



MASTERS OF PHILOSOPHY (M. PHIL.)
PHYSICS
DETAILED SYLLABUS
SESSION 2013-14



PAPER I

RESEARCH METHODOLOGY THEORY AND TECHNIQUES

UNIT - I

Research: Definition, Importance and Meaning of research, Characteristics of research, Types of Research, Steps in research, Identification, Selection and formulation of research problem, Research questions – Research design – Formulation of Hypo Dissertation, Review of Literature.

UNIT – II

Sampling techniques: Sampling theory, types of sampling – Steps in sampling – Sampling and Non-sampling error – Sample size – Advantages and limitations of sampling.

Collection of Data: Primary Data – Meaning – Data Collection methods – Secondary data – Meaning – Relevances, limitations and cautions.

UNIT – III

Statistics in Research – Measure of Central tendency, Dispersion, Skewness and Kurtosis in research, Hypo Dissertation, Fundamentals of Hypo Dissertation testing, Standard Error, Point and Interval estimates, Important Non-Parametric tests: Sign, Run, Kruskal, Wallis tests and Mann, Whitney test.

UNIT – IV

Para metric tests: Testing of significance, mean, Proportion, Variance and Correlation, testing for Significance of difference between means, proportions, variances and correlation co-efficient. Chi-square tests, ANOVA, One-way and Two-way.

UNIT– V

Research Report: Types of reports, contents, styles of reporting, Steps in drafting reports, editing the final draft, evaluating the final draft.

Reference Books:

1. Statistical Methods - S.P. Gupta
2. Research Methodology Methods and Techniques - C.R. Kothari
3. Statistics (Theory and Practice) - B.N. Gupta
4. Research Methodology Methods and Statistical Techniques - Santosh Gupta



PAPER-III

ELECTRONICS AND INSTRUMENTATION

UNIT – I

Transducers And Signal Conditioning

Basic Measurement System – Classification of Transducers in instrumentation and control Systems – Selection – Types – Transducers: Strain gauge – variable resistance – capacitive – inductive – potentiometric resistance type – Piezoelectric – LVDT – Thermistors – thermocouple – Pyrometers – Solar Batteries – Accelerometers – Selsyns – Tachogenerators – Differential transformer – microsyn – Servomotors – eddy current clutches – Electronic aided measurement (blockdiagram) – Basic Instrumentation amplifiers and applications – Chopped and modulated dc amplifier – modulators.

UNIT – II

Data Acquisition, Conversion And Transmission

Data acquisition system – Signal conditioning of the inputs – Single Channel data acquisition System – Multichannel DAS. Sensors based computer data system – Data transmission system. Digital modulation – Pulse Code format – modems.

UNIT – III

Electronic Measuring Instruments

Digital multimeters – Digital frequency meter – Digital measurement of time – Digital tachometer – Automation in digital instruments – Digital phase meter – Digital capacitance meter – Microprocessor based instruments – Electrocardiography – ECG amplifiers – electrodes and leads – ECG recorder principles.

UNIT – IV

Electronic Control Instrumentals

Advantage of Electronic control of Devices – DC Motor speed control – Over voltage and overload protection of DC motors – speed control of a single phase and three phase induction motors – Speed control of synchronous motors –

UNIT- V

Temperature Control



Temperature control – Illumination control – Automatic water level indicator using SCR – Battery operated in vector circuit using power transistor.

References:

1. S.K. Bhattacharya, S. Chatterjee, Industrial Electronics and Control, Tata Mc Graw Hill, 1995 (unit I (Transducers), Unit IV).
2. H.S. Kalsi, electronic (Instrumentation, Tata McGraw Hill, 1995)(unit I Signal Conditioning) unit II, Unit III).
3. Leslia Crom Well, Fred J. Weibell, Erich A. Pfeiffer, Biomedical Instrumentation and measurements, Prentice Hall of India, 1997 (Unit III Electrocardiography).

PAPER-IV NUCLEAR PHYSICS

UNIT-I

Nuclear Properties

Survey of some nuclear properties, Nuclear radius, Nuclear masses and abundances, Binding energy, Electric and magnetic moments and nuclear shapes, Nuclear angular momentum and parity, Nuclear spin, Nuclear moments.

UNIT II

Nuclear Forces

Nuclear stability and the forces between nucleons, Deuteron problem, n-p scattering at low energies, Scattering length, Spin dependence of n-p scattering, Effective range in n-p scattering.

UNIT III

Nuclear Models

Liquid drop model, Semi-empirical mass formula, Magic numbers, Shell model, The collective model.

UNIT IV

Nuclear Reactions



Types of nuclear reactions, Reaction cross-section, Conservation laws, Q-values and its significance, Breit-Wigner formula, Compound nucleus, Optical model, Direct reactions.

UNIT V

Radiation Detectors

Interaction of radiation with matter, G.M. counter: Basic principle, working, quenching and mechanism of pulse formation; Gamma Ray Spectrometer: Basic principle and working of NaI(Tl) detector, Pulse formation mechanism, Basic idea of pulse processing unit, Concept of energy resolution and efficiency;

Semiconductor detectors: Basic principle, Construction and working of Si Surface barrier, Lithium drifted and high purity Germanium detectors.

References:

1. Introductory Nuclear Physics - K.S.Krane
2. Nuclear Physics - Roy and Nigam (9th Edition), New Age Int.
3. Nuclear Physics - Irving Kaplan (2nd Edition), Narosa Pub.
4. Introductory Nuclear Physics - K S Krane, John Wiley
5. Nuclear Physics - D C Tayal, Himalaya Publication
6. Radiation Detectors - S S Kapoor

PAPER-IV
DISSERTATION