

DEPARTMENT OF APPLIED MATHEMATICS
GITAM INSTITUTE OF SCIENCE
GANDHI INSTITUTE OF TECHNOLOGY AND MANAGEMENT
(GITAM)

(Declared as Deemed to be University u/s 3 of the UGC Act, 1956)

GRCET-2019

Syllabus

PART-A

Research Methodology : Meaning of Research, Objectives of Research, Motivation in Research, Types of Research, Research Approaches, Significance of Research, Research Methods versus Methodology.

Defining the Research Problem : What is a Research Problem? Selecting the Problem, Necessity of Defining the Problem.

Research Design : Meaning of Research Design, Need for Research Design, Features of a Good Design.

Sampling Design : Census and Sample Survey, Implications of Sample Design, Steps in Sampling Design, Criteria of Selecting a Sampling Procedure.

PART-B

Real Analysis : Finite, countable and uncountable sets, Metric spaces, compact sets, perfect sets, connected sets. Limits of functions, continuous functions, continuous and compactness, continuity and connectedness, discontinuities, monotone functions, infinite limits and limits at infinity. The Continuity of Derivatives, Derivatives of Higher Order-Taylor's Theorem, Differentiation of Vector-valued Functions. Definition and Existence of the Integral-Properties of the Integral-Integration and Differentiation, Integration of Vector-valued Functions

Complex Analysis : Analytic functions and harmonic functions, Cauchy-Riemann equations, sufficient conditions. Contour integration, Cauchy-Goursat theorem antiderivatives, Integral representation for analytic functions, theorems of Morera and Liouville and some applications, uniform convergence of series, Taylor and Laurent series representations, singularities, zeros and poles, Applications of Taylor and Laurent series. Residue theorem, calculus of residues

Differential Equations : Ordinary differential equations, existence and uniqueness of solutions of initial value problems for first order ordinary differential equations, singular solutions of first order ordinary differential equations, Boundary value problems: Green's function, Partial Differential equations : Lagrange and Charpit's methods , Cauchy problem.

Linear Algebra : Vector spaces, subspaces ,quotient spaces ,linear independence and linear dependence, Bases and dimension, kernel, range, isomorphism, Matrix representation of linear transformation, dual spaces Cayley Hamilton theorem, Canonical forms, Inner product spaces.

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Model Questions

Max. Marks : 140

PART-A

Section –I : Consists of **FIFTY** Objective type questions. 50 ×1 = 50 Marks

1. The statement of purpose in a research study should :
 - (a) Identify the design of the study
 - (b) Specify the type of people to be used in the study
 - (c) Identify the intent or objective of the study
 - (d) Describe the study
2. Which of the following would generally require the largest sample size ?
 - (a) Cluster sampling
 - (b) Simple random sampling
 - (c) Systematic sampling
 - (d) Proportional stratified sampling

Section –II : Consists of **TEN** Fill in the Blank questions 10 ×2 = 20 Marks

PART-B

Section –I : Consists of **FIFTY** Objective type questions. 50 ×1 = 50 Marks

1. In the inner product space $V(F)$, the normal of $\alpha \in V$ is
 - (a) non- negative real number
 - (b) positive real number
 - (c) negative real number
 - (d) 0
2. If α, β are two vectors of an inner product space such that $|(\alpha, \beta)| = \|\alpha\| \|\beta\|$ then α, β are
 - (a) L.D.
 - (b) L.I.
 - (c) orthonormal
 - (d) orthogonal

Section –II : Consists of **TEN** Fill in the Blank questions 10 ×2 = 20 Marks