

# Maharaja Ranjit Singh College of Professional Sciences, Indore

Department of Mathematics

Lesson Plan - B. Sc. I Year(CS/HONS/PCM/IT/ELEX)(July 2017 -Feb18)

Subject-Mathematics

Paper I- Algebra and Trigonometry

Teacher - Manoj Joshi, Shifa Goyal

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	Homogeneous 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	5	Disjunctive normal form
54	5	Conjunctive normal form
55	5	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 trigonometric 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. IYear (CS/HONS/PCM/IT/ELEX)(July 2017 -Feb 2018)

Subject -Mathematics

Paper-II Calculus and Differential Equation

Teacher - Manoj Joshi, Shifa Goyal

Day/Lecture	Unit	Topic
1	1	Basics of Differentiation
2	1	Successive Differentiation
3	1	$n$ th derivative of standard functions
4	1	$n$ th derivative of standard functions
5	1	Questions based on trigonometric 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, intrinsic formula for radius of curvature
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	Geometrical meaning of differential equation,orthogonal trajectories
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 imaginary 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. I Year Year (CS/HONS/PCM/IT/ELEX) (July 2017 -Feb 2018)

Subject -Mathematics

Paper III- Vector Analysis and Geometry

Teacher - Manoj Joshi, Shifa Goyal

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 its 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 its 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 radical axis
34	3	Confocal conics
35	3	Polar equation of conics
36	3	Polar equation of conics
37	4	Cone and its 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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Department of Mathematics

Lesson Plan - B. Sc. IIIsem Year(CS/HONS/PCM/IT/ELEX)(July 2017 -Dec2017)

Subject - Mathematics

Paper-Real An,DE &amp; Abs Alg

**Teacher - Manoj Joshi, Shifa Goyal**

Day/Lecture	Unit	Topic
1	1	Sequence,limit of sequence,types of sequence
2	1	Sequence,limit of sequence,types of sequence
3	1	Theorems
4	1	Theorems
5	1	Cauchy sequence,theorem
6	1	Examples
7	1	Theorems,series,convergence of series
8	1	Tests for convergence
9	1	Tests for convergence
10	1	Tests for convergence
11	1	Alternating series,theorems
12	1	Absolute and conditional convergence
13	2	Power Series method
14	2	Power Series method
15	2	Examples
16	2	Bessel's function, properties
17	2	Bessel's function, properties
18	2	Recurrence relation and Generating function
19	2	Examples
20	2	Legender's function, properties
21	2	Recurrence relation and Generating function
22	2	Practices questions
23	2	Practices questions
24	3	Laplace transformation
25	3	Properties of Laplace transformations
26	3	Examples
27	3	Existance theorem
28	3	Laplace transformation of derivaties and integrals
29	3	Practices questions
30	3	Shifting theorem and practice questions
31	3	Diffetiation and integration of transforms
32	3	Practices questions
33	3	Inverse Laplace transform
34	3	Convolution theorem
35	3	Solving LDE with constant coefficients
36	3	Solving LDE with constant coefficients
37	4	Basics of set theory

38	4	Group,examples
39	4	Examples
40	4	Properties of groups
41	4	Properties of groups
42	4	Definitions
43	4	Modulo group
44	4	Subgroup and theorems
45	4	Theorems
46	4	Order of element
47	4	Theorems
48	4	Cyclic group,examples
49	4	Properties of cyclic group
50	4	Coset,examples
51	4	Coset,examples
52	4	Theorems
53	4	Theorems
54	5	Normal subgroups
55	5	Theorems
56	5	Theorems
57	5	Quotient group
58	5	Homomorphism and isomorphism of groups
59	5	Homomorphism and isomorphism of groups
60	5	Theorems
61	5	Kernal of homomorphism ,theorems
62	5	Theorems
63	5	Permutation group,example
64	5	Permutation group,example
65	5	Types,theorems
66	5	Theorems
67	5	Theorems

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Department of Mathematics

Lesson Plan - B. Sc. IVsem Year(CS/HONS/PCM/IT/ELEX) (Jan 2018 -May2018)

Subject - Mathematics Paper-Abs Alg,Adv-cal,PDE &amp; CA

**Teacher - Manoj Joshi, Shifa Goyal**

<b>Day/Lecture</b>	<b>Unit</b>	<b>Topic</b>
1	1	Group Automorphism,examples
2	1	Group Automorphism,examples
3	1	Inner automorphism,theorems
4	1	Inner automorphism,theorems
5	1	Group of automorphism
6	1	Example and theorems
7	1	Conjugacy relation, Centralizer, Normalizer
8	1	Theorems
9	1	Examples and theorems
10	1	Counting principle, class equation
11	1	Theorems
12	1	Cauchy theorem for finite abelian group
13	1	Cauchy theorem for finite non abelian group
14	2	Ring,examples
15	2	Types of rings,properties
16	2	Subring,examples and theorems
17	2	Integral domain,examples and theorems
18	2	Field,examples
19	2	Properties and theorems
20	2	Subfield,theorems
21	2	Ring homomorphism,isomorphism
22	2	Ring homomorphism,isomorphism
23	2	Theorems
24	2	Ideals,examples
25	2	Types of Ideals,theorems
26	2	Kernal of homomorphism
27	2	Theorems
28	2	Fundamental theorem
29	2	Euclidean Ring
30	3	Maxima minima of function of two variables
31	3	Critical point
32	3	Necessary and sufficient condition
33	3	Examples
34	3	Examples
35	3	Improper integration
36	3	Tests of convergence

37	3	Tests of convergence
38	3	Tests of convergence
39	3	Beta and Gamma function
40	3	Beta and Gamma function
41	3	Beta and Gamma function
42	4	Partial differential equation and its derivation
43	4	Lagrange's method of solution
44	4	Lagrange's method of solution
45	4	Standard forms
46	4	Standard forms
47	4	Charpit general method of solutions
48	4	Charpit general method of solutions
49	4	PDE of second and higher order
50	4	Clasifiation and reduction to canonical form
51	4	Homogeneous and non homogeneous LPDE
52	4	Method of finding CF
53	4	Short method for finding PI
54	5	Limit Continuity and Differtiability of Complex functions
55	5	Analytic functions, CR equation
56	5	Polar form of CR and Harmonic functions
57	5	Method of counstructing of Analytic function
58	5	Mobius Tranformation
59	5	Mobius Tranformation
60	5	Fixed point, Cross ratio and Inverse point
61	5	Fixed point, Cross ratio and Inverse point
62	5	Eliptic, Heperbolic and parabolic transformations.
63	5	Eliptic, Heperbolic and parabolic transformations.

**Maharaja Ranjit Singh College of Professional Sciences, Indore**

Department of Mathematics

Lesson Plan - B. Sc. V sem Year(CS/HONS/PCM/IT/ELEX)(July17-Dec17)

Subject - Mathematics Paper-Linear Algebra &amp; Numerical Analysis

**Teacher - Manoj Joshi, Shifa Goyal**

<b>Day/Lecture</b>	<b>Unit</b>	<b>Topic</b>
1	1	Basics of ring and field
2	1	Definition of vector space
3	1	Examples
4	1	Properties of vector space
5	1	Vector subspace,theorems
6	1	Theorems ,Linear and direct sum
7	1	LI,LD vectors,linear span and theorems
8	1	Finite dimentioanal vector space
9	1	Basis and it's theorems
10	1	Basis and it's theorems
11	2	Linear transformations and isomorphism
12	2	Theorems on homomorphism and direct isomorphism
13	2	Theorems
14	2	Matrix representation,theorems
15	2	Examples
16	2	Rank and nullity of linear transformation
17	2	Eigen values and eigen vectors
18	2	Examples
19	2	Cayley-Hamilton theorem
20	2	Diagonalization of matrix
21	2	Quadratic forms
22	2	Orthogonal reduction
23	2	Examples
24	2	Quotient space
25	2	Theorems on quotient space
26	3	Solution of Equations
27	3	Finite differences, Operators, Interpolation
28	3	Forward and backward Difference formulae
29	3	Forward and backward Difference formulae
30	3	Subdivision of interwals and its examples
31	3	Divided differences Interpolation formulae
32	3	Lagrange's Interpolation formulae
33	4	Solution of Simultaneous equations Direct method
34	4	Solution of Simultaneous equations Direct method
35	4	Iterative Method

36	4	Iterative Method
37	4	Inversion of matrix
38	4	Inversion of matrix
39	4	Examples
40	4	Examples
41	4	Examples
42	5	ODE Eulers and Modified Eulers Method
43	5	Examples
44	5	Single Step R-K Method
45	5	Predictor-Corrector Method
46	5	Milne's Method, Milne's Simpson Method
47	5	Methods on Numerical Differtiation
48	5	Numerical Solution of higher order DE
49	5	Numerical Integration
50	5	Newton Cote's Quadrature formula
51	5	Simson's 1/3 and 3/8 rules, Trapezoidal rule
52	5	Examples
53	5	Gaussian and Quadrature formula
54	5	Examples
55	5	Examples

# Maharaja Ranjit Singh College of Professional Sciences, Indore

Department of

Lesson Plan - B. Sc. VI Year(CS/HONS/PCM/IT/ELEX)(Jan 2018 -June2018)

Subject - Mathematics Paper-Real analysis,Discrete mathematics& Graph Th

Teacher - Manoj Joshi, Vandana Shrivastava

Day/Lecture	Unit	Topic
1	1	Riemann Integral
2	1	Riemann Integral
3	1	Riemann Integral
4	1	Algebra of Riemann integral functions
5	1	Algebra of Riemann integral functions
6	1	Algebra of Riemann integral functions
7	1	Integrability of continuous and monotonic function
8	1	Integrability of continuous and monotonic function
9	1	Examples
10	1	Theorems
11	1	Fundamental theorem of integral calculus
12	1	Mean value theorem,Examples
13	2	Metric space definition and examples
14	2	Neighbourhood,limit point and interior point
15	2	Open set ,close set
16	2	Theorems
17	2	Closure,interior and boundary points
18	2	Subspace of metric space,theorm
19	2	Cauchy sequence and related theorems
20	2	Complete metric space
21	2	Contraction principle ,fixed points
22	2	Complete order field,Glub and Lub property
23	2	Archemedean property,density theorem
24	2	Continuous function and theorems
25	2	Uniform continuity
26	3	Algebra of logic,connectors
27	3	Tautology,contradiction,logical equivalence
28	3	Examples
29	3	Algebra of propositions
30	3	Quntifiers
31	3	Boolean algebra
32	3	Property of boolean algebra
33	3	Examples
34	3	Examples
35	3	Algebra of electric circuits

36	3	Examples
37	4	Boolean functions,minimal boolean functions
38	4	Disjunctive forms,examples
39	4	Comjunctive forms,examples
40	4	Theorems
41	4	Binary relation,equivalence relation
42	4	Examples
43	4	Partitions,theorems
44	4	Partial order realtions
45	4	Examples
46	5	Graph and its examples
47	5	Multi graph,weighted graph,subgraph
48	5	Theorems
49	5	Walk-path,Connected and disconnected graph
50	5	Circuit, theorems
51	5	Shortest path in weighted graph
52	5	Tree,types of tree and examples
53	5	Properties of tree