Shri Vishwanath P. G. College Kalan, Sultanpur

(Affiliated)

DR. RAM MANOHAR LOHIA AVADH UNIVERSITY, AYODHYA

Structure of Syllabus for the Program: M.Sc.

Subject: MATHEMATICS

Course Code		Course Title	Credits	T/P	Evaluation	
					CIE	ETE
A	B	C	D	E	F	G
SEMESTER I (YEAR I)						
B030701T	CORE	Advanced Abstract Algebra	5	T	25	75
B030702T	CORE	Advanced Real Analysis	5	T	25	75
B030703T	CORE	Topology	5	T	25	75
B030706T	FIRST ELECTIVE (Subject Elective)	Fuzzy Sets	5	T	25	75
B030707P	SECOND ELECTIVE (Subject Elective)	Programming in Python-I	5	P	50	50
SEMESTER II (YEAR I)						
B030801T	CORE	Analytical Dynamics	5	T	25	75
B030802T	CORE	Theory of Differential Equation andBoundary Value Problems	5	T	25	75
B030803T	CORE	Measure and Integration	5	T	25	75
B030806T	THIRD ELECTIVE (Generic Elective)	Elementary Statistics	5	T	25	75
B030807P	FOURTH ELECTIVE (Subject Elective)	Programming in Python-II	5	P	50	50
SEMESTER III (YEAR II)						
B030901T	CORE	Functional Analysis	5	T	25	75
B030902T	CORE	Integral Equations	5	T	25	75
B030903T	CORE	Machine Learning	5	T	25	75
B030904T	FIFTH ELECTIVE (Subject Elective)	General Relativity	5	T	25	75
B030907P	SIXTH ELECTIVE (Subject Elective)	Introduction to SCILAB /MATLAB	5	P	50	50
SEMESTER IV (YEAR II)						
B031001T	CORE	Advanced Operations Research	5	T	25	75
B031002T	CORE	Fluid dynamics	5	T	25	75
B031004T	SEVENTH ELECTIVE (Subject Elective)	Differential Geometry of Manifolds	5	T	25	75
B031006P	RESEARCH PROJECT / DISSERTATION	Research Project / Dissertation	10	P	50	50

Semester I

Theoretical Paper-I

B030701T: ADVANCED ABSTRACT ALGEBRA

Unit I

Action of Group G on set, G-set, stabilizers and faithful action of G, Isotopric groups, solvable groups, cauchy's theorem for finite abelian group and finite groups.

Unit II

Maximal subgroups, simple groups, composition series, normal and subnormal series,Jordan-Holder theorem, modules, sub-modules, cyclic module, modulehomomorphism and isomarphism, Schur's lemma, Invariant subspaces, Jordan canonical and rational canonical forms.

Unit-III

Field extensions, finite field extensions, simple field extensions, algebraic field extension, splitting or decomposition field, normal and separable field extension,perfect field.

Unit-IV

Galois group, fundamental theorem of Galois group, Galois group of seperable polynomial, Galois field, construction of Galois field and its subfields.

References :

1. Absract algebra: David S.Dummit, Richard M. Foote–Wiley India Pvt. Ltd.
2. Topic in algebra: I. N. Herstein–Wiley India Pvt. Ltd
3. Modern algebra: A. R. Vasishtha, A.k. Vasishtha -Krishna publications

Theoretical Paper-II

B030702T: ADVANCED REAL ANALYSIS

Unit I

Sequence and series of functions of real numbers, Point wise convergence and Uniform convergence, Cauchy's criterion of uniform convergence, Weierstrass test for uniform convergence of series, Uniform convergence and continuity, Uniform convergence and Uniform integration convergence and differentiation.

Unit II

Riemann-Stieltjes integration and their properties, Riemann-Stieltjes integration with respect to arbitrary integrator, Existence of Riemann-Stieltjes integrals, Integration by parts theorem, Properties of R-S integrable functions, Relation between Riemann and R-S integrals.

Unit III

Functions of several variables, limit, continuity and differentiability of several variables, Directional derivatives, Derivative of functions in an open subset of R^n to R^m. Taylor's theorem, Young's Theorem, Schwarz's theorem.

Unit IV

Functions of bounded variation and their properties, Absolutely continuous functions and their properties, Relation between absolute continuity and function of bounded variation.

Reference:

1. Walter, R. *Principles of Mathematical Analysis*. 3rd edition, McGraw-Hill, 2017.
2. Terence T. *Analysis II*. Hindustan Book Agency, 2009.
3. Malik, S. C. and Arora, S. *Mathematical Analysis*. 2nd edition reprint. New Age International Publishers 2005.
4. Apostol, T. M. *Mathematical Analysis*. 2nd edition. *Wesley Publishing Co.* 2002.
5. Somasundram, D. and Chaudhary, B. *A First Course in Mathematical Analysis*. Narosa PublishingHouse, 1996.

Theoretical Paper-III

B030703T: TOPOLOGY

UNIT-I

Definition and example of Topological space, open and closed sets in Topological space, neighborhoods, closure, interior, exterior, derived and ense sets, bases and sub-bases, sub-spaces.

UNIT-II

Continuous functions and Homeomorphism, first (1^{st}) and second (2^{nd}) countable spaces, separability.

UNIT-III

T_0, T_1, T_2, T_3, T_4 spaces and their basic properties.

UNIT-IV

Connectedness and compactness, definition and some basic theorem.

References:

1. K. D.Joshi: Introduction to general topology—Wiley Eastern, New Delhi
2. J. L. Kelly : General Topology —Van Nostrand Reinhold company, Newyork
3. James R Munkres: Topology —Prentice Hall India Private Ltd, New Delhi
4. J. N. Sharma : Topology —Krishna publications, Meerut

Theoretical Paper-IV
(Optional)
B030706T: FUZZY SETS

UNIT- I

Fuzzy sets and representations of Membership functions, types of Fuzzy sets,α-cut, strong α-cut, level set, support core and height of Fuzzy sets, Normal, equal and equivalent Fuzzy set, containments, union, intersection of Fuzzy sets, degree of sub-set hood, hamming distance, convex fuzzy sets and algebra of convex fuzzy sets.

UNIT- II

Fuzzy numbers, Fuzzy cardinality, Fuzzy arithmetic operations on intervals, arithmetic operations on Fuzzy numbers, Fuzzy equations A+X=B, AX=B.

UNIT- III

Fuzzy relations, union and intersection of Fuzzy relations, Binary Fuzzy relations,domain, range, height, inverse and matrix representations of binary Fuzzy relations, standard composition of Fuzzy relations, Fuzzy equivalence relations.

UNIT- IV

Fuzziness, Shannon Entropy, Fuzzy linear programming problems.

Reference Books:

1 Fuzzy set theory **:**Michael Smithson, Jay Verkuilen**—** Sage Publications
2 Fuzzy sets, Fuzzy logic and Fuzzy systems **:**George J.Klir, Boyuan -World Scientific, Singapore
3 Fuzzy sets and Fuzzy logic **:** M Ganesh **—** PHI Publications
4 Fuzzy set theory **:**Shiv Raj Singh **—**Krishna publications, Meerut

Practical

B030707P: PROGRAMMING IN PYTHON-I

Basics of Python programming

Introduction to Python, Python Identifiers, Key words, Variables & Operators, Data Types, Strings, Lists and Tuples, Dictionary & Sets, Input-Output, Conditional Statements and Expressions, Loops, Control Flow statements, Functions, Modules & Recursions, introduction to Classes and Inheritance, Working with files

1 Getting started, Anaconda Installation, Python notebooks and Editors. Github
2 Calculate the distance between two points in three dimensions
3 Write a program to calculate average of two numbers and print their deviation.
4 Write a program to calculate factorial of a number.
5 Write a program to find GCD of two numbers.
6 Write a program greatest number from three numbers.
7 Write a program to print the reverse of a number.
8 Write a program to classify a given number as prime or composite
9 Write a program that computes permutations P(n,r) and combinations C(n,r)
10 10 Write a program that computes displays all leap years from 1900-2101
11 Write a program to print Fibonacci series up to a given number
12 Write a program to convert binary number to decimal number and vice versa
13 Opening, closing, editing, deleting and creating files in python
14 Create a simple function and call it from the main program
15 15 Loops in python: examples

Semester II

Theoretical Paper-I
B030801T: Analytical Dynamics

Unit-I

Introduction of Analytical Dynamics, Generalized coordinates, Degree of Freedom, Classification of Dynamical System, Conservative and Non Conservative System, generalized Forces, D'Alembert's Principle, Lagrange's equations.

Unit-II

Hamilton's canonical equations, Hamilton's principle and principle of least action, Conservation of Momentum and Displacement of the System, Hamiltonian Function and total Energy, Cyclic or Ignorable Coordinate.

Unit-III

Two-dimensional motion of rigid bodies, Euler's dynamical equations for the motion of a rigid body about an axis, theory of small oscillations andexamples.

Unit-IV

Lagrange Bracket, Poisson Bracket, Canonical Transformation, Jacobi Identity, Hamilton Jacobi Theorem, Poisson's Theorem.

References:

1. Classical Mechanics : Goldestein, H, Pearson Education, 2011
2. Classical Mechanics : Rana and Jog, McGraw Hill Education, 2017
3. Classical Mechanics : J.C. Upadhyaya, Himalaya publication, 2014
4. Analytical Dynamics: A New Approach, Udwadia and Robert, Cambridge University Press, 2007

Theoretical Paper-II

B030802T: Theory of Differential Equation and Boundary Value Problem

UNIT I

Method of separation of variables for Laplace, Fundamental solution of Laplace's Equation, Harmonic functions and properties, The maximum principle, Energy methods, Heat and Wave equations, Mean value Method, Solution of Wave equation with initial values, Fundamental solutions of Heat Equation.

UNIT II

Existence and uniqueness theorem for first order ODE, initial value problem and picardes theorem, convergence of solution of initial value problems, Peano's existence theorem (statement only) and corollaries.

UNIT III

Ordinary Differential Equations of Sturm-Liouville boundary value problem, Eigen values and Eigen functions, Orthogonality theorem, Expansion theorem, Green's function.

UNIT IV

Application of Laplace transform to solve differential equations, Application of Fourier transforms to boundary value Problems.

References:

1. G. F. Simmons, *Differential Equations with Applications and Historical Notes*, McGrawHillEducation.
2. Coddington, E. A. and Levinson, N. (1955) *Theory of Ordinary Differential equations*, TMHEducation.
3. M. D. Raisinghania, Advanced Differential Equations, S. Chand, 2016.
4. D.P. Choudhary and H. I. Freedman: A Course in Ordinary Differential Equations, Narosa Publishing House, NewDelhi,2002.
5. I.N. Sneddon, Elements of Partial Differential Equations, McGraw-Hill, 1988.
6. Robert C Mcowen, Partial Differential Equations: Methods and Applications, Pearson Education Inc. 2003

Theoretical Paper-III

B030803T: MEASURE AND INTEGRATION

Unit-I

Measurable sets, outer and inner measure of a bounded set. Union and intersection of a Measurable sets. Lebesgue measurable sets. Sets of measure zero. Boral sets, measure of countable and uncountable sets.

Unit-II

Measurable functions, algebra of measurable functions, Boral measurable function, measurability of a continuous function, non-measurable function.

Unit-III

Lebesgue integral, Relation between Riemann integral and Lebesgue integral, criterion theorem for Lebesgue integral, Lebesgue integral of bounded measurable function and it's properties, Lebesgue integral of unbounded functions.

Unit-IV

L^p-space,some basic definitions and theorem, Holder's inequality,Minikowski inequality, Schwarz's and Jensen Inequality.

Reference:

1. Measure theory : Krishna B.Athreya, Soumendra N.Lahiri – Trim Hindustan book Agency
2. Measure theory and Integration : G. DE Barra – New Age international Publisher
3. Measure theory and Integratism : A K Malik, S C Malik, S K Gupta – willy Eastern Publisher

Theoretical Paper-IV
(Optional)

B030804T: Elementary Statistics

Unit I

Introduction to Statistics, Branches of Statistics, Population versus Sample, Basic Terminology, Types of Variables, Summation Notation, Sources of Data, and Sampling Techniques, Frequency Distributions, Relative Frequency.

Unit II

Pie Charts, Frequency Histogram, and Cumulative Frequency. Measures of Center: Mean, Median and Mode. Intro to Measures of Dispersion (Ungrouped Data), Measures of Variability: Range, variance and standard deviation.

Unit III

Random variables, Discrete and continuous Random Variables. Mean and Standard Deviation, Probability, probability distributions, Intro to Normal Distribution, Applications of Normal Distribution sampling distributions, binomial distribution, the student's t distribution, the Chi-square distribution

Unit IV

Estimation using confidence intervals, hypothesis testing, linear regression, correlation.

Reference:

1. Gupta, S.C. and Kapoor, V.K. (2007): Fundamentals of Mathematical Statistics, 11th Edn.,(Reprint), Sultan Chand and Sons.
2. Miller, Irwin and Miller, Marylees (2006): John E. Freund's Mathematical Statistics withApplications, (7th Edn.), Pearson Education, Asia.
3. Spiegel and Stephens: Schaum's outlines Statistics, McGraw Hill Education

Practical

B030807P : PROGRAMMING IN PYTHON-II

I. Data Visualization - I

1. Scatter plots
2. Bar charts
3. Histograms
4. Pie Charts

II. Data Visualization - II

5. Interactive plots -1 : modifying display.
6. Interactive plots – 2 : editing data and plots.
7. How to make a simple animation in python

III. Numpy

8. Array Arithmatic
9. Matrix Arithmatic
10. Numerical Methods through numpy

IV. Scipy

11. Regression
12. Optimization
13. Root-Finding

SEMSETER - III

Theoretical Paper-I

B030901T: Functional Analysis

Unit-I

Normed linear space, Banach space, Summability in Normed linear space, continuity and joint continuity.

Unit-II

l^n, l_p, l_2 *and* l_∞ Banach spaces, Riesz – Fisher theorem, Subspaces and Quotient spaces of Banach space, Continuous and Bounded linear Transformation.

Unit-III

Isometric Isomarphism, Topological Isomarphism, Equivalent norm, Riesz- Lemma, Convexity, Hahn- Banach Theorem, Open mapping Theorem , Closed Graph Theorem.

Unit-IV

Hilbert space, the adjoint of an operators T in Hilbert space, Self adjoint, Normal and Unitary operators, Riesz representation theorem

Reference Books:

1. Walter Rudin : Functional Analysis - TATA McGraw Hill New Delhi
2. Lusternik and sobolev : Elements of Functional Analysis - Hindustan Publishing corporation New Delhi
3. E.C. Titchmarsh : A Theory of Functions - Oxford University Press New Delhi
4. J.N. Sharma & A.R.Vasishtha : Functional Analysis - Krishna Publications MeerutWalter Rudin : Functional Analysis - TATA McGraw Hill New Delhi

Theoretical Paper-II

B030902T: INTEGRAL EQUATIONS

Unit-I

Integral Equations:

Definition and classification of linear integral equations. Conversion of initial and boundary value problems into integral equations. Conversion of integral equations into differential equations.

Unit-II

Fredholm Integral Equations:

Solution of integral equations with separable kernels, Eigen values and Eigen functions. Solution by the successive approximations, Neumann series and resolvent kernel. Solution of integral equations with symmetric kernels, Hilbert-Schmidt theorem.

Unit-III

Volterra Integral Equations:

Successive approximations, Neumann series and resolvent kernel. Equations with convolution type kernels.

Unit-IV

Solution of integral equations by transform methods:

Singular integral equations, Hilbert transform and solutions by Laplace transformation.

Reference:

1. Kanwal, R.P.: Linear Integral Equation. Theory and Techniques. Academic Press, 2014.
2. Raisinghania M. D.: Integral Equation & Boundary Value Problem. S. Chand Publishing, 2007.
3. Jerri, A. :Introduction to Integral Equations with Applications, John Wiley & Sons, 1999.
4. Hildebrand, F. B.: Method of Applied Mathematics, Courier Corporation, 2012.
5. Wazwaz, A. M.: A First Course in Integral Equations. World Scientific Publishing Co Inc, 1997
   Kanwal, R.P.: Linear Integral Equation. Theory and Techniques. Academic Press, 2014.

Theoretical Paper-III

B030903T: MACHINE LEARNING

Unit-I

Introduction to Machine Learning (ML), Applications of ML, Recent trends in Machine Learning, Learning, Types of Learning, Introduction to Machine Learning Approaches Understanding of Data and Datasets, Preparation of Data for Analysis and Machine Learning, Dataset cleaning Train, Test and Validation Datasets,Imbalanced data, Outliers, Data Science vs Machine Learning.

Unit-II

SUPERVISED LEARNING (REGRESSION): Regression: Linear Regression,Cost Function, Multiple Linear Regressions, Logistic Regression. Decision Trees, Over fitting and Under fitting, Confusion Matrix, Performance Metrics: Accuracy, Precision, Recall.

Unit-III

Unsupervised Learning: k-Nearest Neighbor (KNN) Classification, Decision Treesfor classification, Logistic Regression Advanced Machine Learning Methods: Neural Networks and Polynomial Fits -over and under fitting.

Unit-IV

Statistical Inference and Bayes Theorem, Frequentist vs. Bayesian Approaches,Introduction to Bayesian Methods: Estimation, Likelihood, Posterior and Priors, Model comparison, Maximum Likelihood.

Text and References Books

1. Coryn A. L., Bailer, Jones, Practical Bayesian Inference: A Primer for Physical Scientists, CUP
2. Stone, James V., Bayes Rule: A tutorial introduction, Sebtel Press
3. Srinivasaraghavan, A. and Joseph, V: Machine Learning, Wiley India Pvt Ltd. 2019
4. Mehryar Mohri, Afshin Rostamizadeh, Ameet Talwalkar: Foundations of Machine Learning, MIT Press, 2012.

Theoretical Paper-IV (Optional)

B030904T: GENERAL RELATIVITY

UNIT-I

Transformation of coordinates, transformation law of tensor, Product of two tensor, Contraction, Quotient law, Metric tensor and Riemannian space, Conjugate tensor, symmetric and anti−tensor, Levi-Civita tensor, Christoffel symbol, Covariant derivative, Riemannian metric.

UNIT-II

Tensor form of gradient, divergence and curls, Parallel transport, Riemannian curvaturetensor, Ricci tensor, Bianchi identities, Geodesic, Null geodesic, Geodesic deviation.

UNIT-III

Introduction to General Relativity, Principle of Equivalence, Principle of General covariance, Mach's Principle, geodesic postulate, Energy momentum tensor, Newtonian approximation of equation of motion, Search for Einstein's field equation, Einstein's field equation reduces to Poisson's equations, deviation of Einstien's field equation from vibrational principle.

UNIT-IV

Gravitational field in empty space, Schwarzschild exterior solution, Singularities in Schwarzschild line element, Isotropic form of Schwarzschild exterior line element, Planetary orbits, Three Crucial tests in General relativity, Birkhoff's theorem.

Books for Study:

1. J.V.Narlikar:An Introductions to Relativity; Cambridge University Press, 2010.
2. James Hartle: Gravity, Pearson Education, 2003
3. S Dhurandhar and Sanjit Mitra: General Relativity and Gravitational Waves, Springer 2022
4. S. P. Puri: General Theory of Relativity; Pearson, 2013.
5. I.B. Khriplovich: General Relativity; Springer Science& Business media, 2005.
6. Ta-Pei Cheng: Relativity, Gravitation and Cosmology, Oxford. 2012 J.V.Narlikar:An Introductions to Relativity; Cambridge University Press, 2010.

Practical

B010907P: Introduction to SCILAB /MATLAB

Introduction to SciLab/ MATLAB, Installation of SciLab/ MATLAB, Basic elements of the language, Looping and Branching: If, select, for, break, continue, Functions, return, Contour plots, tiles, axes, legends.

Matrices: Creating matrices, sum, product of matrices, inverse, rank determinant, comparing matrices, system of equations, working with polynomials, defining a function and output arguments.

Practical's:

1. To print the prime numbers between 1 and 100.
2. Write a program to add, subtract, multiply and divide common fractions.
3. To find the average of between n and 12n where n is an integer.
4. Write a program to check a number is Armstrong or not ?
5. Write a program to display table from 11 to 20.
6. To find the roots of a cubic equation.
7. To sum and difference of any two matrices and hence find the row sum andcolumn sum of a given matrix. .
8. To find inverse of a given 3x3 matrices.
9. Write a program to find the transpose, trace and norm of a matrix.10. To sort all the elements of a 4x4 matrix.
11. Program to accept a matrix and determine whether it is a symmetric matrix,skew-symmetric or not.
12. Write a program to print Fibonacci numbers

Semester IV

Theoretical Paper-I

B031001T: Advanced Operation Research

Unit-I

Game theory, Zero- Sum Game, Solution of rectangular game with saddle point, Solution of 2×2 game without saddle point. Graphical method of solution for 2×n and m×2 games. Integer Programming, Branch and Bound technique.

Unit-II

Network analysis, CPM and PERT, Network components and general procedure forconstruction of networks and numbering of events (Fulkerson's rule) . CPM computation and determination of critical path.

Unit-III

Inventory theory, economic order Quantity Models under various demands having shortages and no shortages, Probabilistic Inventory models with discrete or continuous demand. Simple replacement model for Equipments that deteriorates with time in descrete and continuous form.

Unit-IV

Quening theory and its characteristics, stochastic Processes under steady andtransient states. Study of M/M/1 and M/M/s quening models, Parametric Linear Programming Quening theory and its characteristics, stochastic Processes under steady andtransient states. Study of M/M/1 and M/M/s quening models, Parametric Linear Programming.

Reference Books:

1. Operations Research – kantiswarup, P.K.gupta, Man Mohan–Sultan Chand & sons, New Delhi
2. Operations Research (An Introduction) – Hamdy A. Taha – Pearson
3. Operations Research– R.K.Gupta–Krishna Prakasan
4. Operations Research –K.Nagrajan - New Age International PublicationsOperations Research – kantiswarup, P.K.gupta, Man Mohan–Sultan Chand & sons, New Delhi

Theoretical Paper-II

B031002T: FLUID DYNAMICS

Unit-I

Lagrangian and Eulerian methods to describe the fluid motion, Equation of continuity, Boundary conditions, Stream Lines. Pathlines and streak lines, Velocity potential. Irrotational and rotational motions.

Unit-II

Euler's equations of motion, Pressure equation, Bernoulli's theorem, Impulsive actions, Flow and circulation, The permanence of irrotational motion. Stream function. Irrotational motion in two dimensions. Complex velocity potential. Sources, sinks, doublets, and their images.

Unit-III

The two-dimensional irrotational motion is produced by the motion of circular and ellipticcy linders in a liquid, Kinetic energy of liquid, Milne-Thomson circle theorem. Thetheorem of Blasius, Stoke's stream function.

Unit-VI

Wave motion in gas, speed of sound, equation of motion of a gas, subsonic, sonic, super-sonic flow of a gas, isentropic of a gas, shock formation.

Reference Books:

1. F. Chorlton: Text Book of Fluid Dynamics, C.B.S. Publishers, Delhi,1985.
2. W.H. Besaint and A.S. Ramsey: A Treatise on Hydrodynamics, Part II, C.B.S. Publishers,Delhi,1988.
3. B.G.Verma: Hydrodynamics, Pragati Prakashan, Meerut, 1995.
4. M.D. Raisinghania: Fluid Dynamics, S.Chand and Co, 2003

Theoretical Paper-III (Optional)

B031004T: Differential Geometry of Manifolds

UNIT-I

Definition and examples of differentiable manifold, differentiable function,Tangent space, vector field.

UNIT-II

Connections, Affine connection and Covariant derivative, torsion and curvature tensors, difference tensor of two connections.

UNIT-III

Lie – bracket, Lie – derivative, exterior product of two vectors, Exterior algebra, Exterior derivative.

UNIT-IV

Definition of Riemannian manifold and examples, Riemannian connection, Riemannian curvature tensor and Ricci tensor, scalar curvature, Bianchi identities, constant curvature, definition of Einstein manifold, Geodesic in Riemannian manifold, Projective curvature tensor.

Books for Study:

1 Quddus Khan : Differential Geometry of manifolds — PHI Publications

2 H. S. Shukla & B. N. Prasad: Differential Geometry of manifolds — Vandana Prakashan.

Quddus Khan : Differential Geometry of manifolds — PHI Publications.

Practical-I

B031006P : Major Research Project/ Dissertation

Preamble

The concept of introducing the project will help the student community to learn and apply the principles of Physics and explore the new research avenues. In the course of the project the student will refer books, Journals or collect literature / data by the way of visiting research institutes/ industries. He/she may even do experimental /theoretical work in his/her college and submit a dissertation report with a minimum of 40 pages not exceeding 50 pages.

Format for Preparation of Dissertation

The sequence in which the dissertation should be arranged and bound should be as follows:

1. Cover Page and title Page
2. Declaration
3. Certificate
4. Abstract (not exceeding one page)
5. Acknowledgement (not exceeding one page)
6. Contents (12 Font size, Times new Roman with double line spacing)
7. List of Figures/ Exhibits/Charts
8. List of tables
9. Symbols and notations
10. Chapters
11. References