COMMISSIONERATE OF COLLEGIATE EDUCATION, A.P.

GOVERNMENT DEGREE COLLEGE, RAJAMPETA

(Affiliated to yogi vemana university, Kadapa)
(Re-accredited by NAAC with "B+" Grade in cycle - III)
Rajampet-516115

TEACHING PLAN

Academic Year: 2025-2026

Name of the Department : Mathematics

Name of the Lecturer : V.K. Mallikarjuna Vali

Subject : Mathematics

Sl. No.	Paper	Semester	Page No.
1	Group Theory	III	1-5
2	Numerical methods	III	6-10
3	Vector calculus	V	11-15
4	Solid Geometry	I	16-20
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III - Semister

paper - Group Theory

Teaching Plan No.- 1

Name of the topic	Groups
Hours required	15
Learning Objectives	Binary operations. Semi group, finite, infinite grp. Functions, Groups
Previous Knowledge to be reminded	Functions
Eaxmples/Illustrations	Solved problems
Additional Inputs	Exercise problems
Teaching Aids used	Text Book, Board, chalk piece
References cited	Mathematics Vol-2
Student Activity planned after teaching	Home work
Activity planned outside the Class room, if any	Solve the Example problems
Any other activity	
Topic Synopsis	* Binary operation - Algebric structure * Semi group - monoid. * Def. of group and elemtary properties of finite & infinite groups * Example problems * order of a grop * Composition tables with Examples.

Signature of the Lecturer

Teaching Plan No.- 2

Name of the topic	Sub Groups
Hours required	15
Learning Objectives	product of two subgroups, Union & intersection Cosets - Lagrangs Theorem
Previous Knowledge to be reminded	Groups.
Eaxmples/Illustrations	Solved problems
Additional Inputs	Exercise problems
Teaching Aids used	Board, Chalkpiece, Text Book
References cited	Mathematics Vol-2
Student Activity planned after teaching	practice the problems
Activity planned outside the Class room, if any	Home work
Any other activity	Write the Example problems.
Topic Synopsis	* Def. of complex, multiplication of complex inverse of a complex. * Defn of subgroups - Examples * Criterion for a complex to be subgroups * Criterion for the product of two subgroups to be a subgroups. * union & intersection of a subgroups * Def. of cosets - properties * Index of a subgroup a finite groups * Lagranges Theorem.

Signature of the Lecturer

Teaching Plan No.- 3

Name of the topic	Normal subgroups
Hours required	15
Learning Objectives	Proper & improper normal subgroups Intersection of two normal subgroups.
Previous Knowledge to be reminded	Sub groups
Eaxmples/Illustrations	Excercise problems
Additional Inputs	Solved problems.
Teaching Aids used	Board, chalkpiece, text Book.
References cited	M. Thomas Vol-2
Student Activity planned after teaching	Home work
Activity planned outside the Class room, if any	Practice the problems
Any other activity	Write Assignments
Topic Synopsis	* Defn of normal subgroups - Examples. * Proper and improper normal subgroups * Hamelton group - Criterion for a subgroup to be a normal subgroup * Intersection of two normal subgroups * subgroup of index 2 is a normal subgroup

Signature of the Lecturer

Teaching Plan No.- 4

Name of the topic	Homomorphism
Hours required	15
Learning Objectives	Image of a Homomorphism, elementry properties Isomorphism, Automorphism Kernal of Homomorphism
Previous Knowledge to be reminded	Normal Subgroups
Eaxmples/Illustrations	Solved problems
Additional Inputs	Excercise problems.
Teaching Aids used	Text book, Board, chalk pice
References cited	Mathematics Vol-2
Student Activity planned after teaching	write Example problems.
Activity planned outside the Class room, if any	Home work
Any other activity	Seminar conducted.
Topic Synopsis	* Def. of Homomorphism - Exaples. * Image of Homomorphism, elementry properties of Homomorphism * Isomorphism - Automorphism and its elementry properties * Kernal of a Homomorphism * Fundamental Theorem of Homomorphism and applications.

Signature of the Lecturer

Teaching Plan No.- 5

Name of the topic	permutations and cyclic groups
Hours required	15
Learning Objectives	Additions & multiplications of permutations. even & odd permutations - cayley's theorem
Previous Knowledge to be reminded	-functions.
Eaxmples/Illustrations	Solved problems
Additional Inputs	Exercise problems
Teaching Aids used	Board, text Book chalk piece
References cited	Mathematics vol-2
Student Activity planned after teaching	practice the problems
Activity planned outside the Class room, if any	-Home-work.
Any other activity	Seminars & Assignments Conducted
Topic Synopsis	* Def. of permutation - Examples * permutation multiplication * Inverse of a permutation - cyclic permutations * Even and odd permutations * Cayley's theorem * Def. of cyclic group * elementary properties * classification of cyclic groups.

Signature of the Lecturer

Semister - IV

paper - Numerical Methods

Teaching Plan No.- 1

Name of the topic	The calculus of finite Differences
Hours required	15
Learning Objectives	Fundamental Items of difference calculus, properties & problems on Δ, ∇, E, missing terms
Previous Knowledge to be reminded	
Eaxmples/Illustrations	Solved problems
Additional Inputs	Excrcise problems.
Teaching Aids used	Text Book, Board, chalk piece
References cited	Applied Numerical Analysis
Student Activity planned after teaching	practice the problems.
Activity planned outside the Class room, if any	Home-work
Any other activity	write the Example problems.
Topic Synopsis	* The operators Δ, ∇, E * Fundamental Items of difference calculus * properties & problems on ∇, Δ, E * Relation b/n E & D * Relation b/n D and Δ * problems on missing terms.

Signature of the Lecturer

Teaching Plan No.-2

Name of the topic	Interpolation with equal ad unequal intervals
Hours required	15
Learning Objectives	Newton Forward & Backward Interpolation Newton divided difference – Legranges interpolation
Previous Knowledge to be reminded	Numerical methods
Eaxmples/Illustrations	Solved problems
Additional Inputs	Exercise problems
Teaching Aids used	Board, Text Book
References cited	Numerical methods for scientific ad Engineering
Student Activity planned after teaching	practice the problems
Activity planned outside the Class room, if any	Home work
Any other activity	Assignment given
Topic Synopsis	* Derivations of Newton Forward interpolation and problems * Derivations of Newton Backward interpolation and pr * Newton Devided Difference formula - problems * legranges interpolation formula with problems.

Signature of the Lecturer

Teaching Plan No.- 3

Name of the topic	Central Difference interpolation formulae
Hours required	15
Learning Objectives	Relation b/n δ, μ, σ. Gauss forward & Backward formula, Stirlings formula.
Previous Knowledge to be reminded	Newtons formula.
Examples/Illustrations	Example problems
Additional Inputs	Solved problems
Teaching Aids used	Board, Text Book.
References cited	Applied Numerical Analysis Book
Student Activity planned after teaching	practice the problems.
Activity planned outside the Class room, if any	Solve the exercise problems
Any other activity	Seminar conducted.
Topic Synopsis	★ Central Difference operators δ, μ, σ. ★ Relation b/n δ, μ, σ. ★ Gauss forward formula & problems ★ Gauss Backward formula & problems ★ stirlings formula & problems. ★ Besseles formula & problems.

Signature of the Lecturer

Teaching Plan No.- 4

Name of the topic	Solution of Algebraic and Transcendental Eqn.
Hours required	4L
Learning Objectives	Bisection method, Regula-falsi method iteration method, Newton-Raphson's method
Previous Knowledge to be reminded	Gauss & Newton formulas
Eaxmples/Illustrations	Example problems
Additional Inputs	Exercise problems
Teaching Aids used	Board, Text Book.
References cited	Applied Numerical Analysis Book
Student Activity planned after teaching	Home - work.
Activity planned outside the Class room, if any	practice the problems
Any other activity	Seminar Conducted.
Topic Synopsis	* Bisection method & problems * Regula falsi method & problems * Iteration method & problems * Newton raphson's method & problems.

Signature of the Lecturer

Teaching Plan No.- 5

Name of the topic	Curve fitting.
Hours required	15
Learning Objectives	Least square curve fitting, fitting a stright line.
Previous Knowledge to be reminded	Ellipse, parabola, stright line.
Examples/Illustrations	solved problems
Additional Inputs	Exercise problems.
Teaching Aids used	Text Book, Board
References cited	Numerical methods for scientific and Eng
Student Activity planned after teaching	practice the problems.
Activity planned outside the Class room, if any	practice the Exaple problems.
Any other activity	Seminar & quiz Conducted.
Topic Synopsis	* Least square curve fitting procedure * fitting a stright line * non linear curve fitting * curve fitting by a ~~sum~~ sum of Exponentials.

Signature of the Lecturer

Semester - IV
paper - Vector Calculus

Teaching Plan No.- 1

Name of the topic	Multiple integrals
Hours required	15
Learning Objectives	Double & Triple integrals
Previous Knowledge to be reminded	Integration
Eaxmples/Illustrations	Solved problems
Additional Inputs	Example problems
Teaching Aids used	Board, Text Book
References cited	Mathematics Vol-3
Student Activity planned after teaching	practice the problems
Activity planned outside the Class room, if any	Home work
Any other activity	Write & solve the Exercise prob
Topic Synopsis	* Introduction to Double integrals * Evaluation & properties of Double integrals. * Region of integration * Double integration in polar coordinates * change of order * Triple integrals * Region of integration * Evaluation of triple integrals.

Signature of the Lecturer

Teaching Plan No.- 2

Name of the topic	Vector Differentiation - I
Hours required	15
Learning Objectives	Vector Differentiation, partial Differentiation Gradient, Divergence.
Previous Knowledge to be reminded	Vectors, Dot product, Cross product -
Examples/Illustrations	Solved problems
Additional Inputs	Example problems
Teaching Aids used	Board, Text Book
References cited	Mathematics Vol-3
Student Activity planned after teaching	practice the problems
Activity planned outside the Class room, if any	Solve the Exercise problems
Any other activity	slip test Conducted.
Topic Synopsis	* Vector differentiation - Examples * ordinary derivatives of vectors * partial Differentiation - Examples * Gradient of a scalar point function * Differential derivatives. * Divergence, Curl, Directional Derivatives * Angle b/n two surfaces.

Signature of the Lecturer

Teaching Plan No.- 3

Name of the topic	Vector Differentiation - II
Hours required	15
Learning Objectives	Divergence, Curl
Previous Knowledge to be reminded	Dot & Cross products
Eaxmples/Illustrations	Solved problems
Additional Inputs	Example problems
Teaching Aids used	Text Book, Board
References cited	Mathematics Vol-3
Student Activity planned after teaching	Home-work
Activity planned outside the Class room, if any	Solve IE Exercise prob
Any other activity	Assignment.
Topic Synopsis	* Def. of Divergence - Examples * problems on Divergence * Def. of Curl - Examples * problems on Curl * Formulas involving these operations.

Signature of the Lecturer

Teaching Plan No.-4

Name of the topic	Vector integration
Hours required	15
Learning Objectives	
Previous Knowledge to be reminded	Vector integration - partial differentiation.
Examples/Illustrations	Integration & Differentiation
Additional Inputs	Solved problems
Teaching Aids used	Example problems.
References cited	Board, Text Book
Student Activity planned after teaching	Mathematics Vol - 3
Activity planned outside the Class room, if any	Solve the problems
Any other activity	Home work
Topic Synopsis	Seminar conducted

* Def. of Line integrals - Examples
* problems on Line integrals.
* Def. of surface integrals - Examples
* problems on surface integrals.
* Def. of volume integrals.
* problems on volume integrals.

Signature of the Lecturer

Teaching Plan No.- 5

Name of the topic	Application of vector integration
Hours required	15
Learning Objectives	Gauss Thm, Green's Thm & stoke's Thm and its applications.
Previous Knowledge to be reminded	Integration
Eaxmples/Illustrations	Solved problems
Additional Inputs	Example problems
Teaching Aids used	Board, Text Book
References cited	Mathematics Vol-3
Student Activity planned after teaching	practice the problems
Activity planned outside the Class room, if any	solve the Excersice problems
Any other activity	Seminar conducted
Topic Synopsis	* Gauss Thm - Applications * problems on Gauss Thm * Green's Thm - Applications * problems on Green's Thm * stoke's Thm - Applications * problems on stoke's Thm

Signature of the Lecturer

Semister - I

Paper : Solid Geometry.

Teaching Plan No.- 1

Name of the topic	The plane
Hours required	15
Learning Objectives	Eqn. of plane passing through points, coplanners, angle b/n planes, Bisectors of angle b/n planes, S.D. b/n planes
Previous Knowledge to be reminded	planes, Co-ordinate Geometry
Eaxmples/Illustrations	solved problems.
Additional Inputs	Example problems
Teaching Aids used	Board, Text Book.
References cited	Analitical Solid Geometry by S chand company
Student Activity planned after teaching	practice the problems
Activity planned outside the Class room, if any	Solve the Exercise problems
Any other activity	Home work.
Topic Synopsis	* Def. of plane and intercept form * Eqn. of plane passing through the points * co-planners & angle b/n two planes. * Length of the ⊥ from given point to plane * Bisectors of angle b/n planes. * Combined eqn. of planes * S.D b/n two planes and its eqn. * pair of planes

Signature of the Lecturer

Teaching Plan No.-2

Name of the topic	The Line - I
Hours required	15
Learning Objectives	Line in various forms. angle btn line and plane Image of a Line, S.D btn two lines
Previous Knowledge to be reminded	Co-ordinate Geometry
Eaxmples/Illustrations	Solved problems
Additional Inputs	Example problems
Teaching Aids used	Text Book, Board.
References cited	Analytical solid Geometry by s chand company
Student Activity planned after teaching	practice the Exercise prob.
Activity planned outside the Class room, if any	Home work
Any other activity	slip test conducted.
Topic Synopsis	* Eqn of Line in various forms. * Angle btn line and plane * The condition that the line lie on the same plane. * Two lines are Co-planners. * sets of a conditions which determine a line.

Signature of the Lecturer

Teaching Plan No.-3

Name of the topic	The Line - II
Hours required	15
Learning Objectives	The Lengths and eqn of the S.D lines, The distance from given point to line
Previous Knowledge to be reminded	The Line - I
Examples/Illustrations	Solved problems
Additional Inputs	Exercise problems
Teaching Aids used	Text Book, Board
References cited	solid Geometry Book by S.chand company
Student Activity planned after teaching	practice the Example problems
Activity planned outside the Class room, if any	Assignment given
Any other activity	seminar Conducting.
Topic Synopsis	* The S.D b/n two skew lines. * The Lengths and eqn. of line of S.D b/n two skew lines. * Lengths of the perpendicular from given point to given line.

Signature of the Lecturer

Teaching Plan No.- 1

Name of the topic	The Sphere - I
Hours required	15
Learning Objectives	Eqn. of sphere passing through the points intersection of two sphere. sphere passing Through circle.
Previous Knowledge to be reminded	Circles.
Eaxmples/Illustrations	Solved problems.
Additional Inputs	Excercise problems.
Teaching Aids used	Text Book, Board.
References cited	Solid Geometry text book by S. Chand
Student Activity planned after teaching	practice the problems.
Activity planned outside the Class room, if any	practice the Example problems.
Any other activity	Assignment given
Topic Synopsis	* Def. and eqn of sphere * Eqn. of sphere passing through the points * plane section of a sphere * Intersection of a sphere * Equation of a circle * sphere passing through the circle * Intersection of sphere and line.

Signature of the Lecturer

Teaching Plan No.- 5

Name of the topic	The sphere - II
Hours required	15
Learning Objectives	Tangent plane, polar plane, pole of a plane conjugate points and lines, angle of intersection of spheres, limiting points
Previous Knowledge to be reminded	Circles, sphere - I
Examples/Illustrations	Solved problems
Additional Inputs	Example problems.
Teaching Aids used	Text Book, Record.
References cited	Solid Geometry book by S. Chand Gupta.
Student Activity planned after teaching	practice the problems
Activity planned outside the Class room, if any	Solve the Exercise problems
Any other activity	Seminar Conducting.
Topic Synopsis	* Tangent plane - plane of contact. * polar plane - pole of a plane * conjugate points - conjugate planes * Angle of intersection of two spheres. * Two spheres are orthogonal with Examples. * Radical plane - coaxial system of spheres * Limiting points with problems.

Signature of the Lecturer

Semister - II

paper : Group Theory

Teaching Plan No.- 1

Name of the topic	Groups
Hours required	15
Learning Objectives	Binary operations, semi group, finite & infinite groups, Functions, order of a group.
Previous Knowledge to be reminded	Functions
Eaxmples/Illustrations	Solved problems
Additional Inputs	Excercise problems
Teaching Aids used	Text Book, Board
References cited	Mathematics Vol-2
Student Activity planned after teaching	practice the problems
Activity planned outside the Class room, if any	Home work
Any other activity	Solve the Example problems.
Topic Synopsis	* Binary operations - Algebric structure * Semi group - monoid * Defn group and elementry properties of finite & infinite groups * order of a group - Examples * composition tables with Examples

Signature of the Lecturer

Teaching Plan No.-2

Name of the topic	Sub - Groups
Hours required	15
Learning Objectives	Product of two subgroups, Union & intersection Cosets and Lagranges Thm
Previous Knowledge to be reminded	Groups
Examples/Illustrations	Solved problems
Additional Inputs	Example problems
Teaching Aids used	Text Book, Board
References cited	Mathematics Vol-2
Student Activity planned after teaching	practice the problems
Activity planned outside the Class room, if any	solve the Exercise problems
Any other activity	Slip test conducted.
Topic Synopsis	* Def. of complex with Examples * Def. of subgroups with Examples * Criterion for a Complex to be subgroup * Criterion for the product of two subgroups to be a subgroups. * Union & intersection of Subgroups * Def. of Co-sets - Examples - Index of subgrp * Lagranges Thm.

Signature of the Lecturer

Teaching Plan No.-3

Name of the topic	Normal Subgroups
Hours required	15
Learning Objectives	proper & improper normal subgroups intersection of two normal subgroups
Previous Knowledge to be reminded	Sub groups
Eaxmples/Illustrations	Solved problems
Additional Inputs	Example problems
Teaching Aids used	Text Book, Board
References cited	Mathematics Vol-2
Student Activity planned after teaching	Home work given
Activity planned outside the Class room, if any	Solve the exercise problems
Any other activity	Assignment given
Topic Synopsis	* Def. of normal subgroups - Examples * proper & improper normal subgroups * theorem group - criterion for a subgroup to be a normal subgroup * intersection of two normal subgroups * Subgroup of index 2 is a normal subgroups.

Signature of the Lecturer

Teaching Plan No.-4

Name of the topic	Homomorphism
Hours required	15
Learning Objectives	Image. elementry proprities of a Homomorphism, Isomorphism, Automorphism. Kernal of Homomorphism
Previous Knowledge to be reminded	Normal subgroups
Examples/Illustrations	solved problems
Additional Inputs	Example problems
Teaching Aids used	Board, Text book
References cited	Mathematics vol-2
Student Activity planned after teaching	solve the Exercise prob.
Activity planned outside the Class room, if any	Write Assignments
Any other activity	Seminar Conducted.
Topic Synopsis	* Def. of Homomorphism - Examples * Image of a Homomorphism - Elementry properties of Homomorphism * Isomorphism - Automorphism and its elementry properties * Kernal of a Homomorphism * Fundamental Thm of Homomorphism and its application.

Signature of the Lecturer

Teaching Plan No.- 5

Name of the topic	permutation and cyclic groups.
Hours required	15
Learning Objectives	Addition and multiplication of permutations. Even & odd permutations - Cayli's Theorem
Previous Knowledge to be reminded	functions
Eaxmples/Illustrations	Solved problems
Additional Inputs	Example problems
Teaching Aids used	Text Book, Board.
References cited	Mathematics Vol-2
Student Activity planned after teaching	Solve the Excercise prob.
Activity planned outside the Class room, if any	Write assignments
Any other activity	Seminar Conducting.
Topic Synopsis	* Def. of permutation - Exaples * permutations multiplications. * Inverse of a permutation - cyclic part * Even and odd permutations * Cayli's Theorm * Def. of cyclic group * Elementry properties of cyclic grps. * Cancelation of cyclic grps.

Signature of the Lecturer

Semester - IV

paper - Real Analysis.

Teaching Plan No.-1

Name of the topic	Real numbers & Sequences.
Hours required	15
Learning Objectives	Boundaries, Convergent, divergent & Sequences, monotonic Sequences, Bolzano-Weierstrass thm - Cauchy Sequ-
Previous Knowledge to be reminded	Real numbers
Eaxmples/Illustrations	solved problems
Additional Inputs	Example problems
Teaching Aids used	Board, Text Book.
References cited	Mathematics vol-II By Sachdeva
Student Activity planned after teaching	practice the problems
Activity planned outside the Class room, if any	Solve the Exercise problems.
Any other activity	Home work
Topic Synopsis	* Def. of Sequence and their limits * Range and boundaries & Sequences * Limit of a sequence and convergent and divergent of sequences. * monotonic sequences. * Necessary & sufficient condition for convergence of a monotonic sequences. * Limit point of a sequence - Bolzano-Weierstrass thm * Cauchy's general principle to convergence thm.

Signature of the Lecturer

Teaching Plan No.- 2

Name of the topic	Infinite Series
Hours required	15
Learning Objectives	Convergnt & divergnt of series, p-test - Cauchy's nth root test, D-Alembert's test, Leibnitz test
Previous Knowledge to be reminded	Sequnes.
Eaxmples/Illustrations	Solved problems
Additional Inputs	Example problems
Teaching Aids used	Text Book, Board
References cited	Mathematics vol-2, By S. Chand
Student Activity planned after teaching	practice the problems
Activity planned outside the Class room, if any	Solve the Exercise problems
Any other activity	Slip test Conducted.
Topic Synopsis	* Introduction to series with Examples * Test for Convergnt & divergnt of series * p-Test with Examples * Cauchy's nth root test - with Examples * D-Alemberts Test - with Examples * Leibnitz Test - with examples.

Signature of the Lecturer

Teaching Plan No.-3

Name of the topic	Continuity
Hours required	15
Learning Objectives	Continous fnction, Continuous fnction on Interval, Uniform Continuity
Previous Knowledge to be reminded	Real numbers, series
Eaxmples/Illustrations	Solved problems.
Additional Inputs	Example problems
Teaching Aids used	Board, Text Book
References cited	Mathematics Vol-2 By S. chand
Student Activity planned after teaching	practice the problems.
Activity planned outside the Class room, if any	solve the Excersice prob
Any other activity	Assignment given.
Topic Synopsis	* Def. of Continous fnction with Examples * Combinations of continous fnctions. * problems on convergent fnctions. * problems on Divergent fnctions. * Continous fnctions on intervals. * Uniformly Continuy. * Theorems & problems on uniformly continuous.

Signature of the Lecturer

Teaching Plan No.- 4

Name of the topic	Differentiation and Mean value Theorems
Hours required	1½
Learning Objectives	Derivability of Continuity of a function, Mean value theorems, Rolle's, Lagrange's of Cauchy mean value theorems
Previous Knowledge to be reminded	Differentiation.
Eaxmples/Illustrations	Solved problems
Additional Inputs	Example problems
Teaching Aids used	Board, Text Book
References cited	Mathematics Vol-2 By S. Chand.
Student Activity planned after teaching	Work the Assignments
Activity planned outside the Class room, if any	Solve the Exercise problems.
Any other activity	Slip test conducted.
Topic Synopsis	* The derivability of a function on interval at a point * Derivability and continuous on a function * mean value theorems * Rolels theorem with Examples * Lagranges theorem with Examples * Cauchys mean value theorem with Examples.

Signature of the Lecturer

Teaching Plan No.-5

Name of the topic	Riemann Integration
Hours required	1:5
Learning Objectives	Riemann integral function, Necessary & sufficient condition for R integrability and its properties, Fundamental theorem of Integral calculus
Previous Knowledge to be reminded	Integration
Eaxmples/Illustrations	Solved problems.
Additional Inputs	Example problems
Teaching Aids used	Text Book, Board
References cited	Mathematics Vol-2 By S. Chand.
Student Activity planned after teaching	practice the problems.
Activity planned outside the Class room, if any	Solve the Exercise problems.
Any other activity	Seminar conducted.
Topic Synopsis	* Def. of Riemann integral with Examples. * Darboux theorem * Necessary and sufficient condition for R * properties of integrable functions. * problems on Riemann integrals * fundamental theorem of integral calculus. * integral as the Limit of a sum * Mean value Theorems.

Signature of the Lecturer