



बिलासपुर विश्वविद्यालय, बिलासपुर (छ.ग.) से संबद्ध
समस्त स्नातकोत्तर (शासकीय एवं अशासकीय) महाविद्यालयों में
सत्र 2016-17 से लागू सेमेस्टर पद्धति के अनुसार
नियमित छात्रों के लिए
सेमेस्टर पाठ्यक्रम

एम.ए./एम.एससी. (मास्टर ऑफ आर्ट्स/साइंस)
M.A./M.Sc. (Master of Arts/Science)

विषय - गणित
Subject – Mathematics

बिलासपुर विश्वविद्यालय, बिलासपुर (छ.ग.)

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Bilaspur University, Bilaspur, Chhattisgarh
Syllabus of M.A./M.Sc. MATHEMATICS (Semester System) Session 2016-17 Onwards

SCHEME OF EXAMINATION

&

DETAILED SYLLABUS

For

M.A. /M.Sc.
in
MATHEMATICS



BILASPUR UNIVERSITY

Bilaspur, Chhattisgarh

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BILASPUR VISHWAVIDYALAYA, BILASPUR [CHHATTISGARH]**Scheme of Examination****M.A./M.Sc. (MATHEMATICS) (Semester-I)****2016-17 & Onward**

There shall be five papers. All papers are Compulsory. Each paper shall have 100 marks. Overall tally of marks will be 500.

PAPER	DESCRIPTION	Max. Marks			Min. Pass Marks		
		Ext.	Int.	Pract.	Ext.	Int.	Pract.
I	Advanced Abstract Algebra (I)	80	20	-	29	7	-
II	Real Analysis (I)	80	20	-	29	7	-
III	Topology(I)	80	20	-	29	7	-
IV	Complex Analysis (I)	80	20	-	29	7	-
V	Advanced Discrete Mathematics (I)	80	20	-	29	7	-

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BILASPUR VISHWAVIDYALAYA , BILASPUR (C.G.)**M.A./M.Sc. [MATHEMATICS]****FIRST SEMESTER****PAPER I : ADVANCED ABSTRACT ALGEBRA****Maximum Marks: 80**

NOTE : Ten Questions will be set and a student shall be required to attempt any five questions.

Groups : Permutation group, Normal subgroup, Three Isomorphism Theorem, Correspondence Theorem, Maximum Normal subgroup, Automorphism and Inner Automorphism, Centre of groups

Normal Series: Normal and Subnormal series, Composition Series, Jordan-Holder theorem, Solvable groups, Nilpotent groups.

Rings & Modules: Definitions , Maximal and prime ideals, Nilpotent and Nil Ideals , Zorn's lemma (statements only), its application to obtain maximal ideals.

REFERENCES:

1. P.B. Bhattacharya, S.K. Jain and S.R. Nagpaul: Basic Abstract Algebra (2nd Ed.), Cambridge University Press, Indian Edition, 1997
2. I.S. Luther and I.B.S. Passi, Algebra: Vol. I - Groups, Narosa Publishing House, 1996.
3. Surjeet Singh and Quazi Zameeruddin: Modern Algebra, Vikas Publishing House Pvt. Ltd., 1990.
4. N. Jacobson: Basic Algebra: Vols. I & II, Hindustan Publishing Company, 1980.
5. S. Lang: Algebra, 3rd Edition, Addison-Wesley, 1993.

R. S. Singh

R. S. Singh
J. S. Singh

R. S. Singh
25/6/16

BILASPUR VISHWAVIDYALAYA , BILASPUR (C.G.)

M.A./M.Sc. [MATHEMATICS]

FIRST SEMESTER

PAPER II - REAL ANALYSIS -I

Maximum Marks: 80

NOTE : Ten Questions will be set and a student shall be required to attempt any five questions.

The Riemann - Stieltjes Integral: Definition and existence of Riemann- Stieltjes integral, Properties of the Integral, Integration and differentiation, the fundamental theorem of Calculus, integration of vector-valued function Rectifiable curves.

Functions of Several Variables : Linear transformation, Derivatives in an open subset of \mathbb{R}^n , Contraction principle, Inverse function theorem, Implicit function theorem, Derivatives of higher orders, Differentiation of integrals.

Sequences and series of Functions : Point wise and uniform convergence, Cauchy criterion for uniform convergence, Weierstrass M-test, Abel's and Dirichlet's tests for uniform convergence, Uniform convergence and continuity uniform convergence and Riemann-Stieltjes integration, uniform convergence and differentiation, Weierstrass approximation theorem .

Power Series : Uniqueness theorem for power series, Abel's and Tauber's theorem .

REFERENCES :

- [1] Walter Rudin:Principles of Mathematical Analysis' (3re edition) Mc Graw Hill, Kogakusha, 1976, International student edition.
- [2] P.K. Jain and V.P. Gupta: Lebesgue Measure and Integration, New age International (P) Limited published, New Delhi 1986 (Reprint 2000).

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BILASPUR VISHWAVIDYALAYA , BILASPUR (C.G.)**M.A./M.Sc. [MATHEMATICS]****FIRST SEMESTER****PAPER III – TOPOLOGY -I****Max. Marks. 80**

NOTE : Ten Questions will be set and a student shall be required to attempt any five questions.

Definition and examples of topological spaces. Closed sets, Closure, Dense subsets Neighbourhoods, Interiors, exteriors and boundary points

Accumulation point and derived sets, Bases and sub-bases, subspaces and relative topology, Alternate methods of defining a topology in terms of Kuratowski Closure Operator and Neighbourhood systems.

Continuous functions and Homeomorphism .

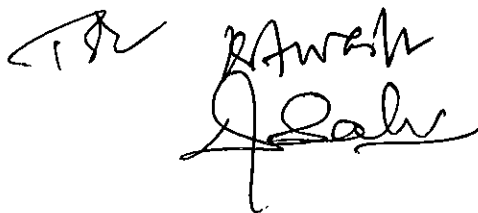
Separation axioms, T_0 , T_1 , T_2 , T_3 , $T_{3\frac{1}{2}}$, T_4 spaces , their characterization and basic properties.

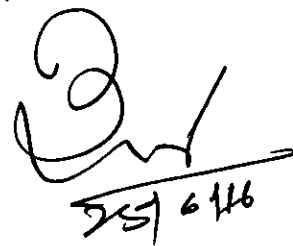
First and second countable spaces, Lindelof's theorems, Separable Spaces, Second Countability and Separability, Uryshohn's lemma and Tietz Extentions Theorem .

REFERENCES::

- 1.G.F. Simmons :Introduction to Topology and Modern Analysis, Mc Graw -Hill
- 2.J.N .Sharma: Topology, Krishna Prakashan Mandir, Meerut
- 3.M.J.Mansfield: Introduction to Topology. Van Nostrand. Princeton, New Jersey, 1963
- 4.Jame R. Munkres: Topology, A First Couese. Prentice Hall, Incorporated, 1974
5. K.D.Joshi: Introduction to General Topology , New Age International(P) Ltd. New Delhi.
- 6.J Dugundji. Topology. Boston: Allyn and Bacon, 1966. [OP]
- 7.B.Mendelson: Introduction to Topology, Dover Publications, 1990..






25/6/16

BILASPUR VISHWAVIDYALAYA , BILASPUR (C.G.)**M.A./M.Sc. [MATHEMATICS]****FIRST SEMESTER****PAPER IV : COMPLEX ANALYSIS- I****Max. Marks. 80**

NOTE : Ten Questions will be set and a student shall be required to attempt any five questions.

Complex Integration. Cauchy-Goursat Theorem. Cauchy's integral Formula. Higher order derivatives.

Morera's theorem. Cauchy inequality and Liouville theorem. The fundamental theorem of Algebra. Taylor's theorem. Maximum modulus principle,

Laurent's series isolated singularities

Meromorphic functions. Schwartz lemma. The Argument principle. Rouché's theorem, Inverse function theorem.

Residues, Cauchy's residue theorem. Evaluation of integrals. Branches of many values functions with special references to $\arg z$, $\log z$, and z^a .

Bilinear transformations their properties and classification. Definitions and examples of Conformal mappings.

REFERENCES:-

1. J.B. Conway : Functions of one complex variable. Springer-Verlag international student Edition. Narosa. publishing House. 1980.
2. D. Sarason : Complex Function theory. Hindustan Book Agency. Delhi 1994.
3. S.Ponnusamy : Foundation of complex Analysis. Narosa publishing house 1997.
4. J.N. Sharma.: Functions of a complex variable , Krishna Prakashan Mandir, Meerut
5. B.S.Tyagi: Functions of a Complex Variable, Kedar Nath Ram Nath Prakashan, Meerut ,1981.

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BILASPUR VISHWAVIDYALAYA , BILASPUR (C.G.)**M.A./M.Sc. [MATHEMATICS]****FIRST SEMESTER****PAPER V : ADVANCED DISCRETE MATHEMATICS - I****Max. Marks. 80**

NOTE : Ten Questions will be set and a student shall be required to attempt any five questions.

Formal logic : Statement and Notation, Connectives – Negation, Conjunction, Disjunction, Truth Table, Conditional and Biconditional statement, well formed formula, Tautology, Equivalent formula, Duality Law functionally complete set of connectives, two state devices and statement logic, Normal form, Principle conjunctive and Principle Disjunctive Normal forms, The theory of interface for the statement calculus, Rules of Interface, Automatic Theorem proving , the predicate calculus, Quantifiers, Predicate formulas, Free and Bound variables, Interface theory of predicate calculus, valid formulas over finite universe, valid formulas involving quantifiers, formulas involving more than one quantifiers.

Algebraic Structure : Algebraic system, Semigroups and Monoids (including those pertaining to concatenation operation), Homomorphism of semigroups and monoids, Congruence relation and Quotient Semigroups, Sub semigroup and Sub Monoids. Direct products. Basic Homomorphism theorem.

Lattices : Lattices as partially ordered sets and their properties. Lattices as Algebraic systems, Sub lattices, Direct products, and homomorphism. Complete, Complemented and Distributive Lattice.

Boolean Algebra : Boolean Algebras as lattices. Various Boolean Identities. The switching Algebra, example, Subalgebras, Direct products and Homomorphism. Join-irreducible elements. Atoms and minterms. Boolean forms and their Equivalence. Minterm Boolean forms. Sum of products, canonical forms. Minimization of Boolean functions Application of Boolean Algebra to Switching theory (Using AND, OR, NOT gates) The karnaugh Map Method.

REFERENCES:

1. J.P. Tremblay & R. Manohar.: Discrete Mathematical structure with application to computer sciences. McGraw Hill Book Co. 1997.
2. Seymour Lipschutz.: Finite Mathematics (International edition 1993) McGraw Hill Book Co. New York.
3. N. Deo: Graph Theory with applications to Engineering and Computer Sciences. Prentice Hall of India.
4. S. Wiitala: Discrete Mathematics - A unified approach McGraw Hill Book Co. New York.
5. C.L. Liu: Elements of Discrete mathematics. McGraw Hill Book Col.
6. M.K.Gupta: Discrete Mathematics , Krishna Prakashan Mandir(P) Ltd., Meerut.

BILASPUR VISHWAVIDYALAYA, BILASPUR CHHATTISGARH]

Scheme of Examination

M.A./M.Sc. (MATHEMATICS) (Semester-II)

2016-17 & Onward

There shall be five papers. All papers are Compulsory. Each paper shall have 100 marks. Overall tally of marks will be 500.

PAPER	DESCRIPTION	Max. Marks			Min. Pass Marks		
		Ext.	Int.	Pract.	Ext.	Int.	Pract.
I	Advanced Abstract Algebra (II)	80	20	-	29	7	-
II	Real Analysis (II)	80	20	-	29	7	-
III	Topology(II)	80	20	-	29	7	-
IV	Complex Analysis (II)	80	20	-	29	7	-
V	Advanced Discrete Mathematics (II)	80	20	-	29	7	-

Dr. J. S. Singh

T. N.

Dr. S. K. Singh

Dr. S. K. Singh
25/6/16

Dr. S. K. Singh

BILASPUR VISHWAVIDYALAYA , BILASPUR (C.G.)**M.A./M.Sc. [MATHEMATICS]****SECOND SEMESTER****PAPER I : ADVANCED ABSTRACT ALGEBRA - II****Maximum Marks: 80**

NOTE : Ten Questions will be set and a student shall be required to attempt any five questions.

Modules and Vector Space:

Definition and examples of submodules, Quotient modules, Direct sum . Modules generated by a set R , Homomorphism of modules , Isomorphism Theorem, exact sequence of modules, short exact sequence Cyclic Modules, Semi Simple Modules, Simple Modules, Schuere's Lemma, Free Modules. Representation of Linear mapping Rank of Linear mapping, Rank Nullity Theorem.

Field Theory: Extension fields, Algebraic and transcendental extensions, Separable and inseparable extensions, Normal extension, Perfect fields, Finite fields, Primitive element, Algebraically closed fields. Automorphisms of extensions, Galois extensions, Fundamental Theorem of Galois theory.

Noetherian and Artinian modules and rings ,Hilbert basis theorem. Wedderburn -Artin theorem.

REFERENCES:

1. P.B. Bhattacharya, S.K. Jain and S.R. Nagpaul: Basic Abstract Algebra (2nd Ed.), Cambridge University Press, Indian Edition, 1997
2. I.S. Luther and I.B.S. Passi, Algebra: Vol. I - Groups, Narosa Publishing House, 1996.
3. Surjeet Singh and Quazi Zameeruddin: Modern Algebra, Vikas Publishing House Pvt. Ltd., 1990.
4. N. Jacobson: Basic Algebra, Vols. I & II, Hindustan Publishing Company, 1980.
5. S. Lang: Algebra, 3rd Edition, Addison-Wesley, 1993.

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BILASPUR VISHWAVIDYALAYA , BILASPUR (C.G.)

M.A./M.Sc. [MATHEMATICS]

SECOND SEMESTER

PAPER II - REAL ANALYSIS -II

Max. Marks. 80

NOTE : Ten Questions will be set and a student shall be required to attempt any five questions.

Measurable sets : Lebesgue outer measure, Lebesgue measure, Properties of measurable sets, Borel sets and their measurability characterization of measurable sets, Non measurable set.

Measurable functions : Definition and properties; Simple, Step and characteristics function, Continuous function, sets of measure Zero. Sequence of functions, Egoroff's theorem structure of measurable function, Lusin theorem, Frechet theorem, Convergence in measure, Riesz theorem.

Lebesgue Integral : Lebesgue integral of a bounded function, Comparison of Riemann integral and Lebesgue integral, Bounded Convergence Theorem, Integral of non negative measurable functions, Fatou's lemma, Monotone convergence theorem, General Lebesgue integral, Lebesgue dominated convergence theorem.

Differentiation and integration : Dini derivatives, Differentiation of monotone functions, Lebesgue theorem, Function of bounded variation, Differentiation of an integral, Lebesgue sets, Absolutely Continuous Functions, Integral of the derivatives

Lebesgue L^p spaces : The classes L^p , Holder and Minikowski inequalities, L^p Banach Spaces, Convergences in the mean

REFERENCES :

- [1] Walter Rudin, :Principles of Mathematical Analysis' (3rd edition) Mc Graw Hill, Kogakusha, 1976, International student edition.
[2] P.K. Jain and V.P. Gupta: Lebesgue Measure and Integration, New age International (P) Limited published, New Delhi 1986 (Reprint 2000).

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Jain *25/6/16*

BILASPUR VISHWAVIDYALAYA , BILASPUR (C.G.)

**M.A./M.Sc. [MATHEMATICS]
SECOND SEMESTER
PAPER III – TOPOLOGY -II**

Max. Marks. 80

NOTE : Ten Questions will be set and a student shall be required to attempt any five questions.

Compactness: Basic properties of compactness

Continous functions and compact sets , compactness and Finite Intersection Property , Sequentially and Countably compact sets, Local Compactness in Metric space
Equivalence of compactness , countable compactness and sequential compactness in metric space.

Connected spaces, connectedness on the real line, Components, Locally connected spaces , Totally disconnected spaces .

Nets- Topology and convergence of Nets, Hausdorffness and nets Filters and their convergence , ultrafilters.

Tychonoff product topology in terms of standard sub-base and its characterization. .
Projection Maps

, Connectedness and product space. Compactness and Product space (Tychonoffs theorem),

REFERENCES:

1. G.F. Simmons : Introduction to Topology and Modern Analysis, Mc Graw -Hill
2. J.N .Sharma: Topology, Krishna Prakashan Mandir, Meerut
3. M.J.Mansfield: Introduction to Topology. Van Nostrand. Princeton, New Jersey, 1963
4. Jame R. Munkres: Topology, A First Couse. Prentice Hall, Incorporated, 1974
5. K.D.Joshi: Introduction to General Topology , New Age International(P) Ltd. New Delhi.
6. J Dugundji. Topology. Boston: Allyn and Bacon, 1966. [OP]
7. B.Mendelson: Introduction to Topology, Dover Publications, 1990.



29/6/16

BILASPUR VISHWAVIDYALAYA , BILASPUR (C.G.)**M.A./M.Sc. [MATHEMATICS]****SECOND SEMESTER****PAPER IV : COMPLEX ANALYSIS- II****Max. Marks. 80**

NOTE : Ten Questions will be set and a student shall be required to attempt any five questions.

ENTIRE FUNCTIONS

Weierstrass factorization theorem Gamma function and its properties. Riemann Zeta function. Riemann's functional equation. Runge's theorem. Mittag Leffler's theorem.

Analytic continuation uniqueness of direct analytic continuation. Uniqueness of analytic continuation along curve. Power series method of analytic continuation. Schwartz's Reflection Principle.

Monodromy theorem and its consequences.

Canonical product. Jensen's formula. Poisson - Jensen Formula. Hadamard's three circles theorem. Order of an entire function.

Exponent of convergence, Borel's theorem. Hadamard's factorization theorem.

The range of an analytic function. Bloch's theorem. The little Picard theorem.

Schottky's theorem. Montel Caratheodory and the Great Picard theorem.

Univalent functions. Bieberbach's conjecture (statement only) and the $1/4$ - theorem.

REFERENCES:-

1. J.B. Conway : Functions of one complex variable. Springer-Verlag international student Edition. Narosa. publishing House. 1980.
2. D. Sarason : Complex Function theory. Hindustan Book Agency. Delhi 1994.
3. S.Ponnusamy : Foundation of complex Analysis. Narosa publishing house 1997.
4. J.N. Sharma.: Functions of a complex variable , Krishna Prakashan Mandir, Meerut
5. B.S.Tyagi: Functions of a Complex Variable, Kedar Nath Ram Nath Prakashan, Meerut ,1981.

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BILASPUR VISHWAVIDYALAYA , BILASPUR (C.G.)**M.A./M.Sc. [MATHEMATICS]****SECOND SEMESTER****PAPER V : ADVANCED DISCRETE MATHEMATICS - II****Max. Marks. 80**

NOTE : Ten Questions will be set and a student shall be required to attempt any five questions.

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Grammar and Language: Phase structure grammar, Rewriting Rules, Derivation, Sentential forms, context –sensitive context, Free and Regular grammars and languages, Notion of syntext, Analysis, Polish Notation, Conversion of Infix experience to Polish Notation. The Rename Polish Notation.

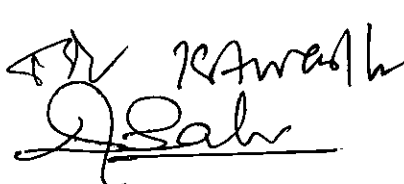
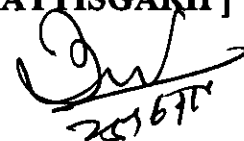
Introductory Computability Theory : Finite state Machines and their Transition, Table diagrams, Equivalence of Finite state Machines, reduced machines, Homomorphism Finite automata, and equivalence of its power to that of Deterministic finite automata. Moore and Mealy Machines, Turing machines and partial recursive functions.

Graph Theory : Definition of (undirected) graph, Paths, Circuits Cycles & Sub graphs, Induced Sub graphs, Degree of a vertex, Connectivity, Planar Graphs and their properties, Trees, Euler's Formula for connected planar Graphs. Complete and complete Bipartite graphs, Kuratowski's Theorem.(statement only), and its use, Spanning trees. Cut sets. Fundamental Cut sets and cycles. Minimal spanning trees. Matrix representation of graphs, Euler's theorem on the Existence of Eulerian Paths, and circuit, Directed Graphs, In degree and out degree of a vertex. Weighted undirected Graphs.

REFERENCES:

1. J.P. Tremblay & R. Manohar.: Discrete Mathematical structure with application to computer sciences. McGraw Hill Book Co. 1997.
2. Seymour Lipschutz.: Finite Mathematics (International edition 1993) McGraw Hill Book Co. New York.
3. N. Deo: Graph Theory with applications to Engineering and Computer Sciences. Prentice Hall of India.
4. S. Wiitala: Discrete Mathematics - A unified approach McGraw Hill Book Co. New York.
5. C.L. Liu: Elements of Discrete mathematics. McGraw Hill Book Col.
6. M.K.Gupta: Discrete Mathematics , Krishna Prakashan Mandir(P) Ltd., Meerut.

BILASPUR VISHWAVIDYALAYA, BILASPUR CHHATTISGARH]

Scheme of Examination

M.A./M.Sc. (MATHEMATICS) (Semester-III)

2017-18 & Onward

There shall be five papers. Two Compulsory & Three Optional Papers Each paper shall have 100 marks. Overall tally of marks will be 500.

COMPULSORY PAPERS							
PAPER	DESCRIPTION	Max. Marks			Min. Pass Marks		
		Ext.	Int.	Pract.	Ext.	Int.	Pract.
I	Integration Theory and Functional Analysis -I	80	20	-	29	7	-
II	Partial Differential Equations, Mechanics and Gravitation-I	80	20	-	29	7	-
OPTIONAL PAPERS (ANY THREE)							
III	Programming in C (With ANSI Features)-I	50	20	30	18	7	11
IV	Fuzzy Sets and their Applications-I	80	20	-	29	7	-
V	Operations Research-I	80	20	-	29	7	-
VI	Fluid Mechanics-I	80	20	-	29	7	-
VII	Information Theory-I	80	20	-	29	7	-
VIII	Fundamentals of Computer Science -I	80	20	-	29	7	-

Dr. D. S. S. *Dr. S. S. S.* *Dr. S. S. S.*
28/11/16 *25/11/16*

BILASPUR VISHWAVIDYALAYA , BILASPUR (C.G.)**M.A./M.Sc. [Mathematics]****THIRD SEMESTER****PAPER - I(Compulsory): Integration Theory and Functional Analysis -I****Max. Marks. 80**

NOTE : Ten Questions will be set and a student shall be required to attempt any five questions.

Signed measure. Hahn decomposition theorem, mutually singular measures. Radon-Nikodym theorem. Lebesgue decomposition. Riesz representation theorem. Extension theorem (Caratheodory).

Lebesgue-Stieltjes integral, product measures, Fubini's theorem. Tonnelé'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.

Baire sets. Baire measure, continuous functions with compact support. Regularity of measures on locally compact spaces.

REFERENCES:

1. H.L. Royden: Real Analysis, Macmillan Publishing Co. Inc., New York, 4th Edition, 1993.
2. B. Choudhary and Sudarsan Nanda: Functional Analysis with Applications Wiley Eastern Ltd., 1989
3. J.H. Williamson: Lebesgue Integration, Holt Rinehart and Winston, Inc. New York. 1962
4. P.R. Halmos: Measure Theory, Van Nostrand, Princeton, 1950.
5. T.G. Hawkins: Lebesgue's Theory of Integration: Its Origins and Development, Chelsea, New York, 1979.
6. B.V. Limaye: Functional Analysis, Wiley Eastern Ltd.
7. G.de. Barra: Measure Theory & Integration, Wiley Eastern Ltd, 1981.
8. Walter Rudin: Real & Complex Analysis, Tata McGraw Hill Publishing. Company, New Delhi.
9. P.K. Jain , O.P. Ahuja & Khalid Ahmad: Functional Analysis, New Age International (P)Ltd., New Delhi.
10. A. Siddiqui: Functional Analysis with Applications: Tata McGraw Hill Publishing Company, New Delhi.

Prof. J. K. Singh *T. A. K. Singh* *Dr. J. K. Singh* *Dr. J. K. Singh*
25/6/16

BILASPUR VISHWAVIDYALAYA , BILASPUR (C.G.)**M.A./M.Sc. [Mathematics]****THIRD SEMESTER****PAPER – II(Compulsory) : Partial Differential Equations, Mechanics & Gravitation - I****Max. Marks. 80****NOTE :**Ten Questions will be set and a student shall be required to attempt any five questions.**Partial Differential Equations****Laplace's Equation-** Fundamental solution, Mean value formulae, Properties of Harmonic function, Green function, Energy method**Heat Equation:** Fundamental solution, Mean value formulae, Properties of solution, Energy method .**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, Hamiltons ODE), Conservation Laws, Representation of solutions, Separation of variables.

Laplace and Fourier Transforms and their applications, Legendre Transform.

Attraction: Attraction of rod, disc, spherical shell and sphere, spherical shell of finite thickness.

Surface integral of normal attraction (Application & Guass's theorem), Laplace and Poisson equations, work done by self attracting system.

REFERENCES :

- 1.D.Raisinghania :Ordinary and Partial Differential Equation, S.Chand , New Delhi.
- 2.Gupta ,Kumar & Sharma: Classical - Mechanics, Pragati Prakashan,
- 3.S.L. Loney :An Elementary Treatise On Statics,University Press.
- 4.I.N. Sneddon: Partial Differential Equation , Mc Graw Hill Book Co.Ltd.
- 5.H.Goldstem: Classical Mechanics, Addition Wesley.
- 6.Narayan Chandra Rana & Pramod Sharad, Chandra Joag: Classical Mechanics. Tata McGraw-Hill Publishing Company, 1991.
- 7.B.D. Gupta & Satya Prakash: Mechanics Relativity .Pragati Prakshan, Meerut.
8. Singh & Chauhan, Partial Differential Equation with Boundary Value Problems.

BILASPUR VISHWAVIDYALAYA , BILASPUR (C.G.)**M.A./M.Sc. [Mathematics]****THIRD SEMESTER****PAPER III(Optional) : Programming in C (with ANSI features) -I****Max. Marks. 50**

NOTE : Ten Questions will be set and a student shall be required to attempt any five questions.

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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 Preprocessor.

Scalar Data Types- Declarations, Different Types of Integers. Different kinds of Integer Constants. Floating- Point Types. Initialization. Mixing Types . Explicit Conversions-Casts. Enumeration Types. The Void Data Type. Typedefs. Finding the Address of an object. Pointers.

Control Flow-Conditional Branching. The Switch Statement. Looping. Nested Loops. The break and continue Statements. The goto statement. Infinite Loops.

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.

REFERENCES:

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. Ritchie: The C Programme Language, 2nd Edition (ANSI Features), Prentice Hall 1989.
3. Yashwant Kanetkar: Let Us C, 8th Edition, B P B Publications 2007.
4. E. Balagurusamy: Programming in C (ANSI), 4th Edition, Tata Mac Graw Hill.

Handwritten signatures and dates:
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 25/6/16

PRACTICAL

The break-up of marks for Third Semester's Practical will be as under :			
Sr. No.	Argument	Maximum Marks	Minimum Passing Marks
1.	Lab Record (Internal Assessment)	6	
2.	Viva-voce (External Assessment)	9	
3.	Program Development and Execution (External Assessment)	15	
Total Marks		30	11

Bojda

GA *Aravindh*

Dr. V
25/6/16

Dr. S

BILASPUR VISHWAVIDYALAYA , BILASPUR (C.G.)**M.A./M.Sc. [Mathematics]****THIRD SEMESTER****PAPER – IV(Optional) : Fuzzy Sets and their Applications -I****Max. Marks. 80**

NOTE : Ten Questions will be set and a student shall be required to attempt any five questions.

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, 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.

Fuzzy Arithmetic: Fuzzy numbers, Arithmetic operations on fuzzy numbers, Lattices of fuzzy numbers, fuzzy equations.

Fuzzy Relations : Fuzzy relations on fuzzy sets, fuzzy binary relations and fuzzy equivalence relations. Fuzzy morphism, standard composition, sup \circ composition, inf \circ composition of fuzzy relations.

Fuzzy Relations Equations : Problem partitioning, solution methods, fuzzy relation equations based upon sup \circ composition and inf \circ composition, approximate solution.

REFERENCES:

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

Dr. S. K. Mishra

18/11

R. Anandh
A. Sahu

Dr. S. K. Mishra
25/6/18

BILASPUR VISHWAVIDYALAYA , BILASPUR (C.G.)**M.A./M.Sc. [Mathematics]****THIRD SEMESTER****PAPER V(Optional) : Operations Research -I****Max. Marks. 80**

NOTE : Ten Questions will be set and a student shall be required to attempt any five questions.

Operations Research and its Scope. Necessity of Operations Research in Industry. Linear Programming-graphical method of solutions, Simplex Method. Theory of the Simplex Method. Two phase method, Big M method of solution to an LPP. Duality in linear programming, Duality theorems, Dual Simplex method. Other Algorithms for Linear Programming-Dual Simplex Method.

Parametric Linear Programming. Upper Bound Technique. Interior Point Algorithm. Linear Goal Programming. Assignment Problems, It's mathematical formulation, Solution of assignment problems, Optimality test. Transportation problems, Formulation of transportation problems, Solutions of Transportation problems, North-West corner method, Least cost method, Vogel's approximation method, Test for optimality U-V method.

Network Analysis-Shortest Path Problem. Minimum Spanning Tree Problem. Maximum Flow I Problem. Minimum Cost Flow Problem. Network Simplex Method. Project Planning and Control I with PERT CPM.

REFERENCES :

1. F.S. Hillier and G.J. Ueberman: Introduction to Operations ResBareft (Sixth Edition), McGraw Hill International Edition, Industrial Engineering Series, 1995 Affiliated East-West Press Pvt. Ltd., New Delhi, Madras.
2. G. Hadley: Linear Programming, Narosa Publishing House, 1995.
3. G. Hadly, Nonlinear and Dynamic Programming, Addison-Wesley, Reading Mass.
4. Mokhtar S. Bazaraa, John J. Jarvis and Hanif D. Sherali: Linear Programming and Network flows, John Wiley I ' & Sons, New York, 1990.
5. H.A. Taha: Operations Research-An introduction, Macmillan Publishing Co., Inc., New York.
6. K. Swarup, P.K. Gupta and M. Mohan: Operations Research, Sultan Chand & Sons, N.Delhi.
7. S.S. Rao: Optimization Theory and Applications, Wiley Eastern Ltd., New Delhi.
8. P. K.. Gupla and D.S. Hira, : Operations Research ,S. Chand & Co. Ltd., N.Delhi.
9. N.S. Kambo, Mathematical Programming Techniques, Affiliated East-West Press Pvt. Ltd., New Delhi, Madras.
10. S.D.Sharma: Operations Research, Kedar Nath Ram Nath Publication, Meerut.

Prakash *Q. Sahu* *Ramesh* *25/6/16*

BILASPUR VISHWAVIDYALAYA , BILASPUR (C.G.)**M.A./M.Sc. [Mathematics]****THIRD SEMESTER****PAPER VI (Optional) : FLUID MECHANICS -I****Max. Marks. 80**

NOTE : Ten Questions will be set and a student shall be required to attempt any five questions.

Kinematics : Lagrangian and Eulerian Methods, Equation of continuity, Stream lines, path lines, streak lines, velocity potential, Irrotational and rotational motions, Boundary surfaces, Vortex lines.

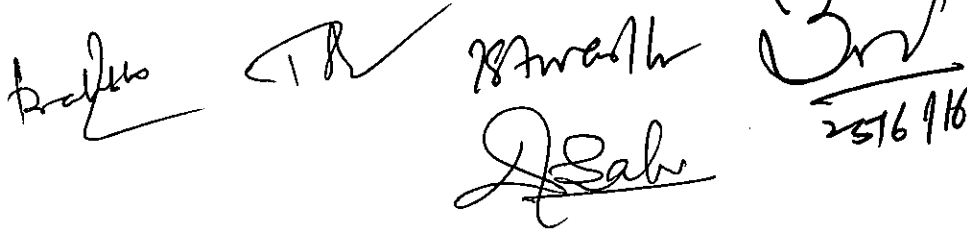
Equations of motion : Euler's dynamical Equations, Bernoulli's Equation of motion by flux method, Equations of motion under Impulsive forces. Principle of Energy for Incompressible fluids. Lagrange's Equations.

Motion in Two dimensions: Lagrange's stream function. Irrotational motion in Two dimensions, Complex velocity Potential, Sources, Sinks, Doublets and their Images, Use of conformal Transformation. The Milne -Thomson Circle Theorem, Theorem of Blasius.

Motion of Cylinders: Motion of a general , circular and coaxial cylinders, Circulation about a moving cylinder, Streaming and circulation about a fixed circular cylinder.

REFERENCES:

1. A.S.Ramsey: A treatise on Hydrodynamics Part II, CBS Publication , Delhi
2. F.Choriton: Text book of Fluid Mechanics, CBS Publication , Delhi
3. L.D.Landan & E.M.Lipschitz : Fluid Mechanics , Pergaman Press.
4. R.K.Rathy: An Introduction to Fluid Dynamics, Oxford and IBH Company, New Delhi, 1976.


 The bottom of the page contains several handwritten signatures and initials. From left to right: a signature that appears to be 'Prof. J. K. Rathy', a set of initials 'TR', a signature 'R. K. Rathy', a signature 'J. K. Rathy', and a signature 'B. K. Rathy' with the date '25/6/16' written below it.

BILASPUR VISHWAVIDYALAYA, BILASPUR (C.G.)

M.A./M.Sc. [Mathematics]

THIRD SEMESTER**PAPER VII (Optional) : INFORMATION THEORY - I****Max. Marks. 80**

NOTE : Ten Questions will be set and a student shall be required to attempt any five questions.

Measure of Information- Axioms for a measure of uncertainty. The Shannon entropy and its properties. Joint and conditional entropies. Transformation and its properties. Some Intuitive properties of a measure of entropy - Symmetry, normalization, expansibility, boundedness, recursivity, maximality, stability, additivity, subadditivity, nonnegativity, continuity, branching etc. and interconnections among them. Axiomatic characterization of the Shannon entropy due to Shannon and Fadeev. Axiomatic characterization of the Shannon entropy due to Tverberg and Leo.

Information functions, the fundamental equation of Information, information function continuous at the origin, nonnegative bounded information functions, measurable information functions and entropy. The fundamental theorem of Information Theory and its strong and weak converses.

REFERENCES:

- 1.R.ASH: Information Theory , Inter science Publishers, New York, 1965.
- 2.F.M.REZA: An Introduction to Information Theory, McGraw Hill Book Company, Inc.,1961
- 3.J,Aczel and Z.Daroczy: On Measures of Information and their characterization, Academic Press, New York

Prof. J. Aczel *T. V. Tverberg* *Z. Daroczy* *J. Aczel*
J. Aczel *J. Aczel* *J. Aczel* *J. Aczel*
 25/6/10

BILASPUR VISHWAVIDYALAYA , BILASPUR (C.G.)**M.A./M.Sc. [Mathematics]****THIRD SEMESTER****PAPER VIII(Optional) : FUNDAMENTALS OF COMPUTER SCIENCE - I****Max. Marks. 80**

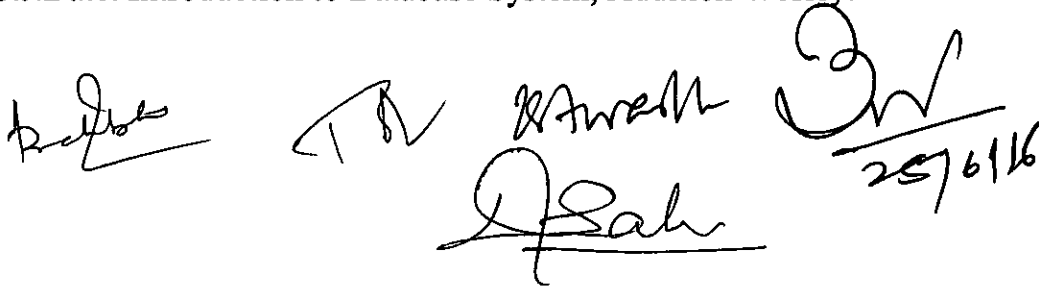
NOTE : Ten Questions will be set and a student shall be required to attempt any five questions.

Object Oriented Programming - Classes and Scope, Nested Classes, Pointer, Class Members, Class Initialization, Assignment and Destruction, Overload functions and Operators, Templates including class templates, Class inheritance and subtyping, multiple and virtual Inheritance.

Data Structures : Analysis of Algorithms, q, W, O, o, w notations; Lists, Stacks, and Queues .Sequential and linked representations. Trees: Binary tree – Search Tree Implimentation, B-tree (concept only); Hasing –open and closed ;Sorting Insertion sort, shell sort, quick sort , beap sort and their analysis.

REFERENCE:

- 1.S.B.Lipman, J.Lajoi: C++ Primer, Addition Wesley.
- 2.B.Stroustrup: The C++ Programming Language, Addition Wesley.
- 3.C.J.Date: Introduction to Database System, Addition Wesley.

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BILASPUR VISHWAVIDYALAYA, BILASPUR CHHATTISGARH]

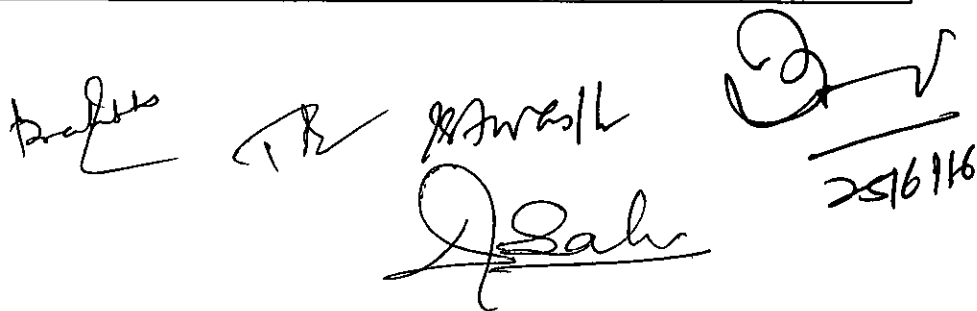
Scheme of Examination

M.A./M.Sc. (MATHEMATICS) (Semester-IV)

2017-18 & Onward

There shall be five papers. Two Compulsory & Three Optional Papers Each paper shall have 100 marks. Overall tally of marks will be 500.

COMPULSORY PAPERS							
PAPER	DESCRIPTION	Max. Marks			Mt. Pass Marks		
		Ext.	Int.	Pract.	Ext.	Int.	Pract.
I	Integration Theory and Functional Analysis -II	80	20	-	29	7	-
II	Partial Differential Equations, Mechanics and Gravitation-II	80	20	-	29	7	-
OPTIONAL PAPERS (ANY THREE)							
III	Programming in C (With ANSI Features)-II	50	20	30	18	7	11
IV	Fuzzy Sets and their Applications-II	80	20	-	29	7	-
V	Operations Research-II	80	20	-	29	7	-
VI	Fluid Mechanics-II	80	20	-	29	7	
VII	Information Theory-I	80	20	-	29	7	
VIII	Fundamentals of Computer Science -II	80	20	-	29	7	



 Prof. Dr. T. R. ...
 Prof. Dr. ...
 Prof. Dr. ...
 25/6/16

BILASPUR VISHWAVIDYALAYA, BILASPUR (C.G.)**M.A./M.Sc. [Mathematics]****FOURTH SEMESTER****PAPER I (Compulsory) : Integration Theory and Functional Analysis- II****Max. Marks. 80**

NOTE : Ten Questions will be set and a student shall be required to attempt any five questions.

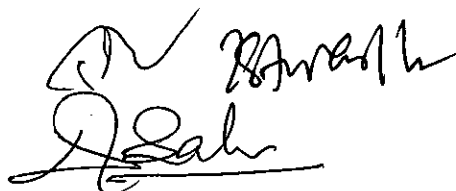
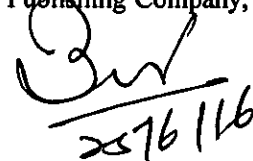
Normed linear spaces. Banach spaces and examples. Quotient space of normed linear spaces and its completeness, equivalent norms. Riesz Lemma, basic properties of finite dimensional normed linear spaces and compactness. Weak convergence and bounded linear transformations, normed linear spaces of bounded linear transformations, dual spaces with examples .

Uniform boundedness theorem and some of its consequences. Open mapping and closed graph theorems. Hahn-Banach theorem for real linear spaces, complex linear spaces and normed linear spaces. 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. Structure of Hilbert spaces. Projection theorem. Riesz representation theorem. Adjoint of an operator on a Hilbert space. Reflexivity of Hilbert spaces. Self-adjoint operators, Positive, projection, normal and unitary operators.

REFERENCES:

- 1.H.L. Royden: Real Analysis, Macmillan Publishing Co. Inc., New York, 4th Edition, 1993.
- 2.B.Choudhary and Sudarsan Nanda: Functional Analysis with Applications Wiley Eastern Ltd., 1989
3. J.H. Williamson: Lebesgue Integration, Holt Rinehart and Winston, Inc. New York. 1962
4. P.R. Halmos: Measure Theory, Van Nostrand, Princeton, 1950.
5. T.G. Hawkins: Lebesgue's Theory of Integration: Its Origins and Development, Chelsea, New York, 1979.
6. B.V.Limaye: Functional Analysis, Wiley Eastern Ltd.
7. G.de. Barra: Measure Theory & Integration, Wiley Eastern Ltd, 1981.
8. Walter Rudin: Real & Complex Analysis, Tata McGraw Hill Publishing. Company, New Delhi.
9. P.K.Jain , O.P.Ahuja & Khalid Ahmad: Functional Analysis, New Age International (P)Ltd., New Delhi.
- 10.A.Siddiqui: Functional Analysis with Applications: Tata McGraw Hill Publishing Company, New Delhi.

BILASPUR VISHWAVIDYALAYA , BILASPUR (C.G.)**M.A./M.Sc. [Mathematics]****FOURTH SEMESTER****PAPER – II (Compulsory): Partial Differential Equations, Mechanics & Gravitation - II****Max. Marks. 80**

NOTE : Ten Questions will be set and a student shall be required to attempt any five questions.

Generalised Co-ordinates, Holonomic and Non-holonomic Systems. Scleronomic and Rheonomic System, Generalised Potentials.

Lagrange's equations of first kind, Lagrange's equations of second kind . Uniqueness of solution, Energy equation for conservation fields.

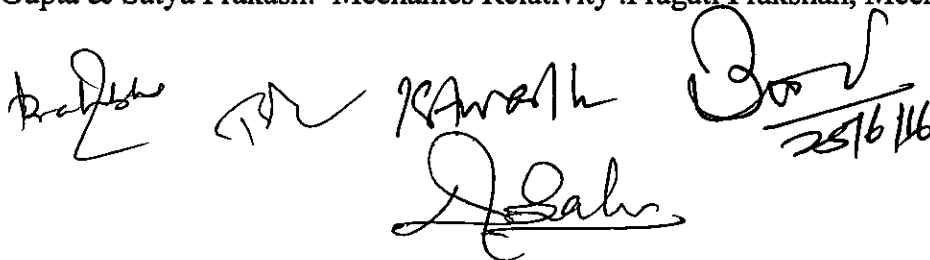
Hamilton's variables.. Hamilton canonical equations. Cyclic coordinates. Routh's equations.

Poisson's Bracket. Poisson's Identity. Jacobi-Poisson Theorem Lagrange's Bracket, 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.

Potential of rod, disc, spherical shell and sphere, spherical shell of finite thickness. Distributions for a given potential. Equipotential surfaces. Surface and solid harmonics. Surface density in terms of surface harmonics.

REFERENCES :

- 1.D.Raisinghania :Ordinary and Partial Differential Equation, S.Chand , New Delhi.
- 2.Gupta ,Kumar & Sharma: Classical - Mechanics, Pragati Prakashan,
- 3.S.L. Loney :An Elementary Treatise On Statics,University Press.
- 4.I.N. Sneddon: Partial Differential Equation , Mc Graw Hill Book Co.Ltd.
- 5.H.Goldstem: Classical Mechanics, Addition Wesley.
- 6.Narayan Chandra Rana & Pramod Sharad, Chandra Joag: Classical Mechanics. Tata McGraw-Hill Publishing Company, 1991.
- 7.B.D. Gupta & Satya Prakash: Mechanics Relativity .Pragati Prakshan, Meerut.



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BILASPUR VISHWAVIDYALAYA , BILASPUR (C.G.)**M.A./M.Sc. [Mathematics]****FOURTH SEMESTER****PAPER III (Optional) : Programming in C (with ANSI features) -II****Max. Marks. 50**

NOTE : Ten Questions will be set and a student shall be required to attempt any five questions.

Arrays - Declaring an Array. Array and Memory. Initializing Arrays. Encryption and Decryption..

Storage Classes-Fixed vs. Automatic Duration. Scope. Global variables. The Register Specifier. ANSI rules for the syntax and Semantics of the storage – class keywords.

Pointers - Pointer Arithmetic. Passing Pointers as Function Arguments. Accessing Array Elements through Pointers. Passing Arrays as Function Arguments. Sorting Algorithms. Strings. Multidimensional Arrays. Arrays of Pointers. Pointers to Pointers.

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.

Structures and Unions-Structures. Dynamic Memory Allocation. Linked Lists. Unions, enum Declarations.

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.

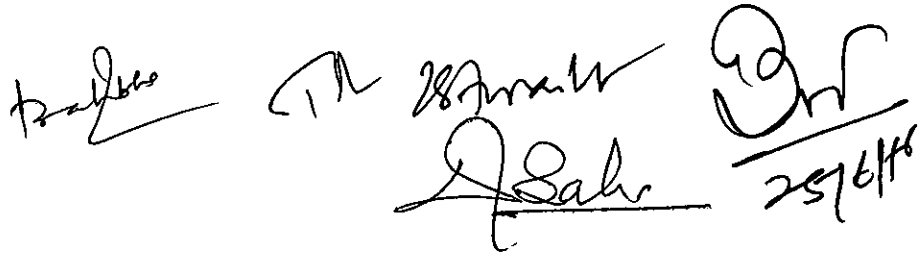
REFERENCES:

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. Ritchie: The C Programme Language, 2nd Edition (ANSI Features), Prentice Hall 1989.
3. Yashwant Kanetkar: Let Us C, 8th Edition, B P B Publications 2007.
4. E. Balagurusamy: Programming in C (ANSI), 4th Edition, Tata Mac Gray Hill.

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PRACTICAL

The break-up of marks for Fourth Semester's Practical will be as under :			
Sr. No.	Argument	Maximum Marks	Minimum Passing Marks
1.	Lab Record (Internal Assessment)	6	
2.	Viva-voce (External Assessment)	9	
3.	Program Development and Execution (External Assessment)	15	
Total Marks		30	11



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BILASPUR VISHWAVIDYALAYA , BILASPUR (C.G.)**M.A./M.Sc. [Mathematics]****FOURTH SEMESTER****PAPER IV (Optional) : Fuzzy Sets and their Applications -II****Max. Marks. 80**

NOTE : Ten Questions will be set and a student shall be required to attempt any five questions.

Possibility Theory : Fuzzy measures, evidence theory, possibility theory, necessity measure, fuzzy sets and possibility theory, possibility theory versus probability theory.

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.


Approximate reasoning : An overview of fuzzy expert systems, Fuzzy implications and their selection, Multi conditional approximate reasoning, the role of fuzzy relation equations.

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.)

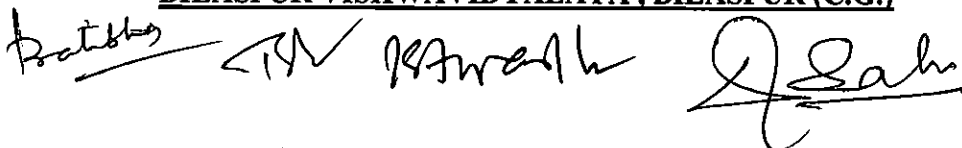
Decision Making in Fuzzy Environment- Individual decision making . Multiperson decision making. Multicriteria decision making. Multistage decision making. Fuzzy ranking methods . Fuzzy linear programming.

REFERENCES:

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.


27/6/16

BILASPUR VISHWAVIDYALAYA , BILASPUR (C.G.)



M.A./M.Sc. [Mathematics]**FOURTH SEMESTER****PAPER - V (Optional) : Operation Research -II****Max. Marks. 80**

NOTE : Ten Questions will be set and a student shall be required to attempt any five questions.

Dynamic Programming-Deterministic and Probabilistic Dynamic programming.

Game Theory-Two-Person, Zero-Sum Games. Games with Mixed Strategies. Graphical , Solution. Solution by Linear Programming.

Integer Programming-Branch and Bound Technique.

Queueing system: Deterministic Queueing system, probability distribution in Queueing, classification of Queueing models, Poission Queueing 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.

Nonlinear Programming- One /and Multi-Variable Unconstrained Optimization. Kuhn-Tucker Conditions for Constrained Optimization. Quadratic Programming. Separable Programming. Convex Programming. Non-convex Programming.

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REFERENCES :

1. F.S. Hillier and G.J. Ueberman: Introduction to Operations ResBareft (Sixth Edition), McGraw Hill International Edition, Industrial Engineering Series, 1995 Affiliated East-West Press Pvt. Ltd., New Delhi, Madras.
2. G. Hadley: Linear Programming, Narosa Publishing House, 1995.
3. G. Hadly, Nonlinear and Dynamic Programming, Addison-Wesley, Reading Mass.
4. Mokhtar S. Bazaraa, John J. Jarvis and Hanif D. Sherali: Linear Programming and Network flows, John Wiley I ' & Sons, New York, 1990.
5. H.A. Taha: Operations Researc~-An introduction, Macmillan Publishing Co., Inc., New Yark.
6. K. Swarup, P.K. Gupta and M. Mohan: Operations Research, Sultan Chand & Sons, N.Delhi.
7. S.S. Rao: Optimization Theory and Applications, Wiley Eastern Ltd., New Delhi.
8. P. K.. Gupla and D.S. Hira, : Operations Research ,S. Chand & Co. Ltd., N.Delhi.
9. N.S. Kambo, Mathematical Programming Techniques, Affiliated East-West Press Pvt. Ltd., New Delhi, Madras.
10. S.D.Sharma: Operations Research,Kedar Nath Ram Nath Publication, Meerut...

BILASPUR VISHWAVIDYALAYA , BILASPUR (C.G.)

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M.A./M.Sc. [Mathematics]**FOURTH SEMESTER****PAPER - VI (Optional) : FLUID MECHANICS -II****Max. Marks. 80**

NOTE : Ten Questions will be set and a student shall be required to attempt any five questions.

Motion of Elliptic Cylinder: Streaming Past a fixed Elliptic cylinder, Rotating Elliptic cylinder, Kinetic Energy ,Circulation.

Motion in Three Dimensions: Motion of a sphere in a liquid at rest at in infinity, Liquid streaming Past a Fixed sphere, Concentric spheres. Equation of motion of a sphere, Stoke's stream function.,

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 Combined Vortex, Vortex Pair , Image of a vortex filament in a plane, Karman street.

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 at an Interface with surface free. Long Gravity waves, Group velocity, Paths of Particles.

REFERENCES:

1. A.S.Ramsey: A treatise on Hydrodynamics Part II, CBS Publication , Delhi
2. F.Choriton: Text book of Fluid Mechanics, CBS Publication , Delhi
3. L.D.Landan & E.M.Lipschitz : Fluid Mechanics , Pergaman Press.
4. R.K.Rathy: An Introduction to Fluid Dynamics, Oxford and IBH Company, New Delhi, 1976.

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 Babbar, TR, R. K. Rathy, and 23/6/16

BILASPUR VISHWAVIDYALAYA , BILASPUR (C.G.)**M.A./M.Sc. [Mathematics]****FOURTH SEMESTER****PAPER - VII (Optional) : INFORMATION THEORY - II****Max. Marks. 80**

NOTE : Ten Questions will be set and a student shall be required to attempt any five questions.

Information Functions: The general solution of the fundamental equation of information. Derivations and their role in the study of information functions.

Continuous Channels: The time -discrete Gaussian channel. Uncertainty of an absolutely continuous random variable. The converse to the coding theorem for time-discrete Gaussian channel. The time -discrete Gaussian channel, Band-limited channels.

Noisless Coding- Ingredients of noiseless coding problem. Uniquely decipherable codes. Necessary and Sufficient condition for the existence of instantaneous codes. Construction of optimal codes.

Discrete Memoryless Channel ; Classification of channels. Information processed by a channel. Calculation of channel capacity. Decoding schemes. The ideal observer.

REFERENCES:

- 1.R.ASH: Information Theory , Inter science Publishers, New York, 1965.
- 2.F.M.REJA: An Introduction to Information Theory, McGraw Hill Book Company, Inc.,1961
- 3.J,Aczel and Z.Daroczy: On Measures of Information and their characterization, Academic Press, New York.

Handwritten signatures and notes:
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 The second signature is "The Raman" with "J. Saha" written below it.
 The third signature is "Saha" with "25/6/16" written below it.

BILASPUR VISHWAVIDYALAYA, BILASPUR (C.G.)**M.A./M.Sc. [Mathematics]****FOURTH SEMESTER****PAPER - VIII (Optional) : FUNDAMENTALS OF COMPUTER SCIENCE - II****Max. Marks. 80**

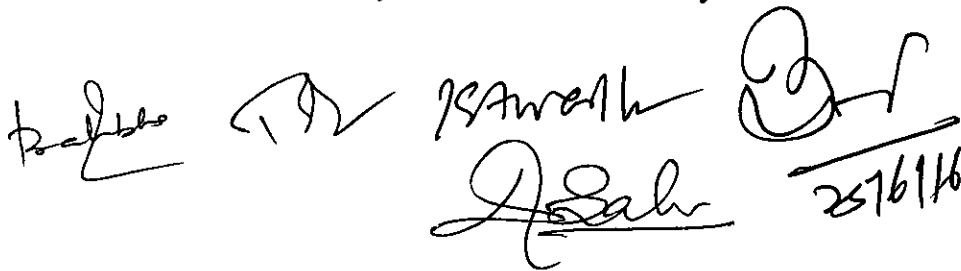
NOTE : Ten Questions will be set and a student shall be required to attempt any five questions.

Database System: Role of Database system, Database system Architecture, Introduction to Relational Algebra and Relational Circuits . SQL – Basic features, including views, Integrity constraints; Database design – normalization up to BCNF.

Operating System – User Interface, Processor Management, I/O Management, Memory Management, Concurrently and Security, Network and Distributed System.

REFERENCES:

- 1.S.B.Lipman, J.Lajoi: C++ Primer, Addition Wesley.
- 2.B.Stroustrup: The C++ Programming Language, Addition Wesley.
- 3.C.J.Date: Introduction to Database System, Addition Wesley.



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