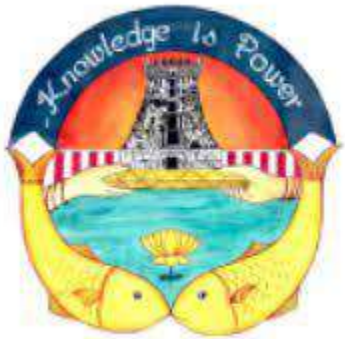
SRI MEENAKSHI GOVERNMENT ARTS COLLEGE FOR WOMEN (AUTONOMOUS)
MADURAI - 2



DEPARTMENT OF MATHEMATICS

Syllabus

B.Sc., Mathematics

(From June 2024 onwards)

SRI MEENAKSHI GOVERNMENT ARTS COLLEGE FOR WOMEN(A)
MADURAI- 625 002

DEPARTMENT OF MATHEMATICS

The Department of Mathematics is offering B.Sc. Mathematics since 1966 and M.Sc. Mathematics since 1980.

The Department of Mathematics has got 11 teaching staff in total that are permanent. In this department there 8 Ph.D., holders, 3 M.Phil., holders and 5 teaching staff are Guest Lecturers, four of them are Ph.D., holders and one of them is M.Phil., holder

Five of the staff members have degree in pedagogy. Three faculty members have PGDCA qualification.

Vision

To Empower Women Students to Attain Academic Excellence

Mission

To Provide a strong foundation in Mathematics which will enable our students to excel in pedagogy and research

Goal

To groom our young students capable of discharging professional, social and economic responsibilities ethically.

UNDER GRADUATE PROGRAMME

Programme Outcomes of B.Sc. Degree in Mathematics

PO1: Disciplinary Knowledge: Capable of demonstrating comprehensive knowledge and understanding of one or more disciplines that form a part of an undergraduate programme of study.

PO2: Critical Thinking: Capability to apply analytic thought to a body of knowledge; analyse and evaluate evidence, arguments, claims, beliefs on the basis of empirical evidence; identify relevant assumptions or implications; formulate coherent arguments; critically evaluate practices, policies and theories by following scientific approach to knowledge development.

PO3: Problem Solving: Capacity to extrapolate from what one has learned and apply their competencies to solve different kinds of non-familiar problems, rather than replicate curriculum content knowledge; and apply one's earning to real life situations.

PO4: Analytical Reasoning: Ability to evaluate the reliability and relevance of evidence; identify logical flaws and holes in the arguments of others; analyse and synthesize data from a variety of sources; draw valid conclusions and support them with evidence and examples and addressing opposing viewpoints.

PO5: Scientific Reasoning: Ability to analyse, interpret and draw conclusions from quantitative / qualitative data; and critically evaluate ideas, evidence, and experiences from an open minded and reasoned perspective.

PO6: Self-directed & Lifelong Learning: Ability to work independently, identify and manage a project. Ability to acquire knowledge and skills, including "learning how to learn", through self-placed and self-directed learning aimed at personal development, meeting economic, social and cultural objectives.

Programme Specific Outcomes of B.Sc. Degree in Mathematics

PSO1: Acquire good knowledge and understanding, to solve specific theoretical & applied problems in different area of mathematics & statistics.

PSO2: Understand, formulate, develop mathematical arguments, logically and use quantitative models to address issues arising in social sciences, business and other context / fields.

PSO3: To prepare the students who will demonstrate respectful engagement with other's ideas, behaviors, beliefs and apply diverse frames of references to decisions and actions. To create effective entrepreneurs by enhancing their critical thinking, problem solving, decision making and leadership skill that will facilitate startups and high potential organizations.

Illustration of B.Sc. Mathematics Curriculum Design

Semester	Part	Course / Title of the Paper	Code	Hours	Credit
I	I	Tamil / Hindi	U231A1 / U231H1	6	3
	II	English	U232A1	6	3
	III	Core1: Algebra & Trigonometry	U23CM1	4	4
		Core2: Differential Calculus	U23CM2	4	4
		GEC 1: Allied – I: Programming in C	U23GM01	4	4
		GEC2(P): Allied – I: Programming in C and C++ Practicals	U23GM02P	2	-
	IV	SEC1: ICT - Tools	U23SEM1	2	2
		Foundation Course	U23FM1	2	2
		Total		**30**	**22**
II	I	Tamil / Hindi	U231A2 / U231H2	6	3
	II	English	U232A2	6	3
	III	Core 3: Analytical Geometry (Two & Three Dimensions)	U23CM3	4	4
		Core 4: Integral Calculus	U23CM4	4	4
		GEC3: Object Oriented Programming with C++	U23GM03	4	4
		GEC2(P): Programming in C and C++ Practical	U23GM02P	2	2
	IV	SEC2: Arithmetic and Mathematical Logic	U23SEM2	2	2
		SEC3: Mathematical Reasoning	U23SEM3	2	2
		Total		**30**	**24**
III	I	Tamil / Hindi	U231A3 / U231H3	6	3
	II	English	U232A3	6	3

	III	Core 5: Vector Calculus and Applications	U23CM5	4	4
		Core 6: Differential Equations and Applications	U23CM6	4	3
		GEC4: Allied Physics - I	U23GP17	4	4
		GEC5(P): Allied Physics Practical - I	U23GP18P	2	-
	IV	Naan Mudhalvan		-	2
		SEC5: Mathematics for Competitive Examinations	U23SEM5	1	1
		Environmental Studies	U23EVS1	1	-
		Total		**30**	**20**
IV	I	Tamil/Hindi	U231A4 / U231H4	6	3
	II	English	U232A4	6	3
	III	Core 7: Industrial Statistics – Industry Module	U23CM7	4	4
		Core 8: Elements of Mathematical Analysis	U23CM8	3	3
		GEC6: Allied Physics - II	U23GP19	4	4
		GEC5(P): Allied Physics Practical – I	U23GP18P	2	2
	IV	SEC6: LaTeX Theory	U23SEM6	2	2
		SEC7(P): LaTeX Practical	U23SEM7P	2	2
		Environmental Studies	U23EVS1	1	2
		Total		**30**	**25**
V	III	Core 9: Abstract Algebra	U23CM9	5	5
		Core 10: Real Analysis	U23CM10	5	5
		Core11: Mechanics	U23CM11	6	3
		Core12: Number Theory	U23CM12	4	4
		DSEC1: Operations Research	U23DM01	4	3

		DSEC2: Numerical Methods with Applications	U23DM02	4	3
	IV	Value Education	U23VE1	2	2
		Summer Internship/ Industry Training	U23SIM1	-	2
		Total		**30**	**27**
VI	III	Core 13: Linear Algebra	U23CM13	6	5
		Core 14: Complex Analysis	U23CM14	6	5
		Core15: Mathematical Modelling	U23CM15	6	3
		DSEC3: Graph Theory & Applications	U23DM03	5	3
		DSEC4: Discrete Mathematics	U23DM09	5	3
	IV	Extension Activity	U23EAM	-	1
		Professional Competency Skill Enhancement Course – Maths for JAM/CUET-PG/TANCET	U23PCM1	2	2
		Total		**30**	**22**
		Overall Total		**180**	**140**

B.Sc., Mathematics (From June 2024 onwards)

CORE, ELECTIVE AND ALLIED

Evaluation Pattern

Internal: 25

External :75

Total: 100

Passing Minimum : 40 Marks

No Internal Minimum

External Minimum : 35% (27 Marks)

Internal and External together: 40%

Question Paper Pattern

Time: 3 hours Maximum Marks :75

Section A:

5 Compulsory Questions

5×2 Marks = 10 Marks

Section B:

5 Questions to be answered under 'Either - Or' pattern

That is each question has an internal choice

5×5 Marks = 25 Marks

(2 Questions from each unit)

Section C:

5 Questions to be answered under 'Either - Or' pattern

5x8 Marks = 40 Marks

(2 Questions from each unit)

GEC - GENERIC ELECTIVE COURSE

LIST OF GENERIC ELECTIVE COURSE - MATHEMATICS

Sl. No.	Sub. Code	Core
1	U23GM01	Programming in C
2	U23GM02P	Programming in C and C++ Practical
3	U23GM03	Object Oriented Programming with C++
4	U23GM04	Statistical Methods
5	U23GM05P	Statistical Methods - Practical
6	U23GM06	Introduction to Data Science
7	U23GM07	Introduction to Machine Learning
8	U23GM08	Introduction to Machine Learning Practical
9	U23GM09	Introduction to Artificial Intelligence
10	U23GM10	Mathematical Finance
11	U23GM11	Allied Mathematics – Paper I (for Physics)
12	U23GM12	Allied Mathematics – Paper II (for Physics)
13	U23GM13	Allied Mathematics – Paper III (for Physics)
14	U23GM14	Allied Mathematics – Paper I (for Chemistry)
15	U23GM15	Allied Mathematics – Paper II (for Chemistry)
16	U23GM16	Allied Mathematics – Paper III (for Chemistry)

LIST OF DISCIPLINE SPECIFIC ELECTIVE COURSES (DSEC)

Sl. No.	Sub. Code	Core
1	U23DM01	Operations Research
2	U23DM02	Numerical Methods with Applications
3	U23DM03	Graph Theory & Applications
4	U23DM04	Mathematical Statistics
5	U23DM05	Integral Transforms & Z Transforms
6	U23DM06	Fuzzy Sets & its applications
7	U23DM07	Optimization Techniques
8	U23DM08	Astronomy / Elements of Space Science
9	U23DM09	Discrete Mathematics

LIST OF SKILL ENHANCEMENT COURSES

Sl. No.	Sub. Code	Core
1	U23SEM1	ICT – Tools
2	U23SEM2	Arithmetic and Mathematical Logic
3	U23SEM3	Mathematical Reasoning
4	U23SEM4	Data Analysis Using SPSS
5	U23SEM5	Mathematics for Competitive examinations
6	U23SEM6	LaTeX Theory
7	U23SEM7(P)	LaTeX Practical

COURSE STRUCTURE ABSTRACT
For B.Sc., Mathematics Programmes

Part	Course	Total No. of Papers	Hours	Credit	Marks
I	Tamil	4	24	12	400
II	English	4	24	12	400
III	Core Course -Major (CCM)	15	69	60	1500
III	GEC– Elective Course (Allied)	6	24	20	600
III	DSEC –Elective Course	4	18	12	400
III	Internship	1	--	2	100
IV	Skill Enhancement Course (SEC-6 & NM)	7	13	13	700
IV	Foundation Course	1	2	2	100
IV	E.V.S.	1	2	2	100
V	Value Education	1	2	2	100
IV	Extension Activity/NSS/NCC/SPORTS	1	-	1	100
IV	Professional Competency Skill	1	2	2	100
Total		**46**	**180**	**140**	**4600**

SEMESTER I

Hours: 4/W 60hrs/Sem I

Course Code: U23CM1 **Credits: 4**

Title of the Paper: ALGEBRA & TRIGONOMETRY

Pedagogy	Hours/W	Lecture	Peer Teaching	GD/Tutorial/Videos	ICT
	4	4	-	-	-

Course Outcomes On completing this course the student will be able to	Unit	Hrs/S
CO1. Classify and Solve reciprocal equations	1	12
CO2. Find the sum of binomial, exponential and logarithmic series	2	12
CO3. Find Eigen values, eigen vectors, verify Cayley – Hamilton theorem and diagonalize a given matrix	3	12
CO4. Expand the powers and multiples of trigonometric functions in terms of sine and cosine	4	12
CO5. Determine relationship between circular and hyperbolic functions and thesummation of trigonometric series	5	12

Course Outcomes	Programme Outcomes						Programme Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3
CO1	3	1	3	-	-	-	3	2	1
CO2	2	1	3	1	-	-	3	2	1
CO3	3	1	3	1	-	-	3	2	1
CO4	3	1	3	-	-	-	3	2	1
CO5	3	1	3	-	-	-	3	2	1

Strong: 3 Medium: 2 Low: 1

SEMESTER I

Hours: 4/W 60hrs/Sem I

Course Code: U23CM1 **Credits: 4**

Title of the Paper: ALGEBRA & TRIGONOMETRY

UNIT I

Reciprocal Equations - Standard form – Increasing or decreasing the roots of a given equation - Removal of terms, Approximate solutions of roots of polynomials by Horner's method – related problems.

UNIT II

Summation of Series- Binomial – Exponential – Logarithmic series (Theorems without proof) – Approximations –Related problems

UNIT III

Characteristic equation – Eigen values and Eigen Vectors - Similar matrices – Cayley - Hamilton Theorem (Statement only) – Finding powers of square matrix, Inverse of a square matrix up to order 3, Diagonalization of square matrices - Related problems.

UNIT IV

Expansions of $sinn\theta, cosn\theta$ in powers of $sin\theta, cos\theta$ - Expansion of tan $n\theta$ interms of $tan\theta$ Expansions $Cos^n\theta, Sin^n\theta, Cos^m\theta Sin^n\theta$ – Expansion of tan $(\theta_1 + \theta_2 + \cdots . + \theta_n)$ – Expansion of $Sin\theta, Cos\theta$ and $tan\theta$ in terms of θ – Related problems.

UNIT V

Hyperbolic functions – Relation between circular and hyperbolic functions – Inverse hyperbolic functions, Logarithm of complex quantities, Summation of trigonometric series – Related problems.

TEXT BOOK

1. Algebra, Volume I by T.K.Manicavachagom Pillay, T.Natarajan, K.S.Ganapathy, Viswanathan Publication, 2007
2. Algebra, Volume II by T.K.Manicavachagom Pillay, T.Natarajan, K.S.Ganapathy, Viswanathan Publication 2008
3. Trigonometry by S.Narayanan and T.K.Manicavachagom Pillay, Viswanathan Publication, 2015

UNIT I: TB1: Chapter-6 Section 16, 16.1, 16.2,17, 19, 30

UNIT II: TB1 : Chapter-3 Section10

Chapter-4 Sections 3.1, 3.5, 3.6, 3.7

UNIT III: TB2 : Chapter-2 Sections 16, 16.1 to 16.4

UNIT IV: TB3 : Chapter-2 Sections 2.1, 2.1.1, 2.1.2

Chapter-3 Sections 3.1, 3.1.1 to 3.4.3

UNIT V: TB3 : Chapter-4 Sections 4.1 to 4.7

Chapter-5 Section 5.3

Chapter-6 Sections 6.1 to 6.6

REFERENCE BOOKS

1. W.S.Burnstine and A.W.Panton, Theory of equations
2. David C.Lay, Linear Algebra and its Applications, 3rdEd., Pearson Education Asia, Indian Reprint, 2007
3. G.B.Thomas and R.L.Finney, Calculus, 9thEd., Pearson Education, Delhi, 2005
4. C.V.Durell and A.Robson, Advanced Trigonometry, Courier Corporation, 2003
5. J.Stewart, L.Redlin, and S.Watson, Algebra and Trigonometry, Cengage Learning, 2012.
6. Calculus and Analytical Geometry, G.B.Thomas and R.L.Finny, Pearson Publication, 9th Edition, 2010.

WEB RESOURCES

1. https://www.mathwarehouse.com/
2. https://www.mathhelp.com/
3. https://www.mathsisfun.com/

SEMESTER I

Hours: 4/W 60hrs/Sem I

Course Code: U23CM2 **Credits: 4**

Title of the Paper: DIFFERENTIAL CALCULUS

Pedagogy	Hours/W	Lecture	Peer Teaching	GD/Tutorial/Videos	ICT
	4	4	-	-	-

Course Outcomes On completing this course the student will be able to	Unit	Hrs/S
CO1. Find the nth derivative, form equations involving derivatives and apply Leibnitz formula	1	12
CO2. Find the partial derivative and total derivative coefficient	2	12
CO3. Determine maxima and minima of functions of two variables and to use the Lagrange's method of undetermined multipliers	3	12
CO4. Find the envelope of a given family of curves	4	12
CO5. Find the evolutes and involutes and to find the radius of curvature using polar co-ordinates	5	12

Course Outcomes	Programme Outcomes						Programme Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3
CO1	3	1	3	-	-	-	3	2	1
CO2	2	1	3	-	-	-	3	2	1
CO3	3	2	3	2	-	-	3	2	1
CO4	3	2	3	2	1	-	3	2	1
CO5	3	2	3	2	1	-	3	2	1

Strong: 3 Medium: 2 Low: 1

SEMESTER I

Hours: 4/W 60hrs/Sem I

Course Code: U23CM2 **Credits: 4**

Title of the Paper: DIFFERENTIAL CALCULUS

UNIT I

Successive Differentiation: Introduction (Review of basic concepts) – The n^{th} derivative – Standard results – Fractional expressions – Trigonometrical transformation – Formation of equations involving derivatives – Leibnitz formula forthe n^{th} derivative of a product .

UNIT II

Partial Differentiation: Partial derivatives – Successive partial derivatives – Function of a function rule – Total differentialcoefficient – A special case – Implicit Functions.

UNIT III

Partial Differentiation (Continued): Homogeneous functions – Partial derivatives of a function of two variables – Maxima and Minima of functions of two variables - Lagrange'smethod of undetermined multipliers.

UNIT IV

Envelope: Method of finding the envelope – Another definition of envelope – Envelope of family of curves which arequadratic in the parameter

UNIT V

Curvature: Definition of Curvature – Circle, Radius and Centre of Curvature – Evolutes and Involutes – Radius of Curvature in Polar Co-ordinates.

TEXT BOOK

1. S. Narayanan and T.K. Manickavachagom Pillay, CalculusVolume I - S. Viswanathan Publishers Pvt. Ltd. 2006.

UNIT I: Chapter-3 Sections 1.1 to 1.6, 2.1, 2.2

UNIT II: Chapter-8 Sections 1.1 – 1.5

UNIT III: Chapter-8 Sections 1.6, 1.7, Sections 4 and 5

UNIT IV: Chapter 10 Sections 1.1 – 1.4

UNIT V: Chapter 10 Sections 2.1, 2.2 and 2.5 – 2.6

REFERENCE BOOKS

1. G.B. Thomas and R.L. Finney, Calculus, Pearson Education, 2010.
2. M.J. Strauss, G.L. Bradley and K. J. Smith, Calculus, 3rd Ed., Dorling Kindersley(India) P. Ltd. (Pearson Education), Delhi, 2007.
3. R. Courant and F. John, Introduction to Calculus and Analysis (Volumes I & II),Springer-Verlag, New York, Inc., 1989.
4. T. Apostol, Calculus, Volumes I and II.

WEB RESOURCES

1. https://nptel.ac.in
2. https://www.mathwarehouse.com/
3. https://www.mathhelp.com/

SEMESTER II

Hours: 4/W 60hrs/Sem II

Course Code: U23CM3 **Credits: 4**

Title of the Paper: ANALYTICAL GEOMETRY (Two & Three Dimensions)

Pedagogy	Hours/W	Lecture	Peer Teaching	GD/Tutorial/Videos	ICT
	4	3	-	1	-

Course Outcomes On completing this course the student will be able to	Unit	Hrs/S
CO1. Find pole, polar for conics, diameters, conjugate diameters for ellipse and hyperbola	1	12
CO2. Find the polar equations of straight line and circle, equations of chord, tangent and normal and to find the asymptotes of hyperbola	2	12
CO3. Explain in detail the system of Planes	3	12
CO4. Explain in detail the system of Straight lines	4	12
CO5. Explain in detail the system of Spheres	5	12

Course Outcomes	Programme Outcomes						Programme Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3
CO1	2	2	2	1	-	-	3	2	1
CO2	2	2	2	1	-	-	3	2	1
CO3	3	2	2	1	-	-	3	2	1
CO4	3	2	3	1	-	-	3	2	1
CO5	3	2	3	1	-	-	3	2	1

Strong: 3 Medium: 2 Low: 1

SEMESTER II

Hours: 4/W 60hrs/Sem II

Course Code: U23CM3 **Credits: 4**

Title of the Paper: ANALYTICAL GEOMETRY (Two & Three Dimensions)

UNIT I

Pole, Polar - Conjugate points and conjugate lines – Conjugate diameters of an ellipse - Semi diameters - Conjugate diameters of hyperbola.

UNIT II

Polar coordinates: General polar equation of straight line – Polar equation of a circle given a diameter, Equation of a straight line, circle, conic – Equation of chord, tangent, normal. Equations ofthe asymptotes of a hyperbola.

UNIT III

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

UNIT IV

Representation of line – Angle between a line and a plane **-** Co-planar lines – Shortest distance between two skew lines – Length of the perpendicular–Intersection of three planes.

UNIT V

Equation of a sphere - General equation - Section of a sphereby a plane - Equation of the circle - Tangent plane - Angle of intersection of two spheres - Condition for the orthogonality - Radical plane.

TEXT BOOK

1. Analytical Geometry of 2D by T.K.Manickavachagampillai & T.Natarajan, S.Viswanathan Publishers Pvt.Ltd -2011.
2. Analytical Solid Geometry of 3D by Shanthi Narayan and Dr.P.K. Mittal-S.Chand & amp; Co. Pvt.Ltd.- for Unit – 3 to 5

UNIT I: TB -1: Chapter **–** 4: Section 11, Chapter – 7 : Section 16.3, Chapter -8: Section 1.5

UNIT II: TB -1 : Chapter – 9 : Sections 1, 5 to 12

UNIT III: TB -2 : Chapter – 2 Sections 2.1 to 2.9.

UNIT IV: TB -2 : Chapter – 3 Sections 3.1 to 3.8.

UNIT V: TB-2: Chapter – 6 Sections 6.1, 6.3, 6.6, 6.7, 6.8

REFERENCE BOOKS

1. S. L. Loney, Co-ordinate Geometry.
2. Robert J. T. Bell, Co-ordinate Geometry of Three Dimensions.
3. Calculus and Analytical Geometry, G.B. Thomas and R. L. Finny, PearsonPublication, 9th Edition, 2010.
4. William H. McCrea, Analytical Geometry of Three Dimensions, Dover Publications, Inc, New York, 2006.
5. John F. Randelph, Calculus and Analytic Geometry, Wadsworth PublishingCompany, CA, USA, 1969.
6. Ralph Palmer Agnew, Analytic Geometry and Calculus with Vectors, McGraw - HillBook Company, Inc. New York, 1962.

WEB RESOURCES

1. https://nptel.ac.in
2. https://www.mathwarehouse.com/https://www.mathhelp.com/
3. https://www.mathsisfun.com/

SEMESTER II

Hours: 4/W 60hrs/Sem II

Course Code: U23CM4 **Credits: 4**

Title of the Paper: INTEGRAL CALCULUS

Pedagogy	Hours/W	Lecture	Peer Teaching	GD/Tutorial/Videos	ICT
	4	4	-	-	-

Course Outcomes On completing this course the student will be able to	Unit	Hrs/S
CO1. Determine the integrals of algebraic, trigonometric and logarithmic functions andto find the reduction formulae	1	12
CO2. Evaluate double and triple integrals and problems using change of order of integration	2	12
CO3. Solve multiple integrals and to find the areas of curved surfaces and volumes ofsolids of revolution	3	12
CO4. Explain beta and gamma functions and to use them in solving problems of integration	4	12
CO5. Explain Geometric and Physical applications of integral calculus	5	12

Course Outcomes	Programme Outcomes						Programme Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3
CO1	3	1	3	-	-	-	3	2	1
CO2	3	1	3	-	-	-	3	2	1
CO3	3	1	3	-	-	-	3	2	1
CO4	3	1	3	-	-	-	3	2	1
CO5	3	1	3	-	2	1	3	2	1

Strong: 3 Medium: 2 Low: 1

SEMESTER II

Hours: 4/W 60hrs/Sem II

Course Code: U23CM4 **Credits: 4**

Title of the Paper: INTEGRAL CALCULUS

UNIT I

Reduction formulae -Types, Integration of product of powers of algebraic and trigonometric functions, Integration ofproduct of powers of algebraic and logarithmic functions - Bernoulli's formula.

UNIT II

Multiple Integrals - Definition of double integrals -Evaluation of double integrals – Double integrals in polar coordinates - Change of order of integration.

UNIT III

Triple integrals –Applications of multiple integrals - Volumes of solids of revolution– change of variables - Jacobian.

UNIT IV

Beta and Gamma functions – Infinite integral - Definitions–Recurrence formula of Gamma functions – Properties of Beta and Gamma functions - Relation between Beta and Gamma functions - Applications.

UNIT V

Geometric and Physical Applications of Integral calculus.(Problems only)

TEXT BOOK

1. Calculus, Volume II, by S.Narayanan and T.K Manicavachagom Pillay. – S. Viswanathan, Publishers – 2007

UNIT I: Chapter–1 Sections 13, 13.1 to 13.10, 14, 15.1

UNIT II: Chapter – 5 Sections 1, 2.1, 2.2, 3.1.

UNIT III: Chapter–5 Sections 4, 5.1 to 5.3, 6.1

Chapter – 6 Sections 1.1,1.2, 2.1 to 2.4

UNIT IV: Chapter –7 Sections 1.1 to 1.4, 2.1, 2.3 , 3 to 6

UNIT V: Chapter –2 Sections 1.4, 2.1, 2.2, 4.1, 4.2

Chapter –3 Sections 1.1 to 1.5.

REFERENCE BOOKS

1. H. Anton, I. Birens and S. Davis, Calculus, John Wiley and Sons, Inc., 2002.
2. G.B. Thomas and R.L. Finney, Calculus, Pearson Education, 2007.
3. P. Dyke, An Introduction to Laplace Transforms and Fourier Series, Springer Undergraduate Mathematics Series, 2001 (second edition).
4. D. Chatterjee, Integral Calculus and Differential Equations, Tata-McGraw Hill Publishing Company Ltd.

WEB RESOURCES

1. https://nptel.ac.in
2. https://www.mathwarehouse.com/
3. https://www.mathhelp.com/
4. https://www.mathsisfun.com/

SEMESTER III

Hours: 4/W 60hrs/Sem III

Course Code: U23CM5 **Credits: 4**

Title of the Paper: VECTOR CALCULUS AND APPLICATIONS

Pedagogy	Hours/W	Lecture	Peer Teaching	GD/Tutorial/Videos	ICT
	4	3	-	1	-

Course Outcomes On completing this course the student will be able to	Unit	Hrs/S
CO1. Find the derivative of vector and sum of vectors, product of scalar and vectorpoint function and to Determine derivatives of scalar and vector products	1	12
CO2. Applications of the operator 'del' and to Explain soleonidal and ir-rotationalvectors	2	12
CO3. Solve simple line integrals	3	12
CO4. Solve surface integrals and volume integrals	4	12
CO5. Verify the theorems of Gauss, Stoke's and Green's Two Dimension	5	12

Course Outcomes	Programme Outcomes						Programme Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3
CO1	3	2	3	1	-	-	3	2	1
CO2	3	2	3	1	2	-	3	2	1
CO3	3	3	3	3	-	-	3	3	1
CO4	3	3	3	3	-	-	3	3	1
CO5	3	3	3	3	2	-	3	3	1

Strong: 3 Medium: 2 Low: 1

SEMESTER III

Hours: 4/W 60hrs/Sem III

Course Code: U23CM5 **Credits: 4**

Title of the Paper: VECTOR CALCULUS AND APPLICATIONS

UNIT I

Vector point function - Scalar point function - Derivativeof a vector and derivative of a sum of vectors - Derivative of a product of a scalar and a vector point function - Derivative of a scalar product and vector product.

UNIT II

The vector operator 'del', The gradient of a scalar pointfunction - Divergence of a vector - Curl of a vector - Solenoidal and irrotational vectors – Simple applications.

UNIT III

Laplacian operator, Vector identities - Line integral - Simple problems.

UNIT IV

Surface integral - Volume integral – Applications.

UNIT V

Gauss divergence Theorem, Stoke's Theorem, Green'sTheorem in two dimensions – Applications to real life situations.

TEXT BOOK

1. Vector Analysis by P. Duraipandian and Kayalal Pachaiyappa - S. Chand Publication

UNIT I: Chapter-2 sections 2.1 to 2.3

UNIT II: Chapter -2 sections 2.4 to 2.7

UNIT III: Chapter-2 sections 2.9 to 2.13,
Chapter 3 sections 3.1 to 3.4

UNIT IV: Chapter -3 Sections 3.5 to 3.7

UNIT V: Chapter -4 sections 4.1 to 4.5

REFERENCE BOOKS

1. J.C. Susan, Vector Calculus, (4th Edn.) Pearson Education,Boston, 2012.
2. A. Gorguis, Vector Calculus for College Students, Xilbius Corporation, 2014.
3. J.E. Marsden and A. Tromba ,Vector Calculus, , (5^{th}edn.) W.H. Freeman, New York, 1988.

WEB RESOURCES

1. https://nptel.ac.in
2. https://www.mathwarehouse.com/
3. https://www.mathhelp.com/
4. https://www.mathsisfun.com/

SEMESTER III

Hours: 4/W 60hrs/Sem III

Course Code: U23CM6 **Credits: 3**

Title of the Paper: DIFFERENTIAL EQUATIONS AND APPLICATIONS

Pedagogy	Hours/W	Lecture	Peer Teaching	GD/Tutorial/Videos	ICT
	4	3	-	1	-

Course Outcomes On completing this course the student will be able to	Unit	Hrs/S
CO1. Determine solutions of homogeneous equations, non-homogeneous equations of degree one in two variables, solve Bernoulli's equations and exact differential equations	1	12
CO2. Find the solutions of equations of first order but not of higher degree and to Determine particular integrals of algebraic, exponential, trigonometric functions and their products	2	12
CO3. Find solutions of simultaneous linear differential equations, linear equations of second order and to find solutions using the method of variations of parameters	3	12
CO4. Form a PDE by eliminating arbitrary constants and arbitrary functions, find complete, singular and general integrals, to solve Lagrange's equations	4	12
CO5. Explain standard forms and Solve Differential equations using Charpit's method	5	12

Course Outcomes	Programme Outcomes						Programme Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3
CO1	3	1	3	2	1	-	3	2	1
CO2	3	1	3	2	1	-	3	2	1
CO3	3	1	3	2	1	-	3	3	1
CO4	3	1	3	2	2	1	3	3	1
CO5	3	1	3	2	2	1	3	3	1

Strong: 3 Medium: 2 Low: 1

SEMESTER III

Hours: 4/W 60hrs/Sem III

Course Code: U23CM6 **Credits: 3**

Title of the Paper: DIFFERENTIAL EQUATIONS AND APPLICATIONS

UNIT I

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

UNIT II

Equation of first order but not of higher degree: Equation solvable for dy/dx- Equation solvable for y -Equation solvable for x – Clairaut's form - Linear Equations with constant coefficients - Particular integrals of algebraic, exponential, trigonometric functions and their products.

UNIT III

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

UNIT IV

Partial differential equation: Formation of PDE by Eliminating arbitrary constants and arbitrary functions – complete integral – singular integral - General integral-Lagrange's Linear Equations – Simple Applications.

UNIT V

Special methods – Standard forms-Charpit's Method –Simple Applications

TEXT BOOK

1. S. Narayanan and T.K. Manickavachagom Pillay, Differential Equations and its Applications, S. Viswanathan Publishers Pvt. Ltd. 2006

UNIT I: Chapter-2 Sections 1 to 6

UNIT II: Chapter-4 Sections 1, 2.1, 2.2, 3.1, Chapter-5 Section 4

UNIT III: Chapter-6 Section 6, Chapter-8 Sections 1 to 4

UNIT IV: Chapter-12 Sections 1.2, 3.1, 3.2 and 4

UNIT V: Chapter-12 Sections 5.1, 5.2, 5.3, 5.4 and 6

REFERENCE BOOKS

1. Shepley L. Ross, Differential Equations, 3rd Ed., John Wileyand Sons, 1984.
2. G.F. Simmons, Differential equations with applications and historical notes, 2nd Ed, Tata Mcgraw Hill Publications, 1991.
3. H.T. H. Piaggio, Elementary Treaties on DifferentialEquations and their applications, C.B.S Publisher &Distributors, Delhi,1985.
4. Horst R. Beyer, Calculus and Analysis, Wiley, 2010.
5. Braun, M. Differential Equations and their Applications. (3rdEdn.), Springer- Verlag, New York. 1983.

WEB RESOURCES

1. https://nptel.ac.in
2. https://www.mathwarehouse.com/
3. https://www.mathhelp.com/
4. https://www.mathsisfun.com/

SEMESTER IV

Hours: 4/W 60hrs/Sem IV

Course Code: U23CM7 **Credits: 4**

Title of the Paper: INDUSTRIAL STATISTICS - INDUSTRY MODULE

UNIT I

Statistical Quality Control: Introduction – Basis of SQC – Benefits of SQC – Process Control and Product control – Control Charts – Toolsfor SQC - Control chart for variables – Control chart for mean (X chart) ,Range Chart (R chart) Standard deviation chart (σ chart)

UNIT II

Control chart for attributes - Natural Tolerance limits and specification limits - Acceptance of sampling plans for attributes -Single, Double, Multiples and sequential sampling plans

UNIT III

Analysis of Time Series: Components – Analysis – Measurement ofTrend – Measurement of Seasonal variation- Index of Industrial production

UNIT IV

Analysis of Variance: Introduction – One way classification – Two way classifications with one observation per cell.

UNIT V

Design of Experiments: Introduction – Three Principles of Experimental Design – Completely Randomised Design –Randomised Block Design.

TEXT BOOK

1. Gupta, S. C. and Kapoor, V.K. (2008): Fundamentals Of Applied Statistics, 4th Edition (Reprint), Sultan Chand & Sons

UNIT I: Chapter-1 Sections 1.1 to 1.8

UNIT II: Chapter-1 Sections 1.9 to 1.12

UNIT III: Chapter-2 Sections 2.1 to 2.5 and Chapter-3 Section 3.7

UNIT IV: Chapter-5 Sections 5.1 to 5.3 [5.3.1 to 5.3.4]

UNIT V: Chapter-6 Sections 6.1 to 6.5

REFERENCE BOOKS

1. Montogomery, D. C. (2009): Introduction to Statistical Quality Control, 6th Edition, Wiley India Pvt. Ltd.
2. S. Leavenworth (1988) Statistical Quality Control (Sixth Edition), McGrawhill Book co, New York.
3. Goon, A. M., M.K. Gupta and B. Dasgupta (1987) Fundamentals of Statistics, Vol. II. World Press, Kolkata.
4. Mahajan (1997) Statistical Quality Control, Dhanpat Rai & sons, New Delhi.
5. Papoulis A. Probability, Random Variables and Stochastic process, Tata McGraw Hill Education Pvt. Ltd., New Delhi
6. Baisnab A., Jas M., Elements of Probability and Statistics, Tata McGraw Hill Education Pvt. Ltd., New Delhi, 1993

WEB RESOURCES

1. **OpenIntro Statistics - https://www.openintro.org/book/stat/**
2. **http://spcchartsonline.com/ - Statistical Quality Control Tutorial**
3. **"Control Charts" (Online Tutorial): https://www.spcforexcel.com/knowledge/control-chart-basics/control-charts**
4. **https://www.analyticsvidhya.com/blog/2018/01/anova-analysis-of-variance/ - ANOVA Tutorial**

SEMESTER IV

Hours: 3/W 45hrs/Sem IV

Course Code: U23CM8 **Credits: 3**

Title of the Paper: ELEMENTS OF MATHEMATICAL ANALYSIS

Pedagogy	Hours/W	Lecture	Peer Teaching	GD/Tutorial/Videos	ICT
	3	3	-	-	-

Course Outcomes On completing this course the student will be able to	Unit	Hrs/S
CO1. Explain in detail about sets and functions, equivalence and countability and the LUB axiom	1	9
CO2. Explain Sequence and Subsequence of real numbers and to find the limit of sequence to test for convergent, divergent, bounded and monotone sequences	2	9
CO3. Explain the operations on convergent and divergent sequences and to Explain the concepts of limit superior and limit inferior and the notion of Cauchy sequences	3	9
CO4. Classify the series of real numbers and the alternating series and their convergence and divergence, the conditional convergence and absolute convergence and solve problems on convergence of the sequences	4	9
CO5. Explain about the metric spaces and functions continuous on a Metric space	5	9

Course Outcomes	Programme Outcomes						Programme Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3
CO1	3	3	2	3	2	-	3	2	1
CO2	3	3	2	3	2	-	3	2	1
CO3	3	3	3	3	2	-	3	2	1
CO4	3	3	3	3	2	-	3	2	1
CO5	3	3	2	3	2	-	3	2	1

Strong: 3 Medium: 2 Low: 1

SEMESTER IV

Hours: 3/W 45hrs/Sem IV

Course Code: U23CM8 **Credits: 3**

Title of the Paper: ELEMENTS OF MATHEMATICAL ANALYSIS

UNIT I

Sets and Functions: Sets and elements - Operations on sets – Functions - Real valued functions – Equivalence - Countability - Real numbers - Least upper bounds

UNIT II

Sequences of Real Numbers: Definition of a sequence and subsequence - Limit of a sequence – Convergent sequences – Divergent sequences - Bounded sequences - Monotone sequences

UNIT III

Operations on convergent sequences – Operations on divergent sequences –Limit superior and Limit inferior - Cauchy sequences.

UNIT IV

Series of Real Numbers: Convergence and divergence – Series with non – negative terms- Alternating series

UNIT V

Conditional convergence and Absolute convergence - Tests for absolute convergence.

TEXT BOOK

1. Richard R. Goldberg, Methods of Real Analysis: Oxford and IBH Publishing, (1 January 2020).

UNIT I: Chapter-1 Sections 1.1 to 1.7

UNIT II: Chapter-2 Sections 2.1 to 2.6

UNIT III: Chapter-2 Sections 2.7 to 2.10

UNIT IV: Chapter-3 Sections 3.1 to 3.3

UNIT V: Chapter-3 Sections 3.4 and 3.6

REFERENCE BOOKS

1. T. M. Apostol, Calculus (Vol. I), John Wiley and Sons (Asia) P.Ltd., 2002.
2. R.G. Bartle and D. R Sherbert, Introduction to Real Analysis,John Wiley and Sons (Asia) P. Ltd., 2000.
3. E. Fischer, Intermediate Real Analysis, Springer Verlag, 1983.
4. K.A. Ross, Elementary Analysis- The Theory of Calculus Series-Undergraduate Texts in Mathematics, Springer Verlag, 2003.

WEB RESOURCES

1. https://nptel.ac.in
2. https://www.mathwarehouse.com/
3. https://www.mathhelp.com/
4. https://www.mathsisfun.com/

SEMESTER V

Hours: 5/W 75hrs/Sem V

Course Code: U23CM9 **Credits: 5**

Title of the Paper: ABSTRACT ALGEBRA

Pedagogy	Hours/W	Lecture	Peer Teaching	GD/Tutorial/Videos	ICT
	5	4	-	1	-

Course Outcomes On completing this course the student will be able to	Unit	Hrs/S
CO1. Explain groups, subgroups and cyclic groups	1	15
CO2. Explain about Normal subgroup, Quotient groups, Homomorphisms and Automorphisms and verify the functions for homomorphism and automorphism properties	2	15
CO3. Explain Permutation groups and apply Cayley's theorem to problems	3	15
CO4. Explain Rings, Ideals and Quotient Rings and examine their structure	4	15
CO5. Discuss about the field of quotient of an integral domain and to Explain in detail about Euclidean Rings	5	15

Course Outcomes	Programme Outcomes						Programme Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3
CO1	3	3	2	3	1	-	3	3	1
CO2	3	3	2	3	1	-	3	3	1
CO3	3	3	2	3	2	-	3	3	1
CO4	3	3	2	3	1	-	3	3	1
CO5	3	3	2	3	2	-	3	3	1

Strong: 3 Medium: 2 Low: 1

SEMESTER: V

Hours: 5/W 75hrs/Sem V

Course Code: U23CM9 **Credits: 5**

Title of the Paper: ABSTRACT ALGEBRA

UNIT I

Introduction to groups- Subgroups- Cyclic groups and properties of cyclic groups- Lagrange's Theorem-A counting principle – Examples

UNIT II

Normal subgroups and Quotient group- Homomorphism-Automorphism -Examples.

UNIT III

Cayley's Theorem-Permutation groups - Examples

UNIT IV

Definition and examples of ring- Some special classes of rings- Homomorphism of rings- Ideals and quotient rings- More ideals and quotient rings.

UNIT V

The field of quotients of an integral domain-EuclideanRings - The particular Euclidean Ring – Examples

TEXT BOOK:

1. Topics in Algebra–I.N.Herstein, Wiley Eastern Ltd. Second Edition (1st January 2006)

UNIT I: Chapter-2 Section 2.4 and 2.5
UNIT II: Chapter-2 Section 2.6 to 2.8
UNIT III: Chapter-2 Section 2.9 and 2.10
UNIT IV: Chapter-3 Section 3.1 to 3.5
UNIT V: Chapter-3 Section 3.6 to 3.8

REFERENCE BOOKS

1. John B. Fraleigh, A First Course in Abstract Algebra, 7th Ed., Pearson, 2002.
2. M. Artin, Abstract Algebra, 2nd Ed., Pearson, 2011.
3. Joseph A Gallian, Contemporary Abstract Algebra, 4th Ed., Narosa, 1999.

WEB RESOURCES:

https://www.open.edu/openlearn/mod/resource/view.php?id=72698

SEMESTER V

Hours: 5/W 75hrs/Sem V

Course Code: U23CM10 **Credits: 5**

Title of the Paper: REAL ANALYSIS

Pedagogy	Hours/W	Lecture	Peer Teaching	GD/Tutorial/Videos	ICT
	5	4	-	1	-

Course Outcomes On completing this course the student will be able to	Unit	Hrs/S
CO1. Explain the concepts of Continuous and Discontinuous functions, open and close sets, Connectedness, Completeness and Compactness	1	15
CO2. Explain the concepts of bounded and totally bounded sets, continuity of inverse functions and Uniform continuity	2	15
CO3. Define the sets of measure zero, to Explain about the existence and properties of Riemann integral	3	15
CO4. Explain the concept of differentiability and to Explain Rolle's theorem, Law of mean, and Fundamental theorem of calculus	4	15
CO5. Explain the point wise and uniform convergence of sequence of function and to derive the Taylor's theorem	5	15

Course Outcomes	Programme Outcomes						Programme Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3
CO1	3	3	1	3	1	-	3	1	1
CO2	3	3	1	3	1	-	3	1	1
CO3	3	3	1	3	1	-	3	1	1
CO4	3	3	1	3	1	-	3	1	1
CO5	3	3	1	3	1	-	3	1	1

Strong: 3 Medium: 2 Low: 1

SEMESTER V

Hours: 5/W 75hrs/Sem V

Course Code: U23CM10 **Credits: 5**

Title of the Paper: REAL ANALYSIS

UNIT I

Limits and Metric Spaces: Limit of a function on a realline - Metric spaces - Limits in metric spaces – Continuous Functions on Metric Spaces: Function continuous at a point on there a line-Function continuous on a metric space.

UNIT II

Continuous Functions on Metric Spaces: Open sets– Closed sets–Discontinuous function on R1. Connectedness, Completeness and Compactness: More about open sets- Connected sets.

UNIT III

Bounded sets and totally bounded sets: Complete metric spaces- Compact metric spaces, Continuous functions on a compact metric space, Continuity of inverse functions, Uniform continuity.

UNIT IV

Derivatives-Rolle's theorem, Law of mean, Fundamental theorems of calculus.

UNIT V

Taylor's theorem-Point wise convergence of sequences of functions, Uniform convergence of sequences of functions

TEXT BOOK

1. Methods of Real Analysis-Richard R.Goldberg (John Wiley & sons, 2nd edition) (Indian edition –Oxford and IBH Publishing Co, New Delhi, 1st January 2020)

UNIT I: Chapter-4 Sections 4.1 to 4.3, Chapter-5 Sections 5.1 ,5.3

UNIT II: Chapter-5 Sections 5.4 to 5.6, Chapter-6 Sections 6.1, 6.2

UNIT III: Chapter-6 Sections 6.3 to 6.8

UNIT IV: Chapter-7 Sections 7.5 to 7.8

UNIT V: Chapter-8 Section 8.5, Chapter 9 Sections 9.1 and 9.2

REFERENCE BOOKS

1. Principles of Mathematical Analysis by Walter Rudin, Tata McGraw Hill Education, Third edition (1 July 2017).
2. Mathematical Analysis Tom M A postal, Narosa Publishing House, 2nd edition (1974), Addison-Wesley publishing company, New Delhi.

WEB RESOURCES

1. https://nptel.ac.in

SEMESTER V

Hours: 6/W 90hrs/Sem V

Course Code: U23CM11 **Credits: 3**

Title of the Paper: MECHANICS

Pedagogy	Hours/W	Lecture	Peer Teaching	GD/Tutorial/Videos	ICT
	6	5	-	1	-

Course Outcomes On completing this course the student will be able to	Unit	Hrs/S
CO1. Define Resultant, Component of a Force, Coplanar forces, like and unlike parallel forces, Equilibrium of a Particle, Limiting equilibrium of a particle on an inclined plane.	1	18
CO2. Define Moment of a force and Couple with examples. Define Parallel Forces and Forces acting along a Triangle, Solve problems on frictional forces	2	18
CO3. Define work, energy, power, rectilinear motions under varying forces. Define Simple Harmonic Motion and find its Geometrical representation.	3	18
CO4. Define Projectile, impulse, impact and laws of impact. Prove that the path of a projectile is a parabola. Find the direct and oblique impact of smooth elastic spheres	4	18
CO5. Define central orbits, explain conic as centered orbits and solve problems related to central orbits	5	18

Course Outcomes	Programme Outcomes						Programme Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3
CO1	3	2	3	2	1	1	3	3	2
CO2	3	2	3	2	1	1	3	3	2
CO3	3	2	3	2	1	1	3	3	2
CO4	3	2	3	2	1	1	3	3	2
CO5	3	2	3	2	1	1	3	3	2

Strong: 3 Medium: 2 Low: 1

SEMESTER V

Hours: 6/W 90hrs/SemV

Course Code: U23CM11 **Credits: 3**

Title of the Paper: MECHANICS

UNIT I

Force: Newton's laws of motion – Resultant of two forces on a particle - Equilibrium of a Particle: Equilibrium of a particle – Limiting equilibrium of a particle on an inclined plane.

UNIT II

Forces on a Rigid Body: Moment of a Force – General motion of a body – Equivalent systems of forces- Parallel Forces – Forces acting along a Triangle - A specific reduction of Forces: Reduction of coplanar forces into a force and couple – Problems involving frictional forces.

UNIT III

Work, Energy and Power: Work – Conservative field offorce – Power -Rectilinear Motion under Varying Force: Simple Harmonic Motion - along a horizontal line – along a vertical line.

UNIT IV

Projectiles: Forces on a projectile – Projectile projected on an inclined plane.

UNIT V

Central Orbits**:** General orbits – Central orbit – Conic as a centered orbit.

TEXT BOOK

1. Mechanics - P.Duraipandian, Lakshmi Duraipandian and Muthamizh Jayapragasam,, S.Chand and co. Private limited - Reprint 2016.

UNIT I: Chapter-2 and Chapter-3
UNIT II: Chapter-4 Sections 4.1 to 4.4, 4.6 (Omit Sections 4.5, 4.7 to 4.9)
Chapter-5 Sections 5.1 to 5.2
UNIT III: Chapter-11 and Chapter-12 Sections – 12.1 to 12.3 (Omit Section 12.4)
UNIT IV: Chapter-13 Sections – 13.1 , 13.2 (Omit Section 13.3)
UNIT V: Chapter-16

REFERENCE BOOKS

1. J.L. Meriam and L. G. Kraige, Engineering Mechanics: Statics, Seventh Edition,Wiley and sons Pvt ltd., New York, 2012.

2. J.L. Meriam, L. G. Kraige, and J.N. Bolton, Engineering Mechanics: Dynamics, 8th edn, Wiley and sons Pvt ltd., New York, 2015.
3. A. K. Dhiman, P.Dhinam and D. Kulshreshtha, Engineering Mechanics (Statics and Dynamics), McGraw Hill Education(India) Private Limited, New Delhi, 2015.

WEB RESOURCES

1. https://nptel.ac.in

SEMESTER V

Hours: 4/W 90hrs/Sem V

Course Code: U23CM12 **Credits: 4**

Title of the Paper: NUMBER THEORY

Pedagogy	Hours/W	Lecture	Peer Teaching	GD/Tutorial/Videos	ICT
	6	5	-	1	-

Course Outcomes On completing this course the student will be able to	Unit	Hrs/S
CO1. Recall the divisibility, prime and composite numbers	1	18
CO2. Define Residue classes, complete and least residue system. Explain magic numbers ,divisibility test and related topics. Explain solution of congruences and chinese remainder theorem.	2	18
CO3. Know the applications of Little fermat's theorem, Euler's theorem, Inverse modulo, Lagrange's theorem and Wolsten hold theorem	3	18
CO4. Acquire knowledge about identical and multiple roots of congruences.	4	18
CO5. Explain Quadratic residues and non-residues, Euler's criterion and explain Legendre's symbol	5	18

Course Outcomes	Programme Outcomes						Programme Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3
CO1	3	2	3	2	1	1	3	3	2
CO2	3	2	3	2	1	1	3	3	2
CO3	3	2	3	2	1	1	3	3	2
CO4	3	2	3	2	1	1	3	3	2
CO5	3	2	3	2	1	1	3	3	2

Strong: 3 Medium: 2 Low: 1

SEMESTER V

Hours: 4/W 60hrs/Sem V

Course Code: U23CM12 **Credits: 4**

Title of the Paper: NUMBER THEORY

UNIT I

Introduction: Divisibility, Prime and Composite numbers.

UNIT II

Congruences: Definition – Residue classes – Complete and least residue system – Reduced residue system – Casting out 9 – Magic numbers - Divisibility test - Linear Congruences – Solution of congruences – Chinese remainder theorem

.

UNIT III

Little Fermat's theorem – Euler's theorem - Inverse modulo – Wilson's theorem and its converse – Lagrange's theorem – Wolsten hold theorem.

UNIT IV

Factor theorem for polynomials – Number of solutions - Congruences of prime power moduli – Composite moduli – Identical congruences – Multiple roots of congruences.

UNIT V

Quadratic residues and non-residues – Euler's criterion – primitive root is a quadratic non-residue – Legendre's symbol.

Text Book: Kumaravelu and Suseela Kumaravelu, Elements of Number Theory, SKV Publications, 2002.

UNIT I **:** Chapter 3, 4
UNIT II **:** Chapter 6
UNIT III **:** Chapter 7
UNIT IV **:** Chapter 8
UNIT V **:** Chapter 10

Reference Books:

1. Ivan Niven, Herbert S. Zuckarman and Hugh L. Montgometry, An Introduction to the Theory of Numbers, 5th Edition, John Wiley and sons, Inc., 2001.
2. V. K. Krishnan, Elementary Number Theory, Universities Press, 2017.

WEB RESOURCES

1. https://nptel.ac.in

SEMESTER VI

Hours: 6/W 90hrs/Sem VI

Course Code: U23CM13 **Credits: 5**

Title of the Paper: LINEAR ALGEBRA

Pedagogy	Hours/W	Lecture	Peer Teaching	GD/Tutorial/Videos	ICT
	6	5	-	1	-

Course Outcomes On completing this course the student will be able to	Unit	Hrs/S
CO1. Acquire a detailed knowledge about vector spaces and subspaces	1	18
CO2. Explain the concepts of Linear Dependence, Linear Independence, Bases and Dimension of basis	2	18
CO3. Explain the concept of Linear Transformations, their Matrix representation and the notion of dual spaces	3	18
CO4. Find the Eigen values and Eigen vectors, to apply the concepts for diagonalisation	4	18
CO5. Explain about Inner product and norms and to apply Gram Schmidt Orthogonalization Process to problems on inner product spaces	5	18

Course Outcomes	Programme Outcomes						Programme Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3
CO1	3	3	2	3	-	-	3	3	1
CO2	3	3	3	3	-	-	3	3	1
CO3	3	3	2	3	1	-	3	3	1
CO4	3	3	3	3	-	-	3	3	1
CO5	3	3	3	3	1	-	3	3	1

Strong: 3 Medium: 2 Low: 1

SEMESTER VI

Hours: 6/W 90hrs/Sem VI

Course Code: U23CM13 **Credits: 5**

Title of the Paper: LINEAR ALGEBRA

UNIT I

Vector spaces – Subspaces – Linear Combinations and linear span - Systems of Linear equations – Homogenous Equations – Non-homogenous Equations – Elementary Matrices – Row reduced -Echelon form

UNIT II

Linear Dependence and Linear independence – Bases – Dimensions

UNIT III

Linear transformations, null spaces and ranges – Matrix representation of a linear transformation –Invertibility and Isomorphisms – dual spaces.

UNIT IV

Eigen values, Eigen vectors, diagonalizability – Invariant subspaces – Cayley– Hamilton theorem

UNIT V

Inner products and norms – Gram Schmidt Orthogonalization Process - Orthogonal complements

TEXT BOOK

1. N.S.Gopalakrishnan, University Algebra, New Age International Publications, Wiley Eastern Ltd.

UNIT I: Chapter-3
UNIT II: Chapter-3
UNIT III: Chapter-3 & Chapter-5
UNIT IV: Chapter-5
UNIT V: Chapter-5

REFERENCE BOOKS

1. I.N.Herstein, Topics in Algebra, Wiley Eastern Ltd.Second Edition, 2006.
2. S. Lang, Introduction to Linear Algebra, 2nd Ed., Springer,2005
3. Linear Algebra - Stephen H Friedberg, Arnold J Insel and Lawrence E Spence, 5th edition (2018) Pearson
4. John B.Fraleigh, First course in Algebra, Addison Wesley.
5. Stephen H. Friedberg, Arnold J. Insel, Lawrence E. Spence, Linear Algebra, 4th Ed., Prentice Hall of India Pvt. Ltd., New Delhi, 2004.
6. David C. Lay, Linear Algebra and its Applications, 3rd Ed.,Pearson Education Asia, Indian Reprint, 2007.
7. Gilbert Strang, Linear Algebra and its Applications, Thomson, 2007.

WEB RESOURCES

1. **https://nptel.ac.in**

SEMESTER VI

Hours: 6/W 90hrs/Sem VI

Course Code: U23CM14 **Credits: 5**

Title of the Paper: COMPLEX ANALYSIS

Pedagogy	Hours/W	Lecture	Peer Teaching	GD/Tutorial/Videos	ICT
	6	5	-	1	-

Course Outcomes On completing this course the student will be able to	Unit	Hrs/S
CO1. Explain about analytic functions, their differentiation and continuity and to verify the Harmonic functions using analyticity conditions	1	18
CO2. Explain the concept of Conformal mappings and mappings by linear transformations and linear fractional transformations	2	18
CO3. Explain about the integrations of functions over simply and multiply connected domains and to derive the Cauchy integral formula, Liouvlle's theorem, Fundamental theorem of Algebra and Maximum Module Principle	3	18
CO4. Find the convergence the sequences and series, to derive Taylor's and Laurent's series	4	18
CO5. Find the nature of singularities, to find the residue of a given function at a given singular point, to Explain about zeros and poles and to evaluate real improper integrals (Excluding poles on the real axis)	5	18

Course Outcomes	Programme Outcomes						Programme Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3
CO1	3	3	3	2	1	-	3	3	2
CO2	3	3	3	2	1	-	3	3	2
CO3	3	3	3	2	1	-	3	3	2
CO4	3	3	3	2	1	-	3	3	2
CO5	3	3	3	2	1	-	3	3	2

Strong: 3 Medium: 2 Low: 1

SEMESTER VI

Hours: 6/W 90hrs/Sem VI

Course Code: U23CM14 **Credits: 5**

Title of the Paper: COMPLEX ANALYSIS

UNIT I

Analytic functions: Functions of a Complex variable – Limits –Theorem on limits – Continuity – Derivatives – Differentiation formulas – Cauchy Riemann equation – **C**onditions for differentiability – Polar coordinates – Analytic functions – Harmonic functions.

UNIT II

Conformal Mapping: Mappings – Mapping by exponential function – Linear transformation – The transformation w=$\frac{1}{z}$ – Mappings by $\frac{1}{z}$ – Linear fractional transformations (bilinear)

UNIT III

Complex Integration: Contour integrals – Some examples – Simply and Multiply connected domains – Cauchy integral formula – Formula for derivatives – Liouville's theorem – Fundamental theorem of Algebra – Maximum modulus principle.

UNIT IV

Sequences and Series: Convergence of sequences – Convergence of series – Taylor's series – Laurent series – Absolute and uniform convergence of power Series – Continuity of sums of power series – Integration & differentiation of power series

UNIT V

Residues and Poles: Isolated singular points – Residues –Cauchy Residue theorem – Residue at infinity – The three types of isolated singular points – Residues at poles – Zeros of analytical functions – Zeros and poles – Evaluation of real improper integrals (excluding poles on the real axis).

TEXT BOOK

1. Complex Analysis, P. Duraipandian & Kayalal Pachiyappa, S. Chand & Company PVT. LTD, New Delhi, 2016

UNIT I: Chapter-4
UNIT II: Chapter-7
UNIT III: Chapter-8 Sections 8.2 to 8.11
UNIT IV: Chapter-5 Sections 5.3, 5.5, 5.6 & Chapter-9 Sections 9.1 to 9.9
UNIT V: Chapter-10 Sections 10.1 to 10.3 (omit Type 4)

REFERENCE BOOKS

1. Linear Algebra – Stephen H Friedberg, Arnold J Insel and Lawrence E Spence, 5th Edition 920180, Pearson.
2. S. Ponnusamy and H. Silverman, Complex variables with applications, Birkhauser, 2006
3. Theodore W. Gamelan, Complex Analysis, Springer Verlag, 2008
4. Joseph Bak and Donald J. Newman, Complex analysis, 2nd Ed., Undergraduate Texts in Mathematics, Springer-Verlag New York, Inc., New York, 1997.

WEB RESOURCES

1. https://nptel.ac.in

SEMESTER VI

Hours: 6/W 90hrs/Sem V

Course Code: U23CM15 **Credits: 3**

Title of the Paper: MATHEMATICAL MODELLING

Pedagogy	Hours/W	Lecture	Peer Teaching	GD/Tutorial/Videos	ICT
	6	5	-	1	-

Course Outcomes On completing this course the student will be able to	Unit	Hrs/S
CO1. Explain simple situations requiring Mathematical Modelling and to Determine the characteristics of such models	1	18
CO2. Model using differential equations in-terms of linear growth and Decay models	2	18
CO3. Model using systems of ordinary differential equations of first order, to discuss about various models under the categories 'Epidemics' and 'Medicine'	3	18
CO4. Explain in detail about difference equations	4	18
CO5. Model using difference equations	5	18

Course Outcomes	Programme Outcomes						Programme Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3
CO1	2	3	3	3	2	2	2	3	2
CO2	2	3	3	3	2	2	2	3	2
CO3	2	3	3	3	2	2	2	3	2
CO4	3	2	2	2	-	1	2	3	2
CO5	2	3	3	3	2	2	2	3	2

Strong: 3 Medium: 2 Low: 1

SEMESTER VI

Hours: 6/W 90hrs/Sem V

Course Code: U23CM15 **Credits: 3**

Title of the Paper: MATHEMATICAL MODELLING

UNIT I

Mathematical Modelling: Simple situations requiring mathematical modelling, Characteristics of mathematical models.

UNIT II

Mathematical Modelling through differential equations: Linear Growth and Decay Models. Non-Linear growth and decay models, Compartment models.

UNIT III

Mathematical Modelling through system of Ordinary differential equations of first order: Prey-predator models, Competition models, Model with removal and model with immigrations. Epidemics: Simple epidemic model, Susceptible- infected- susceptible (SIS) model, SIS model with constant number of carriers. Medicine: Model for Diabetes Mellitus.

UNIT IV

Introduction to difference equations.

UNIT V

Mathematical Modelling through difference equations: Harrod Model, cob web model application to Actuarial Science

TEXT BOOK

1. J N Kapur, Mathematical Modeling, New Age International publishers (2009).

UNIT I: Chapter-1 sections 1.1. to 1.5
UNIT II: Chapter-2 sections 2.1 to 2.4
UNIT III: Chapter-3 Sections 3.1.1, 3.1.2, 3.2.1, 3.5.1
UNIT IV: Chapter-5 Sections 5.1 and 5.2
UNIT V: Chapter-5 Sections 5.3 (5.3.3 not included)

REFERENCE BOOKS

1. Mathematical Modeling by Bimalk. Mishra and DipakK.Satpathi. Ane Books Pvt. Ltd (1 Janauary 2009)

2. Mathematical Modeling Models, Analysis and Applications, by Sandip Banerjee, CRC Press, Taylor & Francis group, 2014
3. Mathematical Modeling applications with Geogebra by Jonas Hall & Thomas Ligefjard, John Wiley & Sons, 2017
4. Mark M. Meerschaert: Mathematical Modeling, Elsevier Publ., 2007.
5. Edward A. Bender: An introduction to mathematical Modeling, CRC Press, 2002
6. Walter J. Meyer, Concepts of Mathematical Modeling, Dover Publ., 2000

WEB RESOURCES

1. https://nptel.ac.in

GENERIC ELECTIVE COURSES

SEMESTER I

Hours: 4/W 60hrs/Sem

Course Code: U23GM01 **Credits: 4**

Title of the Paper: PROGRAMMING IN C

Pedagogy	Hours/W	Lecture	Peer Teaching	GD/Tutorial/Videos	ICT
	4	3	-	-	1

Course Outcomes On completion of this course, students will able to	**Units**	**Hrs/S**
CO1 Remember the program structure of C with its syntax and semantics	1	12
CO2. Understand the programming principles in C (data types, operators, branchingand looping, arrays, functions, structures, pointers and files)	2	12
CO3 Apply the programming principles learnt in real-time problems	3	12
CO4. Analyze the various methods of solving a problem and choose the best method	4	12
CO5. Code, debug and test the programs with appropriate test cases	5	12

Course Outcomes	Programme Outcomes						Programme Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3
CO1	3	2	3	2	1	1	3	3	2
CO2	3	2	3	2	1	1	3	3	2
CO3	3	2	3	2	1	1	3	3	2
CO4	3	2	3	2	1	1	3	3	2
CO5	3	2	3	2	1	1	3	3	2

Strong: 3 Medium: 2 Low: 1

SEMESTER I

Hours: 4/W 60hrs/Sem

Course Code: U23GM01 **Credits:4**

Title of the Paper: PROGRAMMING IN C

UNIT I

Basic structure of a C program – Constants – Variables – Data types.

UNIT II

Operators: Arithmetic – Relational – Logical – Assignment – Increment and decrement – Conditional – Bit wise and special Operators – Arithmetic expressions – Evaluation of expressions – Precedence of arithmetic operators– Mathematical Functions.

UNIT III

Managing input and output operations: Introduction – Reading a Character – Writing a Character -Formatted Input – Formatted Output.

UNIT IV

Decision making – Branching – Simple IF, IF – ELSE – Nesting of IF… ELSE, ELSE if ladder switch statement – Operator – Go to statements – while, do- while and for statements

UNIT V

One dimensional and two dimensional arrays – Initialization of arrays – Handling of character strings – String handling functions

TEXT BOOK

1. Programming in ANSI – C by E. Balagurusamy 4th Edition. Tata McGraw Hill Publishing Company Ltd. New Delhi

UNIT I: Chapter 1: Sections: 1.8, Chapter 2

UNIT II: Chapter 3 : Sections: 3.1 - 3.12, and 3.16

UNIT III: Chapters 4

UNIT IV: Chapter 5, 6

UNIT V: Chapter 7: Sections 7.1 – 7.6, Chapter 8: Sections 8.1 – 8.8

REFERENCE BOOKS

1. Byron Gottfried, Schaum's Outline Programming with C, Fourth Edition, Tata McGraw-Hill, 2018.
2. Darrel L. Graham, C Programming Language, Createspace Independent Publishing Company, 2016
3. Yashavant Kanetkar, Let Us C, Eighteenth Edition, BPB Publications,2021

Web Resources

1. The C Book - a free online book on C programming: https://publications.gbdirect.co.uk//c_book/

   C Programming Wikibook - a free online wikibook on C programming: https://en.wikibooks.org/wiki/C_Programming
2. https://www.w3schools.com/c/index.php - Free C Tutorial
3. https://www.geeksforgeeks.org/c-programming-language/
4. http://visualcplus.blogspot.com/2006/02/lesson-3-data-types-in-registry.html-Free tutorial on C

SEMESTER I & II

Hours: 4/W 60hrs/Sem

Course Code: U23GM02P **Credits: 2**

Title of the Paper: PROGRAMMING IN C AND C++ PRACTICALS

List of Programs

1. Programs to illustrate input, output operations
2. Programs using symbolic constants, library functions
3. Program using various operators
4. Program using arithmetical expressions
5. Programs illustrating concepts of if…else and go to
6. Program illustrating concept of switch … case
7. Program illustrating concept of while looping
8. Program illustrating concept of do…while looping
9. Program illustrating concept of for loop
10. Program using one dimensional array
11. Program using two-dimensional array
12. Programs using string handling functions
13. Programs using tokens
14. Program using Expressions
15. Program using Control Structures
16. Programs using functions
17. Programs illustrating concept of objects and classes
18. Programs using constructors
19. Programs using destructors
20. Programs using concept of single inheritance
21. Programs using multiple inheritance
22. Program using nesting of classes

TEXT BOOKS

1. Programming in ANSI-C by E. Balagurusamy 4th Edition, Tata McGraw Hill Publishing Company Ltd., NewDelhi.
2. Object Oriented Programming with C++ by E. Balagurusamy 4th Edition, Tata McGraw Hill Publishing Company Ltd., NewDelhi.

SEMESTER II

Hours: 4/W 60hrs/Sem

Course Code: U23GM03 **Credits: 4**

Title of the Paper: Object Oriented Programming with C++

Pedagogy	Hours/W	Lecture	Peer Teaching	GD/Tutorial/Videos	ICT
	4	3	-	-	1

Course Outcomes On completion of this course, students will able to	Units	Hrs/S
CO1. Recalling various concepts relating to languages and Applications	1	12
CO2. Understanding various functions of C++ language	2	12
CO3 Applying various classes and objects	3	12
CO4. Analyzing different types of inheritance system	4	12
CO5. Understanding working bout files and exception handling	5	12

Course Outcomes	Programme Outcomes						Programme Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3
CO1	3	2	3	2	1	1	3	3	2
CO2	3	2	3	2	1	1	3	3	2
CO3	3	2	3	2	1	1	3	3	2
CO4	3	2	3	2	1	1	3	3	2
CO5	3	2	3	2	1	1	3	3	2

Strong: 3 Medium: 2 Low: 1

SEMESTER II

Hours: 4/W 60hrs/Sem

Course Code: U23GM03 **Credits:4**

Title of the Paper: Object Oriented Programming with C++

UNIT I

Principles of OOP: Basic concepts – Benefits of OOP – Applications of OOP, Tokens-Keywords – Identifiers and Constants, Basic Data Types – User Defined Data Types, Control Structures.

UNIT II

Functions in C++ - Main function – Function prototyping – Call by reference – Return by reference – Function overloading

UNIT III

Classes and objects: Introduction – Specifying a class – Defining member functions – Private member functions – Memory allocation for objects – Objects as function arguments – Friendly functions.

UNIT IV

Constructions and destructions: Introduction - Constructors – Parameterized constructors – multiple constructors – Copy constructors – Destructors.

UNIT V

Inheritance: Introduction – Defining Derived Classes – Single Inheritance – Multiple Inheritance – Hierarchical Inheritance – Member Classes: Nesting of Classes.

TEXT BOOK

1. Object Oriented Programming with C++ by E.Balagurusamy, 4th Edition, ata McGraw Hill Publishing Company Ltd., NewDelhi.

UNIT I : Chapter 1: Sections: 1.5 – 1.6, 1.8 and Chapter 2: Sections: 3.2 – 3.6 , 3.24

UNIT II : Chapter 4 : Sections: 4.1 – 4.5, and 4.9

UNIT III: Chapter 5 : Sections: 5.1, 5.3, 5.4, 5.8, 5.10, 5.14 and 5.15

UNIT IV: Chapter 6 : Sections: 6.1 – 6.4, 6.7, and 6.11

UNIT V : Chapter 8: Sections: 8.1 – 8.3, 8.6 - 8.7 and 8.12

REFERENCE BOOKS

1. Robert Lafore, Object Oriented Programming in Microsoft C++, Galgotia publication
2. Byron S.Gottfried, Schaum's Outline of programming with C++ 2nd Edition
3. Let us C++ – YeswantKanetkar – BPB Publications, 1999

Web Resources

1. http://cppannotations.sourceforge.net/
2. https://www.cplusplus.com/doc/tutorial/
3. https://www.programiz.com/cpp-programming
4. https://www.w3schools.com/cpp/default.asp - C++ free tutorial

SEMESTER

Hours: 4/W 60hrs/Sem

Course Code: U23GM04 **Credits: 4**

Title of the Paper: STATISTICAL METHODS

Pedagogy	Hours/W	Lecture	Peer Teaching	GD/Tutorial/Videos	ICT
	4	3	-	-	1

Course Outcomes On completion of this course, students will able to	Unit	Hrs/S
CO1. Develop an understanding of the fundamental concepts and principles of statistics,including data collection, classification, and tabulation.	1	12
CO2. Apply measures of central tendency and dispersion to analyze raw and groupeddata and draw meaningful conclusions.	2	12
CO3. Utilize correlation and regression analysis to explore relationships betweenvariables and fit various types of curves to the data.	3	12
CO4. Construct and interpret index numbers, including weighted and unweighted indicesand chain indices.	4	12
CO5. Understand the association of attributes and how to measure consistency,independence, and Yule's coefficient of association.	5	12

Course Outcomes	Programme Outcomes						Programme Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3
CO1	3	2	3	2	1	1	3	3	2
CO2	3	2	3	2	1	1	3	3	2
CO3	3	2	3	2	1	1	3	3	2
CO4	3	2	3	2	1	1	3	3	2
CO5	3	2	3	2	1	1	3	3	2

Strong: 3 Medium: 2 Low: 1

SEMESTER

Hours: 4/W 60hrs/Sem

Course Code: U23GM04 **Credits: 4**

Title of the Paper: STATISTICAL METHODS

UNIT I

Introduction: Statistics, Frequency Distribution - Measures of central Tendency: Mean, Median, Mode, Geometric mean, Harmonic mean.

UNIT II

Measures of dispersion and Coefficient of variation – Problems based on raw data and grouped data

UNIT III

Measure of Skewness - Karl Pearson and Bowley's, Kurtosis and Moment of frequency distribution.

UNIT IV

Curve fitting - Principle of least squares - Linear, Nonlinear, Exponential and Growth curves

UNIT V

Correlation - Rank Correlation - Regression analysis - Problems based on raw data and grouped data

TEXT BOOK

1. Golden Statistics – N.P.Bali, Lakshmi Publications Pvt Ltd, 2016
2. Goon A.M. Gupta. A.K. & Das Gupta, B (1987). Fundamentals of Statistics, Vol.2, World Press Pvt. Ltd., P.R.Vittal, Differential Equations, Fourier and Laplace Transforms, Probablity – (3rd Edition, Reprint 2012), Margham Publications, Chennai – 600017.

UNIT I : Chapter 2

UNIT II: Chapter 3

UNIT III: Chapter 3

UNIT IV: Chapter 4

UNIT V : Chapter 6

REFERENCE BOOKS

1. Bansilal and Arora (1989). New Mathematical Statistics, Satya Prakashan, New Delhi.
2. Kapoor, J.N. & Saxena, H.C. (1976) . Mathematical Statistics , Sultan Chand and Sons Pvt. Ltd, New Delhi

Web Resources

1. Statistics e-labs - http://home.ubalt.edu/ntsbarsh/STAT-DATA/javastat.html
2. Statistical Analysis Lab - https://onlinestatbook.com/stat_analysis/index.html
3. https://www.w3schools.com/statistics/index.php - Interactive Statistics Tutorial
4. https://www.open.edu/openlearn/pluginfile.php/1061809/mod_resource/content/4/Medical%20statistics%20PDF.pdf – Medical Statistics

SEMESTER

Hours: 2/W 30hrs/Sem

Course Code: U23GM05P **Credits: 2**

Title of the Paper: STATISTICAL METHODS PRACTICALS

USING R [OR] SPSS [OR] SCILAB

1. Find the Skewness and Kurtosis of a given dataset distribution.
2. Applying Bayes' theorem to solve simple problems.
3. Find the mass function of a binomial distribution with n=20, p = 0.4. also draw thegraphs of mass function and cumulative distribution function.
4. Given the data n = 50, mean = 25, use appropriate function to find the mass function ofa Poisson distribution. Also draw the graphs of the mass function and cumulative distribution function.
5. Using the normal distribution to calculate confidence intervals for the mean when thestandard deviation is known.
6. Conducting a hypothesis test for the difference between two variances using the F-distribution.
7. Perform t – test for equality of mean.

TEXT BOOK

1. S.C. Gupta & V.K. Kapoor, Fundamentals of Mathematical Statistics, Sultan & sons.

SEMESTER

Hours: 4/W 60hrs/Sem

Course Code: U23GM06 **Credits: 4**

Title of the Paper: INTRODUCTION TO DATA SCIENCE

Pedagogy	Hours/W	Lecture	Peer Teaching	GD/Tutorial/Videos	ICT
	4	3	-	-	1

Course Outcomes On completion of this course, students will able to	Units	Hrs/S
CO1. Identify the different facets of data and explain the data science process.	1	12
CO2. Retrieve and transform data, perform exploratory data analysis, and build models.	2	12
CO3. Evaluate and compare machine learning algorithms and apply them to real world data science problems.	3	12
CO4. Understand the Hadoop framework and use it for big data processing.	4	12
CO5. Explain the concepts of NoSQL databases and apply them to solve datamanagement problems.	5	12

Course Outcomes	Programme Outcomes						Programme Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3
CO1	3	2	3	2	1	1	3	3	2
CO2	3	2	3	2	1	1	3	3	2
CO3	3	2	3	2	1	1	3	3	2
CO4	3	2	3	2	1	1	3	3	2
CO5	3	2	3	2	1	1	3	3	2

Strong: 3 Medium: 2 Low: 1

SEMESTER

Hours: 4/W 60hrs/Sem

Course Code: U23GM06 **Credits: 4**

Title of the Paper: INTRODUCTION TO DATA SCIENCE

UNIT I

Data science in a big data world: Benefits and uses – Facets of data – Data science process – Big data ecosystem and data science

UNIT II

The Data science process: Overview –Rresearch goals - Retrieving data -Transformation – Exploratory Data Analysis – Model building

UNIT III

Algorithms: Applications of Machine learning in Data Science - Machine learning algorithms – Modeling process – Types – Supervised – Unsupervised

UNIT IV

Introduction to Hadoop: Hadoop framework – Spark – Replacing Map Reduce

UNIT V

Introduction to NoSQL: NoSQL – ACID – CAP – BASE – types

TEXT BOOK

1. Davy Cielen, Arno D. B. Meysman, Mohamed Ali, "Introducing Data Science", manning publications 2016.

UNIT I : Chapter 1 - 1.1 – 1.4

UNIT II: Chapter 2 - 2.1 -2.6

UNIT III : Chapter 3 – 3.1 – 3.3

UNIT IV : Chapter 5 – 5.1

UNIT V : Chapter 6 – 6.1

REFERENCE BOOKS

1. Introduction to Data Science - B. Uma Maheswari , R. Sujatha - WILLEY- 2021
2. MurtazaHaider, "Getting Started with Data Science – Making Sense of Data with Analytics", IBM press, E-book.

Web Resources

1. Python Data Science Handbook: Essential Tools for Working with Data by Jake VanderPlas https://jakevdp.github.io/PythonDataScienceHandbook/
2. An Introduction to Machine Learning by Alpaydin https://www.cmpe.boun.edu.tr/~ethem/i2ml2e/
3. https://www.open.edu/openlearn/science-maths-technology/learn-code-data-analysis/content-section-overview?active-tab=content-tab – Learn to code for data analysis – Free Course
4. https://www.w3schools.com/datascience/ - Data Science Tutorial
5. https://www.kaggle.com/code/helgejo/an-interactive-data-science-tutorial - Free data Science Tutorial
6. https://www.nbshare.io/ - Data science learning

SEMESTER

Hours: 4/W 60hrs/Sem

Course Code: U23GM07 **Credits: 4**

Title of the Paper: INTRODUCTION TO MACHINE LEARNING

Pedagogy	Hours/W	Lecture	Peer Teaching	GD/Tutorial/Videos	ICT
	4	3	-	-	1

Course Outcomes On completion of this course, students will able to	Units	Hrs/S
CO1 Students will gain an understanding of the basics of Machine Learning, includingits applications and types.	1	12
CO2. Students will gain knowledge of Classification and Model Selection techniques,including various distance-based Machine Learning methods.	2	12
CO3 Students will be able to implement and evaluate Unsupervised Machine Learningtechniques such as Clustering and PCA.	3	12
CO4. Students will be able to design Machine Learning Algorithms for classification andregression tasks and evaluate their performance using relevant metrics.	4	12
CO5. Students will be able to apply Statistical Learning Theory and Ensemble methodsto improve Machine Learning algorithms' performance	5	12

Course Outcomes	Programme Outcomes						Programme Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3
CO1	3	2	3	2	1	1	3	3	2
CO2	3	2	3	2	1	1	3	3	2
CO3	3	2	3	2	1	1	3	3	2
CO4	3	2	3	2	1	1	3	3	2
CO5	3	2	3	2	1	1	3	3	2

Strong: 3 Medium: 2 Low: 1

SEMESTER

Hours: 4/W 60hrs/Sem

Course Code: U23GM07 **Credits: 4**

Title of the Paper: INTRODUCTION TO MACHINE LEARNING

UNIT I

Introduction to Python & Machine Learning: Overview of Machine Learning and its applications - Components of Machine learning: Data, Feature Extraction, Model Selection, Training, Evaluation – Understanding Python: why Python, First Python program, Python Basics, data Structure and loops - Feature Engineering with Python: Pandas – Data visualization: Line chart, Bar chart, pie chart, Box plot, - Seaborn: Distplot, Jointplot.

UNIT II

Classification and Model Selection: Types of Machine Learning: Supervised, Unsupervised, Reinforcement Learning, deep learning -Classification of machine Learning Concepts - Distance based Machine learning methods – K Nearest Neighbor- classifications – Decision Tree learning-Naïve Bayes –Linear regression - Logistic Regression – Linear regression Models – Support Vector Machine

UNIT III

Unsupervised Machine Learning: Introduction to Clustering Techniques - requirements of clustering Algorithm – Types of Clustering Method – Clustering strategies – Partitioning clustering -: K-Means Clustering - Kernel K means

UNIT IV

Hierarchical Clustering - Evaluation Metrics -Principal Component Analysis (PCA) – Kernel principle Component analysis

UNIT V

Machine learning Algorithms: Designing Machine Learning Algorithms – Classification Metrics – Regression Metrics – Statistical learning theory – Ensemble methods

TEXT BOOK

1. Machine Learning using Python by Manaranjan Pradhan and U Dinesh Kumar , Wiley, 2019
2. Machine Learning - V.K. Jain – Khanna Publishing Pvt. Ltd, 2018

UNIT I: Chapter 1- 1.1,1.2 up to page no. 6;

Chapter 2 – 2.1,2.3,2.4,2.5;

Chapter 3 – 3.6:

Chapter 4 – 4.1 to 4.7,4.8 – 4.8.1& 4.8.2

UNIT II : Chapter 1 – 1.2 to 1.15;

UNIT III: Chapter 2 – 2.1 to 2.9

UNIT IV: Chapter 2 – 2.13 to 2.16:

UNIT V : Chapter 3 – 3.1 to 3.6

REFERENCE BOOKS

1. Data Science and Machine Learning using Python – 2022 by Dr Reema Thareja, bpb Publication, 2020
2. Data Science and Machine Learning by N. Meenakshi and K. E. Rajakumari, 2021

Web Resources

1. https://www.nbshare.io/ -NBSHARE notebook for Interactive tutorials on Machine learning.
2. https://www.simplilearn.com/introduction-to-machine-learning-guide-pdf
3. http://www.r2d3.us/visual-intro-to-machine-learning-part-1/
4. https://www.w3schools.com/python/python_ml_getting_started.asp - ML Tutorial
5. https://www.simplilearn.com/tutorials/machine-learning-tutorial - ML Tutorials

SEMESTER

Hours: 2/W 30hrs/Sem

Course Code: U23GM08 **Credits: 2**

Title of the Paper: INTRODUCTION TO MACHINE LEARNING PRACTICAL

[Either by R Programming or Python Programming]

Using Python

1. Implementing a supervised learning algorithm (such as linear regression or support vector machines) to predict the price of a house based on its features,
2. Implement Naïve Bayes Theorem to classify the English Text.
3. Build a classification model using scikit-learn and TensorFlow to predict whether a patient has a particular disease based on various medical measurements such as blood pressure and cholesterol levels. Use Heart disease dataset
4. Use clustering algorithms such as K-means to group customers based on their purchasing behavior by using Matplotlib and Plotly libraries.Data : Online retail dataset
5. Implementing a decision tree algorithm from scratch to classify a dataset on your own and comparing its performance .
6. Write a Python Program to implement Principal Component Analysis on a dataset of your own choice.

Using R

1. Implementing a supervised learning algorithm (such as linear regression or support vector machines) to predict the price of a house based on its features
2. Implement Naïve Bayes Theorem to classify the English Text in R
3. Use clustering algorithms such as K-means to group customers based on their purchasing behavior by using R.

4. Build a decision tree in R using the rpart() function from the rpart package to predict whether a customer will buy a product based on their age, gender, and income.
5. Implementing a decision tree algorithm from scratch to classify a dataset on your own and comparing its performance.
6. Write a R Program to implement Principal Component Analysis on a dataset of your own choice

SEMESTER

Hours: 4/W 60hrs/Sem

Course Code: U23GM09 **Credits:4**

Title of the Paper: INTRODUCTION TO ARTIFICIAL INTELLIGENCE

Pedagogy	Hours/W	Lecture	Peer Teaching	GD/Tutorial/Videos	ICT
	4	3	-	-	1

Course Outcomes On completion of this course, students will able to	Unit	Hrs/S
CO1. Understand the various concepts of AI Techniques.	1	12
CO2. Understand various AI approaches.	2	12
CO3. Understand various Search Algorithm in AI.	3	12
CO4. Understand reasoning in AI.	4	12
CO5. Understand Knowledge Representation in AI.	5	12

Course Outcomes	Programme Outcomes						Programme Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3
CO1	3	2	3	2	1	1	3	3	2
CO2	3	2	3	2	1	1	3	3	2
CO3	3	2	3	2	1	1	3	3	2
CO4	3	2	3	2	1	1	3	3	2
CO5	3	2	3	2	1	1	3	3	2

Strong: 3 Medium: 2 Low: 1

SEMESTER

Hours: 4/W 60hrs/Sem

Course Code: U23GM09 **Credits: 4**

Title of the Paper: INTRODUCTION TO ARTIFICIAL INTELLIGENCE

UNIT I

Introduction to AI: Scope of AI: Games, theorem proving, natural language processing, vision and speech processing, robotics, expert systems, AI techniques- Characteristics of AI problems – Intelligent Agent.

UNIT II

AI Approaches: Problem Solving (Blind): State space search: Production systems-Searching techniques -Uninformed search techniques

UNIT III

Informed /Heuristic Based Search: Generate-and-Test Algorithm - Hill Climbing - Best-First Search/Greedy Search - Branch and Bound Search - A* Algorithm - Problem Reduction-AO* Algorithm - Constraint Satisfaction - Means-End Analysis (MEA)

UNIT IV

Knowledge Representation: Predicate logic: Unification, Modus ponens,Modus tolens, Resolution in predicate logic, Conflict resolution, Forward chaining, Backward chaining, Conflict resolutions

UNIT V

Structural knowledge representation: Semantic nets: Slots, Exceptions and default frames, Conceptual dependency, Scripts

TEXT BOOK

1. Artificial Intelligence – A Practical Approach - Rajiv Chopra – Second edition – S. Chand & Co Pvt Ltd.

UNIT I: Chapter 1

UNIT II: Chapter 2 – 2.0 - 2.2 , 2.2.1 to 2.2.2

UNIT III: Chapter 2 – 2..2.3

UNIT IV: Chapter 4 - 4.0 – 4.4

UNIT V: Chapter 4 - 4.5

REFERENCE BOOKS

1. Trivedi, M.C., "A Classical Approach to Artifical Intelligence", Khanna Publishing House, Delhi, 2019
2. Saroj Kaushik, "Artificial Intelligence", Cengage Learning India, 2011
3. Artificial Intelligence – Mishra R.B – PHI Learning Pvt ltd, 2010

Web Resources

1. https://online-learning.harvard.edu/course/cs50s-introduction-artificial-intelligence-python
2. https://www.javatpoint.com/artificial-intelligence-ai - AI Tutorial
3. https://www.w3schools.com/ai/ - AI learning
4. https://www.nbshare.io/ - AI learning

SEMESTER

Hours: 4/W 60hrs/Sem

Course Code: U23GM10 **Credits: 4**

Title of the Paper: MATHEMATICAL FINANCE

Pedagogy	Hours/W	Lecture	Peer Teaching	GD/Tutorial/Videos	ICT
	4	3	-	-	1

Course Outcomes On completion of this course, students will able to	Units	Hrs/S
CO1. Apply mathematical concepts and techniques to solve financial problems.	1	12
CO2. Analyze different types of financial instruments and evaluate their risks and returns.	2	12
CO3. Construct investment portfolios and manage risks.	3	12
CO4. Communicate financial information effectively to stakeholders.	4	12
CO5. Understand the ethical and professional standards in the finance industry.	5	12

Course Outcomes	Programme Outcomes						Programme Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3
CO1	3	2	3	2	1	1	3	3	2
CO2	3	2	3	2	1	1	3	3	2
CO3	3	2	3	2	1	1	3	3	2
CO4	3	2	3	2	1	1	3	3	2
CO5	3	2	3	2	1	1	3	3	2

Strong: 3 Medium: 2 Low: 1

SEMESTER

Hours: 4/W 60hrs/Sem

Course Code: U23GM10 **Credits: 4**

Title of the Paper: MATHEMATICAL FINANCE

UNIT I

The concept of interest – Simple interest - Compound Interest - Rate of interest - Accumulation factors - Present values – Capital gains and losses

UNIT II

Basic compound Interest- Functions – Interest rate quantitative – Annuities – Varying Annuities.

UNIT III

Future Derivatives: Swaps and options - Option payoff and profit - European option Pricing – Black - Scholes models – Trading strategies

UNIT IV

Stochastic Interest Rate models – Introductory – Independent annual rates of return – The log – Normal distribution.

UNIT V

Simulation techniques – Random number generation – Dependent annual rate of return – Application of Brownian motion.

TEXT BOOK

1. An Introduction to the Mathematics of Finance: A Deterministic Approach by Stephen Garrett.

UNIT I:[1] Chapter 1 & 2

UNIT II :[1] Chapter 3

UNIT III: [1] Chapter 11

UNIT IV: [1] Chapter 12 – 12.1 to 12.3

UNIT V: [1] Chapter 12 – 12.4 to 12.7

REFERENCE BOOKS

1. An Elementary Introduction To Mathematical Finance by Sheldon M. Ross.

2. Mathematics for Finance by M Capinski and T Zastawniak, Springer (International Edition), 2003.
3. The Calculus of Finance by Amber Habib, Universities Press, 2011.
4. Options, Futures and Other Derivatives 7th edition by John C Hull and SankarshanBasu, Pearson 2009.
5. Investment Science by David Luenberger, Oxford University Press (Indian Edition), 1997.

Web Resources

1. Financial Theory: https://ocw.mit.edu/courses/economics/14-03-financial-theory-fall-2008/
2. Investopedia - Financial Education: https://www.investopedia.com/financial-education-4689775 EC - Financial Mathematics
3. https://www.edx.org/course/financial-analysis-decision-making-0.

ALLIED PAPERS FOR PHYSICS

SEMESTER I

Hours:4/w 60/Sem

Course Code: U23GM11 **Credits:4**

Title of the paper: ALLIED MATHEMATICS - PAPER I

Pedagogy	Hours/W	Lecture	Peer Teaching	GD/Tutorial/Videos	ICT
	4	4	-	-	-

Course Outcomes On completing this course, the student will be able to	Unit	Hrs/S
CO1. Analyse the Binomial series	1	12
CO2. Understand and apply the concept of Exponential & Logarithm series	2	12
CO3. Get clear concept of Relation between roots and coefficients	3	12
CO4. Demonstrate the techniques of Newton's and Horner's method	4	12
CO5: Solve the problems related to Radius& Center of curvature	5	12

Course Outcomes	Programme Outcomes						Programme Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3
CO1	3	2	3	1	-	-	3	2	1
CO2	3	2	3	1	2	-	3	2	1
CO3	3	3	3	3	-	-	3	3	1
CO4	3	3	3	3	-	-	3	3	1
CO5	3	3	3	3	2	-	3	3	1

Strong: 3 Medium: 2 Low: 1

SEMESTER I
ALLIED MATHEMATICS - PAPER I

Hours:4/w 60/Sem

Course Code: U23GM11 **Credits:4**

UNIT I :

Binomial series

UNIT II :

Exponential series - Logarithmic series.

UNIT III :

Theory of equations - Formation of equations – Relation between roots and co-efficients – Reciprocal Equations.

UNIT IV :

Transformation of equations – Newton's and Horner's method of finding roots up to 2 decimals.

UNIT V :

Radius of curvature – Centre of curvature.

TEXT BOOK

1. Ancillary Mathematics Paper - I by Dr. S. Arumugam and Isaac.(1996)

UNIT I: Chapter 5
UNIT II : Chapter 6 and 7.
UNIT III: Chapter 8 (Section 8.1 to 8.3)
UNIT IV: Chapter 8 (Sections 8.4 and 8.5)
UNIT V: Chapter 2

SEMESTER II

Hours:4/w 60/Sem

Course Code: U23GM12 **Credits:3**

Title of the paper: ALLIED MATHEMATICS - PAPER II

Pedagogy	Hours/W	Lecture	Peer Teaching	GD/Tutorial/Videos	ICT
	4	4	-	-	-

Course Outcomes On completing this course the student will be able to	Unit	Hrs/S
CO1. Understand the Hyperbolic functions and Logarthiam of complex number	1	12
CO2. Analysis the properties of definite integral	2	12
CO3. Acquire a good foundation in Differential equation of first order	3	12
CO4. Get Clear Concepts of second order equations and solve the problem	4	12
CO5: Demonstrate the techniques of partial differential equations	5	12

Course Outcomes	Programme Outcomes						Programme Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3
CO1	3	2	3	1	-	-	3	2	1
CO2	3	2	3	1	2	-	3	2	1
CO3	3	3	3	3	-	-	3	3	1
CO4	3	3	3	3	-	-	3	3	1
CO5	3	3	3	3	2	-	3	3	1

Strong: 3 Medium: 2 Low: 1

SEMESTER II
ALLIED MATHEMATICS - PAPER II

Hours:4/w 60/Sem

Course Code: U23GM12 **Credits:3**

UNIT I:

Trigonometry - Expansions – Hyperbolic functions – Logarithm of complex number.

UNIT II:

Definite integrals – Reduction formulae for $\sin^n x$, $\cos^n x$, $\tan^n x$, $\text{cosec}^n x$, $\sec^n x$, $\cot^n x$.

UNIT III:

Differential equations of first order.

UNIT IV:

Second order equations with RHS of the form X^n, e^{ax}, sin bx, cos bx, $e^{ax}\sin bx$, $e^{ax}\cos bx$, $e^{ax}x^n$.

UNIT V:

Partial differential Equations – Formation – Solutions : standard form Pp + Qq = R.

TEXT BOOK

TB 1 : Ancillary Mathematics Paper - I by Dr. S. Arumugam and Isaac.
TB 2 : Ancillary Mathematics Paper - II by Dr. S. Arumugam and Isaac.
TB 3: Ancillary Mathematics Paper - III by Dr. S. Arumugam and Isaac.

UNIT I: TB 1 : Chapter 9, 10 and 11.
UNIT II: TB 2 : Chapter 1 (Section 1.1 to 1.4)
UNIT III: TB 3 : Chapter 1 (Section 1.2)
UNIT IV: TB 3 : Chapter 1 (Section 1.3)
UNIT V: TB 3 : Chapter 3 (Sections 3.1 and 3.2)

SEMESTER II

Hours:4/w 60/Sem

Course Code: U23GM13 **Credits:3**

Title of the paper: ALLIED MATHEMATICS - PAPER III

Pedagogy	Hours/W	Lecture	Peer Teaching	GD/Tutorial/Videos	ICT
	4	4	-	-	-

Course Outcomes On completing this course, the student will be able to	Unit	Hrs\S
CO1. Find the Gradient, Curl and Divergence of a function	1	12
CO2. Evaluate line integral and surface integral	2	12
CO3. Understand the concept of Laplace Transform and inverse Laplace Transform	3	12
CO4. Calculate correlation coefficient and Interpolation	4	12
CO5: Compute Fourier, Cosine and Sine Series	5	12

Course Outcomes	Programme Outcomes						Programme Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3
CO1	3	2	3	1	-	-	3	2	1
CO2	3	2	3	1	2	-	3	2	1
CO3	3	3	3	3	-	-	3	3	1
CO4	3	3	3	3	-	-	3	3	1
CO5	3	3	3	3	2	-	3	3	1

Strong: 3 Medium: 2 Low: 1

SEMESTER II
ALLIED MATHEMATICS - PAPER III

Hours:4/w 60/Sem
Course Code: U23GM13 **Credits:3**

UNIT I :

Differentiation of vectors – Velocity – Acceleration – Gradient – Divergence and curl. (problems only)

UNIT II :

Line and surface integrals – Line integral – Surface Integral – Green, Gauss, Stokes Theorem(without proof).

UNIT III:

Laplace transform – Inverse Laplace Transform – Solution of Differential equation using Laplace transform.

UNIT IV :

Correlation and Rank Correlation – Interpolation – Lagrange's and Newton's methods (Problems only)

UNIT V :

Fourier series – Cosine and Sine series

TEXT BOOK

TB 1 : Ancillary Mathematics Paper II (Revised) by Dr. S. Arumugam and Isaac.
TB 2 : Ancillary Mathematics Paper III (Revised) by Dr. S. Arumugam and Isaac.
UNIT I : TB 1: Chapter 1
UNIT II : TB 1: Chapter 2
UNIT III : TB 1: Chapter 5
UNIT IV : TB 2: Chapter 3, Chapter 4 (Sections 4.1 and 4.2), Chapter 6.(Except index Numbers & finite differences)
UNIT V : TB 2: Chapter 9(Except half range series)

ALLIED PAPERS FOR CHEMISTRY

SEMESTER III

Hours:4/w 60/Sem

Course Code: U23GM14 **Credits:4**

Title of the paper: ALLIED MATHEMATICS - PAPER I

Pedagogy	Hours/W	Lecture	Peer Teaching	GD/Tutorial/Videos	ICT
	4	4	-	-	-

Course Outcomes On completing this course, the student will be able to	Unit	Hrs/S
CO1. Analyse the Binomial series	1	12
CO2. Understand and apply the concept of Exponential & Logarithm series	2	12
CO3. Get clear concept of Relation between roots and coefficients	3	12
CO4. Demonstrate the techniques of Newton's and Horner's method	4	12
CO5: Understand the Hyperbolic functions and Logarithm of complex number	5	12

Course Outcomes	Programme Outcomes						Programme Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3
CO1	3	2	3	1	-	-	3	2	1
CO2	3	2	3	1	2	-	3	2	1
CO3	3	3	3	3	-	-	3	3	1
CO4	3	3	3	3	-	-	3	3	1
CO5	3	3	3	3	2	-	3	3	1

SEMESTER III
ALLIED MATHEMATICS - PAPER I

Hours:4/w 60/Sem

Course Code: U23GM14 **Credits:4**

UNIT I :

Binomial series

UNIT II :

Exponential series - Logarithmic series.

UNIT III :

Theory of equations - Formation of equations – Relation between roots and co-efficients – Reciprocal Equations.

UNIT IV :

Transformation of equations – Newton's and Horner's method of finding roots up to 2 decimals.

UNIT V:

Trigonometry - Expansions – Hyperbolic functions – Logarithm of complex number.

TEXT BOOK

1. Ancillary Mathematics Paper - I by Dr. S. Arumugam and Isaac.(1996)

UNIT I : Chapter 5
UNIT II : Chapter 6 and 7.
UNIT III : Chapter 8 (Section 8.1 to 8.3)
UNIT IV : Chapter 8 (Sections 8.4 and 8.5)
UNIT V : Chapter 9,10,11

SEMESTER IV

Hours: 4 /W 60 /Sem

Course Code: U23GM15 **Credits: 3**

Title of the Paper: ALLIED MATHEMATICS - PAPER II

Pedagogy	Hours/W	Lecture	Peer Teaching	GD/Tutorial/Videos	ICT
	4	4	-	-	-

Course Outcomes On completing this course, the student will be able to	Unit	Hrs\S
CO1: Solve the problems related to Radius& Center of curvature	1	12
CO2. Analyse the properties of definite integral	2	12
CO3. Acquire a good foundation in Differential equation of first order	3	12
CO4. Get Clear Concepts of second order equations and solve the problem	4	12
CO5: Demonstrate the techniques of partial differential equations	5	12

Course Outcomes	Programme Outcomes						Programme Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3
CO1	3	2	3	1	-	-	3	2	1
CO2	3	2	3	1	2	-	3	2	1
CO3	3	3	3	3	-	-	3	3	1
CO4	3	3	3	3	-	-	3	3	1
CO5	3	3	3	3	2	-	3	3	1

Strong: 3 Medium: 2 Low: 1

SEMESTER IV
ALLIED MATHEMATICS - PAPER II

Hours: 4 /W 45 /Sem

Course Code: U23GM15 **Credits: 3**

UNIT I :

Radius of curvature – Center of Curvature

UNIT II:

Definite integrals – Reduction formulae for $\sin^n x$, $\cos^n x$, $\tan^n x$, $\text{cosec}^n x$, $\sec^n x$, $\cot^n x$.

UNIT III:

Differential equations of first order.

UNIT IV:

Second order equations with RHS of the form X^n, e^{ax}, sin bx, cos bx, $e^{ax}\sin bx$, $e^{ax}\cos bx$, $e^{ax}x^n$.

UNIT V:

Partial differential Equations – Formation – Solutions : standard form Pp + Qq = R.

TEXT BOOK

TB 1 : Ancillary Mathematics Paper - I by Dr. S. Arumugam and Isaac.
TB 2 : Ancillary Mathematics Paper - II by Dr. S. Arumugam and Isaac.
TB 3: Ancillary Mathematics Paper - III by Dr. S. Arumugam and Isaac.

UNIT I: TB 1 : Chapter 9, 10 and 11.
UNIT II: TB 2 : Chapter 1 (Section 1.1 to 1.4)
UNIT III: TB 3 : Chapter 1 (Section 1.2)
UNIT IV : TB 3 : Chapter 1 (Section 1.3)
UNIT V: TB 3 : Chapter 3 (Sections 3.1 and 3.2)

SEMESTER IV

Hours:4/W 60 /Sem

Course Code: U23GM16 **Credits: 3**

Title of the Paper: ALLIED MATHEMATICS - PAPER III

Pedagogy	Hours/W	Lecture	Peer Teaching	GD/Tutorial/Videos	ICT
	4	4	-	-	-

Course Outcomes On completing this course, the student will be able to	Unit	Hrs/S
CO1. Calculate correlation coefficient and Index numbers	1	12
CO2: Compute Fourier, Cosine and Sine Series	2	12
CO3. Find the Gradient, Curl and Divergence of a function	3	12
CO4. Evaluate line integral and surface integral	4	12
CO5. Understand the concept of Laplace Transform and inverse Laplace Transform	5	12

Course Outcomes	Programme Outcomes						Programme Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3
CO1	3	2	3	1	-	-	3	2	1
CO2	3	2	3	1	2	-	3	2	1
CO3	3	3	3	3	-	-	3	3	1
CO4	3	3	3	3	-	-	3	3	1
CO5	3	3	3	3	2	-	3	3	1

Strong: 3 Medium: 2 Low: 1

SEMESTER IV
ALLIED MATHEMATICS - PAPER III

Hours: 4/W 60//Sem

Course Code: U23GM16 **Credits: 3**

UNIT I :

Correlation and Rank Correlation – Interpolation – Lagrange and Newton's methods(Problems only)

UNIT II:

Fourier series – Cosine and Sine series

UNIT III :

Differentiation of vectors – Velocity – Acceleration – Gradient – Divergence and curl (problems only)

UNIT IV:

Line integral – Surface Integral – Green, Gauss and Stokes theorems (without proof).

UNIT V:

Laplace transform – Inverse Laplace Transform – Solution of Differential equation using Laplace transform.

TEXT BOOK

TB 1 : Ancillary Mathematics Paper II (Revised) by Dr. S. Arumugam and Isaac.
TB 2 : Ancillary Mathematics Paper III (Revised) by Dr. S. Arumugam and Isaac.

UNIT I : TB 1: Chapter 1(Except index numbers and finite differences)
UNIT II : TB 1: Chapter 2
UNIT III : TB 1: Chapter 5
UNIT IV : TB 2: Chapter 3, Chapter 4 (Sections 4.1 and 4.2), Chapter 6.
UNIT V : TB 2: Chapter 9

DISCIPLINE SPECIFIC ELECTIVE

SEMESTER V

Hours: 4 /W 60hrs/Sem

Course code: U23DM01 **Credits: 3**

Title of the Paper: OPERATIONS RESEARCH

Pedagogy	Hours/W	Lecture	Peer Teaching	GD/Tutorial/Videos	ICT
	4	4	-	-	-

Course Outcomes On completing this course the student will be able to	Unit	Hrs/S
CO1. Solve linear programming problems.	1	12
CO2. Apply different methods to find transportation cost.	2	12
CO3. Recognize Hungarian method to solve Assignment Problems.	3	12
CO4. State Maximin-Minimax principle and list the types of inventories.	4	12
CO5. Identify critical path.	5	12

Course Outcomes	Programme Outcomes						Programme Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3
CO1	3	1	3	-	-	-	3	2	1
CO2	2	1	3	-	-	-	3	2	1
CO3	3	2	3	2	-	-	3	2	1
CO4	3	2	3	2	1	-	3	2	1
CO5	3	2	3	2	1	-	3	2	1

Strong: 3 Medium: 2 Low: 1

SEMESTER V

Hours: 4/W 60hrs/Sem

Course code: U23DM01 **Credits: 3**

Title of the Paper: OPERATIONS RESEARCH

UNIT I

Linear Programming problem - Formulation of LPP Mathematical form - Solution of LPP - Graphical Method - Simplex method.

UNIT II

Two-Phase method – Duality - Axioms of duality theory - Dual simplex method.

UNIT III

Transportation problem - Mathematical form - Initial solutions by Northwest corner rule - Maxima and Minima method - Vogel's approximation method - Optimality test by Modi method for both balanced and unbalanced T.P - Assignment Problem - Hungarian method.

UNIT IV

Game theory - Two person zero sum game - Maximin and minimax principle of optimality - Saddle point - Solution of the game using formula - Graphical solution of (2 x n) and (m x 2) games - LPP method.

UNIT V

Network and basic components – Rules of Network Construction – Time Calculation in network – Critical Path Method – PERT Calculation.

TEXT BOOK

1. T. Veerarajan, Operations Research, Universities Press, 2017.

Unit I: Chapter 1
Unit II: Chapter 2 and Chapter 4.
Unit III: Chapter 8
Unit IV: Chapter 10
Unit V: Chapter 9 and 12.

REFERENCE BOOKS

1. Dr. S. Arumugam and Prof. Thangapandi Issac, Linear Programming, New Gamma Publishing House, March 2015.
2. Kanti Swarup, P. K. Gupta, Manmohan, Operations Research, Sultan Chand & Sons, New Delhi, 1978.

SEMESTER V

Hours: 4/W 60 hrs/Sem

Course Code: U23DM02 **Credits: 3**

Title of the Paper: NUMERICAL METHODS WITH APPLICATIONS

Pedagogy	Hours/W	Lecture	Peer Teaching	GD/Tutorial/Videos	ICT
	4	2	-	1	1

Course Outcomes On completing this course, the student will be able to	Unit	Hrs/S
CO1. Solve the Newton's Raphson method.	1	12
CO2. Find the Calculation of matrix and inverse of a matrix	2	12
CO3. Discuss and demonstrate the concept of interpolation	3	12
CO4. Understand the Newton's Forward and Backward formula.	4	12
CO5. Apply Euler's and Runge Kutta method for fourth order	5	12

Course Outcomes	Programme Outcomes						Programme Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3
CO1	3	3	2	3	1	-	3	3	1
CO2	3	3	2	3	1	-	3	3	1
CO3	3	3	2	3	2	-	3	3	1
CO4	3	3	2	3	1	-	3	3	1
CO5	3	3	2	3	2	-	3	3	1

Strong: 3 Medium: 2 Low: 1

SEMESTER V

Hours: 4 /W 60 hrs/Sem

Course Code: U23DM02 **Credits: 3**

Title of the Paper: NUMERICAL METHODS WITH APPLICATIONS

UNIT I

Algebraic and Transcendental equations – Errors in numeric computations – Iteration method – Aitken's $\Delta 2$ Method – Bisection method – Regula-falsi method – Newton's Raphson method.

UNIT II

Simultaneous equations: Back substitution – Gauss elimination method – Gauss Jordan method – Calculation of inverse of a matrix – Gauss Jacobi iteration method – Gauss Seidal iteration method.(Problems only)

UNIT III

Finite differences – Difference operators – Other difference operators - Difference equations – Formation of difference equations – Linear difference equations.

UNIT IV

Interpolation: Newton's interpolation formula – Central difference interpolation formulae – Lagrange's interpolation formulae – Divided difference formula – Inverse interpolation.

UNIT V

Numerical differentiation – Derivatives using Newton's forward difference formula – Derivatives using Newton's backward difference formula - Derivatives using Newton's central difference formula – Maxima and minima of the interpolating polynomial – Attributes.

Text Book:

1. Dr. S. Arumugam, Prof. A. Thangapandi Isaac and Dr. A. Somasundaram, Numerical Analysis with Programming in C, New Gamma Publishing House, June 2015.

Unit I: Chapter 1

Unit II: Chapter 2

Unit III: Chapter 3

Unit IV: Chapter 4

Unit V: Chapter 5 and Chapter 8 – Section 1

REFERENCE BOOKS:

1. T. Veerarajan and T. Ramachandran, Numerical Methods with Programming in C, McGraw Hill Education, 2008.
2. S. S. Sastry, Introductory Methods of Numerical Analysis, PHI Learning Pvt Ltd., New Delhi, 2012.

SEMESTER VI

Hours: 5 /W 75 /Sem

Course Code: U23DM03 **Credits: 3**

Title of the Paper: GRAPH THEORY & APPLICATIONS

Pedagogy	Hours/W	Lecture	Peer Teaching	GD/Tutorial / Videos	ICT
	5	**3**	**1**	**-**	**1**

Course Outcomes **On completing this course, the student will be able to**	**Unit**	**Hrs/S**
CO1. Acquire the knowledge of basic definitions of Graphs, Isomorphism, Walks, Connected Graphs and Cut Vertices and Edges	1	15
CO2. Gain the knowledge of Eulerian and Hamiltonian Graphs	2	15
CO3. Identify the concept of Bipartite Graphs and Marriage problem	3	15
CO4. Perceive the idea of Planar graphs	4	15
CO5. Recognize the concept of Colouring and Directed graphs	5	15

Course Outcomes	Programme Outcomes						Programme Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3
CO1	3	1	3	-	-	-	3	2	1
CO2	3	1	3	-	-	-	3	2	1
CO3	3	1	3	-	-	-	3	2	1
CO4	3	1	3	-	-	-	3	2	1
CO5	3	1	3	-	2	1	3	2	1

Strong: 3 Medium: 2 Low: 1

SEMESTER VI

Hours: 5/W 75 /Sem

Course Code: U23DM03 **Credits: 3**

Title of the Paper: GRAPH THEORY & APPLICATIONS

UNIT I

Graphs - Subgraphs - Isomorphism and degrees - Walks and connected graphs - Cycles ingraphs - Cut vertices and cut edges.

UNIT II

Eulerain graphs - Fleury's algorithm - Hamiltonian graphs - Weighted graphs.

UNIT III

Bipartite graphs - Marriage problem - Trees - Connector problem.

UNIT IV

Matrix representations - Planar graphs - Euler formula - Platonic solids - Dual of a planegraph - Characterization of planar graphs.

UNIT V

Vertex colouring - Edge colouring - An algorithm for vertex colouring – Directed graphs.

TEXT BOOK

1. S. A. Choudum, A First course in Graph Theory, Macmillan Publishers India PvtLtd, 2000.

Unit I: Chapter 1
Unit II: Chapter 2
Unit III: Chapter 3
Unit IV: Chapter 4 – Section 1 and Chapter 5.
Unit V: Chapter 6 and Chapter 7 – Section 1

REFERENCE BOOK

1. F. Harary, Graph Theory, Narosa Publishing Company, 2001.
2. J. Clark and D. A. Holton, A First Look at Graph Theory, Allied Publishers, NewDelhi, 2005.

SEMESTER

Hours: 5/W 75hrs/Sem

Course Code: U23DM04 **Credits: 3**

Title of the Paper: MATHEMATICAL STATISTICS

Pedagogy	Hours/W	Lecture	Peer Teaching	GD/Tutorial/Videos	ICT
	5	**5**	**-**	**-**	**-**

Course Outcomes On completing this course, the student will be able to	Unit	Hrs/S
CO1. Recall basic concepts and solve problems in Probability Theory.	1	15
CO2. Classify discrete and continuous one dimensional and two dimensional random variables.	2	15
CO3. Define and find Mathematical Expectation, Moment Generating Function and Characteristic Function.	3	15
CO4. Describe Binomial and Poisson distributions.	4	15
CO5. Recognize the concept of Rectangular and Normal distributions.	5	15

Course Outcomes	Programme Outcomes						Programme Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3
CO1	3	2	3	2	1	1	3	3	2
CO2	3	2	3	2	1	1	3	3	2
CO3	3	2	3	2	1	1	3	3	2
CO4	3	2	3	2	1	1	3	3	2
CO5	3	2	3	2	1	1	3	3	2

Strong: 3 Medium: 2 Low: 1

SEMESTER

Hours: 5/W 75hrs/Sem

Course Code: U23DM04 **Credits: 3**

Title of the Paper: MATHEMATICAL STATISTICS

UNIT I

Theory of Probability - Sample Space - Probability function - Laws of Addition - Conditional Probability - Law of multiplication - Independent - Boole's inequality - Baye's Theorem - Theorems with proof and related problems.

UNIT II

Random Variables - Distribution function - Discrete and Continuous random variables - Probability density function - Mathematical Expectation (One dimensional only).

UNIT III

Moment generating function - Cumulates - Characteristic function - Theoretical Distribution - Binomial -n Poisson - Normal - Theorems with proof and related problems.

UNIT IV

Test of Significance of Large samples.

UNIT V

Test of significance of small samples - t-f-Chi square

TEXT BOOK

1. Dr.S. Arumugam, A. Thangapandi Isaac, Statistics, New Gamma Publishing House,July 2016.

UNIT I: Chapter 11
UNIT II: Chapter 12 Sections 1, 2, 3 and 4.
UNIT III: Chapter 12 Sections 5 and 6, Chapter 13
UNIT IV: Chapter 14
UNIT V: Chapter 15, 16

REFERENCE BOOKS

1. T. Veerarajan, Fundamentals of Mathematical Statistics, YesDee PublishingPrivate Ltd, 2017.
2. B. L. Agarwal, Basic Statistics, New Age International Publishers, 6th Edition

SEMESTER

Hours:4/W 60hrs/Sem

Course Code: U23DM05 **Credits: 3**

Title of the Paper: INTEGRAL TRANSFORMS & Z TRANSFORMS

Pedagogy	Hours/W	Lecture	Peer Teaching	GD/Tutorial/Videos	ICT
	4	3	-	1	-

Course Outcomes On completing this course, the student will be able to	Unit	Hrs/S
CO1. Find the Laplace Transform of some standard functions	1	12
CO2. Find the Inverse Laplace of functions and solve the linear differential equations	2	12
CO3. Define the Fourier Transform and explain some properties	3	12
CO4. Evaluate Fourier sine transform, cosine transform of functions	4	12
CO5. Evaluate Z-transforms and Inverse Z-transform	5	12

Course Outcomes	Programme Outcomes						Programme Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3
CO1	3	1	3	2	1	-	3	2	1
CO2	3	1	3	2	1	-	3	2	1
CO3	3	1	3	2	1	-	3	3	1
CO4	3	1	3	2	2	1	3	3	1
CO5	3	1	3	2	2	1	3	3	1

Strong: 3 Medium: 2 Low: 1

SEMESTER

Hours:4/W 60hrs/Sem

Course Code: U23DM05 **Credits: 3**

Title of the Paper: INTEGRAL TRANSFORMS & Z TRANSFORMS

UNIT I

Laplace Transform – Definition – Laplace transforms of e^{ax}, cosax, sinax, coshax, sinhax, x^n, e^{ax} f(x), x^n f(x), $f^n(x)$, n is a positive integer.

UNIT II

Inverse Laplace transform – Definition - Inverse Laplace transform of standard functions.Applications of Laplace transform – Solutions of differential equations of second order with constant co-efficient

UNIT III

Fourier transforms – Sine and Cosine transforms – Properties – Inversion theorem - Sine and Cosine transforms – Convolution theorem.

UNIT IV

Parseval's identity – Infinite Fourier Cosine Transform and Sine Transform -Transform of derivatives.

UNIT-V

Z-transforms - Elementary properties - Inverse Z-transform (using partial fraction and residues) - Initial and final value theorems - Convolution theorem - Formation of difference equations -Solution of difference equations using Z - transform.

TEXT BOOKS

1. Differential equations and its applications by Dr. S. Arumugam and A.Thanga Pandi Issac, New Gamma Publishing house, Palayamkottai.
2. T.Veerarajan, Transforms and Partial Differential Equations, 3rd Edition Mc Graw Hill India (January 1, 2016)

UNIT I :TB 1 Chapter 3 Section 1
UNIT II : TB 1 Chapter 3 Section 2
UNIT III : TB 2 Chapter 4
UNIT IV : TB 2 Chapter 4
UNIT V : TB 2 Chapter 5

REFERENCE BOOKS

1. Laplace Transformations by Gorain
2. Engineering Mathematics, P. Kandasamy, K.Thilagavathy and K.Gunavathy. (Vol. III), S. Chand and Co., Ltd.

SEMESTER

Hours: 4/W 60 /Sem

Course Code: U23DM06 **Credits: 3**

Title of the Paper: FUZZY SETS & ITS APPLICATIONS

Pedagogy	Hours/W	Lecture	Peer Teaching	GD/Tutorial/Videos	ICT
	4	4	-	-	-

Course Outcomes On completing this course, the student will be able to	Unit	Hrs/S
CO1. Recall the basic definitions, characteristics and significance of fuzzy sets.	1	12
CO2. Classify the operations on fuzzy sets, concept of extension principle.	2	12
CO3. List the concept of properties on interval valued arithmetic operations	3	12
CO4. Interpret the combination of logical connectives and fuzzy connectives.	4	12
CO5. Explain the concept of – fuzzy equivalence relation.	5	12

Course Outcomes	Programme Outcomes						Programme Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3
CO1	3	2	3	2	1	1	3	3	2
CO2	3	2	3	2	1	1	3	3	2
CO3	3	2	3	2	1	1	3	3	2
CO4	3	2	3	2	1	1	3	3	2
CO5	3	2	3	2	1	1	3	3	2

Strong: 3 Medium: 2 Low: 1

SEMESTER

Hours: 4 /W 60 /Sem

Course Code: U23DM06 **Credits: 3**

Title of the Paper: FUZZY SETS & ITS APPLICATIONS

UNIT I

Crisp set – operations on crisp sets – Fuzzy sets – Representation of a fuzzy set – representation of membership function – Types of fuzzy sets –cut of a fuzzy set α-cut decomposition –Some more definitions

UNIT II

Operations on fuzzy sets– Properties of operation on fuzzy sets – First and Second decomposition theorems - Product on fuzzy sets

UNIT III

Fuzzy numbers – Linguistic variables – Fuzzy arithmetic – Properties on interval valued arithmetic operations –Operations on fuzzy numbers – Fuzzy equations – Lattice of fuzzy numbers

UNIT IV

Classical logic –Logical connectives – Truth values and truth tables – Fuzzy logic - Fuzzy Logic truth tables – Fuzzy connectives

UNIT V

Relation on fuzzy sets–representation – Composition of fuzzy relations – Max-min composition properties –Fuzzy equivalence relation.

TEXT BOOKS

1. D S Hooda and Vivek Raich, Fuzzy Set Theory and Fuzzy Control, Narosa Publishing House, New Delhi, 2015.

UNIT I: Chapter 1 Sections 1 to 5

UNIT II: Chapter 1 Sections 6 to 8

UNIT III: Chapter 2

UNIT IV: Chapter 3 Sections 1 to 4 and 7 to 9

UNIT V: Chapter 4 Sections 1 to 4

REFERENCE BOOKS

1. George J.Klir and Bo Yuan, Fuzzy Sets and Fuzzy Logic Theory and Applications, PHI Learning Private Limited, New Delhi, 2009.
2. Zimmermann, Fuzzy set theory and its applications, Affiliated East West Press Pvt Ltd, 2nd Edition, 1996.
3. M. Murugalingam and Others, Introduction to Fuzzy Algebra, Sivam Publications, Vikramasingapuram, 2006.

SEMESTER

Hours: 4 /W 60 /Sem

Course Code: U23DM07 **Credits: 3**

Title of the Paper: OPTIMIZATION TECHNIQUES

Pedagogy	Hours/W	Lecture	Peer Teaching	GD/Tutorial/Videos	ICT
	4	4	-	-	-

Course Outcomes On completing this course the student will be able to	Unit	Hrs/S
CO1. Analyse and solve sequencing Problems	1	15
CO2. Demonstrate Queuing Theory and Classify Queuing Models.	2	15
CO3. Distinguish Single server models with finite capacity and infinite capacity, derive their characteristics and solve problems	3	15
CO4. Analyse Birth and Death Process and derive its Characteristics	4	15
CO5. Distinguish multi server models with finite capacity and infinite capacity, derive their characteristics and solve problems	5	15

Course Outcomes	Programme Outcomes						Programme Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3
CO1	3	2	3	2	1	1	3	3	2
CO2	3	2	3	2	1	1	3	3	2
CO3	3	2	3	2	1	1	3	3	2
CO4	3	2	3	2	1	1	3	3	2
CO5	3	2	3	2	1	1	3	3	2

Strong: 3 Medium: 2 Low: 1

SEMESTER

Hours: 4/W 60hrs/Sem

Course Code: U23DM07 **Credits: 3**

Title of the Paper: OPTIMIZATION TECHNIQUES

UNIT I

Sequencing Problem: Introduction – Problem of Sequencing - Basic terms – Processing *n* jobs through 2 machines - Processing *n* jobs through *k* machines

UNIT II

Queueing Theory - Introduction – Elements of Queueing System – Classification of Queueing Models – Model I *{(M/M/1):(∞ / FIFO)}*

UNIT III

Model II *{(M/M/1):(∞ / SIRO)}* and Model III *{(M/M/1):(N/ FIFO)}*

UNIT IV

Model IV (Generalized Model: Birth-Death Process)

UNIT V

Model V *{(M/M/C):(∞/ FIFO)}* and Model VI *{(M/M/C):(N / FIFO)}*

TEXT BOOK

1. Operations Research by Kanti Swarup, P.K.Gupta and Manmohan, Sultan Chand & Sons, ninth edition.

UNIT I: Chapter 12: Sections :12.1 to 12.5
UNIT II, III, IV & V: Chapter 20: Sections 20.1 to 20.3, 20.6 and 20.8

SEMESTER

Hours: 4 /W 60/Sem

Course Code: U23DM08 **Credits: 3**

Title of the Paper: ASTRONOMY

Pedagogy	Hours/W	Lecture	Peer Teaching	GD/Tutorial/Videos	ICT
	4	4	-	-	-

Course Outcomes On completing this course the student will be able to	Unit	Hrs/S
CO1. Understand Celestial co-ordinates, sidereal time	1	12
CO2. Demonstrate effects of Geometric, Heliocentric, Parallax.	2	12
CO3. Find equation of time and conversion of time	3	12
CO4. Understand relation between sidereal month Lunation and relation between theorem	4	12
CO5. Understand Planetary phenomena & Astronomical instruments	5	12

Course Outcomes	Programme Outcomes						Programme Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3
CO1	3	1	3	-	-	-	3	2	1
CO2	2	1	3	-	-	-	3	2	1
CO3	3	2	3	2	-	-	3	2	1
CO4	3	2	3	2	1	-	3	2	1
CO5	3	2	3	2	1	-	3	2	1

Strong: 3 Medium: 2 Low: 1

SEMESTER

Hours: 4 /W 60/Sem

Course Code: U23DM08 **Credits: 3**

Title of the Paper: ASTRONOMY

UNIT I

Spherical Trigonometry – Spherical Triangle – The fundamental formulae of spherical Trigonometry, the sine, cosine, four parts and Napier formulae (without proof)-The Celestial sphere: Celestial coordinators – Diurnal motion - Rising and setting of a star – Sidereal time – Circumpolar star – Morning and Evening stars – Twilight – Earth – Length of the day.

UNIT II

Refraction – Tangent formula – Cassini's formula Effects of Refraction – Geocentric parallax – Effects of Geocentric parallax – Heliocentric parallax – Effects of Heliocentric parallax – Aberration – Its Effects.

UNIT III

Kepler's Laws–Verification of Kepler's Laws– True anomaly, Mean Anomaly–Eccentric Anomaly, Relation between them – Time - Equation of Time – Seasons – Conversion of Time.

UNITIV

Moon – Sidereal Month, Lunation and Relation between them – Phases of the Moon – Lunar Libration surface of the Moon – Metonic cycle – Tides – Eclipses. Shadow cone – Minimum and Maximum number of Eclipses.

UNIT V

Planetary phenomena - Bodes law – Elongation – Sidereal period, synodic period and the relation between them – Phase of a planet– stationary points – Solar system – Stellar universe – A brief history of Astronomy – Astronomical Instruments.

TEXT BOOK

1. Astronomy for degree classes by Prof. S. Kumaravelu and Prof. Susheela Kumaravelu – Rainbow Printers, Nagercoil (2005).

UNIT I: Chapters I, II & III
UNIT II: Chapters IV, V, VIII & IX
UNIT III: Chapters VI & VII
UNIT IV: Chapters XII & XIII
UNIT V: Chapters XIV, XV, XVI, XVII & XVIII

REFERENCE BOOKS

1. Ramachandran . G.V- Astronomy
2. George .O.Abell- Exploration of the Universe (Second Edition)

SEMESTER VI

Hours: 5 /W 75 /Sem

Course Code: U23DM09 **Credits: 3**

Title of the Paper: DISCRETE MATHEMATICS

Pedagogy	Hours/W	Lecture	Peer Teaching	GD/Tutorial/Videos	ICT
	5	4	-	1	-

Course Outcomes On completing this course the student will be able to	Unit	Hrs/S
CO1: Able to apply the concepts of propositional Logic	1	15
CO2: Able to analyze and interpret predicate logic	2	15
CO3: Able to apply the concepts of Lattices & Boolean Algebra.	3	15
CO4: Ability to solve problems in Combinatorics	4	15
CO5: Ability to apply the concepts of formal languages	5	15

Course Outcomes	Programme Outcomes						Programme Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3
CO1	3	1	3	-	-	-	3	2	1
CO2	2	1	3	-	-	-	3	2	1
CO3	3	2	3	2	-	-	3	2	1
CO4	3	2	3	2	1	-	3	2	1
CO5	3	2	3	2	1	-	3	2	1

Strong: 3 Medium: 2 Low: 1

SEMESTER VI

Hours: 5 W 75/Sem

Course Code: U23DM09 **Credits: 3**

Title of the Paper: DISCRETE MATHEMATICS

UNIT I

Propositional Logic: Definition, Connectives, Statements & Notation, Truth Values, Tautology and contradiction, Statement Formulas & Truth Tables, Well-formed Formulas, Equivalence of Formulas, Duality Law, Tautological Implications, normal forms Examples.

UNIT II

Theory of inference, Truth table technique, Rules of inference, Indirect method of proof, Predicate Logic: Definition of Predicates; Statement functions, Variables, Quantifiers, Predicate Formulas, Free & Bound Variables; Valid Formulas & Equivalences, The Universe of Discourse - Examples.

UNIT III

Lattices – Properties of lattices – Lattice as Algebraic System- Sub lattices- lattice Homomorphism- Special Lattices – Boolean Algebra- sub algebra- Boolean Expression and Boolean functions- expression of a Boolean function in canonical form- logic Gates- Karnaugh Map Method

UNITIV

Permutations and Combinations, Pascal's identity, Permutation with repetition, The Pigeonhole Principle, Generalisation of Pigeonhole principle, Principles of Inclusion-Exclusion Principle - Examples.

UNIT V

Introduction- Phrase –Structure Grammar- Types – BNF- Finite state Machine – Input output strings- Finite state Automata

TEXT BOOK

1. Discrete mathematics – T.Veerarajan – McGraw Hill Education 2017

UNIT I: Chapter 1 – up to page no. 26
UNIT II : Chapter 1–Page no.27 to 50
UNIT III: Chapter 2 – Page no. 96 to 114
UNIT IV: Chapter 6 – Page no 314 to 337
UNIT V: Chapter 8 – Page no. 448 to 467

REFERENCE BOOKS

1. Tremblay and Manohar – Discrete Mathematical Structures with application to Computer Science, (Tata McGraw Hill, New Delhi) 1997.
2. Venkataraman .M.K. and others – Discrete mathematics 2000 The National Publishing Company

SKILL ENHANCEMENT COURSES

SEMESTER I

Hours: 2/W 30hrs/Sem I

Course Code: U23SEM1 **Credits: 2**

Title of the Paper: ICT - Tools

Pedagogy	Hours/W	Lecture	Peer Teaching	GD/Tutorial/Videos	ICT
	2	1	-	1	-

Course Outcomes On completing this course the student will be able to	Unit	Hrs/S
CO1. Create a classroom and assign test	1	6
CO2. Develop a whiteboard and animate a document for presentation	2	6
CO3. Draw a 2D and 3D graphs	3	6
CO4. Assess and collect instant results during question session	4	6
CO5. Create a quiz with rubrics and time restrictions	5	6

CO-PO Mapping Table

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO 1	1	3	-	2	-	1	3	1	1	3
CO 2	2	3	1	2	1	1	2	2	1	3
CO 3	2	3	1	2	1	1	-	2	-	3
CO 4	1	3	1	1	1	2	2	2	2	3
CO 5	2	3	-	1	1	-	2	2	1	3
Average	1.6	3	0.6	1.6	0.8	1	1.8	1.8	1	3

Strong - 3 **Medium-2** **Low-1**

CO-PSO Mapping Table

	PSO 1	**PSO 2**	**PSO 3**	**PSO 4**	**PSO 5**
CO 1	1	1	1	1	1
CO 2	2	1	2	1	1
CO 3	3	2	2	1	1
CO 4	1	1	1	2	1
CO 5	2	2	1	1	1
Average	1.8	1.4	1.4	1.2	1

Strong - 3 **Medium-2** **Low-1**

SEMESTER I

Hours: 2/W 30hrs/Sem I

Course Code: U23SEM1 **Credits: 2**

Title of the Paper: ICT - Tools

UNIT I

Google Classroom: Introduction - Creating a classroom – Assigning Test and Assignments – Framing Rubrics for the assigned test.

UNIT II

White Board and PowToon: Introduction – Creating a whiteboard- Manage and Usage of Board – Creating animated videos for training and e -learning courses

UNIT III

GeoGebra: Introduction- Interactive explorations using the tools in 2D and 3D graphics mode.

UNIT IV

Plickers: Introduction - creating a plickers classroom – Assigning tests and assignments in Plickers – Framing rubrics for Plickers – Conducting Plickers assessments – Grading and providing feedback in Plickers- Class discussion with Plickers results.

UNIT V

Kahoot: Introduction – Creating Quiz using the available tools.

Learning Resources:

Websites:

Unit I: https://youtu.be/pl-tBjAM9g4

Unit II: https://youtu.be/EIcsIEYICVU and https://youtu.be/ggR1n7YKoRo

Unit III: https://youtu.be/_2U_yg1l-qg

Unit IV: https://youtu.be/320QHqcc88k

Unit V: https://youtu.be/zBkVp8-CDeo

SEMESTER II

Hours: 2/W 30hrs/Sem II

Course Code: U23SEM2 **Credits: 2**

Title of the Paper: ARITHMETIC AND MATHEMATICAL LOGIC

Pedagogy	Hours/W	Lecture	Peer Teaching	GD/Tutorial/Videos	ICT
	2	1	-	1	-

Course Outcomes On completing this course the student will be able to	Unit	Hrs/S
CO1. Solve problems in Percentage, Profit and Loss	1	6
CO2. Interpret the data	2	6
CO3. Outline the basic principles and operations on sets.	3	6
CO4. Write symbolic representation of statements.	4	6
CO5. Analyze the validity of a statement using truth table.	5	6

CO-PO Mapping Table

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO 1	2	2	3	2	2	1	1	1	1	1
CO 2	1	2	3	2	2	1	1	1	1	1
CO 3	2	1	3	1	2	1	1	1	1	1
CO 4	1	1	2	1	2	1	1	1	1	1
CO 5	1	2	3	1	2	1	1	1	1	1
Average	1	2	3	1	2	1	1	1	1	1

Strong - 3 **Medium-2** **Low-1**

CO-PSO Mapping Table

	PSO 1	**PSO 2**	**PSO 3**	**PSO 4**	**PSO 5**
CO 1	2	2	1	1	1
CO 2	2	2	1	1	1
CO 3	2	1	1	1	1
CO 4	1	3	2	1	1
CO 5	2	2	2	1	1
Average	2	2	1	1	1

Strong - 3 **Medium-2** **Low-1**

SEMESTER II

Hours: 2/W 30hrs/Sem II

Course Code: U23SEM2 **Credits: 2**

Title of the Paper: ARITHMETIC AND MATHEMATICAL LOGIC

UNIT I

Percentage – Profit and Loss-True discount- Odd man out series

UNIT II

Data interpretation- Tabulation – Bar graphs.

UNIT III

Operations on set – Algebra of sets – Finite and Infinite set

UNIT IV

Logic: Symbolic Logic – Preposition – Connectives – Types of connectives – Truth table.

UNIT V

Laws of Logic – Tautology – Contradiction – Principal Conjunctive and Principal Disjunctive Normal forms(using truth table only)

TEXT BOOK

1. Aggarwal. R. S , Quantitative Aptitude , S . Chand and Company Ltd, 2014.
2. Venkatraman .M.K, Discrete Mathematics, The normal publishing company, 2000.

Unit I:[1] Sec I: 10, 11, 32 , 35.

Unit II:[1] Sec II: 36, 37

Unit III:[2] Chapter 1 (sec 1.1 – 1.6)

Unit IV:[2] Chapter 9 (sec 9.1 -9.3)

Unit V: [2] Chapter 9 (9.6 – 9.8 and 9.12)

REFERENCE BOOKS

1. Stoll. R.S, Set Theory and Logic, Eureka publishing House, 1997.
2. Tremblay.J.P, Manohar. R, Discrete Mathematical Structure with applications to Computer science, Tata Mc-Graw -Hill, 2011.
3. Seymour Lipschutz ,Schaum's theory and problemsof set theory Mc-Graw-Hill, 1964

SEMESTER II

Hours: 2/W 30hrs/Sem II

Course Code: U23SEM3 **Credits: 2**

Title of the Paper: MATHEMATICAL REASONING

Pedagogy	Hours/W	Lecture	Peer Teaching	GD/Tutorial/Videos	ICT
	2	1	-	1	-

Course Outcomes On completing this course the student will be able to	Unit	Hrs/S
CO1. Predict the relation with verbal reasoning.	1	6
CO2. Predict the relation with non-verbal reasoning.	2	6
CO3. Analyze the sense of directions	3	6
CO4. Solve puzzles	4	6
CO5. Use logical deductions to verify the validity of the conclusion	5	6

CO-PO Mapping Table

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO 1	2	2	3	1	1	1	1	1	1	2
CO 2	3	3	3	1	1	1	1	1	1	1
CO 3	1	1	1	1	1	1	1	1	1	1
CO 4	3	3	3	3	2	2	2	2	2	1
CO 5	3	3	2	3	1	1	1	1	1	1
Average	3	3	3	3	2	2	2	2	2	2

Strong - 3 **Medium-2** **Low-1**

CO-PSO Mapping Table

	PSO 1	**PSO 2**	**PSO 3**	**PSO 4**	**PSO 5**
CO 1	3	2	2	2	1
CO 2	3	3	2	2	2
CO 3	2	2	2	1	1
CO 4	3	2	2	1	2
CO 5	3	1	1	2	2
Average	3	3	2	2	2

Strong - 3 **Medium-2** **Low-1**

SEMESTER II

Hours: 2/W 30hrs/Sem II

Course Code: U23SEM3 **Credits: 2**

Title of the Paper: MATHEMATICAL REASONING

UNIT I

Blood relation - Deciphering jumbled up descriptions, Relation puzzle and coded relations.

UNIT II

Coding and Decoding - Letter decoding, Direct letter coding, Number/symbol coding.

UNIT III

Puzzle test: Classification type - Seating/placing arrangements

UNIT IV

Comparison type - Family based puzzles.

UNIT V

Logical deduction - Arguments- Assumptions.

TEXT BOOK

1. Aggarwal. R. S, A Modern Approach to verbal & non-verbal reasoning, S.chand& company Ltd., 2013(Reprint).

Unit I: section 1: 5 (Type 1-3)

Unit II: section 1: 4 (Type1-3)

Unit III: section 1: 6 (Type1,2)

Unit IV: section 1:6(Type3,6)

Unit V: section 2: 1-3

REFERENCE BOOKS

1. Aggarwal. R. S, A Modern Approach to verbal reasoning, S.chand& company Ltd., 2006.
2. Aggarwal. R. S, A Modern Approach to non-verbal reasoning, S.chand& company Ltd., 2006.
3. Aggarwal. R.S, A Modern Approach to logical reasoning, S.chand& company Ltd., 2006.

SEMESTER

Hours: 1/W 15hrs/Sem

Course Code: U23SEM4 **Credits: 1**

Title of the Paper: DATA ANALYSIS USING SPSS

Pedagogy	Hours/W	Lecture	Peer Teaching	GD/Tutorial/Videos	ICT
	1	1	-	1	-

Course Outcomes On completing this course the student will be able to	Unit	Hrs/S
CO1. Relating the SPSS packages and Files	1	3
CO2. Use the basic functions of SPSS	2	3
CO3. Process data and generate statistics for some demographic variable analysis.	3	3
CO4. Generate graphs and diagrams for data analysis.	4	3
CO5. Process data and generate outputs using SPSS software.	5	3

CO-PO Mapping Table

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO 1	2	2	3	2	2	1	1	1	1	1
CO 2	1	2	3	2	2	1	1	1	1	1
CO 3	2	1	3	1	2	1	1	1	1	1
CO 4	1	1	2	1	2	1	1	1	1	1
CO 5	1	2	3	1	2	1	1	1	1	1
Average	1	2	3	1	2	1	1	1	1	1

Strong - 3 **Medium-2** **Low-1**

CO-PSO Mapping Table

	PSO 1	**PSO 2**	**PSO 3**	**PSO 4**	**PSO 5**
CO 1	2	2	1	1	1
CO 2	2	2	1	1	1
CO 3	2	1	1	1	1
CO 4	1	3	2	1	1
CO 5	2	2	2	1	1
Average	2	2	1	1	1

Strong - 3 **Medium-2** **Low-1**

SEMESTER

Hours: 1/W 15hrs/Sem

Course Code: U23SEM4 **Credits: 1**

Title of the Paper: DATA ANALYSIS USING SPSS

UNIT I

Introduction of SPSS: SPSS – Introduction, opening a Data File SPP Data Editor - Running statistical Analysis – Editing and manipulating data – Missing values – Editing SPSS output – Viewing Results - PrintingSPSS output -, Importing and Exporting Data Files

UNIT II

Charts and Graphs in SPSS: Bar chart - Line chart -Scatter Plot –Dot Plots - Pie Charts -Histogram

UNIT III

Descriptive Statistics & t- Test Using SPSS: Measure of Central Tendency – Measure of Dispersion – Skewness& Kurtosis - One Sample T–Test, Independent Samples T-Test andPaired T-Test.

UNIT IV

Analysis of Variance & Correlation Using SPSS: One-way ANOVA – Two Way ANOVA – Correlation – Spearman'sRank Correlation

UNIT V

Regression & Chi Square Test Using SPSS : Linear Regression – Multiple Regression - Chi-square test.

TEXT BOOK

1. SPSS FOR YOU – A.Rajathi, P.Chandran – MJP Publishers, 2016
2. Statistical Methods for Practice and Research: A Guide to Data Analysis Using SPSS By**:** Ajai S. Gaur & Sanjaya S. Gaur - SAGE Publications India Pvt Ltd.

UNIT I: Chapter-2
UNIT II: Chapter-4
UNIT III: Chapter-3 Pages 41-49 & Chapter-5 Pages 91-110
UNIT IV: Chapter- 6 Pages 125 -143 & Chapter-7 Pages 155 – 170
UNIT V: Chapter-8 Pages 178 – 193 & Chapter-9

REFERENCE BOOKS

1. "SPSS in Simple Steps", Smruti Bulsari, Sanjay Sinha Kiran Pandya, Dreamtech Press, 2011.
2. "Statistical Data Analysis: A PracticalGuide", Milan Meloun, Woodhead PublishingIndia; 1 edition, 2011.
3. A HANDBOOK OF STATISTICAL ANALYSES USING SPSS (DR. BRIJESH AWASTHI) – Redshine Publication

WEB RESOURCES

1. https://med.und.edu/daccota/_files/pdfs/berdc_resource_pdfs/data_analysis_using_sp ss.pdf
2. https://students.shu.ac.uk/lits/it/documents/pdf/analysing_data_using_spss.pdf
3. https://www.lboro.ac.uk/media/media/schoolanddepartments/mlsc/downloads/spss-and-statistics-guide.pdf
4. http://wise.cgu.edu/wp-content/uploads/2014/11/SPSS-Step-by-Step-Regression-Introduction.pdf
5. https://www.javatpoint.com/spss - **SPSS Tutorial**
6. **https://www.open.edu/openlearn/society-politics-law/sociology/getting-started-spss/content-section-0?active-tab=description-tab - Free Course SPSS**

SEMESTER III

Hours:1/w 30/Sem III

Course Code: U23SEM5 **Credits:1**

Title of the paper: MATHEMATICS FOR COMPETITIVE EXAMINATIONS

Pedagogy	Hours/W	Lecture	Peer Teaching	GD/Tutorial/Videos	ICT
	2	2	-	-	-

Course Outcomes On completing this course the student will be able to	Unit	Hrs/S
CO1. Recall H.C.F, LCM, decimal fractions and simplifications	1	6
CO2. Understand, determine and apply the concept of average and percentage.	2	6
CO3. Classify profit and loss, Ratio and Propositions.	3	6
CO4. Sketch the ability of partnership, Time and work.	4	6
CO5. Demonstrate the knowledge of Simple and Compound interest.	5	6

CO-PO Mapping Table

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO 1	2	2	3	2	2	1	1	1	1	1
CO 2	1	2	3	2	2	1	1	1	1	1
CO 3	2	1	3	1	2	1	1	1	1	1
CO 4	1	1	2	1	2	1	1	1	1	1
CO 5	1	2	3	1	2	1	1	1	1	1
Average	1	2	3	1	2	1	1	1	1	1

Strong - 3 **Medium-2** **Low-1**

CO-PSO Mapping Table

	PSO 1	**PSO 2**	**PSO 3**	**PSO 4**	**PSO 5**
CO 1	2	2	1	1	1
CO 2	2	2	1	1	1
CO 3	2	1	1	1	1
CO 4	1	3	2	1	1
CO 5	2	2	2	1	1
Average	2	2	1	1	1

Strong - 3 **Medium-2** **Low-1**

SEMESTER III

Hours:1/w 30/Sem III

Course Code: U23SEM5 **Credits:1**

Title of the paper: MATHEMATICS FOR COMPETITIVE EXAMINATIONS

UNIT I

H.C.F and L.C.M of Numbers, Decimal Fractions and Simplification.

UNIT II

Average and Percentage.

UNIT III

Profit and Loss, Ratio and Proportion.

UNIT IV

Partnership, Time and work.

UNIT V

Simple Interest, Compound Interest.

TEXT BOOK

Quantitative Aptitude for Competitive Examinations by R.S.Aggarwal published by S. Chand and company Limited,New Delhi, Seventh Revised Edition, 2017

UNIT I: Chapters 2,3 and 4

UNIT II: Chapters 6 and 11

UNIT III: Chapters 12 and 13

UNIT IV: Chapters 14 and 17

UNIT V: Chapters 22 and 23

SEMESTER IV

Hours: 2/W 30hrs/Sem IV

Course Code: U23SEM6 **Credits: 2**

Title of the Paper: LATEX THEORY

Pedagogy	Hours/W	Lecture	Peer Teaching	GD/Tutorial/Videos	ICT
	2	1	-	-	1

Course Outcomes On completing this course the student will be able to	Unit	Hrs/S
CO1. Successfully install LaTeX and its related components on a computer.	1	6
CO2. Independently typeset Mathematical, Scientific and general purpose documents in a well organized manner and atmost accuracy	2	6
CO3. Use of LaTeX and various templates acquired from the course to compose Mathematical documents, Presentation and reports	3	6
CO4. Special Environments Enumerates, Tabular, Cases etc.	4	6
CO5. Power point Presentation using Beamer	5	6

CO-PO Mapping Table

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO 1	2	2	3	2	2	1	1	1	1	1
CO 2	1	2	3	2	2	1	1	1	1	1
CO 3	2	1	3	1	2	1	1	1	1	1
CO 4	1	1	2	1	2	1	1	1	1	1
CO 5	1	2	3	1	2	1	1	1	1	1
Average	1	2	3	1	2	1	1	1	1	1

Strong - 3 **Medium-2** **Low-1**

CO-PSO Mapping Table

	PSO 1	**PSO 2**	**PSO 3**	**PSO 4**	**PSO 5**
CO 1	2	2	1	1	1
CO 2	2	2	1	1	1
CO 3	2	1	1	1	1
CO 4	1	3	2	1	1
CO 5	2	2	2	1	1
Average	2	2	1	1	1

Strong - 3 **Medium-2** **Low-1**

SEMESTER IV

Hours: 2/W 30hrs/Sem IV

Course Code: U23SEM6 **Credits: 2**

Title of the Paper: LATEX THEORY

UNIT I

Basic LaTeX – Sample document and Key Concepts – type style – environments – Lists – Contering – Tables – Verbatim – Vertical and horizontal spacing.

UNIT II

Typesetting Mathematics – Examples – Equation environments – Fonts, hats and underlining – Braces – Arrays and matrices – Customized commands – Theorems like environments.

UNIT III

Math miscellany – Math Styles – Bold Math – Symbols for number sets – Binomial coefficient.

UNIT IV

Further essential LaTeX – Document classes and the overall structure – Titles for documents – Sectioning commands.

UNIT V

Miscellaneous extras – Spacing – Accented characters – Dashes and hyphens – Quotation marks – Trouble shooting – Pinpointing the error – Common errors – Warning messages.

TEXT BOOK: 1. David F Griffiths and Desmond J. Higham, Learning LaTeX, SIAM (Society for Industrial and Applied Mathematics) Publishers, Phidel Phia, 1996.

UNIT I: Chapter 2 Sections 2.1. to 2.4.
UNIT II: Chapter 3 Sections 3.1. to 3.7.
UNIT III: Chapter 3 Sections 3.8.
UNIT IV: Chapter 4 Sections 4.1. to 4.3.
UNIT V: Chapter 4 Sections 4.4 to 4.5.

REFERENCE BOOKS

1. Martin J. Erickson and Donald Bindner, A Student's Guide to the Study, Practice, and Tools of Modern Mathematics, CRC Press, Boca Raton, FL, 2011.
2. L. Lamport. LATEX: A Document Preparation System, User's Guide and Reference Manual. Addison-Wesley, New York, second edition, 1994

SEMESTER IV

Hours: 2/W 30hrs/Sem IV

Course Code: U23SEM7P **Credits: 2**

Title of the Paper: LATEX PRACTICALS

LIST OF PRACTICALS

Write Latex program for the following

1. Type a Document in different alignments (Left, Right, Center, Justify).
2. Type a Letter for applying a job.
3. Type your own Bio – Data.
4. Draw a Table structure.
5. Type a given Mathematical expression using Differentiation, Integration and Trigonometry.
6. Type a given Mathematical expression using all expression.
7. Type a given expression using all inequalities.
8. Type of given Article.
9. Draw any picture and insert in LateX file.
10. Type a given Question paper
11. Convert one LateX file into power point presentation.

TEXT BOOK

1. David F Griffiths and Desmond J. Higham, Learning LaTex, SIAM (Society for Industrial and Applied Mathematics) Publishers, Phidel Phia, 1996.

REFERENCE BOOKS

1. Martin J. Erickson and Donald Bindner, A Student's Guide to the Study, Practice, and Tools of Modern Mathematics, CRC Press, Boca Raton, FL, 2011.
2. L. Lamport. LATEX: A Document Preparation System, User's Guide and Reference Manual.
3. Addison-Wesley, New York, second edition, 1994

FOUNDATION COURSE

SEMESTER I

Hours: 2/W 30hrs/Sem I

Course Code: U23FM1 **Credits: 2**

Title of the Paper: FOUNDATION COURSE

Pedagogy	Hours/W	Lecture	Peer Teaching	GD/Tutorial/Videos	ICT
	2	2	-	-	-

Course Outcomes On completing this course the student will be able to	Unit	Hrs/S
CO1. Prove the binomial theorem and apply it to find the expansions of any $(x + y)^n$ and also, solve the related problems	1	6
CO2. Find the various sequences and series and solve the problems related to them. Explain the principle of counting.	2	6
CO3. Find the number of permutations and combinations in different cases. Apply the principle of counting to solve the problems on permutations and combinations	3	6
CO4. Explain various trigonometric ratios and find them for different angles, including sum of the angles, multiple and sub multiple angles, etc. Also, they can solve the problems using the transformations.	4	6
CO5. Find the limit and derivative of a function at a point, the definite and indefinite integral of a function. Find the points of min/max of a function.	5	6

Course Outcomes	Programme Outcomes						Programme Specific Outcomes	
	POs						PSOs	
	1	2	3	4	5	6	1	2
CLO1	1	1	1	1	1	1	1	1
CLO2	2	1	1	2	2	1	2	1
CLO3	2	1	1	2	2	1	2	1
CLO4	1	1	1	1	1	1	2	1
CLO5	1	1	1	1	1	1	2	1

Strong: 3 Medium: 2 Low: 1

SEMESTER I

Hours: 2/W 30hrs/Sem I

Course Code: U23FM1 **Credits: 2**

Title of the Paper: FOUNDATION COURSE

UNIT I

Algebra: Binomial theorem, General term, Middle term, Problems based on these concepts

UNIT II

Sequences and series (Progressions). Fundamentalprinciple of counting. Factorial n.

UNIT III

Permutations and combinations, Derivation of formulaeand their connections, Simple applications, Combinations with repetitions, Arrangements within groups, Formation of groups.

UNIT IV

Trigonometry: Introduction to trigonometric ratios, Proof of sin(A+B), cos(A+B), tan(A+B) formulae, Multiple and sub multiple angles, sin(2A), cos(2A), tan(2A) etc., Transformations sum into product and product into sum formulae, Inverse trigonometric functions, Sine rule and Cosine rule

UNIT V

Calculus: Limits, Standard formulae and problems, Differentiation, Rest principle, uv rule, u/v rule, Methods of differentiation, Application of derivatives, Integration - Productrule and substitution method.

TEXT BOOK

1. NCERT class XI and XII text books.
2. Any State Board Mathematics text books of class XI and XII

WEB RESOURCES

1. https://www.aicte-india.org/sites/default/files/final%20maths.pdf

https://egyankosh.ac.in/bitstream/123456789/13834/1/Unit-1.pdf

SEMESTER VI

Hours:2/w 30/Sem VI

Course Code: U23PCM1 **Credits:2**

Title of the paper: Professional Competency Skill Enhancement Course – Maths for JAM/CUET-PG/TANCET

Pedagogy	Hours/W	Lecture	Peer Teaching	GD/Tutorial/Videos	ICT
	2	2	-	-	-

Course Outcomes On completing this course the student will be able to	Unit	Hrs/S
CO1. Recall one-one, onto mapping of functions.	1	6
CO2. Understand, determine and apply the concept of even odd and increasing functions	2	6
CO3. Solve problems in limits	3	6
CO4. Demonstrate the knowledge in properties of triangle	4	6
CO5. Explain in detail about circles, heights and distances.	5	6

	Programme Outcomes					Programme Specific Outcomes				
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO 1	4	4	3	3	4	3	3	4	4	4
CO 2	4	4	3	3	4	3	3	4	3	4
CO 3	4	4	3	3	4	3	3	4	4	3
CO 4	3	4	3	4	4	3	3	4	4	3
CO 5	4	4	4	4	4	3	3	4	4	4

Strong - 3 Medium-2 Low-1

SEMESTER VI

Hours:2/w 30/Sem VI

Course Code: U23PCM1 **Credits:2**

Title of the paper: Professional Competency Skill Enhancement Course – Maths for JAM/CUET-PG/TANCET

UNIT I

Functions- One-one – Many one, onto, into maps – Product of Mapping – Domain of Functions – Range of Functions

UNIT II

Identical – Even, Odd Functions – Periodic Functions - Increasing Functions.

UNIT III

Limits

UNIT IV

Properties of Triangle

UNIT V

Circumcircle, Incircle and Excircles of a Triangle – Heights and Distances.

TEXT BOOK

J. K. Goyal, K. P. Gupta, Objective Mathematics, A. S. Prakashan, Meerut, 17^{TH} Edition 2016.

UNIT I **:** Chapter – 1 Section - 1 (F_1- F_{11})
UNIT II **:** Chapter – 1 Section - 1 (F_{12}- F_{17})
UNIT III **:** Chapter – 1 Section - 2
UNIT IV **:** Chapter – 8 Section - 39
UNIT V **:** Chapter – 8 Sections - 40, 41