Study & Evaluation Scheme

of

Master of Science (Mathematics)

[Applicable for Academic Session 2017-18]

[Approved by Hon'ble VC dated August 08, 2017 & August 14, 2018]

TEERTHANKER MAHAVEER UNIVERSITY

N.H.-24, Delhi Road, Moradabad, Uttar Pradesh-244001

Website: www.tmu.ac.in

TEERHANKER MAHAVEER UNIVERSITY

(Established under Govt. of U. P. Act No. 30, 2008)
Delhi Road, Bagarpur, Moradabad (U.P)

Study & Evaluation Scheme
Master of Science
SUMMARY

Programme	:	M.Sc. (Mathematics)
Duration	:	Two-year full time (Four Semesters)
Medium	:	English
Minimum Required Attendance	:	75 %
Credit	:	
Maximum Credit	:	90
Minimum credit required for the degree	:	86

Assessment :

Internal	External	Total
40	60	100

Internal Evaluation (Theory Papers)

Class Test I	Class Test II	Class Test III	Assignment(s)	Attendance	Total
Best two out of three					
10 Marks	10 Marks	10 Marks	10 Marks	10 Marks	40 Marks

Evaluation of Practical :

Internal	External	Total
50	50	100

Evaluation of Seminar/Viva :

Internal	External	Total
50	50	100

Duration of Examination :

External	Internal
3 hrs.	$1\frac{1}{2}$ hrs

(To qualify the course a student is required to secure a minimum of 45% marks in aggregate in each course including the semester-end examination and the teacher's continuous evaluation shall be essential for passing the course and earning its assigned credits. A candidate, who secures less than 45% marks in a course, shall be deemed to have failed in that course.)

Question Paper Structure

1. *The question paper shall consist of six questions. All six are compulsory. First question shall be of short answer type (not exceeding 50 words). Question No. 1 shall contain 8 parts representing all units of the syllabus and students shall have to answer any five (weightage 2 marks each).*
2. *Remaining five questions will be one from each unit with internal choice. The student has to answer one of the two in each question. The weightage of Question No. 2 to 6 shall be 10 marks each.*
3. *Usually each question in the examination should be designed to have a numerical component, where part of syllabus.*

Note 1:

Evaluation Scheme for MOOC, Short Term Courses:

University allows students to undertake additional subjects/course(s) (In-house offered by the university through collaborative efforts or courses in the open domain by various internationally recognized universities) and to earn additional credits on successful completion of the same. Each course will be approved in advance by the University following the standard procedure of approval and will be granted credits as per the approval.

Keeping this in mind the Academic Council in its 10th meeting on February 13, 2016, approved the University proposal and allowed a maximum of two credits to be allocated for MOOC courses. In the pilot phase it is proposed that a student undertaking and successfully completing a MOOC course through edX, Coursera, IIRS and NPTEL could be given a maximum credit of two with 1 credit for credit with 30-60 contact hours and 2 credits for courses having more than 60 credit hours.

For smooth functioning and monitoring of the scheme the following shall be the guidelines for MOOC courses, Add-on courses carried out by the College from time to time.

1. There shall be a MOOC co-ordination committee in the College with a faculty at the level of Professor heading the committee and all Heads of the Department being members of the Committee.
2. The Committee will list out courses to be offered during the semester, which could be requested by the department or the students and after deliberating on all courses finalise a list of courses to be offered with credits defined for each course and the mode of credit consideration of the student. The complete process including the approval of the Vice Chancellor shall be obtained by the College before end of June and end of December for Odd and Even semester respectively of the year in which the course is being offered. In case of MOOC course the approval will be valid only for the semester on offer.
3. A student can opt for a maximum of two MOOC courses for credit during the complete duration of the course other than offered under SWAYAM.
4. College can offer upto 20% credit through courses offered by SWAYAM. However, if the college is offering courses on other MOOC platforms, the total credit offered under MOOC will not exceed 20% including those offered under SWAYAM.
5. Students will register for the course and the details of the students enrolling under the course along with the approval of the Vice Chancellor will be forwarded to the Examination department within fifteen days of start of the semester by the Co-ordinator MOOC through the Principal of the College.

6. Where the MOOC course or Add-on on courses are only offering certificate of successful completion, and credit has been assigned to the course, the University examination division will conduct a MCQ examination for the course with 50 MCQ with 100 marks to facilitate inclusion of the courses in CPI computation.
7. College will define whether the credits are regular credits or to be considered only in case a student fails to secure minimum required credits then the additional subject(s) shall be counted for calculating the minimum credits required for the award of degree.
8. In case the College wants the additional course to be shown in the mark sheet as additional course completed by the students the same shall also be mentioned by the College and the student will opt for the same at the time of taking admission to the course.

Study and Evaluation Scheme
Semester I

S. No.	*Subject Code*	*Subject*	*Periods*			*Credit*	*Evaluation Scheme*		
			L	*T*	*P*		*Internal*	*External*	*Total*
1	MAT111	Differential Equation	4	-	-	4	40	60	100
2	MAT112	Real Analysis	4	-	-	4	40	60	100
3	MAT113	Linear Algebra	4	-	-	4	40	60	100
4	MAT115	Research Methodology	3	1	-	4	40	60	100
5	MCS111/ ECS212/ BCS111	Computer System & Programming in C^{++}	3	-	-	3	40	60	100
6	MCS161/ ECS262/ BCS161	Computer System & Programming in C^{++} (Lab)	-	-	2	1	50	50	100
7	MOOC11	MOOC Program-I (Optional)	-	-	-	1/2	-	100	100
8	MSC111	Discipline & General Proficiency	-	-	-	-	100	-	100
		Total	**18**	**1**	**2**	**20**	**350**	**350**	**800**

Semester II

S. No.	*Subject Code*	*Subject*	*Periods*			*Credit*	*Evaluation Scheme*		
			L	*T*	*P*		*Internal*	*External*	*Total*
1	MAT211	Complex Analysis	4	-	-	4	40	60	100
2	MAT212	Advance Abstract Algebra	4	-	-	4	40	60	100
3	MAT213	Numerical Techniques	4	-	-	4	40	60	100
4	MAT214	Topology	4	-	-	4	40	60	100
5	MAT215	Operation Research	4	-	-	4	40	60	100
6	MAT261	Numerical Techniques (Lab)	-	-	2	1	50	50	100
7	MOOC12	MOOC Program-II (Mandatory)	-	-	-	1/2	-	100	100
8	MSC211	Discipline & General Proficiency	-	-	-	-	100	-	100
		Total	**20**	**0**	**2**	**22/23**	**350**	**450**	**800**

Semester III

S. No.	*Subject Code*	*Subject*	*Periods*			*Credits*	*Evaluation Scheme*		
			L	*T*	*P*		*Internal*	*External*	*Total*
1	MAT311	Functional Analysis	4	-	-	4	40	60	100
2	MAT312	Partial Differential Equations	4	-	-	4	40	60	100
3	MAT314	Graph Theory	4	-	-	4	40	60	100
4	**Departmental Elective-I**								
	MAT315	Probability & Mathematical Statistics	3	-	-	3	40	60	100
	MAT316	Calculus of variations and Integral Equation							
5	**Open Elective**								
	MSC011	Industrial Safety & Health Hazards	4	-	-	4	40	60	100
	MSC012	Elementary Biophysics							
	MSC013	Statistical Techniques in Data Mining							
	MSC014/ ECS411/511/ 611	Database Management System							
6	MOOC13	MOOC Program-III (Mandatory)	-	-	-	1/2	-	100	100
7	MSC311	Discipline & General Proficiency	-	-	-	1	100	-	100
		Total	**19**	**0**	**0**	**21/22**	**300**	**400**	**700**

Semester IV

S. No.	*Subject Code*	*Subject*	*Periods*			*Credits*	*Evaluation Scheme*		
			L	*T*	*P*		*Internal*	*External*	*Total*
1	MAT411	Number Theory	3	-	-	3	40	60	100
2	MAT412	Advance Discrete Mathematics	4	-	-	4	40	60	100
3	**Departmental Elective-II**								
	MAT413	Fourier & Integral Transform	3	-	-	3	40	60	100
	MAT414	Fuzzy sets & its application							
4	MAT461	MATLAB Programming	-	2	2	2	50	50	100
5	MAT492	Project, Seminar & Viva	-	-	24	12	50	50	100
6	MSC411	Discipline & General Proficiency	-	-	-	1	100	0	100
		Total	**10**	**2**	**26**	**25**	**320**	**280**	**600**

Semester I
Differential Equation

Course Code: MAT111

L	T	P	C
4	0	0	4

Objective:

1. To enhance the student knowledge in the concern area.
2. To explore and identify the basic principle and the application of the subject.
3. To enable the use of Linear algebra in coding Matrix

Course Outcomes:

1. Student will get the core knowledge of the subject.
2. They will able to understand the concept and can give interpretation of the results.
3. They will tackle the matrix problems, which are very useful in electrical circuit problems and other Engineering subject such as Graph theory etc.
4. They will able to apply the subject on practical ground.

Unit I **(Lectures 08)**

Linear differential equations with constant coefficients; Initial value problems for second order equations; Second order homogeneous differential equation; Wronskian and its theorem, linear dependence and independence of solutions by Wronskian.

Unit II **(Lectures 08)**

Linear equations with variable coefficients: Method of reduction, Rule to finding out part of the C.F, Removal of first derivative, Changing of independent variable, Variation of parameters, Simultaneous linear differential equation.

Unit III **(Lectures 08)**

Total differential equation, Necessary and sufficient condition for intangibility of a single differential equation, special method I: solution by inspection, special method II: solution of homogeneous equation.

Unit IV **(Lectures 08)**

Power series method, Ordinary point, Solution of the differential equation when x=0 is an ordinary point, Singular point about x=a, Singular point about x=0, Frobenius method with all cases.

Unit V **(Lectures 08)**

Picard's iterative methods, Existence and Uniqueness solutions, Lipschitz condition, Existence Theorem, Uniqueness solutions, Existence and Uniqueness solutions.

Text Books:

1. E. A. Coddington, An Introduction to Ordinary Differential Equations, Prentice-Hall of India.
2. G.F. Simmons, Differential equations with applications and historical note, Tata McGraw Hill.
3. M. Rama Mohana Rao, Ordinary Differential Equations, East-West Press.

Reference Books:

1. G. Birkhoff and G.C. Rota, Ordinary differential equations, John Wiley and Sons.
2. S. G. Deo, V. Lakshmikantham, V. Raghvendra, Text book of ordinary Differential Equations, Tata Mc-Graw Hill.

*** Latest editions of all the suggested books are recommended**

Semester I
Real Analysis

Course Code: MAT112 **L T P C**

4 0 0 4

Objective: Real Analysis is a major course in mathematics, traditionally viewed as a difficult subject. Indeed, Real Analysis is a very rewarding subject that allows for an appreciation of the many interconnections with other mathematical areas.

Course Outcomes-To immerse into the world of formal/abstract mathematics in which formal proofs and definitions are used in abundance.

Unit I **(Lectures 08)**

Riemann Stieltjes Integral:

Definition, Lower and Upper Riemann-Stieltjes integral, Existence of Reimann- Stieltjes integral; Reimann- Stieltjes sum as a limit of sum, Inequalities of Reimann- Stieltjes, Algebra of Reimann- Stieltjes,

Unit II **(Lectures 08)**

Uniform convergence of Sequences and series of functions:

Continuity of the uniform limit of a uniformly convergent sequence, Test for the uniform convergence of a series, Abel's test and Dirichlet's test, Properties of Uniform convergence series; Weierstrass approximation theorem.

Unit III **(Lectures 08)**

Power series; Algebra of power series; Uniqueness theorem for power series; Abel's and Tauber's theorems.

Unit IV **(Lectures 08)**

Functions of several variables; Simultaneous and iterated limits; Partial derivatives; Interchange of the order of differentiation; Linear transformation; Derivatives in an open subset of R^n; Derivatives of higher orders; Taylor's theorem.

Unit V **(Lectures 08)**

Implicit function; Implicit function theorem (without proof); Derivative of Implicit function; Jacobian, Stationary values under constraints.

Text Books:

1. Walter Rudin, *Principles of Mathematical Analysis*, McGraw-Hill.

Reference Books:

1. T. M. Apostol*, Mathematical Analysis*, Narosa Publishing.
2. J. White, *Real Analysis, An Introduction*, Addison-Wesley Publishing.
3. H. L. Royden, *Real Analysis*, Macmillan Publishing Co. Inc.

*** Latest editions of all the suggested books are recommended**

Semester I
Linear Algebra

Course Code: MAT113

L	T	P	C
4	0	0	4

Objective-

1. To enhance the student knowledge in the concern area.
2. To explore and identify the basic principle and the application of the subject.
3. To enable the use of Linear algebra in coding Matrix

Course Outcomes-

1. Student will get the core knowledge of the subject.
2. They will able to understand the concept and can give interpretation of the results.
3. They will tackle the matrix problems, which are very useful in electrical circuit problems and other Engineering subject such as Graph theory etc.
4. They will able to apply the subject on practical ground.

Unit I **(Lectures 08)**

Vector Spaces: Definition, General properties of vector spaces; Vector subspaces; Algebra of subspaces; Linear Spans; Row space of Matrix; Linear dependence and independence of vectors; Finite-dimensional vector spaces; Dimension of vector space and sub-spaces; Quotient spaces; Direct sum of spaces; Coordinates; Disjoint subspaces.

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Unit II **(Lectures 08)**

Vectors in R^n; Curves in R^n; Vectors in R^3; Vector in C^3; Matrices: Addition and scalar multiplication, Transpose of matrix, Square matrices; Systems of linear equations; Diagonalization; Eigen values and Eigen vectors; Minimal polynomial; Cayley-Hamilton Theorem; Hermitian & Skew-Hermitian and unitary matrices; Powers of Matrices; Polynomials in Matrices; Invertible Matrices; Special types of Square Matrices; Complex and Block Matrices.

Unit III **(Lectures 08)**

Linear Transforms; Linear operator; Range and null space of a linear Transformation; Rank and nullity; Product of linear Transformation; Singular Transformation; Representation of linear Transformation by matrix; Dual spaces; Dual Bases; Projections.

Unit IV **(Lectures 08)**

Inner Product Spaces: Definition, Euclidean and unitary spaces; Norm and length of vector; Cauchy-Schwarz's inequality and Applications; Orthogonality, Orthogonal Sets and Basis, Gram-Schmidt orthogonalization process; self-adjoint operators, Complex Inner Product Spaces; Unitary and Normal operators; Projection theorem; Spectral theorem.

Unit V **(Lectures 08)**

Bilinear Forms: Definition, Bilinear form as vectors; Matrix of a bilinear form; Symmetric & skew Symmetric bilinear forms.

Text Books:

1. Vivek Sahai, Vikas Bist; *Linear Algebra*, Narosa Publishing House.
2. Sharma & Vashistha, *Linear Algebra*, Krishna Prakashan Media Ltd.

Reference Books:

1. Schaum's series *Linear Algebra*, Tata McGraw- Hill.
2. Kenneth Hoffman & Ray Kunze, *Linear Algebra*, Pearson Education.

*** Latest editions of all the suggested books are recommended**

Semester-I

Research Methodology

Course Code: MAT115 **L T P C**
3 1 0 4

Objective:

- Students should understand a general definition of research design
- Students should know why educational research is undertaken, and the audiences that profit from research studies
- Students should be able to identify the overall process of designing a research study from its inception to its report

Course Outcomes: At the end of this course, the students should be able to:

- understand some basic concepts of research and its methodologies
- identify appropriate research topics
- select and define appropriate research problem and parameters
- prepare a project proposal (to undertake a project)
- organize and conduct research (advanced project) in a more appropriate manner
- write a research report and thesis

Course Contents:

UNIT I **(Lectures 08)**

Research Methodology: Introduction to Research methodology: Meaning, Objective Types of research & research approaches, Criteria for Good research .Review of Literature. Research problem: Statement, Purpose, Objective, Necessity of defining the problems. Research design: Meaning, Need Features, Different research design.

UNIT II **(Lectures 08)**

Measurement of scaling techniques: Measurement scales, sources of error in measurement, technique of developing measurement tools, Meaning of scaling, its classification, important scaling techniques. Methods of collection, Sampling Techniques

UNIT III **(Lectures 08)**

Introduction to statistics: Meaning, Definition, Characteristics, importance of the study of statistics .Tabulation of Data: Basic principles of graphical representation, Types of diagrams histograms, frequency polygons, smooth frequency polygons, cumulative frequency curve. Measures of central Tendency: Mean, Median Mode, Measures of Dispersion: Range, mean deviation and standard deviation.

UNIT IV **(Lectures 08)**

Testing of Hypotheses, Level of significance, Degree of freedom, Student t-test, F- test, Chi Square-test, Anova-one way & two way; Correlation & regression: Significance, Types of Correlation, Linear Regression

UNIT V **(Lectures 08)**

Interpretation and report writing: Meaning, Techniques of interpretation, significance of report writing, steps in writing, layout of the research report, types of report and precautions for writing research report. Use of SPSS in Data Analysis.

Text Books:

1. Dr. J. A Khan: Biostatistics & Research Methodology, APH Publishing.
2. C. R Kothari: Research Methodology, Methods & techniques New age international Publishers.
3. R. Paneerselvam Research Methodology, PHI Learning Second Edition.
4. Kapoor B.K & Gupta S.C, Fundamental of Statistics, S. Chand Publication, New Delhi.
5. Malhotra Naresh K. Marketing Research, Pearson Education.

*** Latest editions of all the suggested books are recommended**

Semester I
Computer System & Programing in C++

Course Code: MCS111/ECS212/BCS111

L	T	P	C
3	0	0	3

Objective: To learn the basics of computers & C++ programming language.

Course Outcomes:

1. Be exposed to basic hardware and software concepts
2. Be familiar with issues related to software design
3. Be familiar with using C++ functions and the concepts related to good modular design.
4. Be familiar with using C++ structures.
5. Be familiar with using pointers and reference parameters.
6. Be familiar with using text file input/output

Course Contents:

Unit I **(Lectures 08)**

Problem Solving: Phases of problem solving, Algorithms, Structure Chart, Flow chart, Practice of solving Sequence Problems, Selection Problems, Repetition problem.
Statements for problem solving: if, switch, while, for, do, break, continue, go to statements.

Unit II **(Lectures 08)**

Concepts in Computer Application: Generations, Characteristic and Application of Computers, Functional Component of Computer: CPU, I/O devices, Type of Memory.
Translators: Assembler, Compiler, and Interpreter; Number System: Decimal, Octal, Binary and Hexadecimal &their Conversions; Various Codes: BCD, ASCII and EBCDIC and Gray Code.

Unit III **(Lectures 08)**

Concepts in Operating System: Purpose, Services, Types, Functions.
Data Communication & Networks: Types, Topology, IP address classes.
C++ Basics: Data types, Variables, Constants, Keywords, Identifiers, Types of Operators, Memory Allocation operators, Expressions, Pre-processor directives, Introduction to Array, Pointers, Structures and Strings.

Unit IV **(Lectures 08)**

Functions: Scope of variables; Parameter passing; Default arguments; Inline functions; Recursive functions; Pointers to functions.
C++ Classes and Data Abstraction: Class Structure, Objects; this pointer; Friend function; Static class members; Constructors and Destructors; Data abstraction.
Inheritance: Types, Access to the base class members; Virtual base class.

Unit V **(Lectures 08)**

Polymorphism: Function overloading; Operator overloading; Static Binding and Dynamic bindings; Virtual function: Definition, Call mechanism, Pure virtual functions; Virtual destructors; Abstract Classes.

C++ I/O: Stream classes hierarchy; Stream I/O; File streams; Overloading << and >> operators; File Modes, Reading and Writing to a file; Formatted I/O.

Text Books-

1. Bjarne Stroutrup, The C++ Programming Languge, Adison Wesley.
2. Object-Oriented Programming with C++, Balagurusamy, TMH
3. C++ The Complete Reference, Schildt, TMH
4. Programming in C++, Shah & Thaker, ISTE/EXCEL

Reference Books-

1. Beginning C++, The Complete Language, Horton,SPD/WROX
2. Programming with C++, Radhaganesan, Scitech
3. Projects using C++, Varalaxmi, Scitech
4. Object Oriented modelling & Design, RumBaugh, PHI

***Latest editions of all the suggested books are recommended.**

Semester I
Computer System & Programing in C++ (Lab)

Course Code: MCS161/ECS262/BCS161

L	T	P	C
0	0	2	1

LIST OF EXPERIMENTS:

Note: Minimum 15 experiments should be performed from the following:

1. Write a Program (WAP) to calculate Sum & average of N numbers.
2. WAP to convert integer arithmetic to a given number of day and month.
3. WAP to find maximum and minimum out of 3 numbers a, b & c.
4. WAP to find factorial of positive integer.
5. WAP to find sum of series up to n number, 2+5+8+……+n.
6. WAP to print all the number between 1 to 100 which are dividing by 7.
7. WAP to generate Fibonacci series up to n.
8. WAP to calculate area of circle using Functions.
9. WAP to calculate factorial of given number using Recursion function.
10. WAP to find whether number is prime or not.
11. WAP to find that the enter character is a letter or digit.
12. WAP to find addition of two matrix of n*n order.
13. WAP to find multiplication of two matrix of n*n order.
14. WAP to find even or odd up to a given limit n.
15. WAP to find whether a given no is palindrome or not.
16. WAP to Swap two numbers using third Variable and without using third variable.
17. WAP to Swap two numbers using call by value and call by reference.
18. WAP illustrating overloading of various operators.
19. WAP illustrating use of Friend.
20. WAP illustrating use of Inline Function.
21. WAP illustrating use of destructor and various types of constructor.
22. WAP illustrating various forms of Inheritance.
23. WAP illustrating use of virtual functions, virtual Base Class.

Evaluation Scheme of Practical Examination:

Internal Evaluation (50 marks)
Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 4-point scale which would include the practical conducted by the students and a Viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (35 MARKS)				ON THE DAY OF EXAM (15 MARKS)		TOTAL INTERNAL (50 MARKS)
EXPERIMENT (5 MARKS)	FILE WORK (10 MARKS)	VIVA (10 MARKS)	ATTENDANCE (10 MARKS)	EXPERIMENT (5 MARKS)	VIVA (10 MARKS)	

External Evaluation (50 marks)
The external evaluation would also be done by the external Examiner based on the experiment conducted during the examination.

EXPERIMENT (20 MARKS)	FILE WORK (10 MARKS)	VIVA (20 MARKS)	TOTAL EXTERNAL (50 MARKS)

Semester I
DISCIPLINE & GENERAL PROFICIENCY

Course Code: MSC111

There shall be continuous evaluation of the student on the following broad parameters:

1. Observance of dress code.

2. Participation in Conferences /Workshops / Seminars.

3. Attendance in guest lectures, invited talks and special technical sessions organized from time to time.

4. Participation in community projects including NSS.

5. Exhibiting team spirit in different Culture & extra curriculum activities, Department Club activities of the University and College organized from time to time.

6. Observance of rule & regulations in the College/University, Behavior in Campus Premises, Bus, hostel mess and hostel.

7. Performance and awards received in different events (sports/ co-curricular activities) organized at College / University and other level.

8. General behavior

9. Any extraordinary achievement.

The above is an indicative list of parameters on which the students shall be continuously evaluated. The college may evaluate the student on the specific parameters by informing them through a notice displayed on the notice board before evaluation. There shall be no external examination for this course; however, the marks shall be included for calculation of cumulative Performance Index (CPI).

Head of Department would be display GP marks on notice board in prescribed format after IInd & IIIrd CT in semester:

S No		Enroll No.	Student Name	Dress code	Participation in Conferences /Workshops / Seminars	Participation in guest lectures, invited talks and special technical sessions	Participation in community Services	Participation in Culture & extra curriculum activities, Department Club Activities	Participation in sports/ co-curricular activities	General Behavior	Any Extra Achievement
				(5)	**(15)**	**(20)**	**(10)**	**(20)**	**(20)**	**(5)**	**(5)**
	Responsible for marks			Mentor	Head	Head	Mentor	Cultural Events Coordinator & Department Club Coordinator	Sports Coordinator	Mentor	Director or Principal

Semester II
Complex Analysis

Course Code: MAT211

L	T	P	C
4	0	0	4

Objective-

1. Objective of this course develop a toolbox of common math tools utilized in mathematics.
2. In this course covers essential mathematical methods for an emphasis on Complex Analysis, Statistical Methods.
3. To learn common math tools like Mapping, Residues.
4. Apply math tools to physical applications.

Course Outcomes-

1. Students will be able to identify which math tools best suit for physical problems.
2. Apply Cauchy's theorem to spectral and imaging processing.
3. This major combines the objectives of the Mathematics.

Course Contents:

Unit I **(Lectures 08)**

Functions of complex variables; Limit and continuity, Differentiability; Power Series as an analytic function, Exponential and Trigonometric functions, Complex Logarithms, Zeros of analytic functions.

Unit II **(Lectures 08)**

Complex integration, curves in the complex plane, basic properties of complex integrals winding number of a curve; Cauchy–Goursat Theorem, Cauchy's Integral formula, Morera's Theorem, Laurent's series Maximum modulus principle, Schwarz lemma, Liouville's theorem.

Unit III **(Lectures 08)**

Isolated singularities, removable singularity, poles, Singularity at infinity calculus of residue at finite point, residue at the point at in finite residue theorem, Number of zeros, Poles.

Unit IV **(Lectures 08)**

Bilinear transformations, their properties and classifications, Definitions and examples of conformal mappings; spaces of analytic functions, Montel's theorem, Riemann mapping theorem; Mobius transformations.

Unit V **(Lectures 08)**

Hyper-geometric Series, Generalized Hyper-geometric functions, Gamma function and its properties, Riemann Zeta function, Riemann's functional equation.

Text Books:

1. J.B. Conway, Narosa *Complex Analysis*, Publishing House.
2. Ruel V. Churchill, *Complex Variables and Applications,* Tata McGraw-Hill.
3. *Foundation of Complex Analysis,* S. Ponnusamy, Narosa Publishing House.

Reference Books:

1. H.A. Priestly, *Introduction to Complex Analysis,* Clarendon Press, Oxford.
2. J.B. Conway, *Function of one Complex Variable,* Springer-Verlag.
3. L.V. Ahlfors, *Complex Analysis,* McGraw-Hill.
4. Walter Rudin, *Real and Complex Analysis*, McGraw-Hill.

Semester II
Advance Abstract Algebra

Course Code: MAT212

L	T	P	C
4	0	0	4

Objective-The concepts and results of Algebra are fundamental to the study of Mathematics and represent a human achievement of great beauty and power Algebra is a core topic for all disciplines that use higher mathematics and logic.

Course Outcomes-To learn about the core area of mathematics upon which many other areas of mathematics draw and become a sophisticated mathematician.

Course Contents:

Unit I **(Lectures 08)**

Groups–Properties, Examples; subgroups, cyclic groups, homomorphism of groups and Lagrange's theorem; permutation groups, permutations as products of cycles, even and odd permutations, normal subgroups, quotient groups, isomorphism theorems, correspondence theorem.

Unit II **(Lectures 08)**

Group action; Cayley's theorem, group of symmetries, dihedral groups and their elementary properties; orbit decomposition; counting formula; class equation, consequences for p-groups; Sylow's theorems.

Unit III **(Lectures 08)**

Applications of Sylow's theorems, conjugacy classes in S_n and A_n, simplicity of A_n. Direct product; structure theorem for finite abelian groups; invariants of a finite Abelian group.

Unit IV **(Lectures 08)**

Basic properties and examples of ring, domain, division ring and field; direct products of rings, characteristic of a domain, field of fractions of an integral domain; ring homeomorphisms (always unitary); ideals, factor rings, prime and maximal ideals, principal ideal domain; Euclidean domain, unique factorization domain.

Unit V **(Lectures 08)**

A brief review of polynomial rings over a field; reducible and irreducible polynomials, Gauss' theorem for reducibility of $f(x) \in Z[x]$; Eisenstein's criterion for irreducibility of $f(x) \in Z[x]$ over Q, roots of polynomials; finite fields of orders 4, 8, 9 and 27 using irreducible polynomials over Z^2 and Z^3.

Text Books:

1. I.N. Herstein, *Topics in Algebra,* Wiley Eastern Ltd.
2. M. Artin, *Algebra*, Prentice-Hall of India.
3. N. Jacobson, *Basic Algebra,* Hindustan Publishing Corporation.

Reference Books:

1. Maclane and Birkhoff, *Algebra,* Macmillan Company.
2. S. Lang Addision, *Linear Algebra,* Wesley.
3. Hofmann and Kunz, *Linear Algebra*, Prentice Hall.

*** Latest editions of all the suggested books are recommended**

Semester II
Numerical Techniques

Course Code: MAT213

L	T	P	C
4	0	0	4

Objective-This course aims to provide students with the techniques for finding approximate numerical solutions to mathematical problems for which exact or analytical solutions are unavailable or inappropriate.

Course Outcomes-To have an appreciation of the difficulties involved in finding reliable solutions and will gain practical knowledge of how to apply the techniques and methods to specific problems.

Course Contents:

Unit I **(Lectures 08)**

Interpolation: Errors in Polynomial interpolation; Finite differences: Forward, Backward and Central differences, Symbolic relations, Difference of polynomial, Newton's formulae of interpolation, Central difference interpolation formulae: Gauss's, Bessel's & Stirling's formulae, Interpolation with unevenly spaced points: Lagrange's interpolation formula, Divided differences

Unit II **(Lectures 08)**

Errors in numerical calculations: Absolute, Relative and percentage errors, A general error formula, Error in a series approximation; Solutions of algebraic & transcendental equations: The Bisection method, The iteration method, Regula-Falsi method, Secant method, Newton- Raphson method.

Unit III **(Lectures 08)**

Numerical differentiation and integration: Forward, Backward and Central difference formulae for first and second order derivatives; Errors in numerical differentiation; Numerical integration, Trapezoidal rule; Simpson's 1/3 rule, Simpson's 3/8 rule; Boole's and Weddle's rules.

Unit IV **(Lectures 08)**

Numerical solution of ordinary differential equations: Taylor's series, Picard's successive approximations, Euler's, Modified Euler's, Runge-Kutta;
Simultaneous and higher order equations: Taylor's series method and Runge-Kutta method

Unit V **(Lectures 08)**

Boundary value problems, solution of partial differential equations: Finite difference approximations to derivatives; Laplace's equation: Jacobi's method, Gauss Seidel method; Parabolic equations: Explicit scheme, C-N scheme; Hyperbolic equations: Explicit scheme, Implicit scheme.

Text Books:

1. S.S. Sastry, *Introductory Methods of Numerical Analysis*, Prentice Hall of India.
2. Grewal B. S, *Numerical Methods in Engineering and Science*, Khanna Publishers.

Reference Books:

1. M.K. Jain, S. R. K Iyengar & R.K.Jain, *Numerical methods of Scientific and Engineering Computation*, New Age Pub.

*** Latest editions of all the suggested books are recommended**

Semester II
Topology

Course Code: MAT214

L	T	P	C
4	0	0	4

Objective-To gain proficiency in dealing with abstract concepts, with emphasis on clear explanations of such concepts to others, to introduce the theory of metric and topological spaces; to show how the theory and concepts grow naturally from idea of distance.

Course Outcomes-

1. To understand and appreciate the central results of general topology, sufficient for the main applications in geometry, number theory and analysis.
2. To work with continuous functions, and to recognize whether spaces are connected, compact or complete.

Course Contents:

Unit I **(Lectures 08)**

Metric spaces: Metric space, Quasi metric Space, pseudo metric, Open & Closed sphere, Open set, limit Point, Convergence of a sequence, Cauchy sequence, Isometric Space, Closed set, Open set, Interior, closure

UNIT II **(Lectures 08)**

Topological space: Topological space, Elementary concept, Basis for a topology, Open and closed sets, Interior and closure of sets, Neighborhood of a point, Limits points, Boundary of a set, Subspace topology, Relative topology.

UNIT III **(Lectures 08)**

Continuous Functions: Continuity, Sequentially continuous, Homeomorphism, Open and closed maps, Uniform continuity, Product invariant.

UNIT IV **(Lectures 08)**

Separation Axioms: T_0, T_1, T_2 space, Normal space, Hausdorff spaces, Regular spaces, T_3 Space, T_4 space, Tychnoff space, Tietz- Extention theorem, Uryshon Lemma.

UNIT V **(Lectures 08)**

Compactness: Reducible, Compact set, Finite intersection property, Locally Compact, Totally bounded set, Compactness for metric space.

Text Books:

1. James R. Munkres, *Topology,* Pearson Education Pvt. Ltd.
2. J. R Munkres, *Topology A First Course,* Prentice- Hall.
3. J.L. Kelly, *General Topology*, Van Nostrand, Reinhold Co.

Reference Books:

1. G.F. Simmons, *Introduction to Topology and Mordern Analysis*.
2. K. D. Joshi, *Introduction to General Topology*, Wiley Eastern Limited.
3. L. A. Steen and J. A. Seebach Jr, *Counterexamples in Topology,* Holt Rinehart and Winston.

*** Latest editions of all the suggested books are recommended.**

Semester II
Operation Research

Course Code: MAT215

L	T	P	C
4	0	0	4

Objective-The main aim of this course is to present different methods of solving optimization problems in the areas of linear programming, inventory and queuing theory, There will be some introduction to numerical methods for optimization problems.

Course Outcomes-

1. To solve problems involving optimization models with constraints.
2. To have deep insight in solving optimization problems which are linear and non-linear

Unit I **(Lectures 08)**

Introduction: Definition and scope of O.R., Different O.R. models, General methods for solving O.R. models, Main characterization and phases of O.R., Linear programming and Simplex method with simple problems, Two-phase and Big-M methods.

UNIT II **(Lectures 08)**

Inventory Management: Inventory control, Types of inventories, Cost associated with inventories, Factors affecting inventory control, Single item deterministic problems with and without shortages, Inventory control with price breaks, Inventory control for one period without setup cost with uncertain demands (News paper boy type problem).

UNIT III **(Lectures 08)**

Sequencing Theory: Introduction, Processing with n-jobs and two machines, n-jobs and three machines, n-jobs and m- machines, Concept of jobs blocks; Non-linear Programming: Convex sets and convex functions, Non linear Programming, Mathematical formulation, Global Minima & Local Minima of function, Lagrange Multipliers, Kuhn-Tucker Condition (Necessary and sufficient).

UNIT IV **(Lectures 08)**

Queuing Theory: Introduction, Characteristics of queuing systems, Poisson process and Exponential distribution; Classification of queues, Transient and steady states; Poisson queues (M/M/1, M/M/C).

UNIT V **(Lectures 08)**

Markov Analysis: Introduction, Markov Process, State Transition Matrix, Transition Diagram, Construction of a State- Transition Matrix, n-Step Transition Probabilities, Steady State Conditions, Markov Analysis Algorithm.

Text Books:

1. S. D. Sharma Operation Research, Kedar Nath Ram Nath.
2. H.A. Taha, Operation Research An introduction, Macmillan Publishing Company.

Reference Books:

1. P. K. Gupta, Kanti Swarup & Man Mohan, Operation Research, Sultan Chand & Co.
2. R. L. Ackoff and N.W. Sasieni, Fundamental of Operations Research, John Willy.

*** Latest editions of all the suggested books are recommended**

Semester II
Numerical Techniques (Lab)

Course Code: MAT261

L	T	P	C
0	0	2	1

Objective-This lab. aims to provide students with the techniques for finding approximate numerical solutions to mathematical problems by the method of programming.

Course Outcomes-To have an appreciation of the difficulties involved in finding reliable solutions by the method of computer programming.

Write programs in C:

1. To implement floating point arithmetic operations i.e, addition, subtraction, multiplication and division.
2. To deduce errors involved in polynomial interpolation
3. Algebraic and transcendental equation using Bisection, Newton Raphson, Iterative method of False position, rate of conversions of roots in tabular form for each of these methods
4. To implement formulae by Bessel's and Stirling etc.
5. Gaus Interpolation, Flow chart C program & output
6. Implement Numerical Differentiation
7. Implement Numerical Integration using Simpson's 1/3 and 3/8 rules
8. Implement Numerical Integration using Trapezoidal rule.
9. Solution of Differential Equation using 4^{th} order Runge Kutta method
10. Numerical Solution of ordinary first order differential equation- Euler's method with algorithm, flow chart C program and output
11. Newton's and lagrange's Interpolation with algorithm, flowchart C Program and output.
12. Iteration method, flowchart C Program and output

Evaluation Scheme of Practical Examination:

Internal Evaluation (50 marks)
Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 4-point scale which would include the practical conducted by the students and a Viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (35 MARKS)				ON THE DAY OF EXAM (15 MARKS)		TOTAL INTERNAL (50 MARKS)
EXPERIMENT (5 MARKS)	FILE WORK (10 MARKS)	VIVA (10 MARKS)	ATTENDANCE (10 MARKS)	EXPERIMENT (5 MARKS)	VIVA (10 MARKS)	

External Evaluation (50 marks)

The external evaluation would also be done by the external Examiner based on the experiment conducted during the examination.

EXPERIMENT (20 MARKS)	FILE WORK (10 MARKS)	VIVA (20 MARKS)	TOTAL EXTERNAL (50 MARKS)

Semester II
DISCIPLINE & GENERAL PROFICIENCY

Course Code: MSC211

There shall be continuous evaluation of the student on the following broad parameters:

1. Observance of dress code.

2. Participation in Conferences /Workshops / Seminars.

3. Attendance in guest lectures, invited talks and special technical sessions organized from time to time.

4. Participation in community projects including NSS.

5. Exhibiting team spirit in different Culture & extra curriculum activities, Department Club activities of the University and College organized from time to time.

6. Observance of rule & regulations in the College/University, Behavior in Campus Premises, Bus, hostel mess and hostel.

7. Performance and awards received in different events (sports/ co-curricular activities) organized at College / University and other level.

8. General behavior

9. Any extraordinary achievement.

The above is an indicative list of parameters on which the students shall be continuously evaluated. The college may evaluate the student on the specific parameters by informing them through a notice displayed on the notice board before evaluation. There shall be no external examination for this course; however, the marks shall be included for calculation of cumulative Performance Index (CPI).

Head of Department would be display GP marks on notice board in prescribed format after IInd & IIIrd CT in semester:

S No		Enroll No.	Student Name	Dress code	Participation in Conferences /Workshops / Seminars	Participation in guest lectures, invited talks and special technical sessions	Participation in community Services	Participation in Culture & extra curriculum activities, Department Club Activities	Participation in sports/ co-curricular activities	General Behavior	Any Extra Achievement
				(5)	**(15)**	**(20)**	**(10)**	**(20)**	**(20)**	**(5)**	**(5)**
	Responsible for marks			Mentor	Head	Head	Mentor	Cultural Events Coordinator & Department Club Coordinator	Sports Coordinator	Mentor	Director or Principal

Semester III
Functional Analysis

Course Code: MAT311 **L T P C**
4 0 0 4

Objective-This course extends the ideas studied in Analysis and Topology. Many of the topics studied in the course have applications in Approximation theory, linear and Banach spaces, operator's theory and other areas of mathematics.

Course Outcomes- To develop fundamental knowledge and end its own methods of dealing with its own characteristic problems.

Course Contents:

Unit I **(Lectures 08)**

Normed linear spaces, Banach spaces, Examples and counter examples, Quotient space of normed linear spaces and its completeness; Equivalent norms.

Unit II **(Lectures 08)**

Reisz Lemma, Basic properties of finite dimensional normed linear spaces; Bounded linear transformations and normed linear spaces of bounded linear transformations; Uniform boundedness theorem and some of its applications.

Unit III **(Lectures 08)**

Dual spaces, weak convergence, open mapping and closed graph theorems; Hahn Banch theorem for real and complex linear spaces.

Unit IV **(Lectures 08)**

Inner product spaces, Hilbert spaces–Orthonormal sets; Bessel's inequality, complete orthonormal sets and Perseval 's identity.

Unit V **(Lectures 08)**

Structure of Hilbert spaces, Projection theorem, Riesz representation theorem, Adjoint of and operator on Hilbert space, Self adjoint operators, Normal and Unitary operators. Projections.

Text Books:

1. E. Kreyszig, Functional Analysis and its application, John Wiley and sons.
2. J.N. Sharma & A. R. Vashistha, Functional Analysis, Krishana Publication.

Reference Books:

1. G. Bachman & L. Narici, Functional Analysis Academic Press.
2. H.C. Goffman and G. Fedrick, First course in Functional Analysis, Prentice Hall of India.
3. B.V. Limaye, Functional Analysis, New Age International Limited.

*** Latest editions of all the suggested books are recommended**

Semester III

Partial Differential Equations

Course Code: MAT312

L	T	P	C
4	0	0	4

Objective-Partial differential equations arise in every field of science and engineering. So, the solutions of these PDEs are of great interest in understanding various physical phenomena.

Course Outcomes-To study, correctly apply and find the solutions of PDE.

Course Contents:

Unit I **(Lectures 08)**

Examples of PDE, Classification, Transport Equation: Initial value Problem, Non-homogeneous Equation. Laplace's Equation: Fundamental Solution, Mean Value Formulas, Properties of Harmonic Functions, Energy Methods.

Unit II **(Lectures 08)**

Heat Equation: Fundamental Solution; Mean Value Formula, Properties of Solutions, Energy Methods. Wave Equation: Solution by Spherical Means. Non-homogeneous Equations, Energy Methods.

Unit III **(Lectures 08)**

Nonlinear First Order PDE-Complete Integrals, Envelopes, Characteristics; Hamilton –Jacobi Equations (Calculus of Variations, Hamilton's ODE, Legendre Transform, Hopf-Lax Formula, Weak Solutions, Uniqueness), Conservation Laws (Rankine-Hugoniot condition, Lax-Oleinik formula, Weak Solutions, Uniqueness).

Unit IV **(Lectures 08)**

Representation of Solutions-Separation of Variables, Similarity Solutions (Plane and Traveling Waves, Solitons, Similarity Linder Scaling), Fourier and Laplace Transform, Hopf-Cole Transform, Hodograph and Legendre Transforms. Potential Functions.

Unit V **(Lectures 08)**

Deriving Difference Equations, Elliptic Equations: Solution of Laplace's equation, Leibmann's method, relaxation method, solution of Poisson's equation, Parabolic equation: solution of heat equation, Bender-Schmidt method.

Text Books:

1. L.C. Evans, Partial Differential equations, Graduate Studies in Mathematics. Volume 19, AMS, 1998.
2.]. P. Prasad and R. Ravindran, Partial Differential equations, New Age International Pub. F. John, Partial Differential equations, Springer- Verlag.

Reference Books:

1. W. E. William, *Partial Differential equations,* Clarendon press-oxford.
2. E. T. Copson, *Partial differential equations,* Cambridge university press.
3. I.N. Sneddon, *Elements of partial differential equations,* Mc-Graw Hill book company.

*** Latest editions of all the suggested books are recommended**

Semester III
Graph Theory

Course Code: MAT314

L	T	P	C
4	0	0	4

Objective-To study and develop the concepts of graphs, sub graphs, trees, connectivity, Euler tours, Hamilton cycles, matching, coloring of graphs, Matrix representation of graphs, vertex coloring, and planar graphs, Dual.

Course Outcomes- To relate computing theory with applications, understand and design the different types of graphs with networking.

Course Contents:

Unit I **(Lectures 08)**

Graph; Applications of Graph; Finite and Infinite Graphs; Null Graph; Incidence and Degree; Isolated Vertex; Pendant Vertex; Isomorphism; Sub graphs; Walks; Paths; Circuits; Connected Graphs, Disconnected Graphs and Components.

Unit II **(Lectures 08)**

Euler's Graph; Operations on Graphs; Hamiltonian Paths and Circuits; Shortest Path Algorithms; The Traveling Salesman Problem**;** Dijkastra's Algorithm; Fleury's Algorithm

Unit III **(Lectures 08)**

Trees; Properties of Trees; Pendant Vertices in a Tree; Distance and Centers in a Tree; Rooted and Binary Trees, On Counting Trees; Spanning Trees; Fundamental Circuits; Finding All Spanning Trees of a Graph; Spanning Trees in a Weighted Graph; Cut-Sets; Some Properties of a Cut-Set; Fundamental Circuits and Cut-Sets, Connectivity and Separability; Network Flows.

Unit IV **(Lectures 08)**

Combinatorial and Geometric Graphs; Planar Graphs; Kuratowski's Two Graphs; Different, Detection of Planarity; Geometric Dual; Combinatorial Dual; Thickness and Crossings; Vectors and Vector Space; Associated with a Graph.

Unit V **(Lectures 08)**

Matrix representation of graphs; Incidence matrix; Sub matrix of $A(G)$; Circuit matrix, Fundamental circuit matrix and Rank of B; Cut-set matrix; Path matrix; Adjacency Matrix; Adjacency Matrix; Chromatic Number; Chromatic Partitioning; Chromatic Polynomial; Matching Coverings, The Four-Color Problem.

Text Books:

1. Narsingh Deo; Graph Theory; Prentice-Hall, Inc.
2. Douglas B. West; Introduction to Graph Theory; Pearson Education Pvt. Ltd.
3. Gary Chartrand; Chromatic Graph Theory; CRC Press.

Reference Books:

1. J.A. Bondy U.S.R. Murty; Graph Theory, Springer.
2. Reinhard Diestel; Graph Theory, Springer.

*** Latest editions of all the suggested books are recommended**

Semester III

Probability & Mathematical Statistics

Course Code: MAT315

L	T	P	C
3	0	0	3

Objective-This course introduces Random and Continuous variable, with sampling significance tests, estimation, probability distributions with rigorous mathematical treatment.

Course Outcomes-To study, correctly apply and interpret different statistical methods. This study is helpful to test the significance of the different types of data in different fields.

Course Contents:

Unit I **(Lectures 08)**

Random variable and sample space, notion of probability, axioms of probability, empirical approach to probability, conditional probability, independent events, probability distributions with discrete and continuous random variables, joint probability mass function, marginal distribution function, joint density function.

Unit II **(Lectures 08)**

Mathematical expectation- Definition of Mathematical Expectation, Moments, Moment generating function and their theorems, Cumulants, Theorems on variance and standard deviation, Chebyshev's inequality, weak law of large numbers.

UNIT III **(Lectures 08)**

Discrete Probability Distributions: Binomial distribution MGF, CF, PGF and Recurrence relation, Poisson distribution Poisson MGF C.F, PGF, binomial dist tends to passion distribution; Negative Binomial-MGF, Poisson process as a limiting case of negative binomial distribution, hypergeometric-Mean & Variance, Approximation to Binomial Distribution.

UNIT IV **(Lectures 08)**

Continuous probability distributions: Uniform-, Moments, M.G.F, Characteristic function; Exponential- MGF, Beta distribution of first kind, Second kind; Gamma-distribution MGF

Unit V **(Lectures 08)**

Theory of estimation, characteristics of estimation- Consistency, Unbiasedness, Efficiency and Sufficiency, Invariance Property of Consistent Estimators, Sufficient Conditions for Consistency, Efficient Estimators, Most Efficient Estimator, Sufficiency.

Text Books:

1. Robert V. Hogg and Allen T. Craig, Introduction to Mathematical Statistics, Macmillan Publishing Co. Inc.
2. Charles M. Grinstead and J. Laurie Snell, Introduction to Probability, American Mathematical Society.

Reference Books:

1. Feller, W: Introduction to Probability and its Applications, Wiley Eastem Pvt. Ltd.
2. K. L. Chung, A course in Probability, Academic Press.
3. R. Durrett, Probability Theory and Examples, Duxbury Press.

*** Latest editions of all the suggested books are recommended**

Semester III
Calculus of Variations & Integral Equation

Course Code: MAT316

L	T	P	C
3	0	0	3

Objective-To impact analytical ability in solving variationally problem and integral equations**.**

Course Outcome- Fully understand the properties of geometrical problems-

- Be familiar with variationally problems
- Be familiar isoperimetric problems
- Be thorough with different types of integral equations
- Be exposed to the decomposition method

Unit I **(Lectures 08)**

Variationally Problems with Moving Boundaries:

The concept of Variation and its properties – Euler's equation – Variationally problems for functional – Functionals dependent on higher order derivatives – Functions of several independent variables – Some applications to problems of mechanics.

UNIT – II **(Lectures 08)**

Variationally Problems With Moving Boundaries (Contd.)

Movable boundary for a functional dependent on two functions – One sided variations – Reflection and Refraction of extremals – Diffraction of light rays.

UNIT – III **(Lectures 08)**

Integral Equations

Introduction – Definition – Regularity conditions – Special kinds of Kernals – Eigen values and eigen functions – Convolution integral – Reduction to a system of algebraic equations – Examples – Fredholm alternative – Examples – An approximation method.

UNIT – IV **(Lectures 08)**

Method of Successive Approximations and Fredholm Theory:

Method of successive approximations – Iterative scheme – Examples – Volterra integral equations – Examples – Some results about the resolvent kernel – The method of solution of Fredholm equation – Fredholm first theorem – Examples.

UNIT – V **(Lectures 08)**

Applications to Ordinary Differential Equations

Initial value problems – Boundary value problems – Examples – Singular integral equations – The Abel integral equations - Examples.

Test Book:

1. A. S. Gupta, Calculus of Variations with Applications, PHI, New Delhi.

2. Ram P. Kanwal, Linear Integral Equations, Theory and Techniques, Academic Press, New York.

Reference Books:

1. M. D. Raisinghania, Integral Equations and Boundary Value Problems, S. Chand & Co., New Delhi.

2. Sudir K. Pundir and Rimple Pundir, Integral Equations and Boundary Value Problems, Pragati Prakasam.

*** Latest editions of all the suggested books are recommended**

Semester-III

Industrial Safety & Health Hazards

Course Code: MSC011 **L T P C**
4 0 0 4

Objective: The course content focuses on t Industrial safety programs and toxicology, Industrial laws, regulations, fire and explosion, preventive methods, relief and its sizing methods. The course helps to analyse industrial hazards and its risk assessment.

Course Outcomes: By the end of the course the students will be able to analyze the effect of release of toxic substances, understand the industrial laws, regulations and source models which helps them to apply the methods of prevention of fire and explosions. This course also helps to understand the methods of hazard identification and preventive measures.

Course Contents:

UNIT I **(Lectures 08)**

Physical and Chemical Hazards: Noise, noise exposure regulation, properties of sound, occupational damage, risk factors, sound measuring instruments, permissible exposure limit. Ionizing radiation, types, effects, monitoring instruments, control programs, OSHA standard-non-ionizing radiations, effects, types, radar hazards, microwaves and radio-waves, lasers, TLV-cold environments, hypothermia, wind chill index, control measures- hot environments, thermal comfort, heat stress indices, acclimatization, estimation and control.
Recognition of chemical hazards-dust, fumes, mist, Air Sampling instruments, Types, Measurement Procedures.

UNIT II **(Lectures 08)**

Occupational Health and Toxicology: Concept and spectrum of health - functional Units and activities of occupational health services, notifiable occupational diseases such as silicosis, asbestosis, pneumoconiosis, siderosis, anthracosis, aluminosis and anthrax, lead-nickel, chromium and manganese toxicity, gas poisoning (such as CO, ammonia, coal and dust etc) their effects and prevention – cardio pulmonary resuscitation, audiometric tests, eye tests, vital function tests.

UNIT III **(Lectures 08)**

Hazardous Waste Management: Hazardous waste management in India-waste identification, characterization and classification technological options for collection, treatment and disposal of hazardous waste-selection charts for the treatment of different hazardous wastes-methods of collection and disposal of solid wastes-health hazards-toxic and radioactive wastes-incineration and vitrification - hazards due to bio-process dilution- standards and restrictions – recycling and reuse

UNIT IV **(Lectures 08)**

Radiation Control: Radiation shielding – radiation dose – dose measurements – Units of exposure – exposure limits – barriers for control of radioactivity release – control of radiation exposure to plant personnel – health physics surveillance – waste management and disposal practices – environmental releases.

UNIT V **(Lectures 08)**

Occupational Physiology: Man as a system component – allocation of functions – efficiency – occupational work capacity – aerobic and anaerobic work – evaluation of physiological requirements of jobs – parameters of measurements – categorization of job heaviness – work organization – stress – strain – fatigue – rest pauses – shift work – personal hygiene.

Reference Books:

1. L.M Deshmukh Industrial safety management.
2. Ralph king and John magid industrial hazard and safety.

*** Latest editions of all the suggested books are recommended**

Semester-III

Elementary Biophysics

Course Code: MSC012 **L T P C**
4 0 0 4

Objective: The Objective of this Course is to provide an idea of various physical process and phenomena which are applicable in bioscience.

Course Outcomes: After Completion of this course student will learn the physical process such as bonding in atom and molecules, spectroscopic techniques, isotopes and radioactivity, radiation and biophysics which are used in understanding the bioscience.

Course Contents:

Unit – I: **(Lectures 08)**

Foundations of Biophysics-I: Biophysics as an interdisciplinary science, aim and scope of biophysics. Chemical and physical forces between atoms and molecules: Atomic and molecular forces. Inter-atomic molecular bonds: Ionic, covalent and Vander Waals bonds, Coordinate bonds and hydrophobic interaction. Mechanism of bond formation based on electronic orbitals. Formation of molecular orbitals, Sigma and Pi bonds, Hybridization. Examples of bond formation between C-C, C-N and carbon and other atoms.

Unit – II: **(Lectures 08)**

Physical methods of investigation of macromolecules: Biological macromolecules, General classification, Physical methods of determining size and shape of molecules. Separation methods: Diffusion, Sedimentation and osmosis. Viscosity and surface tension measurements.

Unit – III: **(Lectures 08)**

Instrumental methods of analysis of biological systems: Light scattering by macromolecules. Optical activity, Absorption spectroscopy and spectrophotometry, Calorimetry, IR and Raman spectroscopy for study of biomolecules. NMR spectroscopy for studying interactions and identification of biomolecules. X-ray diffraction and microscopy for studying living matter (basics).

Unit – IV: **(Lectures 08)**

Isotopes and radioactivity: Radioactive decay laws, production of radioisotopes (radio nuclides), allocation of radioactive traces, isotopic tracer method. Assay using radioactive substances, Labelling and detection methods using fluorescent molecules (a few examples).

Unit – V: **(Lectures 08)**

Radiation biophysics: Radiation sources, Interaction of radiation with matter (general discussion), energy transfer process, measurement of radiation, Dosimetry, Biological effects of radiation, effect of radiation on living systems, radiation protection and radiation therapy.

Reference Books:

1. Essential of Biophysics – P. Narayanan, New Age International Publications.

2. Aspects of Biophysics- William Hughes, John Wiley and Sons.

3. Biochemistry of Nucleic acids- Adams et al. Chapmann and Hall.

4. Biophysics- Vasantha Pattabi and N. Goutham, Narosa Publishing House, New Delhi.

5. Biophysics- Cotterill.

*** Latest editions of all the suggested books are recommended**

Semester III
Statistical Techniques in Data Mining

Course Code: MSC013

L	T	P	C
4	0	0	4

Unit I **(Lectures 08)**

Introduction: Fundamentals of data mining, Data Mining Functionalities, Classification of Data Mining systems, Data Mining Task Primitives, Integration of a Data Mining System with a Database or a Data Warehouse System, Major issues in Data Mining.

Data Preprocessing: Need for Preprocessing the Data, Data Cleaning, Data Integration and Transformation, Data Reduction, Discretization and Concept Hierarchy Generation.

Unit II **(Lectures 08)**

Mining Frequent Patterns, Associations and Correlations: Basic Concepts, Efficient and Scalable Frequent Itemset Mining Methods, Mining various kinds of Association Rules, From Association Mining to Correlation Analysis, Constraint-Based Association Mining.

Unit III **(Lectures 08)**

Classification and Prediction: Issues Regarding Classification and Prediction, Classification by Decision Tree Induction, Bayesian Classification, Rule-Based Classification, Classification by Back propagation, Support Vector Machines, Associative Classification, Lazy Learners, Other Classification Methods, Prediction, Accuracy and Error measures, Evaluating the accuracy of a Classifier or a Predictor, Ensemble Methods.

Unit IV **(Lectures 08)**

Cluster Analysis Introduction : Types of Data in Cluster Analysis, A Categorization of Major Clustering Methods, Partitioning Methods, Hierarchical Methods, Density-Based Methods, Grid-Based Methods, Model-Based Clustering Methods, Clustering High-Dimensional Data, Constraint Based Cluster Analysis, Outlier Analysis - Mining Streams, Time Series and Sequence

Unit V **(Lectures 08)**

Mining Object, Spatial, Multimedia, Text and Web Data: Multidimensional Analysis and Descriptive Mining of Complex Data Objects, Spatial Data Mining, Multimedia Data Mining, Text Mining, Mining the World Wide Web.

Applications and Trends in Data Mining: Data Mining Applications, Data Mining System Products and Research Prototypes, Additional Themes on Data Mining and Social Impacts of Data Mining.

Text Books:

1. 1. Data Mining – Concepts and Techniques - Jiawei Han & Micheline Kamber, Morgan Kaufmann Publishers.
2. Introduction to Data Mining – Pang-Ning Tan, Michael Steinbach and Vipin Kumar, Pearson education.
3. Data Mining Techniques – Arun K Pujari, University Press.

Reference Books:

1. Data Warehousing in the Real World – Sam Aanhory & Dennis Murray Pearson Asia.
2. Data Warehousing Fundamentals – Paulraj Ponnaiah Wiley student Edition.
3. The Data Warehouse Life cycle Tool kit – Ralph Kimball Wiley student edition.
4. Building the Data Warehouse By William H Inmon, John Wiley & Sons Inc.
5. Data Mining Introductory and advanced topics –Margaret H Dunham, Pearson education.

*** Latest editions of all the suggested books are recommended**

Semester III

Database Management System

Course Code: MSC014/ECS411/511/611	L	T	P	C
	4	0	0	4

Objective: Introducing the fundamental concepts necessary for designing, using, and implementing database systems and applications. The goal of this course is for students to become well-grounded in basic concepts necessary for understanding DB and their users, DBMS concepts, architecture , the concepts of the Entity Relationship(ER) model, the data abstraction and semantic modeling concepts leading to EER data model, describe the basic relational model, its integrity constraints and update operations, and the operation of relational algebra, describe relational schema design, and it covers the normalization and functional dependency algorithm.

Course Outcomes:

1. Be familiar with a commercial relational database system (Oracle) by writing SQL using the system.
2. Be familiar with the relational database theory, and be able to write relational algebra expressions for queries.
3. Be familiar with basic database storage structures and access techniques: file and page organizations, indexing methods including B-tree, and hashing.
4. Be familiar with the basic issues of transaction processing and concurrency control.

Course Contents:

Unit I: (Lectures 08)

Introduction: Scope and purpose of database system, view of data, relational databases, database architecture, transaction management, database system Vs filesystem, Database system concept and architecture, data definitions language, DML.

Data Models: The importance of data models, Basic building blocks, Business rules, The evolution of data models, Degrees of data abstraction

Unit II: (Lectures 08)

Database design and ER Model: overview, ER-Model, Constraints, ER-Diagrams, ERD Issues, weak entity etc, Codd's rules, Relational Schemas, Introduction to UML, Relational database model: Logical view of data, keys, integrity rules.

Relational Database design: features of good relational database design, atomic domain and Normalization (1NF, 2NF, 3NF, BCNF)

Unit III: (Lectures 08)

Relational data Model and Language: Relational algebra: introduction, Selection and projection, set operations, renaming, Joins, Division, syntax, semantics. Operators, grouping and

ungrouping, Relational comparison. Calculus: Tuple relational calculus, Domain relational Calculus, calculus vs algebra, Computational capabilities, constraints, Views.

Introduction on SQL: Characteristics of SQL, advantage of SQL. SQL data type and literals. Types of SQL commands. SQL operators and their procedure. Tables, views and indexes. Queries and sub queries. Aggregate functions. Insert, update and delete operations, Joins, Unions, Intersection, Minus, Cursors, Triggers, and Procedures in SQL/PL SQL.

Unit IV: **(Lectures 08)**

Usage of Oracle:

1. Installing oracle
2. Creating Entity-Relationship Diagram using case tools.
3. Writing SQL statements Using ORACLE
4. MYSQL: a) Writing basic SQL SELECT statements.
   b) Restricting and sorting data.
   c) Displaying data from multiple tables.
   d) Aggregating data using group function.
   e) Manipulating data.
   f) Creating and managing tables.
5. Normalization in ORACLE.
6. Creating cursor in oracle.
7. Creating procedure and functions in oracle.
8. Creating packages and triggers in oracle.

Unit V: **(Lectures 08)**

Transaction management: ACID properties, serializability and concurrency control Lock based concurrency control (2PL, Deadlocks), Time stamping methods, optimistic methods, database recovery management.

Text Books:

1. Elmasri, R., Navathe, S., Fundamentals of Database Systems, Addison-Wesley.
2. G. K. Gupta, "Data Base Management", Tata Mc Graw Hill.
3. Atul Kahate, "Introduction to Database Management Systems" Pearson Education, New Delhi, 2006.

***Latest editions of all the suggested books are recommended.**

Semester III
DISCIPLINE & GENERAL PROFICIENCY

Course Code: MSC311 **C-1**

There shall be continuous evaluation of the student on the following broad parameters:

1. Observance of dress code.

2. Participation in Conferences /Workshops / Seminars.

3. Attendance in guest lectures, invited talks and special technical sessions organized from time to time.

4. Participation in community projects including NSS.

5. Exhibiting team spirit in different Culture & extra curriculum activities, Department Club activities of the University and College organized from time to time.

6. Observance of rule & regulations in the College/University, Behavior in Campus Premises, Bus, hostel mess and hostel.

7. Performance and awards received in different events (sports/ co-curricular activities) organized at College / University and other level.

8. General behavior

9. Any extraordinary achievement.

The above is an indicative list of parameters on which the students shall be continuously evaluated. The college may evaluate the student on the specific parameters by informing them through a notice displayed on the notice board before evaluation. There shall be no external examination for this course; however, the marks shall be included for calculation of cumulative Performance Index (CPI).

Head of Department would be display GP marks on notice board in prescribed format after IInd & IIIrd CT in semester:

S No		Enroll No.	Student Name	Dress code	Participation in Conferences /Workshops / Seminars	Participation in guest lectures, invited talks and special technical sessions	Participation in community Services	Participation in Culture & extra curriculum activities, Department Club Activities	Participation in sports/ co-curricular activities	General Behavior	Any Extra Achievement
				(5)	**(15)**	**(20)**	**(10)**	**(20)**	**(20)**	**(5)**	**(5)**
	Responsible for marks			Mentor	Head	Head	Mentor	Cultural Events Coordinator & Department Club Coordinator	Sports Coordinator	Mentor	Director or Principal

Semester IV
Number Theory

Course Code: MAT411

L	T	P	C
3	0	0	3

Objective-This course presents the theory and application of Number theory and to show how certain number theoretical theorems can be applied within cryptography and to use the theory to solve simple Diophantine equations. It extents the theory of optimization methods to more realistic problems.

Course Outcomes-After completing this course students will be able to solve the number system and find their optimization.

Course Contents:

Unit I **(Lectures 08)**

The Division Algorithm, the gcd, The Euclidean Algorithm, Diophantine equation ax + by = c; The fundamental theorem of arithmetic; The Sieve of Eratosthenes; The Goldbach conjecture.

Unit II **(Lectures 08)**

Theory of Congruences – Basic properties of Consequence; Linear Congruences, Chinese remainder theorem, Fermat's Theorem, Wilson's Theorem. Statement of Prime number theorem. Some primality testing.

Unit III **(Lectures 08)**

Number-Theoretic Functions – The functions T and Sigma; The mobius inversion formula; The Greatest integer function, Euler's Phi function – Euler Theorem, Properties of the Phi-function, Applications to Cryptography.

Unit IV **(Lectures 08)**

The order of an integer modulo n, Primitive roots for primes; The theory of indices, Euler's criterion, Legendre's symbol and its properties; Quadratic reciprocity, Quadratic congruences with composite moduli.

Unit V **(Lectures 08)**

Perfect Numbers; Representation of integers as sum of two squares and sum of more than two squares.

Text Books:

1. Davis M. Burton, Elementary Number Theory, USB.

Reference Books:

1. U. Dudley, Elementary Number Theory, Freeman & Co.
2. George Andrews, Number Theory, Courier Dover Publications.

*** Latest editions of all the suggested books are recommended**

Semester IV

Advanced Discrete Mathematics

Course Code: MAT412

L	T	P	C
4	0	0	4

Objective-

1. To train students with good breadth of knowledge in core areas of Information Technology by using concepts of Discrete Mathematics.
2. In this course several fundamental areas of discrete mathematics and algebra, with important applications in computer science
3. Introduce Mathematical Logic, especially First Order Logic to students intending to graduate in Computer Science.
4. Introduce proof techniques such as Mathematical Induction and Contradiction These techniques will come in handy for courses such as Analysis of Algorithms and Automata Theory.
5. Develop an understanding of counting, functions and relations

Course Outcomes-

1. An advanced knowledge of advanced discrete mathematics topics drawn from Graph theory, Possets and Lattices, set theory, combinatorial designs, and finite State Machine Language.
2. An ability to apply knowledge of mathematics, including discrete mathematics, probability, statistics, science, computer science and engineering, electronic engineering and electrical engineering as it applies to computer hardware and software.
3. Distinguish between Propositional Logic and First Order Logic. & Have an understanding of elementary combinatory.
4. Know how to check if a proposition is satisfiable.
5. Apply induction and other proof techniques towards solving recurrences and other problems in elementary algebra.

Course Contents:

Unit I **(Lectures 08)**

Propositional Calculus: Proposition and logical operations; Proposition and truth tables; Tautologies & contradiction; Logical equivalence; Conditional & Bi-conditional statements; Logical implication; Propositional functions & quantifiers. Semi groups & Monoids: Definitions and examples of semi groups and monoids; Isomorphism & homomorphism of semi groups and monoids.

UNIT II **(Lectures 08)**

Partially ordered set; Hasse diagram; External element of poset; Lattices as algebraic system; Sub lattices, Isomorphic lattices, Bounded lattices; Complete, Compliment, Complemented lattices, Modular lattices, Penthogonal lattices, Pentagonal.

UNIT III **(Lectures 08)**

Boolean algebra: Definition, Principle of duality, Basic Theorems, Sub algebra, Isomorphic; Boolean algebra as lattices; Boolean functions and min-terms; Disjunctive normal form; Complete disjunctive normal form; Conjugate normal form.

UNIT IV **(Lectures 08)**

Language & Grammar and their types: Regular expressions and Regular sets; Regular language, Finite state Automata.

UNIT V **(Lectures 08)**

Finite state Machine, Semi-Machines and languages; Application of Logic Circuit: Sum-of products form for Boolean algebra; Minimal Boolean expressions, Prime implicants, Logic and Circuits; Boolean functions, Karnaugh map.

Text Books:

1. B.Colman, R.C. Busby & S.Ross, Discrete Mathematical Structures, Prentice Hall of India Pvt. Ltd.
2. Schaum's series Discrete Mathematics, Tata Mc-Graw- Hill Edition.

Reference Books:

1. Susanna S. Epp, Discrete Mathematics with Applications, Thomson Learning TM.

*** Latest editions of all the suggested books are recommended**

Semester IV
Fourier & Integral Transform

Course Code: MAT413

L	T	P	C
3	0	0	3

Objective- The Laplace and Fourier Transforms aim to take a differential equation in a function and turn it into an algebraic equation involving its transform. Such an equation can then be solved by algebraic manipulation, and the original solution determined by recognizing its transform or applying various inversion methods.

Course Outcome- Students will gain a range of techniques employing the Laplace and Fourier Transforms in the solution of ordinary and partial differential equations. They will also have an appreciation of generalized functions, their calculus and applications.

Course Contents:

Unit I **(Lectures 08)**

Laplace Transform: Definition of Laplace Transform, Linearity property - Piecewise continuous function, Existence of Laplace transform, First and second shifting theorems of Laplace transform, Change of scale property, Laplace transform of derivatives, Initial value problems, Laplace transform of Integrals, Laplace transform of Multiplication by t, Laplace transform of Divison by t, Laplace transform of periodic functions and error function.

Unit II **(Lectures 08)**

Inverse Laplace Transform: Inverse Laplace Transform, Linearity property, First and second shifting theorems of Inverse L.T., Change of scale property, Division by p, Convolution theorem, Heaviside's expansion formula, Solution of Ordinary Differential Equations with constant coefficients by L.T., Solution of Simultaneous Ordinary Differential Equations.

Unit III **(Lectures 08)**

Fourier Series: Fourier Series, Dirichlet's conditions Fourier Series for even and odd functions, Determination of Fourier coefficients Periodic functions, Orthogonality of sine and cosine functions, Half range Fourier series Other forms of Fourier series, Parseval's theorem.

Unit IV **(Lectures 08)**

Fourier Transforms: Fourier Integral and Fourier transform, Properties of Fourier transform, Fourier complex transformation and it's properties, Fourier sine and cosine transformations and application to simple heat transfer equation.

Unit V **(Lectures 08)**

Fourier Inverse Transforms: Fourier transform Inverse Theorem for Fourier Transform Fourier Sine and Cosine transforms and their inversion formula, Linearity property of Fourier transforms, Change of Scale property, Shifting theorem, Modulation theorem, Convolution theorem of Fourier transforms, Parseval's identity, Solution of Partial Differential Equations Applications of Fourier transforms to initial and boundary value problems.

Test Books:

1. A. R. Vasistha & Dr. R. K. Gupta, Integral Transforms, Published by Krishna Prakashan Media Pvt. Ltd, Meerut.
2. S. Ranganatham & Dr. V. Ramesh Babu, Fourier Series and Integral Transforms, S. Chand & Co., New Delhi.

Reference Books:

1. Shanthi Narayan and P. K. Mittal, A Course of Mathematical Analysis S. Chand & Co., New Delhi.
2. R. V. Churchill, Operational Mathematics, Mc Graw Hill Company.

*** Latest editions of all the suggested books are recommended**

Semester IV
Fuzzy Sets and its Application

Course code: MAT414

L	T	P	C
3	0	0	3

Objective-The course presents some fundamental knowledge of fuzzy sets, fuzzy logic and its applications in fuzzy decision making. The aim is to equip students with some state-of-the-art fuzzy-logic technology.

Course Outcomes-

- To understand basic knowledge of fuzzy sets and fuzzy logic,
- To apply fuzzy inferences,
- To apply fuzzy information in decision making,
- To appreciate the theory of possibility on the basis of evidences.

Course Contents:

UNIT I **(Lectures 08)**

Crisp Sets, Fuzzy Sets (basic types), Fuzzy Sets (basic concepts); Representation of fuzzy sets; Decompositions theorems; Extension principle for fuzzy sets.

UNIT II **(Lectures 08)**

Operations on fuzzy sets (Fuzzy compliment, Intersection and union); Combinations of operations.

UNIT III **(Lectures 08)**

Fuzzy numbers, Linguistic variables; Arithmetic operations on fuzzy numbers; Lattice of fuzzy numbers, Fuzzy equations.

UNIT IV **(Lectures 08)**

Crisp and fuzzy relations; Projections; Binary fuzzy relations; Binary relations on a single set; Fuzzy equivalence relations; Fuzzy compatibility relations; Fuzzy ordering relations; Fuzzy morphism; Sup-i compositions of binary fuzzy relations.

UNIT V **(Lectures 08)**

Fuzzy relation equations; Fuzzy logic; Fuzzy decision making**;** Fuzzy linear programming; Linear Regression with fuzzy parameters; Fuzzy regression with fuzzy data.

Text Books:

1. George J. Klier and Bo Yuan, Fuzzy Sets and Fuzzy Logic, Prentice Hall of India.
2. H.J. Zimmerman, Fuzzy Set Theory and Its Applications, Kluwer Academic Publishers.

Reference Books:

1. Kaufmann, A. and Gupta, M.M. Fuzzy Mathematical Models in Engineering and Management Science, Elsevier Science Inc.

*** Latest editions of all the suggested books are recommended**

Semester-IV

MATLAB Programming

Course Code: MAT461 **L T P C**
0 2 2 2

Course Contents:

Unit I **(Lectures 08)**

MATLAB Basics: MATLAB environment, Menus and the toolbar, Basic computer programming, variables and constants, operators and simple calculations, formulas and functions, MATLAB toolboxes, use of MATLAB help, Debugging MATLAB codes**.**

Unit II **(Lectures 08)**

Matrices & Vectors: Matrix representation, Resizing and Reshaping Matrices, General Operating on Matrices, Multidimensional Arrays and sorting of arrays, Matrices in the MATLAB Environment, Matrix Operations and Function in MATLAB, Matrix Division, Eigen values and vectors, Special matrices.

Unit III **(Lectures 08)**

Loop and Selection Statements: Functions and Scripts, break statement, continue statement, end statement, for statement, for nested loop statement, if/else if/else statement, while statement - nested while statement.

Unit IV **(Lectures 08)**

Plotting And I/O: Plot functions, X-Y Plotting, plotyy, surf, mesh, contour, pie chart, bar diagram, 3D plots, handle graphics and plot properties, saving and printing plots, File input/output, writing and reading spreadsheet files, Using MAT files for variables, Simple programs.

Unit V **(Lectures 08)**

Toolboxes: Curve fitting toolbox: Curve Fitting Objects and Methods. Signal Processing toolbox: Filter Design Process Overview, Basic Filter Design Process. Symbolic math toolbox: Symbolic Objects, Creating and Performing Symbolic Computations. **(Lectures 08)**

Text Books:

1. Ross L. Spencer and Michael Ware, Introduction to MATLAB, Brigham Young University.

Reference Book:

1. Suresh Chandra, Applications of Numerical Techniques with C, Narosa.
2. Vinay K. Lngle and John G. Proakis, Digital Signal Processing Using Matlab, PWS Publishing Company.
3. P.B. Zbar and A.P. Malvino, Basic Electronics: A Text-Lab Manual, Tata Mc-Graw Hill.

*** Latest editions of all the suggested books are recommended**

Evaluation Scheme of Practical Examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 4-point scale which would include the practical conducted by the students and a Viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (35 MARKS)				ON THE DAY OF EXAM (15 MARKS)		TOTAL INTERNAL (50 MARKS)
EXPERIMENT (5 MARKS)	FILE WORK (10 MARKS)	VIVA (10 MARKS)	ATTENDANCE (10 MARKS)	EXPERIMENT (5 MARKS)	VIVA (10 MARKS)	

External Evaluation (50 marks)
The external evaluation would also be done by the external Examiner based on the experiment conducted during the examination.

EXPERIMENT (20 MARKS)	FILE WORK (10 MARKS)	VIVA (20 MARKS)	TOTAL EXTERNAL (50 MARKS)

Semester-IV

Project, Seminar & Viva

Course Code: MAT492

L	T	P	C
0	0	24	12

For students to enter into preliminary research field both in theory and experiment the concept of Project has been introduced in the final Semester. In the Project, the student will explore new developments from the books and journals, collecting literature / data and write a Dissertation based on his / her work and studies. The Project Work can also be based on experimental work in industries / research laboratories.

Selection of Topic:

1. Students will make project which should be preferably a working of third thoughts based on their subject.
2. The student will be assigned a faculty guide who will be the supervisor of the students. The faculty would be identified at the end of the III semester.
3. The assessment of performance of the students should be made at least twice in the semester. Internal assessment shall be for 50 marks. The students shall present the final project live using overhead projector PowerPoint presentation on LCD to the internal committee and the external examiner.
4. The evaluation committee shall consist of faculty members constituted by the college which would be comprised of at least three members comprising of the department Coordinator's Class Coordinator and a nominee of the Director/Principal. The students guide would be special in invitee to the presentation. The seminar session shall be an open house session. The internal marks would be the average of the marks given by each members of the committee.

The Marking shall be as follows.

Internal: 50 marks

By the Faculty Guide – 25 marks

By Committee appointed by the Director/Principal – 25 marks

External: 50 marks

By External examiner by the University – 50

Top Cover- The sample top cover shall be as under:

TITLE (18 pt Times New Roman CAPS)

DISSERTATION/PROJECT (14)

Submitted in Partial Fulfillment of the Requirements for the Degree of (14)

MASTER OF SCIENCE (16)

In (16)

Mathematics (16)

Submitted by (12)

Name

Enrollment No

Under the guidance of (12)

Name of Guide & Designation (14)

Department of Mathematics (14)
Faculty of Engineering
Teerthanker Mahaveer University (14)
Moradabad-244001(14)

(December, 2014) (14)

Order of Contents (14)

Orders of contents are as follows:

1. Title Page
2. Certificate
3. Candidate's Declaration
4. Acknowledgement
5. Abstract
6. Contents with page numbers
7. List of Figures
8. List of Tables
9. List of Abbreviations
10. List of Symbols
11. Chapter 1: Introduction
    Chapter 2: Literature Review
    Chapter 3: ….
    Chapter 4: ….
    Chapter 5: Conclusion
    Appendix: Code
12. References
13. Publications

CERTIFICATE

This is to certify that dissertation/Project entitled "…… ……." which is submitted by …… in partial fulfillment of the requirement for the award of degree M.Sc. in **Mathematics**, Faculty of Engineering, Teerthanker Mahaveer University, Moradabad is a record of the candidate own work carried out by him under my/our supervision. The matter embodied in this dissertation/Project is original and has not been submitted for the award of any other degree.

Signature of Supervisor(s) **Head,**

Name & Designation of Supervisor(s) **Department of Physics**

. **FOE, TMU**

CANDIDATE'S DECLARATION

This is to certify that Dissertation/Project entitled "……" which is submitted by me in partial fulfilment of the requirement for the award of degree M.Sc. in **Mathematics**, Faculty of Engineering, Teerthanker Mahaveer University, Moradabad comprises only my original work and due acknowledgement has been made in the text to all other material used.

I, hereby, further declared that in case of legal dispute in relation to my M.Sc. dissertation/Project, I will be solely responsible for the same.

Date: Name of Candidate

Enrollment No.

ACKNOWLEDGEMENT

Apart from the efforts of me, the success of this dissertation/project depends largely on the encouragement and guidelines of many others. I take this opportunity to express my gratitude to the people who have been instrumental in the successful completion of this dissertation/project.

I would like to show my greatest appreciation to _ _ _ _. I can't say thank you enough for his/her tremendous support and help. I feel motivated and encouraged every time I attend his/her meeting. Without his/her encouragement and guidance this dissertation/project would not have materialized.

The guidance and support received from _ _ _ (Name of Guide) was vital for the success of the dissertation/project. Without the wise counsel and able guidance, it would have been impossible to complete the dissertation/project in this manner I am grateful for his/ her constant support and help.

I express gratitude to other faculty members of Mathematics Department, FoE for their intellectual support throughout the course of this work. Finally, I am indebted to all whosoever have contributed in this dissertation/project work and friendly stay at FoE.

Place: **Name of Candidate**

Date:

Contents *I*

List of Figure

LIST OF TABLES

Table **Page**

List of Abbreviations

RFID	Radio Frequency Identity
IVRS	Interactive Voice Response Service
ASR	Automatic Speaker Recognition
PSK	Phase Shift Keying
DFT	Discrete Fourier Transform

List of Symbols

N	Time index
Ω	Frequency in radian
Σ	Standard deviation
x(n)	Signal variable

CHAPTER (Font size 14)

GUIDELINES

1.1 Size
Standard bond paper size A4 (297x210mm) should be used.

1.2 Page number

Page should be numbered consecutively and clearly. No page number should be indicated on title page. Certificate, candidate's declaration and acknowledgement, pages are to be counted & from certificate to acknowledgement Greek numbers should be used. From main text to end of dissertation Indian numerals should be used. All typing should be on right hand pages only.

1.3 Margin
Top 1.0", Bottom 1.0" Left 1.5" Right 1.0"

1.4 Line spacing

Line spacing should 1.5.

1.5 Font

Times new roman, size 12 for text, 12 (BOLD) may be used for headings & subheadings.

1.6 CD-ROM

All dissertation/project report should include soft copy on CD-ROM accompanied with dissertation/project report in pocket pasted on inside of back cover.

1.7 Text

Before producing the final copies of a dissertation /project report the candidate should ensure that all the spelling, grammar, punctuation and bibliography is complete and exact. Text should in 3rd person form. One is not supposed to use the words like I, we etc.

1.8 File Binding
The Project Report should be hard bound with Title page in Maroon color. The name of the candidate, degree (specifying the specialization) etc shall be printed in golden color on the Title page.

A candidate/group will submit two hardcopies with soft copies in CD to the department and candidate/group will also make an extra copy for themselves.

1.9 Figure

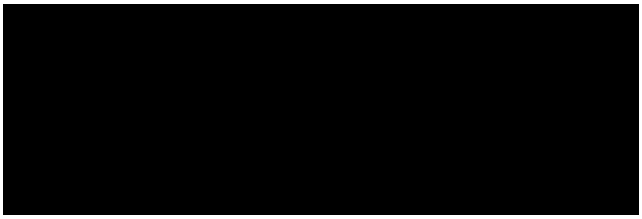

Figure 1.1: Waveform of ECG signal

1.10 Table

Table 1.1: Comparison of different methods

Method	Base	Result (%)
Method 1	ABCD	50.98
Method 2	AB	23.67
Method 3	CD	42.77

1.11 Reference

All the references should be arranged year wise. Examples are in reference page

1.11.1 First reference is for book.

1.11.2 Second reference is for article of journal.

1.11.3 Third reference is for proceeding of conference paper.

References

[1] C. Brusaw, C. Aired, and W. Oliu, *Handbook of Technical Writing,* 3rd ed., New York St. Martine's Press, 1987.

[2] S. K. Kenue and J. F. Greenleaf, "Limited angle multi frequency diffiation tomography", *IEEE Trans. Sonic Utrason*. Vol. SU-29, no. 6, pp. 213-217, July 1982.

[3] R. Finkel, R. Taylor, R. Paul and J. Francklin, "An overview of AL programming system for automation"*, in proc. Forth int. Joint Conf. on Artif. Intell. ,* Sept 3-7, 1975 pp. 758-755.

List of Publications

Journals

- S. K. Kenue and J. F. Greenleaf, "Limited angle multi frequency diffiation tomography", *IEEE Trans. Sonic Utrason*. Vol. SU-29, no. 6, pp. 213-217, July 1982.
- S. K. Kenue and J. F. Greenleaf, "Limited angle multi frequency diffiation tomography", accepted for publication in *IEEE Trans. Sonic Utrason*. 2012
- S. K. Kenue and J. F. Greenleaf, "Limited angle multi frequency diffiation tomography", communicated to *IEEE Trans. Sonic Utrason*. 2012

International Conferences

- R. Finkel, R. Taylor, R. Paul and J. Francklin, "An overview of AL programming system for automation"*, in proc. Forth int. Joint Conf. on Artif. Intell. ,* Sept 3-7, 1975, pp. 758-755.
- R. Finkel, R. Taylor, R. Paul and J. Francklin, "An overview of AL programming system for automation"*,* accepeted for publication *in proc. Forth int. Joint Conf. on Artif. Intell. ,* Sept 3-7, 2012
- R. Finkel, R. Taylor, R. Paul and J. Francklin, "An overview of AL programming system for automation"*, communicated to the proc. Forth int. Joint Conf. on Artif. Intell. ,* Sept 3-7, 2012,

National Conferences

- R. Finkel, R. Taylor, R. Paul and J. Francklin, "An overview of AL programming system for automation"*, in proc. Forth national. Joint Conf. on Artif. Intell. ,* Sept 3-7, 1975, pp. 758-755.
- R. Finkel, R. Taylor, R. Paul and J. Francklin, "An overview of AL programming system for automation"*,* accepeted for publication *in proc. Forth national . Joint Conf. on Artif. Intell. ,* 2012
- R. Finkel, R. Taylor, R. Paul and J. Francklin, "An overview of AL programming system for automation"*, communicated to the proc. Forth national Conf. on Artif. Intell. ,* 2012,

EVALUATION SHEET

(To be filled by the GUIDE & Internal Examiners only)

Name of Candidate:
Roll No:

Class and Section:

Please evaluate out of Five marks each.

S. No.	Details	Marks (5) Guide	Marks (5) Int. Exam. 1	Marks (5) Int. Exam. 2
1.	Objective Identified & Understood			
2.	Literature Review / Background Work (Coverage, Organization, Critical Review)			
3.	Discussion/Conclusions (Clarity, Exhaustive)			
4.	Slides/Presentation Submitted (Readable, Adequate)			
5.	Frequency Of Interaction (Timely Submission, Interest Shown, Depth, Attitude)			
	Total (Out of 25)			
	Average out of 50			

Signature: Signature: Signature:
Date: Date: Date:

EVALUATION SHEET FOR EXTERNAL EXAMINER

(To be filled by the External Examiner only)

Name of Candidate:

Roll No:

I. For use by **External Examiner ONLY**

S. No.	Details	Marks (10) each
1.	Objective Identified & Understood	
2.	Literature Review / Background Work (Coverage, Organization, Critical Review)	
3.	Discussion/Conclusions (Clarity, Exhaustive)	
4.	Power Point Presentation (Clear, Structured)	
5.	Slides (Readable, Adequate)	
	Total (Out of 50)	

Signature:

Date:

EVALUATION SUMMARY SHEET

(To be filled by External Examiner)

Name and Roll No.	Internal Examiners (50)	External Examiner (50)	Total (100)	Result (Pass/Fail)

Note: The summary sheet is to be completed for all students and the same shall also be Compiled for all students examined by External Examiner. The Format shall be provided by the course coordinator.

Semester IV
DISCIPLINE & GENERAL PROFICIENCY

Course Code: MSC411 **C-1**

There shall be continuous evaluation of the student on the following broad parameters:

1. Observance of dress code.

2. Participation in Conferences /Workshops / Seminars.

3. Attendance in guest lectures, invited talks and special technical sessions organized from time to time.

4. Participation in community projects including NSS.

5. Exhibiting team spirit in different Culture & extra curriculum activities, Department Club activities of the University and College organized from time to time.

6. Observance of rule & regulations in the College/University, Behavior in Campus Premises, Bus, hostel mess and hostel.

7. Performance and awards received in different events (sports/ co-curricular activities) organized at College / University and other level.

8. General behavior

9. Any extraordinary achievement.

The above is an indicative list of parameters on which the students shall be continuously evaluated. The college may evaluate the student on the specific parameters by informing them through a notice displayed on the notice board before evaluation. There shall be no external examination for this course; however, the marks shall be included for calculation of cumulative Performance Index (CPI).

Head of Department would be display GP marks on notice board in prescribed format after IInd & IIIrd CT in semester:

S No		Enroll No.	Student Name	Dress code	Participation in Conferences /Workshops / Seminars	Participation in guest lectures, invited talks and special technical sessions	Participation in community Services	Participation in Culture & extra curriculum activities, Department Club Activities	Participation in sports/ co-curricular activities	General Behavior	Any Extra Achievement
				(5)	**(15)**	**(20)**	**(10)**	**(20)**	**(20)**	**(5)**	**(5)**
	Responsible for marks			Mentor	Head	Head	Mentor	Cultural Events Coordinator & Department Club Coordinator	Sports Coordinator	Mentor	Director or Principal