Maharaja Ranjit Singh College of Professional Sciences, Indore

Department of Mathematics

Lesson Plan - B. Sc. IYear(CS/HONS/PCM/IT/ELEX) (July 2019 -20)

Subject-Mathematics   Paper I- Algebra and Trigonometry

Teacher - Manoj Joshi

Day/Lecture	Unit	Topic
1	1	Basics of matrices
2	1	Types of matrices,determinant and its properties
3	1	Rank of matrices
4	1	Question on rank of matrices
5	1	Question on rank of matrices
6	1	Echelon form of matrices and numericals
7	1	Echelon form of matrices and numericals
8	1	Normal form of matrices
9	1	Question on normal form of matrices
10	1	Characteristic equation of matrix
11	1	Eigen values and eigen vector of matrix
12	1	Questions based on eigen values and eigen vectors
13	1	Linearly dependent and independent vectors
14	1	Row rank and column rank
15	1	Practise questions and doubts
16	1	Proof of theorems based on eigen values and eigen vector
17	2	Cayley- Hamilton theorem statement and verification
18	2	Proof of Cayley-Hamilton theorem and numerical problems
19	2	Solution of linear equation by matrix method
20	2	Consistency and inconsistency of linear equation
21	2	Numerical Problems
22	2	Numerical Problems
23	2	Homogoneous linear equations
24	2	Non homogeneous equations
25	2	Theorems on consistency and inconsistency
26	2	Theorems on consistency and inconsistency
27	2	Cremer's method of solving linear equation
28	2	Practise questions and doubts
29	2	Practise questions and doubts
30	2	Revision
31	3	Introduction to theory of equation

32	3	Symmetric function of the roots
33	3	Synthetic division,roots of multiplicity
34	3	GCD of polynomials
35	3	Relation between roots
36	3	Numericals on relation between the roots
37	3	Numericals on relation between the roots
38	3	Transformation of equations,roots with sign change
39	3	Reciprocal equation,roots diminished by h
40	3	Descartes rule ,removal of the terms
41	3	Practise questions and doubts
42	3	Practise questions and doubts
43	4	Logic-logical connectives
44	4	Truth tables,problem on logical connectivity
45	4	Tautology,contradiction,logical equivalence
46	4	Algebra proposition
47	4	Boolean algebra definition
48	4	Examples on Boolean algebra
49	4	Properties of Boolean algebra
50	4	Properties of Boolean algebra
51	4	Properties of Boolean algebra,Boolean functions
52	4	Minimal Boolean function
53	4	Disjunctive normal form
54	4	Conjuctive normal form
55	4	Problems on normal forms
56	5	Algebra of electric circuit
57	5	Parallel and series connection and their problems
58	5	Logic gates and their problems
59	5	Logic gates and their problems
60	5	Practise questions and doubts
61	5	De-Moivre's theorem and it's proof
62	5	Problems on De-Moivre's theorem
63	5	Problems on De-Moivre's theorem
64	5	Expansion of Sine,Cosine and Tan Series

65	5	Direct and Inverse circular functions
66	5	Hyperbolic functions
67	5	Problems on above funtions
68	5	Problems on above funtions
69	5	Expansion of trigonometric functions
70	5	Expansion of trigonometric functions
71	5	Logerithm of complex quantities
72	5	Gregory Series
73	5	Gregory Series

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Department of Mathematics

Lesson Plan - B. Sc. I Year(CS/HONS/PCM/IT/ELEX)(July 2019-20)

Subject -Mathematics   Paper-II Calculus and Differential Equation

Teacher - Shifa Goyal

Day/Lecture	Unit	Topic
1	1	Basics of Differentiation
2	1	Successive Differentiation
3	1	nth derivative of standard functions
4	1	nth derivative of standard functions
5	1	Questions based on trignometric transformation
6	1	Questions based on partial fraction
7	1	Application of De-Moivre's theorem
8	1	Proof of Leibnitz theorem and questions
9	1	Numericals on Leibnitz theorem
10	1	Proof of Maclaurin's theorem and questions
11	1	Numericals on Maclaurin and Taylor's theorem
12	1	Asymptote introduction and general method to find asymptote
13	1	Shorter methods to find asymptote
14	1	Asymptote parallel to axes and curvilinear asymptotes
15	1	Asymptotes of polar curves and its intersection with curve
16	2	Curvature,intrnsic formula for radius of curnature
17	2	Cartesian, parametric and pedal formula to find radius of curvature
18	2	Tangents at origin,centre of curvature,chord of curvature
19	2	Concavity,convexity and point of inflexion,singular points
20	2	Multiple points,tangents at origin,cusp and node
21	2	Tracing of curves an introduction
22	2	Tracing of cartesian curves
23	2	Tracing of cartesian curves
24	2	Tracing of cartesian curves
25	2	Tracing of polar curves
26	2	Tracing of polar curves
27	2	Tracing of parametric curves
28	2	Tracing of parametric curves
29	3	Integration of transcendental functions
30	3	Integration of transcendental functions and Hyperbolic functions
31	3	Definite integrals and general properties
32	3	Reduction formulae
33	3	Reduction formulae
34	3	Quadrature and determination of plane curves
35	3	Quadrature of polar curves,area between two curves
36	3	Rectification for cartesian equations
37	3	Rectification for cartesian equations
38	3	Rectification for parametric and polar equations
39	3	Numericals on parametric and polar equations

40	3	Intrinsic equation from cartesian and polar equations
41	4	Introduction of Linear differential equations and their solution
42	4	Linear differential equations and equation reducible to linear
43	4	Change of variables,exact differential equations and their solutions
44	4	Integrating factor,rules for finding integrating factors
45	4	Rules for finding integrating factors
46	4	Equations solvable for p
47	4	Equations solvable for x and y
48	4	Clairaut's form,Singular solutions
49	4	Geomerical meaning of differential equation,orthogonal trajectries
50	4	Differential equation of orthogonal trajectories,self orthogonal family
51	5	Linear differential equations with constant coefficients
52	5	Auxiliary equation with equal and different roots
53	5	Auxiliary equations with imaginery roots
54	5	General method to find particular integral
55	5	Short methods to find particular integral
56	5	Short methods to find particular integral
57	5	Differential equations reducible to linear equations
58	5	Linear differential equations of second order
59	5	Method of Variation of parameters
60	5	Method of Variation of parameters

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Department of Mathematics
Lesson Plan - B. Sc. IYear(CS/HONS/PCM/IT/ELEX) (July 2019 -20)
Subject -Mathematics   Paper III- Vector Analysis and Geometry
Teacher - Divya Agrawal,Manoj Joshi

Day/Lecture	Unit	Topic
1	1	Introduction of vector triple product,geometrical significance
2	1	Condition of coplanar and non-coplanar vectors
3	1	Vector product of four vectors
4	1	Reciprocal system of vectors and its properties
5	1	Limit,continuity and differentiability of vector functions
6	1	Derivative of scalar product of vectors
7	1	Derivative of cross product and triple product of vectors
8	1	Scalar and vector point function,directional derivatives
9	1	Gradient of scalar point functions
10	1	Theorems,gradient of constant,sum and difference of two functions
11	1	Gradient of product and quotient of two functions
12	1	Unit tangent vector,tangent line and divergence of a vector
13	1	Curl of vector,constant vector and sum of two functions
14	2	Vector integration,definite integral
15	2	Line integral,circulation
16	2	Irrotational vector
17	2	Surface integral
18	2	Volume integral
19	2	Gauss's divergent theorem
20	2	Deductions and applications of Gauss divergence theorem
21	2	Green's theorem
22	2	Stoke's theorem and it's cartesian equivalent
23	2	Application of Stoke's theorem
24	2	Applications of Gauss and Stoke's theorem
25	3	General equation of second degree,conic section and it's nature
26	3	Centre ,axes,eccentricity and foci of conic
27	3	Tracing of parabola and hyperbola
28	3	Tracing of ellipse
29	3	System of conics
30	3	System of conics
31	3	Angle between two curves,orthogonal circles
32	3	Conics passing through 4&5 points
33	3	Radical axis and properties of redical axis
34	3	Confocal conics
35	3	Polar equation of conics
36	3	Polar equation of conics
37	4	Cone and it's equation
38	4	Condition of general equation of 2nd degree to represent cone
39	4	Equation of cone with vertex at origin

40	4	Generators of the cone
41	4	Reciprocal cone and enveloping cone
42	4	Right circular cone
43	4	Equation with cylinder
44	4	Different numerical examples of cylinder
45	4	Right circular cylinder
46	4	Tangent plane to the cylinder
47	4	Enveloping cone of cylinder
48	5	Central conicoid
49	5	General and standard equation of central conicoid
50	5	Types of conicoids
51	5	Tangent line,tangent plane
52	5	Director sphere,normal lines
53	5	Polar planes,polar lines
54	5	Enveloping cone,enveloping cylinder,locus of chords
55	5	Paraboloid
56	5	Paraboloid
57	5	Plane section of conicoid
58	5	Plane section of conicoid
59	5	Generating lines
60	5	Generating lines

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Lesson Plan - B. Sc. IIYear(CS/HONS/PCM/IT/ELEX) (July 2019 -20)

Subject -Mathematics   Paper-I Abstract Algebra

Teacher - Manoj Joshi

Day/Lecture	Unit	Topic
1	1	Basics of set
2	1	Binary operations,definition of group
3	1	Examples of group
4	1	Examples of group,groupoid,semigroup and monoid
5	1	Properties of group
6	1	Modulo groups,residue class
7	1	Subgroup,criterion for subgroup
8	1	Algebra of subgroups
9	1	Subgroup generated by subsets
10	1	Order of element and it's theorem
11	1	Theorems related with order of group
12	1	Cyclic group and it's examples
13	1	Properties of cyclic group
14	2	Coset and it's definition and examples
15	2	Theorems on cosets
16	2	Theorems on cosets
17	2	Coset decomposition and Lagrange's theorem
18	2	Normal subgroups,definition and examples
19	2	Theorems on normal subgroups
20	2	Theorems on normal subgroups
21	2	Algebra of normal subgroups
22	2	Self conjugate elements and centre of group
23	2	Quotient group
24	2	Theorems on quotient groups
25	3	Homomorphism and Isomorphism
26	3	Properties of Hpmomorphism
27	3	Theorems of Homomorphism and Isomorphism
28	3	Kernal of Homomorphism
29	3	Theorems on kernal of Homomorphism
30	3	Fundamental theorem
31	3	Permutation group
32	3	Types and properties of permutation
33	3	Theorems on permutation
34	3	Cyclic permutation,transposition,even-odd permutation
35	3	Theorems on even permutation

36	3	Cayley's theorem
37	4	Group Automorphism
38	4	Inner Automorphism and it's theorem
39	4	Therems on Automorphism
40	4	Conjugate element and conjugacy relation
41	4	Conjugate class and self conjugate relations
42	4	Self conjugate elements and centre of group
43	4	Normalizer of an element and theorems
44	4	Class equation of finite group
45	4	Centre for group of prime - power order
46	4	Cauchy's theorem for finite abelian group
47	4	Cauchy's theorem for finite non-abelian group
48	5	Ring it's definition
49	5	Examples of rings
50	5	Types of rings
51	5	Properties of rings
52	5	Ring Homomorphism and Isomorphism
53	5	Theorems on ring homomorphism and isomorphism
54	5	Ideals and principle Ideals
55	5	Kernal of ring Homomorphism,Euclidean ring
56	5	Subring and characteristics of rings
57	5	Polynomial ring and it's properties
58	5	Integral domain and field
59	5	Theorems on integral domain and field
60	5	Theorems on integral domain and field

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Lesson Plan - B. Sc. II Year(CS/HONS/PCM/IT/ELEX)(July 2019-20)

Subject - Mathematics   Paper -II   Advanced Calculus

Teacher - Divya Agrawal, Shifa Goyal

Day/Lecture	Unit	Topic
1	1	Definition and limit of sequence
2	1	Examples of convergent sequence
3	1	Types of sequence and it's examples
4	1	Theorems on convergent sequence
5	1	Cauchy's sequence and it's theorems
6	1	Convergence of series
7	1	Test of convergence of series
8	1	Test of convergence of series
9	1	Test of convergence of series
10	1	Alternate series and it's convergence
11	1	Absolute and conditional convergence
12	1	Theorems and related questions
13	2	Continuity of function of one variable and examples
14	2	Continuity in intervals
15	2	Kinds of discontinuity with examples
16	2	Uniform continuity it's theorem and examples
17	2	Differentiability and examples
18	2	Differentiability on an interval and examples
19	2	Chain rule,derivative of inverse function
20	2	Darboux theorem,Roll's theorem
21	2	Problems on Darboux and Roll's theorem
22	2	Langrange's Mean value & Cauchy's mean value theorem
23	2	Taylor theorem and its various forms
24	2	Problems on Taylor's theorem
25	3	Function of two variables with examples
26	3	Limit of function of two variables
27	3	Continuity of function of two variables
28	3	Examples and questions
29	3	Partial differentiation
30	3	Euler's theorem
31	3	Problems based on Euler's theorem
32	3	Change of variable
33	3	Change of variable
34	3	Taylor's theorem of two variables
35	3	Jacobian

36	3	Jacobian
37	4	Family of curves, Envelopes
38	4	Problems to find envelope
39	4	Evolute and problems based on it
40	4	Maxima and Minima
41	4	Problems to find Maxima and Minima
42	4	Lagrange's undetermined multiplier method
43	4	Beta function and its properties
44	4	Gammma function and its properties
45	4	Problems based on Beta and Gamma function
46	4	Legendre's duplication formula
47	5	Multiple Integral and examples
48	5	Examples of multiple integral of polar coordinates
49	5	Dirichlet's integral and its problems
50	5	Volume of solid of revolution and examples
51	5	Surface revolution and examples
52	5	Change of order of integration
53	5	Change of order of integration

Maharaja Ranjit Singh College of Professional Sciences, Indore

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Lesson Plan - B. Sc. IIYear(CS/HONS/PCM/IT/ELEX) (July 2019-20)

Subject - Mathematics   Paper - III   Differential Equation

Teacher - Shifa Goyal

Day/Lecture	Unit	Topic
1	1	Power Series solution with numericals
2	1	Series solution by Forbenious method,Numericals
3	1	Series solution by Forbenious method,Numericals
4	1	Bessel function and its properties
5	1	Reccurence relations
6	1	Orthogonality of Bessel's function
7	1	Legendre function
8	1	Generating function of Legendre function
9	1	Roderige's formula,Christofel summmation formula
10	1	Reccurence relations
11	2	Definition of Laplace transformation and some standard functions
12	2	Properties and theorems of Laplace transformation
13	2	Laplace transformation of product of 't' and its powers
14	2	Initial and final value theorem and problems
15	2	Laplace transformation of derivatives
16	2	Laplace transformation of derivatives and realted problems
17	2	Laplace transformation of Integrals
18	2	Laplace trnsformation of periodic functions
19	3	Inverse Laplace transformation
20	3	Inverse Laplace transformation of standard functions
21	3	Properties of Inverse Laplace transformation
22	3	Problems based on inverse Laplace transformation
23	3	Inverse Laplace of Multiplication and division of 'p'
24	3	Convolution theorem and its problems
25	3	Heavside expansion formula and problems
26	3	Application of Laplace transformation
27	3	Application of Laplace transformation
28	4	Partial differential equations of first order
29	4	Problems based on PDE
30	4	Lagranges metod to solve PDE
31	4	Problems of PDE of first order
32	4	Standard form of PDE of order one degree high
33	4	Standard form of PDE of order one degree high
34	4	Charpit's general method of solution
35	4	Charpit's general method of solution
36	5	Partial differential equations of higher order
37	5	Examples on Partial differential equations of higher order
38	5	Canninical form
39	5	Classification of linear PDE of second order

40	5	Homogeneous linear partial differential equation
41	5	Nonhomogeneous linear PDE
42	5	Short methods for finding particular integral
43	5	Short methods for finding particular integral
44	5	Equations reducible to PDE with constant coefficient
45	5	Equations reducible to PDE with constant coefficient
46	5	Geometric problems
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Lesson Plan - B. Sc. IIIYear(CS/HONS/PCM/IT/ELEX) (July 2019 -20)

Subject -Mathematics   Paper I- Linear Algebra and Numerical Analysis

Teacher - Manoj Joshi, Shifa Goyal

Day/Lecture	Unit	Topic
1	1	Basics of group and field
2	1	Definition of Vector space
3	1	Examples of vector space
4	1	Properties of vector space
5	1	Vector subspaces,theorems
6	1	Theorems on vector subspaces
7	1	Linear combination of vectors,LI and LD vectors
8	1	Theorems
9	1	Finite dimensional vector space
10	1	Existense and extention theorem
11	1	Linear and direct sum and related theorems
12	1	Examples on LI ,LD and basis
13	1	Properties of finite dimensional vector space
14	1	Quotient space
15	2	Linear transformation definition and examples
16	2	Properties of linear transformation
17	2	Isomorphism and some Theorems
18	2	Theorems on homomorphism and isomorphism
19	2	Matrix repesentation of linear transformation
20	2	Examples and theorems
21	2	Rank and nullity of linear transformation,theorems
22	2	Theorems,singular and non singular LT
23	2	Dual space,dual basis
24	2	Annhiliator,adjaoint of LT
25	2	Eigen values and eigen vector of LT
26	2	Examples and theorems
27	2	Diagonalization of matrix,Qudratic forms
28	2	Bilinear and quadratic forms
29	3	Inner product of vector spaces
30	3	Examples
31	3	Properties of Inner product
32	3	Norm of a vector,unit vector
33	3	Orthogonal vector and orthonormal set
34	3	Theorems
35	3	S-C-S inequality,Bessel's inequality

36	3	Orthogonalization of a base
37	3	Theorems
38	4	Solution of Equations
39	4	Solution of Equations
40	4	Solution of Equations
41	4	Interpolation Definition and examples
42	4	Lagranges Interpolation, Divided Differences
43	4	Interpolation usings Divided Differences
44	4	Numerical Quadrature
45	4	Numerical Quadrature
46	4	Newton Cotes formulae
47	4	Gauss Quadrature
48	4	Gauss Quadrature
49	5	Direct method for solving System of linear equations
50	5	Direct method for solving System of linear equations
51	5	LU decomposition, Cholesky method
52	5	Iterative method
53	5	Iterative method
54	5	Ordinary Differtial equations: Euler method
55	5	Euler Modified method, Single step method
56	5	Runge Kutta's method, Multi step method
57	5	Milne Simpson method
58	5	Method based on Numerical integration
59	5	Method based on Numerical differentiation
60	5	Examples

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Lesson Plan - B. Sc. IIIYear(CS/HONS/PCM/IT/ELEX)(July 2019 -20)

Subject - Mathematics   Paper-II Real and complex Analysis

Teacher - Divya Agrawal, Shifa Goyal

Day/Lecture	Unit	Topic
1	1	Basics of Riemann integral
2	1	Upper and Lower sum and related Lemmas
3	1	Riemann integral
4	1	Theorems on Riemann integral
5	1	Theorems on Riemann integral
6	1	Theorems on Riemann integral
7	1	Fundamental and mean value theorem
8	1	Second mean value theorem and problems
9	1	Partial derivatives and examples
10	1	Differentiability of function of two variables
11	1	Theorems on differentiability
12	1	Schwarz's and Young's theorem
13	1	Examples
14	2	Convergence of improper integration of first kind
15	2	Tests for convergence of improper integration
16	2	Tests for convergence of improper integration
17	2	Convergence of improper Integration of second kind
18	2	Tests for convergence of improper integration of second kind
19	2	Tests for convergence of improper integration of second kind
20	2	Absolute convergence
21	2	Integral as a function of a parameter
22	2	Integral as a function of a parameter
23	2	Fourier series
24	2	Fourier series
25	3	Metric Space definitation and examples
26	3	Open sphere,closed sphere, neighbourhood and limit point
27	3	Open set,closed set and theorems
28	3	Boundary points,metric subspace
29	3	Cauchy sequence and its theorems
30	3	Complete metric space and theorems
31	3	Fixed point and Banach contraction principle
32	3	Real numbers,extend axiom,field,order axiom
33	3	Bounded and unbounded sets
34	3	Completeness ,Archemedian Property,Density theorem
35	3	Theorems on dense and nowhere dense sets,Baire category theorem
36	3	Seprable space , First countable and second countable space
37	4	Continuous function, Uniform Continuity
38	4	Compact spaces
39	4	Sequential compactness
40	4	Finite intersection Property and compactness
41	4	Continuous functions and compact set

42	4	Separated sets, disconnected and connected set
43	4	Totally Disconnected set and components
44	4	Connected sub sets and continuous functions
45	5	Introduction of complex numbers
46	5	Properties of moduli and argument
47	5	Equation of straight lines and circle and inverse point
48	5	Limit and Continuity of complex numbers
49	5	Uniform continuity and differtiability of complex functions
50	5	Analytic function and C-R equation
51	5	Polar form of C-R equation and Hormonic functions
52	5	Methods of constrction of analytic function
53	5	Mobius Transformation
54	5	Resultant of two mobius tranformation and problems
55	5	Problems on fixed point of mobius transformation
56	5	Cross ratio and related problems
57	5	Critical mapping
58	5	Elliptic, hyperbolic and parabolic transformation
59	5	Nesessary and sufficient condition of Conformal mapping
60	5	Transcendental, exponential and logrithimic transformation

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Lesson Plan - B. Sc. IIIYear(CS/HONS/PCM/IT/ELEX)(July 2019 -20)

Subject -Mathematics   PaperIII- Discrete Mathematics

Teacher - Manoj Joshi, Divya Agrawal

Day/Lecture	Unit	Topic
1	1	Basics of Boolean Algebra
2	1	Properties of Boolean Algebra,Minimal Boolean function
3	1	Disjunctive normal form and examples
4	1	Examples and theorems
5	1	Conjunctive normal form
6	1	Examples
7	1	Binary and invrse relations
8	1	Composite and equivalence relations
9	1	equivalence classs and related theorems
10	1	Examples and questions
11	2	Partial order relations and questions
12	2	Partial order set and total order set
13	2	Hasse diagram,maximal and minimal element
14	2	Lub,glb,definition of Lattice
15	2	Example of lattices
16	2	Dual lattices,distributive lattice,complemented lattice
17	3	Definition of graph and examples
18	3	Types of graphs,subgraphs
19	3	Walk,path, circuit,connected and disconnected graph
20	3	Theorems
21	3	Euler graph,Hamiltonian path and Circuit
22	3	Shortest path in weighted graph, Dijkstra algorithm
23	3	Examples
24	4	Definition of Tree,rooted tree and binary tree
25	4	Theorems on tree
26	4	Theorems on tree,spanning tree
27	4	Kruskal's Algorithm
28	4	Prim's Algorithm
29	5	Matrix representation of graph,incidence matrix
30	5	Adjacency matrix
31	5	Cut set and examples
32	5	Theorems on cutset
33	5	Planar graph,Kuratowski's two graphs
34	5	Planar graph,Kuratowski's two graphs
35	5	Planar graph,Kuratowski's two graphs

36	5	Planar graph,Kuratowski's two graphs
37	5	Doubt Solving
38	5	Doubt Solving
39	5	Doubt Solving
40	5	Revision
41	5	Revision
42		