A.D.M. COLLEGE FOR WOMEN (AUTONOMOUS)

Nationally Re-Accredited with "A" Grade by NAAC – 4th Cycle
(Affiliated to Bharathidasan University, Thiruchirappalli)
No.1, College Road, Velippalayam,
Nagapattinam–611001, Tamil Nadu,
India

DEPARTMENT OF MATHEMATICS

(For the candidates admitted from the academic year 2024-2025)

UG SYLLABUS

2024-2025

PG DEPARTMENT OF MATHEMATICS

(for the candidates admitted from the academic year 2024-2025)

B.Sc., Mathematics

Programme Educational Objectives (PEO):

PEO 1:	To gain knowledge in fundamental ideas of mathematics and to develop the Mathematical thinking.
PEO 2:	To provide the highest level of education in mathematics and to produce competent And creative Mathematicians.
PEO 3:	To enable the learners to solve mathematical problems using mathematical techniques.
PEO 4:	To communicate mathematics accurately, precisely and effectively.
PEO 5:	To inculcate the mathematical concepts, intellectual skills, courage and integrity, Sensitivity to the needs and aspiration of the society among the learners.

Programme Outcomes (POs): UG

On completion of the course, the learner will be able to

PO 1:	applythebasicconceptsofmathematicstoformulateand evaluatethe real- world Problems.
PO 2:	Utilize the mathematical principles to think analytically, systematically and critically While solving problems and making decisions.
PO 3:	Construct the logical arguments and apply the laws of logic in mathematical proofs.
PO 4:	Learn and apply the appropriate methods and procedures in MATLAB, SPSS etc.
PO 5:	Pursue careers in academia, industry and the other areas of Mathematics.

Programme Specific Outcomes (PSO) B.Sc.,

On completion of the course, the learner will be able to

PSO 1:	Identify the applications of mathematics in other disciplines and society.
PSO 2:	Formulate and develop mathematical arguments in a logical manner.
PSO 3:	Able to identify, locate and solve the issue or problem effectively.
PSO 4:	Acquire good knowledge in advanced areas of mathematics.
PSO 5:	Understand and formulate quantitative models arising in social science, business and Other contexts.

CURRICULUM STRUCTURE – UG (SCIENCE) – I Year 2024 Batch Onwards
(For B.Sc Mathematics)

Part	Category of Courses	No. of Courses	Hrs	Total Credits
Part I	Language Courses (Tamil/Hindi/French/Arabic/ Sanskrit)	4	24	12
Part II	English Language Courses	4	24	12
Part III	Core Courses (CC)	15	70	60
	Minor Course	6	24	16
	Discipline Specific Courses (DSC)	3	10	9
	Project	1	3	3
Part IV	Skill Enhancement Courses (SEC)	4	8	8
	Ability Enhancement Courses (AEC)	3	6	6
	Multi Disciplinary Courses (NME)	2	4	4
	Environmental Studies	1	2	2
	Value Education	1	2	2
	Soft Skill Development	1	2	2
	Summer Internship/Industrial Activity	0	0	2
Part V	Gender Studies	1	1	1
	Extension Activity (NCC/NSS/Sports/Any Other Activities)	0	0	1
	Total	46	180	140

EXTRA CREDIT SCHEME STRUCTURE – 2024 - 2027

Courses	Credits	Semester	Marks
tra Credit Courses I(Professional English) ECPEA - ECC I - PROFESSIONAL ENGLISH FOR ARTS AND SOCIAL SCIENCES **(Tamil, English, History, Economics, Mathematics, CS, IT, BCA)** ECPEB - ECC I - PROFESSIONAL ENGLISH FOR COMMERCE AND MANAGEMENT **(Commerce & BBA)** ECPEC - ECC I - PROFESSIONAL ENGLISH FOR LIFE SCIENCES **(Zoology, Botany, Biochemistry & Marine)** ECPED - ECC I - PROFESSIONAL ENGLISH FOR PHYSICAL SCIENCES **(Physics, Chemistry & Geology)**	2	I	100
tra Credit Courses II(Skill Course I – Add on)	2	II	100
tra Credit Courses III(Skill Course II- Add on)	2	III	100
tra Credit Courses IV(Skill Course III- Add on)	2	IV	100
lue added course I (Multidisciplinary)	2	V	100
lue added Course II (Same disciplinary)	2	VI	100
Total	**12**		

SCHEME OF EXAMINATIONS– 2024Batch

(For UG Science)

SEMESTER – I							
PART	**COURSE TYPE**	**COURSES**	**HOURS**	**CREDITS**	**EXAM DURATION**	**MAX. MARKS**	
						CIA	**EXT**
Part I	Language Course I	LC I – Pothu Tamil -I	6	3	3	25	75
Part II	English Course I	ELC I – General English – I	6	3	3	25	75
Part III	Core Course I	CC I - Differential Calculus And Trigonometry	4	4	3	25	75
	Core Course II	CC II - Classical Algebra And Theory Of Numbers	4	4	3	25	75
	First Minor Course I	FMC I - Physics I(T)	4	3	3	25	75
	First Minor Course II	FMC II - Physics II(P)	2	-	-	-	-
Part IV	Skill Enhancement Course I	SEC I - Sagemath Programming Lab	2	2	3	40	60
	VE	Value Education	2	2	3	25	75
tra Credit 1	Extra Credit I	Extra Credit Course I - Professional English		2	-	0	100
		No. of Courses – 7+1	**30**	**21 + 2**			

SEMESTER – II							
PART	**COURSE TYPE**	**COURSES**	**HOURS**	**CREDITS**	**EXAM DURATION**	**MAX. MARKS**	
						CIA	**EXT**
Part I	Language Course II	LC II - Pothu Tamil -II	6	3	3	25	75
Part II	English Course II	ELC II - General English – II	6	3	3	25	75
Part III	Core Course III	CC III - Integral Calculus	4	4	3	25	75
	Core Course IV	CC IV - Analytical Geometry Of Three Dimensions With Geogebra	4	4	3	40	60
	First Minor Course II	FMC II - Physics II Practical	2	2	3	40	60
	First Minor Course III	FMC III - Physics III(T)	4	3	3	25	75
Part IV	Skill Enhancement Course II	SEC II - Introduction To Python Programming Lab	2	2	3	40	60
	EVS	Environmental Studies	**2**	2	3	25	75
tra dit II	Extra Credit II	Extra Credit Courses II(Skill Course I – Add on)	-	2	-	0	100
		No. of Courses – 8 + 1	**30**	**23 + 2**			

SEMESTER – III							
PART	**COURSE TYPE**	**COURSES**	**HOURS**	**CREDITS**	**EXAM DURATION**	**MAX. MARKS**	
						CIA	**EXT**
Part I	Language Course III	LC III - Pothu Tamil -III	6	3	3	25	75
Part II	English Course III	ELC III - General English – III	6	3	3	25	75
Part III	Core Course V	CC V - Differential Equations And Laplace Transforms	4	4	3	25	75
	Core Course VI	CC VI - Vector Calculus And Fourier Series	4	4	3	25	75
	Second Minor Course I	SMC I - Mathematical Statistics I	4	3	3	25	75
	Second Minor Practical I	SMP I - Mathematical Statistics II Practical Using R - Programming	2	-	-	-	-
Part IV	Multi Disciplinary Course I	NME I - Mathematics For Competitive Examinations I	2	2	3	25	75
	Skill Enhancement Course III	SEC III - Differential Equations Using Sci Lab	2	2	3	40	60
tra redit III	Extra Credit III	Extra Credit Courses III(Skill Course II- Add on)		2	-	0	100
		No. of Courses – 7+ 1	**30**	**21 + 2**			

SEMESTER – IV							
PART	**COURSE TYPE**	**COURSES**	**HOURS**	**CREDITS**	**EXAM DURATION**	**MAX. MARKS**	
						CIA	**EXT**
Part I	Language Course IV	LC IV - Pothu Tamil -IV	6	3	3	25	75
Part II	English Course IV	ELC IV - General English – IV	6	3	3	25	75
Part III	Core Course VII	CC VII - Sequences And Series	4	4	3	25	75
	Core Course VIII	CCVIII - Numerical Analysis	4	4	3	25	75
	Second Minor Practical I	SMP I - Mathematical Statistics II Practical Using R - Programming	2	2	3	40	60
	Second Minor Course II	SMC II - Mathematical Statistics III	4	3	3	25	75
Part IV	Multi Disciplinary Course II	NME II - Mathematics For Competitive Examinations II	2	2	3	25	75
	Ability Enhancement Course I	AEC I - MATLAB Programming	2	2	3	40	60
	Summer Internship/Ind. Training	Internship	0	2	-	-	-
tra redit IV	Extra Credit IV	Extra Credit Courses IV(Skill Course III- Add on)		2	-	0	100

		No. of Courses – 8 + 1	**30**	**25+2**			

SEMESTER – V							
PART	**COURSE TYPE**	**COURSES**	**HOURS**	**CREDITS**	**EXAM DURATION**	**MAX. MARKS**	
						CIA	**EXT**
Part III	Core Course IX	CC IX - Algebra	6	4	3	25	75
	Core Course X	CC X - Real Analysis	6	4	3	25	75
	Core Course XI	CC XI - Astronomy	6	4	3	25	75
	Core Course XII	CC XII - Mechanics	5	4	3	25	75
	Discipline Specific Elective I	DSE I - C Programming Theory	3	3	3	25	75
	Ability Enhancement Course II	AEC II - Introduction To Artificial Intelligence	2	2	3	25	75
	SSD	Soft Skill Development	2	2	3	25	75
tra Credit V	Extra Credit Courses V	Value added course I (Multidisciplinary)- R Lab with TABULA	0	2	-	0	100
		No. of Courses – 7 + 1	**30**	**23 + 2**			

SEMESTER – VI							
PART	**COURSE TYPE**	**COURSES**	**HOURS**	**CREDITS**	**EXAM DURATION**	**MAX. MARKS**	
						CIA	**EXT**
Part III	Core Course XIII	CC XIII - Complex Analysis	5	4	3	25	75
	Core Course XIV	CC XIV - Operations Research With TORA	5	4	3	40	60
	Core Course XV	CC XV - Graph Theory	5	4	3	25	75
	Core Course XVI	CC XVI - Project	3	3	3	25	75
	Discipline Specific Elective II	DSE II - C Programming Practical	3	3	3	40	60
	Discipline Specific Elective III	DSE III - Mathematical Modelling With Excel	4	3	3	40	60
Part IV	Ability Enhancement Course III	AEC III - Quantitative Aptitute	2	2	3	25	75
	Skill Enhancement Course IV	SEC IV - Document Preparation System Using Latex	2	2	3	40	60
Part V	GS	Gender Studies	1	1	3	25	75
	Extension Activities	(NCC/NSS/Sports/Any Other Activities)	-	1	-	-	-
tra Credit VI	Extra Credit Courses VI	Value added Course II (Same disciplinary)- R Lab with TABULA		2	-	0	100

		No. of Courses – 9 + 1	**30**	**27 + 2**			

Grand Total – Credit 140 & Extra Credit 12

Controller of Examinations

Semester I

Semester-I/Core Course-I	**DIFFERENTIAL CALCULUS AND TRIGONOMETRY**	**CourseCode:**
Instruction Hours:4	**Credits: 4**	**Exam Hours:3**
Internal Marks:25	**External Marks:75**	**Total Marks:100**

Cognitive Level	**K1-Recalling** **K2 –Understanding** **K3-Applying** **K4 – Analyzing** **K5-Evaluating** **K6- Creating**	
Course Objectives	**The Course aims** • To inculcate the basics of differentiation and their applications. • To introduce the notion of curvatures, circle and radius of curvature. • To develop conceptual understanding of evolutes& involutes and polar co-ordinates. • To acquire the basic knowledge of circular and hyperbolic functions of complex variables. • To develop skill in summing up infinite trigonometric series using appropriate methods.	
UNIT	**CONTENT**	**HOURS**
UNIT I	**Successive Differentiation:** Successive Differentiation – The derivative – Standard Results– Fractional expressions– Trignometrical transformation–Formation of equations involving derivatives–Leibnitz formula for the derivative of a product–A complete formal proof for induction–Examples. **(Chapter III: Sec 1.1–2.2)**	**15 Hours**
UNIT II	**Envelopes, Curvature of plane curves:** Curvature – Circle, radius and centre of curvature – Cartesian formula for the radius of curvature. **(Chap.X: Sec 2.1-2.3)**	**15 Hours**
UNIT III	**Envelopes, Curvature of plane curves, Maxima and Minima:** The coordinates of the centre of curvature – Evolute & Involute – Radius of curvature when the curve is given in polar coordinates – p-r equations: pedal equation of a curve –Maxima and Minima– Theorems (without proof)–Problems. **(Chap.X: Sec 2.4-2.7 & Chap.V: Sec 1.1-1.3)**	**15 Hours**

UNIT IV	**Hyperbolic functions:** Introduction–Hyperbolic functions–Relations between hyperbolic functions corresponding to relations between circular functions - Inverse hyperbolic functions. **(Chap.IV: Sec. 1-2.3)**	**15 Hours**
UNIT V	**Summation of Trigonometric series:** Logarithms of complex quantities–Method of Differences - Angle arithmetic progression method–Gregory's series. **(Chap.V: Sec 5 & Chap.VI : Sec 1-2, 3.1)**	**15 Hours**

Text Books:

1. T.K. Manickavachagam Pillai, S.Narayanan, Calculus Volume I, S.V. Publications, Chennai, 2019.
2. S. Narayanan, T.K. Manickavachagam Pillai, Trigonometry, S. Viswanathan Pvt. Ltd and Vijay Nicole Imprints Pvt. Ltd, 2010.

Reference Books:

1. S. Arumugam and Isaac, Calculus Volume I, New Gamma Publishing House,1991.
2. S. Arumugam, Isaac, Thangapandi, Trigonometry and Fourier series, New Gamma Publications, Revised Edition, 1999.

Web–Resources:

https://nptel.ac.in

Course Outcomes:

On completion of the course, students able to

CO1: Apply Leibnitz's Theorem for finding the n^{th} derivative of product of functions.

CO2: evaluate envelopes and curvatures of plane curves.

CO3: Compute maxima and minima of plane curves.

CO4: Interpret the relation between circular and hyperbolic functions.

CO5: find the sum of infinite series.

Mapping of Course outcomes with Programme Outcomes & Programme Specific Outcomes:

CO/PO	PO					PSO				
	1	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**
CO1	M	S	M	M	M	S	S	S	S	M
CO2	S	S	M	M	M	M	M	S	S	M
CO3	M	S	M	M	M	M	S	M	W	M
CO4	M	M	M	W	M	M	M	S	S	M
CO5	M	M	M	W	M	M	M	S	S	M

S -- Strongly Correlated
M – Moderately Correlated
W -- Weakly Correlated
N – No Correlation

Semester-I/Core Course II	CLASSICAL ALGEBRA AND THEORY OF NUMBERS	Course Code:
Instruction Hours:4	Credits: 4	Exam Hours:3
Internal Marks:25	External Marks:75	Total Marks:100

Cognitive Level	**K1-Recalling** **K2 –Understanding** **K3-Applying** **K4 – Analyzing** **K5-Evaluating** **K6- Creating**	
Course Objectives	**The Course aims** • To lay a good foundation for the study of Theory of Equations. • To train the students in operative algebra. • To study the Descarte's rule of sign. • To know the applications to Maxima and minima • To understand the theory of numbers	
UNIT	**CONTENT**	**HOURS**
UNIT I	**Theory of equations** Forming the equations with the given roots – Relation between the roots and coefficients – Symmetric functions of the roots–Sum of the powers of the roots of an equation **(Textbook 1- Chapter 6 : Sec 9 - 13)**	**12 Hours**
UNIT II	**Theory of equations** . Newton's theorem on the sum of the powers of the roots - Transformations of equations – Diminishing, Increasing & Multiplying the roots by a constant – Reciprocal equation - **(Textbook 1- Chapter 6 : Sec 14–17)**	**12 Hours**
UNIT III	**Theory of equations** Form of the quotient and remainder when a polynomial is divided by a Binomial –Removal of terms –Transformation in General - Descartes' rule of signs**. (Textbook 1 - Chapter 6 : Sec.18,19,21 & 24)**	**12 Hours**
UNIT IV	**Inequalities** Inequalities – Elementary Principles – Geometric and Arithmetic means – Weirstrass inequalities – Cauchy's inequality – Applications to Maxima and Minima.**(Textbook 2 – Chapter 4)**	**12 Hours**
UNIT V	**Theory of Numbers** Theory of Numbers – Prime & Composite numbers – divisors of a given number N – Euler's Function ϕ(N) and its value – The highest Power of a prime P contained in N! – Congruences – Fermat's, Wilson's & Lagrange's Theorems. (**Textbook 2- Chapter 5**)	**12 Hours**

Text Books:

1. T.K.M. Pillai and S. Narayanan, Algebra Volume I, S. Viswanathan Printers and Publishers Pvt. Ltd., Chennai, 2019.
2. T.K.M. Pillai, S. Narayanan and K.S. Ganapathy, Algebra Volume II, S. Viswanathan Printers and Publishers Pvt. Ltd., Chennai, 2015.

Reference Books:

1. M. L. Khanna, Algebra, Jai PrakashNath & Co, 1974.
2. K. Balakrishnan and N. Ramabathran, Text Book of Modern Algebra, Vikas Publishing House Pvt.Ltd,1978.

Web–Resources: https://nptel.ac.in

COURSE OUTCOMES:

On completion of the course, students able to

CO1: Know the foundation of Theory of Equations.

CO2: Applying the skills to solve problems in operative algebra.

CO3: Evaluate the quotient and remainder in polynomial division.

CO4: Apply the Weirstrass and Cauchy inequalities.

CO5: Interpret problems under congruences

Mapping of Course outcomes with Programme Outcomes & Programme Specific Outcomes:

CO/PO	PO					PSO				
	1	2	3	4	5	1	2	3	4	5
CO1	S	S	M	S	S	S	S	S	S	S
CO2	S	S	S	S	S	S	S	S	S	S
CO3	S	S	S	W	S	S	S	S	S	M
CO4	S	S	S	S	S	S	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	S

S-Strongly Correlated

M-Moderately Correlated

W-Weakly Correlated

N–No Correlation

Semester-I / SEC I	SAGE MATH PROGRAMMING LAB	Course Code:
Instruction Hours: 2	Credits: 2	Exam Hours: 3
Internal Marks: 40	External Marks: 60	Total Marks: 100

Cognitive Level	**K 1 - Recalling** **K2 - Understanding** **K3 - Applying** **K4 - Analyzing** **K5 – Evaluating** **K6 - Creating**
Course Objectives	**The Course Objectives** • To develop a sage math program in differential calculus and trigonometry. • To plot 2D and 3D shapes using sagemath

UNIT	CONTENT	Hours
Programs	1. Use Sage Math as a calculator 2. Find the roots of a polynomial 3. Find the inverse of a matrix 4. To resolve a fraction into partial fractions. 5. Solve the system of equations 6. Solving Equations using Sage Math 7. To calculate the radius of curvature 8. Find the limit of the function 9. To find the derivative of a function. 10. Find the higher order derivatives of a function 11. Find the maximum value of a function. 12. Find the minimum value of a function. 13. To calculate the sum of a series 14. 2D Plotting with Sage Math 15. 3D Plotting with Sage Math **Books and References:** 1. www.sagemath.org 2. Mathematical Computation with Sage by Paul Zimmermann available from on http://www.sagemath.org 3. An Introduction to SAGE Programming: With Applications to SAGE Interacts for Numerical Methods by Razvan A Mezei, Springer	

Semester II

Semester-II/ Core Course-III (CC)	INTEGRAL CALCULUS	Course Code:
Instruction Hours: 4	Credits: 4	Exam Hours: 3
Internal Marks: 25	External Marks: 75	Total Marks: 100

Cognitive Level	**K1-Recalling** **K2 –Understanding** **K3-Applying** **K4-Analyzing** **K5 – Evaluating** **K6-Creating**	
Course Objectives	**The Course aims** • To inculcate the basics of integration. • To study some applications of definite integrals. • To know the techniques for integration. • To find area under plane curves using integration. • To understand the consequences of beta and gamma function.	
UNIT	**CONTENT**	**HOURS**
UNITI	**Integration:** Revision of all integral models–Simple problems.**(Chapter 1:Sec 1 to 7)**	**12 Hours**
UNITII	**Integration:** Definite integrals –Integration by Parts, Reduction formula, Bernoulli's Formula. **(Chapter 1: Sec 11,12,13 & 15.1)**	**12 Hours**
UNITIII	**Geometrical Applications of Integration:** Area under plane curves-Cartesian co-ordinates-Area of a closed curve - Examples –Areas in polar co-ordinates**. (Chapter 2: Sec 1.1, 1.2,1.3 & 1.4)**	**12 Hours**
UNITIV	**Multiple Integrals** Double integrals–Changing the order of Integration– Triple Integrals. **(Chapter 5: Sec 1,2.1,2.2,3.1 & Sec 4)**	**12 Hours**
UNITV	**Improper Integrals: Beta and Gamma Functions** Beta & Gamma functions and the relation between them–Integration using Beta & Gamma functions. **(Chapter 7: Sec 2.1 to 2.3, 3, 4 & 5)**	**12 Hours**

Text Books:

1. S. Narayanan and T.K. Manickavasagam Pillai, Calculus Volume II, S.Viswanathan (Printers & Publishers) Pvt Ltd, Chennai, 2017

Reference Books:

1. Shanti Narayan, Differential & Integral Calculus,10th Revised Edition, S.Chand & Co.Ltd,1962.
2. Shanti Narayan, P.K.Mittal, Integral Calculus, S. Chand & Co.Ltd,2005.

Web–Resources: https://nptel.ac.in

Course Outcomes

On Completion of the Course, Students should be able to

CO1 : find the solutions of the integrals.
CO2 : Solve integrals by using integration by parts rule.
CO3 : find the area of plane curves using Cartesian and polar coordinates.
CO4 : evaluate the area by changing the given order of integration, multiple integrals.
CO5 : Understand the concepts of Beta and Gamma functions.

Mapping of Course outcomes with Programme Outcomes & Programme Specific Outcomes:

CO/PO	PO					PSO				
	1	2	3	4	5	1	2	3	4	5
CO1	S	S	S	S	S	S	S	S	S	S
CO2	S	S	S	S	S	S	S	S	S	S
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	S

S-Strongly Correlated

M- Moderately Correlated

W- Weakly Correlated

N–No Correlation

Semester II / CC IV	ANALYTICAL GEOMETRY OF THREE DIMENSIONS WITH GEOGEBRA	Course Code:
Instruction Hours: 3 (theory) + 1 (practical)	Credits:4	Exam Hours: 3
Internal Marks :40	ExternalMarks:60	Total Marks: 100

Cognitive Level	**K 1** Recalling **K 2** Understanding **K 3** Applying **K4** Analyzing **K5** Evaluating **K6** Creating	
Course Objectives	**The Course aims** • Necessary skills to analyze characteristics and properties of two- and three-dimensional geometric shapes. • To present mathematical arguments about geometric relationships. • To solve real world problems on geometry and its applications.	
UNIT	**Content**	**No.of Hours**
I	**The Plane** Coordinates in Space –Direction cosines of a line in space –Angle between lines in space –Relation between direction cosines - Equation of a plane in normal form –Angle between planes– system of planes **(Chapter 1 : Sec 1.5 to 1.7, Chapter 2 : Sec 2.1 to 2.3, 2.5)**	**Hours**
II	**The Straight line** Representation of a line- Equation of the line through a given point drawn in given direction – Equation of a line through two points- two forms of the equation of a line – transformation from the unsymmetrical to the symmetrical form-Angle between line and space- condition for aline to lie in aplane- coplanar lines- condition for coplanarity **(Chapter 3: Section 3.1 - 3.4)**	
III	**The Sphere** General equation of a sphere- Sphere through four given points - Plane section of a sphere- Intersection of two spheres – sphere with a given diameter- sphere through given circle – Equation of a tangent plane **(Chapter 6 : Sec. 6.1 to 6.4, 6.6)**	**Hours**
IV	**The Cone and Cylinder** Equation of a cone with conic as guiding curve- Enveloping cone of a sphere- Quadratic cones with vertex at origin - Equation of a Cylinder – Enveloping cylinder	**Hours**

	(Chapter 7 : Sec. 7.1.1 to 7.1.3, 7.7.1, 7.7.2)	
V	**Geogebra Programming:** Comparison of Geogebra math Apps- Introduction- Explore the App – perspective and views- tools- commands- style bar- settings- tips and tricks for algebraic input- renaming objects- inserting static text- inserting pictures- saving Geogebra files www.geogebra.org	**Hours**

Text Books:

1. Shanthi Narayanan and Mittal P.K, Analytical Solid Geometry, 16th Edition, S.Chand & Co., New Delhi, 2016.
2. S.Arumugam and A.Thangapandi Issac,Analytical Geometry 3D and Vector Calculus,New Gamma Publication House,Palayamkottai,2017.

Reference Books:

S.G.Venkatachalapthy,Analytical Geometry,Margham Publications, Chennai, 2013.

Web–Resources: **https://nptel.ac.in**

Course Outcomes

On Completion of the Course, Students should be able to

CO 1: understand and apply the concept of system of planes

CO 2: find angle between two planes and to solve coplanar lines

CO 3: to solve the problems on sphere

CO 4: to solve the problems on cone and cylinder

CO 5: understand the mathematical software geogebra

Mapping of Course outcomes with Programme Outcomes & Programme Specific Outcomes:

CO/PO	PO					PSO				
	1	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**
CO1	S	S	M	M	M	M	M	S	S	M
CO2	S	S	M	M	M	M	M	S	S	M
CO3	S	S	M	M	M	M	M	S	S	M
CO4	S	S	M	M	M	M	M	S	S	M
CO5	S	S	M	M	M	M	M	S	S	M

S-Strongly Correlated

M-Moderately Correlated

W-Weakly Correlated

N–No Correlation

Semester-II / SECII	**INTRODUCTION TO PYTHON PROGRAMMING LAB**	**Course Code:**
Instruction Hours: 2	**Credits: 2**	**Exam Hours: 3**
Internal Marks: 40	**External Marks: 60**	**Total Marks: 100**

Cognitive Level	**K 1 - Recalling** **K2 - Understanding** **K3 - Applying** **K4 - Analyzing** **K5 – Evaluating** **K6 - Creating**
Course Objectives	**The Course Objectives** • To develop a python program in integral calculus and analytical geometry • To compute area of polygons using python.

UNIT	CONTENT	Hours
Programs	1. Solving a quadratic equation 2. Checking if a number is prime 3. Calculating the factorial of a number 4. Finding the maximum of a list 5. Computing definite integrals 6. Computing improper integrals 7. Computing multiple integrals 8. Computing the distance between two points 9. Computing the equation of a line passing through two points 10. Finding the shortest path between two points 11. Computing the area of a polygon **Books and references** 1. www.sagemath.org 2.Introduction to Problem Solving with Python, E. Balagurusamy,TMH, 1st, 2016.	

Semester III & IV

Semester-III/ Core Course-V	DIFFERENTIAL EQUATIONS AND LAPLACE TRANSFORMS	Course Code:
Instruction Hours: 4	Credits: 4	Exam Hours:3
Internal Marks:25	External Marks:75	Total Marks:100

Cognitive Level	**K1-Recalling** **K2 –Understanding** **K3-Applying** **K4 – Analyzing** **K5 – Evaluating** **K6-Creating**	
Course Objectives	**The Course aims** • To study the higher order linear differential equations with constant coefficients. • To find the solutions of linear differential equations with variable coefficients. • To acquire the knowledge of complete, singular and particular integrals of first order PDE. • To compute solutions of PDEs using Charpits method. • To gain the basic knowledge of Laplace transforms and its inverse with applications.	
UNIT	**CONTENT**	**HOURS**
I	**Linear Differential equations with constant coefficients** The Operators D and D^{-1}-Evaluation of particular integral of e^{ax}, $\cos ax$,$\sin ax$,x^k where k is a positive integer - .**(Chapter 2:Sections 1 to 4).**	**12 Hours**
II	**Linear Differential equations with constant coefficients** Linear Equations with variable coefficients - To find the particular integral–Equations reducible to linear homogeneous equation – Variation of parameters.**(Chapter2:Sections 8 to 10)**	**12 Hours**
III	**Partial Differential Equations** Derivation of partial differential equations -By elimination of arbitrary constants - By the elimination of arbitraryfunctions – Different integrals of partial differential equations - General, particular, complete and singular integral (Geometrical meaning not expected) – Standard types of first order equations (Standard 1 to 4). **(Chapter 4: Sections1, 2, 3 and Section 5: 5.1-5.4)**	**12 Hours**
IV	**Partial Differential Equations** Equations reducible to the standard forms-Lagrange's equation– Charpit's method**. (Chapter 4:Section 5-5.5, Section 6, Section 7)**	**12 Hours**
V	**The Laplace Transforms** Standard formulae– Some general Theorems (statement only) and Simple Applications – Laplace transform of periodic functions - Inverse Laplace transforms (problems only)–Application to the solution of Second order ordinary differential equations with constant coefficients. **(Chapter 5: Sec. 1-8)**	**12 Hours**

Text Books:

T.K.Manickavasagam Pillai and S.Narayanan, Calculus Vol III, S.Viswanathan Printers and Publishers Pvt. Ltd. Chennai, Reprint 2012.

Reference Books:

1. M.L.Khanna,Differential Equations,Jai Prakash Nath & Co,Meerut City,1984.
2. M.K.Venkatraman,Engineering Mathematics,The National Publishing Co,Madras,1984

Web–Resources: https://nptel.ac.in

Course Outcomes

On Completion of the Course, Students should be able to

CO1 : solve the higher order linear differential equations with constant coefficients
CO2 : solve differential equations by using method of variation of parameters
CO3 : find solutions of first order partial differential equations of the standard forms
CO4 : solve the PDE's using Charpit's method.
CO5 : Apply the techniques of Laplace transform and inverse Laplace transform

Mapping of Course outcomes with Programme Outcomes & Programme Specific Outcomes:

CO/PO	PO					PSO				
	1	2	3	4	5	1	2	3	4	5
CO1	S	S	M	M	S	S	M	S	S	S
CO2	S	S	M	M	S	S	M	S	S	S
CO3	S	S	M	M	S	S	M	S	S	S
CO4	S	S	M	M	M	S	S	S	S	M
CO5	S	S	M	M	S	S	M	M	S	S

S - Strongly Correlated

M - Moderately Correlated

W- Weakly Correlated

N– NoCorrelation

Semester-III/Core Course-VI	VECTOR CALCULUS AND FOURIER SERIES	Course Code:
Instruction Hours:4	Credits: 4	Exam Hours:3
Internal Marks:25	External Marks:75	Total Marks:100

Cognitive Level	**K1-Recalling** **K2 –Understanding** **K3-Applying** **K4 – Analyzing** **K5-Evaluating** **K6- Creating**	
Course Objectives	**The Course aims** • To understand the fundamental concepts of vector differentiation. • To develop the knowledge of vector integration.. • To acquire the interpretation of curl of a vector field. • To inculcate the basic concepts of Fourier series. • To know about half range sine and cosine series	
UNIT	**CONTENT**	**HOURS**
UNIT I	**Vector differentiation:** Velocity & acceleration – Level surfaces –The vector differential operator – Gradient of a vector – Direction and magnitude of gradient – Divergence & curl of a vector – Solenoidal &Irrotational vectors . – Formula involving operator–Operators involving twice and problems. **(Chapter IV:Section 4– 12)**	**15 Hours**
UNIT II	**Vector integration:** Line integral–Conservative field–Volume integral–Surface integral (problems and theorem statement only). **(ChapterVI: Section2–5)**	**15 Hours**
UNIT III	**Application of vector integration:** Gauss Divergence Theorem– Green'stheorem–Stoke's Theorem(StatementsOnly)– Simple Problems. **(Chapter VI: Section 6–10)**	**15 Hours**
UNIT IV	**Fourier series:** Definition of Fourier series–Fourier series expansion of periodic function with period 2π $[(0, 2\pi), (0, 2l)]$ **(Chapter VI: Sections 1 and 2)**	**15 Hours**
UNIT V	**Even and odd functions:** Definition of even and odd functions – Properties–Use of these functions in Fourier series– Half range Fourier series – Development in cosine series–Development in sine series. **(Chapter VI:Section 3–5)**	**15 Hours**

TextBooks:

1. T.K.Manickavasagam Pillai and S.Narayanan,Vector Algebra and Analysis, S.Viswanathan Printers and Publishers Pvt. Ltd.,Chennai, 1986.(For units I, II and III)
2. T.K.Manickavasagam Pillai and S.Narayanan,Calculus Volume III, S.Viswanathan Printers and Publishers Pvt.Ltd., Chennai, 2004. (For units IV&V)

ReferenceBooks:

1. P.R.Vittal and V.Malini, Vector Calculus, Fourier Series and Fourier Transforms, Margham Publications, Chennai, Reprint 2013.
2. P.Durai Pandiyan and Lakshmi Durai Pandiyan,VectorAnalysis,Emerald Publishers 1986.
3. R.Balaji,Transforms and Partial Differential Equations, G.Balaji Publishers, 2005.

Web–Resources:

1. https://www.sakshieducation.com/Engg/EnggAcademia/CommonSubjects/MathMethods-Fourier_Series.pdf
2. https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&ved=2ahUKEwjqsY2k9NzyAhXR4nMBHYVhBlUQFnoECAcQAQ&url=https%3A%2F%2Fwww.math.ust.hk%2F~machas%2Fvector-calculus-for-engineers.pdf&usg=AOvVaw3UmDgmJIoj7nWOznTeyO7P

Course Outcomes

On Completion of the Course, the students should be able to

CO1 : explain the concepts of differentiation of vector field.
CO2 : integrate the vecto rfunctions over curves and surfaces.
CO3 :compute integrals using Green's theorem,Stoke's theorem and the divergence theorem.
CO4 :solve the wave equations, Laplace equations using Fourier series
CO5 : derive the Fourier Series to the periodic signals in half range.

Mapping of Course outcomes with Programme Outcomes & Programme Specific Outcomes:

CO/PO	PO					PSO				
	1	2	3	4	5	1	2	3	4	5
CO1	S	S	M	W	S	S	M	S	S	S
CO2	S	S	M	W	S	S	M	S	S	S
CO3	S	S	M	W	S	S	S	S	S	M
CO4	S	S	M	W	S	S	M	M	S	S
CO5	S	S	M	W	S	S	S	M	S	S

S-StronglyCorrelated

M-ModeratelyCorrelated

W-WeaklyCorrelated
N–NoCorrelation

Semester III / SMC I	MATHEMATICAL STATISTICS I	Course Code:
Instruction Hours: 4	Credits: 3	Exam Hours: 3
Internal Marks :25	External Marks:75	Total Marks: 100

Cognitive Level	**K 1** Recalling **K 2** Understanding **K 3** Applying **K4** Analyzing **K5** Evaluating **K 6** Creating	
Course Objectives	**The Course aims** ➢ To equip the knowledge of probability. ➢ To acquire knowledge about one dimensional random variables. ➢ To impart knowledge about two dimensional random variables. ➢ To impart the knowledge about mathematical expectation. ➢ To study the discrete probability distributions.	
UNIT	**Content**	**No.of Hours**
I	Theory of Probability Probability – Mathematical and Statistical Probability, Axiomatic approach to Probability - Addition and multiplication theorem (two events only) – Baye's theorem– Simple problems.	**12 Hours**
II	One Dimensional Random Variables Random variables – concepts – one dimensional random variable – discrete and continuous r.v – probability mass function – probability density function – distribution function – Simple problems.	**12 Hours**
III	Two Dimensional Random Variables Two dimensional random variables – discrete – continuous random variables – marginal, conditional probability functions – Simple problems.	**12 Hours**
IV	Mathematical Expectation Mathematical expectation – definition – properties of expectation (with proof). Moments – relation between raw moments and central moments only– their relations. Variance –properties of variance, covariance (concept only) – Simple problems – conditional expectations and conditional variance (concept only) – Simple problems.	**12 Hours**
V	Discrete Probability Distributions Concept of Moment Generating Function (m.g.f)- Cumulant Generating Function (c.g.f)- Characteristic function. Binomial and Poisson distribution – definition – moments- mean and variance only - recurrence relation for the moments – Moment generating function - Characteristic function - Simple problems only.	**12 Hours**

Text Book	S.C. Gupta & V.K.Kapoor , Fundamentals of Mathematical Statistics- Sultan Chand and Sons,11th Edition ,2014 Unit I: Chapter 3 - 3.1, 3.3, 3.4, 3.5, 3.9, 3.9.1, 3.9.3, 3.11, 3.12, 3.13 Unit V: Chapter 8 - 8.4, 8.4.1, 8.4.2 ,8.4.6, 8.4.7, 8.4.8, 8.5, 8.5.2, 8.5.4,8.5.5 8.5.6, 8.5.7, 8.5.8
Reference Books	1. S.P. Gupta, Statistical methods- Sultan Chand and Sons, 45th Edition 2017 2. R.S.N.Pillai&V.Bagavathi, Statistics –S.Chand& company LTD, Reprint 2014.
e - Resources	1. http://www.dcpehvpm.org 2. https://pdfbooksforstd.blogspot.com
Course Outcomes	CO1:apply the theory of probability CO2:utilize one dimensional random variables. CO3:compute two dimensional random variables. CO4:discuss the mathematical expectation CO5:explain discrete probability distributions

Semester-III/ MDC I	**MATHEMATICS FOR COMPETITIVE EXAMINATIONS I**	Course Code:
Instruction Hours:2	Credits: 2	Exam Hours:3
Internal Marks-25	External Marks-75	Total Marks: 100

Cognitive Level	**K1-Recalling** **K2 –Understanding** **K3-Applying** **K4 – Analyzing** **K5 – Evaluating** **K6-Creating**	
Course Objectives:	• To study the problems on series. • To understand the coding and decoding. • To learn the problems relating blood relation. • To know about the mathematical puzzles. • To interpret the logics using venn diagram	
UNIT	**CONTENT**	**HOURS**
Unit I	**Series Completion:** Number Series –Alphabet Series.**(P.No. 139– 159**)	**6 Hours**
Unit II	**Coding and Decoding:** Letter Coding–Number Coding–Matrix Coding. **(P.No. 169– 192)**	**6 Hours**
Unit III	**Blood Relation:** Deciphering jumbled up descriptions–Relation Puzzle–Coded Relations**. (P.No. 220 – 241)**	**6 Hours**
Unit IV	**PuzzleTest:** Seating / Placing arrangements – Comparison Test.**(**P.No. 253 –278**)**	**6 Hours**
Unit V	**VennDiagram** Direction Sense Test–Logical Venn Diagram**.** **(P.No.324 –333, 348 – 366).**	**6 Hours**

Text Book:

R.S. Agarwal, A Modern approach to Verbal and Non-Verbal Reasoning, S.Chand& Company Ltd, New Delhi-55.

Reference Books:

1. Dinesh Khattar, The Pearson Guide to Quantitative Aptitude for Competitive Examinations, Pearson Publications,2014.
2. Arun Sharma,Teach Yourself Quantitative Aptitude,McGraw Hill Education,2017.

Web-Resources:

1. https://www.splessons.com/lesson/profit-loss-problems/
2. https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&cad=rja&uact=8&ved=2ahUKEwiQ7pHb9tzyAhWp7HMBHcEbBcEQFnoECAMQAQ&url=https%3A%2F%2Fgradeup.co%2Fquantitative-aptitude-practice-questions-answers-pdf-i&usg=AOvVaw11iv2GCS3pvGLz9i2Nd48L

Course Outcomes:

On completion of the course the learner will be able to

CO1: solve the problems on series.
CO2: write the coding and decoding.
CO3: evaluate problems on blood relation
CO4: solve mathematical puzzles
CO5:compute problems using venn diagram.

Semester III / SEC III	DIFFERENTIAL EQUATIONS USING SCILAB	Course Code:
Instruction Hours: 2	Credits: 2	Exam Hours: 3
Internal Marks :40	External Marks:60	Total Marks: 100

Cognitive Level	**K 1** Recalling **K 2** Understanding **K 3** Applying **K4** Analyzing **K5** Evaluating **K 6** Creating	
Course Objectives	The Course aims to understand SCI language and to solve linear differential equations using SCI commands under different methods.	
UNIT	**Lab Exercises**	**Hours**
	1. Solve the First order differential equation $\frac{dy}{dx} = e^{-x}$ with $y = 0$ for $x = 0$. 2. Solve the First order differential equation $\frac{dy}{dx} + e^{-x}\, y = x^2$. 3. Solve the First order differential equation $\frac{dy}{dx} = (4x + y + 3)^2$. 4. Solve the Second order differential equation *Y''= -4y,y(0)=3 and y'(0)=0.* 5. Solve the Second order differential equation *Y''= 6y-y',y(0)=1 and y'(0)=0.* 6. Solve the Laplace transform of $f(t) = 3 - 2e^{-t}$ 7. Solve the Laplace transform of $f(t) = t^2 e^{-3t}$ 8. Solve the Inverse Laplace transform of $f(t) = \frac{s}{(s^2+a^2)^2}$ 9. Solve the Inverse Laplace transform of $f(t) = \frac{s+2}{(s^2+4s+5)^2}$ 10. Solve the Inverse Laplace transform of $f(t) = \frac{s}{(s+3)^2+4}$	30 Hours

Semester-IV/ Core Course-VII	SEQUENCES AND SERIES	Course Code:
Instruction Hours: 4	Credits: 4	Exam Hours: 3
Internal Marks: 25	External Marks: 75	Total Marks: 100

Cognitive Level	**K1-Recalling** **K2-Understanding** **K3-Applying** **K4-Analyzing** **K5-Evaluating** **K6- Creating**	
Course Objectives	**The Course aims** • To lay a good foundation for sequences. • To study the behavior of monotonic sequences. • To know the concepts of subsequences and Cauchy sequences. • To find the convergence of series using different tests. • To learn about the alternating series and absolute convergence.	
UNIT	**CONTENT**	**HOURS**
UNIT I	**Sequences:** Sequences – Bounded Sequences–Monotonic Sequences – Convergent Sequences – Divergent and Oscillating Sequences.**(Chapter3:Sec.3.0–3.5)**	**15 Hours**
UNIT II	**Monotonic Sequences:** Algebra of Limits–Behavior of Monotonic Sequences. **(Chapter3:Sec.3.6&3.7)**	**15 Hours**
UNIT III	**Subsequences:** Some theorems on limits–Subsequences–Limit points–Cauchy sequences. **(Chapter3:Sec.3.8-3.11)**	**15 Hours**
UNIT IV	**Series:** Infinite series–Cauchy'sgeneral principle of Convergence–Comparison test.(comparison test statement only,no proof**).** **(Chapter4:Sec.4.1&4.2)**	**15 Hours**
UNIT V	**Tests of convergence:** D Alembert's Ratio test–Cauchy's root test–Alternating Series–Absolute Convergence (Statements only for all tests**).** **(Chapter 4: Sections- Relevant part of 4.3 and 4.4,Chapter 5: Sec 5.1 & 5.2)**	**15 Hours**

TextBooks:

1. Dr.S.Arumugam & Mr.A.Thangapandi Isaac Sequences and Series, New Gamma Publishing House,2002.

ReferenceBooks:

1. T.K. Manickavasagam Pillai, T. Natarajan and K.S. Ganapathy, Algebra Vol I, S.Viswanathan Printers & Publishers Pvt.Ltd., Chennai,2018.

2. M.K.Singal and Asha Rani Singal,A first course in Real Analysis,20th edition,R.Chand and Co.,New Delhi.

Web–Resources:

1. https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&cad=rja&uact=8&ved=2ahUKEwim0c-YktjyAhXygtgFHQWjDbUQFnoECAMQAQ&url=http%3A%2F%2Fwww.stet.edu.in%2FSSR_Report%2FStudy%2520Material%2FPDF%2FMATHS%2FUG%2FII%2520Year%2F1.pdf&usg=AOvVaw2qrx17JQoDI4_E8hFnAV1w
2. https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&ved=2ahUKEwibxYSj-9zyAhUTIbcAHXdWCQ8QFnoECCUQAQ&url=https%3A%2F%2Fpeople.math.osu.edu%2Ffowler.291%2Fsequences-and-series.pdf&usg=AOvVaw3b6gLzhe84ycqzcCJCSqB5

Course Outcomes:

On Completion of the Course, Students should be able to

CO1 : find the convergence of sequences
CO2 : evaluate the limits and describe the behavior of monotonic sequences
CO3 : interpret the concepts of subsequences and Cauchy sequences.
CO4 : discuss the convergence or divergence of series using various tests
CO5 : compute the absolute convergence of series.

Mapping of Course outcomes with Programme Outcomes & Programme Specific Outcomes:

CO/PO	PO					PSO				
	1	2	3	4	5	1	2	3	4	5
CO1	S	M	M	W	S	S	M	S	S	S
CO2	S	S	M	W	S	S	M	S	S	S
CO3	S	S	M	W	S	S	M	S	S	S
CO4	S	S	M	W	S	S	M	S	S	M
CO5	S	S	M	W	S	S	M	S	S	M

S – Strongly Correlated

M – Moderately Correlated

W – Weakly Correlated

N – No Correlation

Semester IV / CC VIII	NUMERICAL ANALYSIS	Course Code:
Instruction Hours: 4	Credits: 4	Exam Hours: 3
Internal Marks: 25	External Marks: 75	Total Marks: 100

Cognitive Level	**K1-Recalling** **K2 –Understanding** **K3-Applying** **K4 – Analyzing** **K5-Evaluating** **K6- Creating**	
Course Objectives	**The Course aims** • To introduce the basic concepts of solving algebraic transcendental equations. • To introduce the basic concepts of solving linear and non-linear equations. • To understand techniques of interpolation. • To understand methods too numerical differentiation and integration. • To understand numerical solution of ordinary differential equations.	
UNIT	**CONTENT**	**HOURS**
UNIT I	Solution of algebraic and transcendental equations – Bisection methods – Iteration method – Method of False Position – Newton Raphson method. (Sections : 2.2 , 2.3 , 2.4 and 2.5)	**12 Hours**
UNIT II	Finite differences – Forward differences and backward differences – Central differences – symbolic relations and Separations of Symbols – Newton's formula for Interpolations – Interpolation with unevenly spaced points – Lagrange's interpolation formula – Divided differences and their properties – Newton's general interpolation formula.(Sections 3.3, 3.3.1 , 3.3..4, 3.6 , 3.9.1 , 3.10 , 3.10.1)	**12 Hours**
UNIT III	Numerical differentiation – Using Newton's Forward and Backward difference Formulae – Numerical Integration – Trapezoidal rule – Simpson's 1/3 rule – Simpson's 3/8 rule. (Sections 5.1 , 5.2 , 5.4, 5.4.1 , 5.4.2 , 5.4.3)	**12 Hours**
UNIT IV	Gauss Elimination method – Iterative methods – Gauss Jacobi method – Gauss Seidal method. (Sections 6.3.2 , 6.4)	**12 Hours**
UNIT V	Numerical solutions of ordinary differential equations – Solution by Taylor series – Picard's method of successive approximations – Euler's method – Modified Euler method – Runge – Kutta methods.	**12 Hours**

TEXT BOOK :

" Introductory methods of Numerical Analysis (Third edition)" , by Sastry ,S.S., Prentice Hall of India , New Delhi , 1998 .

REFERENCE BOOKS:

1 Kandasamy , P., Thilakavathy , K. and Gunavathy , K." Numerical Methods", S,Chand and Co., New Delhi , 1999.

2 "Numerical Methods in Science and Engineering" by Dr. M. K. Venkatraman M.A.,M.Tech., Ph.D., National Publishing Co., 1997 .

Web–Resources:

- https://en.wikipedia.org/wiki/Runge%E2%80%93Kutta_methods
- https://www.bmj.com/about-bmj/resources-readers/publications/statistics-square-one/11-correlation-and-regression

Course Outcomes :

On completion of the course, students able to

CO1: acquire basic knowledge in solving interpolation with equal interval problems by various numerical methods. Estimate the missing terms through interpolation methods.

CO2: apply appropriate numerical methods to solve the problem with most accuracy.

CO3: be able to derive Trapezoidal rule, Simpson's 1/3 – rule, Simpson's 3/8 – rule.

CO4: be able to find the solution of linear systems by using Direct methods, Matrix inversion method, Gaussian elimination methods, Gauss-Jordan Method.

CO5: be able to find the find the solution of ordinary differential equation of first order by Euler, Taylor and Runge-Kutta methods.

Mapping of Course outcomes with Programme Outcomes & Programme Specific Outcomes:

CO/PO	PO					PSO				
	1	2	3	4	5	1	2	3	4	5
CO1	S	S	M	S	S	S	M	S	S	S
CO2	S	S	M	S	S	S	M	S	S	S
CO3	S	S	M	S	S	S	M	S	S	S
CO4	S	S	M	S	S	S	M	S	S	S
CO5	S	S	M	S	S	S	M	S	S	S

S - Strongly Correlated

M - Moderately Correlated

W – Weakly Correlated

N – No Correlation

Semester IV / SMP I	MATHEMATICAL STATISTICS PRACTICAL USING R-PROGRAMMING	Course Code:
Instruction Hours: 2	Credits: 2	Exam Hours: 3
Internal Marks : 40	External Marks: 60	Total Marks: 100

Cognitive Level	**K 1** Recalling **K 2** Understanding **K 3** Applying **K4** Analyzing **K5** Evaluating **K6** Creating	
Course Objectives	**The Course aims** After taking the course, students will be able to • Use R for statistical programming and computation • Write functions and use R in an efficient way • Fit some basic types of statistical models	
UNIT	**Content**	**No.of Hours**
Programs	• Plotting Bar chart • Plotting histogram and pie chart • Measures of central tendency -Mean, median, mode • Measures of Dispersion- std. deviation, mean deviation • Correlation - Linear models. • Large sample tests • Small sample t- test • Small sample F-test • Small sample Chi-square test • ANOVA (one way) • ANOVA (Two way)	
Reference Books	1. Alain F. Zuur, Elena N. leno, Erik H.W.G. Meesters Beginner's Guide to Springer, 2009. 2. Allerhand M. Tiny Handbook of R-Springer Briefs in Statistics, 2011 3. Baayen R. Analyzing Linguistic Data - A Practical Introduction to Statistics usin 2008. 4. Gardener M. Beginning R - The Statistical Programming Language, 2012. 5. Jim Albert, Maria Rizzo R by Example, 2012. 6. Matloff N. Art of R Programming - A Tour of Statistical Software Design, 2011.	

Semester IV / SMC II	MATHEMATICAL STATISTICS III	Course Code:
Instruction Hours: 4	Credits: 3	Exam Hours: 3
Internal Marks :25	External Marks:75	Total Marks: 100

Cognitive Level	**K 1** Recalling **K 2** Understanding **K 3** Applying **K4** Analyzing **K5** Evaluating **K 6** Creating	
Course Objectives	**The Course aims** • To impart the knowledge about the degree of relationship between variable sand estimate unknown variable from known variable. • To acquire knowledge about normal distribution. • To impart the knowledge about exact sampling distribution. • To study large sample tests • To study small sample tests	
UNIT	**Content**	**No. of Hours**
I	**Continuous Distribution** Normal distribution – definition– properties of Normal distribution -mode - median -moment generating function- moments of normal distribution. Uniform distribution – definition- mean and variance.	**12 Hours**
II	**Correlation and Regression Analysis** Correlation (two variables only) – Karl Pearson's Coefficient of Correlation and its properties. Spearman's Rank Correlation Coefficient (repeated and non-repeated). Lines of Regression – definition – properties of Regression Coefficients – Simple problems.	**12 Hours**
III	**Exact Sampling Distributions** Sampling distributions – Chi Square, Student's t, F-	**12 Hours**

	distribution– definition, derivation of the distribution and its mean and variance only. - Relationship among t, F & Chi Square distribution.	
IV	Test of hypothesis–null and alternative, type I and type II errors, one tailed and two tailed tests, level of significance, Procedure for testing hypothesis. Test of significance – large sample tests; test of significance for single proportion, difference of proportions, single mean, difference of means – Simple problems.	**12 Hours**
V	**Small Sample Tests** Small sample tests –t-test for single mean, difference of means and paired t- test. F-test for equality of variances – Chi square test – test for goodness of fit - test for Independence of attributes - Simple problems.	**12 Hours**
Text Book	S.C.Gupta & V.K.Kapoor, Fundamentals of Mathematical Statistics Sultan Chand and Sons,11th Edition ,2014 UNIT I: Chapter 9 -9.2,9.2.1,9.2.2,9.2.3,9.2.4,9.2.5,9.2.6,9.2.7,9.2.8 UNIT III: Chapter 16 -16.1,16.2,16.2.1,16.2.4,16.5,16.5.1,16.5.2,16.7,16. Chapter 15:15.1,15.2,15.3,15.3.1	
Reference Books	1. S.P.Gupta,Statistical methods-Sultan Chand and Sons,45th Edition 2017 2. R.S.N.Pillai & V.Bagavathi, Statistics–S.Chand & company LTD, Reprint 2014.	
e - Resources	1. http://www.dcpehvpm.org 2. https://pdfbooksforstd.blogspot.com	
Course Outcomes	CO1: Compute correlation coefficients and regression equations. CO2: Identify the applications of normal distribution. CO3: Explain exact sampling distribution. CO4: Apply large sample tests. CO5: Use small sample tests.	

Semester-IV/MDC-II	**NME II - MATHEMATICS FOR COMPETITIVE EXAMINATIONS II**	CourseCode:
Instruction Hours:2	Credits:2	Exam Hours:3
Internal Marks-25	External Marks-75	Total Marks:100

Cognitive Level	**K1-Recalling** **K2 –Understanding** **K3-Applying** **K4 – Analyzing** **K5 – Evaluating** **K6-Creating**	
Course Objectives:	• To learn the problems solving techniques for numbers. • To study the operations on numbers. • To develop arithmetical skills. • To know about puzzles. • To enhance the facts of logical reasoning	
UNIT	**CONTENT**	**HOURS**
Unit I	**Number,Ranking and Time Sequence Test** Number Test – Ranking Test – Time sequence Test.**(P.No. 417 –432)**	**6 Hours**
Unit II	**Mathematical Operations:** Problem Solving by Substitution–Interchange of signs and numbers– Deriving the appropriate conclusion. **(P.No. 432 –454)**	**6 Hours**
Unit III	**Arithmetical Reasoning** Calculation based Problem–Data based question–Problem on ages – Venn diagram based questions**.** **(P.No. 459– 474)**	**6 Hours**
Unit IV	**Missing Characters** Inserting the Missing character. **(P. No.475–492)**	**6 Hours**

UnitV	**Logical Reasoning** Data sufficiency–Logical Sequence of Words–Logical Reasoning.(**P. No.495 – 506, 455– 458, PartII1-14)**	**6 Hours**

Text Book:

R.S.Agarwal, A Modern Approach to Verbal and Non-Verbal Reasoning,S.Chand &Company Ltd, New Delhi-55.

Reference Books:

1. Dinesh Khattar, The Pearson Guide to Quantitative Aptitude for Competitive Examinations, Pearson Publications,2014.
2. Arun Sharma,Teach Yourself Quantitative Aptitude,Mc Graw Hill Education, 2017.

Web-Resources:

1. https://www.splessons.com/lesson/profit-loss-problems/
2. https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&cad=rja&uact=8&ved=2ahUKEwiQ7pHb9tzyAhWp7HMBHcEbBcEQFnoECAMQAQ&url=https%3A%2F%2Fgradeup.co%2Fquantitative-aptitude-practice-questions-answers-pdf-i&usg=AOvVaw11iv2GCS3pvGLz9i2Nd48L

CourseOutcomes:

On completion of the course the learner will be able to

CO1:develop quantitative ability.

CO2: apply mathematical operations.

CO3: decipher arithmetical reasoning

CO4: solve logical reasoning.

CO5 : crack competitive examinations.

DISCIPLINE DEVOTION DUTY

Semester IV / AEC I	MATLAB PROGRAMMING	Course Code:
Instruction Hours: 2	Credits: 2	Exam Hours: 3
Internal Marks :40	External Marks:60	Total Marks: 100

Cognitive Level	**K 1** Recalling **K 2** Understanding **K 3** Applying **K4** Analyzing **K5** Evaluating **K6** Creating	
UNIT	**Content**	**No.of Hours**
	1. Matrix Manipulation 2. Program to draw 2 – D Graphs. 3. Program to draw sub – plots. 4. Program to draw 3 – D Graphs. 5. Solving Quadratic Equation. 6. To find Binomial Coefficient n_{c_r} 7. To generate Fibonacci numbers. 8. To solve differential Equation using Bisection Method. 9. Solving Algebraic Equations Using Newton Raphson Method. 10. Solving System of Equations Using Matlab Codes. 11. Numerical solution to find integral using Trapezoidal Rule. 12. Numerical solution to find integral using Simpson's 1/3 Rule. 13. To Solve Differential Equation Using Euler's Method. 14. To solve Differential Equation Using Runge – Kutta Method.	**30 Hours**

Semester V&VI

Semester V / CC IX	ALGEBRA	Course Code:
Instruction Hours: 6	Credits: 4	Exam Hours: 3
Internal Marks :25	External Marks:75	Total Marks: 100

Cognitive Level	**K 1** Recalling **K 2** Understanding **K 3** Applying **K4** Analyzing **K5** Evaluating **K6** Creating
Course Objectives	**The Course aims** • To acquire the knowledge of basic abstract system of mathematics. • To understand the concepts of subgroups, normal subgroups, isomorphism and homomorphism. • To study the algebraic systems with two binary operations and properties of rings up to isomorphism. • To learn the concepts of vector spaces, subspaces and linear independence. • To explore the concepts of basis and dimension, matrix of a linear transformation and the inner product space.

UNIT	Content	No.of Hours
I	**Groups** Introduction –Definitions and Examples – Subgroups – Cyclic groups – Order of an element – Cosets and Lagrange's Theorem . **(Sections 3.1, 3.5 to 3.8)**	**18 Hours**
II	**Groups** Normal subgroups and quotient groups – Finite groups and Cayley's theorem – isomorphism and homomorphism. **(Sections 3.9 to 3.11).**	**18 Hours**
III	**Rings** Definition and examples – Elementary properties of rings –Types of rings – Characteristics of rings – Subrings – Ideals – Quotient rings – Homomorphism of rings. **(Sections 4.1 to 4.8 & 4.10).**	**18 Hours**
IV	**Vector spaces** Introduction –Definition and examples – Subspaces – Linear transformation- Span of a set – Linear independence. **(Sections 5.1 to 5.5)**	**18 Hours**
V	**Vector spaces and Inner Product Space** Basis and dimension – Rank and Nullity – Matrix of a linear transformation – Inner product space.	**18 Hours**

	(Sections 5.6 to 5.8 & Chapter 6)	
Text Book	Modern Algebra by S. Arumugam and A. Thangapandi Isaac., New Gamma Publishing House, Revised Edition, Palayamkottai, 2003.	
Reference Books	1. R. Balakrishnan& N. Ramapathran, Modern Algebra, Vikas publishing House Pvt Ltd, New Delhi, 1982. 2. S. G. Venkatachalapathy, Modern Algebra, Margham Publications, 2016. .	
Web - Resources	https://nptel.ac.in	
Course Outcomes	On completion of the course, the learners will be able to **CO 1:** gain the knowledge of sets, mapping, relations, groups and subgroups. **CO 2:** interpret the notion of normal groups and isomorphism. **CO 3:** analyze the concepts of homomorphism and isomorphism for rings and field. **CO 4:** recognize the facts of vector space and linear independence. **CO 5:** calculate the basis, dimension, matrix of the linear transformation and inner product space	

Mapping of Course outcomes with Programme Outcomes & Programme Specific Outcomes:

CO/PO	Pos						PSOs		
	1	2	3	4	5	6	1	2	3
CO1	S	S	M	S	W	-	S	S	W
CO2	S	S	M	S	W	-	S	S	W
CO3	S	S	M	S	M	-	S	S	W
CO4	S	S	M	S	W	-	S	S	W
CO5	S	S	M	S	M	-	S	S	W

S - Strongly Correlated
M - Moderately Correlated
W - Weakly Correlated
N - No Correlation

Semester- V/ Core Course-X	REAL ANALYSIS	Course Code:
Instruction Hours: 6	Credits: 4	Exam Hours:3
Internal Marks:25	External Marks:75	Total Marks:100

Cognitive Level	**K1-Recalling** **K2 –Understanding** **K3-Applying** **K4 – Analyzing** **K5 – Evaluating** **K6-Creating**	
Course Objectives	**TheCourseaims** • To lay a good foundation for real analysis. • To explore the concepts of continuity and discontinuity. • To understand the derivability and itsrelated parameters. • To learn mean value theorems and Taylor's series. • To gain the knowledge of Riemann integration	
UNIT	**CONTENT**	**HOURS**
UNIT I	**Real numbers** Absolute value – Completeness –Some important subsets of R – Representation of real numbers as a point on a straight line –Intervals– Countable andUncountable sets. **(Chapter1:Sec5-10)**	**18 Hours**
UNIT II	**Limits and Continuity** Continuous functions – Types of discontinuities – Algebra of Continuous functions – Boundedness of Continuous Functions – Intermediate value Theorem–Inverse function theorem–Uniform continuity of a function.**(Chapter5: Section: 2-8)**	**18 Hours**
UNIT III	**Derivatives** Introduction–Derivability and continuity–Algebra of derivatives– Inverse function theorem for derivatives–Darboux's theorem–Inverse Trigonometric Functions–Derivatives of Inverse Trigonometric Functions. **(Chapter 6 :Sec1-7)**	**18 Hours**
UNIT IV	**Mean ValueTheorems** Rolle's Theorem – Lagrange's Mean value theorem–Cauchy's Mean Value Theorem -Taylor's theorem –Taylor Series –PowerSeries expansions of some standard functions. **(Chapter 8: Sec1-6)**	**18 Hours**

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NIT V	**Riemannintegration** Introduction –Riemann Integrability and integral of a bounded functions over finite domain - Darboux's theorem –Another equivalent definition of Integrability and Integral -Conditions of Integrability – Particular classes of bounded integrable functions –Properties of Integrable functions – Functions defined by definite integrals –Mean Value Theorem of integral calculus**(Chapter6:6.1-6.9)**	**18Hours**

Text Books:

1. M.K.Singa land AshaRaniSingal,A first course in Real Analysis,34 th edition,R.Chand and Co.,New Delhi, 2020. (For units I to IV).
2. Shanti Narayan,A Course of Mathematical Analysis ,S.Chand and Co.,New Delhi,1962.(For Unit V).

Reference Books:

1. Walter Rudin,Principles of Mathematical Analysis,Thirdedition,McGraw-Hill International Company,NewYork, 1984.
2. Robert G.Bartle,Donald R.Sherbert,Introduction to RealAnalysis,Third Edition,Shri Balaji Art, Delhi.

Web–Resources: https://nptel.ac.in

Course Outcomes

On Completion of the Course, Students should be able to

CO1 : apply the order completeness property.
CO2 :differentiate the continuity and discontinuity of functions.
CO3 : find the derivative of a given function.
CO4 : demonstrate the mean value theorems.
CO5 : interpret the integrability

Mapping of course outcomes with Programme Outcomes & Programme Specific Outcomes:

CO/PO	PO					PSO				
	1	2	3	4	5	1	2	3	4	5
CO1	S	S	S	W	M	S	S	S	S	M
CO2	S	S	S	W	M	S	S	S	S	M
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	W	S	S	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	S

S-Strongly Correlated

M-Moderately Correlated

W-Weakly Correlated

N–No Correlation

Semester-V/Core Course-XI	ASTRONOMY	Course Code:
Instruction Hours:6	Credits: 4	Exam Hours:3
Internal Marks:25	External Marks:75	Total Marks:100

Cognitive Level	**K1-Recalling** **K2 –Understanding** **K3-Applying** **K4 – Analyzing** **K5-Evaluating** **K6- Creating**	
Course Objectives	**TheCourseaims** • To introduce the exciting world of astronomy. • To study spherical trigonometry in the field of astronomy. • To conceptualize the structure of the solar system and the universe. • To classify the difference between the planets, stars and types of galaxies in the universe. • To relate the earth,sun,galaxy with the universe.	
UNIT	**CONTENT**	**HOURS**
UNITI	**SphericalTrigonometry** Sphere –Secondaries – Spherical figures – spherical triangle –Polar triangle – Cosine formula – Sine formula – Cotangent formula – Sublemental cosine formula – Napier's analogies –Napier's rules Relevantpropertiesofsphereandformulaeinsphericaltrigonometry - Celestial sphere and diurnalmotion-Celestial coordinates-siderealtime. **(Chapter I full, Chapter II:Article 39-69)**	**18 Hrs**
UNITII	**CelestialSphere** Morning and evening stars-circumpolar stars- diagram of thecelestial sphere-zones of earth-perpetual day-dip of horizon-to find an expression for Dip – To find the distance between two mountains- Effects of Dip- Twilight – To find the duration of Twilight –To find the condition that Twilight may lost throughout night – To find the number of consecutive nights having Twilight throughout night – To find the duration of Twilight when it is shortest – Civil, nautical and astronomical twilights.**(ChapterII:Article80-82,86,87,89,90,Sec5: Article106-109,Sec6:Article111-116)**	**18 Hrs**
UNIT III	**Refraction** Refraction-lawsofrefraction-Astronomical refraction - tangentformula for refraction -Cassini'sformula- To find Cassini's constants A and B - horizontalrefraction-Geocentricparallax: Parallax – Effects of Geocentric Parallax-horizontalparallax.**(Chapter IV:Article 117-120,129,130,131, Chapter V:Article135-145)**	**18 Hrs**

UNIT IV	**Kepler'sLaws** Kepler'slaws-verificationof1 st and2 nd lawsinthecaseofearth-Anomalies -Kepler's equation-Seasons-causes-kinds of years. **(ChapterVI,VIIArticle173-175)**	**18 Hrs**
UNIT V	**TheMoon** Moon-sidereal andsynodicmonths -elongation- phaseof moon - eclipses-umbra and penumbra-lunar and solar eclipses-eclipticlimits-maximumandminimum number of eclipses near anodean dina year Saros.**(Chapter XII: Article 229-241, ChapterXIII:Article 256-259, 269,273-275)**	**18 Hrs**

Text Books:

1.Kumaravelu S and Susheela Kumaravelu, Astronomy for degree classes, 7th edition, *SKV Publishers*,Nagercoil, 1986.

Reference Books:

1. M.L.Khanna,Sperical Astronomy,Jai Prakash and Co,1983.
2. Dinah L.Moche,Astronomy: A Self Teaching Guide,Eighth Edition, Wiley Publications, 2014

Web – Resources: https://nptel.ac.in

Course Outcomes

On Completion of the Course, Students should be able to

CO1 :perform calculations on celestial bodies.
CO2 :compare our galaxy with other galaxies.
CO3 :apply the principles and fundamental techniques of the astronomy.
CO4 :analyze the size,age structure and motion of the universe over all using cosmological models.
CO5 :understand the phases of moon and occurrence of Eclipses.

Mapping of Course outcomes with Programme Outcomes/Programme Specific Outcomes

CO/PO	PO					PSO				
	1	2	3	4	5	1	2	3	4	5
CO1	S	S	M	W	M	S	M	M	M	M
CO2	S	M	M	W	M	S	M	M	S	M
CO3	M	M	M	W	M	M	M	M	M	M
CO4	S	S	M	W	M	S	M	M	M	M
CO5	S	S	M	W	M	S	M	M	M	M

S-Strongly Correlated
M-Moderately Correlated
W-Weakly Correlated
N–No Correlation

Semester- V/ Core Course- XII	MECHANICS	Course Code:
Instruction Hours:5	Credits: 4	Exam Hours:3
Internal Marks:25	External Marks:75	Total Marks:100

Cognitive Level	**K1-Recalling** **K2 -Understanding** **K3-Applying** **K4 – Analyzing** **K5-Evaluating** **K6- Creating**	
Course Objectives	**The Course aims** • To provide the basicknowledge about Equilibrium of a particle and rigid bodies. • To learn the effect of Hanging strings and Suspension bridge. • To study the simple harmonic motions and projectiles. • To know the concepts of Impact and Impulsive force. • To handle practical problems in central objects and basics of moment of inertia.	
UNIT	**CONTENT**	**HOURS**
UNIT I	**Equilibrium of A Particle And Forces On A Rigid Body** Equilibrium of a Particle–Moment of aForce –General Motion of aRigid Body– Parallel Forces- Forces along the sides of a triangle -Couples. **(Chapter3: Section3.1,Chapter4: Sections4.1,4.2,4.4,4.5,4.6)**	**12 Hours**
UNIT II	**Hanging strings** Equilibrium of a uniform homogeneous strings–Suspension bridge– Simple Problems. **(Chapter9:Sections 9.1 &9.2)**	**12 Hours**
UNIT III	**RectilinearmotionsundervaryingforceandProjectiles** Simple Harmonic Motion –S.H.M along a horizontal line – S.H.M.along a vertical line — Forces on a Projectile –Projectile projected onaninclinedplane –enveloping Parabola orboundingparabola. **(Chapter 12:sections 12.1to12.3& 13.1to13.3)**	**12 Hours**
UNIT IV	**Impact** Impulsive force–Impact of Spheres–Impact of two smooth spheres-Impact of a smooth sphere on a plane–Oblique impact of two smooth spheres.**(Chapter 14:Sections14.1to14.5)**	**12 Hours**
UNIT V	**CentralOrbitsandMomentofInertia** General orbits–Central orbit–Conic as a centered orbit-Moment of Inertia– Perpendicular and Parallel axes theorems. **(Chapter16:Sections 16.1-16.3&Chapter17: 17.1)**	**12 Hours**

TextBooks:

P.Duraipandian,Laxmi Duraipandian and Muthamizh Jayapragasam, Mechanics S.Chand and Company,New Delhi,2007.

ReferenceBooks:

1. M.K.Venkatraman, Dynamics, Agasthiyar Publications, 11th Edition, 2004.
2. M.K.Venkatraman,Statics,A.Rajhan's Publications,16th Edition,1990.

Web–Resources: https://nptel.ac.in

Course Outcomes

On Completion of the Course,Students should be able to

CO1 : understand the equilibrium of a particle in statics and dynamics.
CO2 : Demonstrate theclear concept of Hanging strings and suspension bridge.
CO3 : learn the concepts of rectilinear motion, simple harmonic motion and
CO4 : projectile clarify the Impact of spheres and Impulsive forces.
CO5 : Exhibit the concepts on Central Orbit and Moment of Inertia.

Mapping of Course outcomes with Programme Outcomes & Programme Specific Outcomes:

CO/PO	PO					PSO				
	1	2	3	4	5	1	2	3	4	5
CO1	S	S	M	W	S	M	M	S	S	S
CO2	S	S	M	W	S	S	M	S	S	M
CO3	S	S	S	W	S	S	S	S	S	S
CO4	S	S	M	W	S	S	M	S	S	W
CO5	S	S	M	W	S	S	M	S	S	M

S - Strongly Correlated

M - ModeratelyCorrelated

W - Weakly Correlated

N – No Correlation

Semester V / DSE I	**DSE I - C PROGRAMMING THEORY**	**Course Code:**
Instruction Hours: 3	**Credits: 3**	**Exam Hours: 3**
Internal Marks: 25	**External Marks: 75**	**Total Marks: 100**

Cognitive Level	**K1-Recalling** **K2 –Understanding** **K3-Applying** **K4 – Analyzing** **K5-Evaluating** **K6- Creating**	
Course Objectives	**The Course aims** • To understand Programming basics and the fundamentals of C • To develop Mathematical and logical operations in C • Using if statement and loops in C Program. • Arranging data in arrays in C Program. • To understand File management Techniques in C Program.	
UNIT	**CONTENT**	**HOURS**
UNIT I	Overview of C – Basic Structure of C programs – Constants, Variable & operators and Expression – Data types **(Chapter 1 – Sec 1.4, Chapter 2 – sec 2.1 to 2.10), Chapter 3 – sec 3.1 to 3.16)**	**12 Hours**
UNIT II	Managing Input and Output Operators – Decision Making and Branching – Decision Making and Looping **(Chapter 4 - Sec 4.1 to Sec 4.5 , Chapter 5 – sec 5.1 to 5.9), Chapter 6 – sec 6.1 to 6.5)**	**12 Hours**
UNIT III	Arrays – Handling of character strings **(Chapter 7 – Sec 7.1 to 7.5, Chapter 8 – sec.8.1 to 8.9)**	**12 Hours**
UNIT IV	User – Defined Functions -Structures and Unions **(Chapter 9 – sec 9.1 to 9.15 , Chapter 10 – Sec 10.1 to 10.11)**	**12 Hours**
UNIT V	File Management in **C (Chapter 12 – Sec 12.1 to 12.7)**	**12 Hours**

Text Book:

E. BALAGURUSAMY , "PROGRAMMING IN ANSI C ", TATA Mc Graw Hill, SECONOD EDITION, 2000.

Web–Resources:

1. **https://www.learn-c.org/**
2. **https://www.tutorialspoint.com/cprogramming/c_useful_resources.htm**

Course Outcomes :

On completion of the course, students able to

CO1: Develop a C program

CO2: Control the sequence of the program and give logical outputs

CO3: Store different data types in the same memory

CO4: Manage I/O operations in C program

CO5: Understand the basics of file handling mechanisms

Semester V / AEC II	AEC II - INTRODUCTION TO ARTIFICIAL INTELLIGENCE	Course Code:
Instruction Hours: 2	Credits: 2	Exam Hours: 3
Internal Marks :25	External Marks:75	Total Marks: 100

Cognitive Level	**K 1** Recalling **K 2** Understanding **K 3** Applying **K4** Analyzing **K5** Evaluating **K6** Creating
Course Objectives	**The Course aims** • To develop semantic-based and context-aware systems to acquire, organize process, share and use the knowledge embedded in multimedia content. Research will aim to maximize automation of the complete knowledge lifecycle and achieve semantic interoperability between Web resources and services.

UNIT	Content	No.of Hours
I	Artificial Intelligence: The AI Problems- The underlying Assumptions – What is an AI Technique **Chapter 1: 1.1 to 1.3**	6 Hours
II	**Problems, Problem Spaces and Search:** Defining the problem as a state space search- Production system- Problem Characteristics **Chapter 2 – 2.1 to 2.3**	**6 Hours**
III	**Knowledge Representation Issues:** Representations and mappings – Approaches to knowledge representation – Issues in Knowledge representation **Chapter 4: 4.1 to 4.3**	**6 Hours**
IV	**Symbolic Reasoning under Certainty:** Introduction to Non monotonic Reasoning- Logics of Non monotonic Reasoning – Implementation issues **Chapter: 7- 7.1 to 7.3**	**6 Hours**
V	**Symbolic Reasoning under Certainty:** Augmenting a Problem Solver – Implementation : Depth – First Search, Implementation: Breadth – First Search **Chapter: 7- 7.4 to 7.6**	**6 Hours**

Text Book	Elaine Rich, Kevin Knight , Artificial Intelligence - Second Edition, , Tata McGraw-Hill Publishing Company Limited, New Delhi
Reference Books	1. S.Russsel and P.Norvig, "Artificial Intelligence – A modern Approach" Second Edition, Pearson Education 2. Davil Poole, Alan Mackworth, Randy Goebel, " Computational Intelligence: a logical approach", Oxford University Press
e - Resources	1. https://nptel.ac.in 2. http://mathforum.org, http://ocw.mit.edu/ocwweb/Mathematics, http://www.opensource.org, www.mathpages.com

Semester-VI/ Core Course-XIII	**COMPLEX ANALYSIS**	Course Code:
Instruction Hours:5	Credits:4	Exam Hours:3
Internal Marks-25	External Marks-75	Total Marks:100

Cognitive Level	**K1-Recalling** **K2 –Understanding** **K3-Applying** **K4 – Analyzing** **K5-Evaluating** **K6-Creating**	
Course Objectives	**The Course aims** • To lay a good foundation for complex analysis. • To acquire the knowledge in elementary and bilinear transformations. • To explore the ideas of complex integration. • To understand the expansions of series. • To find the residues using poles.	
UNIT	**Content**	**No.ofHours**
I	**Analytic Functions** Functions of complex variable – Limits –Theorems on limit – Continuousfunctions–Differentiability–The Cauchy-Riemann Equations–Analytic functions-Harmonic functions.**(Chapter2:Sections2.1-2.8).**	**18 Hours**
II	**Bilinear Transformations** Elementary transformations–Bilinear transformations–Cross ratio–Fixed pointsof bilinear transformations. **(Chapter 3: Section 3.1-3.4)**	**18 Hours**
III	**Complex Integration** Definite integral–Cauchy's theorem–Cauchy's integral formula –Higher derivatives.**(Chapter 6: Section 6.1 -6.4)**	**18 Hours**
IV	**Series Expansions** Taylor's series–Laurent's series–Zeros of an analytic function–Singularities.**(Chapter 7: Section 7.1- 7.4)**	**18 Hours**
V	**Calculus of Residues** Residues–Cauchy's Residue theorem –Evaluation of definite integrals.**(Chapter 8: Sections 8.1- 8.3)**	**18 Hours**

Text Books:

1. S.Arumugam,A.Thangapandi Issac,A.Somasundaram,Complex Analysis,Scitech Publications(India Pvt Ltd), Chennai, 2019.

ReferenceBooks:

1. P. Duraipandiyan, LaxmiDuraipandiyan, D. Muhilan, Complex Analysis, Emerald

Publishers,Channai, 1986.
2. T. K. Manikavachaagam Pillai, Complex Analysis, S. Viswanathan Printers and Publishers Pvt Ltd,2009.

Web-Resources:https://nptel.ac.in

Course Outcomes	On completion of the course,the learners will be able to
	CO 1: understand the basic concepts of Cauchy-Riemann equations in Cartesian and polarcoordinates.
	CO 2: interpret the analytic functions, harmonic functions, elementary and bilinear transformation concepts.
	CO 3: Apply the theorems using complex integration.
	CO 4: Expand theTaylor's and Laurent's series of functions.
	CO 5: Solve the definite integrals using the concepts of residues.

Mapping of Course outcomes with Programme Outcomes &Programme Specific Outcomes:

CO/PO	**PO**					**PSO**				
	1	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**
CO1	S	S	M	M	S	S	M	M	S	M
CO2	S	S	M	M	M	S	M	S	S	M
CO3	S	S	M	W	S	S	M	S	S	S
CO4	S	S	M	W	M	S	M	S	S	S
CO5	S	S	S	W	M	S	S	S	S	M

S-StronglyCorrelated
M-ModeratelyCorrelated

W-WeaklyCorrelated

N–NoCorrelation

Semester VI / CC XIV	OPERATIONS RESEARCH WITH TORA	Course Code:
Instruction Hours: 3 (Theory) + 2 (Practical)	Credits: 4	Exam Hours: 3
Internal Marks : 40	External Marks: 60	Total Marks: 100

Cognitive Level	**K 1** Recalling **K 2** Understanding **K 3** Applying **K4** Analyzing **K5** Evaluating **K 6** Creating	
Course Objectives	**The Course aims** • To find the solution of the LPP using graphical method • To understand different types of LPP • To solve Transportation Problem using various methods • To introduce Assignment Problem and solve it • To explore the concepts of Network Analysis and rules of networkconstruction	
UNIT	**Content**	**No.of Hours**
I	**Linear Programming Problem:** General Linear Programming Problem – Canonical and Standard form of LPP – Simplex method – Solving Simple Problems Using TORA **(Chapter 3: 3.4 to 3.5, Chapter 4: 4.3)**	**12 Hours**
II	**Linear Programming Problem (Simplex Method):** Dual Pair– Formulating a dual Problem – Duality and Simplex Method– Dual SimplexMethod.(Excluding Theorems) – Solving Simple Problems Using TORA **(Chapter 5: Section 5.2 - 5.3, 5.7, 5.9)**	**12 Hours**
III	**Transportation Problem:** The Transportation Table –Loops in Transportation Tables –Triangular basis in TP –Solution of a Transportation problem –Finding an Initial Basic feasible Solution – Test for Optimality – Transportation Algorithm	**12 Hours**

	(MODI Method) – Solving Simple Problems Using TORA **(Chapter 10: Section 10.5-10.10 & 10.13)**	
IV	**Assignment problem:** Mathematical formulation of the problem – Solution methods of Assignment algorithm – The Travelling Salesman Problem – Solving Simple Problems Using TORA **(Chapter 11: Section 11.2 - 11.3 & 11.7)**	**12 Hours**
V	**Network Scheduling by PERT/ CPM:** Network and Basic Components – Logical Sequencing –Rule of Network Construction –Concurrent Activities – Critical Path Analysis – Probability considerations in PERT –Distinction between PERT and CPM –Applications of Network Techniques – Solving Simple Problems Using TORA **(Chapter 25: Section 25.2 - 25.9)**	**12 Hours**
Lab Exercise	1. Solving Linear Programming Problem –Simplex method using TORA 2. Solving LPP in Dual Simplex method 3. Solving Transportation problem by MODI method. 4. Solving Assignment problem 5. Finding optimum solution of network scheduling by PERT/CPM method.	**12 Hours**
Text Book	Kanti Swarup, P.K. Gupta and Man Mohan, Operations Research, Sultan Chand and Sons , Educational Publishers, New Delhi, 2014.	
Reference Books	1. V. Sundaresan, K. Ganesan, Resource Managemant Techniques, A.R. Publications, 2002 . 2. J.K.Sharma, Operations Research Theory and Applications Macmillan India Ltd, 3rdedition, 2006.	

Course Outcomes	CO 1: analyze and solve linear programming models of real life situations CO 2: understand the problem solving method of Simplex and Big M Method. CO 3: exhibit the applications of Transportation Problem CO 4: solve Assignment problems CO 5: use PERT and CPM techniques in solving Network Analysis problems

Mapping of Course outcomes with Programme Outcomes &Programme Specific Outcomes:

CO/PO	PO					PSO				
	1	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**
CO1	S	S	S	S	S	S	S	S	S	S
CO2	S	S	S	S	S	S	S	S	S	S
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	S

S - Strongly Correlated

M - Moderately Correlated

W - Weakly Correlated

N - No Correlation

Semester-VI /CC XV	**GRAPH THEORY**	Course Code:
Instruction Hours:5	Credits:4	Exam Hours:3
Internal Marks-25	External Marks-75	Total Marks:100

Cognitive Level	**K1-Recalling** **K2 –Understanding** **K3-Applying** **K4 – Analyzing** **K5 – Evaluating** **K6-Creating**	
Course Objectives:	• To understand the basic concepts of the graphs. • To learn the various operations and degree sequences of graphs. • To discuss the properties of Eulerian, Hamiltonian graphs and trees. • To know about the planar graphs. • To gain the knowledge of colourability of the graph.	
UNIT	**CONTENT**	**HOURS**
Unit I	**Graphs and Subgraphs:** Introduction–The Konigsberg Bridge problem–Definition and examples–Degrees –Subgraphs –Isomorphism. **(Chapter1:Sections1.0,1.1 and Chapter2:Section 2.0-2.4)**	**12Hours**
UnitII	**Matrices and Degree Sequences:** Introduction - Matrices–Operations on graphs–Degree Sequences and Graphic Sequences–Walks, trials and paths – Connectedness and components.**(Chapter 2:Sections 2.8 & 2.9,Chapter 3:Sections3.0 - 3.2and Chapter 4: Sections 4.0-4.2)**	**12 Hours**
Unit III	**Eulerian and Hamiltonian graphs,Trees:** Introduction – Eulerian Graphs–Hamiltonian graphs–Characterization of Trees–Centre of a tree. **(Chapter 5: Sections 5.0- 5.2 and Chapter 6:Sections 6.0- 6.2)**	**12 Hours**
UnitIV	**Planar Graphs:** Introduction–Definition and properties–Characterization of Planar graphs. **(Chapter 8:Section 8.0–8.2)**	**12 Hours**

UnitV	**Colourability:** Introduction –Chromatic number and chromatic index –The Five Colour Theorem–Four colour problem–Chromatic polynomials.**(Chapter 9:Section 9.0 –9.4)**	**12 Hours**

Text Book:

1.S.Arumugam and S.Ramachandran, Invitation to Graph Theory,New Gamma Publishing House,Palayamkottai(2013).

ReferenceBooks:

1. Gary Chartrand and Ping Zhang, Introduction to Graph Theory,Tata McGraw-Hill,NewYork (2006).
2. S.Kumaravelu,Susheela Kumaravelu,Graph Theory,Janki Calender Corporation, Sivakasi(1999).

Web-Resources: https://nptel.ac.in

CourseOutcomes:

On completion of the course the learner will be able to

CO1: understand the concepts of graphs upto isomorphism.
CO 2: acquire the knowledge of degree sequences, connectedness and components of graphs.
CO3: demonstrate the characterization of Eulerian, Hamiltonian and trees.
CO4: interpret the planarity of graphs.
CO5:identify the chromatic number,index and polynomial of a graph.

Mapping of Course outcomes with Programme Outcomes &Programme Specific Outcomes:

CO/PO	PO					PSO				
	1	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**
CO1	S	S	S	S	S	S	S	S	S	S
CO2	S	S	S	S	S	S	S	S	S	S
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	S

S - Strongly Correlated

M - Moderately Correlated

W - Weakly Correlated

N - No Correlation

Semester-VI / DSE II	DSE II - C PROGRAMMING PRACTICAL	Course Code:
Instruction Hours: 3	**Credits: 3**	**Exam Hours: 3**
Internal Marks: 40	**External Marks: 60**	**Total Marks: 100**

Cognitive Level	**K 1 - Recalling** **K2 - Understanding** **K3 - Applying** **K4 - Analyzing** **K5 – Evaluating** **K6 - Creating**
Course Objectives	**The Course Objectives** • To develop a C Program. • To control the sequence of the program and give logical Output. • To manage input output operations in C Program. • To implement strings in C Programming. • To store different data types in the same memory.

UNIT	CONTENT	Hours
Programs	1. Solving a Quadratic Equation. 2. Sum of series (Sine , Cosine , e^x) 3. Ascending and descending order of numbers. 4. Largest and smallest of given numbers. 5. Sorting names in alphabetical order. 6. Finding factorial, generating Fibonacci numbers using recursive functions. 7. Matrix Manipulations (Addition , subtraction and Multiplication). 8. Mean , Standard Deviation and Variance.	

Semester VI / DSE III	MATHEMATICAL MODELLING WITH EXCEL	Course Code:
Instruction Hours: 4	Credits: 3	Exam Hours: 3
Internal Marks : 40	External Marks: 60	Total Marks: 100

Cognitive Level	**K 1** Recalling **K 2** Understanding **K 3** Applying **K4** Analyzing **K5** Evaluating **K 6** Creating	
Course Objectives	**The Course aims** ➢ To find optimal solution in decision Making Problems using Excel.	
UNIT	**Content**	**No. of Hours**
Programs	1. Find the best fit line for a set of data in four different ways using Least Square Method. 2. Find optimal solution to making fruit baskets. 3. Find requirements and minimize the cost in diet problem. 4. Find minimum cost in Delivering Bread as in Transportation Problem. 5. Find optimal Solution in Delivering Breadasin Assignment Problem. 6. Find optimal solution in Home improvement decisions Problem. 7. Generate a Sensitivity Analysis report on Fruit Basket Problem. 8. Maxmize $f(x) = -x^2 + 4x$ under Gradient Method.	
Text Book	Brain Albright , Mathematical Modelling with Excel.	

Semester VI/ AEC III	**AEC III - QUANTITATIVE APTITUDE**	Course Code:
Instruction Hours:2	Credits: 2	Exam Hours:3
Internal Marks-25	External Marks-75	Total Marks: 100

Cognitive Level	**K1-Recalling** **K2 –Understanding** **K3-Applying** **K4 – Analyzing** **K5 – Evaluating** **K6-Creating**	
Course Objectives:	• To learn puzzles • To know the time series problems. • To study the arithmetical reasoning problems. • To identify the missing character. • To get the logical ability	
UNIT	**CONTENT**	**HOURS**
Unit I	**Problems on Puzzles Blood Relation:** Deciphering jumbled up descriptions–Relation Puzzle–Coded Relations**. (P.No. 220 – 241)**	**6 Hours**
Unit II	**Mathematical Operations:** Problem Solving by Substitution–Interchange of signs and numbers– Deriving the appropriate conclusion. **(P.No. 432 –454)**	**6 Hours**
Unit III	**Arithmetical Reasoning** Calculation based Problem–Data based question–Problem on ages – Venn diagram based questions**.** **(P.No. 459– 474)**	**6 Hours**
Unit IV	**Puzzles on Missing Characters** Inserting the Missing character. **(P. No.475–492)**	**6 Hours**

Unit V	**Logical Reasoning** Data sufficiency–Logical Sequence of Words (**No.495 – 506, 455– 458,)**	**6 Hours**

Text Book:

R.S. Agarwal, A Modern approach to Verbal and Non-Verbal Reasoning, S.Chand& Company Ltd, New Delhi-55.

Reference Books:

1. Dinesh Khattar, The Pearson Guide to Quantitative Aptitude for Competitive Examinations, Pearson Publications,2014.
2. Arun Sharma,Teach Yourself Quantitative Aptitude,McGraw Hill Education,2017.

Web-Resources:

1. https://www.splessons.com/lesson/profit-loss-problems/

Course Outcomes:
On completion of the course the learner will be able to

CO1: solve the problems on series.
CO2: write the coding and decoding.
CO3: evaluate problems on blood relation
CO4: solve mathematical puzzles
CO5:compute problems using venn diagram.

Semester-VI/SEC-IV	**DOCUMENT PREPARATION SYSTEM USING LATEX**	Course Code:
Instruction Hours:2	Credits:2	Exam Hours:3
Internal Marks-40	External Marks-60	Total Marks:100

Cognitive Level	**K1-Recalling** **K2 –Understanding** **K3-Applying** **K4 – Analyzing** **K5 – Evaluating** **K6-Creating**	
Course Objectives:	• To introduce the fundamentals of Latex. • To know the symbols and arrays in Latex. • To study the commands and floating body in Latex. • To know the of table of contents,sections and paragraphs. • To understand the page breaking,numbering and listing environment .	
UNIT	**CONTENT**	**HOURS**
Unit I	**Introduction:** Preparing Inputs – Sentences and Paragraphs (Quotation mark,dashes,Spaceafteraperiod,Special Symbols and Simple text Generating Commands).	**6Hours**
Unit II	**Sectioning the document:** Document classes – Sectioning – Changing the text style – Accents, Symbols – Mathematical Formulas and Symbols – Arrays – Delimeters and Multiline Formulas.	**6Hours**
Unit III	**Commands and Floating Bodies:** Defining commands and environments–Figures and Floating Bodies – marginal Notes –Liningup in Columns.	**6Hours**
Unit IV	**TableofcontentsandCitations:** Creating Table of Contents–Cross References– Bibliography and Citations – Splitting Your Input – Making Index and Glossary– Keyboard Input and Screen Output.	**6Hours**

Unit V	**Pagebreakandnumbering:** Slides and Overlays – Notes – Printing only some slides and Notes – Letters – Lining and Page Breaking – Numbering – Length,spaces and boxes – Listmaking Environments.	**6Hours**

TextBook:

A Document PreparationSystem Latex,By Leslie Lamport,Addison-Wesley Publications,1994.

ReferenceBooks:

1. Stefan Kottwitz, Latex Beginner's Guide: Create high-quality, professional-looking documents and books for business and science using LaTeX, Packt Publishing, 2011.
2. S. Swapna Kumar, LATEX - A Beginner Guide to Professional Documentation, Laxmi Publications Pvt Ltd, 2020.

Web-Resources: https://nptel.ac.in

Experiment:

1. Creating a document.
2. Creatingtable of contents ina document.
3. Numbering and alignment of a document.
4. Writing mathematical equations.
5. Inserting footnotes,header and footer.
6. Creating matrices.
7. Creating tables.
8. Drawing graphs.
9. Inserting diagrams,pictures and graphs.
10. Creating bibliography.

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Course Outcomes:

On completion of the course the learner will be able to

CO1:	Interpret the fundamentals of Latex.
CO2:	Apply the symbols and arrays In Latex.
CO3:	Compile the commands and floating body in Latex.
CO4:	Write tableof contents,sections and paragraphs.
CO5:	put pagebreak, number the contents and list the environment.