SHRIMATI INDIRA GANDHI COLLEGE

(Nationally Accredited at "A" Grade (3rd Cycle) by NAAC)

Chatram Bus Stand, Tiruchirappalli – 620002.

CRITERION - II

2.6.2. PO CO MAPPING FOR MATHEMATICS

SHRIMATI INDIRA GANDHI COLLEGE

(Nationally Accredited at 'A' Grade (3rd Cycle) by NAAC)

TIRUCHIRAPPALLI-620 002

PG & RESEARCH DEPARTMENT OF MATHEMATICS

B.Sc., Mathematics

PROGRAMME OUTCOMES:

PO1: Enhance knowledgeable in the subject of science and apply the principles of the same To the needs of the Employer / Institution / own business.

PO2: Acquire the Analytical skills in the field/area of science.

PO3: Understand and appreciate professional ethics, community living and building initiatives.

PO4: Analyze and compare alternative solutions to computing problems.

PO5: Apply mathematical foundations, algorithmic principles, and computer science theory \ in the modeling and design of computer-based systems in a way that demonstrates Comprehension of the trade-offs involved in design choices.

PROGRAMME SPECIFIC OUTCOMES:

PSO1: Understand the foundation of Mathematics.

PSO2: Demonstrate basic manipulative skills in algebra, geometry, trigonometry, and beginning calculus

PSO3: Apply the unifying structures of mathematics (i.e., sets, relations and functions, Logical structure) and the relationships among them

PSO4: Demonstrate proficiency in writing proof.

PSO5: Apply critical thinking skills to solve problems that can be modeled mathematically.

Signature of the HOD

I SEMESTER

CORE COURSE I

DIFFERENTIAL CALCULUS AND TRIGONOMETRY – 16SCCMM1

UNIT I Methods of Successive Differentiation – Leibnitz,s Theorem and its applications Increasing & Decreasing functions –Maxima and Minima of function of two variables.

UNIT II Curvature – Radius of curvature in Cartesian and in Polar Coordinates – Centre of curvature–Evolutes & Involutes

UNIT III Expansions of sin (nx), cos (nx), tan (nx) – Expansions of sin nx, cos nx – Expansions of sin(x), cos(x), tan(x) in powers of x.

UNIT IV Hyperbolic functions – Relation between hyperbolic & Circular functions- Inverse hyperbolic functions.

UNIT V Logarithm of a complex number –Summation of Trigonometric series – Difference method- Angles in arithmetic progression method –Gregory's series

Course Outcome

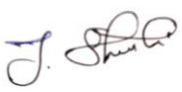
CO1: Explain the relationship between the derivative of a function as a function and the notion of the derivative as the slope of the tangent line to a function at a point.

CO2: Find maxima and minima, critical points and inflection points of functions and to Determine centre of curvature.

CO3: Demonstrate knowledge of several trigonometric identities and use them to verify Other identities.

CO4: Evaluate trigonometric, hyperbolic and inverse trigonometric functions.

CO5: Understand polar coordinates, equations and graphs, the complex plane and DeMoivre's Theorem.



Signature of the HOD

DIFFERENTIAL CALCULUS AND TRIGONOMETRY – 16SCCMM1 - MAPPING

CO - PO – PSO

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

If there is no correlation, put "-"

CO\PO, PSO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	2	-	2	3	2	2	-	-
CO2	3	3	3	2	-	3	3	-	2	3
CO3	3	3	2	2	-	3	-	3	-	2
CO4	3	3	3	-	2	3	3	-	3	2
CO5	3	3	-	1	3	3	2	3	-	-
Average	3	2.8	2	1	1.4	3	2	1.6	1	1.4

Signature of the HOD

CORE COURSE II

INTEGRAL CALCULUS - 16SCCMM2

UNIT I Revision of all integral models – simple problems

UNIT II Definite integrals - Integration by parts & reduction formula

UNIT III Geometric Application of Integration-Area under plane curves: Cartesian coordinates -Area of a closed curve - Examples - Areas in polar co-ordinates.

UNIT IV Double integrals – changing the order of Integration – Triple Integrals.

UNIT V Beta & Gamma functions and the relation between them – Integration using Beta & Gamma functions

Course Outcome

CO1: Apply Integral calculus to solve problems.

CO2: Solve definite and indefinite integrals using substitution, integration by parts and other standards techniques.

CO3: Solve application problems in multiple integrals.

CO4: Apply the Fundamental theorem of calculus to evaluate definite integrals.

CO5: Able to solve Integrals by using Beta and Gamma functions.

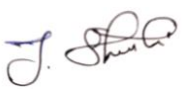
Signature of the HOD

INTEGRAL CALCULUS - 16SCCMM2 - MAPPING

CO - PO – PSO

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)
If there is no correlation, put "-"

CO\PO, PSO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	-	-	2	3	3	2	-	2
CO2	3	3	2	2	2	3	-	3	2	3
CO3	3	3	3	2	-	3	2	2	3	-
CO4	3	3	2	2	2	3	2	3	-	2
CO5	3	3	3	-	-	3	3	-	3	3
Average	3	3	2	1.2	1	3	2	2	1.6	2



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III SEMESTER

CORE COURSE V

SEQUENCES AND SERIES - 16SCCMM5

Unit I Sequences – Bounded Sequences – Monotonic Sequences – Convergent Sequence – Divergent Sequences – Oscillating sequences

Unit II Algebra of Limits – Behavior of Monotonic functions

Unit III Some theorems on limits – subsequences – limit points : Cauchy sequences

Unit IV Series – infinite series – Cauchy's general principal of convergence – Comparison – test theorem and test of convergence using comparison test (comparison test statement only, no proof)

Unit V Test of convergence using D Alembert's ratio test – Cauchy's root test – Alternating Series – Absolute Convergence (Statement only for all tests)

Course Outcome

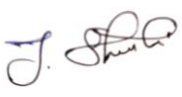
CO1: Define different types of sequence.

CO2: Discuss the behavior of the geometric sequence.

CO3: Prove properties of convergent and divergent sequences.

CO4: Analyze Cauchy's first and second limit theorems. Give examples for convergence, divergence and oscillating infinite series.

CO5: Investigate the behavior of the geometric series and Alternating series. Verify the given series is convergent or divergent by using different tests.



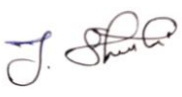
Signature of the HOD

SEQUENCES AND SERIES - 16SCCMM5 - MAPPING

CO - PO – PSO

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)
If there is no correlation, put "-"

CO\PO, PSO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	2	3	-	3	1	3	3	2	3	3
CO2	3	3	2	3	1	3	3	3	2	2
CO3	3	3	2	2	2	3	3	3	2	2
CO4	3	3	2	2	2	3	2	2	3	3
CO5	3	3	2	-	2	3	3	2	3	2
Average	2.8	3	1.6	2	1.6	3	2.8	2.4	2.6	2.4



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CORE COURSE VI

CLASSICAL ALGEBRA AND THEORY OF NUMBERS - 16SCCMM6

Unit I Relation between roots & coefficients of Polynomial Equations – Symmetric functions – Sum of the rth Powers of the Roots

Unit II Newtion's theorem on the sum of the power of the roots-Transformations of Equations – Diminshing, Increasing & Multiplying the roots by a constant - Reciprocal equations - To increase or decrease the roots of the equation by a given quantity.

Unit III Form of the quotient and remainder – Removal of terms – To form of an equation whose roots are any power – Transformation in general – Descart's rule of sign

Unit IV Inequalities – elementary principles – Geometric & Arithmetic means – Weirstrass inequalities – Cauchy inequality – Applications to Maxima & Minima.

Unit V Theory of Numbers – Prime & Composite numbers – divisors of a given number N – Euler's Function (N) and its value – The highest Power of a prime P contained in N! – Congruences – Fermat's, Wilson's & Lagrange's Theorems.

Course Outcome

CO1 : Analyze the relation between roots and coefficients of polynomial Equations.

CO2 : Learn symmetric functions

CO3 :Describe transformation of Equations.

CO4 : Execute Weierstrass and Cauchy's inequalities.

CO5 :Prove Fermat's, Wilson's and Lagrange's Theorems

Signature of the HOD

CLASSICAL ALGEBRA AND THEORY OF NUMBERS - 16SCCMM6 - MAPPING

CO - PO – PSO

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)
If there is no correlation, put "-"

CO\PO, PSO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	2	3	2	3	3	2	3	3
CO2	3	2	2	3	1	3	3	3	2	2
CO3	3	3	2	2	-	3	2	3	2	2
CO4	3	3	2	1	2	3	2	2	3	3
CO5	3	3	2	1	2	3	2	2	3	2
Average	3	2.8	2	2	1.4	3	2.4	2.4	2.6	2.4

Signature of the HOD

V SEMESTER

CORE COURSE IX

NUMERICAL METHODS WITH MATLAB PROGRAMMING - 16SCCMM9

UNIT I

MATLAB Environment : Getting Started – Solving Problems in MATLAB – Saving you works – Predefined MATLAB Functions – Using Predefined Functions – Manipulating Matrices – Computational Limitations-Special Values and Functions.

UNIT II

Plotting : Introduction Two Dimensional Plots – Three Dimensional Plotting – Editing Plots from the Menu Bar – Creating Plots from the Workshop Window – Programming in MATLAB : introduction – Problems with Two Variables – Input/Functions – Statement level Control Structures.

UNIT III

Numerical Techniques : Introduction – Curve Fitting: Linear and Polynomial Regression – Using the Interactive Fitting Tools – Numerical Integration – Numerical Differentiation.

UNIT IV

Curve Fitting – Linear and parabolic curves by the method of least squares principle Solving algebraic and transcendental equations-Bisection method, false position method and Newton Raphson method – Solving simultaneous algebraic equation – Guass – seidal method – Guass elimination method.

UNIT V

Interpolation – Newton's forward and backward difference formulae – Lagrange's interpolation formulae – Numerical integration using Trapezoidal and Simpson's one – third rules – solution of ODE's = Euler method and Runge – Kutta fourth order method.

Course Outcome

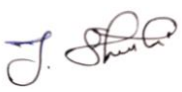
CO1 : Read, understand and trace the execution of programs written in MATLAB.

CO2 : Write the MATLAB code for a given algorithm.

CO3 :Solve an algebraic or transcendental equation using an appropriate numerical method.

CO4 : Solve a linear system of equations using an appropriate numerical method.

CO5 :Demonstrate Interpolation & solution of ODE's.



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NUMERICAL METHODS WITH MATLAB PROGRAMMING - 16SCCMM9 - MAPPING

CO - PO – PSO

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

If there is no correlation, put "-"

CO\PO, PSO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	2	3	-	3	1	3	3	2	3	3
CO2	3	3	2	3	1	3	3	3	2	2
CO3	3	3	2	2	2	3	3	3	2	2
CO4	3	3	2	2	2	3	2	2	3	3
CO5	3	3	2	-	2	3	3	2	3	2
Average	2.8	3	1.6	2	1.6	3	2.8	2.4	2.6	2.4

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CORE COURSE X

REAL ANALYSIS - 16SCCMM10

UNIT I

Real Number system – Field axioms –Order relation in R. Absolute value of a real number & its properties –Supremum & Infimum of a set – Order completeness property – Countable & uncountable sets.

UNIT II

Continuous functions –Limit of a Function – Algebra of Limits – Continuity of a function –Types of discontinuities – Elementary properties of continuous functions – Uniform continuity of a function.

UNIT III

Differentiability of a function –Derivability & Continuity –Algebra of derivatives – Inverse Function Theorem – Daurboux"s Theorem on derivatives.

UNIT IV

Rolle's Theorem –Mean Value Theorems on derivatives- Taylor's Theorem with remainder- Power series expansion .

UNIT V

Riemann integration –definition – Daurboux's theorem –conditions for integrability – Integrability of continuous & monotonic functions - Integral functions –Properties of Integrable functions - Continuity & derivability of integral functions – The Fundamental Theorem of Calculus and the First Mean Value Theorem.

Course Outcome

CO1 : Describe fundamental properties of the real numbers that lead to the formal development of real analysis.

CO2 : Classify algebra of limits and continuous functions

CO3 :Prove Daurboux's Theorem on derivatives.

CO4 : Analyze Mean value theorems on derivatives.

CO5 :Expand power series. Demonstrate continuity & derivability of integral functions.

Signature of the HOD

REAL ANALYSIS - 16SCCMM10 - MAPPING

CO - PO – PSO

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CO\PO, PSO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	-	3	3	3	2	2	-
CO2	2	2	2	3	3	3	3	2	3	2
CO3	3	2	3	2	2	3	2	3	2	3
CO4	2	3	-	2	3	2	2	-	2	3
CO5	3	2	2	-	3	2	-	2	3	2
Average	2.6	2.4	2	1.4	2.8	2.6	2	1.8	2.4	2

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CORE COURSE XI

STATICS - 16SCCMM11

UNIT I

Introduction – Forces acting at a point: Triangle of forces – Resolution of force – Condition of equilibrium.

UNIT II

Parallel forces and Moments: Resultant of parallel forces – Theorems on Moments – Moment about an axis – couples.

UNIT III

Equilibrium of three forces acting on a rigid body: Conditions of equilibrium – Trigonometrical theorems and problems - Coplanar forces: Reduction of Coplanar forces – Equation of Line of action of the resultant – Conditions of equilibrium

UNIT IV

Friction: Introduction – Laws of Friction – Definitions – Equilibrium of a particle on a rough inclined plane.

UNIT V

Equilibrium of strings: Equation of the Common Catenary -Parabolic Catenary.

Course Outcome

CO1 : To provide the basic knowledge of Equilibrium of a particle.

CO2 : To learn parallel forces and moments.

CO3 :To study the conditions of equilibrium of forces acting on a rigid body.

CO4 : Describe the frictional force.

CO5 : Classify common catenary and parabolic catenary.

Signature of the HOD

STATICS - 16SCCMM11 - MAPPING

CO - PO – PSO

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

If there is no correlation, put "-"

CO\PO, PSO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	3	3	2	3	3	3	2	2
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CO4	3	2	3	2	2	3	2	2	-	2
CO5	2	-	2	3		3	-	-	-	2
Average	2.4	2	2.2	2.6	0.8	3	2	2	0.8	1.6

Signature of the HOD

CORE PRACTICAL I

NUMERICAL METHODS WITH MATLAB PROGRAMMING (P) - 16SCCMM1P

LIST OF PRACTICALS

1. Linear Interpolation
2. Linear Regression
3. Curve Fitting
4. Trapezoidal rule of integration
5. Simpson's 1/3 rule of integration
6. Newton – Raphson method of solving equations
7. Gauss – elimination method of solving simultaneous equations
8. Gauss – Seidal method of solving simultaneous equations
9. R-K fourth order method of solving differential equations
10. Lagrange's method of interpolation.

Course Outcome

CO1 : Understand programming through numerical methods.

CO2 : Apply the techniques of MATLAB programming.

CO3 :Solve Numerical problems using MATLAB programming.

CO4 : Evaluate linear interpolation using MATLAB programming.

CO5 :Calculate the solutions to system of linear algebraic equations using MATLAB programming.

Signature of the HOD

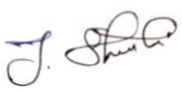
NUMERICAL METHODS WITH MATLAB PROGRAMMING (P) - 16SCCMM1P - MAPPING

CO - PO – PSO

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

If there is no correlation, put "-"

CO\PO, PSO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO	3	2	3	2	2	3	3	2	2	3



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PSO4: Demonstrate proficiency in writing proof.

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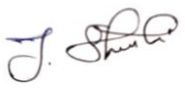

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II SEMESTER

CORE COURSE III

DIFFERENTIAL EQUATIONS AND LAPLACE TRANSFORMS - 16SCCMM3

UNIT I First order, higher degree differential equations solvable for x, solvable for y, solvable for dy/dx, Clairauts form – Conditions of integrability of M dx + N dy = 0 – simple problems.

UNIT II Particular integrals of second order differential equations with constant coefficients - Linear equations with variable coefficients – Method of Variation of Parameters (Omit third & higher order equations).

UNIT III Formation of Partial Differential Equation – General, Particular & Complete integrals – Solution of PDE of the standard forms - Lagrange's method - Solving of Charpit's method and a few standard forms.

UNIT IV PDE of second order homogeneous equation with Constant coefficients – Particular integrals of the forms eax+by, Sin(ax+by), Cos(ax+by), xrys and eax+by.f(x,y).

UNIT V Laplace Transforms – Standard formulae – Basic theorems & simple applications – Inverse Laplace Transforms – Use of Laplace Transforms in solving ODE with constant coefficients.

Course Outcome

CO1: Solve and apply linear differential equations of first order, (higher degree) second order.
CO2: Solve linear differential equations using Laplace transform techniques.
CO3: Develop the ability to apply ordinary and partial differential equations to significant applied and theoretical problems.
CO4: Distinguish between the Linear and Non Linear Partial and Ordinary Differential equations.
CO5: To learn to apply Laplace Transform to solve Ordinary Differential equations with constant Coefficients.

Signature of the HOD

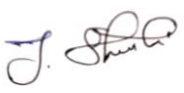
DIFFERENTIAL EQUATIONS AND LAPLACE TRANSFORMS - 16SCCMM3 - MAPPING

CO - PO – PSO

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

If there is no correlation, put "-"

CO\PO, PSO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	-	3	3	-	2	3	3	-	3
CO2	3	3	3	3	3	2	2	3	3	3
CO3	3	-	-	3	-	2	3	2	-	2
CO4	-	2	3	-	3	3	2	3	2	2
CO5	3	3	3	3	2	2	3	2	-	-
Average	2.4	1.6	2.4	2.4	1.6	2.2	2.6	2.6	1	2



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CORE COURSE IV

ANALYTICAL GEOMETRY 3D - 16SCCMM4

UNIT I

Coordinates in space-Direction consines of a line in space-angle between lines in space – equation of a plane in normal form. Angle between planes – Distance of a plane from a point.

UNIT II

Straight lines in space – line of intersection of planes – plane containing a line. Coplanar lines – skew lines and shortest distance between skew lines- length of the perpendicular from point to line.

UNIT III

General equation of a sphere-Section of sphere by plane-tangent planes –condition of tangency-system of spheres generated by two spheres - System of spheres generated by a sphere and plane.

UNIT IV

The equation of surface – cone – intersection of straight line and quadric cone – tangent plane and normal

UNIT V

Condition for plane to touch the quadric cone - angle between the lines in which the plane cuts the cone. Condition that the cone has three mutually perpendicular generators- Central quadrics – intersection of a line and quadric – tangents and tangent planes – condition for the plane to touch the conicoid

Course Outcome

CO1: Determine all distinguish features of parabola, hyperbola and ellipse from its standard form its equation.

CO2: Describe curves using a parametric approach and in how the conic sections are described in parametric form.

CO3: Solve problems involving geometric relation between lines, planes and spheres.

CO4: Improve and outline the logical thinking.

CO5: To learn conditions for the plan to touch the quadratic cone and conicoid.

Signature of the HOD

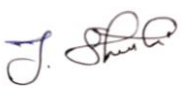
ANALYTICAL GEOMETRY 3D - 16SCCMM4 - MAPPING

CO - PO – PSO

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

If there is no correlation, put "-"

CO\PO, PSO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	-	-	3	2	3	3	3	-
CO2	3	3	-	2	3	2	3	3	2	3
CO3	3	3	2	-	3	3	3	2	3	-
CO4	2	3	-	-	2	2	3	2	2	2
CO5	3	-	3	3	-	2	3	2	-	2
Average	2.8	2.4	1	1	2	2.2	3	2.4	2	1.4



Signature of the HOD

IV SEMESTER

CORE COURSE VII

VECTOR CALCULUS AND FOURIER SERIES - 16SCCMM7

UNIT I

Vector differentiation –velocity & acceleration-Vector & scalar fields –Gradient of a vector- Directional derivative – divergence & curl of a vector solinoidal & irrotational vectors –Laplacian double operator –simple problems

UNIT II

Vector integration –Tangential line integral –Conservative force field –scalar potential- Work done by a force - Normal surface integral- Volume integral – simple problems.

UNIT III

Gauss Divergence Theorem – Stoke's Theorem- Green's Theorem – Simple problems & Verification of the theorems for simple problems.

UNIT IV

Fourier series- definition - Fourier Series expansion of periodic functions with Period 2 and period 2a – Use of odd & even functions in Fourier Series.

UNIT V

Half-range Fourier Series – definition- Development in Cosine series & in Sine series Change of interval – Combination of series

Course Outcome

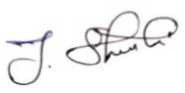
CO1: Understand vector differentiation and integration.

CO2: Compute the curl and the divergence of vector fields.

CO3: Prove Gauss Divergence Theorem, Green's and Stoke's Theorem

CO4: Evaluate the Fourier series of various even and odd functions.

CO5: Analyze combination of series



Signature of the HOD

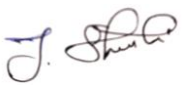
VECTOR CALCULUS AND FOURIER SERIES - 16SCCMM7 - MAPPING

CO - PO – PSO

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

If there is no correlation, put "-"

CO\PO, PSO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	2	3	2	3	2	3	3	3	-	3
CO2	2	3	2	3	3	3	3	-	2	3
CO3	2	3	2	3	2	3	3	2	3	3
CO4	2	3	2	3	2	2	3	3	2	2
CO5	2	3	2	3	1	2	3	2	3	2
Average	2	3	2	3	2	2.6	3	2	2	2.6



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CORE COURSE VIII

LINEAR ALGEBRA - 16SCCMM8

Unit I Vector spaces:

Vector spaces – Definition and examples – Subspaces-linear transformation – Span of a set.

Unit II Basis and Dimension:

Linear Independence – Basis and Dimension –Rank and Nullity.

Unit III Matrix and Inner product space:Matrix of a linear transformation -Inner product space – Definition and examples – Orthogonality – Gram Schmidt orthogonalisation process – Orthogonal Complement.

Unit IV Theory of Matrices:Algebra of Matrices - Types of Matrices – The Inverse of a Matrix – Elementary Transformations – Rank of a matrix.

Unit V Characteristic equation and bilinear forms:Characteristic equation and Cayley - Hamilton theorem – Eigen values and Eigen vectors

Course Outcome

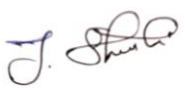
CO1: Understand the concepts of vector spaces, subspaces, bases, dimension and their properties.

CO2: Relate matrices and linear transformations

CO3: Compute eigen values and eigen vectors of linear transformations.

CO4: Prove Cayley- Hamilton theorem, Schwarz inequality, Gram Schmidt orthogonalization process.

CO5: Learn properties of inner product spaces and determine orthogonality in inner product Spaces.



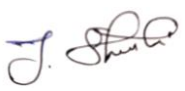
Signature of the HOD

LINEAR ALGEBRA - 16SCCMM8 - MAPPING

CO - PO – PSO

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)
If there is no correlation, put "-"

CO\PO, PSO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	2	2	2	3	2	3	2	3	2	2
CO2	3	3	1	2	2	2	3	2	2	3
CO3	2	3	2	2	2	2	2	2	1	2
CO4	2	3	2	3	2	2	2	2	2	2
CO5	3	2	3	2	2	3	1	1	2	2
Average	2.4	2.6	2	2.4	2	2.4	2	2	1.8	2.2



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VI SEMESTER

CORE COURSE XII

ABSTRACT ALGEBRA - 16SCCMM12

UNIT I

Groups : Definition and Examples – Elementary Properties of a Group – Equivalent Definitions of a Group.-Permutation Groups

UNIT II

Subgroups - Cyclic Groups-Order of an Element – Cosets and Lagrange's Theorem .

UNIT III

Normal Subgroups and Quotient Groups - Isomorphism –Homomorphism

UNIT IV

Rings: Definitions and Examples - Elementary properties of rings –Isomorphism - Types of rings.-Characteristic of a ring – subrings – Ideals - Quotient rings

UNIT V

Maxi mal and Prime Ideals.-Homomorphism of rings – Field of quotient of an integral domain – unique factorization domain-Euclidean domain

Course Outcome

CO1 : Identify sets that are group, subgroups, normal subgroups, ideals and field through examples and problems.

CO2 : Learn the concept of a function, map between two sets, groups, rings.

CO3 : Find the kernel of the homomorphism.

CO4 : Understand the concepts of homomorphism and isomorphism on groups and rings

. **CO5 :** Analyze the concept of quotient groups.

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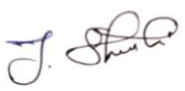
ABSTRACT ALGEBRA - 16SCCMM12 - MAPPING

CO - PO – PSO

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)
If there is no correlation, put "-"

CO\PO, PSO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	3	-	-	3	3	3	3	-
CO2	3	3	2	2	2	2	3	3	-	3
CO3	3	2	3	-	2	3	3	2	2	-
CO4	3	3	2	2	-	2	3	2	-	-
CO5	3	2	-	-	2	2	3	2	-	2
Average	3	2.4	2	0.8	1.2	2.4	3	2.4	1	1



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CORE COURSE XIII

COMPLEX ANALYSIS - 16SCCMM13

UNIT I

Functions of a Complex variable –Limits-Theorems on Limits –Continuous functions – Differentiability – Cauchy-Riemann equations – Analytic functions –Harmonic functions.

UNIT II

Elementary transformations - Bilinear transformations – Cross ratio – fixed points of Bilinear Transformation – Some special bilinear transformations.

UNIT III

Complex integration - definite integral – Cauchy's Theorem –Cauchy's integral formula –Higher derivatives - .

UNIT IV

Series expansions – Taylor's series – Laurant's Series – Zeroes of analytic functions – Singularities.

UNIT V

Residues – Cauchy's Residue Theorem –Evaluation of definite integrals.

Course Outcome

CO1 : Understand the significance of differentiability and analyticity of complex functions leading to the Cauchy Riemann equations.

CO2 : Learn the role of Cauchy's theorem and Cauchy integral formula in evaluation of contour integrals.

CO3 : Apply Liouville's theorem in fundamental theorem of algebra.

CO4 : Prove Taylor and Laurent series expansions of analytic functions.

CO5 : Classify the nature of singularity, poles and residues.

Interpret Cauchy Residue theorem to evaluate definite integrals.

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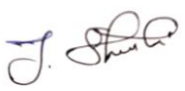
COMPLEX ANALYSIS - 16SCCMM13 - MAPPING

CO - PO – PSO

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

If there is no correlation, put "-"

CO\PO, PSO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	3	3	-	3	3	3	2	2
CO2	3	2	2	2	2	2	-	3	2	-
CO3	3	2	2	-	3	3	2	2	2	2
CO4	3	2	2	2	-	2	2	3	2	-
CO5	3	2	1	2	2	-	3	-	1	2
Average	3	2	2	1.8	1.4	2	2	2.2	1.8	1.2



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CORE COURSE XIV

DYNAMICS - 16SCCMM14

UNIT I

Introduction-Kinematics: Velocity-Relative Velocity-Angular Velocity-Acceleration-Relative Acceleration-Motion in a straight line under uniform acceleration.

UNIT II

Projectile: Projectile-Path of a projectile-Characteristics-Horizontal projection-Projectile up/down an inclined plane-Enveloping parabola.

UNIT III

Collision of Elastic Bodies: Introduction-Definitions-Fundamental Laws of impact-Impact of a smooth sphere on a fixed smooth plane-Direct impact of two smooth spheres-Oblique impact of two smooth spheres-Dissipation of energy due to impact-Compression and Restitution-Impact of a particle on a rough plane.

UNIT IV

Simple Harmonic Motion: Introduction-S.H.M. in straight line-Compositions of simple harmonic motions of the same period.

UNIT V

Motion Under The action Of Central Forces: Velocity and acceleration in polar coordinates-Equiangular spiral-Differential Equation of central orbits-Pedal Equation of the central orbit-Two-fold problems in central orbits.

Course Outcome

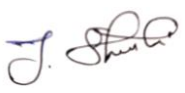
CO1 :Distinguish kinematic and kinetic motion.

CO2 :Identify the basic relations between distance, time, velocity, and acceleration.

CO3 :Analyze the Projectiles. Examine the simple harmonic motion.

CO4 :Execute differential equation of central orbits and pedal equation of the central orbit.

CO5 :Understand an oblique impact of two smooth spheres.



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DYNAMICS - 16SCCMM14 - MAPPING

CO - PO – PSO

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)
If there is no correlation, put "-"

CO\PO, PSO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	2	-	2	3	2	3	2	2
CO2	2	3	2	2	-	2	2	2	2	-
CO3	2	2	3	1	-	3	-	-	2	2
CO4	3	2	2	2	1	2	2	3	3	-
CO5	3	2	3	-	2	3	-	2	3	2
Average	2.6	2.2	2.4	1	1	2.6	1.2	2	2.4	1.4

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MAJOR BASED ELECTIVE II (A)

GRAPH THEORY - 16SMBEMM2:1

UNIT I

Introduction - The Konigsberg Bridge Problem - Graphs and subgraphs: Definition and Examples - Degrees - Subgraphs - Isomorphism. –independent sets and coverings.

UNIT II

Matrices - Operations on Graphs - Walks, Trails and Paths – Connectedness and Components - Eulerian Graphs.

UNIT III

Hamiltonian Graphs (Omit Chavatal Theorem) - Characterization of Trees - Centre of a Tree.

UNIT IV

Planarity: Introduction - Definition and Properties - Characterization of Planar Graphs.

UNIT V

Directed Graphs: Introduction - Definitions and Basic Properties – Some Applications: Connector Problem - Kruskal's algorithm - Shortest Path Problem – Dijkstra's algorithm.

Course Outcome

CO1 : Understand the origin of Graph Theory.

CO2 : Illustrate different types of graphs.

CO3 : Execute Operations on graphs.Discuss connectedness and components of graphs.

CO4 : Characterize trees and planar graphs.Describe Kruskal's algorithm and Dijkstra's algorithm of graphs.

CO5 : Explain independent sets and covering sets.

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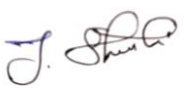
GRAPH THEORY - 16SMBEMM2:1 - MAPPING

CO - PO – PSO

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)
If there is no correlation, put "-"

CO\PO, PSO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	3	3	2	3	3	3	2	2
CO2	3	3	3	3	-	3	2	3	-	-
CO3	2	3	-	2	-	3	3	2	2	2
CO4	3	2	3	2	2	3	2	2	-	2
CO5	2	-	2	3		3	-	-	-	2
Average	2.4	2	2.2	2.6	0.8	3	2	2	0.8	1.6



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MAJOR BASED ELECTIVE III (A)

ASTRONOMY - 16SMBEMM3:1

UNIT I

Relevant properties of sphere and formulae in spherical trigonometry (no proof, no problems) - Celestial sphere and diurnal motion -Celestial coordinates-sidereal time.

UNIT II

Morning and evening stars -circumpolar stars- diagram of the celestial sphere -zones of earth -perpetual day-dip of horizon-twilight.

UNIT III

Refraction - laws of refraction -tangent formula-Cassini's formula - horizontal refraction- geocentric parallax -horizontal parallax.

UNIT IV

Kepler's laws - verification of 1st and 2nd laws in the case of earth - Anomalies -Kepler's equation - Seasons -causes -kinds of years.

UNIT V

Moon-sidereal and synodic months - elongation - phase of moon - eclipses-umbra and penumbra - lunar and solar eclipses - ecliptic limits - maximum and minimum number of eclipses near a node and in a year - Saros.

Course Outcome

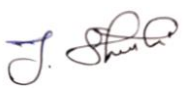
CO1 : Understand the movements of celestial objects.

CO2 : Examine the stars and zones of earth.

CO3 : Understand the phenomenon of parallax in the celestial objects.

CO4 : Study Kepler's law of equations.

CO5 : Classify the formation of the moon and its surface features. Explain independent sets and covering sets.



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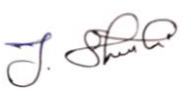
ASTRONOMY - 16SMBEMM3:1 - MAPPING

CO - PO – PSO

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)
If there is no correlation, put "-"

CO\PO, PSO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	3	3	2	3	3	3	2	2
CO2	3	2	3	3	-	3	3	2	-	-
CO3	2	2	2	2	-	2	2	2	3	2
CO4	2	2	2	2	2	3	3	2	-	3
CO5	3	2	-	2		2	-	3	2	-
Average	2.6	2	2	2.4	0.8	2.6	2.2	2.4	1.4	1.4



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SHRIMATI INDIRA GANDHI COLLEGE

(Nationally Accredited at 'A' Grade (3rd Cycle) by NAAC)

TIRUCHIRAPPALLI-620 002

PG & RESEARCH DEPARTMENT OF MATHEMATICS

M. Sc., Mathematics

PROGRAMME OUTCOMES:

PO1: Develop professional foundations through activities such as teaching, internship and fellowships.

PO2: Attained profound Expertise in Discipline

PO3: Acquire the basic tools needed to carry out independent research.

PO4: Proficient in their specialized area and successfully complete an advanced research project.

PO5: Develop skills in problem solving, critical thinking and analytical reasoning as applied to scientific problems.

PROGRAMME SPECIFIC OUTCOMES:

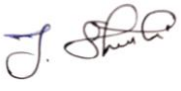
PSO1: Understand the nature of abstract mathematics and explore the concepts in further details.

PSO2: Interpret the real-world problems in to mathematical equations and draw the inferences by finding appropriate solutions.

PSO3: Acquire mathematical knowledge and skills appropriate to professional activities.

PSO4: Qualify national level tests.

PSO5: Explore ideas of mathematics for propagation of knowledge.



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I SEMESTER

CORE COURSE l
ALGEBRA-P16MA11

UNIT I

GROUP THEORY: A counting principle – Normal Subgroups and Quotient groups – Homomorphism – Cayley's theorem – Permutation groups – Another counting principle– Sylow's theorems.

UNIT II

RING THEORY : Homomorphisms -Ideals and quotient rings – More ideals and quotient rings –Euclidean Rings-A particular Euclidean Ring.

UNIT III

Polynomial rings – Polynomials over the rational field – polynomials over commutative Rings -Inner Product spaces.

UNIT IV

FIELDS: Extension fields – Roots of Polynomials – More about roots.

UNIT V

The elements of Galois theory– Finite fields.

Course Outcome

CO1 : Understand the foundation in Algebraic structure like Groups and Rings.
CO2 : Learn the problem solving ability in Algebra.
CO3 : Acquire the knowledge of permutation groups and normal subgroups and counting tricks in algebra.
CO4 : Understand the various forms of polynomial rings and inner product spaces.
CO5 : Absorb the knowledge on elements of the Galois Theory and the field of quotients of an integral domain.

Signature of the HOD

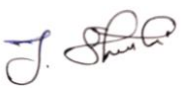
ALGEBRA-P16MA11-MAPPING

CO - PO – PSO

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

If there is no correlation, put "-"

CO\PO, PSO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	3	-	-	3	3	3	-	2
CO2	-	3	2	2	2	2	-	3	2	-
CO3	2	-	-	-	-	3	2	2	2	-
CO4	2	-	2	2	-	2	2	-	-	-
CO5	-	-	-	-	2	-	-	-	-	2
Average	1.4	1	1.4	0.8	0.8	2	2	1.6	0.8	0.8



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CORE COURSE II

REAL ANALYSIS-P16MA12

UNIT I

Basic Topology: Finite, Countable and Uncountable Sets – Metric spaces – Compact sets – Perfect sets – Connected sets.

Numerical Sequences and Series: Sequences – Convergence – Subsequences - Cauchy Sequences – Upper and Lower Limits - Some Special Sequences – Tests of convergence– Power series – Absolute convergence – Addition and multiplication of series – Rearrangements.

UNIT II

Continuity: Limits of functions – Continuous functions – continuity and Compactness– Continuity and connectedness – Discontinuities – Monotonic functions – Infinite limits and limits at infinity. Differentiation: Derivative of a real function – Mean value Theorems - Intermediate value theorem for derivatives – L'Hospital's Rule – Taylor's Theorem – Differentiation of vector valued functions.

UNIT III

Riemann – Stieltjes Integral: Definition and Existence – Properties – Integration and Differentiation – Integration of vector valued functions.

UNIT IV

Sequences and series of functions: Uniform Convergence and Continuity – Uniform Convergence and Differentiation – Equicontinuous families of functions – The Stone – Weierstrass Theorem.

UNIT V

Functions of several variables: Linear Transformations - Differentiation – The Contraction Principle – The Inverse Function Theorem - The Implicit Function Theorem.

Course Outcome

CO1 : Get the thorough knowledge of the various aspects of real line.

CO2 : Gain mastery in the fundamental concepts such assets and functions, Induction principle, Finite and Infinite sets.

CO3 : Understand the basic concepts in metric spaces geometrically and with rigor.

CO4 : Realize the key idea of convergence of sequences and the quantitative inequality estimates. Here numerous examples would have demonstrated the role of inequalities.

CO5 : Learn the crucial concept of continuity of functions and work on problems emphasizing these ideas of real analysis.

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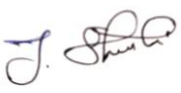
REAL ANALYSIS-P16MA12-MAPPING

CO - PO – PSO

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

If there is no correlation, put "-"

CO\PO, PSO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	3	-	-	3	3	3	-	2
CO2	-	3	2	2	2	2	-	3	2	-
CO3	2	-	-	-	-	3	2	2	2	-
CO4	2	-	2	2	-	2	2	-	-	-
CO5	-	-	-	-	2	-	-	-	-	2
Average	1.4	1	1.4	0.8	0.8	2	2	1.6	0.8	0.8



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CORE COURSE III

ORDINARY DIFFERENTIAL EQUATIONS- P16MA13

UNIT I

The general solution of the homogeneous equation– he use of one known solution to find another – The method of variation of parameters – Power Series solutions. A review of power series– Series solutions of first order equations – Second order linear equations; Ordinary points.

UNIT II

Regular Singular Points – Gauss's hypergeometric equation – The Point at infinity - Legendre Polynomials – Bessel functions – Properties of Legendre Polynomials and Bessel functions.

UNIT III

Linear Systems of First Order Equations – Homogeneous Equations with Constant Coefficients – The Existence and Uniqueness of Solutions of Initial Value Problem for First Order Ordinary Differential Equations – The Method of Solutions of Successive Approximations and Picard's Theorem.

UNIT IV

Oscillation Theory and Boundary value problems – Qualitative Properties of Solutions – Sturm Comparison Theorems – Eigenvalues,Eigenfunctions and the Vibrating String.

UNIT V

Nonlinear equations: Autonomous Systems; the phase plane and its phenomena – Types of critical points; Stability – critical points and stability for linear systems – Stability by Liapunov's direct method – Simple critical points of nonlinear systems.

Course Outcome

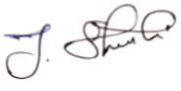
CO1: Gain in-depth knowledge of differential equations and their applications.

CO2: Find the general solution of the first order linear homogeneous equations.

CO3: Understand the utility of the theory of power series which is studied in Real Analysis course through solving various second order differential equations.

CO4: Understand the importance of studying well-posedness of the problem namely existence, uniqueness and continuous dependence of first order differential equations through Picard's theorem.

CO5: Work on numerous problems using comparison theorem in Sturm Liouville's problems.



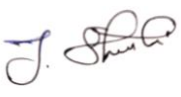
Signature of the HOD

ORDINARY DIFFERENTIAL EQUATIONS- P16MA13-MAPPING

CO - PO – PSO

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)
If there is no correlation, put "-"

CO\PO, PSO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	2	3	3	3	2	-
CO2	3	3	3	3	2	3	3	2	-	-
CO3	2	2	-	2	-	2	2	2	-	-
CO4	2	-	2	-	2	-	-	2	-	2
CO5	-	2	-	-		2	2	-	2	-
Average	2	2	1.6	1.6	1.2	2	2	1.8	0.8	0.4



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CORE COURSE IV

GRAPH THEORY- P16MA14

Unit I Basic Results

Basic Concepts - Subgraphs - Degrees of Vertices - Paths and Connectedness- Operations on Graphs - Directed Graphs: Basic Concepts - Tournaments.

Unit II Connectivity

Vertex Cuts and Edge Cuts - Connectivity and Edge - Connectivity, Trees:Definitions, Characterization and Simple Properties - Counting the Number of Spanning Trees - Cayley's Formula.

Unit III Independent Sets and Matchings

Vertex Independent Sets and Vertex Coverings - Edge Independent Sets -Matchings and Factors - Eulerian Graphs - Hamiltonian Graphs.

Unit IV Graph Colourings

Vertex Colouring - Critical Graphs - Triangle - Free Graphs - Edge Colourings of Graphs - Chromatic Polynomials.

Unit V Planarity

Planar and Nonplanar Graphs - Euler Formula and its Consequences - K5 and K3,3 are Nonplanar Graphs - Dual of a Plane Graph - The Four-Colour Theorem and the Heawood Five-Colour Theorem-Kuratowski's Theorem.

Course Outcome

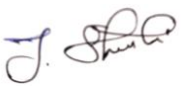
CO1 : Analyse the rigorous study of the basic concept of graph theory.

CO2 : Study the applications of graph theory in other disciplines.

CO3 : Learn the connectivity on vertex cuts and edge cuts.

CO4 : Study the counting of the number of spanning trees and Cayley's Formula

CO5 : Gain the knowledge of the Four-Colour Theorem and Kuratowski's Theorem.



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GRAPH THEORY- P16MA14-MAPPING

CO - PO – PSO

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)
If there is no correlation, put "-"

CO\PO, PSO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	2	-	3	3	3	2	2
CO2	2	3	2	2	-	3	2	3	2	-
CO3	3	2	-	-	2	3	2	2	-	-
CO4	2	-	2	2	-	2	2	-	-	-
CO5	-	2	-	-	2	-	-	-	2	2
Average	2	2	1.4	1.2	0.8	2.2	1.8	1.6	1.2	0.8

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CORE COURSE V

INTEGRAL EQUATIONS, CALCULUS OF VARIATIONS AND TRANSFORMS-P16MA15

UNIT I

Calculus of variations – Maxima and Minima – the simplest case – Natural boundary and transition conditions - variational notation – more general case – constraints and Lagrange's multipliers – variable end points – Sturm-Liouville problems.

UNIT – II

Fourier transform - Fourier sine and cosine transforms - Properties Convolution - Solving integral equations - Finite Fourier transform - Finite Fourier sine and cosine transforms - Fourier integral theorem - Parseval's identity.

UNIT III

Hankel Transform : Definition – Inverse formula – Some important results for Bessel function – Linearity property – Hankel Transform of the derivatives of the function – Hankel Transform of differential operators – Parseval's Theorem

UNIT IV

Linear Integral Equations - Definition, Regularity conditions – special kind of kernels – eigen values and eigen functions – convolution Integral – the inner and scalar product of two functions – Notation – reduction to a system of Algebraic equations – examples– Fredholm alternative - examples – an approximate method.

UNIT V

Method of successive approximations: Iterative scheme – examples – Volterra Integral equation – examples – some results about the resolvent kernel. Classical Fredholm Theory: the method of solution of Fredholm – Fredholm's first theorem – second theorem – third theorem.

Course Outcome

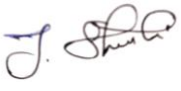
CO1 : Understand the concept of calculus of variations and integral equations and their applications.

CO2 : Study the different types of transforms and their properties

CO3 : Classify Fredholm , Volterra and singular type integral equations

CO4 : Solve integral equations using Fredholm theorem, Fredholm Alternative theorem and method of successive approximations.

CO5 : Understand the classical Fredholm theory.



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INTEGRAL EQUATIONS, CALCULUS OF VARIATIONS AND TRANSFORMS-P16MA15-MAPPING

CO - PO – PSO

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)
If there is no correlation, put "-"

CO\PO, PSO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	2	-	3	3	3	2	2
CO2	3	3	2	3	-	3	3	2	2	-
CO3	3	2	-	-	2	3	2	2	-	-
CO4	2	-	2	2	-	2	2	-	-	2
CO5	3	3	-	-	3	3	-	-	1	2
Average	2.8	2.2	1.4	1.4	1	2.8	2	1.4	1	1.2

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III SEMESTER

CORE COURSE IX

CLASSICAL DYNAMICS-P16MA31

UNIT I

Introductory concepts: The mechanical system - Generalized Coordinates - constraints - virtual work - Energy and momentum.

UNIT II

Lagrange's equation: Derivation and examples - Integrals of the Motion - Small oscillations.

UNIT III

Special Applications of Lagrange’s Equations: Rayleigh’s dissipation function - impulsive motion - Gyroscopic systems - velocity dependent potentials.

UNIT IV

Hamilton's equations: Hamilton's principle - Hamilton’s equations - Other variational principles - phase space.

UNIT V

Hamilton - Jacobi Theory: Hamilton's Principal Function – The Hamilton - Jacobi equation - Separability.

Course Outcome

CO1: Understand the Mechanical System of particles.

CO2: Derive Lagrange's equations of motion using d'Alembert's principle.

CO3: Compare dissipative systems and velocity dependent potentials.

CO4: Classify Hamilton Principle and other variational principles.

CO5: Analyze the concepts of Hamilton - Jacobi theory.

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CLASSICAL DYNAMICS-P16MA31-MAPPING

CO - PO – PSO

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)
If there is no correlation, put "-"

CO\PO, PSO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	-	3	3	2	2	2	-	2	-
CO2	2	-	2	-	-	-	-	2	-	3
CO3	3	3	-	-	3	3	-	-	2	-
CO4	2	3	-	2	-	3	-	3	2	2
CO5	3	-	3	2	-	2	3	-	-	-
Average	2.6	1.2	1.6	1.4	1	2	1	1	1.2	1

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CORE COURSE X

MEASURE AND INTEGRATION- P16MA32

UNIT I

Measure on Real line - Lebesgue outer measure - Measurable sets - Regularity - Measurable function - Borel and Lebesgue measurability.

UNIT II

Integration of non-negative functions - The General integral - Integration of series - Riemann and Lebesgue integrals.

UNIT III

Abstract Measure spaces - Measures and outer measures - Completion of a measure - Measure spaces - Integration with respect to a measure.

UNIT IV

Convergence in Measure- Almost uniform convergence- Signed Measures and Halin Decomposition –The Jordan Decomposition

UNIT V

Measurability in a Product space – The product Measure and Fubini's Theorem.

Course Outcome

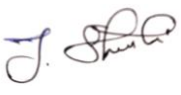
CO1: Observe the idea of measurable function, simple functions and their properties.

CO2: Discuss about the importance of Riemann and Lebesgue integrals.

CO3: Classify measure and outer measure.

CO4: Understand the convergence in measure.

CO5: Describe the product Measure and Fubini's Theorem.



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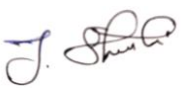
MEASURE AND INTEGRATION- P16MA32-MAPPING

CO - PO – PSO

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)
If there is no correlation, put "-"

CO\PO, PSO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	2	-	-	2	3	2	2	-
CO2	3	2	2	-	-	3	2	-	-	2
CO3	-	3	-	-	3	3	2	-		-
CO4	2	-	3	-	-	2	3	-	2	-
CO5	2	-	3	2	3	-	-	-	2	3
Average	1	1.6	2	0.4	1.2	2	2	0.4	1.2	1



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CORE COURSE XI

TOPOLOGY-P16MA33

UNIT I TOPOLOGICAL SPACES:

Topological spaces - Basis for a topology - The order topology - The product topology on X x Y - The subspace topology - Closed sets and limit points.

UNIT II CONTINUOUS FUNCTIONS :

Continuous functions - the product topology - The metric topology.

UNIT III CONNECTEDNESS:

Connected spaces- connected subspaces of the Real line - Components and local connectedness.

UNIT IV COMPACTNESS:

Compact spaces - compact subspaces of the Real line - Limit Point Compactness – Local Compactness.

UNIT V COUNTABILITY AND SEPARATION AXIOMS:

The countability Axioms - The separation Axioms - Normal spaces - The Urysohn Lemma - The Urysohn metrization Theorem - The Tietz extension theorem.

Course Outcome

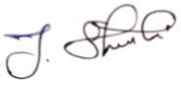
CO1: Understand the various topological spaces.

CO2: Realize how topological spaces are generalization of metric spaces.

CO3: Explore the components and connectedness of topological spaces.

CO4: Elucidate the compact subspaces of real line.

CO5: Study Urysohn metrization Theorem and Tietz extension theorem.



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TOPOLOGY - P16MA33 - MAPPING

CO - PO – PSO

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)
If there is no correlation, put "-"

CO\PO, PSO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	2	3	-	3	2	2	2	2	-	-
CO2	2	3	-	-	-	2	2	-	3	-
CO3	3	2	-	3	3	-	3	2	-	-
CO4	3	3	-	2	-	-	3		2	-
CO5	3	2	2	-	-	2	-	3	-	2
Average	`2.6	`2.6	0.4	1.6	1	1.2	2	1.4	1	0.4

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ELECTIVE III (2)

DISCRETE MATHEMATICS- P16MAE3

Unit I Relations and Functions:

Binary relations, equivalence relations and partitions, partial order relations, inclusion and exclusion principle, Hasse diagram, Pigeon hole principle. Functions, inverse functions, compositions of functions, recursive functions.

Unit II Mathematical Logic:

Logic operators, Truth tables, Theory of inference and deduction, mathematical calculus, predicate calculus, predicates and qualifiers.

Unit III Lattices:

Lattices as Partially Ordered Sets. Their Properties, Lattices as algebraic Systems, Sub lattices, Direct Product and homomorphism. Some Special Lattices - Complete, Complemented and Distributive Lattices, Isomorphic Lattices.

Unit IV Boolean algebra:

Various Boolean identities, the switching Algebra Example, Sub Algebras, Direct Production and Homomorphism. Boolean Forms and their Equivalence, Midterm Boolean forms, Sum of Products, Canonical Forms. Minimization of Boolean Functions. The Karnaugh Map Method.

Coding Theory: Coding of binary information and error detection, Group codes, decoding and error correction.

Unit V Grammar and Languages:

Phrase structure grammars, rewriting rules, derivation sentential forms, language generated by grammar, regular, context free and context sensitive grammar and languages.

Course Outcome

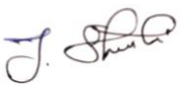
CO1: Describe Relations and Functions.

CO2: Explain Mathematical Logic.

CO3: Discuss different kinds of lattices and their properties.

CO4: Workout in detail Various Boolean identities, Karnaugh Map Method and Coding theory.

CO5: Elucidate Grammar and Languages.



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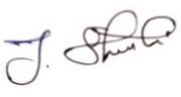
DISCRETE MATHEMATICS- P16MAE3-MAPPING

CO - PO – PSO

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)
If there is no correlation, put "-"

CO\PO, PSO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	3	2	2	3	3	2	2	-
CO2	2	3	2	3	-	3	3	2	3	2
CO3	3	2	2	3	2	3	3	3	-	-
CO4	3	3	2	2	-	3	2	2	3	2
CO5	2	2	3	-	2	3	2	3	2	2
Average	2.6	2.4	2.4	2	1.2	3	2.6	2.4	2	1.2



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ELECTIVE IV (2)

ADVANCED OPERATIONS RESEARCH- P16MAE4

Unit I

Integer Programming.

Unit II

Dynamic (Multistage) programming.

Unit III

Decision Theory and Games.

Unit IV

Inventory Models.

Unit V

Nonlinear Programming algorithms.

Course Outcome

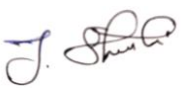
CO1: Understand Integer programming problem and apply OR techniques in business and management problems.

CO2: Solve Dynamic programming problems.

CO3: Describe Decision theory and Games.

CO4: Have the knowledge of Inventory models.

CO5: Demonstrate the nonlinear programming problems.



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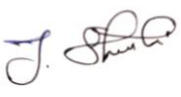
ADVANCED OPERATIONS RESEARCH- P16MAE4- MAPPING

CO - PO – PSO

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)
If there is no correlation, put "-"

CO\PO, PSO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	2	3	-	-	2	3	3	-	-	2
CO2	3	-	2	-	-	3	3	3	2	-
CO3	3	2	-	-	-	3	2	-	-	-
CO4	3	2	-	3	-	3	3	2	3	-
CO5	2	-	3	-	2	3	2	2	-	2
Average	2.6	1.4	1	0.6	0.8	3	2.8	1.4	1	0.8



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SHRIMATI INDIRA GANDHI COLLEGE

(Nationally Accredited at 'A' Grade (3rd Cycle) by NAAC)

TIRUCHIRAPPALLI-620 002

PG & RESEARCH DEPARTMENT OF MATHEMATICS

M.Sc., Mathematics

PROGRAMME OUTCOMES:

PO1: Develop professional foundations through activities such as teaching, internship and fellowships.

PO2: Attained profound Expertise in Discipline

PO3: Acquire the basic tools needed to carry out independent research**.**

PO4: Proficient in their specialized area and successfully complete an advanced research project**.**

PO5: Develop skills in problem solving, critical thinking and analytical reasoning as applied to scientific problems.

PROGRAMME SPECIFIC OUTCOMES:

PSO1: Understand the nature of abstract mathematics and explore the concepts in further details.

PSO2: Interpret the real-world problems in to mathematical equations and draw the inferences by finding appropriate solutions.

PSO3: Acquire mathematical knowledge and skills appropriate to professional activities.

PSO4: Qualify national level tests**.**

PSO5: Explore ideas of mathematics for propagation of knowledge.

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II SEMESTER

CORE COURSE 8

COMPLEX ANALYSIS - P16MA21

UNIT I

Elementary Point Set Topology: Sets and Elements – Metric Spaces – Connectedness – Compactness – Continuous Functions – Topological Spaces; Conformality: Arcs and Closed Curves – Analytic Functions in Regions – Conformal Mapping – Length and Area; Linear Transformations: The Linear Group – The Cross Ratio – Symmetry

UNIT II

Fundamental theorems in complex integration: Line Integrals – Rectifiable Arcs – Line Integrals as Functions of Arcs – Cauchy's Theorem for a Rectangle – Cauchy's Theorem in a Disk; Cauchy's Integral Formula: The Index of a Point with Respect to a Closed Curve – The Integral Formula – Higher Derivatives.

UNIT III

Local Properties of Analytic Functions - Removable Singularities - Taylor's Theorem – Integral representation of the nth term - Zeros and Poles – Algebraic order of f(z) – Essential Singularity - The Local Mapping – The Open Mapping Theorem - The Maximum Principle.

UNIT IV

The General Form of Cauchy's Theorem: Chains and Cycles – Simple Connectivity – Homology – The General Statement of Cauchy's Theorem – Proof of Cauchy's Theorem – Locally Exact Differentials – Multiply Connected Regions; The Calculus of Residues: The Residue Theorem – The Argument Principle – Evaluation of Definite Integrals

UNIT V

Harmonic Functions: Definition and Basic Properties – The Mean-value Property – Poisson's Formula – Schwarz's Theorem – The Reflection Principle; Power series expansions-Weierstrass's Theorem – The Taylor Series – The Laurent Series;

Course Outcome

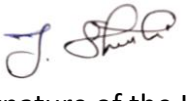
CO1: Determine whether a function is differentiable and if so, find its derivative.

CO2: Get expertise in the concept of convergence of sequences and series of complex numbers, continuity and differentiability of function on complex numbers.

CO3: Express complex differentiable functions as power series.

CO4: Identify the isolated singularities of a function and determine whether they are removable, poles or essential.

CO5: Get acquainted with various techniques of proving fundamental theorem of algebra, open mapping theorem, maximum modulus theorem and Liouville/s theorem



Signature of the HOD

COMPLEX ANALYSIS - P16MA21 - MAPPING

CO - PO – PSO

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)
If there is no correlation, put "-"

CO\PO, PSO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	2	3	-	3	3	2	-	3
CO2	3	2	2	3	-	2	3	2	3	2
CO3	2	2	2	3	2	3	3	-	2	3
CO4	2	3	2	2	-	2	2	2	3	2
CO5	3	2	3	2	2	3	2	3	2	2
Average	2.6	2.4	2.2	2.6	0.8	2.6	2.6	1.8	2	2.4

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CORE COURSE 9

LINEAR ALGEBRA - P16MA22

UNIT I: Matrices:

Systems of linear Equations - Matrices and Elementary Row operations -Row-reduced echelon Matrices - Matrix Multiplication - Invertible Matrices -Bases and Dimension. (Only revision of Vector spaces and subspaces).

Unit II: Linear transformations:

The algebra of linear transformations - Isomorphism of Vector Spaces - Representations of Linear Transformations by Matrices - Linear Functionals - The Double Dual - The Transpose of a Linear Transformation.

Unit III: Algebra of polynomials:

The algebra of polynomials - Lagrange Interpolation - Polynomial Ideals -The prime factorization of a polynomial - Commutative rings – Determinant functions.

Unit IV: Determinants:

Permutations and the uniqueness of determinants - Classical Adjoint of a (square) matrix - Inverse of an invertible matrix using determinants -Characteristic values - Annihilating polynomials.

Unit V: Diagonalization:

Invariant subspaces - Simultaneous triangulation and simultaneous Diagonalization Direct-sum Decompositions - Invariant Direct sums – Primary Decomposition theorem.

Course Outcome

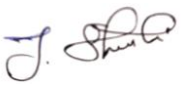
CO1: Understand the concepts of vector spaces, bases and dimensions of a vector space.

CO2: To find the Jordan canonical forms of various linear transformation and thereby able to solve various problems.

CO3: Realise that the subject evolves as a generalization of solving a system of linear equations.

CO4: To find the Jordan canonical forms of various linear transformation and thereby able to solve various problems.

CO5: Having got trained in numerous examples the student realizes the isomorphic theory of Linear transformations and matrices.



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LINEAR ALGEBRA - P16MA22- MAPPING

CO - PO – PSO

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

If there is no correlation, put "-"

CO\PO, PSO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	2	3	3	2	2	3
CO2	3	2	3	3	2	2	3	2	3	2
CO3	2	2	2	3	-	3	3	-	-	3
CO4	2	3	2	2	-	2	2	2	3	2
CO5	3	2	3	2	2	3	2	3	2	2
Average	2.6	2.4	2.6	2.6	1.2	2.6	2.6	1.8	2	2.4

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CORE COURSE 10

PARTIAL DIFFERENTIAL EQUATIONS-P16MA23

UNIT I

Partial differential equations- origins of first order Partial differential equations- Cauchy's problem for first order equations- Linear equations of the first order- Integral surfaces Passing through a Given curve- surfaces Orthogonal to a given system of surfaces -Non linear Partial differential equations of the first order.

UNIT II

Cauchy's method of characteristics- compatible systems of first order equations- Charpits method- Special types of first order equations- Solutions satisfying given conditions- Jacobi's method.

UNIT III

Partial differential equations of the second order : The origin of second order equations –second order equations in Physics – Higher order equations in Physics - Linear partial differential equations with constant co-efficient- Equations with variable coefficients- Characteristic curves of second order equations

UNIT IV

Characteristics of equations in three variables- The solution of Linear Hyperbolic equations-Separation of variables. The method of Integral Transforms – Non Linear equations of the second order.

UNIT V

Laplace equation : Elementary solutions of Laplace's equations-Families of equipotential Surfaces- Boundary value problems-Separation of variables –Problems with Axial Symmetry.

COURSE OUTCOME:

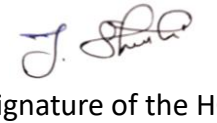
CO1: Acquire skills to solve Cauchy problem of first order equations and solve compatible system of first order equations using Charpit's method.

CO2: Gain knowledge on occurrence and derivation of Laplace and poison equations.

CO3: Solve first order equations and nonlinear partial differential equations using various methods.

CO4: Identify and solve the three main classes of second order equations, elliptic, parabolic and hyperbolic.

CO5: Solve one dimensional wave equations using the method of separation of variables.



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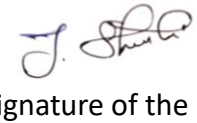
PARTIAL DIFFERENTIAL EQUATIONS-P16MA23- MAPPING

CO - PO – PSO

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)
If there is no correlation, put "-"

CO\PO, PSO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	2	2	-	3	3	2	2	3
CO2	3	2	2	3	2	2	3	2	3	2
CO3	3	2	2	3	2	3	3	2	-	3
CO4	2	3	2	2	-	2	2	2	3	2
CO5	2	2	3	2	2	3	2	3	2	-
Average	2.6	2.4	2.2	2.4	1.2	2.6	2.6	2.2	2	2



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ELECTIVE I (3)

FUZZY SETS AND THEIR APPLICATIONS - P16MAE1C

UNIT I From Classical Sets To Fuzzy Sets, Fuzzy Sets Verses Crisp Sets:

Fuzzy sets: Basic types – Fuzzy sets: Basic Concepts –Additional Properties of α – cuts-Extension Principle for fuzzy sets .

UNIT II Operations On Fuzzy Sets:

Types of operations– Fuzzy complements- Fuzzy Intersections:t-Norms – Fuzzy Unions:t-Conorms - Combinations of Operations.

UNIT III Fuzzy Arithmetic:

Fuzzy numbers - Linguistic variables -Arithmetic operations on intervals –Arithmetic operations on Fuzzy numbers .

UNIT IV Fuzzy Relations:

Binary Fuzzy Relations – Binary Relations on a Single Set – Fuzzy Equivalence Relations – Fuzzy Compatibility Relations –Fuzzy Ordering Relations – Fuzzy Morphisms.

UNIT V Fuzzy Decision Making:

Individual decision making – Multiperson Decision Making-Ranking methods – Fuzzy Linear programming.

Course Outcome:

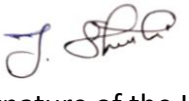
CO1: Gain knowledge about operations on fuzzy and evaluate problems on intervals and fuzzy numbers using functional operations.

CO2: Familiar with the extension principle, it's compatibility with the α-level sets and the usefulness of the principle in performing fuzzy number arithmetic operations.

CO3: Construct the appropriate fuzzy numbers corresponding to uncertain and imprecise collected data.

CO4: Determine the concepts of fuzzy compatibility relations, fuzzy ordering relations and fuzzy morphisms.

CO5: Understand the basic concepts of fuzzy sets, fuzzy arithmetic and fuzzy relations.



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FUZZY SETS AND THEIR APPLICATIONS - P16MAE1C-MAPPING

CO - PO – PSO

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)
If there is no correlation, put "-"

CO\PO, PSO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	3	2	2	3	3	2	2	3
CO2	3	2	2	3	-	2	3	2	3	2
CO3	2	2	2	3	2	3	3	3	-	3
CO4	3	3	2	2	-	2	2	2	3	2
CO5	2	2	3	2	2	3	2	3	2	2
Average	2.6	2.2	2.4	2.4	1.2	2.6	2.6	2.4	2	2.4

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ELECTIVE II (1)

STOCHASTIC PROCESSES - P16MAE2A

UNIT I

Stochastic Processes: Some notions – Specification of Stochastic processes – Stationary processes – Markov Chains – Definitions and examples – Higher Transition probabilities – Generalization of independent Bernoulli trails – Sequence of chain – Dependent trains.

UNIT II

Markov chains : Classification of states and chains – determination of Higher transition probabilities – stability of a Markov system – Reducible chains – Markov chains with continuous state space.

UNIT III

Markov processes with Discrete state space : Poisson processes and their extensions – Poisson process and related distribution – Generalization of Poisson process- Birth and Death process – Markov processes with discrete state space (continuous time Markov Chains).

UNIT IV

Renewal processes and theory : Renewal process – Renewal processes in continuous time – Renewal equation – stopping time – Wald's equation – Renewal theorems.

UNIT V

Stochastic processes in Queuing – Queuing system – General concepts – the queuing model M/M/1 – Steady state Behaviour – transient behaviour of M/M/1 Model – Non-Markovian models - the model GI/M/1.

Course Outcome:

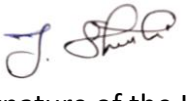
CO1: Acquire skills to evaluate Markov chain with a denumerable number of stated.

CO2: Develop a positive attitude to categorize status and chains.

CO3: Give specification of stochastic process and give examples for steady process.

CO4: Understand Markov chains and explain the generalization of Independent Bernoulli trails.

CO5: Describe renewal processes in continuous time using Wald's equation.



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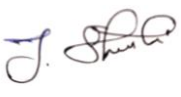
STOCHASTIC PROCESSES - P16MAE2A-MAPPING

CO - PO – PSO

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)
If there is no correlation, put "-"

CO\PO, PSO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	3	2	2	3	3	2	2	3
CO2	2	3	2	3	-	3	3	2	3	2
CO3	3	2	2	3	2	3	3	3	-	3
CO4	3	3	2	2	-	3	2	2	3	2
CO5	2	2	3	-	2	3	2	3	2	-
Average	2.6	2.4	2.4	2	1.2	3	2.6	2.4	2	2



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IV SEMESTER

CORE COURSE XII

FUNCTIONAL ANALYSIS-P16MA41

UNIT I

Algebraic Systems: Groups – Rings – The structure of rings – Linear spaces – The dimension of a linear space – Linear transformations – Algebras – Banach Spaces : The definition and some examples – Continuous linear transformations – The Hahn-Banach theorem – The natural imbedding of N in N** - The open mapping theorem – The conjugate of an operator

UNIT II

Hilbert Spaces: The definition and some simple properties – Orthogonal complements – Orthonormal sets - The conjugate space H* - The adjoint of an operator – Self-adjoint operators – Normal and unitary operators – Projections

UNIT III

Finite-Dimensional Spectral Theory: Matrices – Determinants and the spectrum of an operator – The spectral theorem – A survey of the situation

UNIT IV

General Preliminaries on Banach Algebras: The definition and some examples – Regular and singular elements – Topological divisors of zero – The spectrum – The formula for the spectral radius – The radical and semi-simplicity

UNIT V

The Structure of Commutative Banach Algebras : The Gelfand mapping – Applications of the formula r(x) = lim || xn ||1/n - Involutions in Banach Algebras – The Gelfand-Neumark theorem.

Course Outcome

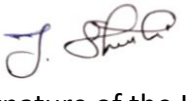
CO1: Study the three structure theorems of functional Analysis viz., Hahn- Banach theorem, Open Mapping theorem and Uniform boundedness Principle.

CO2: Analyze Hilbert spaces and orthogonality to the spectral theory of operations on a Hilbert space.

CO3: Understand functional analytic language required to study problems of practical interest.

CO4: Understand weak topology on a normed linear space and the appreciate Banach theorem.

CO5: Get a working knowledge on Banach algebra of bounded linear operator.



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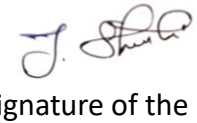
FUNCTIONAL ANALYSIS - P16MA41 - MAPPING

CO - PO – PSO

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)
If there is no correlation, put "-"

CO\PO, PSO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	2	2	2	3	2	2	-	2
CO2	2	3	2	-	-	3	3	3	2	-
CO3	2	2	-	-	-	2	2	-	-	-
CO4	-	2	2	3	-	-	3	-	3	2
CO5	2	-	-	-	2	2	-	2	-	
Average	1.8	1.8	1.2	1	0.8	2	2	1.4	1	0.8



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CORE COURSE XIII

DIFFERENTIAL GEOMETRY- P16MA42

UNIT I SPACE CURVES:

Definition of a space curve - Arc length - tangent - normal and binormal - curvature and torsion - contact between curves and surfaces- tangent surface- involutes and evolutes- Intrinsic equations - Fundamental Existence Theorem for space curves- Helics.

UNIT II INTRINSIC PROPERTIES OF A SURFACE:

Definition of a surface - curves on a surface - Surface of revolution - Helicoids - Metric- Direction coefficients - families of curves- Isometric correspondence- Intrinsic properties.

UNIT III GEODESICS:

Geodesics - Canonical geodesic equations - Normal property of geodesics- Existence Theorems - Geodesic parallels - Geodesics curvature- Gauss- Bonnet Theorem - Gaussian curvature- surface of constant curvature.

UNIT IV NON INTRINSIC PROPERTIES OF A SURFACE:

The second fundamental form- Principal curvature - Lines of curvature - Developable – Developable associated with space curves and with curves on surface - Minimal surfaces - Ruled surfaces.

UNIT V DIFFERENTIAL GEOMETRY OF SURFACES:

Compact surfaces whose points are umblics- Hilbert's lemma - Compact surface of constant curvature - Complete surface and their characterization - Hilbert's Theorem - Conjugate points on geodesics.

Course Outcome

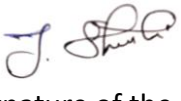
CO1: Develop the notion of surfaces and their properties.

CO2: Study geodesics and differential geometry of surfaces.

CO3: Understand Canonical geodesic equations, curvature and Gauss-Bonnet theorem.

CO4: Get Knowledge on Second fundamental form, space curves and ruled surfaces.

CO5: Analyze how parametrizations of plane curves can be used to evaluate integrals over the curve.



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DIFFERENTIAL GEOMETRY- P16MA42 - MAPPING

CO - PO – PSO

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)
If there is no correlation, put "-"

CO\PO, PSO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	2	-	-	3	3	2	2	-
CO2	2	2	-	-	-	3	2	-	-	2
CO3	3	2	3	2	2	2	3	3	2	-
CO4	2	3	-	2	-	3	2	2	2	-
CO5	3	3	2	-	3	2	-	2	2	3
Average	2.6	2.4	1.4	0.8	1	2.6	2	1.8	1.6	1

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CORE COURSE XIV

ADVANCED NUMERICAL ANALYSIS - P16MA43

Unit I

Transcendental and polynomial equations:Rate of convergence – Secant Method, Regula Falsi Method, Newton Raphson Method, Muller Method and Chebyshev Method. Polynomial equations: Descartes' Rule of Signs - Iterative Methods: Birge-Vieta method, Bairstow's method Direct Method: Graeffe's root squaring method.

Unit II

System of Linear Algebraic equations and Eigen Value Problems: Error Analysis of Direct methods – Operational count of Gauss elimination, Vector norm, Matrix norm, Error Estimate. Iteration methods - Jacobi iteration method, Gauss Seidel Iteration method, Successive Over Relaxation method - Convergence analysis of iterative methods, Optimal Relaxation parameter for the SOR method. Finding eigen values and eigen vectors – Jacobi method for symmetric matrices and Power methods only.

Unit III

Interpolation and Approximation:- Hermite Interpolations, Piecewise and Spline Interpolation –piecewise linear interpolation, piecewise quadratic interpolation, piecewise cubic interpolation, spline interpolation-cubic Spline interpolation. Bivariate Interpolation-Lagrange Bivariate interpolation. Least square approximation.

Unit IV

Differentiation and Integration: Numerical Differentiation – Optimum choice of Step length – Extrapolation methods – Partial Differentiation. Numerical Integration: Methods based on undetermined coefficients - Gauss Legendre Integration method and Lobatto Integration Methods only.

Unit V

Ordinary differential equations – Singlestep Methods: Local truncation error or Discretization Error, Order of a method, Taylor Series method, Runge-Kutta methods: Explicit Runge–Kutta methods– Minimization of Local Truncation Error, System of Equations, Implicit Runge-Kutta methods. Stability analysis of single step methods (RK methods only).

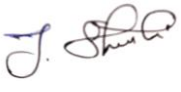
Course Outcome

CO1: Communicate the theory behind various numerical methods.

CO2: Apply these methods to solve mathematical problems.

CO3: Analyze the concepts of Hermite, Piecewise and spline Interpolation with examples.

CO4: Understand the techniques of Differentiation and Integration.



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CO5: Solve ordinary differential equations using Truncation Error.

ADVANCED NUMERICAL ANALYSIS - P16MA43 - MAPPING

CO - PO – PSO

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)
If there is no correlation, put "-"

CO\PO, PSO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	-	3	3	3	2	2	-
CO2	2	2	2	3	3	3	3	2	3	2
CO3	3	2	3	2	2	3	2	3	2	3
CO4	2	3	-	2	3	2	2	-	2	3
CO5	3	2	2	-	3	2	-	2	3	2
Average	2.6	2.4	2	1.4	2.8	2.6	2	1.8	2.4	2

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ELECTIVE V (3)

ALGEBRAIC NUMBER THEORY - P16MAE5C

UNIT I

Introduction – Divisibility – Primes – The Binomial Theorem – Congruences – Euler's totient - Fermat's, Euler's and Wilson's Theorems – Solutions of congruences – The Chinese Remainder theorem.

UNIT II

Techniques of numerical calculations – Public key cryptography – Prime power Moduli – Primitive roots and Power Residues –Congruences of degree two.

UNIT III

Number theory from an Algebraic Viewpoint – Groups, rings and fields – Quadratic Residues- The Legendre symbol (a/r) where r is an odd prime – Quadratic Reciprocity – The Jacobi Symbol (P/q) where q is an odd positive integer.

UNIT IV

Binary Quadratic Forms – Equivalence and Reduction of Binary Quadratic Forms – Sums of three squares – Positive Definite Binary Quadratic forms – Greatest integer Function – Arithmetic Functions – The Mobius Inversion Formula – Recurrence Functions – Combinatorial number theory .

UNIT V

Diophantine Equations – The equation ax+by=c – Simultaneous Linear Diophantine Equations – Pythagorean Triangles – Assorted examples.

Course Outcome

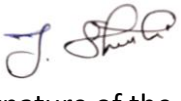
CO1: Analyze the students to the charm, niceties and nuances in the world of numbers.

CO2: Develop some of the Applications of the Theory of Numbers.

CO3: Describe the techniques of numerical calculations.

CO4: Knowledge on binary quadratic forms,

CO5: Diophantine equations, Pythagorean triangles with assorted examples.Understand Fermat's theorem, Euler's theorem



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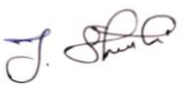
ALGEBRAIC NUMBER THEORY - P16MAE5C - MAPPING

CO - PO – PSO

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)
If there is no correlation, put "-"

CO\PO, PSO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	2	2	3	3	3	2	2	-
CO2	3	2	2	-	3	3	3	2	3	2
CO3	2	3	-	3	3	2	2	2	-	3
CO4	2	-	3	2	2	2	-	-	2	2
CO5	-	2	-	2	3	3	2	2	2	3
Average	2	2	1.4	1.8	2.8	2.6	2	1.6	2.8	2



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