

DEPARTMENT OF ELECTRONICS AND PHYSICS
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

Physics

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
SUBJECT : PHYSICS

Unit-I

Classical, Quantum and Statistical Mechanics

Classical Mechanics

D'Alembert's Principle, Lagrange's equation, Hamilton's equation of motion and conservation theorems. Euler angles, Canonical transformation and Poisson brackets.

Quantum Mechanics

General formalism of wave mechanics Schrödinger's wave equation, Angular momentum operators, Time independent and dependent perturbation theory. Scattering phenomena, differential – cross section and Born approximation.

Statistical Mechanics

Postulates of statistical mechanics, probability calculations and general interaction between systems. Ensemble- its types- probability calculations, mean energies and dispersions of ensembles. Quantum Statistics .Equation of state for Ideal Bose and Fermi gas, Bose -Einstein condensation, Theory of white dwarf stars.

Unit-II

Electrodynamics

Electromotive force-ohm's law, EMF, Motional EMF Electromagnetic induction –Faraday laws, induced electric field, Inductance, Energy in magnetic fields. Maxwell equations-magnetic charge, Maxwell equations in matter, Charge and Energy equation, Pointing theorem Electromagnetic Theory.

Unit-III

Solid State Physics & Nuclear Physics

Crystal structure, Lattice Vibrations -mono and Diatomic, specific heat theories- Einstein and Debye theories. Energy bands in solids- Kronig Penney model, Concept effective mass. Polarizability- theory of electronic, ionic and orientational polarization and Classification of magnetic materials.

Nuclear Physics

General properties of Nuclei, Scattering of α -particles – Experimental verification – Nuclear size – Theories of nuclear composition, – Binding energy – semi empirical mass formula and applications. Interaction of gamma rays with matter – photo electric effect, Compton effect, pair production. Detection of nuclear radiation- ionization chamber and proportional counter. Nuclear Fission and Fusion

Unit-IV

Low dimensional Physics and Electronics

Electromagnetic Spectrum, Molecular energies, Classification of molecules, Rotational, vibrational and vibrational-rotational spectra of diatomic molecules, Characteristic group absorptions, IR spectrometer, Electronic Spectra, Frank Condon principle

Hydrogen atom-spectrum, Orbital angular momentum, Larmor precession, Stern and Gerlach experiment, Energy levels and transitions in Helium atom, Normal and anomalous Zeeman effect

Electronics

Basics of semiconductor; p-n junctions, diodes, transistors, LCR circuits, rectifiers, amplifiers, active Filters and oscillators. Basics of OPAMPs and their applications. Basics of digital electronics.

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Model Paper

PART-A

Section- I: Consists of FIFTY Objective type 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: Consists of TEN two mark questions. 10 x 2 = 20 Marks

PART -B

Section -I

Answer all objective type questions, Each question carries ONE mark. 50 × 1 = 50

- 1) Using Hund's rule the total J for electronic ground state of the N atom is
a) 1/2 b) 3/2 c) 0 d) 1

- 2) Coordination number in FCC unit cell.
a) 6 b) 12 c) 8 d) 14

Section -II

Answer all fill in the blank type questions, Each question carries TWO marks. $10 \times 2 = 20$

- 1) Gauss law in integral form -----
- 2) Lagrangian of charged particle moving in electromagnetic field is -----
- 3) Current amplification factor in CE Configuration $\beta =$ -----

