a series	K1,K2	I
CO 2: Explain and illustrate the concepts of Derivatives	K2,K3	II
CO 3: Explain Rolle's theorem, Lagrange's mean value theorem and demonstrate Cauchy's mean value theorem.	K3,K4	III
CO 4: Summarize the necessary and sufficient condition to estimate extreme values.	K5	IV
CO 5: Analyze and experiment the concept of Riemann integration.	K3,K4	V

UNIT I **Infinite Series:** Raabe's Test – Cauchy's Condensation Test – Another important comparison series – Kummer's Test – Gauss's Test- Bertrand and De Morgan's Test – Maclaurin's Integral Test – Logarithmic Test.

UNIT II **Derivatives:** Introduction- Derivability and continuity - Algebra of derivatives – Inverse Function theorem for derivatives – Darboux's theorem.

UNIT III **Mean Value Theorems:** Rolle's theorem- Lagrange's Mean Value theorem – Cauchy's Mean Value theorem-Taylor's theorem-Taylor's series-Power series expansion of some standard functions.

UNIT IV **Mean Value Theorems(Continued):** Monotone functions **Maxima and Minima:** Introduction – Conditions for existence of extreme values.

UNIT V **Calculus:** Definition of the Riemann integral – Existence of the Riemann integral – Properties of the Riemann integral.

UNIT VI **Dynamic component meant for experiential learning**

- Indeterminate Forms
- The indeterminate form $0/0$
- The indeterminate form ∞/∞
- The indeterminate form $\infty - \infty$
- The indeterminate form $0, \infty$.

TEXT BOOKS

1. **M. K. Singal & Asha Rani Singal**, A First Course in Real Analysis, R. Chand & Co, New Delhi, 24th Edition, 2006.
2. **Richard R. Goldberg**, Methods of Real Analysis, Oxford & IBH publishing Company Private Limited, New Delhi

UNIT I	Book1	Chapter 4	Sections 13 to 20
UNIT II	Book1	Chapter 6	Sections 1 to 5
UNIT III	Book1	Chapter 8	Sections 1 to 6
UNIT IV	Book1	Chapter 8 Chapter 9	Sections 7 Sections 1 to 2
UNIT V	Book2	Chapter 7	Sections 7.2 to 7.4
UNIT VI	Book1	Chapter 10	Sections 1 to 5

REFERENCE BOOKS

1. **S. C. Malik**, Principles of Real Analysis, Third Edition, New Age International Publishers, 2011.
2. **Shanti Narayan**, A Course of Mathematical Analysis, Edition 12, (Revised), 1979, S.Chand & Company Ltd.

E BOOK

3. A course in Calculus and Real Analysis, Sudhir R. Ghorpade and Balmohan V. Limaye, Second Edition.



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Programme	Semester	Course Code	Course Title
B.Sc.Mathematics	VI		Complex Analysis
Part :III	Core Course - XII	Credit: 5	Hours per week:5
CIA	25 Marks	SE	75 Marks

SYLLABUS

(For Students admitted from 2021 onwards)

OBJECTIVES :

- To study the behavior of complex-valued functions
- To train the students in the operative techniques on complex valued functions

On Completion of this course the students will be able to

Course Outcomes:(CO)	Knowledge Level	Units
CO 1: Categorize the Analytical functions and discuss about the Harmonic functions	K1,K2,K4	I
CO 2: Classify the elementary transformations and fixed points of bilinear transformations.	K1,K2,K3,K4	II
CO 3: Apply Cauchy integral formula and Cauchy's theorem on integrals.	K1.K2,K3,K4	III
CO 4: Analyze Taylor's series, Laurent's series, Zeros of analytical functions and singularities.	K2,K3,K4	IV
CO 5: Evaluate residues using Cauchy's residues theorem.	K1,K2,K4,K5	V

- UNIT I** **Analytic functions:** : Functions of a complex variable – Limits – Theorems of limit – Continuous functions – Differentiability – The Cauchy- Riemann Equations - Analytic functions – Harmonic functions - Conformal Mapping.
- UNIT II** **Bilinear transformations** : Elementary transformations –Bilinear transformations – Cross ratio – Fixed points of Bilinear transformations.
Mapping by Elementary Functions: The Mapping $w = z^2$ - The Mapping $w = z^n$ where n is a positive integer- The Mapping $w = e^z$ - The Mapping $w = \sin z$ - The Mapping $w = \cos z$
- UNIT III** **Complex Integration** : Definite integral – Cauchy’s theorem – Cauchy’s integral formula –Higher derivatives.
- UNIT IV** **Series Expansions:**Taylor’s series – Laurent’s series – Zeros of an analytic function – Singularities.
- UNIT V** **Calculus of Residues** : Residues – Cauchy’s Residue theorem – Evaluation of Definite integrals.
- UNIT VI** **Dynamic component meant for experiential learning**
- Power series
 - Sequences and series
 - Sequences and series of functions
 - Power series
 - Elementary functions

TEXT BOOK

Dr. S. Arumugam, A. Thangapandi Issac and S. Somasundaram, Complex Analysis, Sixth Reprint – Jan. 2016, Scitech Publication (India) Pvt. Ltd., Chennai

UNIT I	Chapter 2	Sections	2.1 to 2.9
UNIT II	Chapter 3	Sections	3.1 to 3.4
	Chapter 5	Sections	5.1 to 5.5
UNIT III	Chapter 6	Sections	6.1 to 6.4
UNIT IV	Chapter 7	Sections	7.1 to 7.4
UNIT V	Chapter 8	Sections	8.1 to 8.3
UNIT VI	Chapter 4	Sections	4.1 to 4.4

REFERENCE BOOKS

1. **J. N. Sharma**, Functions of a Complex Variable, Fifteenth Revised and Enlarged Edition 1988, Published by Krishna PrakashanMandir, Meerut.
2. **M.L.Khanna**, Functions of a Complex Variable, Edition 3, Published by S.V. Nath – Jai PrakashNath& Co. Meerut, 1984.

E BOOK

3. **Elias M.Stein &Rami Shakarachi**, Complex Analysis (Princeton Lecturers in Analysis, Volume-II), Princeton University, Edition 2003



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Programme	Semester	Course Code	Course Title
B.Sc.Mathematics	VI		Dynamics
Part :III	Core Course - XIII	Credit: 5	Hours per week:5
CIA	25 Marks	SE	75 Marks

SYLLABUS

(For Students admitted from 2021 onwards)

OBJECTIVES :

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

On Completion of this course the students will be able to

Course Outcomes:(CO)	Knowledge Level	Units
CO 1: Analyse relative ,angular velocity,Define and calculate moment of inertia in particular cases using parallel axes and perpendicular axes theorem.	K1,K3,K4	I
CO 2: Analyse and Discuss about projectiles, path, range of a projectile and range on an inclined plane.	K2,K3	II
CO 3: Analyze and explain about collision of elastic bodies, impact of two bodies and loss of kinetic energy .	K1,K2,K4	III
CO 4: Explain the motion under the action of central forces, find the pedal equation for some curves.	K1,K2,K4	IV
CO 5: Analyse and Discuss about simple harmonic motion,demonstrate the motion of a rigid body about a fixed axis.	K2,K3	V

UNIT I

Kinematics: Relative velocity - Angular Velocity – Acceleration.

Moment of Inertia: Definition – The theorem of parallel axes – The theorem of perpendicular axes – Moments of Inertia in some particular cases – Dr. Routh’s Rule – Equipmental Systems.

- UNIT II** **Projectiles:** Definitions - Two fundamental Principles – The path and Range of a Projectile – Range on an inclined plane.
- UNIT III** **Collision of Elastic Bodies:** Introduction – Definitions - Fundamental Laws of Impact – Direct impact and oblique impact of two smooth spheres.
- UNIT IV** **Motion under the action of central forces:** Introduction – Velocity and acceleration in polar co-ordinates – Motion under a central force – Differential equation of central orbits – pedal equation of some of the well-known curves – Apses and apsidal distances – Given the law of force to the pole, to find the orbit – Law of the inverse square – Law of the inverse Cube.
- UNIT V** **Simple Harmonic Motion:** Introduction – S.H.M.in a straight line – General solution of the S.H.M. equation.
Motion of a rigid body about a fixed Axis: Introduction – Kinetic energy and Angular Momentum of a rigid body – principle of Energy – The Compound Pendulum – Centres of suspension and oscillation – Motion of a flywheel acted on by a couple – Torsional vibrations.
- UNIT VI** **Dynamic component meant for experiential learning**
- Impulsive Forces
 - Impulse
 - Impact of two bodies
 - Loss of Kinetic Energy in Impact
 - Motion of a shot and gun
 - Impact of water on a surface.

TEXT BOOK

Dr. M. K. Venkataraman, Dynamics, Eighteenth Edition, Agasthiar Publications, 2017.

UNIT I	Chapter 3 Chapter 12	Sections	3.10 to 3.31	Page no.29 to 69
UNIT II	Chapter 6	Sections	6.1 to 6.16	Page no.139 to 184
UNIT III	Chapter 8			
UNIT IV	Chapter 11			
UNIT V	Chapter 10 Chapter 13	Sections	10.1 to 10.7	Page no.309 to 330
UNIT VI	Chapter 7			

REFERENCE BOOKS

1. **K. Viswanatha Naik and M.S. Kasi**, Dynamics, Emerald Publishers.
2. **A.V. Dharmapadam**, Dynamics, S. Viswanathan Pvt. Ltd.

E BOOK

3. **J.L.Meriam, L.G.Kraige** , Dynamics, John Wiley & Sons.

Instruction to Question paper setter

Equal weightage may be given for theory and problems.



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First Allied Course offered by Department of Mathematics to the students of Commerce

Programme	Semester	Course Code	Course Title
B.Com.	I		Business Mathematics
Part : III	First Allied Course I	Credit: 3	Hours per week: 4
CIA	25 Marks	SE	75 Marks

SYLLABUS

(For Students admitted from 2021 onwards)

OBJECTIVES:

- To expose the students to various techniques of differentiation and integration.
- To make students solve real life problem in Business Mathematics.

On completion of this course the students will be able to

Course Outcomes:(CO)	Knowledge Level	Units
CO1: Examine the concept of derivatives for maxima and minima	K1,K2,K3,K4	I
CO2: Analyse the rate of change in business and economics	K3,K4	II
CO3: Illustrate the methods to test the consistency of a system of simultaneous linear equations	K2,K3,K4	III
CO4: Identify finance and economics problems mathematically	K1,K2,K3,K4	IV
CO5: Construct a linear programming problem and solve using simplex method	K1,K2,K4,K5	V

- UNIT I** **Series:** Arithmetic progression – Geometric progression – Harmonic Progression.
Derivatives: Uses of derivatives – Marginal concepts – Elasticities- Increasing and Decreasing functions – Maxima and Minima – L Hospital's rule.
- UNIT II** **Integration:** Indefinite integrals – Standard Forms – Determination of 'C' – Definite integrals – Method of substitution – Method of partial fractions – Method of Integration by parts – Uses in Economics – Consumers and Producers surplus.
- UNIT III** **Matrices and Determinants:** Definition of Matrix – Types of Matrices – Matrix Operation I – System of Linear Equation – Determinants Matrix Operation II – Rank - Consistency of a system of simultaneous Linear equation – Input – Output Analysis.
- UNIT IV** **Mathematics of Finance:** Basic concepts – Simple Interest and Compound Interest – Simple Interest – Formulae and Problems – Compound Interest – Formulae and Problems – Effective Rate and Nominal Rate of Interest – Depreciation – Annuities – Sinking Fund – Amortization Table – Discounting.



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First Allied Course offered by Department of Mathematics to the students of Commerce

Programme	Semester	Course Code	Course Title
B.Com.	II		Business Statistics
Part : III	First Allied Course II	Credit: 3	Hours per week: 4
CIA	25 Marks	SE	75 Marks

SYLLABUS

(For Students admitted from 2021 onwards)

OBJECTIVES:

- To make the students gain knowledge in statistics and to solve real life problems.
- To analyze and compare results by different methods.

On completion of this course the students will be able to

Course Outcomes:(CO)	Knowledge Level	Units
CO1: Determine all measures of central tendencies for raw and grouped data	K1,K2,K3,K4	I
CO2: Analyse Measures of Dispersion	K2,K3,K4	II
CO3: Calculate regression and correlation for forecasting	K2,K3,K4	III
CO4: Analyse Statistics in business problems and finding their inference	K1,K2,K4	IV
CO5: Inspect appropriate Statistical techniques for business data	K1,K2,K3,K4	V

UNIT I **Measures of Central Tendency:** Mean-Median-Mode- Geometric Mean-Harmonic Mean -Positional Measures.

UNIT II **Measures of Dispersion:** Range-Quartile deviation-Mean deviation-Standard deviation- coefficient of variation- Variance- Skewness - Moments - Kurtosis.

UNIT III **Simple correlation and Regression:** Types of correlation –Scatter diagram-Karl Pearson’s co-efficient of correlation –Rank correlation-Simple Linear Regression- Properties of regression lines and co-efficients.

UNIT IV **Method of least squares and Time Series:** Principles of least squares –Fitting of a straight line –Analysis of Time series –Components-Seasonal fluctuations.

UNIT V **Index Numbers:** Characteristics of Index numbers –General problems in the construction of Index numbers-Tests of consistency and Adequacy - cost of living Index –Deflating base shifting- splicing.

UNIT VI **Dynamic component meant for experiential learning**

- Probability
- Relative Frequency approach
- Axiomatic approach- Method I
- Factorial
- Permutation
- Combination.

TEXT BOOK

P.A.Navnitham, Business Mathematics and Statistics, Jai Publishers, Trichy. June 2008, (Part II: Business Mathematics)

UNIT I	Chapter:	7	Page No:159-180,196-208,212-226, 271-282.
UNIT II	Chapters:	8 9	Page No:301-348,368 – 373 Page No:396-429
UNIT III	Chapters:	12 13	Page No:503-517 Page No:540-569
UNIT IV	Chapters:	11 14	Page No:496-501 Page No:579-612
UNIT V	Chapter:	10	Page No:444-466
UNIT VI	Chapter:	16	Page No: 654- 669

REFERENCE BOOKS

1. **P.R.Vittal** Business Mathematics and Statistics, Third Enlarged Edition1996, Margham Publications, Madras- 600 018.
2. **R.S.N.Pillai and V.Bagavathy**, statistics seventeenth edition 1984, S.Chand & Company Ltd. NewDelhi-110055

E BOOK

3. <https://www.pdfdrive.com/business-mathematics-and-statistics-sixth-edition-e10525973.html>

Andre francis, Business Mathematics and Statistics,Sixth edition, published by Thomson learning 2004.



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First Allied Practical offered by Department of Mathematics to the students of Commerce

Programme	Semester	Course Code	Course Title
B.Com.	I, II		Practical Mathematics for Commerce
Part : III	First Allied Practical	Credit: 3	Hours per week: 2
CIA	40 Marks	SE	60 Marks

SYLLABUS

(For Students admitted from 2021 onwards)

OBJECTIVES:

- To make students solve real life problems in Business and Management.
- To give enough working knowledge to handle practical problems.

On completion of this course the students will be able to

Course Outcomes:(CO)	Knowledge Level
CO1: Discuss the applications of Geometric Mean and Harmonic Mean	K2
CO2: Examine the consistency of a given data	K4
CO3: Apply correlation analysis for forecasting	K3
CO4: Explain input and output analysis using matrix	K5
CO5: Use statistical analysis in cost of living index	K3

Problem solving methods on

1. Mean, Median and Mode
2. Geometric Mean
3. Harmonic Mean
4. Quartile deviation

5. Mean deviation from mean
6. Mean deviation from median
7. Mean deviation from mode
8. Standard deviation
9. Coefficient of variation
10. Rank correlation
11. Two Regression lines
12. Graphical Method
13. Simplex Method
14. Input – Output Analysis using matrix
15. Cost of living Index



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Second Allied Course offered by Department of Mathematics to the students of Chemistry/
Physics

Programme	Semester	Course Code	Course Title
B.Sc. Chemistry/ Physics	III		Allied Mathematics – I
Part : III	Second Allied Course I	Credit: 3	Hours per week: 4
CIA	25 Marks	SE	75 Marks

SYLLABUS

(For Students admitted from 2021 onwards)

OBJECTIVES:

- To impart the knowledge of applications of mathematics in their respective fields.
- To develop analytical thinking to solve problems.

On completion of this course the students will be able to

Course Outcomes:(CO)	Knowledge Level	Units
CO1: Discuss the nature of roots and solve equations	K1, K3, K4	I
CO2: Apply Leibnitz formula to determine n th derivative of a product	K1, K2, K3, K4	II
CO3: Discover radius of curvature, Evolute and Involute	K1, K2, K3, K4	III
CO4: Determine Fourier Series for different functions	K2, K3, K4	IV
CO5: Determine Fourier Series for different functions applying the change of interval	K2, K3, K4	V

UNIT I **Theory of Equations:** Nature of Roots-Relation between the coefficients and the roots of an algebraic equation-Transformation of equations.

UNIT II **Differential Calculus:** Higher derivatives – The nth derivative – standard results – Trigonometrical transformation – Formation of equations involving derivatives – Leibnitz formula for the nth derivative of a product (Omitting a complete formal proof by induction) - Jacobian

UNIT III **Differential Calculus (Continued): Curvature :** Curvature – circle, radius and centre of curvature – Cartesian formula for the radius of curvature – The co-ordinates of the centre of curvature - Evolute and Involute.

UNIT IV **Fourier Series:** Fourier series - Even and odd functions - Properties of odd even functions - Half range Fourier series

UNIT V **Fourier Series (Continued):** Development in cosine series - Development in sine series – Change of Interval

UNIT VI **Dynamic component meant for experiential learning**

- Integration
- Properties of definite integrals
- Integration by parts – Reduction formulae
- Integration of the type $\int e^{ax} \cos bx \, dx$ (a and b are constants)
- Bernoulli's Formula.

TEXT BOOKS

1. **S. Narayanan, R. Hanumantha Rao and T.K. Manicavachagom Pillay**, Ancillary Mathematics – Volume I, Edition 2011, S. Viswanathan Pvt. Ltd.
2. **S. Narayanan, R. Hanumantha Rao and T.K. Manicavachagom Pillay**, Ancillary Mathematics, Volume II, Edition 2013, S. Viswanathan Pvt. Ltd.

UNIT I	Book 1	Chapter 2	Sections: 2.1 to 2.3
UNIT II	Book 1	Chapter 6	Sections: 6.1 & 6.2
UNIT III	Book 1	Chapter 6	Section : 6.4 (pages: 296-310)
UNIT IV	Book 2	Chapter 2	Sections: 1 to 4
UNIT V	Book 2	Chapter 2	Sections: 5.1, 5.2, 6
UNIT VI	Book 2	Chapter 1	Sections: 11 to 15

REFERENCE BOOKS

1. **T.K. Manicavachagom Pillay and S. Narayanan**, Calculus : Volume -1, S. Viswanathan Pvt. Ltd., 2007.
2. **S. Narayanan and T.K. Manicavachagom Pillay**, Calculus: Volume – II, S. Viswanathan Pvt. Ltd., 2007.

E BOOK

3. **Sean Mauch**, Advanced Mathematical Methods for Scientists and Engineers, March 19, 2003, Mauch Publishing Company
<https://www.pdfdrive.com/introduction-to-methods-of-applied-mathematics-or-advanced-mathematical-methods-for-scientists-d18669693.html>



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Second Allied Course offered by Department of Mathematics to the students of Chemistry/
Physics

Programme	Semester	Course Code	Course Title
B.Sc. Chemistry/ Physics	IV		Allied Mathematics – II
Part : III	Second Allied Course II	Credit: 3	Hours per week: 4
CIA	25 Marks	SE	75 Marks

SYLLABUS

(For Students admitted from 2021 onwards)

OBJECTIVES:

- To impart the knowledge of applications of mathematics in their respective fields.
- To give enough working knowledge to handle practical problems.

On completion of this course the students will be able to

Course Outcomes:(CO)	Knowledge Level	Units
CO1: Calculate the complementary function and particular integral of Differential Equations	K ₁ , K ₃ , K ₄	I
CO2: Determine the solutions of partial differential equations	K ₁ , K ₂ , K ₃	II
CO3: Solve differential equations using Laplace Transformation.	K ₁ , K ₂ , K ₄	III
CO4: Analyze the Physical applications of Differentiation of Vector Functions.	K ₁ , K ₂ , K ₃ , K ₄	IV
CO5: Analyze the coordinate system and plane.	K ₂ , K ₂ , K ₃	V

UNIT I Differential Equations: Linear equations with constant coefficients : Definitions – The Operators D and D⁻¹ – Complementary function – Particular integral – Special methods for finding particular integral

UNIT II Partial Differential Equations: Introduction – Derivation of partial differential equations – Elimination of arbitrary constants and arbitrary functions – Different integrals of partial differential equations – Solutions of partial differential equations in some simple cases – Standard type of first order equations.

UNIT III **Laplace Transforms:** Definition – Results – Some general theorems – The Inverse Transform – Results of Inverse Laplace Transform – Solution of ordinary differential equations using Laplace Transformation.

UNIT IV **Vector Analysis: Differentiation of vector functions:** Physical applications - Level Surfaces –Vector Differential Operator- Gradient–Direction and Magnitude of Gradient- Divergence and curl.

UNIT V **Vector Analysis (Continued): Integration of vectors:** Line Integral - Volume Integral - Surface Integral - Evaluation of surface integral.

UNIT VI **Dynamic component meant for experiential learning**

- Analytical Geometry of Three Dimensions
- Co-ordinate System
- Rectangular Cartesian Co-ordinates
- Distance between two points
- Direction Cosines
- Planes
- Equation of a plane
- Angle between two planes
- Angle bisector of two planes

TEXT BOOKS

1. **S. Narayanan and T.K. Manicavachagom Pillay**, Calculus – Volume III, Edition 2007, S. Viswanathan Pvt. Ltd.
2. **S. Narayanan, R. Hanumantha Rao and T.K. Manicavachagom Pillay**, Ancillary Mathematics, Volume II, Edition 2013, S. Viswanathan Pvt. Ltd.
3. **Dr. S. Arumugam and A.Thangapandian Issac**, Analytical Geometry 3D and Vector Calculus, Edition 2003, New Gamma Publishing House

UNIT I Book 1 Chapter 2 Sections: 1 to 4

UNIT II Book 2 Chapter 6 Section : 1 to 5

UNIT III Book 2 Chapter 7 Sections: 1 to 6

UNIT IV Book 2 Chapter 8 Sections: 14 to 20

UNIT V Book 2 Chapter 8 Sections: 1 to 5 (page No. 363 to 381)

UNIT VI Book 3 Chapter 1 Sections: 1.1 to 1.3

Chapter 2 Sections: 2.1 to 2.3

REFERENCE BOOKS

- 1 **T.K. Manicavachagom Pillay and T. Narayanan**, A text Book of Analytical Geometry, Part II (Three Dimensions), Reprint 2007, S.Viswanathan Pvt.ltd.
- 2 **H. K. Dass**, Advanced Engineering Mathematics, S. Chand and Company. Ltd., 1992

E BOOK

Sean Mauch, Advanced Mathematical Methods for Scientists and Engineers, March 19, 2003, Mauch Publishing Company

<https://www.pdfdrive.com/introduction-to-methods-of-applied-mathematics-or-advanced-mathematical-methods-for-scientists-d18669693.html>



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Second Allied Practical offered by Department of Mathematics to the students of Chemistry/ Physics

Programme	Semester	Course Code	Course Title
B.Sc. Chemistry/ Physics	III, IV		Practical Mathematics
Part : III	Second Allied Practical	Credit: 3	Hours per week: 2
CIA	40 Marks	SE	60 Marks

SYLLABUS

(For Students admitted from 2021 onwards)

OBJECTIVES:

- To impart the knowledge of applications of mathematics in their respective fields.
- To give enough working knowledge to handle practical problems.

On completion of this course the students will be able to

Course Outcomes:(CO)	Knowledge Level
CO1: Define radius of curvature, Evolute and Involute	K1
CO2: Formulate Fourier Series for different functions	K5
CO3: Evaluate the solution of Partial Differential Equations	K4
CO4: Compute solution of differential equations using Laplace Transformation	K2
CO5: Classify the Physical applications of Differentiation of Vector Functions	K3

Problem solving methods on

1. Nature of Roots
2. Transformation of equations
3. Higher derivatives

4. Radius of curvature
5. Co-ordinates of centre of curvature
6. Evolute and Involute
7. Half range Fourier series
8. Special methods for finding particular integral
9. Solutions of partial differential equations
10. Solution of ordinary differential equations using Laplace Transformation
11. Solenoidal vectors
12. Irrotational vectors
13. Line Integral
14. Volume Integral
15. Surface Integral



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Second Allied Course offered by Department of Mathematics to the students of Computer Science

Programme	Semester	Course Code	Course Title
B.Sc. Computer Science	III		Numerical And Statistical Methods
Part : III	Second Allied Course I	Credit: 3	Hours per week: 4
CIA	25 Marks	SE	75 Marks

SYLLABUS

(For Students admitted from 2021 onwards)

OBJECTIVES:

- To introduce iterative methods for solving linear algebraic equations and interpolating polynomials.
- To introduce iterative methods for solving linear algebraic equations and interpolating polynomials.

On completion of this course the students will be able to

Course Outcomes:(CO)	Knowledge Level	Units
CO1: Evaluate numerical solution for Algebraic and Transcendental Equations	K2,K3&K4	I
CO2: Describe numerical differentiation and integration	K1,K3	II
CO3: Discuss the numerical solution of ordinary differential equations	K2,K3	III
CO4: Analyze the correlation and regression	K4,K5	IV
CO5: Explain the fitting of Binomial,Poission and Normal distributions	K2,K3	V

UNIT I

Solution of Algebraic and Transcendental Equations: Introduction- Bisection Method –Method of false position – Iteration Method – Newton Raphson Method.

Interpolation : Introduction – Finite differences – Forward differences, Backward differences – Newton’s formulae for interpolation.

UNIT II

Numerical Differentiation And Integration :Introduction – Numerical

Differentiation – Numerical Integration – Trapezoidal rule – Simpson's $\frac{1}{3}$
 rule- Simpson's $\frac{3}{8}$ rule-Romberg Integration

UNIT III Numerical Solutions of Ordinary Differential Equations :Introduction – Solution by Taylors's series – Picards Method of successive approximations – Euler's method – Runge Kutta Methods.

UNIT IV Correlation and Regression: Introduction – Correlation – Rank Correlation – Regression – Correlation Co-efficient for a Bivariate frequency distribution.

UNITV Some Special Distributions: Introduction –Fitting of Binomial distribution –Fitting of Poisson distribution -Fitting of normal distribution((Theorem statements only)

UNIT VI Dynamic component meant for experiential learning

- Numerical Linear Algebra
- Gaussian Elimination method
- Necessity for Pivoting
- Gauss Jordan method.

TEXT BOOKS

1. **S.S. Sastry**, Introductory Methods of Numerical Analysis, Edition 5, June 2012, Prentice Hall of India Private Ltd. New – Delhi.
2. **Dr. S. Arumugam and A. ThangapandiIssac**, 'Statistics', Edition June 2004, New Gamma Publishing House, Palayamkottai.

UNIT I	BOOK 1	Chapter 2	Sections	2.1 to 2.5
		Chapter 3	Sections	3.1, 3.3, 3.3.1, 3.3.2, 3.6, 3.9.1.
UNIT II	BOOK 1	Chapter 6	Sections	6.1 , 6.2 (Excluding 6.2.1, 6.2.2), 6.4, 6.4.1, 6.4.2, 6.4.3.6.4.4,6.4.6

UNIT III	BOOK 1	Chapter 8	Sections	8.1 to 8.5(Excluding 8.4.1 and 8.4.2) and 8.5
UNIT IV	BOOK 2	Chapter 6		
UNIT V	BOOK 2	Chapter 13	Sections	13.1(Page.no 350-356) 13.2 (Page.no 365-369) 13.3(Page.no 380-389)
UNIT VI	BOOK 1	Chapter 7	Sections	7.5.1,7.5.2,7.5.3

REFERENCE BOOKS

1. **Dr. B.C. Goel and Dr. S.K. Mittal**, Numerical Analysis, Numerical Analysis, Pragati Prakashan Publishers, Tenth edition, 1994.
2. **S.C. Gupta and V.K. Kapoor**, Fundamentals of Mathematical Statistics, Edition 10 (Revised), August 2000, Sultan Chand and Sons

E-BOOK

3. **G.V. Milovanovic, D. R. Dordevic**, Numerical Methods in Computational Engineering



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Second Allied Course offered by Department of Mathematics to the students of Computer Science

Programme	Semester	Course Code	Course Title
B.Sc. Computer Science	IV		Operations Research
Part : III	Second Allied Course II	Credit: 3	Hours per week: 4
CIA	25 Marks	SE	75 Marks

SYLLABUS

(For Students admitted from 2021 onwards)

OBJECTIVES:

- To introduce the various techniques of Operation Research.
- To make students solve real life problems in Business and Management.

On completion of this course the students will be able to

Course Outcomes:(CO)	Knowledge Level	Units
CO1: Explain LPP, the formulation and its graphical solution	K2,K3	I
CO2: Evaluate LPP using simplex algorithm	K3,K4	II
CO3: Construct transportation problem as LPP and solve by MODI method	K3,K4&K5	III
CO4: Describe the Hungarian Assignment method	K2,K3	IV
CO5: Compare PERT and CPM	K3,K4&K5	V

UNIT I **Linear Programming Problem:** Introduction- Linear programming Problem - Mathematical formulation of the problem - Graphical Solution method – General Linear Programming Problem – Canonical and Standard Forms of L.P.P.

UNIT II **Linear Programming – Simplex Method:** Introduction – Fundamental Properties of Solutions (Theorem Statements only) - The Computational Procedure –Use of Artificial Variables - Degeneracy in Linear Programming.

UNIT III **Transportation Problem:** Introduction – LP formulation of the Transportation Problem – Existence of Solution in T.P. (Theorem Statements only) - The transportation Table – Loops in Transportation tables – Finding an initial basic feasible Solution – Test for Optimality – Transportation Algorithm (MODI Method)

UNIT IV **Assignment Problem:** Introduction - Mathematical Formulation of the Problem (Theorem Statements only) - Solution Methods of Assignment Problem (Hungarian Assignment method only)-The Travelling Salesman Problem

Games and Strategies: Introduction – Two-person zero-sum Games – Some Basic Terms – The Maximin – Minimax Principle - Games without Saddle points – Mixed Strategies – Graphic Solution of $2 \times n$ and $m \times 2$ Games.

UNIT V **Network Scheduling By Pert \CPM:** Introduction – Network: Basic Components – Rules of Network Constructions – Concurrent Activities – Critical Path Analysis – Probability Considerations in PERT – Distinction between PERT and CPM

UNIT VI **Dynamic component meant for experiential learning**

- Games and Strategies
- Dominance property
- General Solution of $m \times n$ Rectangular Games.

TEXT BOOK

Kantiswarup, P.K. Gupta and Manmohan, Operations Research, Thirteenth Edition – 2007, Published by Sultan Chand & Sons.

UNIT I	Chapter 2 Chapter 3	Sections Sections	2.1, 2.2(page no.: 39 to 46) and 2. 3 3.2,3.4,3.5
UNIT II	Chapter 4	Sections	4.1 to 4.5
UNIT III	Chapter 10	Sections	10.1 to 10.3(Theorem Statements only) 10.5, 10.6, 10.9, 10.10, 10.13
UNIT IV	Chapter 11 Chapter 17	Sections Sections	11.1 to 11.3, 11. 17.1 to 17.6
UNIT V	Chapter 25	Sections	25.1 , 25.2 , 25.4 to 25.8
UNIT VI	Chapter 17	Sections	17.7 and 17.9

REFERENCE BOOKS

1. **B.S. Goel and S.K Mittal,** Operations Research
2. **D.S. Hira and P.K. Gupta,** Operations Research

E BOOK

3. **P. RamMoorthy,** Operations Research, New Age International (P) Limited, Publishers, www.newagepublishers.com



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Second Allied Practical offered by Department of Mathematics to the students of Computer Science

Programme	Semester	Course Code	Course Title
B.Sc. Computer Science	III, IV		Practical Mathematics for Computer Science
Part : III	Second Allied Practical	Credit: 3	Hours per week: 2
CIA	40 Marks	SE	60 Marks

SYLLABUS

(For Students admitted from 2021 onwards)

OBJECTIVES:

- To introduce the various techniques of Operation Research.
- To make students solve real life problems in Business and Management.

On completion of this course the students will be able to

Course Outcomes:(CO)	Knowledge Level
CO1: Explain numerical integration using Trapezoidal Rule and Euler's Method	K2
CO2: Calculate Correlation coefficient for a bivariate frequency distribution	K4
CO3: Apply simplex method to the solutions of simultaneous linear equations and inverse of a matrix	K3
CO4: Describe stepping stone solution method	K1
CO5: Modify special cases of assignment problems	K5

Problem solving methods

1. Bisection Method
2. Method of False Position
3. Newton Raphson method

4. Newton's Formula for interpolation
5. Numerical differentiation
6. Numerical integration
7. Trapezoidal Rule
8. Simpson's Rule
9. Correlation coefficient for a bivariate frequency distribution
10. Simplex method
11. Transportation Problems
12. Assignment Problems
13. Two-person zero-sum games
14. CPM
15. PERT



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Programme	Semester	Course Code	Course Title
B.Sc Mathematics	V		Discrete Mathematics
Part : III	MBE I (Optional)	Credit: 4	Hours Per Week:5
CIA	25 Marks	SE	75 Marks

SYLLABUS

(For Students admitted from 2021 onwards)

OBJECTIVES:

- To introduce basic concepts of logic and lattices.
- To lay a foundation on Boolean algebra.

On Completion of this course the students will be able to

Course Outcomes:(CO)	Knowledge Level	Units
CO1: Define the basic concepts of logics.	K1	I
CO2: Describe the concepts of predicate calculus.	K1	II
CO3: Explain lattices and the properties of Lattices.	K4	III
CO4: Explain Boolean Algebras, Boolean polynomials and Karnaugh maps.	K4	IV
CO5: Solve the recurrence relations.	K3	V

UNIT I

Foundations: Logic - connectives - predicates and Quantifiers– Methods of proof-Basics of counting-Addition and multiplication principles- Integers and induction-Well-ordering principle-Division in Z-Fundamental theorem of Arithmetic-Modular Arithmetic-Principle of mathematical Induction and Pigeonhole Principle-Pigeonhole Principle.

UNIT II

Predicate Calculus: Well-formed Formulas-Truth Table of Well-Formed Formula-Tautology, contradiction and contingency-Equivalence of Formulas-Algebra of Propositions-Quine Method- Functionally Complete sets-Normal Forms of Well-Formed Formulas-Rules of Inference for Propositional Calculus-Well-Formed Formulas of Predicate Calculus- Rules of Inference for Predicate calculus –

Predicate Formulas involving Two or More Quantifiers.

UNIT III **Lattices:** Definitions and examples-Properties of Lattices-Lattices as algebraic systems-Sub Lattices and Lattice isomorphism-Special classes of Lattice-Distributive Lattices and Boolean algebras.

UNIT IV **Boolean Algebras:** Boolean algebra as Lattice- Boolean algebra as an algebraic system-Properties of Boolean algebra-Sub algebras and homomorphisms of Boolean algebras-Boolean functions-Boolean expressions-Sum of products canonical form.

UNIT V **Boolean Algebras(Continued):** Values of Boolean Expressions and Boolean Functions-Switching Circuits and Boolean Functions-Half- Adders and Full- Adders- Representation and minimization of Boolean functions: Representation by Karnaugh maps-Minimization of Boolean Function using Karnaugh maps -Representation of Boolean functions in CUBE notation - Quine-McCluskey Algorithm for Minimization of Boolean functions- Quine-McCluskey Algorithm on Computer-Don't care conditions.

UNIT VI **Dynamic component meant for experiential learning**

- Formulation as Recurrence Relations
- Solving Recurrence Relation by Iteration
- Solving Recurrence Relations
- Solving Linear Homogeneous Recurrence Relations of Order Two
- Solving Linear Nonhomogeneous Recurrence Relations.

TEXT BOOK

N. Chandrasekaran & M.Umaparvathi, Discrete Mathematics, PHI Learning Private Limited, Edition 2010.

UNIT I	Chapter 1	Sections: 1.1,1.2, 1.6 to 1.8
UNIT II	Chapter 2	Pages 101-131
UNIT III	Chapter 8	Pages 411-423
UNIT IV	Chapter 9	Sections: 9.1 to 9.4,9.5: 9.5.1 & 9.5.2
UNIT V	Chapter 9	Sections: 9.5: 9.5.3 to 9.5.5 & 9.6
UNIT VI	Chapter 6	Sections: 6.1 to 6.5

REFERENCE BOOKS

1. **J.P.Tremblay,R.Manohar**, Discrete Mathematical Structures With Applications to Computer Science , Tata McGraw-Hill Publishing company Ltd.,Edition 1997
2. **V.Sundaresan, K.S. Ganapathy Subramanian,K.Ganesan**, Discrete Mathematics, A.R. Publications,3rd Edition 1999

E BOOK

3. <https://www.pdfdrive.com/schaums-outline-of-discrete-mathematics-third-edition-schaums-e6841453.html>



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Programme	Semester	Course Code	Course Title
B.Sc Mathematics	V		Graph Theory
Part : III	MBE I	Credit: 4	Hours Per Week:5
CIA	25 Marks	SE	75 Marks

SYLLABUS

(For Students admitted from 2021 onwards)

OBJECTIVES:

- To give introduction to the basic concepts of graph theory.
- To study applications of graph theory.

On Completion of this course the students will be able to

Course Outcomes:(CO)	Knowledge Level	Units
CO1: Analyze the concepts of connected graphs, disconnected graphs, Euler's graphs, Hamiltonian paths and circuits.	K1,K2,K4	I
CO2: Describe trees, fundamental circuits, cuts and cut vertices.	K1,K2,K3,K4	II
CO3: Explain knowledge in planar graphs.	K1,K2,K3,K4	III
CO4: Describe incidence matrix, cut set matrix, path matrix and adjacency matrix.	K1,K2,K3,K4	IV
CO5: Explain digraph, paths and connections.	K1,K2,K3,K4	V

UNIT I

Graphs And Subgraphs: Introduction – Definition and Examples – Degrees – Subgraphs – Isomorphism – Independent Sets and Coverings- Intersection Graphs and Line Graphs-Matrices – Operations on Graphs.

UNIT II

Degree Sequences: Introduction-Degree Sequences-Graphic Sequences

Connectedness: Introduction – Walks, Trails and Paths – Connectedness and Components – Blocks- Connectivity.

- UNIT III** **Eulerian And Hamiltonian Graphs:** Introduction – Eulerian Graphs – Hamiltonian Graphs.
Trees: Introduction – Characterisation of Trees – Centre of a Tree.
- UNIT IV** **Planarity:** Introduction – Definition and properties – Characterization of planar Graphs - Thickness, Crossing and Outer Planarity.
- UNIT V** **Directed Graphs:** Introduction – Definitions and Basic properties – Paths and Connections- Digraphs and Matrices- Tournaments.
- UNIT VI** **Dynamic component meant for experiential learning**
- The Konigsberg Bridge problem
 - Four colour problem
 - Graph Theory in India
 - Connector Problem
 - Shortest Path Problem.

TEXT BOOK

S. Arumugam and S. Ramachandran, Invitation to Graph Theory, Reprint June 2019, Scitech publications (India) Pvt. Ltd.

UNIT I	Chapter 2	Sections 2.0 to 2.4, 2.6 to 2.9 .
UNIT II	Chapter 3	Sections 3.0 to 3.2
	Chapter 4	Sections 4.0 to 4.4
UNIT III	Chapter 5	Sections 5.0 & 5.2
	Chapter 6	Sections 6.0 & 6.2
UNIT IV	Chapter 8	Sections 8.0 & 8.3
UNIT V	Chapter 10	Sections 10.0 to 10.4
UNIT VI	Chapter 1	Sections 1.1 to 1.3
	Chapter 11	Sections 11.1 & 11.2

REFERENCE BOOKS

1. **Narsingh Deo**, Graph Theory with Applications to Engineering and Computer Science, Prentice-Hall of India Pvt. Ltd New Delhi – 110 001, 2011.
2. **F. Harary**, Graph Theory, Narosa Publishing House, New Delhi, 1988.

E book

3. **Robin J. Wilson**, Introduction to Graph Theory , Fourth edition, Addison Wesley Longman Limited.



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Programme	Semester	Course Code	Course Title
B.Sc Mathematics	VI		Astronomy
Part : III	MBE II (Optional)	Credit: 4	Hours Per Week:5
CIA	25 Marks	SE	75 Marks

SYLLABUS

(For Students admitted from 2021 onwards)

Objectives:

- To introduce the exciting world of Astronomy to the students.
- To understand the movements of celestial objects.

On Completion of this course the students will be able to

Course Outcome: (CO)	Knowledge Level	Units
CO1: Explain Celestial sphere and Diurnal Motion	K3	I
CO2: Describe The zones of earth and Dip of Horizon	K1	II
CO3: Discuss Influence of temperature and pressure of atmosphere on refraction	K2	III
CO4: Apply Kepler's Laws of planetary motion to find Seasons – Julian Date .	K3	IV
CO5: Discuss Determination of latitude of a place	K4	V

UNIT I **Celestial sphere and Diurnal Motion:** Celestial sphere and Diurnal Motion – Celestial co-ordinates – Sidereal times

UNIT II **Celestial sphere and Diurnal Motion (Continued):** Morning and evening stars – Diagram of the celestial sphere

The Earth: The zones of earth – Perpetual day and perpetual night – Dip of Horizon – Civil, nautical and astronomical twilights.

UNIT III **Refraction:** Refraction – Influence of temperature and pressure of atmosphere on refraction

Geocentric parallax: Parallax – Equatorial horizontal parallax.

UNIT IV **Kepler’s Laws:** Kepler’s Laws of planetary motion Time: Seasons – Julian Date .

UNIT V **Astronomical Observations :** Fixing the ecliptic – Determination of latitude of a place **The Moon:** Introduction – The tides.

UNIT VI **Dynamic component meant for experiential learning**

- Eclipses

TEXT BOOK

Prof. S.Kumaravelu & Prof. Susheela Kumaravelu, Astronomy, Revised and enlarged edition, 2013.

UNIT I Chapter II Sections 39 to 79

UNIT II Chapter II Sections 80 to 86

Chapter III Sections 87 to 90, 106 to 116

UNIT III Chapter IV Sections 117 to 134

Chapter V Sections 135 to 145

UNIT IV Chapter VI Sections 146 to 162

Chapter VII Sections 173 to 178

UNIT V Chapter XI Sections 215 to 224

Chapter XII Sections 229 to 255

UNIT VI Chapter XIII Sections 256 to 284

REFERENCE BOOKS

1. **G.V. Ramachandran**, Text Book of Astronomy, Mission Press, Palayamkottai, 1965.
2. **Robert H. Baker & Laurence W. Fredrick**, Astronomy, Ninth Edition, Van Nonstrand Reinhold Company.

EBOOK:

3. <https://www.pdfdrive.com/the-astronomy-book-e183972482.html>



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Programme	Semester	Course Code	Course Title
B.Sc.	VI		Operations Research
Part : III	MBE II	Credit: 4	Hours Per Week:5
CIA	25 Marks	SE	75 Marks

SYLLABUS

(For Students admitted from 2021 onwards)

Objectives:

- To introduce various techniques in Operations Research.
- To make students to solve real life problems

On Completion of this course the students will be able to

Course Outcome: (CO)	Knowledge Level	Units
CO 1: Explain the formulation of LPP.	K1,K3, K4	I
CO 2: <i>Construct the dual of LPP and solve LPP through duality and dual simplex method.</i>	K2,K3, K4	II
CO 3: Formulate transportation and assignment problem as LPP and solve by appropriate methods	K2, K4	III
CO 4: Analyze the methods of Queuing systems	K1,K2, K4	IV
CO 5: Demonstrate the rules of network and compare PERT/CPM.	K2,K3, K4	V

UNIT I

Linear Programming Problem-Mathematical Formulation:

Introduction – Linear Programming Problem – Mathematical Formulation of the Problem. Illustration on Mathematical formulation L.P.P's.

Linear Programming Problem-Graphical Solution: introduction – Graphical solution method – Some Exceptional Cases – General Linear Programming Problem – Canonical and Standard forms of L.P.P.

Linear Programming-Simplex Method: Introduction – Fundamental properties of solutions (Theorem statements only) – The Computational Procedure.

UNIT II **The Simplex Method (Continued):** Use of Artificial Variables – Degeneracy in Linear Programming – Applications of Simplex method.

Duality in Linear Programming : Introduction – General Primal – Dual pair – Formulating a Dual Problem – Primal – Dual Pair in matrix form – Duality Theorems (Theorem Statements only) – Duality and simplex method – Dual simplex method.

UNIT III **Transportation Problem :** Introduction – LP formulation of the transportation problem – Existence of solution in T.P. – The transportation table – Loops in transportation tables – Finding an initial basic feasible solution – test for optimality – Degeneracy in transportation problem – transportation Algorithm (MODI Method).- Some exceptional cases.

Assignment Problem : Introduction – Mathematical formulation of the Problem – Solution - Methods of Assignment Problem. –The Travelling salesman problem.

UNIT IV **Queuing Theory :** Introduction- Queuing system- Elements of a Queuing system – Operating Characteristics of a Queuing system – Deterministic Queuing system- Probability distributions in Queuing system-Classification of Queuing Models- Definition of Transient and Steady states- Poisson Queuing Systems-Model I (M/M/1):(∞/ FIFO)- Model II (M/M/1):(∞/ SIRO)- Model III (M/M/1):(N/ FIFO)- Model IV(Generalised Model: Birth-Death Process).

UNIT V **Network Scheduling By Pert / CPM :**Introduction – Network : Basic Components – Rules of network construction – Concurrent Activities – Critical Path Analysis – Probability Considerations in PERT – Distinction between PERT and CPM.

UNIT VI **Dynamic component meant for experiential learning**

- Games And Strategies
- Two – Person zero
- Sum games
- some basic terms
- The Maximin – Minimax Principle
- Games without Saddle points
- Mixed Strategies
- Dominance property.

TEXT BOOK

KantiSwarup, P. K. Gupta, Man Mohan, Operations Research, Fifteenth Edition, Published by Sultan Chand & Sons, 2010.

UNIT I	Chapter 2	Sections	2.1 to 2.4 (Page No 39 -46)
	Chapter 3	Sections	3.1 to 3.5
	Chapter 4	Sections	4.1 to 4.3(Theorem statement only)
UNIT II	Chapter 4	Section	4.4 ,4.5 and 4.8
	Chapter 5	Sections	5.1 to 5.5 (Theorem statement only) 5.7 and 5.9
UNIT III	Chapter 10	Sections	10.1 to 10.3, 10.5, 10.6, 10.9, 10.10, 10.12, 10.13, 10.15.
	Chapter 11	Sections	11.1 to 11.3 and 11.7.
UNIT IV	Chapter 21	Sections	21.1 to 21.9.
UNIT V	Chapter 25	Sections	25.1, 25.2, 25.4 to 25.8.
UNIT VI	Chapter17	Sections	17.1 to 17.5, 17.7

REFERENCE BOOKS

1. **B.S. Goel and S.K. Mittal**, Operations Research, PragatiPrakashan, India, Sixth Edition 1984.
2. **P.K. Gupta and D.S. Hira**, Operations Research, S. Chand & Company private Limited, New Delhi, Seventh Revised Edition, 2014.

E BOOK

3. **R.Malhotra and D.K.Jain**, Operations Research, AGRIMOON.COM



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Programme	Semester	Course Code	Course Title
B.Sc Mathematics	VI		Mathematical Modelling
Part : III	MBE III (Optional)	Credit: 4	Hours Per Week:5
CIA	25 Marks	SE	75 Marks

SYLLABUS

(For Students admitted from 2021 onwards)

OBJECTIVES:

- To study the mathematical models through ODE and difference equations.
- To train the students to develop mathematical models in real life problems.

On Completion of this course the students will be able to

Course Outcomes:(CO)	Knowledge Level	Units
CO 1: Discuss mathematical models for growth and decay processes using ordinary differential equations.	K1	I
CO 2: Explain the concepts of difference equations and method of solving difference equations.	K2, K3	II
CO 3: Prepare mathematical models through difference equations.	K5	III
CO 4 : Create mathematical models through PDE	K5	IV
CO 5 : Express mathematical models through graphs.	K2	V

UNIT I **Mathematical Modelling through ordinary differential equations of first order:** Mathematical Modelling through differential equations - Linear growth and decay models - Non-linear growth and decay models – Compartment models.

UNIT II **Mathematical Modelling through ordinary differential equations of first order(continued):** Mathematical Modelling in dynamics through ordinary differential equations of first order- Mathematical modelling of geometrical problems through ordinary differential equations of first order.

Mathematical modelling through systems of ordinary differential equations of the first order: Mathematical modelling in population dynamics -Mathematical modelling of epidemics through systems of ordinary differential equations of first order.

UNIT III **Mathematical modelling through ordinary differential equations of second order:** Mathematical modelling of planetary motions - Mathematical modelling of circular motion and motion of satellites - Mathematical modelling through linear differential equations of second

order - Miscellaneous Mathematical Models through ordinary differential equations of second order.

UNIT IV **Mathematical modelling through Difference equations** - The need for Mathematical modelling through difference equations – Some simple models– Basic Theory of linear difference equations with constant coefficients - Mathematical Modelling through difference equations in Economics and Finance.

UNIT V **Mathematical modelling through graphs:** Situations that can be modelled through graphs – Mathematical models in terms of directed graphs – Mathematical models in terms of signed graphs – Mathematical modelling in terms of weighted digraphs – Mathematical modelling in terms of unoriented graphs.

UNIT VI **Dynamic component meant for experiential learning**

- Simple situations requiring mathematical modeling
- The technique of Mathematical modeling
- Classification of mathematical models
- Some characteristics of Mathematical models
- Mathematical modelling through geometry
- Mathematical modelling through Algebra

TEXT BOOK

J. N. KAPUR, Mathematical Modelling, Reprint 2013, New age international (P) Limited Publishers (formerly Wiley Eastern Limited), New Delhi.

UNIT I	Chapter 2	Sections	2.1 to 2.4
UNIT II	Chapter 2	Sections	2.5 and 2.6
	Chapter 3		3.1 and 3.2
UNIT III	Chapter 4	Sections	4.1 to 4.4
UNIT IV	Chapter 5	Sections	5.1 to 5.3
UNIT V	Chapter 7	Sections	7.1 to 7.5
UNIT VI	Chapter 1	Sections	1.1 to 1.6

REFERENCE BOOKS

1. **Clive L. Dym**, Principles of Mathematical Modelling, Second Edition, Academic Press.
2. **Bimal K. Mishra & Dipak K. Satpathi**, Mathematical Modelling, Ane Books India.

E BOOK

3. **Sandip Banerjee** , Mathematical Modelling - Models, Analysis and Applications, CRC press, Taylor and francis Group, 2014



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Programme	Semester	Course Code	Course Title
B.Sc Mathematics	VI		Number Theory
Part : III	MBE III	Credit: 4	Hours Per Week:5
CIA	25 Marks	SE	75 Marks

SYLLABUS

(For Students admitted from 2021 onwards)

OBJECTIVES:

- To lay a good foundation for number theory.
- To prepare the students for solving problems through congruences.

On Completion of this course the students will be able to

Course Outcomes:(CO)	Knowledge Level	Units
CO1: Identify and use the concepts of fundamental theorem of arithmetic	K2, K3	I
CO2: Apply and Analyze permutations and combinations, Fermat's little theorem and Wilson's theorem	K3,K4	II
CO3:Analyze and Apply the concept of congruence to solve the system of congruences	K2, K3, K4	III
CO4: Classify and apply the notion of arithmetic functions $\varphi(n), d(n), \sigma(n), \mu(n)$	K3,K4	IV
CO5:Analyze and use the concepts of Tchebychev's theorem	K3,K4	V

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

UNIT II **Combinatorial and Computational Number Theory** : Permutations and Combinations – Fermat's Little Theorem – Wilson's Theorem – Generating Functions .

- UNIT III** **Fundamentals of Congruences** : Basic properties of Congruences – Residue systems
Solving Congruences : Linear Congruences –The Theorems of Fermat and Wilson Revisited-The Chinese Remainder Theorem
- UNIT IV** **Arithmetic Functions** : Combinatorial study of $\phi(n)$ – Formulae for $d(n)$ $\sigma(n)$ – Multiplicative arithmetic functions – The Mobius Inversion formula
- UNIT V** **Prime Numbers** : Elementary properties of $\pi(x)$ - Tchebychev’s Theorem- Some unsolved problems about primes
- UNIT VI** **Dynamic component meant for experiential learning**
- Graphical representation
 - Euler’s partition theorem
 - Searching for Partition Identities

TEXT BOOK

George E. Andrews, Number Theory, Hindustan Publishing Corporation, Delhi, Second Indian Reprint, 1989.

.UNIT I	Chapter 2	Sections	2.1 to 2.4
UNIT II	Chapter 3	Sections	3.1 to 3.4
UNIT III	Chapter 4	Sections	4.1 to 4.2
	Chapter 5	Sections	5.1 to 5.3
UNIT IV	Chapter 6	Sections	6.1 to 6.4
UNIT V	Chapter 8	Sections	8.1 and 8.3
UNIT VI	Chapter 12	Sections	12.1 to 12.4

REFERENCE BOOKS

1. **C.Y. Hsiung**, Elementary Theory of Numbers, Allied Publishers Ltd.
2. **T.M. Apostol**, Introduction to Analytic Number Theory, Narosa Publishing House.

E BOOKS

3. <https://www.pdfdrive.com/rosen-elementary-number-theory-and-its-applications-e13449311.html>

4. <https://www.pdfdrive.com/number-theory-art-of-problem-solving-aops-e1505092.html>



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Programme	Semester	Course Code	Course Title
B.Sc.Mathematics	III		Combinatorics
Part : IV	SBE - I	Credit: 2	Hours Per Week:2
CIA	25Marks	SE	75 Marks

SYLLABUS

(For Students admitted from 2021 onwards)

OBJECTIVES :

- Able to compute permutations and combinations
- Compare various types of relations .

On Completion of this course the students will be able to

Course Outcome: (CO)	Knowledge Level	Units
CO 1:Estimate permutations and combinations with examples	K1,K2,K3,K4,K5	I
CO 2:Apply Binomial identities and generating functions	K1,K2,K3	II
CO 3:Analyze the properties binary relations in a set and represent a relation by matrix	K1,K2,K3,K4	III
CO 4:Identify a relation by matrix	K1,K2,K4	IV
CO 5:ExamineWarshall's algorithm for transitive closure .	K1,K2,K3,K4	V

UNIT I

Combinatorics: Permutations – Combinations - Permutations with Repetitions- Combinations with Repetitions.

- UNIT II** **Combinatorics(Continued):** Permutations of Sets with Indistinguishable Objects – Miscellaneous Problems on Permutations and Combinations. Binomial Identities and Binomial Theorem - Binomial Identities – Generating Functions of Permutations and Combinations.
- UNIT III** **Relations and Functions:** Binary Relations - Operations on Relations. Properties of Binary Relations in a Set .
- UNIT IV** **Relations and Functions(Continued):** Equivalence Relations and Partial Orderings - Representation of a Relation by a Matrix-Representation of a Relation By a Digraph.
- UNIT V** **Relations and Functions(Continued):** Closure of Relations-Warshall's Algorithm for Transitive Closure- More on Functions
- UNIT VI** **Dynamic component meant for experiential learning**
- Some Important Functions
 - Hashing Functions.

TEXT BOOK

N. Chandrasekaran , M. Umaparvathi, Discrete Mathematics, PHI Learning Private limited, New Delhi, 2010.

- UNIT I** Chapter 3 Sections 3.1 to 3.4
- UNIT II** Chapter 3 Sections 3.5 to 3.7
- UNIT III** Chapter 5 Sections 5.1 & 5.2
- UNIT IV** Chapter 5 Sections 5.3 to 5.5
- UNIT V** Chapter 5 Sections 5.6 to 5.8
- UNIT VI** Chapter 5 Sections 5.9 & 5.10

REFERENCE BOOKS

1. J.P. Tremblay,R. Manohar,Discrete Mathematical Structures With Applications to Computer Science, Tata McGraw-Hill Publishing company Ltd.,Edition 1997
2. V.Sundaresan, K.S. Ganapathy Subramanian,K.Ganesan, Discrete Mathematics, A.R. Publications,3rd Edition 1999

E-book

3. **Pablo Soberian,** Problem solving methods in Combinatorics-An approach to Olympiad Problems.



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Programme	Semester	Course Code	Course Title
B.Sc.Mathematics	V		Practical: MATLAB
Part : IV	SBE III	Credit: 2	Hours Per Week: 2
CIA	40 Marks	SE	60 Marks

SYLLABUS

(For Students admitted from 2021 onwards)

OBJECTIVES :

- To introduce the mathematical software MATLAB for high performance numerical computations.
- To give practical knowledge of MATLAB.

On Completion of this course the students will be able to

Course Outcome: (CO)	Knowledge Level	Units
CO 1: Explain Algebraic and Transcendental equations using MATLAB	K3	I
CO 2: Compute the sum, product, transpose of matrices, the inverse and eigen values of matrices	K3	II
CO 3: Evaluate the problems on Differential Equations and Integral Equations	K4	III
CO 4: Determine graph using MATLAB and analyze the PASCAL's Triangle.	K3	IV
CO 5: Evaluate the problems on Numerical differentiation and Integration	K4	V

LIST OF PRACTICAL

1. Algebraic and symbolic calculations using MATLAB.
2. Solving Algebraic and Transcendental equations.
3. Finding the sum, product and transpose of matrices.
4. Finding the inverse and eigen values of matrices.
5. Solving problems on Differential Equations.
6. Solving problems on Integral Equations
7. Generating a Taylor polynomial.
8. Classification of a Partial Differential Equation.

9. Fitting of a Curve using MATLAB.
10. Plotting a graph using MATLAB.
11. Calculation of summation of a series.
12. Generation of PASCAL's Triangle.
13. Solving problems on Trigonometric Equations.
14. Solving problems on Numerical differentiation.
15. Solving problems on Numerical Integration.



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Programme	Semester	Course Code	Course Title
B.Sc.Mathematics	IV		Financial Mathematics
Part : IV	SBE II	Credit: 2	Hours Per Week:2
CIA	25Marks	SE	75 Marks

SYLLABUS

(For Students admitted from 2021 onwards)

OBJECTIVES :

- To give practice in preparing for bank exams
- To train the students in solving problems related to finance

On Completion of this course the students will be able to

Course Outcome: (CO)	Knowledge Level	Units
CO 1: Evaluate square roots and Cube roots	K1,K2	I
CO 2: Calculate profit and loss, Ratio and proportion.	K3	II
CO 3: Explain partnership and estimate different types of Interest.	K1,K2	III
CO 4: Assess various types of Discounts	K4	IV
CO 5: Analyze Graphs and Charts	K3, K4	V

UNIT I Simplification – Square Roots & Cube Roots – Problems on numbers .

UNIT II Percentage – Profit & Loss – Ratio & Proportion.

UNIT III Partnership – Simple Interest – Compound Interest.

UNIT IV Stocks & Shares – True Discount – Banker's Discount.

UNIT V Bar graphs – Pie Charts – Line Graphs.

UNIT VI **Dynamic component meant for experiential learning**

- Area
- Volume and surface areas

TEXT BOOK

R.S. Aggarwal, Quantitative Aptitude , Reprint 2013, S. Chand and company Ltd. Ram Nagar, New Delhi - 110 055.

UNIT I Chapters 4,5 & 7

UNIT II Chapters 10,11&12

UNIT III Chapters 13,21& 22

UNIT IV Chapters 29,32 &33

UNIT V Chapters 37, 38 & 39

UNIT VI Chapters 24 & 25

REFERENCE BOOKS

1. **Abijith Guha**, Quantitative Aptitude for all competitive examinations, McGraw Hill Education, 2016.
2. **Arvind Sharma**, Quantitative Aptitude and Arithmetic Competitive Exam Book, Sura College of Competition, 2017.

E BOOK

3. <https://www.pdfdrive.com/quantitative-aptitude-and-reasoning-d187540802.html>
R.V.Praveen, Quantitative Aptitude and Reasoning, Second edition, PHI learning PVT.



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Programme	Semester	Course Code	Course Title
UG Programme	III		General skills in Mathematics-I
Part : IV	NME- I	Credit: 2	Hours Per Week:2
CIA	25Marks	SE	75 Marks

SYLLABUS

(For Students admitted from 2021 onwards)

OBJECTIVES:

- Analyze various statistical concepts
- Compare real world datas

On Completion of this course the students will be able to

Course Outcome: (CO)	Knowledge Level	Units
CO 1:Analyze bar graphs and pie-diagrams	K1,K2,K4	UNIT I
CO 2:Calculate arithmetic mean ,median and mode	K2,K3,K4	UNIT II
CO 3:Apply the concepts of measures of dispersion	K2,K3	UNIT III
CO 4:Determine Standard deviation and Variance	K1,K3,K4	UNIT IV
CO 5:Explain the concepts of Correlation , Rank Correlation	K1,K2,K4, K5	UNIT V

UNIT I **Data Interpretation:** Tabulation – Bar graphs - Pie Diagrams.

UNIT II **Central tendencies:** Arithmetic Mean – Median – Mode.

UNIT III **Measures of Dispersion:** Range – Mean Deviation .

- UNIT IV** **Measures of Dispersion(continued):** Standard deviation – Variance – Coefficient of Variation.
- UNIT V** **Correlation and Regression:** Introduction – Correlation – Rank Correlation.
- UNIT VI** **Correlation and Regression(Continued):** Regression- Correlation coefficient for a bivariate frequency distribution.

TEXT BOOKS

- BOOK 1** **R.S.Aggarwal**, Quantitative Aptitude-Fully Solved, Revised Edition S.Chand and Company Ltd., Ram Nagar ,New Delhi.
- BOOK 2** Statistics , **S.Arumugam and A.Thangapandi Issac**,New Gamma Publishing House , Edition July 2011.

UNIT I	Book 1: SECTION II	Chapter	36 to 38
UNIT II	Book 2: Chapter 2	Sections:	2.1, 2.2 (Median Only), 2.3
UNIT III	Book 2: Chapter 3	Section:	3.1
UNIT IV	Book 2: Chapter 3	Section:	3.1 (Continued)
UNIT V	Book 2: Chapter 6	Sections:	6.1 and 6.2
UNIT VI	Book 2: Chapter 6	Sections:	6.3 and 6.4

REFERENCE BOOKS

1. **H.C. Saxena and J.N. Kapoor**, “Mathematical Statistics”, S. Chand and Company Ltd.
2. **A.M. Mathai**, “Introduction to Statistical mathematics” , S. Chand and Company Ltd.

E BOOK

3. <https://www.pdfdrive.com/number-theory-art-of-problem-solving-aops-e1505092.html>



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Programme	Semester	Course Code	Course Title
UG Programme	IV		General skills in Mathematics-II
Part : IV	NME II	Credit: 2	Hours Per Week:2
CIA	25Marks	SE	75 Marks

SYLLABUS

(For Students admitted from 2021 onwards)

OBJECTIVES :

- Ability to solve quantitative problems
- Access real life problems

On Completion of this course the students will be able to

Course Outcome: (CO)	Knowledge Level	Units
CO 1:Determine H. C. F and L. C. M of numbers	K1,K2,K3,K4	I
CO 2: Analyze the concepts of Profit and Loss , Ratio and Proportion	K2,K3,K4	II
CO 3:Analyze the concepts about the Time and Work , Pipes and Cistern	K1,K2,K4	III
CO 4:Analyze the concepts of Time and Distance , Alligation or Mixture	K1,K2,K3,K4	IV
CO 5:Estimate Simple Interest , Compound Interest	K1,K2,K3,K4,K5	V

UNIT I H. C. F and L. C. M of number – Problems on Ages

UNIT II Profit and Loss – Ratio and Proportion

UNIT III Time and Work – Pipes and Cistern

UNIT IV Time and Distance – Alligation or Mixture

UNIT V Simple Interest – Compound Interest

UNIT V Tabulation – bar Graphs

TEXT BOOK

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UNIT I Chapters 2 & 8

UNIT II Chapters 11& 12

UNIT III Chapters 15& 16

UNIT IV Chapter 17 & 20

UNIT V Chapters 21& 22

UNIT VI Chapters 36 & 37

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3. <https://www.pdfdrive.com/number-theory-art-of-problem-solving-aops-e1505092.html>