Atal Bihari Vajpayee Vishwavidyalaya, Bilaspur (C.G.)

Scheme and Syllabus

of

M. Sc. (Maths)

Program Code: MSCMATHR115

Semester system for affiliated college
(As per LOCF and credit system)

No change.
(Dr. U.K. Shrivastava)

w.e.f. 2024-2025

(As approved by AC and EC meetings held on 16.08.2023 and 18.04.2023 respectively)

अटलबिहारीवाजपेयीविश्वविद्यालय,बिलासपुर(छ.ग.)
कोनीपुलिसथाना के सामने, बिलासपुर–रतनपुरमार्ग, कोनी, बिलासपुर(छ.ग.) 495009
Website :www.bilaspuruniversity.ac.in

Scheme of M.Sc. Mathematics Program under Semester System

Program Code: MSCMATHR115

Semester	N.	Course Code	Subject Name	Credit			Total Credit	Marks			
								ESE	IA	Total	
				L	P	T				Max	Min
Third	1	MATHT301	Integration Theory & Functional Analysis -I	3	0	1	4	80	20	100	36
	2	MATHT302	Partial Differential Equation, Mechanics and Gravitation- I	3	0	1	4	80	20	100	36
		OPTIONAL PAPERS (Any Three)									
	3	MATHP303	Programming in C (With ANSI Features)- I	2	1	1	4	80	20	100	36
	4	MATHT304	Fuzzy Sets and Their Applications- I	3	0	1	4	80	20	100	36
	5	MATHT305	Operation Research- I	3	0	1	4	80	20	100	36
	6	MATHT306	Fluid Mechanics - I	3	0	1	4	80	20	100	36
	7	MATHT307	Fundamental of Computer Science- I	3	0	1	4	80	20	100	36
		Subtotal					20				
Fourth	1	MATHT401	Integration Theory& Functional Analysis-II	3	0	1	4	80	20	100	36
	2	MATHT402	Partial Differential Equation, Mechanics and Gravitation- II	3	0	1	4	80	20	100	36
		OPTIONAL PAPERS(Any Three)									
	3	MATHP403	Programming in C (With ANSI Features)- II	2	1	1	4	80	20	100	36
	4	MATHT404	Fuzzy Sets and Their Applications - II	3	0	1	4	80	20	100	36
	5	MATHT405	Operation Research- II	3	0	1	4	80	20	100	36
	6	MATHT406	Fluid Mechanics - II	3	0	1	4	80	20	100	36
	7	MATHT407	Fundamental of Computer Science-II	3	0	1	4	80	20	100	36
		Subtotal					20				
Total							**80**	1600	400	**2000**	

Abbreviations used:

ESE: End Semester Exam
IA: Internal Assessment

Part A: Introduction				
Program: M.Sc. Mathematics		Semester: III	Year: II	w.e.f. 2024-2025
1.	Course Code	MATHT301		
2.	Course Title	Integration Theory and Functional Analysis -I		
3.	Course Type	Theory		
4.	Pre-requisite (ifany)	No		
5.	Course Learning. Outcomes (CLO)	**At the end of this course, the students will be able to:** • Gain knowledge of Classical Banach Space, Normed and Banach Space, Bounded Linear Operators, Bounded Linear Functions, Concepts of Specific Geometry of Hilbert Spaces, Spectral Theory, Measure Spaces, Extension Theorem. • Gain knowledge of defining Measure Spaces, Signed Measure, Absolute Continuity and Singularity of Measures. • Gain knowledge to apply Lebesgue Decomposition Theorem and Random Nikodym Theorem. • Gain concepts of linear Spaces, Inner Product Spaces, Bounded Linear Operators between these Spaces, Compact, Self Adjoint Operators, Normal Operators and Spectrum of Bounded Linear Operators. • Develop competency of comparing the difference between Banach and Hilbert Spaces. • Develop competency of computing Dual Spaces of certain Banach Spaces. • Gain knowledge of working with weak and weaker Topologies on Normed Linear Spaces.		
6.	**Credit Value**	04		
7.	**Total Marks**	**Internal Marks: 20** **External Marks: 80**	**Min Passing Marks:36**	

Part B: Content of the Course		
Total Number Lectures : 60		
Unit	**Topics**	**Total Hours**
	Integration Theory	
I.	Signed Measure, Hahn Decomposition Theorem, Mutually Singular Measure, Random Nikodym Theorem, Lebesgue Decomposition, Riesz Representation Theorem, Extension Theorem(Caratheodory).	12

uhth

II.	Lebesgue-Stieltjes Integral, Product Measure, Fubini's Theorem, Tunnelle's Theorem, Integral Operator, Inner Measure, Extension by Set of Measure Zero, Caratheodory Outer Measure, Hausdorff Measure, Differentiation and Integration, Decomposition into Absolutely Continuous and Singular Parts.	12
III.	Baire Sets, Baire Measure, Continuous Functionwith Compact Support, Regularity of Measures on Locally Compact Spaces.	12
	Functional Analysis	
IV.	Normed Linear Spaces, Banach Spaces, and Examples, Quotient Space of Normed Linear Space and its Completeness, Equivalent Norms, Riesz Lemma, Basic Properties of Finite Dimensional Normed Linear Spaces and Compactness.	12
V.	Weak Convergence and Bounded Linear Transformation, Normed Linear Spaces, Bounded Linear Transfomations, Dual Spaces with Examples.	12

Part C - **Learning Resource**

Text Books, Reference Books, E-Resources

Text Books:

1. Real Analysis, H. L. Royden, Macmillan Pub. Co. Inc., Fourth Edition, New York 1962.
2. Introductory Functional Analysis with Applications, Kreyszig, John Wiley & Sons (Asia) Pte Ltd.
3. Functional Analysis, P. K. Jain, O.P. Ahuja & Khalid Ahmed, New Age International (P) Ltd., New Delhi.

Reference Books:

1. Lebesgue Integration, J. H. Williamson, Holt Rinehart and Wintson, Inc., New York 1962.
2. Measure Theory. P R. Halmos, Van Nostrand, Princeton, 1950.
3. Lebesgue Theory of Integration: Its Origin and Development, T. G. Hawkins, Chelsa New York, 1979
4. Functional Analysis, B. V. Limye, Wiley Eastern Ltd.1981
5. Functional Analysis with Applications, A. Siddiqui, Tata McGraw Hill Publishing Company, New Delhi.

E-Resources:

1. https://onlinecourses.nptel.ac.in
2. https://epgp.inflibnet.ac.in
3. https://swayam.gov.in

अटल बिहारी वाजपेयी विश्वविद्यालय,बिलासपुर(छ.ग.)

कोनी पुलिस थाना के सामने, बिलासपुर--रतनपुर मार्ग, कोनी, बिलासपुर(छ.ग.) 495009

Website :www.bilaspuruniversity.ac.in

S.N.	Member Name	Signature
01	**Dr. Umesh Kumar Shrivastava, Chairman** Professor & P.G. Head, Govt. E.R.R. Science College, Bilaspur	
02	**Dr. Smt. Kiran Lata Awasthi** Asstt. Prof. & P.G. Head, C.M. Dubey P.G. College, Bilaspur	
03	**Dr.Aradhana Sharma,** Asstt. Prof. & U.G. Head, Govt. Bilasa Girls P.G. College, Bilaspur	
04	**Shri Yatendra Kumar Upadhyay** Asstt. Prof. & U.G. Head , Govt. Niranjan Keshrwani College, Kota	
05	**Shri Dildar Singh Tandan,** Asstt. Prof. Govt. Agrasen College, Bilha	
06	**Smt. Suchitra Tiwari,** Asstt. Prof., Govt. J.P.Verma Arts & Comm. College, Bilaspur	

Part A: Introduction				
Program: M.Sc. Mathematics		Semester: IV	Year: 2023-24	w.e.f.:2024-2025
1.	Course Code	**MATHT401**		
2.	Course Title	Integration Theory and Functional Analysis -II		
3.	Course Type	**Theory**		
4.	Pre-requisite (ifany)	No		
5.	Course Learning. Outcomes (CLO)	**At the end of this course, the students will be able to:** • Gain knowledge of Classical Banach Space, Normed and Banach Space, Bounded Linear Operators, Bounded Linear Functions, Concepts of Specific Geometry of Hilbert Spaces, Spectral Theory, Measure Spaces, Extension Theorem. • Gain knowledge of defining Measure Spaces, Signed Measure, Absolute Continuity and Singularity of Measures. • Gain knowledge to apply Lebesgue Decomposition Theorem and Random Nikodym Theorem. • Gain concepts of linear Spaces, Inner Product Spaces, and Bounded Linear Operators between these Spaces, Compact, Self Adjoint Operators, Normal Operators and Spectrum of Bounded Linear Operators. • Develop competency of comparing the difference between Banach and Hilbert Spaces. • Develop competency of computing Dual Spaces of certain Banach Spaces. • Gain knowledge of working with weak and weaker Topologies on Normed Linear Spaces.		
6.	**Credit Value**	**04**		
7.	**Total Marks**	**Internal Marks: 20** **External Marks: 80**	**Min Passing Marks:36**	

Part B: Content of the Course		
Total Number Lectures : 60		
Unit	**Topics**	**Total Hours**
	Functional Analysis	
I.	Uniform Boundedness Theorem and some of its consequences, Open Mapping and Closed Graphs Theorems, Hahn-Banach Theorem for Real Linear Spaces, Complex Linear Spaces and Normed Linear Spaces.	12
II.	Reflexive Spaces, Weak Sequential Compactness, Compact Operators, Solvability of Linear Equations in Banach Spaces(Fredholm Alternatives), The Closed Range Theorem, Inner Product Spaces, Hilbert Spaces, Orthonormal Sets, Bessel's Inequality, Complete Orthonormal Sets and Parseval's Identity.	12
III.	Structure of Hilbert Spaces, Projection Theorem, Riesz Representation Theorem, Adjoint of an Operator on a Hilbert Space. Reflexivity of Hilbert Spaces.	12

IV.	Self-adjoint Operators, Positive, Projection, Normal and Unitary Operators, Abstract Variational Boundary-Value Problems, The Generalised Lax-Milgram Theorem.	12
V.	Spectral Theory- Eigen Values of Linear Operator, The Spectrum of a Bounded Linear Operator, Spectral Properties, Complex Analysis and Spectral Theory.	12

Part C - **Learning Resource**

Text Books, Reference Books, E-Resources

Text Books:

1. Real Analysis, H. L. Royden, Macmillan Pub. Co. Inc., Fourth Edition, New York 1962.
2. Introductory Functional Analysis with Applications, Kreyszig, John Wiley Sons (Asia) Pvt. Ltd.
3. Functional Analysis, P. K. Jain, O.P. Ahuja & Khalid Ahmed, New Age International (P) Ltd., New Delhi.

Reference Books:

1. Lebesgue Integration, J. H. Williamson, Holt Rinehart and Wintson, Inc., New York 1962.
2. Measure Theory. P R. Halmos, Van Nostrand, Princeton, 1950.
3. Lebesgue Theory of Integration: Its Origin and Development, T. G. Hawkins, Chelsa New York, 1979.
4. Functional Analysis, B. V. Limye, Wiley Eastern Ltd.1981.
5. Functional Analysis with Applications, A. Siddiqui, Tata McGraw Hill Publishing Company, New Delhi.

E-Resources:

1. https://onlinecourses.nptel.ac.in
2. https://epgp.inflibnet.ac.in
3. https://swayam.gov.in

अटल बिहारी वाजपेयी विश्वविद्यालय,बिलासपुर(छ.ग.)

कोनी पुलिस थाना के सामने, बिलासपुर–रतनपुर मार्ग, कोनी, बिलासपुर(छ.ग.) 495009
Website :www.bilaspuruniversity.ac.in

S.N.	Member Name	Signature
01	**Dr. Umesh Kumar Shrivastava, Chairman** Professor & P.G. Head, Govt. E.R.R. Science College, Bilaspur	
02	**Dr. Smt. Kiran Lata Awasthi** Asstt. Prof. & P.G. Head, C.M. Dubey P.G. College, Bilaspur	
03	**Dr. Aradhana Sharma,** Asstt. Prof. & U.G. Head, Govt. Bilasa Girls P.G. College, Bilaspur	
04	**Shri Yatendra Kumar Upadhyay** Asstt. Prof. & U.G. Head , Govt. Niranjan Keshrwani College, Kota	
05	**Shri Dildar Singh Tandan,** Asstt. Prof. Govt. Agrasen College, Bilha	
06	**Smt. Suchitra Tiwari,** Asstt. Prof., Govt. J.P.Verma Arts & Comm. College, Bilaspur	

अटलबिहारीवाजपेयीविश्वविद्यालय,बिलासपुर(छ.ग.)

कोनीपुलिसथाना के सामने, बिलासपुर--रतनपुरमार्ग, कोनी, बिलासपुर(छ.ग.) 495009

Website :www.bilaspuruniversity.ac.in

Part A: Introduction				
Program: M.Sc. Mathematics		Semester: III	Year: 2024-25	w.e.f.:2024-25
1.	Course Code	MATHT302		
2.	Course Title	Partial Differential Equations, Mechanics & Gravitation-I		
3.	Course Type	Theory		
4.	Pre-requisite (ifany)	No		
5.	Course Learning Outcomes (CLO)	**At the end of this course, the students will be able to:** • Gain knowledge of kinematics, equation of motion, motion in two dimension, attraction and potential, mechanics variation principle and Lagrangian formula, calculus of variation, Hamiltonian formulation in mechanics and gravitation. • Gain knowledge of understanding dynamics of fluid flows and governing nondimensional parameters.		
6.	**Credit Value**	04		
7.	**Total Marks**	**Internal Marks: 20** **External Marks: 80**	**Min Passing Marks:36**	

Part B: Content of the Course		
Unit	**Topics**	**Total Hours**
I.	**Laplace's Equation**-Fundamental solution, Mean value formulae, Properties of Harmonic function, Green function, Energy method.	12
II.	**Heat Equation** - Fundamental solution, Mean value formulae, Properties of solution, Energy method.	12
III.	**Wave Equation** - Solutions by spherical means, Homogeneous equations, Energy method. Non-linear first order PDE, complete integrals, Envelopes characteristics, Hamilton Jacobi equations (calculus of variations, Hamilton's ODE), Conservation Laws, Representation of solutions, Separation of variables Laplace and Fourier Transforms and their applications, Legendre Transform.	12
IV.	**Attraction** - Attraction of rod, disc, spherical shell and sphere, spherical shell of finite thickness.	12
V.	Surface integral of normal attraction (Application &Guass's theorem) Laplace and Poisson equations, work done by self-attracting system.	12

W. L. h

Part C - **Learning Resource**
Text Books, Reference Books, E-Resources

Text Books:

1. Gupta, Kumar & Sharma: Classical - Mechanics, Pragati Prakashan Meerut.
2. B.D Gupta & Satya Prakash. Mechanics Relativity. Pragati Prakshan, Meerut.
3. Walter A. Strauss: Partial Differential Equations, John Wiley and Sons Inc.
4. Lawrence C. Evans: Partial Differential Equations, American Mathematical Society.
5. Brahma Nand, B. S. Tyagi and B. D. Sharma: Attraction and Potential, Kedar Nath, Ram Nath publication.

Reference Books:

1. D. Raisinghania: Ordinary and Partial Differential Equation, S Chand Publication, New Delhi.
2. S L. Loney: An Elementary TreatiSe on Statics, University Press.
3. I. N. Sneddon: Partial Differential Equation, McGraw Hill Book Co. Ltd.
4. H. Goldstem: Classical Mechanics, Addition Wesley.
5. Narayan Chandra Rana & Pramod Sharad, Chandra Joag: Classical Mechanics. Tata McGraw-Hill Publishing Company, 1991.

E-Resources:

1. https://onlinecourses.nptel.ac.in
2. https://epgp.inflibnet.ac.in
3. https://swayam.gov.in

S.N.	Member Name	Signature
01	**Dr. Umesh Kumar Shrivastava, Chairman** *Professor & P.G. Head, Govt. E.R.R. Science College, Bilaspur*	
02	**Dr. Smt. Kiran Lata Awasthi** Asstt. Prof. & P.G. Head, C.M. Dubey P.G. College, Bilaspur	
03	**Dr.Aradhana Sharma,** Asstt. Prof. & U.G. Head, Govt. Bilasa Girls P.G. College, Bilaspur	
04	**Shri Yatendra Kumar Upadhyay** Asstt. Prof. & U.G. Head , Govt. Niranjan Keshrwani College, Kota	
05	**Shri Dildar Singh Tandan,** Asstt. Prof. Govt. Agrasen College, Bilha	
06	**Smt. Suchitra Tiwari,** Asstt. Prof., Govt. J.P.Verma Arts & Comm. College, Bilaspur	

Part A: Introduction				
Program: M.Sc. Mathematics		Semester: IV	Year: 2024-25	w.e.f.:2024-2025
1.	Course Code	MATHT402		
2.	Course Title	Partial Differential Equations, Mechanics & Gravitation-II		
3.	Course Type	Theory		
4.	Pre-requisite (ifany)	No		
5.	Course Learning Outcomes (CLO)	**At the end of this course, the students will be able to:** • Gain knowledge of deriving and applying equation of motion. • Gain concepts of mechanics variation principle, Lagrange's formula and their applications. • Gain the basic ideas of turbulence.		
6.	**Credit Value**	04		
7.	**Total Marks**	**Internal Marks: 20** **External Marks: 80**	**Min Passing Marks:36**	

Part B: Content of the Course		
Unit	Topics	Total Hours
I.	Generalised co-ordinates, Holonomicand non-holonomicsystems, Scleronomic and Rheonomicsystem, Generalised Potentials Lagrange's equations of first kind,Lagrange's equations of second kind. Uniqueness of solution,Energy equation for conservation fields.	12
II.	Hamilton's variable, Hamilton canonical equations, cyclic coordinates, Routh's equations. Poisson's Bracket, Poisson's identity, Jacobi-Poisson theorem, Lagrange's bracket.	12
III.	Motivating problems of calculus of variations, Shortest distance, Minimum surface of revolution, Brachistochrone problem, isoperimetric problem, Geodesic, Fundamental lemma of calculus of variations, Euler's equation for one dependent function and its generalization to (i) independent functions, (ii) higher order derivatives, Conditional extremum under geometric constraints and under integral constraints.	12
IV.	Potential of rod, disc, spherical shell and sphere, spherical shell of finite thickness.	12
V.	Distributions for a given potential, Equipotential surfaces, Surface and solid harmonics. Surface density in terms of surface harmonics.	12

Part C - **Learning Resource**
Text Books, Reference Books, E-Resources

Text Books:

1. Gupta, Kumar & Sharma: Classical - Mechanics, Pragati Prakashan Meerut.
2. B.D Gupta & Satya Prakash. Mechanics Relativity. Pragati Prakshan, Meerut.

Reference Books:

1. D. Raisinghania: Ordinary and Partial Differential Equation, S Chand Publication, New Delhi.
2. S L. Loney: An Elementary TreatiSe On Statics, University Press.
3. I N. Sneddon: Partial Differential Equation, McGraw Hill Book Co. Ltd.
4. H. Goldstem: Classical Mechanics, Addition Wesley.
5. Narayan Chandra Rana & Pramod Sharad, Chandra Joag: Classical Mechanics. Tata McGraw-Hill Publishing Company, 1991.

E-Resources:

1. **https://onlinecourses.nptel.ac.in**
2. **https://epgp.inflibnet.ac.in**
3. **https://swayam.gov.in**

S.N.	Member Name	Signature
01	**Dr. Umesh Kumar Shrivastava, Chairman** Professor & P.G. Head, Govt. E.R.R. Science College, Bilaspur	
02	**Dr. Smt. Kiran Lata Awasthi** Asstt. Prof. & P.G. Head, C.M. Dubey P.G. College, Bilaspur	
03	**Dr.Aradhana Sharma,** Asstt. Prof. & U.G. Head, Govt. Bilasa Girls P.G. College, Bilaspur	
04	**Shri Yatendra Kumar Upadhyay** Asstt. Prof. & U.G. Head , Govt. Niranjan Keshrwani College, Kota	
05	**Shri Dildar Singh Tandan,** Asstt. Prof. Govt. Agrasen College, Bilha	
06	**Smt. Suchitra Tiwari,** Asstt. Prof., Govt. J.P.Verma Arts & Comm. College, Bilaspur	

अटलबिहारीवाजपेयीविश्वविद्यालय,बिलासपुर(छ.ग.)
कोनीपुलिसथाना के सामने, बिलासपुर–रतनपुरमार्ग, कोनी, बिलासपुर(छ.ग.) 495009
Website :www.bilaspuruniversity.ac.in

Part A: Introduction				
Program: M.Sc.Mathematics		Semester: III	Year: 2024-25	w.e.f.:2024-25
1.	Course Code	**MATHT303**		
2.	Course Title	ProgramminginC(withANSIfeatures) -I		
3.	Course Type	**Theory & Practical**		
4.	Pre-requisite (ifany)	No		
5.	Course Learning. Outcomes (CLO)	**At the end of this course, the students will be able to:** • Gain knowledge of array, character array and strings, user defined functions, structure and unions, pointers. • Gain knowledge of understanding computer programming language concepts. • Gain ability to design and develop computer programs, analyze and interpret the concepts of pointers, declarations, initialization, operations on pointers and their usage. • Gain ability to define data types and use them in simple data processing, applications. Also he /she must be able to use concept of array of structure and he/she must be able to define union and enumeration user defined data type. • Develop confidence for self-education and ability for lifelong learning needed for computer language.		
6.	**Credit Value**	04		
7.	**Total Marks**	**Internal Marks: 20** **External Marks: 50** **Practical Marks: 30**	**Min Passing Marks:36**	

Part B: Content of the Course		
Unit	**Topics**	**Total Hours**
I.	An overview of programming, Programming language, Classification- C Essentials Program Development Functions, Anatomy of a C Function, Variables and Constants, Expressions, Assignment Statements, Formatting Source Files, Continuation Character, The Pre-processor.	9
II.	Scalar Data Types- Declarations, Different Types of integers, Different kinds of integer Constants, Floating- Point Types, initialization, mixing Types, Explicit ConversionsCasts, Enumeration Types. The Void Data Type typesets, Finding the Address of an object Pointers.	9
III.	Control Flow- Conditional Branching, The Switch Statement, Looping, Nested Loops, The break and continue Statements, The go to statement infinite Loops.	9
IV.	Operators and Expressions-Precedence and Associativity, Unary Plus and minus operators, Binary arithmetic operators, Arithmetic assignment operators, increment and Decrement Operators, Comma Operator, Relational Operators, Logical Operators, Bit manipulation Operators, Bitwise Assignment Operators, Cast Operator, Size of Operators, Conditional Operator, memory Operators.	9

V.	Arrays-Declaring an Array, Array and memory, initializing Arrays, Encryption and Decryption.	9

Part C - **Learning Resource**
Text Books, Reference Books, E-Resources

Text Books:

1. Peter A. Darnell and Philip E. Margolis, C: A Software Engineering Approach, Narosa Publishing House (Springer international Student Edition) 1993.
2. Brian W. Kernighan & Dennis M. Ritohie. The C Programme Language, 2nd Edition (ANSI Features), Prentice Hall 1989.
3. Yashwant Kanetkar. Let Us C, 8th Edison, B P B Publications 2007.

Reference Books:

1. E. Balagurusamy. Programming in C (ANSI), 4th Edison, Tata Mac Graw Hill.

E-Resources:

1. https://onlinecourses.nptel.ac.in
2. https://epgp.inflibnet.ac.in
3. https://swayam.gov.in

S.N.	Member Name	Signature
01	**Dr. Umesh Kumar Shrivastava, Chairman** Professor & P.G. Head, Govt. E.R.R. Science College, Bilaspur	
02	**Dr. Smt. Kiran Lata Awasthi** Asstt. Prof. & P.G. Head, C.M. Dubey P.G. College, Bilaspur	
03	**Dr.Aradhana Sharma,** Asstt. Prof. & U.G. Head, Govt. Bilasa Girls P.G. College, Bilaspur	
04	**Shri Yatendra Kumar Upadhyay** Asstt. Prof. & U.G. Head , Govt. Niranjan Keshrwani College, Kota	
05	**Shri Dildar Singh Tandan,** Asstt. Prof. Govt. Agrasen College, Bilha	
06	**Smt. Suchitra Tiwari,** Asstt. Prof., Govt. J.P.Verma Arts & Comm..College, Bilaspur	

Part A: Introduction				
Program: M.Sc. Mathematics		Semester: IV	Year: 2024-25	w.e.f. 2024-2025
1.	Course Code	MATHP403		
2.	Course Title	ProgramminginC(withANSIfeatures) -II		
3.	Course Type	Theory & Practical		
4.	Pre-requisite (ifany)	No		
5.	Course Learning. Outcomes (CLO)	**At the end of this course, the students will be able to:** • Gain knowledge of strings processing, array, records and pointers, linked lists, stack, queues, recursion. • Gain knowledge of understanding and explaining the concept of abstract data types, separation of definitions of data types from implementation. • Gain ability to discuss recursion and tree traversal algorithm. • Gain skills of implementing basic algorithm for sorting and searching. • Gain skills of implementing basic data structures such as stacks, queues & trees.		
6.	**Credit Value**			
7.	**Total Marks**	**Internal Marks: 20** **External Marks: 50** **Practical Marks: 30**	**Min Passing Marks:36**	

Part B: Content of the Course		
Unit	**Topics**	**Total Hours**
I.	Storage Classes- Fixed vs. Automatic Duration, Scope, Global variables. The Register specifier, ANSI rules for the syntax and Semantics of the storage - class keywords	9
II.	Pointers- Pointer Arithmetic, Passing Pointer as Function Arguments, Accessing Array Elements through Pointers, Passing Arrays as Function Arguments, Sorting Algorithms, Strings, Multidimensional Arrays, Arrays of Pointers, Pointers to Pointers.	9
III.	Functions-Passing Arguments, Declarations and Calls, Pointers to Functions, Recursion, The main Function, Complex Declarations, The C Preprocessor-macro Substitution, Conditional Compilation, include Facility, Line Control.	9
IV.	Structures and Unions- Structures, Dynamic memory Allocation, Linked Lists, Unions, enum, Declarations.	9
V.	Input and Output- Streams, Buffering, The < Stdio.h > Header File, Error Handling, Opening and Closing a File, Reading and Writing Data, Selecting an I/O method, Unbuffered I/O Random Access, The standard library for input/output.	9

Part C - **Learning Resource**
Text Books, Reference Books, E-Resources

Text Books:

1. Peter A. Darnell and Philip E. Margolis, C: A Software Engineering Approach, Narosa Publishing House (Springer international Student Edition) 1993.
2. Brian W. Kernighan & Dennis M. Ritohie. The C Programme Language, 2nd Edition (ANSI Features), Prentice Hall 1989.
3. Yashwant Kanetkar. Let Us C, 8th Edison, B P B Publications 2007.

Reference Books:

1. E. Balagurusamy. Programming in C (ANSI), 4th Edison, Tata Mac Graw Hill.

E-Resources:

1. **https://onlinecourses.nptel.ac.in**
2. **https://epgp.inflibnet.ac.in**
3. **https://swayam.gov.in**

S.N.	Member Name	Signature
01	**Dr. Umesh Kumar Shrivastava, Chairman** Professor & P.G. Head, Govt. E.R.R. Science College, Bilaspur	
02	**Dr. Smt. Kiran Lata Awasthi** Asstt. Prof. & P.G. Head, C.M. Dubey P.G. College, Bilaspur	
03	**Dr.Aradhana Sharma,** Asstt. Prof. & U.G. Head, Govt. Bilasa Girls P.G. College, Bilaspur	
04	**Shri Yatendra Kumar Upadhyay** Asstt. Prof. & U.G. Head , Govt. Niranjan Keshrwani College, Kota	
05	**Shri Dildar Singh Tandan,** Asstt. Prof. Govt. Agrasen College, Bilha	
06	**Smt. Suchitra Tiwari,** Asstt. Prof., Govt. J.P.Verma Arts & Comm. College, Bilaspur	

Part A: Introduction				
Program: M.Sc. Mathematics		Semester: III	Year: 2024-25	w.e.f. 2024-25
1.	Course Code	MATHT304		
2.	Course Title	Fuzzy Sets and their Applications-I		
3.	Course Type	Theory		
4.	Pre-requisite (if any)	No		
5.	Course Learning Outcomes (CLO)	**At the end of this course, the students will be able to:** • Students gained knowledge of Fuzzy sets, The Zadeh's extension principle, Fuzzy numbers, Min-max Composition and its properties, Fuzzy equivalence relations, Possibility theory, Fuzzy measures, Necessity measure, Fuzzy logic, Fuzzy quantifiers, approximate reasoning, Multi conditional approximate researching, fuzzification, defuzzification, Decision making in Fuzzy environment, Fuzzy ranking methods. • Students gained ability to find fuzzy sets and to discuss the types of fuzzy sets.		
6.	**Credit Value**	**04**		
7.	**Total Marks**	**Internal Marks: 20** **External Marks: 80**	**Min Passing Marks:36**	

Part B: Content of the Course		
Unit	**Topics**	**Total Hours**
I.	Fuzzy sets- Basic definitions α- cuts, Convex fuzzy sets, Basic operations on fuzzy sets, Types of fuzzy sets, properties of α - cuts, representation of fuzzy sets, First and Second decomposition theorem, Extension Principle for fuzzy sets.	12
II.	Fuzzy complements, the two characterization theorems on fuzzy complements, t-norms and t-conorms, Algebraic product and sum, bounded difference and sum, statements of characterization for t-norms and t-conorms, combination of operators.	12
III.	Fuzzy Arithmetic- Fuzzy numbers, Arithmetic operations on fuzzy numbers, Lattices of fuzzy numbers, fuzzy equations.	12
IV.	Fuzzy Relations- Fuzzy relations on fuzzy sets, fuzzy binary relations and 'fuzzy equivalence relations, Fuzzy morphism, standard composition, sup i composition, inf-wi composition of fuzzy relations,	12

V.	Fuzzy Relations Equations- Problem partitioning, solution methods, fuzzy relation equations based upon sup i composition and inf-wi composition, approximate solution.	12

Part C - **Learning Resource**

Text Books, Reference Books, E-Resources

Text Books:

1. G.J. Klir and B. Yuan: Fuzzy Sets and Fuzzy Logic, Prentice Hall of India New Delhi.
2. H.J. Zimmermann, Fuzzy Sets and Fuzzy logic, Prentice Hall of India New Delhi.

Reference Books:

3. Dr. A. K. Bhargava: Fuzzy set Theory, Fuzzy Logic and Their Applications, S. Chand Publication, New Delhi.
4. S. K. Pundir and R. Pundir : Fuzzy Sets and Their Applications, Pragati Publication Meerut.

E-Resources:

1. **https://onlinecourses.nptel.ac.in**
2. **https://epgp.inflibnet.ac.in**
3. **https://swayam.gov.in**

S.N.	Member Name	Signature
01	**Dr. Umesh Kumar Shrivastava, Chairman** Professor & P.G. Head, Govt. E.R.R. Science College, Bilaspur	
02	**Dr. Smt. Kiran Lata Awasthi** Asstt. Prof. & P.G. Head, C.M. Dubey P.G. College, Bilaspur	
03	**Dr.Aradhana Sharma,** Asstt. Prof. & U.G. Head, Govt. Bilasa Girls P.G. College, Bilaspur	
04	**Shri Yatendra Kumar Upadhyay** Asstt. Prof. & U.G. Head , Govt. Niranjan Keshrwani College, Kota	
05	**Shri Dildar Singh Tandan,** Asstt. Prof. Govt. Agrasen College, Bilha	
06	**Smt. Suchitra Tiwari,** Asstt. Prof., Govt. J.P.Verma Arts & Comm. College, Bilaspur	

Part A: Introduction				
Program: M.Sc. Mathematics		Semester: IV	Year: 2024-25	w.e.f.:2024-2025
1.	Course Code	MATHT404		
2.	Course Title	Fuzzy Sets and their Applications-II		
3.	Course Type	Theory		
4.	Pre-requisite (ifany)	No		
5.	Course Learning. Outcomes (CLO)	**At the end of this course, the students will be able to:** • Gaincompetency to illustrate fuzzy relations. • Gainability to explain fuzzy measures and to classify possibility and necessity measures. • Gainability to determine decision making in fuzzy environments. • Gainability to recognize fuzzy logic fuzzy inference system. • Gaincompetency to make applications on fuzzy logic membership functions and fuzzy inference system.		
6.	**Credit Value**	04		
7.	**Total Marks**	**Internal Marks: 20** **External Marks: 80**	**Min Passing Marks:36**	

Part B: Content of the Course		
Unit	**Topics**	**Total Hours**
I.	Possibility Theorem- Fuzzy measures, evidence theory, possibility theory versus probability theory.	12
II.	Fuzzy Logic- An overview of classical logic, Multivalued logics, Fuzzy propositions, Fuzzy quantifiers, Linguistic Hedges, inference from conditional and qualified fuzzy proposition, the compositional rule of inference.	12
III.	Approximate reasoning-An overview of fuzzy expert systems. Fuzzy implications and their selection, multi conditional approximate reasoning the role of fuzzy relation equations.	12
IV.	An introduction to fuzzy control- Fuzzy controllers, Fuzzy rule base, Fuzzy inference engine, fuzzification, defuzzification and various defuzzification methods (the center of area, the center of maxima, and the mean of maxima methods.)	12

u.h.h

V.	Decision making in Fuzzy Environment-individual decision making, multi person decision making, multi criteria decision making, multistage decision making, Fuzzy ranking methods, Fuzzy linear programming.	12

Part C - **Learning Resource**

Text Books, Reference Books, E-Resources

Text Books:

1. G.J. Klir and B. Yuan: Fuzzy Sets and Fuzzy Logic, Prentice Hall of India New Delhi.
2. H.J. Zimmermann, Fuzzy Sets and Fuzzy logic, Prentice Hall of India New Delhi.

Reference Books:

3. Dr. A. K. Bhargava: Fuzzy set Theory, Fuzzy Logic and Their Applications, S. Chand Publication, New Delhi.
4. S. K. Pundir and R. Pundir : Fuzzy Sets and Their Applications, Pragati Publication Meerut.

E-Resources:

1. **https://onlinecourses.nptel.ac.in**
2. **https://epgp.inflibnet.ac.in**
3. **https://swayam.gov.in**

S.N.	Member Name	Signature
01	**Dr. Umesh Kumar Shrivastava, Chairman** Professor & P.G. Head, Govt. E.R.R. Science College, Bilaspur	
02	**Dr. Smt. Kiran Lata Awasthi** Asstt. Prof. & P.G. Head, C.M. Dubey P.G. College, Bilaspur	
03	**Dr.Aradhana Sharma,** Asstt. Prof. & U.G. Head, Govt. Bilasa Girls P.G. College, Bilaspur	
04	**Shri Yatendra Kumar Upadhyay** Asstt. Prof. & U.G. Head , Govt. Niranjan Keshrwani College, Kota	
05	**Shri Dildar Singh Tandan,** Asstt. Prof. Govt. Agrasen College, Bilha	
06	**Smt. Suchitra Tiwari,** Asstt. Prof., Govt. J.P.Verma Arts & Comm. College, Bilaspur	

Part A: Introduction				
Program: M.Sc. Mathematics		Semester: I	Year: 2024-25	w.e.f.:2024-25
1.	Course Code	MATHT305		
2.	Course Title	OPERATIONS RESEARCH -I		
3.	Course Type	Theory		
4.	Pre-requisite (ifany)	No		
5.	Course Learning. Outcomes (CLO)	**At the end of this course, the students will be able to:** • Gain ability to formulate LPP and to obtain the solution of LPP by Simplex method. • Gain knowledge of duality in Linear Programming. • Understand concept of Goal Programming. • Gain knowledge of how to find the initial basic feasible solution of a transportation problem and Assignment Problem. • Gain knowledge of Network analysis.		
6.	**Credit Value**	04		
7.	**Total Marks**	**Internal Marks: 20** **External Marks: 80**	**Min Passing Marks:36**	

Part B: Content of the Course		
Unit	**Topics**	**Total Hours**
I.	Operations Research and its Scope, Necessity of Operations Research in Industry. Linear Programming-graphical method of solutions, Simplex Method, Theory of theSimplex Method.	12
II.	Two phase method, Big M method of solution to LPP. Duality in linearprogramming, Duality theorems, Dual Simplex method, Other algorithms for LinearProgramming-Dual Simplex Method.	12
III.	Linear Goal Programming, Parametric Linear Programming, Upper Bound Technique, Interior Point Algorithm.	12
IV.	Assignment Problems, Its mathematical formulation, Solutionof assignment problems, Optimality test. Transportation Problems, Formulation ofTransportation problems, Solutions of Transportation problems, North-West cornerMethod, least cost method, Vogel's approximation method, Test for optimality U-Vmethod.	12
V.	Network Analysis. Shortest Path Problem, minimum spanning tree Problem, Project Planning and Control with PERT and CPM method.	12

Part C - **Learning Resource**
Text Books, Reference Books, E-Resources

Text Books:

1. Kanti Swarup, P.K. Gupta & Man Mohan, Operations Research., Sultan Chand & sons, New Delhi.
2. S.D. Sharma, Operations Research, Kedar Nath Ram Sons & co. Publisher Meerut (thirteenth-edition) 2001.

Reference Books:

1. P. K. Gupta D. S. Hira.: Operations Research ,S Chand & Co. Ltd., New Delhi.
2. H.A. Taha, Operations Research an Introduction, Macmillan publishing INC., New-York.
3. F. S. Hillier& G.J. Lieberman, Introduction to Operations Research, (sixth- edition). McGraw Hill International Edition.

E-Resources:

1. **https://onlinecourses.nptel.ac.in/noc20_cs82/preview**
2. **https://swayam.gov.in/**
3). **https://www.coursera.org/**

S.N.	Member Name	Signature
01	**Dr. Umesh Kumar Shrivastava, Chairman** Professor & P.G. Head, Govt. E.R.R. Science College, Bilaspur	
02	**Dr. Smt. Kiran Lata Awasthi** Asstt. Prof. & P.G. Head, C.M. Dubey P.G. College, Bilaspur	
03	**Dr.Aradhana Sharma,** Asstt. Prof. & U.G. Head, Govt. Bilasa Girls P.G. College, Bilaspur	
04	**Shri Yatendra Kumar Upadhyay** Asstt. Prof. & U.G. Head , Govt. Niranjan Keshrwani College, Kota	
05	**Shri Dildar Singh Tandan,** Asstt. Prof. Govt. Agrasen College, Bilha	
06	**Smt. Suchitra Tiwari,** Asstt. Prof., Govt. J.P.Verma Arts & Comm. College, Bilaspur	

Part A: Introduction				
Program: M.Sc. Mathematics		Semester: IV	Year: 2024-25	w.e.f. 2024-25
1.	Course Code	MATHT405		
2.	Course Title	OPERATION RESEARCH -II		
3.	Course Type	THEORY		
4.	Pre-requisite (ifany)	NO		
5.	Course Learning. Outcomes (CLO)	**At the end of this course, the students will be able to:** • Gainability to propose the best strategy using decision mapping methods under uncertainty and game theory. • Gainability to analyze any real life system with limited constraints and depict it in a model from. • Gainknowledge of nonlinear programming. • Gainability of how to obtain the Steady-state solutions of Markovian queuing models. • Gainability of how to evaluate the computational performance unconstrained and constrained problems, optimization and learning algorithms.		
6.	**Credit Value**			
7.	**Total Marks**	**Internal Marks: 20** **External Marks: 80**	**Min Passing Marks:36**	

Part B: Content of the Course		
Unit	**Topics**	**Total Hours**
I.	Dynamic Programming- Deterministic and Probabilistic Dynamic programming.	12
II.	Game Theory- Two-Person, Zero-Sum Games, Games with Mixed Strategies, Graphical Solution, Solution by Linear Programming.	12
III.	Integer Programming- Branch and Bound Technique, Pure and mixed, Gomory's cutting plane method.	12
IV.	Queuing system- Deterministic Queuing system, probability distribution in Queuing, classification of Queuing models, PoissonQueuing system ((M/M/I) (∞/FIFO),(M/M/I) (/SIRO) (M/M/I) (N/FIFO)), Inventory control The concept of EOQ, Deterministic inventory problem with no shortages	12
V.	Nonlinear Programming- One/ Multi-Variable Unconstrained Optimization, Kuhn-Tucker Conditions for Constrained Optimization, Quadratic Programming, Separable Programming, Convex Programming, Non-convex Programming	12

Part C - **Learning Resource**
Text Books, Reference Books, E-Resources

Text Books:

1. Kanti Swarup, P.K. Gupta & Man Mohan, Operations Research., Sultan Chand & sons, New Delhi.
2. S.D. Sharma, Operations Research, Kedar Nath Ram Sons & co. Publisher Meerut (thirteenth-edition) 2001.

Reference Books:

1. P. K. Gupta D. S. Hira.: Operations Research ,S Chand & Co. Ltd., New Delhi.
2. H.A. Taha, Operations Research an Introduction, Macmillan publishing INC., New-York.
3. F. S. Hillier& G.J. Lieberman, Introduction to Operations Research, (sixth- edition). McGraw Hill International Edition.

E-Resources:) **https://onlinecourses.nptel.ac.in/noc20_cs82/preview**

2) **https://swayam.gov.in/**

3) **https://www.coursera.org/**

S.N.	Member Name	Signature
01	**Dr. Umesh Kumar Shrivastava, Chairman** Professor & P.G. Head, Govt. E.R.R. Science College, Bilaspur	
02	**Dr. Smt. Kiran Lata Awasthi** Asstt. Prof. & P.G. Head, C.M. Dubey P.G. College, Bilaspur	
03	**Dr.Aradhana Sharma,** Asstt. Prof. & U.G. Head, Govt. Bilasa Girls P.G. College, Bilaspur	
04	**Shri Yatendra Kumar Upadhyay** Asstt. Prof. & U.G. Head , Govt. Niranjan Keshrwani College, Kota	
05	**Shri Dildar Singh Tandan,** Asstt. Prof. Govt. Agrasen College, Bilha	
06	**Smt. Suchitra Tiwari,** Asstt. Prof., Govt. J.P.Verma Arts & Comm. College, Bilaspur	

Part A: Introduction				
Program: M.Sc. Mathematics		Semester: Third	Year: 2024-25	w.e.f.: 2024-2025
1.	Course Code	MATHT306		
2.	Course Title	Fluid Mechanics I		
3.	Course Type	Theory		
4.	Pre-requisite (if any)	NO		
5.	Course Learning Outcomes (CLO)	**At the end of this course, the students will be able to:** 1. Gain the knowledge of Kinematics, Equation of Motion, Motion in Two Dimensions, Motion of Cylinders, Motion in Three Dimension, Vortex Motion, Stress Strain and the Navier-Stokes Equation. Plane Poiseuille and Couette Flow. 2. Gain knowledge of understanding Dynamics of Fluid Flow and governing Non-dimensional Parameters. 3. Gain knowledge of deriving and applying Equation of Motion. 4. Gain concepts of Mechanics, Variation Principle, Lggrange's Formula and their applications. 5. Gain the basic ideas of Turbulence.		
6.	**Credit Value**	**04**		
7.	**Total Marks**	**Internal Marks: 20** **External Marks: 80**	**Min Passing Marks:36**	

Part B: Content of the Course		
Unit	Topics	Total Hours
I	**Kinematics-** Lagrangian and Eulerian methods, Equation of continuity, Streak lines, velocity potential, Irrotational and rotational motion, Boundary surfaces, Vortex lines.	12
II	**Equation of motion-** Euler dynamical equations, Bernoulli's equation of motion by flux method, Equation of motion under impulsive forces. Principle of energy for incompressible fluids, Lagrange's equation of motion	12
III	**Motion in two dimension-** Lagrange's stream function, Irrotational motion in two dimension, complex potential, sources, sinks, doublets and their images, Use of conformal transformation. The Milne- Thomson Circle theorem of Blasius.	12
IV	**Motion of Cylinders-** Motion of a general, circular and coaxial cylinders, Circulation about a moving cylinder, Streaming and circulation about a fixed circular cylinder,	12

V	**Plane Poiseuille and Couette flow**: Plane Poiseuille and Couette flow between two parallel plates, Theory of Lubrication, Flow through tubes of uniform cross section in form of circle, annulus, ellipse and equilateral triangle under constant pressure gradient, unsteady flow over a flat plate.	12

Part C - Learning Resource

Text Books, Reference Books, E-Resources

Text Books:

1. A Treatise on Hydrodynamics Part-II, W. H. Besant and A.S. Ramsey, CBS Publication, Delhi
2. Text book of Fluid Dynamics, F. Chorlton, Va Nostrand Reinhold Co.

Reference Books:

1. An introduction to Fluid Dynamics, R. K. Rathy, Oxford and IBH Company, New Delhi,1976
2. An Introduction to Fluid Mechnics, G. K. Batchelor, Foundation Books New Delhi.
3. Boundary Layers, A.D. Young, AIAA Education Series,Washington DC,1989.

E-Resources:

1. **https://onlinecourses.nptel.ac.in**
2. **https://epgp.inflibnet.ac.in**
3. **https://swayam.gov.in**

S.N.	Member Name	Signature
01	**Dr. Umesh Kumar Shrivastava, Chairman** Professor & P.G. Head, Govt. E.R.R. Science College, Bilaspur	
02	**Dr. Smt. Kiran Lata Awasthi** Asstt. Prof. & P.G. Head, C.M. Dubey P.G. College, Bilaspur	
03	**Dr.Aradhana Sharma,** Asstt. Prof. & U.G. Head, Govt. Bilasa Girls P.G. College, Bilaspur.	
04	**Shri Yatendra Kumar Upadhyay** Asstt. Prof. & U.G. Head , Govt. Niranjan Keshrwani College, Kota	
05	**Shri Dildar Singh Tandan,** Asstt. Prof. Govt. Agrasen College, Bilha	
06	**Smt. Suchitra Tiwari,** Asstt. Prof., Govt. J.P.Verma Arts & Comm. College, Bilaspur	

अटल बिहारी वाजपेयी विश्वविद्यालय, बिलासपुर (छ.ग.)

कोनी पुलिस थाना के सामने, बिलासपुर–रतनपुर मार्ग, कोनी, बिलासपुर (छ.ग.) 495009

Website ; www.bilaspuruniversity.ac.in

Part A: Introduction				
Program: M.Sc. Mathematics		Semester: IV	Year: 2024-25	w.e.f.: 2024-2025
1.	Course Code	MATHT406		
2.	Course Title	Fluid Mechanics II		
3.	Course Type	Theory		
4.	Pre-requisite (if any)	NO		
5.	Course Learning Outcomes (CLO)	**At the end of this course, the students will be able to:** 1. Gain the knowledge of Kinematics, Equation of Motion, Motion in Two Dimensions, Motion of Cylinders, Motion in Three Dimension, Vortex Motion, Stress Strain and the Navier-Stokes Equation. Plane Poiseuille and Couette Flow. 2. Gain knowledge of understanding Dynamics of Fluid Flow and governing Non-dimensional Parameters. 3. Gain knowledge of deriving and applying Equation of Motion. 4. Gain concepts of Mechanics, Variation Principle, Lggrange's Formula and their applications. 5. Gain the basic ideas of Turbulence.		
6.	**Credit Value**	04		
7.	**Total Marks**	**Internal Marks: 20** **External Marks: 80**	**Min Passing Marks:36**	

Part B: Content of the Course		
Unit	**Topics**	**Total Hours**
I	**Motion in three dimension-** Motion of a sphere in a liquid at rest at infinity, Liquid streaming past a fixed sphere, Concentric sphere, Equation of motion of a sphere, Stoke's stream function	12
II	**Vortex motion-** Vortex motion and its elementary properties, Kelvin's proof Conservation of velocity, Strength of a vortex tube. Rectilinear vortices with circular and elliptic section, Pressure distribution, Rankine combine vortex, Vortex Pair, Image of a vortex filament in a plane, Karman street	12
III	**Wave motion of an ideal fluid-** Wave motion of an ideal fluid and its properties Progressive waves on the surface of a canal and deep canal, Standing waves, Energy of progressive waves, Reduction of progressive waves to a steady motion, Capillary waves, Waves in an interface with surface free, Long gravity waves, group velocity, Path of particles.	12
IV	**Stress, Strain and The Navier -Stokes equation :** Stress component of real fluid. Relation between rectangular component of Stress in a real fluid, normal strain, strain component, connection between stress and gradient of velocity. The Navier - Stokes equation, equation of motion in other coordinate system.	12

V	**Motion of Elliptic Cylinder-** Streaming past a fixed Elliptic cylinder, Rotating elliptic cylinder, Kinetic energy, Circulation.	12

Part C - **Learning Resource**

Text Books, Reference Books, E-Resources

Text Books:

1. A Treatise on Hydrodynamics Part-II, W. H. Besant and A.S. Ramsey,CBS Publication, Delhi
2. Text book of Fluid Dynamics,F. Chorlton, Va Nostrand Reinhold Co.

Reference Books:

1. An introduction to Fluid Dynamics, R. K. Rathy, Oxford and IBH Company, New Delhi,1976
2. An Introduction to Fluid Mechnics, G. K. Batchelor, Foundation Books New Delhi.
3. Boundary Layers, A.D. Young, AIAA Education Series,Washington DC,1989.

E-Resources:

1. **https://onlinecourses.nptel.ac.in**
2. **https://epgp.inflibnet.ac.in**
3. **https://swayam.gov.in**

S.N.	Member Name	Signature
01	**Dr. Umesh Kumar Shrivastava, Chairman** Professor & P.G. Head, Govt. E.R.R. Science College, Bilaspur	
02	**Dr. Smt. Kiran Lata Awasthi** Asstt. Prof. & P.G. Head, C.M. Dubey P.G. College, Bilaspur	
03	**Dr.Aradhana Sharma,** Asstt. Prof. & U.G. Head, Govt. Bilasa Girls P.G. College, Bilaspur	
04	**Shri Yatendra Kumar Upadhyay** Asstt. Prof. & U.G. Head , Govt. Niranjan Keshrwani College, Kota	
05	**Shri Dildar Singh Tandan,** Asstt. Prof. Govt. Agrasen College, Bilha	
06	**Smt. Suchitra Tiwari,** Asstt. Prof., Govt. J.P.Verma Arts & Comm. College, Bilaspur	

Part A: Introduction				
Program: **M.Sc. Mathematics**		Semester: III	Year: 2024-25	w.e.f.: 2024-25
1.	Course Code	**MATHT307**		
2.	Course Title	**Fundamental of Computer Science-I**		
3.	Course Type	**Theory**		
4.	Pre-requisite (if any)	No		
5.	Course Learning Outcomes (CLO)	At the end of this course, the students will be able to: • Learn the basics of how computer originated, and its internal components. • Understand programming languages evolved in due course of time. • Understand design principles of software and its types. • Understand the needs of security in computer system and how firewall works. • Study latest trends in IT field.		
6.	**Credit Value**	4		
7.	**Total Marks**	**Internal Marks: 20** **External Marks: 80**	**Min. Marks: 40**	

Part B: Content of the Course		
Unit	**Topics**	**Total Hours**
I.	**Introduction:** Components of computer system, History of computer, Generation and classification of computers, Input-Output device, Storage device: Primary memory and its types (RAM- SRAM and DRAM, ROM-PROM, EPROM, EEPROM, Cache Memory), Secondary memory (Magnetic-Floppy, Hard Disk, Magnetic Tape, Optical CD, VCD, CD-R, CD-RW).	12
II.	**Introduction and Evolution of Programming language**: Machine, Assembly and High Level languages; Language Processor: Assembler, Interpreter, Compiler, Linker, Loader and Their Types; Types of programming language, Characteristics of good programming language, Programming paradigms: procedural oriented and object oriented programming; Number System: Decimal, Binary, Octal, and Hexadecimal Representations and Their Conversions.	12
III.	**Software and Its Need:** Types of software: system software, application software, utility software; firmware, middleware; MS-Office: features of MS-Word including Microsoft equations, MS-Excel and MS-PowerPoint, Introduction to Latex Software.	12
IV.	**Internet:** Definition, history of internet, basic services of internet, use of internet, internet search engine, internet security: Firewall, encryption/decryption methods.	12

V.	**Application of IT:** IT in business, Industry, home, education, entertainment, science, engineering, e-commerce, m-commerce; Latest IT trends: Artificial Intelligence (AI), Data Mining, Cloud computing, Big data.	12

Keywords: Computer, Random Access Memory, Read Only Memory (ROM), Cache Memory, Binary, Programming Language, Middleware, Firewall, Encryption.

Part C- Learning Resources

Text Books, Reference Booksand E-Resources

TEXT/REFERENCE BOOKS:

1. Computer Fundamentals, P.K. Sinha, BPB Publication, SixthEdition.
2. Fundamentals of Computers, V. Rajaraman, PHI SixthEdition.
3. Computer Fundamentals Architecture and Organization, B. Ram, New Age International Publishers, FifthEdition.
4. Fundamentals of Information Technology, ChetanShrivastava, Kalyan Publishers.
5. Computers Today, Suresh K. Basandra, Galgotia Publications.
6. Fundamentals of Information Technology, Alexis Leon and Mathews Leon, Vikash Publication.

E-RESOURCES:

1. https://www.w3schools.blog/computer-fundamentals-tutorial
2. https://vikaspedia.in/education/digital-litercy/it-literacy-courses-in-associating-with-msup/computer-fundamentals
3. https://www.tutorialspoint.com/computer_fundamentals/index.htm
4. https://vikaspedia.in/education/digital-litercy/it-literacy-courses-in-associating-with-msup/computer-fundamentals
5. https://onlinecourses.swayam2.ac.in/cec20_cs05/preview
6. https://www.tutorialpandit.com/
7. https://www.tutorialspoint.com/internet_technologies/internet_overview.htm
8. https://www.javatpoint.com/internet
9. https://www.thecomputerfreak.com/2021/07/what-are-the-applications-of-internet-in-hindi.html
10. http://www.ace-edu.in/wp-content/uploads/2018/06/CN-Lab-Manual.pdf
11. https://sjce.ac.in/wp-content/uploads/2018/01/CCNA-lab-Manual.pdf
12. https://www.slideshare.net/amichoksi/internet-technology-and-its-applications

अटल बिहारी वाजपेयी विश्वविद्यालय, बिलासपुर (छ.ग.)

कोनी पुलिस थाना के सामने, बिलासपुर-सेमरपुर मार्ग, कोनी, बिलासपुर (छ.ग.) 495009

Website : www.bilaspuruniversity.ac.in

Members of BOS

1. **Dr. Umesh Kumar Shrivastava** -Chairman
   Prof. and Head, Department of Mathematics
   Govt. E.R.R. Science P. G. College Bilaspur

2. **Dr. Smt. Kiran Lata Awasthi** - Member
   Asstt.Prof., Dept. of Mathmatics
   C.M. Dubey P. G. College, Bilaspur (C.G.)

3. **Dr. Aradhana Sharma** -Member
   Asst. Prof. and Head, Dept. of Mathematics
   Govt. Bilasa Girls P. G. College, Bilaspur

4. **Prof. Yatendra Kumar Upadhyay** -Member
   Asst. Prof. and Head, Dept. of Mathematics
   Govt. Niranjan Kesharwani College, Kota

5. **Prof. Dildar Singh Tandon** -Member
   Asst. Prof. and Head, Dept. of Mathematics
   Govt. Agrasen College, Belha

6. **Prof. Smt. Suchita Tiwari** -Member
   Asst. Prof. and Head, Dept. of Mathematics
   Govt. J.P.Verma PG Arts and Commerce College, Bilaspur (C.G.)

Part A: Introduction			
Program: **M.Sc. Mathematics**		Semester: **IV**	w.e.f. 2024-25
1.	Course Code	**MATHT407**	
2.	Course Title	**Fundamental of Computer Science-II**	
3.	Course Type	**Theory**	
4.	Pre-requisite (if any)	No	
5.	Course Learning. Outcomes (CLO)	At the end of this course, the students will be able to: • Describe the important computer system resources and the role of operatingsystem in their management policies and algorithms. • Understand Data, Database system and its architecture. • Understand Relational Database design using Normalization. • Use different types of data structures, operations and algorithms. • Use stack, Queue, Lists, Trees and Graphs in problem solving.	
6.	**Credit Value**	**4**	
7.	**Total Marks**	**Internal Marks: 20** **External Marks: 80**	**Min. Marks: 40**

Part B: Content of the Course		
Unit	**Topics**	**Total Hours**
I.	**Introduction to Operating System:**What is an Operating System, Operating Systems Architecture, Function of Operating System. Booting Process, Types of Operating System: Multi-Programming, Multi-Tasking, Multi-Threading; Operating Systems Classification: Simple Batch Systems, Multi-programmed Batches systems, Time-Sharing Systems, Parallel & Distributed Operating Systems, System Calls, Android, Linux, Windows.	12
II.	**Overview of Database Management:** Data and information, File System versus Database Systems, Database System Applications, Purpose of database systems, Advantages and Disadvantages of DBMS, View of data, Schemas and Instances, Data Abstraction, Data Independence, Database Architecture, Database Users and Administrators, History of Database systems.	12
III.	**Relational Algebra:** Selection, Projection, cross product, different types of joins (inner join, outer join, self join) Set operations, Relational Calculus, Overview of SQL Query Language, Introduction to SQL constructs. **Normalization:**Functional dependencies, Join dependencies, Normal forms (1NF, 2NF, 3NF and BCNF)	12
IV.	**Data Structure:**Data Structure and its Classification, Arrays: Array concept (one dimension, two dimension), Operations for one dimension array (insertion, deletion, traversal),Concept of a linked list, Circular & Doubly linked list, Operations on linked lists, Insertion & Deletion of elements, Applications of linked lists. Stack and Queue: Definitions, Operations and	12

	application, Polish Notation.	
V.	**Tree and Graphs:**Binary Trees, Definition, Memory Representation, Trees traversal algorithms (recursive and non-recursive), Binary Search Tree, B+ Tree.**Graph:**Introduction, Graph Theory Terminology, representation of graphs, Operations on graph, Graph Traversal – Breadth first Traversal, Depth first Traversal, Shortest path Algorithm.	12

Keywords: Operating System, Multiprogrammin, Multithreading, Database, Schema, Instance, Array, Tree, Linked list, Stack, Queue.

Part C- Learning Resources

Text Books, Reference Booksand E-Resources

TEXT/REFERENCE BOOKS:

1. Database Systems Concepts, A Silberschatz, H F. Korth& S. Sudarshan, McGraw-Hill.
2. Fundamentals of Database Systems, R Elmasri& S B. Navathe, Pearson Education.
3. Operating System Concepts, Silbersachatz and Galvin, Pearson Education Pub.
4. W. Stallings, Operating Systems, Internals & Design Principles 2008 5th Edition, Prentice Hall of India.
5. Fundamentals of Data structures, Ellis Horowitz & Sartaj Sahni, AW Pub.
6. "Data Structures and Program Design in C", R. Kurse, Leung &Tondo, 2nd Edition, PHI publication

E-RESOURCES:

1. **Coursera:** Introduction: https://www.coursera.org/specializations/codio-introduction-operating-systems?
2. Introduction of DBMS: https://onlinecourses.swayam2.ac.in/cec19_cs05/preview
3. Introduction of RDBMS: https://onlinecourses.nptel.ac.in/noc19_cs46/preview
4. Introduction to Data Structure https://www.youtube.com/watch?v=zWg7U0OEAoE&list=PLBF3763AF2E1C572F&index=1
5. E-PG pathshala:https://epgp.inflibnet.ac.in/
6. Swayam:https://swayam.gov.in/

Members of BOS

1. **Dr. Umesh Kumar Shrivastava** -Chairman
   Prof. and Head, Department of Mathematics
   Govt. E.R.R. Science P. G. College Bilaspur

2. **Dr. Smt. Kiran Lata Awasthi** - Member
   Asstt.Prof., Dept. of Mathmatics
   C.M. Dubey P. G. College, Bilaspur (C.G.)

3. **Dr. Aradhana Sharma** -Member
   Asst. Prof. and Head, Dept. of Mathematics
   Govt. Bilasa Girls P. G. College, Bilaspur

4. **Prof. Yatendra Kumar Upadhyay** -Member
   Asst. Prof. and Head, Dept. of Mathematics
   Govt. Niranjan Kesharwani College, Kota

5. **Prof. Dildar Singh Tandon** -Member
   Asst. Prof. and Head, Dept. of Mathematics
   Govt. Agrasen College, Belha

6. **Prof. Smt. Suchita Tiwari** -Member
   Asst. Prof. and Head, Dept. of Mathematics
   Govt. J.P.Verma PG Arts and Commerce College, Bilaspur (C.G.)