

**KADI SARVA
VISHWAVIDYALAYA,
GANDHINAGAR**



**B.Sc. Curriculum as Per NEP
Mathematics Courses for Semester 2**

W.E.F. June 2023



Mathematics Major Course-1

MTM215-1C Calculus and Differential Equations

LEARNING OUTCOMES:

After completing this course student will be able to

- Perform integration of trigonometric functions using reduction formula.
- Evaluate definite integrals and improper integrals.
- Understand the concept of multiple integrals.
- Understand the concept of operations on vectors, gradient, divergence and curl.
- Learn the concept of ordinary differential equation.
- Solve various types of problems of linear and non-linear differential equation.

TEACHING AND EVALUATION SCHEME:

Subject Code	Subject Title	Teaching Scheme	Credits	Examination Scheme			Total Marks
		Theory Per Week		Hrs.	Max Marks		
					CCE	SEE	
MTM215-1C	Calculus and Differential Equations	4	4	2.5	50	50	100

<p>Unit 1 Integral Calculus Teaching Hours: 15</p> <p>Integration of trigonometric functions $\sin^n x, \cos^n x, \sin^p x \cos^q x$ (Reduction formula), Evaluation of definite integrals, Improper integrals, Multiple integrals.</p>
<p>Unit 2 Vector Calculus Teaching Hours: 15</p> <p>Scalar and vector, Addition of vectors, Unit vector, Position vector of a point, Product of three vectors, Product of four vectors, Differentiation of vectors, Gradient, Divergence, Curl and their geometrical interpretation.</p>
<p>Unit 3 Ordinary Differential Equations of First Order and First Degree Teaching Hours: 15</p> <p>Introduction, Order and degree of a differential equation, Linear and non-linear differential equations, Solution of a differential equation, Types of solution of differential equation, Formation of a differential equation, The Wronskian, Method of solution of ordinary differential equation of first order and first degree, Variable separable form, Homogeneous differential equation, Non homogeneous differential equation.</p>

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Unit 4 Linear and Nonlinear Differential Equations

Teaching Hours: 15

Exact differential equation, Non exact differential equation reducible to exact differential equation by multiplying with an integrating factor, Linear differential equation (Leibnitz's equation), Nonlinear differential equation reducible to linear form (Bernoulli's differential equation), Clairaut's equation, Equations solvable for p (dy/dx), Equations solvable for y , Equations solvable for x .

- *Continuous Evaluation: It consists of Assignments / Seminars / Presentations / Quizzes / Surprise Tests

Reference Books:

1. Differential Equations, Dr. R. C. Shah, Books India Publications.
2. Linear Algebra and Vector Calculus, Ravish R. Singh, Mukul Bhatt, Mc Graw Hill Education(India) Private Limited.
3. Calculus, Dr. R.C. Shah, Books India Publication.
4. Integral Calculus, Shanti Narayan and Dr. P. K. Mittal, S. Chand Publication.
5. Ordinary and Partial Differential Equations, M.D. Raisinghania, S. Chand Publications



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Mathematics Major Course-2

MTM216-1C Application of Calculus and Differential Equations

Learning Outcomes:

After completing this course student will be able to

- Learn to find area between curves.
- Learn to find volume of solids.
- Understand the methods to evaluate double integrals.
- Understand the methods to evaluate triple integrals.
- Acquire the knowledge to find divergence and curl of vector point function.
- Understand the application of ordinary differential equations.

TEACHING AND EVALUATION SCHEME:

Subject Code	Subject Title	Teaching Scheme	Credits	Examination Scheme			Total Marks
		Practical Per Week		Hrs.	Max Marks		
					CCE	SEE	
MTM216-1C	Application of Calculus and Differential Equations	8	4	5	50	50	100

Unit 1 Applications of Integration

Teaching Hours: 15

1. Finding area between curves.
2. Finding volume by slicing.
3. Finding volume of solids of revolution by disk method.
4. Finding volume of solids of revolution by Washer method.
5. Finding volume by cylindrical shells.
6. Evaluation of double integrals.
7. Evaluation of triple integrals.
8. To find divergence of vector point function.
9. To find curl of vector point function.



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Unit 2 Applications of Differential Equations

Teaching Hours: 15

1. Application of differential equation of first order and first degree of variable separable form.
2. Application of Leibnitz's equation.
3. Examples on Bernoulli's equation.
4. Application of homogeneous differential equation.
5. Examples on non-homogeneous differential equation.
6. Examples on exact differential equation.
7. Examples on non-Exact differential equation.
8. Trajectories.

Reference Books:

1. Differential Equations, Dr. R. C. Shah Books India Publications.
2. Linear Algebra and Vector Calculus, Ravish R. Singh, Mukul Bhatt, Mc Graw Hill Education(India) Private Limited.
3. Calculus, Dr. R.C. Shah, Books India Publication.
4. Integral Calculus, Shanti Narayan and Dr. P. K. Mittal, S. Chand publication.
5. Ordinary and Partial Differential Equations, M.D. Raisinghania, S. Chand Publications
6. Advanced Engineering Mathematics, H. K. Dass, S. Chand Publications



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Mathematics Minor Course Semester– 2

MTE210-1C Probability and Probability Distributions-I

Learning Outcomes:

After completing this course student will be able to

- Understand the concept of probability and various theorems related to probability.
- Understand the definition of mathematical expectation.
- Understand the meaning of probability distribution and to get in depth knowledge on Binomial distribution.

TEACHING AND EVALUATION SCHEME:

Subject Code	Subject Title	Teaching Scheme		Credits	Examination Scheme			Total Marks
		Theory Per Week	Practical Per week		Hrs.	CCE	SEE	
MTE210-1C	Probability and Probability Distributions-I	2	4	4	2 (Th.) 2.5 (Pr.)	50	50	100

Unit 1 Probability Theory

Teaching Hours: 15

Definition of probability, Importance of the concept of probability, Classical probability approach, Modern definition of probability, Objective and subjective approach to probability, Experiment, Event, Types of event, Theorems of probability, Addition and multiplication theorem, Conditional probability, Bayes' theorem, Random variable, Expected value, Addition and multiplication laws of expectation, Use of geometric progression series in probability, Probability distribution of a random variable.

Unit 2 Binomial Distribution

Teaching Hours: 15

Probability Distributions, Usefulness of theoretical distribution, Types of theoretical distributions, Meaning of Binomial distribution, Characteristics of Binomial distribution, Probability function of Binomial distribution, Various terms of Binomial distribution, Expected frequencies of Binomial distribution, Constants of Binomial distribution.



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Practicals

Teaching Hours: 60

1. Computation of Quartiles.
2. Computation of Percentile.
3. Computation of quartile deviation.
4. Computation of percentile deviation.
5. Computation of mean deviation.
6. Computation of standard deviation and variance.
7. Examples based on probability and conditional probability.
8. Examples based on Bayes' theorem.
9. Examples on Binomial distribution.
10. Examples to calculate constants of Binomial distribution.

*Continuous Evaluation: It consists of Assignments/Seminars/Presentations/Quizzes/Surprise Tests

Reference Books:

1. Statistical analysis: Graphs and diagrams, Spectrum books(P)Ltd, New Delhi.
2. Introduction to the Practice of Statistics, Moore, S. David; Mc Cabe, P. George W. H. Freeman and Company, New York.
3. Basic Statistics, Agarwal, B. L., New Age International(P)Ltd.
4. Introduction to the theory of Statistics, Mood, A. M., Greybill, F.A., Boes, D.C., McGraw Hill.
5. Fundamentals of Mathematical Statistics, S. C. Gupta and V. K. Kapoor, Sultan Chand and Sons, New Delhi.
6. Business Statistics, P. C. Tulsian and Bharat Jhunjhnuwala, S Chand and Company Limited, New Delhi.



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Mathematics Multidisciplinary Course –Semester 2

MDC220-1C Object Oriented Programming using C++

Learning Outcomes:

After completing this course student will be able to

- Develop C++ programs to solve problems using procedure oriented approach.
- Develop C++ programs using classes and objects.
- Solve problem related to real life entities by using inheritance, templates.
- Develop functions.
- Use polymorphism in C++ programs.

TEACHING AND EVALUATION SCHEME:

Subject Code	Subject Title	Teaching Scheme		Credits	Examination Scheme			Total Marks
		Theory Per Week	Practical Per week		Hrs.	CCE	SEE	
MDC220-1C	Object Oriented Programming using C++	2	4	4	2(Th.) 2.5(Pr.)	50	50	100

Unit1 Overview of C++ and basic Concepts

Teaching Hours:15

Introduction to features of Object-Oriented Programming v/s Procedural Programming, OOP basic concepts, C++ basic syntax and structure, Data types and modifiers, Variables, Operators, sizeof and typedef, Decision making, Loop types, Storage classes, Functions, Classes and Objects: Defining class and object, Access controls in classes, Accessing data members, Member functions in class

Unit 2 Constructor and Destructor, Inheritance and Overloading

Teaching Hours:15

Constructor and Destructor, Introduction of inheritance, Defining a derived class, Different kinds of inheritance: Single, Multilevel, Multiple, Hierarchical, Hybrid inheritances, Polymorphism, Function overriding, Operator overloading and Function overloading



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Practicals

Teaching Hours: 60

1. Programs based on input and output.
2. Programs on iterations.
3. Programs on control structures.
4. Examples of all types of constructors.
5. Examples of all types of destructor.
6. Programs based on all types of Inheritance.
7. Programs based on function overloading.
8. Programs of operator overloading.

- *Continuous Evaluation: It consists of Assignments / Seminars / Presentations / Quizzes / Surprise Tests

Reference Books:

1. E. Balaguruswamy, Object Oriented Programming in C++.
2. Schaums Outline series, *Programming in C++*.
3. Venugopal, Rajkumar, Ravishankar, *Mastering C++*, Mc Graw Hill.
4. Stroustrup, Bjarne, *The C++ Programming Language*, Addison Wesley.
5. Robert Lafore, *Object Oriented Programming in C++*, McGraw Hill.



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Mathematics SEC (Skill Enhancement Course)–Semester 2

SEC219-1C Cyber Sphere and Security: Global Concern

Learning Outcomes:

After completing this course student will be able to

- Apprehend key terms of cyber domain and identify cyber threats.
- Understand cyber law concepts.
- Diagnose and examine basic security loopholes, anomalous behavior in internet.
- Principles of web security.
- Secure and protect personal data with safe Internet usage.

TEACHING AND EVALUATION SCHEME:

Subject Code	Subject Title	Teaching Scheme		Credits	Examination Scheme			Total Marks
		Theory Per Week	Practical Per week		Hrs.	CCE	SEE	
SEC219-1C	Cyber Sphere and Security: Global Concern	2	0	2	2	25	25	50

Unit 1 Introduction to Cyber Security

Teaching Hours: 15

Types of Threats: Malware, Viruses, Trojan horses, Spyware, Denial of service attacks, Web attacks, Networks and the Internet, How the internet works, IP addresses, Cyber stalking, Fraud, and abuse industrial espionage in cyberspace, Cryptography basics, Computer security software, Virus scanners, Firewalls, Antispyware intrusion-detection software, Website security, Email, Mobile devices, Employees facility, Security, Operational security, Payment cards incident response and reporting.

Unit 2 Cyber Crime

Teaching Hours: 15

Introduction, Categorization of cybercrimes, Technical aspects of cybercrimes: Unauthorized access & Hacking, Trojan attack, Virus and worm attack, E-mail & IRC related crimes, Forgery, IPR violations, Cyber terrorism, Banking/Credit card related crimes, Ecommerce/ Investment frauds, Sale of illegal articles, Online gambling, Defamation, Pedophiles, Identity theft, Data diddling, Theft of internet hours, Theft of computer system (Hardware), Physically damaging a computer system, Breach of privacy and confidentiality.

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Reference Books:

1. Computer Security Fundamentals, by Chuck Easttom, Pearson Education.
2. Anti-Hacker Tool Kit (Indian Edition) by Mike Shema, Publication Mc Graw Hill.
3. Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives by Nina Godbole and Sunit Belpure, Publication Wiley