

# Maharaja Ranjit Singh College of Professional Sciences, Indore

Department of Mathematics

Lesson Plan - B. Sc. I sem(CS/HONS/PCM/IT/ELEX)(July 2016-Dec 2016)

Subject-Mathematics Paper I- Matrix theory,Calculus & Geometry

Teacher - Manoj Joshi, Shifa Goyal

Day/Lecture	Unit	Topic
1	1	Basics of matrices
2	1	Rank of matrices
3	1	Rank of matrices
4	1	Question on rank of matrices
5	1	Echelon form of matrices and numericals
6	1	Normal form,question on normal form of matrices
7	1	Normal form,question on normal form of matrices
8	1	Eigen values and eigen vector of matrix
9	1	Eigen values and eigen vector of matrix
10	1	Questions based on eigen values and eigen vectors
11	1	Linearly dependent and independent vectors
12	1	Linearly dependent and independent vectors
13	1	Row rank and column rank,theorems
14	1	Cayley- Hamilton theorem statement and verification
15	1	Proof of Cayley-Hamilton theorem and numerical problems
16	1	Solution of linear equation by matrix method
17	1	Solution of linear equation by matrix method
18	2	Theory of equation,Symmetric function of the roots
19	2	Synthetic division,roots of multiplicity,Gcd
20	2	Relation between roots,examples
21	2	Relation between roots,examples
22	2	Relation between roots,examples
23	2	Reciprocal equation,roots diminished by h,Descarte's rule
24	2	De-Moivre's theorem
25	2	De-Moivre's theorem
26	2	De-Moivre's theorem
27	2	Direct and inverse circular functions
28	2	Examples
29	2	Hyperbolic functions
30	2	Hyperbolic functions
31	3	Continuity of function

32	3	Properties,theorems
33	3	Properties,theorems
34	3	Uniform continuity,examples
35	3	Differentiability
36	3	Differentiability
37	3	Mean value theorem
38	3	Examples
39	3	Darboux's theorem
40	3	Theorems
41	3	Examples
42	4	Integration of Irrational algebraic functions
43	4	Integration of Irrational algebraic functions
44	4	Integration of Irrational algebraic functions
45	4	Integration of Irrational algebraic functions
46	4	Integration of transcendental functions
47	4	Integration of transcendental functions
48	4	Integration of transcendental functions
49	4	Integration of transcendental functions
50	4	Reduction formulae
51	4	Reduction formulae
52	4	Definite integration
53	4	Definite integration
54	4	Definite integration
55	5	Cone,general equation
56	5	Cone with given vertex
57	5	Reciprocal cone,enveloping cone
58	5	Reciprocal cone,enveloping cone
59	5	Right circular cone
60	5	Practice questions
61	5	Practice questions
62	5	Cylinder
63	5	Right circular cylinder
64	5	Right circular cylinder
65	5	Tangent plane to cylinder
66	5	Tangent plane to cylinder
67	5	Tangent plane to cylinder
68	5	Examples

69	5	Examples
70	5	Doubt solving

**Maharaja Ranjit Singh College of Professional Sciences, Indore**  
 Department of Mathematics  
 Lesson Plan - B. Sc. II sem(CS/HONS/PCM/IT/ELEX)(Jan 2017 -May 2017)  
 Subject -Mathematics Paper-II Adv Cal,DE,Vec Cal  
**Teacher - Manoj Joshi, Shifa Goyal**

Day/Lecture	Unit	Topic
1	1	Successive Differentiation
2	1	Successive Differentiation
3	1	nth derivative of standard functions
4	1	nth derivative of standard functions
5	1	Questions based on trigonometric transformation,partial fraction
6	1	Application of De-Moivre's theorem,Proof of Leibnitz theorem
7	1	Proof of Maclaurin's theorem and questions
8	1	Practice questions
9	1	Practice questions
10	1	Numericals on Maclaurin and Taylor's theorem
11	1	Asymptote introduction and general method to find asymptote
12	1	Shorter methods to find asymptote,Asymptote parallel to axes
13	1	Asymptotes of polar curves and its intersection with curve
14	1	Curvature,intrinsic formula for radius of curvature
15	1	Cartesian, parametric and pedal formula to find radius of curvature
16	1	Tangents at origin,centre of curvature,chord of curvature
17	1	Concavity,convexity and point of inflexion,singular points
18	1	Multiple points,tangents at origin,cusp and node
19	1	Tracing of cartesian curves
20	1	Tracing of cartesian curves
21	1	Tracing of polar curves
22	1	Tracing of parametric curves ,Tracing of parametric curves
23	2	Limit of function of two variables
24	2	Continuity of function of two variables
25	2	Continuity of function of two variables
26	2	Examples
27	2	Partial differentiation equation,Euler's theorem
28	2	Examples of Euler's theorem
29	2	Jacobian
30	2	Jacobian
31	2	Jacobian
32	2	Differentiability of function of two variables
33	2	Differentiability of function of two variables
34	2	Taylor's theorem
35	2	Multiple Integral
36	2	Multiple Integral
37	2	Multiple Integral
38	3	Linear differential equation,equations reducible to linear
39	3	Change of variables,exact differential equations and their solutions
40	3	Integrating factor,rules for finding integrating factors
41	3	Equations solvable for p,equations solvable for x and y
42	3	Clairaut's form,Singular solutions
43	3	Orthogonal trajectories,self orthogonal family
44	3	Linear differential equations with constant coefficients
45	3	Methods to find complementary function
46	3	General method to find particular integral
47	3	Short methods to find particular integral
48	3	Short methods to find particular integral
49	4	Homogeneous equation,Linear differential equations of second order,
50	4	Linear differential equations of second order,
51	4	Method of Variation of parameters
52	4	Method of Variation of parameters
53	4	Simultaneous differential equation of first order
54	4	Simultaneous differential equation of first order
55	4	Method of differentiation
56	4	Geometrical Interpretation of differential equation
57	5	Vector differentiation
58	5	Vector differentiation
59	5	Gradient,divergence and curl
60	5	Gradient,divergence and curl
61	5	Gradient,divergence and curl
62	5	Vector integration

63	5	Vector integration
64	5	Examples
65	5	Examples
66	5	Gauss theorem
67	5	Gauss theorem
68	5	Stoke's theorem
69	5	Stoke's theorem
70	5	Green's theorem

# Maharaja Ranjit S

Lesson Plan - B. Sc. III

Subject - Mathema

Tea

Day/Lecture	Unit
1	1
2	1
3	1
4	1
5	1
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# **ingh College of Professional Sciences, Indore**

Department of Mathematics

sem(CS/HONS/PCM/IT/ELEX) (July 2016-Dec2016)

tics

Paper-Real An,DE & Abs Alg

acher - **Manoj Joshi, Shifa Goyal**

<b>Topic</b>
Sequence,limit of sequence,types of sequence
Sequence,limit of sequence,types of sequence
Theorems
Theorems
Cauchy sequence,theorem
Examples
Theorems,series,convergence of series
Tests for convergence
Tests for convergence
Tests for convergence
Alternating series,theorems
Absolute and conditional convergence
Power Series method
Power Series method
Examples
Bessel's function, properties
Bessel's function, properties
Recurrence relation and Generating function
Examples
Legender's function, properties
Recurrence relation and Generating function
Practices questions
Practices questions
Laplace transformation
Properties of Laplace transformations
Examples
Existance theorem
Laplace transformation of derivaties and integrals
Practices questions
Shifting theorem and practice questions
Diffetiation and integration of transforms



Practices questions
Inverse Laplace transform
Convolution theorem
Solving LDE with constant coefficients
Solving LDE with constant coefficients
Basics of set theory
Group,examples
Examples
Properties of groups
Properties of groups
Definitions
Modulo group
Subgroup and theorems
Theorems
Order of element
Theorems
Cyclic group,examples
Properties of cyclic group
Coset,examples
Coset,examples
Theorems
Theorems
Normal subgroups
Theorems
Theorems
Quotient group
Homomorphism and isomorphism of groups
Homomorphism and isomorphism of groups
Theorems
Kernal of homomorphism ,theorems
Theorems
Permutation group,example
Permutation group,example
Types,theorems
Theorems
Theorems

# Maharaja Ranjit S

Lesson Plan - B. Sc. IV

Subject - Mat

Tea

Day/Lecture	Unit
1	1
2	1
3	1
4	1
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6	1
7	1
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# **ingh College of Professional Sciences, Indore**

Department of Mathematics

sem (CS/HONS/PCM/IT/ELEX)(Jan 2017 -May2017)

hematics Paper-Abs Alg,Adv-cal,PDE & CA

acher -**Manoj Joshi, Shifa Goyal**

<b>Topic</b>
Group Automorphism,examples
Group Automorphism,examples
Inner automorphism,theorems
Inner automorphism,theorems
Group of automorphism
Example and theorems
Conjugacy relation,Centralizer,Normalizer
Theorems
Examples and theorems
Counting principle,class equation
Theorems
Cauchy theorem for finite abelian group
Cauchy theorem for finite non abelian group
Ring,examples
Types of rings,properties
Subring,examples and theorems
Integral domain,examples and theorems
Field,examples
Properties and theorems
Subfield,theorems
Ring homorphism,isomorphism
Ring homorphism,isomorphism
Theorems
Ideals,examples
Types of Ideals,theorems
Kernal of homomorphism
Theorems
Fundamental theorem
Euclidean Ring
Maxima minima of function of two variables
Critical point

Necessary and sufficient condition
Examples
Examples
Improper integration
Tests of convergence
Tests of convergence
Tests of convergence
Beta and Gamma function
Beta and Gamma function
Beta and Gamma function
Partial differential equation and its derivation
Lagrange's method of solution
Lagrange's method of solution
Standard forms
Standard forms
Charpit general method of solutions
Charpit general method of solutions
PDE of second and higher order
Clasifiation and reduction to canonical form
Homogeneous and non homogeneous LPDE
Method of finding CF
Short method for finding PI
Limit Continuity and Differtiability of Complex functions
Analytic functions, CR equation
Polar form of CR and Harmonic functions
Method of counstructing of Analytic function
Mobius Tranformation
Mobius Tranformation
Fixed point, Cross ratio and Inverse point
Fixed point, Cross ratio and Inverse point
Eliptic, Heperbolic and parabolic transformations.
Eliptic, Heperbolic and parabolic transformations.

# Maharaja Ranjit S

Lesson Plan - B. Sc.

Subject - Mathematic

Tea

Day/Lecture	Unit
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# **Engineering College of Professional Sciences, Indore**

Department of Mathematics

V sem (CS/HONS/PCM/IT/ELEX)(July16-Dec16)

Subject - Paper-Linear Algebra & Numerical Analysis

Teacher - **Manoj Joshi, Shifa Goyal**

<b>Topic</b>
Basics of ring and field
Definition of vector space
Examples
Properties of vector space
Vector subspace,theorems
Theorems ,Linear and direct sum
LI,LD vectors,linear span and theorems
Finite dimensional vector space
Basis and it's theorems
Basis and it's theorems
Linear transformations and isomorphism
Theorems on homomorphism and direct isomorphism
Theorems
Matrix representation,theorems
Examples
Rank and nullity of linear transformation
Eigen values and eigen vectors
Examples
Cayley-Hamilton theorem
Diagonalization of matrix
Quadratic forms
Orthogonal reduction
Examples
Quotient space
Theorems on quotient space
Solution of Equations
Finite differences, Operators, Interpolation
Forward and backward Difference formulae
Forward and backward Difference formulae
Subdivision of intervals and its examples
Divided differences Interpolation formulae



Lagrange's Interpolation formulae
Solution of Simultaneous equations Direct method
Solution of Simultaneous equations Direct method
Iterative Method
Iterative Method
Inversion of matrix
Inversion of matrix
Examples
Examples
Examples
ODE Eulers and Modified Eulers Method
Examples
Single Step R-K Method
Predictor-Corrector Method
Milne's Method, Milne's Simpson Method
Methods on Numerical Differtiation
Numerical Solution of higher order DE
Numerical Integration
Newton Cote's Quadrature formula
Simson's 1/3 and 3/8 rules, Trapezoidal rule
Examples
Gaussian and Quadrature formula
Examples
Examples

# Maharaja Ranjit S

Lesson Plan - B. Sc. V

Subject - Mathematics

Tea

Day/Lecture	Unit
1	1
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# ingh College of Professional Sciences, Indore

Department of Mathematics

VI(CS/HONS/PCM/IT/ELEX) (Jan 2017 -June2017)

Paper-Real analysis,Discrete mathematics& Graph Th

acher - Manoj Joshi, Shifa Goyal

Topic
Riemann Integral
Riemann Integral
Riemann Integral
Algebra of Riemann integral functions
Algebra of Riemann integral functions
Algebra of Riemann integral functions
Integrability of continuous and monotonic function
Integrability of continuous and monotonic function
Examples
Theorems
Fundamental theorem of integral calculus
Mean value theorem,Examples
Metric space definition and examples
Neighbourhood,limit point and interior point
Open set ,close set
Theorems
Closure,interior and boundary points
Subspace of metric space,theorm
Cauchy sequence and related theorems
Complete metric space
Contraction principle ,fixed points
Complete order field,Glb and Lub property
Archemedeian property,density theorem
Continuous function and theorems
Uniform continuity
Algebra of logic,connectors
Tautology,contradiction,logical equivalence
Examples
Algebra of propositions
Quntifiers
Boolean algebra

Property of boolean algebra
Examples
Examples
Algebra of electric circuits
Examples
Boolean functions,minimal boolean functions
Disjunctive forms,examples
Comjunctive forms,examples
Theorems
Binary relation,equivalence relation
Examples
Partitions,theorems
Partial order realtions
Examples
Graph and its examples
Multi graph,weighted graph,subgraph
Theorems
Walk-path,Connected and disconnected graph
Circuit, theorems
Shortest path in weighted graph
Tree,types of tree and examples
Properties of tree