

SEMESTER-IV**Full Marks 50****PAPER-844****DISCRETE MATHEMATICS – II**

Unit -I: Lattices and Boolean Algebra : Lattices as partially ordered Sets, Boolean Algebra.

Unit –II : Boolean functions, Representation and Minimization of Boolean functions.

Unit – III : Graph Theory : Introduction, Basic concepts

Book prescribed : Discrete Mathematical structures with applications to computer science : J.P.Tremblay & R.Manohar. (Tata MCGraw Hill)
Chapters: 4(4.1, 4.2, 4.3, 4.4), 5(5.1 only)

PAPER-845**Full Marks 50****PRACTICAL**

Practical Record : 10 marks

Viva : 10 marks

Experiment : 30 marks

A student has to perform one experiment from the following list of experiments.

1. Write a program and draw the flow chart for the numerical solution of a nonlinear equation by Aitken's Δ^2 method.
2. Draw a flowchart and write a program for solving a differential equation by 2nd order Range-kutta method.
3. Graphical solution of a production allocation problem.
4. Solution of L.P.P. by simplex method.
5. Solution of a transportation problem
6. Solution of a traveling salesman assignment problem.
7. Variation of the path independence of the integrals of a function inside the domain of Analyticity.
8. Approximation of a Riemann – stieltjes Integral from the truncated Riemann-Stieltjes sum.
9. Solution of Quadratic programming problem by woulfe's method.
10. Program of minimum cost problem.

PAPER-841**Full Marks 50(40+10)****OPERATIONS RESEARCH – II**

Unit I: Transportation problem : L.P. formulation of T.P, Existence of solution , Duality in T.P , The Transportation table, Loops in Transportation Table , Triangular Basis in a T.P, solution of a T.P, Finding an Initial B.F.S, Test of optimality, Degeneracy in T.P. Modi method, stepping stone method, Assignment problem, Mathematical formulation, solution methods of Assignment problem.

Unit II : Non-Linear programming.

Unit III: Non-Linear programming –methods: Introduction, graphical solution , Kuhn –Tucker conditions with non-negative constraints, quadratic programming, wolfe's modified simplex method.

Book prescribed: Operation research (13th edn) : Kanti swarup, P.K.Gupta & Manmohan (Sultan chand & sons)

Chapters : 10(10.1 – 10.10,10.12-10.14),11 (11.1 -11.3),27,28 (28.1 – 28.5)

PAPER-842**Full Marks 50(40+10)****FUNCTIONAL ANALYSIS –II**

Unit –I Uniform Bounded ness principle (Excluding Divergence of Fourier series of continuous functions and Quadrature formula), closed graph and open mapping theorems.

Unit -II : Duals and Transposes, compact linear maps.

Unit – III : Inner product spaces, orthonormal sets.

Book prescribed : Functional analysis (2nd Edn): B.V.Limaye (New Age)

Chapters : III (Art 9 (restricted) , 10) , IV (Art 13), V (Art 17), VI (Art 21,22)

PAPER-843**Full Marks 50(40+10)****POSSIBILITY THEORY**

Unit – I: Fuzzy relations and Fuzzy graphs

Unit – II: Possibility Theory

Unit -III: Fuzzy Logic

Book Prescribed : Fuzzy Sets and their application (UGC Model curriculum)

(Pragati Prakashan) : S.K.Pundir & R.Pundir

Chapter : 4,5,6

SEMESTER-III**PAPER-831****Full Marks 50(40+10)****PROBABILITY THEORY**

Unit I : Probability space, Distribution

Unit II: Convergence of random variables, characteristic functions.

Unit III: Convergence of Distributions.

Book Prescribed: Modern probability Theory : B.R.Bhatt, Chapters: 3(3.1 to 3.6) , 4(4.1 to 4.4) , 6(6.1 to 6.5), 7(7.1 to 7.4) , 8(8.1 to 8.3)

PAPER-832**Full Marks 50(40+10)****FUNCTIONAL ANALYSIS -I**

Unit I : Relation on a set, Linear spaces and linear maps, Metric spaces and continuous functions.

Unit II: Normed spaces, Continuity of linear maps.

Unit III : Hahn-Banach Theorems, Banach spaces

Book prescribed: Functional Analysis (2nd Edition): B.V.Limaye (New Age International (p) Ltd)

Chapters : I (Art 1,2,3), II

PAPER-833**Full Marks 50(40+10)****FUZZY SET THEORY**

Unit I : Fuzzy Set Theory

Unit II: Operations on Fuzzy Sets.

Unit III : Fuzzy numbers and Arithmetic

Book Prescribed: Fuzzy Sets and their applications: (UGC model Curriculum) (Pragati prakashan)

By : S.K Pundir & R.Pundir

Chapter : 1,2,3

PAPER-834**Full Marks 50(40+10)****DISCRETE MATHEMATICS-I**

Unit I : Mathematical logic : Statement and notation, connectives (Except logical capabilities of programming language) , Normal forms.

Unit II : Theory of Inference for the statement calculus, predicate calculus, Inference Theory of the predicate calculus.

Unit III : Set Theory : Representation of Discrete structures, Relations and ordering, Recursive functions, Sets & Predicates.

Book prescribed: Discrete Mathematical structures with Applications to computer science : J.P.Tremblay & R.Manohar (Tata MC Graw – Hill)

Chapter : 1 (1.1 , 1.2 (Except 1.2.5), 1.3, 1.4, 1.5, 1.6) , 2 (2.2, 2.3, 2.6.1)

PAPER-835**Full Marks 50(40+10)****OPERATIONS RESEARCH – I**

Unit I : Linear Programming Problem, Mathematical formulation of the problem, Graphical solution Method, Some exceptional cases, General linear programming problem, canonical and standard forms of L.P.P.

Unit II: Simplex method, Fundamental properties of solutions, The computational procedure, Use of Artificial variables, Solution of simultaneous linear equations.

Unit III: Duality in linear programming, General primal Dual pair, formulating a Dual problem, Primal-Dual pair in matrix form, Duality theorems, complementary slackness theorem, Duality and simplex method, Dual simplex method.

Book Prescribed: Operations Research : Kantiswarup, P.K.Gupta, and Manmohan (13th edition) (Sultan chand & sons)

Chapter : 2,3 (3.1 to 3.5), 4 (4.1 to 4.6), 5(5.1 to 5.7, 5.9)

PAPER-824**TOPOLOGY – II**

Unit I : Complete metric spaces and function spaces

Unit II : Baire spaces and Dimension Theory

Unit III : The fundamental group

Book prescribed: Topology (2nd Edition) : J.R.Munkres (Pearson prentice Hall)

Chapter : 7 (Art 43, 45, 46, 47), 8 (Art 48, 49, 50) , 9 (Art 51, 52, 53, 54)

PAPER-825**Full Marks 50(40+10)****PRACTICAL**

Practical Record : 10 Marks

Viva : 10 Marks

Experiment : 30 Marks

A student has to perform one experiment from the following list of experiments.

1. Finding the approximate solution of a Differential Equation by Picard's method.
2. Solving a pair of equation by Newton – Raphson Method
3. Solving an initial value problem by 2nd and 4th order Runge – kutta method.
4. Solving a non-linear equation numerically by higher order Newton-cotes Rules.
5. Drawing the table and graph of legendre polynomials.
6. Numerical evaluation of definite integrals by 2 and 3 points Gauss-Legendre rules
7. Solving a non-linear equation numerically by Aitken's Δ^2 process
8. Drawing the table $\hat{a}(p,q)$ for p and q in given ranges using asymptotic formula.
9. Numerical Determination of the variation of the function f(x)

= for suitable values of and \hat{a} in a given range.10.Evaluation of the Integral $\int_0^1 \frac{x^{1/3}}{1-x} \log \frac{1}{x} dx$ correct to 5 decimalplaces using the formula $\int_0^1 \frac{x^{1/3}}{1-x} \log \frac{1}{x} dx = 9 \sum_{n=1}^{\infty} \frac{1}{(3n+1)^2}$ **PAPER-821****Full Marks 50(40+10)****COMPLEX ANALYSIS-II**

Unit - I General form of Cauchy's theorems, calculus of residues and Evaluation of Definite integrals, Harmonic functions.

Unit - II series & product Developments, Power series expansions, Partial fractions & factorization, Entire function.

Unit -III Elliptic functions.

Books Prescribed : Complex analysis- By L.V.Ahlfors. (3rd Edn) MC-Graw-Hill)

Chapters : 4 (Subsections : 4,5,6) 5 (Subsection : 1,2,3),7.

PAPER-822**Full Marks 50(40+10)****NUMERICAL ANALYSIS-II**

Unit - I Numerical Intergration : Methods based on undetermined coefficients: Composite Intergration Methods, Romberg Integration, Double Integration.

Unit - II Ordinary differential equations : Initial value problems.

Numerical methods, Single step methods, Multisep methods.

Unit - III Ordinary Differential equations: Boundary value problems Introduction, Initial value problem method (shooting method)

Book Prescribed : Numerical methods for scientific & Enginnering computation (5th Edn) (New Age) : M.K.Jain, S.R.K.Iyenger & R.K.Jain.

Chapter : 5(5.8-5.11), 6(6.3, 6.4, 6.6), 7(7.1, 7.2)

PAPER-823**Full Marks 50(40+10)****ABSTRACTALGEBRA**

Unit - I Group Theory

Unit - II Ring Theory

Unit - III Field

Book prescribed : Topics in Algebra : I.N.Herstein

Chapters : 2(2.8 to 2.12), 3(3.5 to 3.10), 5(5.1 to 5.3)

$$x^\alpha \sin \frac{1}{x^\beta}$$

PAPER- 811
SEMESTER-I
Full Marks 50(40+10)
NUMARICAL ANALYSIS –I

Unit –I: Transcendental and polynomial equation:
 Iteration methods Based on 2nd Degree equation, Rate of convergence of Muller & Chebyshev methods, General iteration method (except first order method), System of non-linear equations, Methods for complex roots, polynomial equations.

Unit –II:- Interpolation and approximation:
 Hermite Interpolation, piecewise and spline interpolation Bivariate interpolation, Approximation, least square approximation, Uniform Approximation, rational Approximation.

Unit –III: Differentiation: Numerical Differentiation, optimum choice of step length, Extrapolation methods, Partial differentiation.

Book Prescribed: Numerical methods for scientific and Engineering Computation (5th Edn) (New Age): M.K.Jain, S.R.K.Iyengar & R.K.Jain.
 Chapter : 2 (2.4,2.5 (only Muller & chebyshev methods) , 2.6 (except 1st order iteration method), 2.7,2.8, 2.9), 4 (4.5-4.11), 5 (5.1-5.5)

PAPER - 812 **Full Marks 50(40+10)**

MEASURE AND INTEGRATION

Unit –I : Lebesgue Measure
 Unit –II : Lebesgue Integral
 Unit –III : Differentiation and Integration.

Book prescribed: Real Analysis (3rd Edn) : H.L.Royden (prentice Hall of India)
 Chapter: 3,4,5

PAPER-813 **Full Marks 50(40+10)**

LINEAR ALGEBRA

Unit – I : Vector Space.

Unit – II : Algebra of linear transformations, Characteristic roots, matrices, Canonical forms (Triangular form, Nilpotent transformations)

Unit – III: Trace and Transpose, Determinant
 Real Quadratic forms.

Book Prescribed: Topics in Algebra : I.N.Herstein (wiley)
 Chapters: 4(excluding 4.4), 6(6.1,6.2,6.3,6.4,6.5,6.8,6.9,6.11)

PAPER-814 **Full Marks 50(40+10)**

COMPLEX ANALYSIS -I

Unit –I : Complex numbers, Conformality, Linear transformations.

Unit –II: Complex functions

Unit –III: Fundamental Theorems, Cauchy's Integral formula, Local properties of Analytic functions

Book prescribed : Complex Analysis (3rd Edn) By: L.V. Ahlfors –(Mc-Graw-Hill)
 Chapter : 1,2,3, (Subsections 2.1, 2.2, 2.3, 3.1, 3.2,3.3,3.4, only) ,4 (subsections 1,2,3 only)

PAPER-815 **Full Marks 50(40+10)**

TOPOLOGY -I

Unit I : Topological spaces and continuous functions.

Unit II : Connectedness and Compactness

Unit III: Countability and Separation axioms; The Tychonoff Theorem.

Book prescribed: Topology (2nd Edition) : J.R.Munkres (Pearson Prentice Hall)
 Chapters : 2 (Art. 12 to 19) , 3 (Art. 23,24,26, 27, 28), 4 (Art 30, 31, 33), 5 (Art 37)



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Admission Batch 2010 and onwards

The P.G Mathematics course shall comprise of four semesters each consisting of 5 (five) papers. Each theory paper carries 50 marks out of which 40 marks are earmarked for Term-End Examination and 10 marks are earmarked for Internal Assessment Examination. There are two practical papers, one in Semester- II and other in Semester IV. Each practical paper carries 50 marks.

THE SYLLABUS STRUCTURE FOLLOWS:

PAPERS:		MARKS:
SEMESTER- I		
PAPER-811	Numerical Analysis –I	50(40+10)
PAPER-812	Measure and Integration	50(40+10)
PAPER-813	Linear Algebra	50(40+10)
PAPER-814	Complex Analysis -I	50(40+10)
PAPER-815	Topology-I	50(40+10)
SEMESTER-II		
PAPER-821	Complex Analysis-II	50(40+10)
PAPER-822	Numerical Analysis –II	50(40+10)
PAPER-823	Abstract Algebra	50(40+10)
PAPER-824	Topology-II	50(40+10)
PAPER-825	Practical	50
SEMESTER-III		
PAPER-831	Probability Theory	50(40+10)
PAPER-832	Functional Analysis -I	50(40+10)
PAPER-833	Fuzzy Set Theory	50(40+10)
PAPER-834	Discrete mathematics –I	50(40+10)
PAPER-835	Operations Research -I	50(40+10)
SEMESTER-IV		
PAPER-841	Operations Research –II	50(40+10)
PAPER-842	Functional Analysis –II	50(40+10)
PAPER-843	Possibility Theory	50(40+10)
PAPER-844	Discrete mathematics – II	50(40+10)
PAPER-845	Practical	50