

पण्डित सुन्दरलाल शर्मा (मुक्त) विश्वविद्यालय छत्तीसगढ़

(छ,ग, भासन के अधिनियम क्रमांक 26 सन् 2004 द्वारा स्थापित)

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पाठ्यक्रम

एम.ए. / एम.एस.सी. गणित

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REGISTRAR

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University Chhattisgarh
BILASPUR (C.G.)

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Incharge NAAC Criteria-
PSSOU, CG Bilaspur

M.A./M.Sc. (Maths)

Final Year

Operation Research

Paper-V

Unit -I

1 – Introduction

The origin and the development of O.R., The Nature and Definition of OR, Objective of OR, Phases of OR Method, Areas of Applications of OR, Scientific Method in OR, Characteristics of Operations Research, Modeling in OR, Types of Models, General Methods of Solution for OR Models

2 – Mathematical Preliminaries

Elementary Probability Theory, Matrices and Determinants, Vectors and Vector Spaces, Simultaneous Linear Equations, Finite Difference, Differentiation of Integrals, Generating Functions

Unit -II

3 – Inventory Theory

Inventory, Variables in an Inventory Problems, Need of Inventory, Classification or Categories of Inventory Models, Deterministic Models, Deterministic Models with Shortage, Multi Item, Deterministic Models with one Constant, Probabilistic Models, Purchase Inventory Models with Price Breaks,

4 – Replacement Problems

Replacement and Replacement Situations, Replacement of Major of Capital Item that Deteriorates with time, To determine the Best Replacement Age of Items whose Maintenance Costs Increase with time and the value of money also change with time, Replacement of Items in Anticipation of Complete Failure the Probability of Which Increase with time, To Determine the interval of Optimum Replacement, Problems in Mortality, Staffing Problem; Mortality Tables,

5 – Allocation (General Linear Programming Problems)

General Linear Programming Problems, Mathematical Formulation of a L.P.P, Basic Solution, Solution of a Linear Programming Problem, Geometrical Method for the solution of a Linear

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Programming Problem, Analytic Method, Slack and Surplus Variables, Application of Linear Programming Techniques, Limitations of Linear Programming

Unit -III

6 – Convex Sets and Their Properties

Some Important Definitions, Some Important Theorems

7 – Simplex Method

Simplex Method, Fundamental Theorem of Linear Programming, To obtain B.F.S. from a F.S., To Determine Improved B.F.S., Unbounded Solutions, Optimality Conditions, Alternative Optimal Solutions, Inconsistency and Redundancy in Constraint Equations, Artificial Variables Technique, Degeneracy in Simplex Method, Solution of System of Simultaneous Linear Equations by Simplex Method, Inverse of a Matrix by Simplex Method

Unit -IV

8 – Transportation Problem

Transportation Problem, Mathematical Formulation of a Transportation Problem, Solution of a Transportation Problem, Optimality Test, Degeneracy in Transportation Problems, Unbalanced Transportation Problems, Profit Maximization Problems

9 – Network Analysis (PERT – CPM)

The Theory of Graphs, Network, CPM/PERT Techniques

Answer of Exercises

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Complex Analysis

Paper-VI

Unit - I

Chapter - 1 Complex Numbers

Complex Numbers, Properties of the Addition of Complex Numbers, Properties of the Multiplication of Complex Numbers, Difference of Two Complex numbers, Division in \mathbb{C} , Modulus of A Complex Number, Conjugate of A Complex Number, Modulus-argument Form or Polar Standard Form or Trigonometric, Form of A Complex Number, The Geometrical Representation of Complex Numbers, The Points on the Argand Plane Representing The sum, Difference, Product And Division of Two Complex Numbers, More Properties of Moduli And Arguments, Theorem: The order Relations Greater Than or Less Than Do Not Apply, To Complex Numbers, Some Important Results About Complex Numbers, Integral And Rational Powers of A Complex Number, Geometrical Applications of Complex Numbers, Complex Equation of A Straight Line In The Complex Plane Projection, Equation of A Circle in The complex Plane, The Spherical Representation of Complex Numbers And Stereo graphic Projection

Unit - II

Chapter - 2 Analytic Functions

Curves in the Argand Plane, Functions of a Complex Variable, Neighborhoods of a Point, Limits And Continuity, Differentiability, Analytic, Holomorphic and Regular Functions, The Necessary and Sufficient Conditions For $f(z)$ To be Analytic, Polar Form of Cauchy-Riemann Equations, Derivative of $w=f(z)$ In Polar Form, Orthogonal System, Harmonic Function, Methods of Constructing a Regular Function (Milne-Thomson's Method), Multiple Valued Functions

Unit - III

Chapter - 3 Complex Integration

Introduction, Definitions, Rectifiable Arcs, Functions of Bounded Variation, Complex Integrals, Evaluation Of Some Integrals, ab-initio (By definition), Reduction Of Complex Integrals To Real Integrals, Some Elementary Properties Of Complex Integrals, An Upper Bound For A Complex Integral, Line Integrals As Functions Of Arcs, Cauchy's Fundamental Theorem, Cauchy Goursat Theorem. (Second proof), Cauchy Goursat Theorem. (Third proof), Cauchy's Integral Formula, Derivative Of An Analytic Function, Higher Order Derivatives Of An Analytic Function, Poisson's Integral Formula For A Circle. Morera's Theorem. Cauchy's Inequality, Indefinite Integrals, Integral Function, Expansion Of Analytic Functions As Power Series : Taylor's and Laurent's series

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Unit - IV

Chapter - 4 Zeros and Singularities of an Analytic Function, Meromorphic Function

Introduction, Definitions, The Zeros of An Analytic Function, Singularities of An Analytic Function, Polynomials and Its Characterizations, Rational Functions and its Characterizations, Theorems on Poles and Other Singularities, Maximum Modulus Principle, Minimum Modulus Principle, The Excess of the Number of Zeros Over the Number of Poles of a Meromorphic Function. The Argument Principle, Rouché's Theorem, Schwarz Lemma, Fundamental Theorem of Algebra

Answer of Objective type Questions

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Mathematical Statistics

Paper_VII

UNIT - I

CHAPTER- 1 Frequency Distributions and Measures of Central Tendency

Classification and Tabulation, Frequency Polygon, Histogram and Ogive, Measures of Central Tendency, Arithmetic Mean, Median, Mode, Geometric Mean, Harmonic Mean, Quartiles and Partition Values

CHAPTER- 2 Measures of Dispersion, Skewness, Moments and Kurtosis

Range, Quartile Deviation, Standard Deviation, Mean Deviation, Coefficient of Variation, Relation between central moments and moments about any arbitrary origin

UNIT - II

CHAPTER- 3 Probability

Definition, Addition theorem of Probability, Multiplication Theory of Probability, Dependent and Independent Events, Probability of at least one event, Binomial and Multinomial theorems, Probability Axiomatic Approach, Conditional Probability, Theorem of Total Probability for Compound Events

UNIT - III

CHAPTER- 4 Method of Least Squares and Curve Fitting

Method of Least Squares, Some Special Curves

CHAPTER- 5 Bivariate Distribution, Correlation and Regression

Scatter or Dot diagram, Karl-Pearson's Coefficient of Correlation, Sterograms and Correlation Surface, Probable Error of Coefficient of Correlation, Spearman's Rank Correlation, Regression, Properties of Regression coefficients, Correlation Ratio

CHAPTER- 6 Multiple and Partial Correlations

Multiple Correlation, Partial Correlation, Multiple Correlation Coefficient, Partial Correlation Coefficient

CHAPTER- 7 Consistence of Data and Association of Attributes

Attributes, Class Frequencies, Consistence of Data, Independence and Association of Attributes

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UNIT – IV

CHAPTER- 8 Finite Differences and Interpolation

E and D Notation, Factorial Notation, Interpolation, Central Differences, Distinguish between Interpolation and Extrapolation, Divided Difference Formula

CHAPTER- 9 Index Numbers

Uses, Construction of Index Numbers, Fixed and Chain Bases, Index Numbers Based on Arithmetic Mean, Fisher's Ideal Index Number, Circular Test

CHAPTER- 10 Analysis of Time Series

Movements, Methods of Determining Trend, Estimation of Seasonal Trend, Utility of Time Series, Link Relative Method

Answer of Multiple Choice Questions

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M.A./M.Sc Final Year
(OOPs and Programming in C++)

खण्ड - I

- अध्याय - 1 C++ का परिचय
अध्याय - 2 C++ वातावरण
अध्याय - 3 C++ प्रोग्राम्स का निर्माण तथा संकलन करना

खण्ड - II

- अध्याय - 4 निर्णयन एवं शाखान्वयन
अध्याय - 5 ऐरेज़ तथा फंक्शन्स

खण्ड - III

- अध्याय - 6 क्लासेज़ तथा ऑब्जेक्ट्स
अध्याय - 7 ऐरे, पॉइन्टर्स, रेफरेन्सेज़ तथा डाइनेमिक ऐलोकेशन ऑपरेटर्स
अध्याय - 8 कन्स्ट्रक्टर्स तथा डिस्ट्रक्टर्स
अध्याय - 9 फंक्शन तथा ऑपरेटर ओवरलोडिंग

खण्ड - IV

- अध्याय - 10 इन्हेरिटेन्स
अध्याय - 11 पॉलीमॉर्फिज़्म
अध्याय - 12 टेम्पलेट और अपवाद हैंडलिंग

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M.A./M.Sc. (Maths)

Previous Year

TOPOLOGY

Paper_I

UNIT - I

Chapter 1 : Elements of set Theory

Sets, Functions and Relations, Real Numbers, Products and Co-products, Finite and Infinite sets, Countable and Uncountable, Well - Ordered sets, Partially Ordered sets, The Maximum Principle and Zorn's lemma.

UNIT - II

Chapter 2 : Metric Space

The real line \mathbb{R} , Metric, Euclidean Spaces, Some Important Inequalities, Bounded and Unbounded Metric Spaces, Some Important Metric Spaces, Spheres (or Balls), Open sets, Closed sets, Neighbourhood, Accumulation points, Adherent points, Closure, Interior, Exterior and Boundary of a set, Dense and Non-dense sets, Sequences and Sub-sequences in a Metric space, Cauchy's Sequence, Complete Metric Space, Completeness and Contracting Mappings, Some Complete Metric Spaces, Completion of a Metric Space

UNIT - III

Chapter 3 : Topological Spaces

Topological Spaces, Order topologies, The Product topology, The subspace topology, Closed sets and limit points, Continuous function, The quotient topology, Metric Topology, Connected spaces, Compact spaces, Locally compact spaces and Alexandroff Compactification

UNIT - IV

Chapter 4 : Normal Spaces 134-148

Countability Axioms, Separation Axioms, Normal spaces, Second countable regular spaces and the Urysohn metrization theorem, Completely regular spaces and the Stone-Čech compactification, Answer of Multiple Choice Questions

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M.A./M.Sc. (Maths)

Previous Year

Real Analysis

Paper_II

Unit-I

Chapter - 1 Real Number System & Real Line

Real Number system, Mathematical induction, The Real line

Chapter - 2 Limit, Continuity and Differentiability

Functions and Limits, Continuity, Differential functions of one variable, L' Hospital's Rule, Taylor's theorem

Unit-II

Chapter - 3 Riemann Integral and Improper Integrals

Definition of the Integral, Existence of the Integral, Properties of the Integral, Improper Integrals, A more advanced look at the Existence of the proper Riemann Integral

Chapter - 4 Sequence and Series

Sequence of real numbers, Real Topics Revisited with sequences, Infinite series of constants, Sequence and series of Functions

Unit-III

Chapter - 5 Structure of R^n and Functions of Several Variables

Structure of R^n , Continuous Real - Valued functions of n variables, Partial Derivatives and the Differential, The chain Rule and Taylor's theorem

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Chapter - 6 Linear Transformations and Matrices

Linear Transformations and Matrices, Continuity and Differentiability of transformations

Unit-IV

Chapter - 7 Multiple Integrals

Definition and Existence of the Multiple Integral, Iterated Integrals and Multiple Integrals, Change of variables in Multiple Integrals, Answer of Multiple Choice Questions

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M.A./M.Sc. (Maths)
Previous Year
Partial Differential
Paper_III

Unit - I

CHAPTER - 1 An Introduction to Partial Differential Equations

Order and Degree; Linear Partial Differential Equation of First Order; Lagrange's Linear Equation; Compatible System of First Order Equations; Lagrange's Auxiliary Equations; Charpit's Method; Jacobi's Method; Monge's Method of the Type $(Rr+Ss+Tt = V)$

Unit - II

CHAPTER-2 Partial Differential Equations of Second Order

Linear Homogeneous Partial Differential Equation with Constant Coefficients; Method of finding P.I. of A Linear Homogeneous Partial Differential Equation; Non-Homogeneous Linear Partial Differential Equation with Constant Coefficients; Method for Finding the C.F. and P.I. of Non-Homogeneous Equations with Constant Coefficients; Equations Reducible to Linear Partial Differential Equation with Constant Coefficient

CHAPTER-3 Elliptic Differential Equations

Product Method : Solutions fo Boundary Value Problems by The Method fo Separation of Variables; Laplace Equation; Harmonic Function; Solution of two Dimensional Laplace Equation : Separation of Variables; Solution of Laplace Equation of Three Dimensional; Solution of Two-dimensional Laplace Equation in Plane Polar Coordinate; Solution of Laplace Equatin in Cylindrical Coordinates; Solution of Laplace Equation in Spherical Coordinates

Unit - III

CHAPTER - 4 Parabolic Differential Equations

One Dimensional Heat Equation; Solution of One Dimensional Heat Equation; Solution of Two Dimensional Heat Equation; Solution of Three Dimensional Heat Equation; Solution of Hat Equation in Cylindrical Coordinates; Solution of Hat Equation in Spherical Coordinates; Uniqueness of the Solution and Maximum-Minimum Principle

CHAPTER - 5 Hyperbolic Differential Equations

Forms of Wave Equation; Derivation of One Dimensional Wave Equation; Derivation of Two Dimensional Wave Equation; Solution of One Dimensional Wave Equation; D'Alembert's Solution of Wave Equation; Solution of Two Dimensional Wave Equation; Forced Vibrations : Solution of Non-Hameogeneous

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Equation; Boundary and Initial Value Problems for Two Dimensional Wave Equation : Method of Eigen Function; Solution of Wave Equation in Polar Coordinates : Vibration of A Circular Membranes; Solution of Wave Equation in Cylindrical Coordinates; Solution of Wave Equation in Spherical Polar Coordinates; Uniqueness of the Solution for the Wave Equation

Unit - IV

CHAPTER - 6 Green, Dirac Delta and Harmonic Function

The Dirac Delta Function; The Sampling Property of the Dirac Delta Function; The Delta Function As a Limit; Properties of the Dirac Delta Function And its Derivatives; Green's Function for Diffusion Equation; Some Important Uniqueness Theorem; Potential Theory; Kelvin Inversion Theorem; Poisson's Integral Formula : Potential Equation for A circle: Green's Function for Dirichlet Problem; The Neumann Problem; Solution of One Dimensional Wave Equation; Solution of Wave Equation by Laplace Transform; Properties of Harmonic Function

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ANSWER OF EXERCISES

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M.A./M.Sc. (Maths)

Previous Year

Discrete Mathematics

Paper_IV

UNIT-I

- Chapter 1* Introduction
- Chapter 2* Mathematical Logic
- Chapter 3* : Conditional Statement/Bi-conditional Statements

UNIT-II

- Chapter 4* Boolean Algebra
- Chapter 5* Predicate Calculus and Quantifier
- Chapter 6* Set Theory

UNIT-III

- Chapter 7* Relation and Functions.
- Chapter 8* : Algebraic Structure
- Chapter 9* Subgroups & Normal Subgroups.
- Chapter 10* : Ring, Field and Integraldomain

UNIT-IV

- Chapter 11* : Linear Spaces (Vector Spaces)
- Chapter 12* : Linear Transformations

Answer of Exercises

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