

**DEPARTMENT OF BIOCHEMISTRY AND BIOINFORMATICS**  
**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 a Sample Design, Steps in Sampling Design, Criteria of Selecting a Sampling Procedure.

**PART-B**

**Unit 1:**

Structure, properties, functions and metabolism of carbohydrates, amino acids, proteins, lipids and nucleic Acids Principles of bioenergetics - Entropy, Enthalpy, Free energy, High energy compounds, Electron Transport chain, Substrate level and oxidative phosphorylation. Properties and classification of enzymes, factors affecting enzyme activity, Enzyme inhibition.

**Unit 2:**

Structure of prokaryotic and eukaryotic cells. Structure and functions of plasma membrane, mitochondria, chloroplast, golgi, ER and nucleus. Membrane channels and pumps. Transport mechanisms. Membrane receptors and second messenger systems in signal transduction. Cell cycle and its regulation. Stem cells – types and properties. Replication, Transcription, Translation in prokaryotes and eukaryotes.

**Unit 3:**

Photosynthesis - C<sub>3</sub>, C<sub>4</sub> and CAM plants. Nitrogen fixation. Phytohormones. Principles of tissue culture. Regeneration pathways of plant tissue culture. Isolation and culture of protoplasts. Types of animal cell and organ cultures. Principles of inheritance. Linkage and crossing over. Mutagens and types of mutations. Sex determination, sex linked inheritance.

**Unit4:**

Physiological role and disorders of hypothalamic, adenohipophysial, neurohypophysial, thyroid, parathyroid, renal, pancreatic, adrenal and sex hormones. Innate and Adaptive immunity. Immune cells and organs of immune system. Antigens and Antibodies, Antigen presenting cells. MHC, Humoral and cell-mediated responses. Cytokines, Hypersensitivity and Auto immunity.

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**Model Paper**

**PART-A**

Section- I: Multiple choice questions

50 x 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:

10 x 2 = 20 Marks

**PART-B**

Section- I: Multiple choice questions

50 x 1 = 50 Marks

1. Deficiency of adrenal cortex hormones results in
  - a) Tetany
  - b) Acromegaly
  - c) Addison disease
  - d) Cretinism
  
2. Pattern recognition receptors (PRR) include
  - a) Lectin-like molecules
  - b) Lipoteichoic acid
  - c) LPS
  - d) PAMPs

Section- II: Fill in the blanks

10 x 2 = 20 Marks

1. Synthesis of glucose from amino acids is termed as \_\_\_\_\_.
2. Glycogen is stored in \_\_\_\_\_.
3. Penicillin can cause \_\_\_\_\_ hypersensitivity.