



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. Marlen Vals

Subject : Mathematics

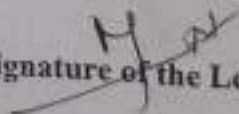
Sl. No.	Paper	Semester	Page No.
1	Group Theory	III	1-5
2	Numerical methods	III	6-10
3	Vector calculus	V	11-15
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III - Semester

Paper - Group Theory

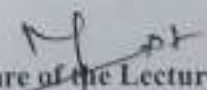
Teaching Plan No.- 1

Name of the topic	Groups
Hours required	15
Learning Objectives	Binary operations, Semi group, finite, infinite groups, Functions, Groups
Previous Knowledge to be reminded	Functions
Examples/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	<ul style="list-style-type: none">* Binary operation - Algebraic structure* Semi group - monoid.* Def. of group and elementary properties of finite & infinite groups* Example problems* order of a group* Composition tables with Examples.


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Teaching Plan No.- 2

Name of the topic	Sub Groups
Hours required	15
Learning Objectives	product of two subgroups, Union & intersection Cosets - Lagrange's theorem
Previous Knowledge to be reminded	Groups.
Examples/Illustrations	solved problems
Additional Inputs	Excercise problems
Teaching Aids used	Board, chalk-piece, 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	<ul style="list-style-type: none"> * Def. of cosets, multiplication of cosets inverse of a coset. * Def. of subgroups - Examples * Criterion for a coset to be subgroup * Criterion for the product of two subgroups to be a subgroup. * Union & intersection of a subgroups * Def. of cosets - properties * Index of a subgroup a finite group * Lagrange's theorem.


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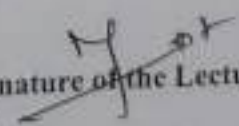
Teaching Plan No.- 3

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	
Examples/Illustrations	Sub groups
Additional Inputs	Exercise problems
Teaching Aids used	Solved problems
References cited	Board, Chackra, text Book, Mathematics Vol-2
Student Activity planned after teaching	
Activity planned outside the Class room, if any	Home work
Any other activity	Practice the problems Write Assignments
Topic Synopsis	<ul style="list-style-type: none"> * Defn of normal subgroups - Examples. * proper and improper normal subgroups * Himmilton group - Criterion for a subgroup to be a normal subgroup * Intersection of two normal subgroups * subgroup of index 2 is a normal subgroup


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Teaching Plan No.- 4

Name of the topic	Homomorphism
Hours required	15
Learning Objectives	Image of a Homomorphism, elementary properties
Previous Knowledge to be reminded	Isomorphism, Automorphism, Kernel of Homomorphism
Examples/Illustrations	Normal subgroups
Additional Inputs	Solved problems
Teaching Aids used	Exercise problems.
References cited	Text Book, Board, chalk piece
Student Activity planned after teaching	Mathematics vol-2
Activity planned outside the Class room, if any	write Example problems.
Any other activity	Home work
Topic Synopsis	Seminar conducted.
	<ul style="list-style-type: none"> * Def. of Homomorphism - Example. * Image of Homomorphism, elementary properties of Homomorphism * Isomorphism - Automorphism and its elementary properties * Kernel of a Homomorphism * Fundamental Theorem of Homomorphism and applications.


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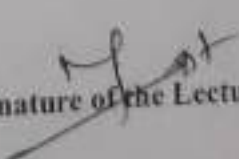
Teaching Plan No.- 5

Name of the topic	permutation P and cyclic groups.
Hours required	15
Learning Objectives	Addition & multiplication of permutations. even & odd permutation - Cayley's theorem
Previous Knowledge to be reminded	functions.
Examples/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	Seminar & Assignments conducted
Topic Synopsis	<ul style="list-style-type: none">* Defn of permutation - Examples* permutation multiplication* Inverse of a permutation - cyclic permutation* Even and odd permutation* Cayley's theorem* Defn of cyclic group* Elementary properties* Classification of cyclic groups.


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Teaching Plan No.-1

Name of the topic	The calculation of finite differences
Hours required	15
Learning Objectives	Fundamental items of difference calculus.
Previous Knowledge to be reminded	properties & problems on Δ, ∇, E , mixing terms
Examples/Illustrations	Solved problems
Additional Inputs	Exercise 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	<ul style="list-style-type: none"> * The operators Δ, ∇, E * Fundamental items of difference calculus * properties & problems on ∇, Δ, E * Relation s/n E & D * Relation s/n D and Δ * problems on mixing terms.


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Teaching Plan No.-2

Name of the topic	Interpolation with equal and unequal intervals
Hours required	1 $\frac{1}{2}$
Learning Objectives	Newton Forward & Backward Interpolation Newton divided difference - Lagrange interpolation
Previous Knowledge to be reminded	Numerical methods
Examples/Illustrations	Solved problems
Additional Inputs	Exercise problems
Teaching Aids used	Board, Text Book
References cited	Numerical methods for scientific and Engineering
Student Activity planned after teaching	practice like problems
Activity planned outside the Class room, if any	Home work
Any other activity	Assignment given
Topic Synopsis	<ul style="list-style-type: none"> * Derivations of Newton Forward interpolation and problems * Derivations of Newton Backward interpolation and problems * Newton Divided Difference formula - problems * Lagrange interpolation formula with problems


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Teaching Plan No.-3

Name of the topic	Central difference interpolation formulae
Hours required	15
Learning Objectives	Relation b/w δ, μ, σ . Gauss forward & backward formula, Stirling's formula.
Previous Knowledge to be reminded	Newton's 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	<ul style="list-style-type: none"> * Central Difference operations δ, μ, σ. * Relation b/w δ, μ, σ. * Gauss forward formula & problems. * Gauss backward formula & problems * Stirling's formula & problems. * Bessel's formula & problems.


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Teaching Plan No.- 4

Name of the topic	Solutions of Algebraic and Transcendental Equations
Hours required	16
Learning Objectives	Bisection method, Regular-faloi method, iteration method, Newton-Raphson's method
Previous Knowledge to be reminded	Gauss & Newton formulas
Examples/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	<ul style="list-style-type: none">* Bisection method of problems* Regular faloi method of problem* Iteration method of problems* Newton Raphson's method of problems.


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Teaching Plan No.- 5

Name of the topic	Curve fitting.
Hours required	15
Learning Objectives	Least square curve fitting, fitting a straight line.
Previous Knowledge to be reminded	
Examples/Illustrations	Ellips, parabola, straight line. solved problems
Additional Inputs	Excercise 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 example problems.
Any other activity	Seminar & quiz Conducted.
Topic Synopsis	<ul style="list-style-type: none"> * Least square curve fitting procedure * fitting a straight line * non linear curve fitting * Curve fitting by a sum sum of Exponentials.


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Semester - II
 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
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	Home work
Any other activity	Write & solve the Exercise prob
Topic Synopsis	<ul style="list-style-type: none"> * 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.


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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	
Examples/Illustrations	Vectors, dot product, Cross product - solved problems
Additional Inputs	Example problems
Teaching Aids used	Record, 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	<ul style="list-style-type: none"> * Vector differentiation - Examples * ordinary derivatives of vectors * partial Differentiation - Examples * Gradient of a scalar point function * Differential derivatives. * Divergence, Curl, Directional Derivatives * Angle b/w two surfaces.


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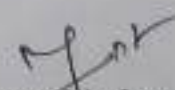
Teaching Plan No.- 3

Name of the topic	Vector Differentiation - II
Hours required	15
Learning Objectives	
Previous Knowledge to be reminded	Divergence, curl
Examples/Illustrations	Dot & Cross products 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 the Exercise prob
Any other activity	Assignment.
Topic Synopsis	<ul style="list-style-type: none">* Def. of Divergence - Examples* problems on Divergence* Def. of curl - Examples* problems on curl* formulas involving these operations.


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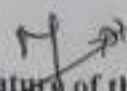
Teaching Plan No.-4

Name of the topic	Vector integrations
Hours required	15
Learning Objectives	
Previous Knowledge to be reminded	Vector integrations - partial differentiations.
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
	<ul style="list-style-type: none"> * 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.


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Teaching Plan No.-5

Name of the topic	Application of vector integration
Hours required	15
Learning Objectives	Gauss Theorem, Green's Theorem & Stokes's Theorem and its applications.
Previous Knowledge to be reminded	
Examples/Illustrations	Integration 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	Seminar conducted
Topic Synopsis	<ul style="list-style-type: none">* Gauss Theorem - Applications* problems on Gauss Theorem* Green's Theorem - Applications* problems on Green's Theorem* Stokes's Theorem - Applications* problems on Stokes's Theorem


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Semester - I

Paper : Solid Geometry.

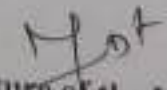
Teaching Plan No.-1

Name of the topic	The plane
Hours required	15
Learning Objectives	Eqn. of plane passing through points, co-planeness, angle in planes, Bisectors of angle in planes, S.D. in planes
Previous Knowledge to be reminded	planes, co-ordinate Geometry
Examples/Illustrations	solved problems.
Additional Inputs	Example problems
Teaching Aids used	Board, Text Book.
References cited	Analytical Solid Geometry by S Chand company
Student Activity planned after teaching	practice the problems
Activity planned outside the Class room, if any	olve the Exercise problems
Any other activity	home work.
Topic Synopsis	<ul style="list-style-type: none"> * Def. of plane and intercept form * Eqn. of plane passing through the points * co-planeness of angle in two planes. * Length of the \perp from given point to plane * Bisectors of angle in planes. * Combined eqn. of planes. * S.D. in two planes and its eqn. * pair of planes

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Teaching Plan No.-2

Name of the topic	The Line - I
Hours required	15
Learning Objectives	Line in various forms, angle b/w line and plane Image of a Line, S.O b/w two lines
Previous Knowledge to be reminded	
Examples/Illustrations	Co-ordinate Geometry 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 probs.
Activity planned outside the Class room, if any	
Any other activity	Home work
Topic Synopsis	clip test conducted. * Eqn of Line in various forms. * Angle b/w line and plane * The condition that the line lie on the same plane. * Two lines are co-planar. * sets of a conditions which determine a line.


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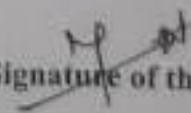
Teaching Plan No.-3

Name of the topic	The Line - II
Hours required	15
Learning Objectives	The Length and eqn of the S.D lines, The \perp distance from given point to line
Previous Knowledge to be reminded	
Examples/Illustrations	The Line - I Solved problems
Additional Inputs	Exercise problems
Teaching Aids used	Trat Book, Board
References cited	Solid Geometry Book by S. Chand Company
Student Activity planned after teaching	practice like Example problems
Activity planned outside the Class room, if any	
Any other activity	Assignment given Seminar Conducting.
Topic Synopsis	<ul style="list-style-type: none"> * The S.D b/w two skew lines. * The Length and eqn. of line of S.D b/w two skew lines. * Length of the perpendicular from given point to given line.


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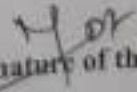
Teaching Plan No.- 4

Name of the topic	The sphere - I
Hours required	15
Learning Objectives	Eqn. of sphere passing through the points intersection of two spheres, sphere passing through circle.
Previous Knowledge to be reminded	Circles.
Examples/Illustrations	Solved problems.
Additional Inputs	Exercise problems.
Teaching Aids used	Text Book, Board.
References cited	College 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	<ul style="list-style-type: none"> * 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.


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Teaching Plan No.- 5

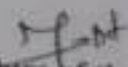
Name of the topic	The sphere - II
Hours required	15
Learning Objectives	Tangent plane, polar plane, pole of a plane conjugate points and lines, angle of intersection of spheres, limiting points
Previous Knowledge to be reminded	
Examples/Illustrations	Circles, sphere - I
Additional Inputs	worked problems
Teaching Aids used	Example problems
References cited	Text Book, Record.
Student Activity planned after teaching	Collected Geometry book by S. Chand copy.
Activity planned outside the Class room, if any	practice the problems
Any other activity	take the Exercise problems
Topic Synopsis	Seminar conducting. <ul style="list-style-type: none"> * 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 ex. pl. * Radical plane - coaxial system of spheres * Limiting points with problems.


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Semester - II
 Paper : Group Theory


Teaching Plan No.- 1

Name of the topic	Groups
Hours required	15
Learning Objectives	Binary operations, semi grp, finite infinite groups, functions, order of a group.
Previous Knowledge to be reminded	Functions
Examples/Illustrations	Solved problems
Additional Inputs	Exercise 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	<ul style="list-style-type: none"> * Binary operations - Algebraic structure * Semi group - monoid * Defn group and elementary properties of finite & infinite groups * order of a group - Examples * composition tables with examples.


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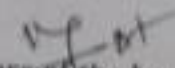
Teaching Plan No.-2

Name of the topic	Sub-Groups
Hours required	15
Learning Objectives	Product of two subgroups, union & intersection cosets and Lagrange's 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	<ul style="list-style-type: none"> * 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 cosets - Examples - Index of subgroups * Lagrange's thm.


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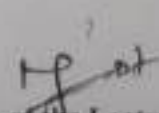
Teaching Plan No. 3

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	
Examples/Illustrations	Sub groups 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	
Any other activity	Solve the Exercise problems Assignment given
Topic Synopsis	<ul style="list-style-type: none">* Def. of normal subgroups - Examples* proper & improper normal subgroups* Homom group - Criteria for a subgroup to be a normal subgroup* intersection of two normal subgroups* Subgroup of index 2 is a normal subgroup.


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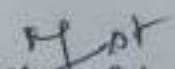
Teaching Plan No.-4

Name of the topic	Homomorphism
Hours required	15
Learning Objectives	Image, elementary properties of a Homomorphism, Isomorphism, Automorphism, Kernel 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	<ul style="list-style-type: none"> * Def. of Homomorphism - Examples * Image of a Homomorphism - Elementary properties of Homomorphism * Isomorphism - Automorphism and its elementary properties. * Kernel of a Homomorphism * Fundamental theorem of Homomorphism and its application.


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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 - Cayley's theorem.
Previous Knowledge to be reminded	functions
Examples/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 Exercise prob.
Activity planned outside the Class room, if any	Write assignments
Any other activity	Seminar Conducting.
Topic Synopsis	<ul style="list-style-type: none"> * Def. of permutation - Examples * permutations multiplication. * Inverse of a permutation - cyclic part * even and odd permutations * Cayley's theorem * Def. of cyclic group * Elementary Properties of cyclic groups. * cancellation of cyclic groups.


 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	Foundation, convergent, divergent \mathbb{R} spaces, monotonic sequences, Bolzano-Weierstrass thm - Cauchy's principle
Previous Knowledge to be reminded	Real numbers
Examples/Illustrations	solved problems
Additional Inputs	Example problems
Teaching Aids used	Board, Text Book.
References cited	Mathematics vol-II by Sachind
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	<ul style="list-style-type: none">* Def. of sequence and their limits* Range and boundaries of \mathbb{R} spaces* Limit of a sequence and convergent and divergent of sequences.* Monotonic sequences.* Necessary & sufficient condition for convergence of a monotonic sequence.* Limit point of a sequence - Bolzano-Weierstrass thm* Cauchy's general principle to converge thm.

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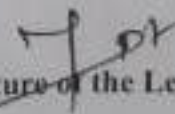
Teaching Plan No.-2

Name of the topic	Infinite Series
Hours required	15
Learning Objectives	Convergent & divergent of series, p-test - Cauchy's n^{th} root test, D-Alembert's test, Leibnitz test
Previous Knowledge to be reminded	Sequences.
Examples/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	skit/ent conducted.
Topic Synopsis	<ul style="list-style-type: none">* Introduction to series with Examples* Test for Convergent & divergent of series* p-Test with Examples* Cauchy's n^{th} root test - with Examples* D-Alembert's Test - with Examples* Leibnitz Test - with examples.

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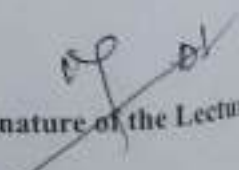
Teaching Plan No.-3

Name of the topic	Continuity
Hours required	15
Learning Objectives	Continuous function, continuous function on intervals, uniform continuity
Previous Knowledge to be reminded	Real numbers, series
Examples/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	olve the Exercise prob
Any other activity	Assignment given.
Topic Synopsis	<ul style="list-style-type: none">* Def. of Continuous function with exapls* Combinations of continous functions.* problems on convergent functions.* problem on Divergent functions.* Continuous functions on intervals.* Uniformly Continous.* Theorem & problems on uniformly continous.


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Teaching Plan No.- 4

Name of the topic	Differentiation and Mean value Theorem
Hours required	15
Learning Objectives	Derivability and Continuity of a function mean value theorem, Rolle's, Lagrange and Cauchy Mean value
Previous Knowledge to be reminded	Differentiation
Examples/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	<ul style="list-style-type: none"> * The derivability of a function on interval at a point * Derivability and continuous on a function. * Mean value theorem * Rolle's theorem with examples * Lagrange's theorem with examples * Cauchy's mean value theorem with examples.


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Teaching Plan No.-5

Name of the topic	Riemann Integration
Hours required	115
Learning Objectives	Riemann integral function, necessary & sufficient condition for R integrability and its properties, fundamental theorem of Integral calculus
Previous Knowledge to be reminded	
Examples/Illustrations	Integration 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	<ul style="list-style-type: none"> * Def. of Riemann integral with examples. * Darboux sums * Necessary and sufficient condition for R * properties of integrable functions. * problems on Riemann integral * fundamental theorem of integral calculus. * integral as the Limit of a sum * Mean value theorem.


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