"Education for Knowledge, Culture and Science"

… Shikshanmaharshi Dr. Bapuji Salunkhe

VIVEKANAND COLLEGE (AUTONOMOUS), KOLHAPUR

Department of Mathematics

B.Sc.-II

Semester-III & IV

CBCS Syllabus to be implemented from June 2019 Onwards.

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Semester: III
MATHEMATICS-DSC -1005 C
Differential and Integral Calculus
Theory: 72 Hours (96 lectures of 48 minutes) - Credits -4 (Marks-100)

Section I: Differential Calculus

Course Outcomes:

After studying this course student will able to

CO1: Make use of concept of derivative to study different curves geometrically.

CO2: make use of vector differentiation to study various physical phenomenon.

Unit	Contents	Hours Allotted
1	**Jacobian**: Definition of Jacobian of transformation, Basic examples, Various properties of Jacobian, Examples related on the properties, Application of Jacobian.	08
2	**Curvature :** Definitions: Curve, Curvature of Curve, Radius of Curvature, Curves with constant curvature, Formulas for Radius of curvature for curves in Cartesian, Parametric and Polar forms, Related examples.	08
3	**Asymptotes and Singular Points:** Asymptotes: Definition and Working rule to determine asymptote, Asymptote by inspection, Intersection of curve with Asymptote, asymptote by expansion, Position of curve with respect to an Asymptote. Definitions: Cups, Nodes and Conjugate Points, Tangents at Origin, Types of Cups, Radii of curvature at multiple points	12
4	**Vector Differentiation:** Definition: Vector differential operator Del., Divergence, Gradient and curl of vector, Properties of Divergence, Curl and Gradient of Vector, directional derivative of a vector, Related examples, Solenoidal , irrotational and conservative fields, Scalar potential, Vector identities	08

Reference Books:

1) Shanti Narayan; Dr. P. K. Mittal, *Differential Calculus, S. Chand Publishing*

2) S. V. Kumbhokar, G.V. Kumbhojkar, *Advanced Calculus*, Nirali Pubilcation

3) N. Piskunov, Differential And Integral Calculus, MIR Publisher, MOSCOW.

4) G.B.Thomson, R. L. Finney, Calculus, 9th Edition, Pearson Education, Delhi, 2005.

5) H. Anton, I. Bivens and S. Davis, Calculus, John Wiley and Sons(Asia) P.Ltd. , 2002.

Section II: Integral Calculus

Course Outcomes:

After studying this course student will able to

CO1: solve improper integrals.

CO2: find the area, volume of the given region.

CO3: find Fourier series expansion of the given functions.

Unit	Contents	Hours Allotted
1	**Beta and Gamma Functions**: Definition of Beta function, Basic Properties of Beta function, Examples on Beta functions, Definition of Gamma function, Basic Properties of Gamma function, Examples on Gamma functions, Relation between Beta and Gamma function	**08**
2	**Multiple Integrals:** Double Integration: Method of Evaluation and related examples,(Cartesian and Polar Form), Change of order of integration, Change of Variable, Examples on Triple Integral.	**10**
3.	**Centre of Gravity and Moment of Inertia:** Introduction, Centre of Gravity, Moment of Inertia, Mass and Lamina, Examples.	**8**
4	**Fourier Series:** Periodic functions, Even and Odd functions, Fourier Series Expansion of elementary functions, (Over the different ranges $[-\pi, \pi], [0, 2\pi], [-c, c], [0, 2c]$) Fourier Sine and Cosine series expansion, Half Range series expansion.	**10**

Reference Books:

1) S. V. Kumbhokar, G.V. Kumbhojkar, *Advanced Calculus*, Nirali Pubilcation

2) N. Piskunov, Differential And Integral Calculus, MIR Publisher, MOSCOW.

3) G.B.Thomson, R. L. Finney, Calculus, 9th Edition, Pearson Education, Delhi, 2005.

4) H. Anton, I. Bivens and S. Davis, Calculus, John Wiley and Sons(Asia) P.Ltd. , 2002.

MATHEMATICS-DSC -1003D

Semester: IV Mathematics-Paper- IV
Discrete Mathematics and Integral Transform
Theory: 72 Hours (96 lectures of 48 minutes) - Credits -4 (Marks-100)
Section I: Discrete Mathematics

Course Outcomes:

After studying this course student will able to

CO1: aware with different mathematical structures.

CO2: have sufficient knowledge of graph theory to apply in various fields .

Unit	Contents	Hours Allotted
1	**Sets and Relations** Algebra of Sets, Duality, finite sets and Counting Principle, classes of Sets, Power set and partition, Mathematical Induction, product of sets, Relations, Pictorial representation of relations, composition of relations, Types of relations, Closure properties, equivalence relations and partial order relations.	08
2	**Generating functions and Recurrence relation** Ordinary and exponential generating functions, Basic properties of generating functions, enumerators, Applications to partitions, Ferrer's graph, dual partitions, applications to solving recurrence relations, linear recurrence relation with constant coefficients, homogeneous solutions and total solutions, particular solutions and total solutions.	10
3	**Boolean Algebra:** Introduction, Basic Definitions, Duality, Basic Theorems, Boolean algebra as Lattices RepresentationTheorem, Sum-of-Products Form for Sets,Sum-of-Products Form for Boolean Algebras, Minimal Boolean Expressions, Prime Implicants, Logic Gates and Circuits,Truth Tables, Boolean Functions, Karnaugh Maps	08
4	**Graph Theory:** Graphs and Multigraphs, Subgraphs, Isomorphic and Homeomorphism Graphs, Paths, Connectivity, Traversable and Eulerian Graphs, Bridges of Konigsberg, Labeled and Weighted Graphs, Complete, Regular, and Bipartite Graphs, Tree Graphs, Planar Graphs, Graph Colorings	10

Reference Books:

1) S. Lipschutz, M.Lipson: *Disrete Mathematics*, Schaums Outline

Section II: Integral Transformation

Course Outcomes:

After studying this course student will able to

CO1: familiar with different kinds of integral transformations.

CO2: make use of the transformations to solve differential equations.

Unit	Contents	Hours Allotted
1	**Laplace Transformation:** Function of an exponential order, General Integral transform and its Kernel, Laplace transform: Definition, Linearity property, Laplace transform of some standard functions, Properties of Laplace Transform and related examples.	**09**
2	**Inverse Laplace Transformation:** Definition, basic properties and examples of Inverse Laplace Transform, Convolution theorem and related examples, Application to solve ordinary, partial differential equations and initial value problems.	**09**
3	**Fourier Transform:** Fourier Integral theorem, Fourier Transform, Fourier Sine and Cosine Transform, Inverse Fourier Transform, Related examples.	**09**
4	**Hankel Transform:** Introductory definitions and Properties, Definition of the Hankel Transform, Connection with the Fourier transform, Properties and Examples, Applications, the Finite Hankel Transform	**09**

Reference Books:

1) Goyal and Gupta: *Integral Transform*, Krishna Publication, Meerut.

2) Goyal : *Integral Transform*, Vikas Publishing House.

MATHEMATICS LAB: DSC -1003C (Practical) Credits: 08 Marks: 100

Core Course Practical In Mathematics (CCPM-II)
Differential and Integral Calculus, Discrete Mathematics, Integral Transform
(Marks 50) credits 04

1) Jacobian
2) Radius of Curvature (Cartesian Form)
3) Radius of Curvature (Polar Form)
4) Radius of Curvature (Parametric Form)
5) Asymptotes (To find Position and nature of double points on the curves)
6) Singular Points (To find multiple points and tangent)
7) Beta and Gamma Function
8) Double Integration
9) Laplace Transform
10) Fourier Transform
11) Hankel Transform
12) Fourier Series
13) Sets and Relations
14) Recurrence relation
15) Boolean Algebra
16) Graph Theory

Core Course Practical In Mathematics (CCPM-III)
Introduction to Scilab and C Language
(Marks 50) credits 04

1) Introduction to Scilab
2) Matrix
3) Accessing elements of Matrixs
4) Sub Matrix
5) Advanced Matrix operation
6) Polynomial
7) Plotting graphs
8) Introduction to Scilab Programming
9) Numerical Methods to find the root of the given function
10) Interpolation
11) Numerical solution of Ordinary Differential Equations -I- Euler's and Euler's Modified Method
12) Numerical solution of Ordinary Differential Equations -II- Runge Kutta Method
13) Numerical Integration-I Trapezoidal Rule
14) Numerical Integration-II Simpson's Rule
15) Numerical Methods for solution of System of linear equations-I Gauss Jordan
16) Numerical Methods for solution of System of linear equations-I Gauss Seidel

Reference Books:

1) Shanti Narayan; Dr. P. K. Mittal, *Differential Calculus, S. Chand Publishing*

2) S. V. Kumbhokar, G.V. Kumbhojkar, *Advanced Calculus*, Nirali Pubilcation

3) N. Piskunov, Differential And Integral Calculus, MIR Publisher, MOSCOW.

4) Scilab- A hand on Introduction by Satish Anniger

5) Goyal and Gupta: Integral Transform, Krishna Publication, Meerut.

6) Goyal : Integral Transform, Vikas Publishing House.

3) S. Lipschutz, M.Lipson: Disrete Mathematics, Schaums Outline

Skill Enhancement Course
Skill enhancement Experiments

Analytic Geometry

1. Techniques for sketching parabola, ellipse and hyperbola.
2. Classification of quadratics equations representing curves.
3. Graphing standard quadratic surfaces

Ref**erence Book:**

1. G. B. Thomson, R. L. Finney, Calculus, 9th Edition, Pearson Education, Delhi, 2005.

2. H. Anton, I. Bivens and S. Davis, Calculus, John Wiley and Sons(Asia) P.Ltd. , 2002.

(To be included in C.M.L.-II)

Theory of Equations

1. Polynomial: Definition, representation and its extreme values
2. Relation between Roots and coefficients
3.Solution of Reciprocal and Binomial equations.

Reference Books:

1. W. S. Burnside , A.W.Panton, *The theory of Equations*, DublinUniversity Press, 1954.

2. C. C. MacDuffee, Theory of Equations, John Wiley and Sons Inc., 1954.

(To be included in C.M.L.-III)

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Structure of B. Sc. II (Semester III & IV) (Mathematics)

B. Sc.II	Subject (Core Course)	No. of Lect.	Hours	Credit
Semester-III	MATHEMATICS-: Differential and Integral Calculus	5	4	4
Semester-IV	MATHEMATICS Discrete Mathematics and Integral Transform	5	4	4
Annual	MATHEMATICS LAB(II) Differential, Integral Calculus, Discrete Mathematics, Integral Transform	4	3.2	4
	MATHEMATICS LAB(III)- INTRODUCTION TO SCILAB AND NUMERICAL ANALYSIS	4	3.2	4

Nature of Theory Question Paper

***Instructions*:** *1) All the questions are **compulsory**.*

*2) Answers to the two sections should be written in **same** answer book.*

*3) Figures to the right indicate **full** marks.*

*4) Draw neat labeled diagrams **wherever** necessary.*

5) Use of log table/calculator is allowed.

SECTION-I

Time : 2 hours **Total Marks: 40**

Q.1. Choose correct alternative. **8**

i)

A) B) C) D)

ii)

A) B) C) D)

iii)

A) B) C) D)

iv)

A) B) C) D)

v)

A) B) C) D)

vi)

A) B) C) D)

vii)

A) B) C) D)

viii)

A) B) C) D)

Q.2. Attempt any two. **16**

A)

B)

C)

Q.3. Attempt any four. **16**

a)

b)

c)

d)

e)

f)

SCHEME OF MARKING (THEROY)

Sem.	DSC	Marks	Evaluation	Sections	Answer Books	Standard of passing
III	1003C	80	Semester wise	Two sections each of 40 marks	As per Instruction	35% (28 marks)
IV	1003D	80	Semester wise	Two sections each of 40 marks	As per Instruction	35% (28marks)

SCHEME OF MARKING (CIE) Continuous Internal Evaluation

Sem.	DSC	Marks	Evaluation	Sections	Answer Books	Standard of passing
III	1003C	20	Concurrent	-	As per Instruction	35% (7 marks)
IV	1003D	20	Concurrent	-	As per Instruction	35% (7 marks)

SCHEME OF MARKING (PRACTICAL)

Sem.	DSC	Marks	Evaluation	Sections	Standard of passing
III AND IV	1003C 1003D	100	Annual	As per Instruction	35% (18 marks)

*A separate passing is mandatory