

**GOVT. D.B. GIRLS' P.G. (AUTONOMOUS) COLLEGE
RAIPUR CHHATTISGARH**

FACULTY OF MATHEMATICS

**SYLLABUS
OF
M.Sc. MATHEMATICS
2020-21**

Ist SEMESTER

Signature of Chairman

Signature of Member (Subject)

M.Sc. MATHEMATICS

Ist SEMESTER

Theory

Part A

No.	Title	Marks						Credit Point	Total
		Theory		Test		Seminar			
		Max.	Min.	Max.	Min.	Max.	Min.		
Paper-I	Advanced Abstract Algebra (I)	80	16	10	2	10	2	5	100
Paper-II	Real Analysis (I)	80	16	10	2	10	2	5	100
Paper-III	Topology	80	16	10	2	10	2	5	100
Paper-IV	Complex Analysis (I)	80	16	10	2	10	2	5	100
Paper-V	Advanced Discrete Mathematics(I)	80	16	10	2	10	2	5	100

APPROVED BY THE BOARD OF STUDIES ON

NAME	IN THE CAPACITY OF	SIGNATURE
Dr. MADHU SHRIVASTAVA	CHAIRMAN	
Dr. B.S. THAKUR	SUBJECT EXPERT (University Nominee)	
Dr. AMITABH BANERJEE	SUBJECT EXPERT (Principal Nominee)	
Mrs. RASHMI SENGUPTA	MEMBER OF THE DEPARTMENT	
Mrs. KIRAN DEWANGAN	MEMBER OF THE DEPARTMENT	
Ku. SANDHYA SAHU	EX-STUDENT	

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DEPARTMENT OF MATHEMATICS
CLASS M.Sc.Ist SEMESTER
MATHEMATICS
SESSION 2020-21

PAPER -I

Advanced Abstract Algebra (I)

Maximum Marks: 80

Number of Units : IV

Minimum Marks: 16

Unit-I

Groups -Normal and Subnormal series. Composition series. Jordan-Holder theorem. Solvable groups. Nilpotent groups.

Unit-II

Field theory- Extension fields. Algebraic and transcendental extensions. Separable and inseparable extensions. Normal extensions.

Unit-III

Perfect fields .Finite fields .Primitive elements. Algebraically closed fields.

Unit-IV

Automorphisms of extensions. Galois extensions. Fundamental theorem of Galois theory. Solution of polynomial equations by radicals. Insolvability of the general equation of degree 5 by radicals.

Books Recommended:

1. P.B.Bhattacharya, S.K.Jain, S.R.Nagpaul : Basic Abstract Algebra, Cambridge University press

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2. I.N.Herstein : Topics in Algebra, Wiley Eastern Ltd.
3. QuaziZameeruddin and SurjeetSingh : Modern Algebra

References

1. M.Artin, Algebra, Prentice -Hall of India, 1991.
2. P.M. Cohn, Algebra,Vols. I,II&III, John Wiley & Sons, 1982,1989,1991.
3. N.Jacobson, Basic Algebra, Vols. I , W.H. Freeman, 1980 (also published by Hindustan Publishing Company).
4. S.Lang, Algebra, 3rd edition, Addison-Wesley, 1993.
5. I.S. Luther and I.B.S. Passi, Algebra, Vol. I-Groups, Vol.II-Rings, Narosa Publishing House (Vol.I-1996,Vol. II-1999)
6. D.S.Malik, J.N.Mordeson, and M.K.Sen, Fundamentals of Abstract Algebra, Mc Graw-Hill, International Edition,1997.
7. VivekSahai and VikasBist, Algebra, Narosa Publishing House, 1999.
8. I. Stewart, Galois theory, 2nd edition, Chapman and Hall, 1989.
9. J.P. Escofier, Galois theory, GTM Vol.204, Springer, 2001..
10. Fraleigh , A first course in Algebra Algebra, Narosa,1982

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CLASS M.Sc.Ist SEMESTER
MATHEMATICS
SESSION 2020-21
PAPER-II

Real Analysis (I)

Maximum Marks: 80

Number of Units : IV

Minimum Marks: 16

Unit-I

Sequences and series of functions, pointwise and uniform convergence, Cauchy criterion for uniform convergence, Weierstrass M-test, Abel's and Dirichlet's tests for uniform convergence, uniform convergence and continuity, definition and simple properties of Riemann-Stieltjes integral, uniform convergence and Riemann-Stieltjes integration, uniform convergence and differentiation, Weierstrass approximation theorem.

Unit-II

Power series, uniqueness theorem for power series, Abel's and Tauber's theorems. Rearrangements of terms of a series, Riemann's theorem.

Unit-III

Functions of several variables, linear transformations, Derivatives in an open subset of \mathbb{R}^n , Chain rule, Partial derivatives, interchange of the order of differentiation, Derivatives of higher orders, Taylor's theorem, Inverse function theorem, Implicit function theorem.

Unit-IV

Jacobians, extremum problems with constraints, Lagrange's multiplier method, Differentiation of integrals. Partitions of unity, Differential forms, Stoke's theorem.

Recommended Books:

1. Principle of Mathematical Analysis By W. Rudin
2. Real Analysis By H. L. Roydon

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References

1. Walter Rudin, Principles of Mathematical Analysis (3rd edition) McGraw-Hill, Kogakusha, 1976, International student edition.
2. T.M. Apostol, Mathematical Analysis, Narosa Publishing House, New Delhi, 1985.
3. Gabriel Klambauer, Mathematical Analysis, Marcel Dekkar, Inc. New York, 1975.
4. A.J. White, Real Analysis; an introduction, Addison-Wesley Publishing Co., Inc., 1968.
5. G.de Barra, Measure Theory and Integration, Wiley Eastern Limited, 1981.
6. E. Hewitt and K. Stromberg. Real and Abstract Analysis, Berlin, Springer, 1969.
7. P.K. Jain and V.P. Gupta, Lebesgue Measure and Integration, New Age International (P) Limited Published, New Delhi, 1986 Reprint 2000).
8. I.P. Natanson, Theory of Functions of a Real Variable. Vol. I, Frederick Ungar Publishing Co., 1961.
9. H.L. Royden, Real Analysis, Macmillan Pub. Co. Inc. 4th Edition, New York .1962.
10. Richard L. Wheeden and Antoni Zygmund, Measure and Integral: An Introduction to Real Analysis, Marcel Dekker Inc. 1977.
11. J.H. Williamson, Lebesgue Integration, Holt Rinehart and Winston, Inc. New York. 1962.
12. A. Friedman, Foundations of Modern Analysis, Holt, Rinehart and Winston, Inc., New York, 1970.
13. P.R. Halmos, Measure Theory, Van Nostrand, Princeton, 1950.
14. T.G. Hawkins, Lebesgue's Theory, of Integration: Its Origins and Development, Chelsea, New York, 1979.
15. K.R. Parthasarathy, Introduction to Probability and Measure, Macmillan Company of India Ltd., Delhi, 1977.
16. R.G. Bartle, The Elements of Integration, John Wiley & Sons, Inc. New York, 1966.
17. Serge Lang, Analysis I & II, Addison-Wesley Publishing Company, Inc. 1969.
18. Inder K. Rana, An Introduction to Measure and Integration, Narosa Publishing House, Delhi, 1997.
19. Walter Rudin, Real & Complex Analysis, Tata McGraw-Hill Publishing Co. Ltd. New Delhi, 1966.

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CLASS M.Sc.Ist SEMESTER
MATHEMATICS
SESSION 2020-21
PAPER-III

Topology

Maximum Marks: 80

Number of Units : IV

Minimum Marks: 16

Unit-I

Countable and uncountable sets. Infinite sets and the Axiom of Choice. Cardinal numbers and its arithmetic. Schroeder-Bernstein theorem. Cantor's theorem and the continuum hypothesis. Zorn's lemma, well-ordering theorem. Definition and examples of topological spaces. Closed sets. Closure. Dense subsets. Neighbourhoods. Interior, exterior and boundary. Accumulation points and derived sets. Bases and sub-bases. Subspaces and relative topology.

Unit-II

Alternate methods of defining a topology in terms of Kuratowski Closure Operator and Neighbourhood Systems. Continuous functions and homeomorphism. First and Second Countable spaces. Lindelof's theorems. Separable spaces. Second countability and reparability.

Unit-III

Separation axioms; their Characterizations and basic properties. Urysohn's lemma, Tietze extension theorem.

Unit-IV

Compactness. Continuous functions and compact sets. Basic properties of Compactness. Compactness and finite intersection property. Sequentially and countably compact sets. Locacompactness and one point compactification. Stone-Cech compactification. Compactness in metric spaces. Equivalence of compactness, countable compactness and sequential compactness in metric space. Connected spaces. Connectedness on the real line. Components. Locally connected spaces.

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Recommended Books:

1. Topology By James R.Munkres
2. Topology By K.D.Joshi

References

1. James R.Munkres, Topology, A First Course, Prentice Hall of India Pvt. Ltd., New Delhi, 2000.
2. J. Dugundji, Topology, Allyn and Bacon, 1966 (reprinted in India by Prentice Hall of India Pvt. Ltd.).
3. George F.Simmons, Introduction to Topology and modern Analysis, McGraw-Hill Book Company, 1963.
4. K.D.Joshi, Introduction to General Topology, Wiley Eastern Ltd., 1983.
5. J.Hocking and G Young, Topology, Addison-Wiley Reading, 1961.
6. J.L. Kelley, General Topology, Van Nostrand, Reinhold Co., New York, 1995.
7. L. Steen and J. Seebach, Counter examples in Topology, Holt, Rinehart and Winston, New York, 1970.
8. W.Thron, Topologically Structures, Holt, Rinehart and Winston, New York, 1966.
9. N.Bourbaki, General Topology Part I (Transl.), Addison Wesley, Reading, 1966.
10. R. Engelking, General Topology, Polish Scientific Publishers, Warszawa, 1977.
11. W. J. Pervin, Foundations of General Topology, Academic Press Inc. New York, 1964.
12. E.H.Spanier, Algebraic Topology, McGraw-Hill, New York, 1966.
13. S. Willard, General Topology, Addison-Wesley, Reading, 1970.
14. Crump W.Baker, Introduction to Topology, Wm C. Brown Publisher, 1991.
15. Sze-Tsen Hu, Elements of General Topology, Holden-Day, Inc. 1965.
16. D. Bushaw, Elements of General Topology, John Wiley & Sons, New York, 1963.
17. M.J. Mansfield, Introduction to Topology, D.VanNostrand Co. Inc. Princeton, N.J., 1963.
18. B. Mendelson, Introduction to Topology, Allyn & Bacon, Inc., Boston, 1962.
19. C. Berge, Topological Spaces, Macmillan Company, New York, 1963.
20. S.S. Coirns, Introductory Topology, Ronald Press, New York, 1961.
21. Z.P. Mamuzic, Introduction to General Topology, P. Noordhoff Ltd., Groningen, 1963.
22. K.K.Jha, Advanced General Topology, Nav Bharat Prakashan, Delhi

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DEPARTMENT OF MATHEMATICS
CLASS M.Sc.Ist SEMESTER
MATHEMATICS
SESSION 2020-21
PAPER-IV

Complex Analysis (I)

Maximum Marks: 80

Number of Units : IV

Minimum Marks: 16

Unit-I

Complex integration, Cauchy-Goursat. Theorem. Cauchy's integral formula. Higher order derivatives. Morera's Theorem. Cauchy's inequality and Liouville's theorem. The fundamental theorem of algebra. Taylor's theorem. Laurent's series. Isolated singularities. Meromorphic functions.

Unit-II

Maximum modulus principle. Schwarz lemma. The argument principle. Rouché's theorem Inverse function theorem. Residues. Cauchy's residue theorem. Evaluation of integrals. Branches of many valued functions with special reference to $\arg z$, $\log z$ and z^a .

Unit-III

Bilinear transformations, their properties and classifications. Definitions and examples of Conformal mappings.

Unit-IV

Spaces of analytic functions. Hurwitz's theorem. Montel's theorem Riemann mapping theorem.

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Recommended Books

1. L.V. Ahlfors, Complex Analysis, McGraw - Hill, 1979.
2. D. Sarason, Complex Function Theory, Hindustan Book Agency, Delhi, 1994.
3. J.B. Conway, Functions of one Complex variable, Springer-Verlag, International student-Edition, Narosa Publishing House, 1980.

References

1. H.A. Priestly, Introduction to Complex Analysis, Clarendon Press, Oxford 1990.
2. Liang-shin Hahn & Bernard Epstein, Classical Complex Analysis, Jones and Bartlett Publishers International, London, 1996.
3. S. Lang, Complex Analysis, Addison Wesley, 1977.
4. Mark J. Ablowitz and A.S. Fokas, Complex Variables: Introduction and Applications, Cambridge University press, South Asian Edition, 1998.
5. E. Hille, Analytic Function Theory (2 Vols.) Gonn & Co., 1959.
6. W.H.J. Fuchs, Topics in the Theory of Functions of one Complex Variable, D. Van Nostrand Co., 1967.
7. C. Carathéodory, Theory of Functions (2 Vols.) Chelsea Publishing Company, 1964.
8. M. Heins, Complex Function Theory, Academic Press, 1968.
9. Walter Rudin, Real and Complex Analysis, McGraw-Hill Book Co., 1966.
10. S. Saks and A. Zygmund, Analytic Functions, Monografic Matematyczne, 1952.
11. E.C. Titchmarsh, The Theory of Functions, Oxford University Press, London.
12. W.A. Veech, A Second Course in Complex Analysis, W.A. Benjamin, 1967.
13. S. Ponnusamy, Foundations of Complex Analysis, Narosa Publishing House, 1997.

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CLASS M.Sc.Ist SEMESTER
MATHEMATICS
SESSION 2020-21
PAPER-V

Advanced Discrete Mathematics (I)

Maximum Marks: 80

Number of Units : IV

Minimum Marks: 16

Unit-I

Formal Logic-Statements. Symbolic Representation and Tautologies. Quantifiers, Predicates and Validity. Propositional Logic. Lattices-Lattices as partially ordered sets. Their properties. Lattices as Algebraic Systems. Sublattices, Direct products, and Homomorphisms. Some Special Lattices e.g., Complete, Complemented and Distributive Lattices. Boolean Algebras- Boolean Algebras as Lattices. Various Boolean Identities. The Switching Algebra example. Subalgebras

Unit-II

Semigroups & Monoids-Definitions and Examples of Semigroups and monoids (including those pertaining to concatenation operation). Homomorphism of semigroups and monoids. Congruence relation and Quotient Semigroups. Subsemigroup and submonoids. Direct Products. Basic Homomorphism Theorem.

Unit-III

Direct Products and Homomorphisms. Join-Irreducible elements, Atoms and Minterms. Boolean Forms and Their Equivalence. Minterm Boolean Forms, Sum of Products Canonical Forms. Minimization of Boolean Functions. Applications of Boolean Algebra to Switching Theory (using AND, OR & NOT gates). The Karnaugh Map Method.

Unit-IV

Grammars and Languages-Phrase-Structure Grammars. Rewriting Rules. Derivations. Sentential Forms. Language generated by a Grammar. Regular, Context-Free, and Context Sensitive Grammars and Languages. Regular sets, Regular Expressions and the Pumping Lemma. Kleene's Theorem. Notions of Syntax Analysis, Polish Notations. Conversion of Infix Expressions to Polish Notations. The Reverse Polish Notation.

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Recommended Books:

1. Elements of Discrete Mathematics By C.L.Liu
2. J.P. Tremblay & R. Manohar, Discrete Mathematical Structures with Applications to Computer Science, McGraw-Hill Book Co., 1997.

References

1. J.L. Gersting, Mathematical Structures for Computer Science, (3rd edition), Computer Science Press, New York.
2. Seymour Lipschutz, Finite Mathematics (International) edition 1983), McGraw-Hill Book Company, New York.
3. S.Wiitala, Discrete Mathematics-A Unified Approach, McGraw-Hill Book Co.
4. J.E. Hopcroft and J.D Ullman, Introduction to Automata Theory, Languages & Computation, Narosa Publishing House.
5. C.L Liu, Elements of Discrete Mathematics, McGraw-Hill Book Co.
6. N. Deo. Graph Theory with Application to Engineering and Computer Sciences. Prentice Hall of India

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FACULTY OF MATHEMATICS

**SYLLABUS
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IInd SEMESTER**

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M.Sc. MATHEMATICS

IInd SEMESTER

Theory

No.	Title	Marks						Credit Point	Total
		Theory		Test		Seminar			
		Max.	Min.	Max.	Min.	Max.	Min.		
Paper-I	Advanced Abstract Algebra (II)	80	16	10	2	10	2	5	100
Paper-II	Real Analysis (II)	80	16	10	2	10	2	5	100
Paper-III	General and Algebraic Topology	80	16	10	2	10	2	5	100
Paper-IV	Complex Analysis (II)	80	16	10	2	10	2	5	100
Paper-V	Advanced Discrete Mathematics(II)	80	16	10	2	10	2	5	100

APPROVED BY THE BOARD OF STUDIES ON

NAME	IN THE CAPACITY OF	SIGNATURE
Dr. MADHU SHRIVASTAVA	CHAIRMAN	
Dr. B.S. THAKUR	SUBJECT EXPERT (University Nominee)	
Dr. AMITABH BANERJEE	SUBJECT EXPERT (Principal Nominee)	
Mrs. RASHMI SENGUPTA	MEMBER OF THE DEPARTMENT	
Mrs. KIRAN DEWANGAN	MEMBER OF THE DEPARTMENT	
Ku. SANDHYA SAHU	EX-STUDENT	

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DEPARTMENT OF MATHEMATICS
CLASS M.Sc.IInd SEMESTER
MATHEMATICS
SESSION 2020-21
PAPER-I

Advanced Abstract Algebra (II)

Maximum Marks: 80

Number of Units : IV

Minimum Marks: 16

Unit-I

Modules - Cyclic modules. Simple modules. Semi-simple modules. Schuler's Lemma. Free modules. Noetherian and artinian modules and rings-Hilbert basis theorem. Wedderburn-Artin theorem. Uniform modules, primary modules, and Noether-Lasker theorem.

Unit-II

Linear Transformations - Algebra of linear transformation, characteristic roots, matrices and linear transformations.

Unit-III

Canonical Forms - Similarity of linear transformations. Invariant subspaces. Reduction to triangular forms. Nilpotent transformations. Index of nilpotency. Invariants of a nilpotent transformation. The primary decomposition theorem. Jordan blocks and Jordan forms.

Unit-IV

Smith normal form over a principal ideal domain and rank. Fundamental structure theorem for finitely generated modules over a Principal ideal domain and its applications to finitely generated abelian groups. Rational canonical form. Generalized Jordan form over any field.

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Books Recommended:

1. P.B.Bhattacharya, S.K.Jain, S.R.Nagpaul : Basic Abstract Algebra, Cambridge University press
2. I.N.Herstein : Topics in Algebra, Wiley Eastern Ltd.
3. QuaziZameeruddin and SurjeetSingh : Modern Algebra

References

1. M.Artin, Algebra, Prentice -Hall of India, 1991.
2. P.M. Cohn, Algebra,Vols. I,II&III, John Wiley & Sons, 1982,1989,1991.
3. N.Jacobson, Basic Algebra, Vols. I & II,W.H. Freeman, 1980 (also published by Hindustan Publishing Company).
4. S.Lang, Algebra, 3rd edition, Addison-Wesley, 1993.
5. I.S. Luther and I.B.S. Passi, Algebra, Vol. I-Groups, Vol.II-Rings, Narosa Publishing House (Vol.I-1996,Vol. II-1999)
6. D.S.Malik, J.N.Mordeson, and M.K.Sen, Fundamentals of Abstract Algebra, Mc Graw-Hill, International Edition,1997.
7. K.B. Datta, Matrix and Linear Algebra, Prentice Hall of India Pvt. Ltd., New Delhi,2000.
8. S.K.jain,A. Gunawardena and P.B Bhattacharya, Basic Linear Algebra with MATLAB, Key College Publishing (Springer-Verlag),2001.
9. S.Kumaresan, Linear Algebra, A Geometric Approach, Prentice-Hall of India, 2000.
10. VivekSahai and VikasBist, Algebra, Narosa Publishing House, 1999.
11. I. Stewart, Galois theory, 2nd edition, Chapman and Hall, 1989.
12. J.P. Escofier, Galois theory, GTM Vol.204, Springer, 2001.
13. T.Y. Lam, lectures on Modules and Rings, GTM Vol. 189, Springer-Verlag,1999.
14. D.S. Passman, A Course in Ring Theory, Wadsworth and Brooks/Cole Advanced Books and Softwares, Pacific groves. California, 1991.
15. Fraleigh , A first course in Algebra Algebra, Narosa,1982.

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DEPARTMENT OF MATHEMATICS

CLASS M.Sc.IInd SEMESTER

MATHEMATICS

SESSION 2020-21

PAPER-II

Real Analysis (II)

Maximum Marks: 80

Number of Units : IV

Minimum Marks: 16

Unit-I

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

Unit-II

Lebesgue outer measure. Measurable sets. Regularity. Measurable functions. Borel and Lebesgue measurability. Non-measurable sets. Integration of Non-negative functions. The General integral. Integration of Series.

Unit-III

Measures and outer measures, Extension of a measure. Uniqueness of Extension. Completion of a measure. Measure spaces. Integration with respect to a measure. Riemann and Lebesgue Integrals.

Unit-IV

The Four derivatives. Lebesgue Differentiation Theorem. Differentiation and Integration. Functions of Bounded variation. The L^p -spaces. Convex functions. Jensen's inequality. Holder and Minkowski inequalities. Completeness of L^p , Convergence in Measure, Almost uniform convergence.

Recommended Books:

Signature of Chairman

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1. Principle of Mathematical Analysis by W. Rudin
2. Real Analysis by H. L. Roydon

References

1. Walter Rudin, Principles of Mathematical Analysis (3rd edition) McGraw-Hill, Kogakusha, 1976, International student edition.
2. T.M. Apostol, Mathematical Analysis, Narosa Publishing House, New Delhi, 1985.
3. Gabriel Klambauer, Mathematical Analysis, Marcel Dekkar, Inc. New York, 1975.
4. A.J. White, Real Analysis; an introduction, Addison-Wesley Publishing Co., Inc., 1968.
5. G.de Barra, Measure Theory and Integration, Wiley Eastern Limited, 1981.
6. E. Hewitt and K. Stromberg, Real and Abstract Analysis, Berlin, Springer, 1969.
7. P.K. Jain and V.P. Gupta, Lebesgue Measure and Integration, New Age International (P) Limited Published, New Delhi, 1986 Reprint 2000).
8. I.P. Natanson, Theory of Functions of a Real Variable. Vol. I, Frederick Ungar Publishing Co., 1961.
9. H.L. Royden, Real Analysis, Macmillan Pub.Co.Inc. 4th Edition, New York .1962.
10. Richard L. Wheeden and Antoni Zygmund, Measure and Integral: An Introduction to Real Analysis, Marcel Dekker Inc. 1977.
11. J.H. Williamson, Lebesgue Integration, Holt Rinehart and Winston, Inc. New York. 1962.
12. A. Friedman, Foundations of Modern Analysis, Holt, Rinehart and Winston, Inc., New York, 1970.
13. P.R. Halmos, Measure Theory, Van Nostrand, Princeton, 1950.
14. T.G. Hawkins, Lebesgue's Theory, of Integration: Its Origins and Development, Chelsea, New York, 1979.
15. K.R. Parthasarathy, Introduction to Probability and Measure, Macmillan Company of India Ltd., Delhi, 1977.
16. R.G. Bartle, The Elements of Integration, John Wiley & Sons, Inc. New York, 1966.
17. Serge Lang, Analysis I & II, Addison-Wesley Publishing Company, Inc. 1969.
18. Inder K. Rana, An Introduction to Measure and Integration, Narosa Publishing House, Delhi, 1997.
19. Walter Rudin, Real & Complex Analysis, Tata McGraw-Hill Publishing Co.Ltd. New Delhi, 1966.

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DEPARTMENT OF MATHEMATICS

CLASS M.Sc.IInd SEMESTER

MATHEMATICS

SESSION 2020-21

PAPER-III

General and Algebraic Topology

Maximum Marks: 80

Number of Units : IV

Minimum Marks: 16

Unit-I

Tychonoff product topology in terms of standard sub-base and its characterizations. Projection maps. Separation axioms. Product spaces. Connectedness and product spaces. Compactness and product spaces (Tychonoff's theorem). Countability and product spaces.

Unit-II

Embedding and metrization. Embedding lemma and Tychonoff embedding. The Urysohn metrization theorem. Metrization theorems and Paracompactness-Local finiteness. The Nagata-Smirnov metrization theorem. Paracompactness. The Smirnov metrization theorem.

Unit-III

Nets and filter. Topology and convergence of nets. Hausdorffness and nets. Compactness and nets. Filters and their convergence. Canonical way of converting nets to filters and vice-versa. Ultra-filters and Compactness.

Unit-IV

The fundamental group and covering spaces-Homotopy of paths. The fundamental group. Covering spaces. The fundamental group of the circle and the fundamental theorem of algebra

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Recommended Books:

1. James R.Munkres, Topology, A First Course, Prentice Hall of India Pvt. Ltd., New Delhi, 2000.
2. K.D.Joshi, Introduction to General Topology, Wiley Eastern Ltd., 1983.

References

1. J. Dugundji, Topology, Allyn and Bacon, 1966 (reprinted in India by Prentice Hall of India Pvt. Ltd.).
2. George F.Simmons, Introduction to Topology and modern Analysis, McGraw-Hill Book Company, 1963.
3. J.Hocking and G Young, Topology, Addison-Wiley Reading, 1961.
4. J.L. Kelley, General Topology, Van Nostrand, Reinhold Co., New York, 1995.
5. L. Steen and J. Seebach, Counter examples in Topology, Holt, Rinehart and Winston, New York, 1970.
6. W.Thron, Topologically Structures, Holt, Rinehart and Winston, New York, 1966.
7. N. Bourbaki, General Topology Part I (Transl.), Addison Wesley, Reading, 1966.
8. R. Engelking, General Topology, Polish Scientific Publishers, Warszawa, 1977.
9. W. J. Pervin, Foundations of General Topology, Academic Press Inc. New York, 1964.
10. E.H.Spanier, Algebraic Topology, McGraw-Hill, New York, 1966.
11. S. Willard, General Topology, Addison-Wesley, Reading, 1970.
12. Crump W.Baker, Introduction to Topology, Wm C. Brown Publisher, 1991.
13. Sze-Tsen Hu, Elements of General Topology, Holden-Day, Inc. 1965.
14. D. Bushaw, Elements of General Topology, John Wiley & Sons, New York, 1963.
15. M.J. Mansfield, Introduction to Topology, D.VanNostrand Co. Inc. Princeton, N.J., 1963.
16. B. Mendelson, Introduction to Topology, Allyn & Bacon, Inc., Boston, 1962.
17. C. Berge, Topological Spaces, Macmillan Company, New York, 1963.
18. S.S. Coirns, Introductory Topology, Ronald Press, New York, 1961.
19. Z.P. Mamuzic, Introduction to General Topology, P. Noordhoff Ltd., Groningen, 1963.
20. K.K.Jha, Advanced General Topology, NavBharat Prakashan, Delhi.

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DEPARTMENT OF MATHEMATICS
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MATHEMATICS
SESSION 2020-21
PAPER-IV

Advanced Complex Analysis (II)

Maximum Marks: 80

Number of Units : IV

Minimum Marks: 16

Unit-I

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

Unit-II

Analytic Continuation. Uniqueness of direct analytic continuation. Uniqueness of analytic continuation along a curve. Power series method of analytic continuation Schwarz Reflection Principle. Monodromy theorem and its consequences.

Unit-III

Harmonic functions on a disk. Harnack's inequality and theorem. Dirichlet Problem. Green's function. Canonical products. Jensen's formula. Poisson-Jensen formula. Hadamard's three circles theorem.

Unit-IV

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".

Recommended Books:

1. L.V. Ahlfors, Complex Analysis, McGraw - Hill, 1979.
2. D. Sarason, Complex Function Theory, Hindustan Book Agency, Delhi, 1994.

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3. J.B. Conway, Functions of one Complex variable, Springer-Verlag, International student-Edition, Narosa Publishing House, 1980.

References

1. H.A. Priestly, Introduction to Complex Analysis, Clarendon Press, Oxford 1990.
2. Liang-shin Hahn & Bernard Epstein, Classical Complex Analysis, Jones and Bartlett Publishers International, London, 1996.
3. S. Lang, Complex Analysis, Addison Wesley, 1977.
4. Mark J. Ablowitz and A.S. Fokas, Complex Variables: Introduction and Applications, Cambridge University press, South Asian Edition, 1998.
5. E. Hille, Analytic Function Theory (2 Vols.) Gonn & Co., 1959.
6. W.H.J. Fuchs, Topics in the Theory of Functions of one Complex Variable, D. Van Nostrand Co., 1967.
7. C. Carathéodory, Theory of Functions (2 Vols.) Chelsea Publishing Company, 1964.
8. M. Heins, Complex Function Theory, Academic Press, 1968.
9. Walter Rudin, Real and Complex Analysis, McGraw-Hill Book Co., 1966.
10. S. Saks and A. Zygmund, Analytic Functions, Monografic Matematyczne, 1952.
11. E.C. Titchmarsh, The Theory of Functions, Oxford University Press, London.
12. W.A. Veech, A Second Course in Complex Analysis, W.A. Benjamin, 1967.
13. S. Ponnusamy, Foundations of Complex Analysis, Narosa Publishing House, 1997.

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DEPARTMENT OF MATHEMATICS

CLASS M.Sc.IInd SEMESTER

MATHEMATICS

SESSION 2020-21

PAPER-V

Advanced Discrete Mathematics (II)

Maximum Marks: 80

Number of Units : IV

Minimum Marks: 16

Unit-I

Graph Theory-Definition of (Undirected) Graphs, Paths, Circuits, Cycles, & Subgraphs. Induced Subgraphs .Degree of a vertex .Connectivity. Planar Graphs and their properties. Trees. Euler's Formula for connected planar Graphs. Complete & Complete Bipartite Graphs. Kuratowski's Theorem (statement only) and its use.

Unit-II

Spanning Trees, Cut-sets, Fundamental Cut -sets, and Cycle. Minimal Spanning Trees and Kruskal's Algorithm. Matrix Representations of Graphs. Euler's Theorem on the Existence of Eulerian Paths and Circuits.

Unit-III

Directed Graphs. In degree and Out degree of a Vertex. Weighted undirected Graphs. Dijkstra's Algorithm..strong Connectivity & Warshall's Algorithm. Directed Trees. Search Trees. Tree Traversals.

Unit-IV

Introductory Computability Theory-Finite State Machines and their Transition Table Diagrams. Equivalence of finite State Machines. Reduced Machines. Homomorphism. Finite Automata. Acceptors. Non-deterministic Finite Automata and equivalence of its power to that of Deterministic Finite Automata. Moore and mealy Machines. Turing Machine and Partial Recursive Functions.

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Recommended Books:

1. Elements of Discrete Mathematics By C.L.Liu
2. Graph Theory and its application By N.Deo
3. Theory of Computer Science By K.L.P.Mishra and N.Chandrashek

References:

1. J.P. Tremblay & R. Manohar, Discrete Mathematical Structures with Applications to Computer Science, McGraw-Hill Book Co., 1997.
2. J.L. Gersting, Mathematical Structures for Computer Science, (3rd edition), Computer Science Press, New York.
3. Seymour Lipschutz, Finite Mathematics (International) edition 1983), McGraw-Hill Book Company, New York.
4. S.Wiitala, Discrete Mathematics-A Unified Approach, McGraw-Hill Book Co.
5. J.E. Hopcroft and J.D Ullman, Introduction to Automata Theory, Languages & Computation, Narosa Publishing House.
6. C.L Liu, Elements of Discrete Mathematics, McGraw-Hill Book Co.
7. N. Deo. Graph Theory with Application to Engineering and Computer Sciences. Prentice Hall of India.

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RAIPUR CHHATTISGARH

FACULTY OF MATHEMATICS

SYLLABUS

OF

M.Sc. MATHEMATICS

2020-21

IIIrd SEMESTER

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M.Sc. MATHEMATICS
IIIrd SEMESTER
Theory

Part A

No.	Title	Marks						Credit Point	Total
		Theory		Test		Seminar			
		Max	Min	Max	Min	Max	Min		
Paper-I	Integration theory and Functional Analysis(I)	80	16	10	2	10	2	5	100
Paper-II	Partial Differential Equations and Mechanics (I)	80	16	10	2	10	2	5	100
Optional Paper									
Paper-III(A)	Fundamentals of Computer Science	70	14	--	--	--	--	3	70
Paper-III(B)	Fuzzy Sets and their applications(I)	80	16	10	2	10	2	5	100
Paper-IV	Operations Research (I)	80	16	10	2	10	2	5	100
Paper-V	Programming in C (with ANSI features) (I)	70	14	--	--	--	--	3	70

Practical

Part B

	Name of The Practical	Marks		Credit Point
		Max.	Min.	
Practical-I	Object Oriented Programming and Data Structure	30	6	2
Practical-II	Programming in C	30	6	2

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Dr. MADHU SHRIVASTAVA	CHAIRMAN	
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Dr. AMITABH BANERJEE	SUBJECT EXPERT (Principal Nominee)	
Mrs. RASHMI SENGUPTA	MEMBER OF THE DEPARTMENT	
Mrs. KIRAN DEWANGAN	MEMBER OF THE DEPARTMENT	
Ku. SANDHYA SAHU	EX-STUDENT	

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DEPARTMENT OF MATHEMATICS

CLASS M.Sc.IIIrd SEMESTER

MATHEMATICS

SESSION 2020-21

PAPER -I

Integration Theory and Functional Analysis (I)

Maximum Marks: 80

Number of Units : IV

Minimum Marks: 16

Unit-I

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

Unit-II

Lebesgue-Stieltjes integral, product measures, Fubini's theorem. 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. Integration of continuous functions with compact support, Riesz-Markoff theorem.

Functional Analysis:

Unit-III

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.

Unit-IV

Weak convergence and bounded linear transformations, normed linear spaces of bounded linear transformations, dual spaces with examples.

Books Recommended :

1. P.R. Halmos, Measure Theory, Van Nostrand, Princeton, 1950.

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2. B.Choudhary and S.Nanda, Functional Analysis with Applications. Wiley Eastern Ltd. 1989.
3. H.L. Royden, Real Analysis, Macmillan Publishing Co. Inc., New York, 4th Edition, 1993.

References

1. S.K. Berberian, Measure and integration, Chelsea Publishing Company, New York, 1965.
2. G. de Barra, Measure Theory and Integration, Wiley Eastern Limited, 1981.
3. P.K. Jain and V.P. Gupta, Lebesgue Measure and Integration, New Age International (P) Limited, New Delhi, 2000.
4. Richard L. Wheeden and Antoni Zygmund, Measure and Integral : An Introduction to Real Analysis, Marcel Dekker Inc. 1977.
5. J.H. Williamson, Lebesgue Integration, Holt Rinehart and Winston, Inc. New York. 1962.
6. T.G. Hawkins, Lebesgue's Theory of Integration: Its Origins and Development, Chelsea, New York, 1979.
7. K.R. Parthasarathy, Introduction to Probability and Measure, Macmillan Company of India Ltd., Delhi, 1977.
8. R.G. Bartle, The Elements of Integration, John Wiley & Sons, Inc. New York, 1966.
9. Serge Lang, Analysis I & II, Addison-Wesley Publishing Company, Inc. 1967.
10. Inder K. Rana, An Introduction to Measure and Integration, Narosa Publishing House, Delhi, 1997.
11. Walter Rudin, Real & Complex Analysis, Tata McGraw-Hill Publishing.
12. Edwin Hewitt and Karl Stromberg, Real and Abstract Analysis, Springer-Verlag, New York.
13. Edwin Hewitt and Kenneth A. Ross, Abstract Harmonic Analysis, Vol. 1, Springer-Verlag, 1993.
14. G. Bachman and L. Narici, Functional Analysis, Academic Press, 1966.
15. N. Dunford and J.T. Schwartz, Linear Operators, Part I, Interscience, New York, 1958.
16. R.E. Edwards, Functional Analysis, Holt Rinehart and Winston, New York, 1965.
17. C. Goffman and G. Pedrick, First Course in Functional Analysis, Prentice Hall of India, New Delhi, 1987.
18. P.K. Jain, O.P. Ahuja and Khalil Ahmad, Functional Analysis, New Age International (P) Ltd. & Wiley Eastern Ltd., New Delhi, 1997.
19. R.B. Holmes, Geometric Functional Analysis and its Applications, Springer-Verlag, 1975.

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20. K.K. Jha, Functional Analysis, Students' Friends, 1986.
21. L.V. Kantorovich and G.P. Akilov, Functional Analysis, Pergamon Press, 1982.
22. E. Kreyszig, Introductory Functional Analysis with Applications, John Wiley & Sons, New York, 1978.
23. B.K. Lahiri, Elements of Functional Analysis, The World Press Pvt. Ltd., Calcutta, 1994.
24. A.H. Siddiqui, Functional Analysis with Applications, Tata McGraw-Hill Publishing Company Ltd. New Delhi
25. B.V. Limaye, Functional Analysis, Wiley Eastern Ltd.
26. L.A. Lustenik and V.J. Sobolev, Elements of Functional Analysis, Hindustan Publishing Corporation, New Delhi, 1971.
27. G.F. Simmons, Introduction to Topology and Modern Analysis, McGraw-Hill Book Company, New York, 1963.
28. A.E. Taylor, Introduction to Functional Analysis, John Wiley and Sons, New York, 1958.
29. K. Yosida, Functional Analysis, 3rd edition Springer-Verlag, New York, 1971.
30. J.B. Conway, A Course in Functional Analysis, Springer-Verlag, New York, 1990.
31. Walter Rudin, Functional Analysis, Tata McGraw-Hill Publishing Company Ltd., New Delhi, 1973.
32. A. Wilansky, Functional Analysis, Blaisdell Publishing Co., 1964.
33. J. Tinsley Oden & Leszek F. Dernkowicz, Applied Functional Analysis, CRC Press Inc., 1996.

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DEPARTMENT OF MATHEMATICS
CLASS M.Sc.IIIrd SEMESTER

MATHEMATICS
SESSION 2020-21

PAPER -II

Partial Differential Equations and Mechanics (I)

Maximum Marks: 80

Number of Units : IV

Minimum Marks: 16

Unit-I

Partial Differential Equations:

Examples of PDE. Classification. Transport Equation-Initial value Problem. Non-homogeneous Equation. Laplace's Equation-Fundamental Solution, Mean Value Formulas, Properties of Harmonic Functions, Green's Function, Energy Methods. Heat Equation-Fundamental Solution, Mean Value Formula, Properties of Solutions, Energy Methods. Wave Equation-Solution by Spherical Means, Non-homogeneous Equations, Energy Methods.

Unit-II

Analytical Dynamics:

Generalized coordinates. Holonomic and Non-holonomic systems. Scleronomic and Rheonomic systems. Generalized potential. Lagrange's equations of first kind. Lagrange's equations of second kind. Uniqueness of solution. Energy equation for conservative fields. Hamilton's variables. Donkin's theorem. Hamilton canonical equations. Cyclic coordinates. Routh's equations.

Unit-III

Poisson's Bracket. Poisson's Identity. Jacobi-Poisson Theorem. 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) 'n' dependent functions, (ii) higher order derivatives. Conditional extremum under geometric constraints and under integral constraints.

Unit-IV

Gravitation:

Attraction and potential of rod, disc, spherical shells and sphere. Surface integral of normal attraction (application & Gauss' theorem). Laplace and Poisson equations. Work done by selfattracting systems. Distributions for a given potential. Equipotential surfaces. Surface and solid harmonics. Surface density in terms of surface harmonics.

Books Recommended :

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1. L.C. Evans, Partial Differential Equations, Graduate Studies in Mathematics, Volume 19, AMS, 1998.
2. F. Gantmacher, Lectures in Analytic Mechanics, MIR Publishers, Moscow, 1975.
3. R.C.Mondal, Classical Mechanics, Prentice Hall of India
4. S.L. Loney, An Elementary Treatise on Statics, Kalyani Publishers, New Delhi, 1979.

References

1. Books on Partial differential equation by I.N. Sneddon, F. John, P. Prasad and R. Ravindran, Amarnath etc.
2. A.S. Ramsey, Dynamics Part II, The English Language Book Society and Cambridge University Press, 1972.
3. H. Goldstein, Classical Mechanics (2nd edition), Narosa Publishing House, New Delhi.
4. I.M. Gelfand and S.V. Fomin, Calculus of Variations, Prentice Hall.
5. Narayan Chandra Rana & Pramod Sharad Chandra Joag, Classical Mechanics, Tata McGraw Hill, 1991.
6. Louis N. Hand and Janet D. Finch, Analytical Mechanics, Cambridge University Press, 1998.
7. A.S. Ramsey, Newtonian Gravitation, The English Language Book Society and the Cambridge University Press.

DEPARTMENT OF MATHEMATICS CLASS M.Sc.IIIrd SEMESTER

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MATHEMATICS
SESSION 2020-21
OPTIONAL PAPER-III (A)
Fundamentals of Computer Science-Theory and Practical
(Object Oriented Programming and Data Structure)

Maximum Marks: 70

Number of Units : IV

Minimum Marks: 14

Unit-I

Object Oriented Programming-Classes and Scope, nested classes, pointer class members; Class initialization, assignment and destruction.

Unit-II

Overloaded functions and operators; Templates including class templates; class inheritance and virtual functions.

Unit-III

Data Structures-Analysis of algorithms, q, W, O, o, w notations ; Sequential and linked representations, Lists, Stacks, and queues;

Unit-IV

Trees: Binary tree- search tree implementation, B-tree (concept only);
Sorting: Insertion sort, shell sort, quick-sort, heap sort and their analysis; Hashing-open and closed.

Books Recommended :

1. S.B. Lipman, J. Lajoi: C++ Primer, Addison Wesley.
2. B. Stroustrup; The C++ Programming Language, Addison Wesley.
3. C.J. Date : Introduction to Database Systems, Addison Wesley.
4. C. Ritchie: Operating Systems-Incorporating UNIX and Windows, BPB Publications.
5. M.A. Weiss, Data Structures and Algorithm Analysis in C++, Addison Wesley.

DEPARTMENT OF MATHEMATICS
CLASS M.Sc.IIIrd SEMESTER
MATHEMATICS

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SESSION 2020-21
OPTIONAL PAPER-III (B)
FUZZY SETS AND ITS APPLICATIONS (I)

Maximum Marks: 80

Number of Units : V

Minimum Marks: 16

UNIT-I

Fuzzy sets-Basic definitions, α -level sets. Convex fuzzy sets. Basic operations on fuzzy sets. Types of fuzzy sets. Cartesian products, Algebraic products. Bounded sum and difference, t-norms and tconorms.

UNIT-II

The Extension Principle- The Zadeh's extension principle. Image and inverse image of fuzzy sets. Fuzzy numbers. Elements of fuzzy arithmetic.

UNIT-III

Fuzzy Relations on Fuzzy sets, Composition of Fuzzy relations. Min-Max composition and its properties.

UNIT-IV

Fuzzy equivalence relations. Fuzzy compatibility relations. Fuzzy relation equations. Fuzzy graphs, Similarity relation.

UNIT-V

Possibility Theory-Fuzzy measures. Evidence theory. Necessity measure. Possibility measure. Possibility distribution. Possibility theory and fuzzy sets. Possibility theory versus probability theory.

REFERENCES :

1. H.J. Zmmemann, Fuzzy set theory and its Applications, Allied Publishers Ltd. New Delhi, 1991.
2. G.J. Klir and B. Yuan- Fuzzy sets and fuzzy logic, Prentice-Hall ol India, New Delhi, 1995.

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MATHEMATICS
SESSION 2020-21

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PAPER -IV
Operations Research (I)

Maximum Marks: 80
Minimum Marks: 16

Number of Units : IV

Unit-I

Operations Research and its Scope. Necessity of Operations Research in Industry. Linear Programming-Simplex Method. Theory of the Simplex Method. Duality and Sensitivity Analysis.

Unit-II

Other Algorithms for Linear Programming-Dual Simplex Method. Parametric Linear Programming. Upper Bound Technique. Interior Point Algorithm. Linear Goal Programming.

Unit-III

Transportation and Assignment Problems.

Unit-IV

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.

Books Recommended :

1. F.S. Hillier and G.J. Ueberman. Introduction to Operations ResBareft (Sixth Edition), McGraw Hill International Edition, Industrial Engineering Series, 1995. (This book comes with a CD containing tutorial software).

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2. G. Hadley, Linear Programming, Narosa Publishing House, 1995.
3. G. Hadly, Nonlinear and Dynamic Programming, Addison-Wesley, Reading Mass.
4. H.A. Taha, Operations Research -An introduction, Macmillan Publishing Co., Inc., New York.
5. Kanti Swarup, P.K. Gupta and Man Mohan, Operations Research, Sultan Chand & Sons, New Delhi
6. Mokhtar S. Bazaraa, John J. Jarvis and Hanif D. Sherali, Linear Programming and Network flows, John Wiley & Sons, New York, 1990.
1. Ltd., New Delhi.
2. Prem Kumar Gupta and D.S. Hira, Operations Research-An Introduction. S. Chandi & Company Ltd., New Delhi.
3. N.S. Kambo, Mathematical Programming Techniques, Affiliated East-West Press Pvt. Ltd., New Delhi, Madras
4. R.K. Rathy, An Introduction to Fluid Dynamics, Oxford and IBH Publishing Company, New Delhi, 1976.
5. A.D. Young, Boundary Layers, AIAA Education Series, Washington DC, 1989.
6. S.W. Yuan, Foundations of Fluid Mechanics, Prentice Hall of India Private Limited, New Delhi, 1976.
7. UNDO Systems Products (Visit website <http://www.Hndo.com/productsf.html>)
 - (i) UNDO (the linear programming solver)
 - (ii) UNDO Callable Library (the premier optimisation engine)
 - (iii) LINGO (the linear, non-linear, and integer programming solver with mathematical modelling language)
 - (i) What's Best I (the spreadsheet add-in that solves linear, non-linear, and integer problems).

All the above four products are bundled into one package to form the Solver Suite. For more details about any of the four products one has to click on its name.

- (i) Optimisation Modelling with UNDO (8" edition) by Linus Schrage.
- (ii) Optimisation Modelling with LINGO by Unus Schrage.

More details available on the Related Books page York, 1979.

DEPARTMENT OF MATHEMATICS
CLASS M.Sc.IIIrd SEMESTER
MATHEMATICS

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SESSION 2020-21

PAPER -V

Programming in C (with ANSI features) Theory and Practical

Maximum Marks: 70

Number of Units : IV

Minimum Marks: 14

Unit-I

An overview of programming. Programming language, Classification. Essentials-program Development. Functions. Anatomy of a C Function. Variables and Constants. Expressions. Assignment Statements. Formatting Source Files. Continuation Character. The Preprocessor.

Unit-II

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.

Unit-III

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

Unit-IV

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

Books Recommended :

1. Peter A. Darnell and Philip E. Margolis, C: A Software Engineering Approach, Narosa Publishing House (Springer International Student Edition) 1993.
2. Samuel P. Harkison and Gly L. Steele Jr., C : A Reference Manual, 2nd Edition, Prentice Hall, 1984.
3. Brian W. Kernighan & Dennis M. Ritchie, The C Programme Language, 2nd Edition (ANSI Features), Prentice Hall 1989

DEPARTMENT OF MATHEMATICS

CLASS M.Sc.IIIrd SEMESTER

SESSION 2020-21

PRACTICAL-I

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Signature of Member (Subject)

Object Oriented Programming and Data Structure

Maximum Marks: 30

Minimum Marks: 06

Distribution of Marks

Sessional	-	05
Practical	-	20
Viva	-	05

List of Practicals:

C++ program

1. Write a Program to reverse the digit of number and compare them and also find the sum of digits of number.
2. Write a Program using inline function to find multiplication and division of any two numbers.
3. Write a Program to create class BOOK having data members book_no , book_title , price and member functions to read the details of book ,total cost of books and function purchase to ask the user to input the number of copies to be purchased.
4. Write a Program to create class COMPLEX having member function to store and show real and imaginary part of number and also show addition of two complex numbers.
5. Write a Program to calculate area of circle, rectangle, triangle using function overloading concept.
6. Write a Program to change the sign and increase the value by one of given number using operator overloading concept.
7. Write a Program for implementation of copy constructor.
8. Create a class circle with data member radius; provide member function to calculate area. Derive a class sphere from class circle; provide member function to calculate volume.
9. Write a Program to create class student with data member roll_no; provide member function to get and put roll_no. Derive a class test provide member functions to read and show the marks of two subjects. Again Derive a class result from class test to display the result of student including the total marks obtained by student.
10. Write a Program that illustrate use of virtual function.
11. Write a Program to find biggest number among three numbers using pointer and function.
12. Write a Program using function Template to swap different type of numbers.

Data Structure Programs

1. Write a Program to insert an element and replace an element by new element at desired position in an array.

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2. Write a Program to search the required element in an array.
3. Write a Program to find the largest element from an array.
4. Write a Program to perform Bubble Sorting in an array.
5. Write a Program to perform Insertion Sorting in an array.
6. Write a Program to perform Quick Sort in an array.
7. Write a Program to push and pop element on Stack.
8. Write a Program to insert and show element from Queue.
9. Write a program to perform Heap Sort in an array.
10. Write a Program to search the required element in Binary Tree

DEPARTMENT OF MATHEMATICS
CLASS M.Sc.IIIrd SEMESTER
SESSION 2020-21
PRACTICAL-II
Programming in C

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Distribution of Marks

Sessional	- 05
Practical	- 20
Viva	- 05

List of Practicals:**INPUT/OUTPUT & OPERATORS /EXPRESSIONS**

1. WAP to apply all arithmetic symbols.
2. WAP to find simple interest.
3. WAP to calculate the sum and average of five numbers.
4. Write a program to swap the two numbers
 - a) using third variable b) without using third variable
5. WAP to convert Fahrenheit into centigrade and vice versa.
6. Write a Program to calculate area and perimeter of a circle
7. WAP compute surface ,area and volume of a cube.
8. Write a program to enter any two numbers and display greater number using ternary operator.

BRANCHING

9. Write a program to check the given number is even or odd.
 - a) using ternary operator. b) using only if statements.
 - c) using if else statements. d) using goto statements.
10. Write a program to enter any three numbers and display greater number.
 - a) using ternary operator. b) using if statements. c) using if else statements.
11. Write a program to check the given year is leap or not.
12. WAP to calculate the power of an integer.
13. WAP to calculate sum of natural numbers.
14. Write a program to check the number is perfect or not.
15. Write a program to check the square is perfect or not.
16. Write a program to calculate electricity bill using switch case.
17. Write a program of roots of a Quadratic Equation.

LOOPING

18. Print the following
 - a) 2,4,6,8,.....n. (the even series)
 - b) 1,3,5,7.....n. (the odd series)
 - c) 2,1,4,3,6,.....n,n-1.
 - d) Write a program to display Fibonacci series.
19. WAP to display a *table* of any number.
20. Write a program to check the number is Armstrong or not using for loop.
21. Write a program to calculate the sum of all digits of given number.
22. Write a program to find factorial of any number
 - a) using for loop b) using while loop c) using do-while loop
23. Write a Program to find out the *prime numbers* between 1 to 100.
24. Write a program to generate the following pattern:
 - a) * * * b.) * c) 1

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*

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* * *

1 2
1 2 3

ARRAYS

25. WAP to print 1D array elements.
26. WAP to sum of a 1D array elements.
27. Write a program to find out the greatest and smallest element in 1-D array.
28. WAP to print 2D array elements.
29. WAP to find the sum all 2D array (matrix) elements.
30. Write a program to create the addition of two matrixes.
31. Write a program to display a diagonal matrix.
32. Write a program to multiply the two matrices.
33. Write a program to find out the greatest and smallest element in 2-D array.

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**GOVT. D.B. GIRLS' P.G. (AUTONOMOUS) COLLEGE
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FACULTY OF MATHEMATICS

**SYLLABUS
OF
M.Sc. MATHEMATICS
2020-21
IVth SEMESTER**

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M.Sc. MATHEMATICS
IVth SEMESTER
Theory

Part A

No.	Title	Marks						Credit Point	Total
		Theory		Test		Seminar			
		Max	Min	Max	Min.	Max	Min.		
Paper-I	Functional Analysis (II)	80	16	10	2	10	2	5	100
Paper-II	Partial Differential Equations and Mechanics (II)	80	16	10	2	10	2	5	100
Optional Paper									
Paper-III(A)	Operating System and Database Management System	70	14	--	--	--	--	3	70
Paper-III(B)	Fuzzy Sets and their applications(II)	80	16	10	2	10	2	5	100
Paper-IV	Operations Research (II)	80	16	10	2	10	2	5	100
Paper-V	Programming in C (with ANSI features) (II)	70	14	--	--	--	--	3	70

Practical

Part B

	Name of The Practical	Marks		Credit Point
		Max.	Min.	
Practical-I	Data Base Management System	30	6	2
Practical-II	Programming in C	30	6	2

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Dr. B.S. THAKUR	SUBJECT EXPERT (University Nominee)	
Dr. AMITABH BANERJEE	SUBJECT EXPERT (Principal Nominee)	
Mrs. RASHMI SENGUPTA	MEMBER OF THE DEPARTMENT	
Mrs. KIRAN DEWANGAN	MEMBER OF THE DEPARTMENT	
Ku. SANDHYA SAHU	EX-STUDENT	

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DEPARTMENT OF MATHEMATICS
CLASS- M.Sc.IVth SEMESTER
MATHEMATICS
SESSION 2020-21

PAPER -I
Functional Analysis (II)

Maximum Marks: 80

Number of Units : IV

Minimum Marks: 16

Unit-I

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. The closed Range Theorem.

Unit-II

Inner product spaces. Hilbert spaces. Orthonormal Sets. Bessel's inequality. Complete orthonormal sets and Parseval's identity.

Unit-III

Structure of Hilbert spaces. Projection theorem. Riesz representation theorem. Adjoint of an operator on a Hilbert space. Reflexivity of Hilbert spaces.

Unit-IV

Self-adjoint operators, Positive, projection, normal and unitary operators. Abstract variational boundary-value problem. The generalized Lax-Milgram theorem.

Books Recommended :

1. B.Choudhary and S.Nanda, Functional Analysis with Applications. Wiley Eastern Ltd. 1989.
2. H.L. Royden, Real Analysis, Macmillan Publishing Co. Inc., New York, 4th Edition, 1993.

References

1. Serge Lang, Analysis I & II, Addison-Wesley Publishing Company, Inc. 1967.
2. Walter Rudin, Real & Complex Analysis, Tata McGraw-Hill Publishing.
3. Edwin Hewitt and Karl Stromberg, Real and Abstract Analysis, Springer-Verlag, New York.
4. Edwin Hewitt and Kenneth A. Ross, Abstract Harmonic Analysis, Vol. 1, Springer-Verlag, 1993.

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6. N. Dunford and J.T. Schwartz, Linear Operators, Part I, Interscience, New York, 1958.
7. R.E. Edwards, Functional Analysis, Holt Rinehart and Winston, New York, 1965.
8. C. Goffman and G. Pedrick, First Course in Functional Analysis, Prentice Hall of India, New Delhi, 1987.
9. P.K. Jain, O.P. Ahuja and Khalil Ahmad, Functional Analysis, New Age International (P) Ltd. & Wiley Eastern Ltd., New Delhi, 1997.
10. R.B. Holmes, Geometric Functional Analysis and its Applications, Springer-Verlag, 1975.
11. K.K. Jha, Functional Analysis, Students' Friends, 1986.
12. L.V. Kantorovich and G.P. Akilov, Functional Analysis, Pergamon Press, 1982.
13. E. Kreyszig, Introductory Functional Analysis with Applications, John Wiley & Sons, New York, 1978.
14. B.K. Lahiri, Elements of Functional Analysis, The World Press Pvt. Ltd., Calcutta, 1994.
15. A.H. Siddiqui, Functional Analysis with Applications, Tata McGraw-Hill Publishing Company Ltd. New Delhi
16. B.V. Limaye, Functional Analysis, Wiley Eastern Ltd.
17. L.A. Lustenik and V.J. Sobolev, Elements of Functional Analysis, Hindustan Publishing Corporation, New Delhi, 1971.
18. G.F. Simmons, Introduction to Topology and Modern Analysis, McGraw-Hill Book Company, New York, 1963.
19. A.E. Taylor, Introduction to Functional Analysis, John Wiley and Sons, New York, 1958.
20. K. Yosida, Functional Analysis, 3rd edition Springer-Verlag, New York, 1971.
21. J.B. Conway, A Course in Functional Analysis, Springer-Verlag, New York, 1990.
22. Walter Rudin, Functional Analysis, Tata McGraw-Hill Publishing Company Ltd., New Delhi, 1973.
23. A. Wilansky, Functional Analysis, Blaisdell Publishing Co., 1964.
24. J. Tinsley Oden & Leszek F. Dernkowicz, Applied Functional Analysis, CRC Press Inc., 1996.

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DEPARTMENT OF MATHEMATICS
CLASS- M.Sc.IVth SEMESTER
MATHEMATICS
SESSION 2020-21
PAPER -II

Partial Differential Equations and Mechanics (II)

Maximum Marks: 80

Number of Units : IV

Minimum Marks: 16

Partial Differential Equations

Unit-I

Nonlinear First Order PDE-Complete Integrals, Envelopes, Characteristics, HamiltonJacobi Equations (Calculus of Variations, Hamilton's ODE, Legendre Transform, Hopf-Lax Formula, Weak Solutions, Uniqueness), Conservation Laws (Shocks, Entropy condition, LaxOleinik formula, Weak Solutions, Uniqueness, Riemann's Problem, Long Time Behaviour)

Unit-II

Representation of Solutions-Separation of Variables, Similarity Solutions (Plane and Travelling Waves, Solitons, Similarity under Scaling), Fourier and Laplace Transform, Hopf-Cole Transform, Hodograph and Legendre Transforms, Potential Functions. Asymptotics (Singular Perturbations, Laplace's Method, Geometric Optics, Stationary Phase, Homogenization), Power Series (Non-characteristic Surfaces, Real Analytic Functions, Cauchy-Kovalevskaya Theorem)

Analytical Dynamics:

Unit-III

Hamilton's Principle. Principle of least action. Poincare Cartan Integral invariant. Whittaker's equations. Jacobi's equations. Lee Hwa Chung's theorem, canonical transformations and properties of generating functions.

Unit-IV

Hamilton-Jacobi equation. Jacobi theorem. Method of separation of variables. Lagrange Brackets. Condition of canonical character of a transformation in terms of Lagrange brackets and Poisson brackets, invariance of Lagrange brackets and Poisson brackets under canonical transformations.

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Books Recommended :

1. L.C. Evans, Partial Differential Equations, Graduate Studies in Mathematics, Volume 19, AMS, 1998.
2. F. Gantmacher, Lectures in Analytic Mechanics, MIR Publishers, Moscow, 1975.
3. R.C.Mondal, Classical Mechanics, Prentice Hall of India

References

1. Books on Partial differential equation by I.N. Sneddon, F. John, P. Prasad and R. Ravindran, Amarnath etc.
2. A.S. Ramsey, Dynamics Part II, The English Language Book Society and Cambridge University Press, 1972.
3. H. Goldstein, Classical Mechanics (2nd edition), Narosa Publishing House, New Delhi.
4. I.M. Gelfand and S.V. Fomin, Calculus of Variations, Prentice Hall.
5. Narayan Chandra Rana & Pramod Sharad Chandra Joag, Classical Mechanics, Tata McGraw Hill, 1991.
6. Louis N. Hand and Janet D. Finch, Analytical Mechanics, Cambridge University Press, 1998.

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DEPARTMENT OF MATHEMATICS
CLASS- M.Sc.IVth SEMESTER
MATHEMATICS
SESSION 2020-21
OPTIONAL PAPER-III (A)

Operating System and Database Management System

Maximum Marks: 70

Number of Units : IV

Minimum Marks: 14

Unit-I

Database Systems-Role of database systems, database system architecture and data modeling.Introduction to relational algebra and relational calculus.

Unit-II

Introduction to SQL: Basic features including views; Integrity constraints; Database design-normalization up to BCNF.

Unit-III

Operating Systems- Overview of operating system, user interface, processor management, memory management.

Unit-IV

I/O management, concurrency and Security, network and distributed systems.

Books Recommended:

1. S.B. Lipman, J. Lajoi: C++ Primer, Addison Wesley.
2. B. Stroustrup; The C++ Programming Language, Addison Wesley.
3. C.J. Date : Introduction to Database Systems, Addison Wesley.
4. C. Ritchie: Operating Systems-Incorporating UNIX and Windows, BPB Publications.
5. M.A. Weiss, Data Structures and Algorithm Analysis in C++, Addison Wesley.

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DEPARTMENT OF MATHEMATICS
CLASS- M.Sc.IVth SEMESTER
MATHEMATICS
SESSION 2020-21
OPTIONAL PAPER-III (B)
FUZZY SETS AND ITS APPLICATIONS (II)

Maximum Marks: 80

Number of Units : V

Minimum Marks: 16

Unit-I

Fuzzy Logic-An overview of classical logic, Multivalued logics, Fuzzy propositions. Fuzzy quantifiers. Linguistic variables and hedges. Inference from conditional fuzzy propositions, the compositional rule of inference.

Unit-II

Approximate Reasoning-An overview of Fuzzy expert system. Fuzzy implications and their selection. Multiconditional approximate reasoning. The role of fuzzy relation equation.

Unit-III

An introduction to Fuzzy Control-Fuzzy controllers. Fuzzy rule base. Fuzzy inference engine. Fuzzification.

Unit-IV

Defuzzification and the various defuzzification methods (the centre of area, the centre of maxima, and the mean of maxima methods).

Unit-V

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

REFERENCES :

51. H.J. Zmmemann, Fuzzy set theory and its Applications, Allied Publishers Ltd. New Delhi, 1991.
52. G.J. Klir and B. Yuan- Fuzzy sets and fuzzy logic, Prentice-Hall ol India, New Delhi, 1995.

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DEPARTMENT OF MATHEMATICS
CLASS- M.Sc.IVth SEMESTER
MATHEMATICS
SESSION 2020-21
PAPER -IV
Operations Research (II)

Maximum Marks: 80
Minimum Marks: 16

Number of Units : IV

Unit-I

Dynamic Programming-Deterministic and Probabilistic Dynamic programming.

Unit-II

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

Unit-III

Integer Programming-Branch and Bound Technique.

Unit-IV

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

Books Recommended :

1. F.S. Hillier and G.J. Ueberman. Introduction to Operations ResBareft (Sixth Edition), McGraw Hill International Edition, Industrial Engineering Series, 1995. (This book comes with a CD containing tutorial software).
2. G. Hadley, Linear Programming, Narosa Publishing House, 1995.
3. G. Hadly, Nonlinear and Dynamic Programming, Addison-Wesley, Reading Mass.
4. H.A. Taha, Operations Research -An introduction, Macmillan Publishing Co., Inc., New Yark.
5. Kanti Swarup, P.K. Gupta and Man Mohan, Operations Research, Sultan Chand & Sons, New Delhi

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6. Mokhtar S. Bazaraa, John J. Jarvis and Hanif D. Sherali, Linear Programming and Network flows, John Wiley I' & Sons, New York, 1990.

References

1. S.S. Rao, Optimization Theory and Applications, Wiley Eastern Ltd., New Delhi.
2. Prem Kumar Gupta and D.S. Hira, Operations Research-An Introduction. S. Cliand & Company Ltd., New Delhi.
3. N.S. Kambo, Mathematical Programming Techniques, Affiliated East-West Press Pvt. Ltd., New Delhi, Madras
4. R.K. Rathy, An Introduction to Fluid Dynamics, Oxford and IBH Publishing Company, New Delhi, 1976.
5. A.D. Young, Boundary Layers, AIAA Education Series, Washington DC, 1989.
6. S.W. Yuan, Foundations of Fluid Mechanics, Prentice Hall of India Private Limited, New Delhi, 1976.
7. UNDOSystems Products (Visit websHe <http://www.Hndo.com/productsf.html>)
 - (i) UNDO (the linear programming solver)
 - (ii) UNDO Callable Library (the premier optimisation engine)
 - (iii) LINGO (the linear, non-linear, and integer programming solver with mathematical modelling language)
 - (i) What's Best I (the spreadssheet add-in that solves linear, non-linear, and integer problems).

All the above four products are bundled into one package to form the Solver Suite. For more details about any of the four products one has to click on its name.

- (i) Optimisation Modelling with UNDO (8" edition) by Linus Schrage.
- (ii) Optimisation Modelling with LINGO by Unus Schrage.

More details available on the Related Boo~s page York, 1979.

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DEPARTMENT OF MATHEMATICS
CLASS- M.Sc.IVth SEMESTER
MATHEMATICS
SESSION 2020-21
PAPER-V

Programming in C (with ANSI features) (II)

Maximum Marks: 70

Number of Units : IV

Minimum Marks: 14

Unit-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.

Unit-II

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.

Unit-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.

Unit-IV

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.

Books Recommended :

1. Peter A. Darnell and Philip E. Margolis, C: A Software Engineering Approach, Narosa Publishing House (Springer International Student Edition) 1993.
2. Samuel P. Harkison and Gly L. Steele Jr., C : A Reference Manual, 2nd Edition, Prentice Hall, 1984.
3. Brian W. Kernighan & Dennis M. Ritchie, The C Programme Language, 2nd Edition (ANSI Features), Prentice Hall 1989.

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DEPARTMENT OF MATHEMATICS
CLASS M.Sc.IVth SEMESTER
MATHEMATICS
SESSION 2020-21
PRACTICAL-I

Data Base Management System

Maximum Marks: 30

Minimum Marks: 06

Distribution of Marks

Sessional	-	05
Practical	-	20
Viva	-	05

List of Practicals:

- 1) Retrieve the list of the ename and job of all the employee.
- 2) Display the names of employees working as clerks, salesman or analyst and drawing a salary more than 3000.
- 3) Display the list of employee number and names that get commission.
- 4) Display the list of employee number and names that not get commission.
- 5) Display the list of employee name whose name starts with 'A'.
- 6) Display the list of employee name where name ends with 'S'.
- 7) Display all information about employee where the second character of employee name is either 'L' or 'M'.
- 8) Display the name of employee where salary is greater than 900 and less than 1200.
- 9) Display all information of employee table where the salary is between 900 and 1500.
- 10) To trim the ename, salary where salary is less than average salary.
- 11) Display ename where Job is clerk and department no is 20.
- 12) Display department numbers and total salary for each department.
- 13) Display department numbers with more than three employees in each department.
- 14) Display the name of employees who earn highest salary in their respective departments. or Display the name of person who is getting the maximum salary (using nested queries).
- 15) Display the employee names who are working in accounting dept.
- 16) Display the common jobs from department number 10 and 20.
- 17) Display the names of employees working in sales department.

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- 18) Display those employees whose salary is greater than his manager's salary.
- 19) Display those employees who one working in same department where his manager is working.
- 20) Display those employees who one not working under any manager.
- 21) Write a Query to apply Aggregate function on Employee table (min, max, sum, avg, count).
- 22) Write a Query to apply Numerical function (Lower, mod, power).
- 23) Write a Query to apply modify, add, update and drop function.
- 24) Create view V1 from emp table which consists of ename, job, salary and comm.
- 25) Create the view of 3 different columns taken from two different table.

Table (Creation)

Q1. Create table worker which should have following fields & constraint

Wcode	primary key
Wname	
Wsal	default 1500
Wcomm	check<200

Q2. Create table client_master.

Client_no	varchar(7)
Name	varchar(20)
City	varchar(30)
Pincode	number(8)
State	varchar(15)
Bal_due	number(10,2)

Q3. Create table product-master.

Product_no	varchar(7)
Description	varchar(10)
Profit_percent	number(4,2)
Qty_on_hand	number(10)
Reorder	number(8)
Sell_price	number(8,2)
Cost_price	number(8,2)

Q4. Create table salesman_master

Salesman_no	varchar(6)
Name	varchar(20)
City	varchar(20)

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Pincode	number(10)
State	varchar(20)
sal_amt	number(8,2)
tgt_to_get	number(8,2)

Queries (Retrival)

- Q1. Retrieve the entity constant of the client master table.
- Q2. Retrieve the list of the name and cities of the entire client.
- Q3. List of various products available from the product_master table.
- Q4. List all the clients who are located in Bombay.
- Q5. Find the total salary of all salesman.
- Q6. Find the names of salesman who have salary greater than 3000.
- Q7. Find the names of the client who do not have zero balance.
- Q8. Find the names of all clients where name starts with 'P'.

Queries (Updation)

- Q1. Change the city of client-no 'c0002' to 'chennai'.
- Q2. Change the bal_due of client_no 'c0001' to Rs. 1000.
- Q3. Change the cost_price of 'floppies' to Rs. 950.
- Q4. Change the city of salesman to Mumbai.
- Q5. Change the qty_on_hand of 'CD drive' to 100.

Queries (Alter)

- Q1. Add the column called 'comm' of data type number and size=5 to sales master table.
- Q2. Change the size of sell_price to (10,2) from product_master.
- Q3. Modify the 'bal_due' as it can not have null value from client_master table.
- Q4. Alter table emp by adding column named 'mob_no' then insert values in it.

PL/SQL

- Q1. Addition of two numbers.
- Q2. Write a program to receive two numbers and perform addition, subtraction, multiplication, division.
- Q3. Write a program to check year is leap year or not where year is entered by user.

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Q4. Write a program to check the given number is even or odd.

Q5. Write a program to display following pattern.

a. * * * * *	b. *
* * * *	* *
* * *	* * *
* *	* *
*	*

Q6. Write a program for exception handling.

Q7. Write a program to illustrate working of trigger.

Q8. Write a program to find the factorial of any no.

Q9. Write a program to display the table of any one no.

Q10. Write a program to create function that take percent and display corresponding division.

Q11. Write a program using Stored Function which shows the grade of student.

Q12. Create a trigger so that data can be inserted only in business hour.

Q13. Write a PL/SQL code to print the 10 number and also insert into table called Num Demo.

Q14. Write a program for predefined exception.(ZERO_DIVIDE)

Q15. Create a trigger to modify one table to another.

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DEPARTMENT OF MATHEMATICS
CLASS M.Sc.IVth SEMESTER
MATHEMATICS
SESSION 2020-21
PRACTICAL-II
Programming in C

Maximum Marks: 30

Minimum Marks: 06

Distribution of Marks

Sessional	-	05
Practical	-	20
Viva	-	05

List of Practicals:

Array

- 1 Write a program to print the one dimensional array.
- 2 Write a program to print the two dimensional array.
- 3 Write a program to find the sum all matrix elements.
- 4 Write a program to add the two matrices.
- 5 Write a program to multiply the two matrices.
- 6 Write a program to arrange an array increasing or decreasing order by bubble sort.
- 7 Write a program to arrange an array increasing or decreasing order by insertion sort.

String

- 8 Write a program in c to input two strings consisting of maximum 80 characters.
examine both the strings and remove all the common characters from both these strings.
display the resultant strings
- 9 Write a program to find the number of vowels in any string.
- 10 Write a program to copy one string to another without using string library function.
- 11 Write a program to check the entered string is palindrome or not.

Pointer

- 13 Write a program in C to find smallest in any array of n elements using pointers.
- 14 Write a program to illustrate the use of pointer in arithmetic operations.
- 15 Write a program using pointers to compute the sum of all elements stored in an array.

Function

- 16 Write a program in c to find the factorial of a number using the function without return type.
- 17 Write a program to find the greatest value through function with return type.
- 18 Write a program to calculate standard deviation of an array of values using functions.
- 19 Write a program in c to find the factorial of a number using recursion.
- 20 Write a program to generate Fibonacci series by recursive function.
- 21 Write a program to swap (interchange) the value using call by value and call by references .

Preprocessor

- 22 Write a macro to find the gcd(greatest common divisor) of two integers .

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How does a macro differ from a function? Illustrate the same for the gcd macro.

23 Write a program to calculate a area of circle using macro.

Structure

24 Write a program to illustrate the comparison of structure variables.

25 Write a program to create a linear link list and printout the list and the total number of items in the list.

26 Write a program to accept of 5 countries which are playing cricket , number of match played in this year , number of match wins , number of loss, number of draw and print the point with this record.

- 1) 2 point for each win
- 2) -1 point for each loss
- 3) 1 point for each draw.

27 Write C program to create a structure called “student” having following members: rollno, name , marks. Find the student getting maximum marks assuming there are 60 students.

File

28 Write a program which reads data from the key board and write it to a file called My file further display the contents of this file.

29 Write a program to copy one file to another.

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