Hemchandracharya North Gujarat University, Patan

PH.D. COURSE WORK SYLLABUS

SUBJECT : PHYSICS

Scheme & Course

Sr.	Paper	Nomenclature	Credits	Marks
1.	Paper-I-PHYSICS-CW-101	Research Methodology	04	70+30
2.	Paper-II-PHYSICS-CW-102	Plasma Physics and Nonlinear Optics	04	70+30
3.	Paper-III-PHYSICS-CW-103	Computer Applications in the subject	04	70+30
4.	Paper-IV-PHYSICS-CW-104	Review of published research in the relevant field	04	70+30
5.	Paper-V-PHYSICS-CW-105	Comprehensive Viva	04	100

Notes:

1. The candidate has to obtain a minimum of 55% of marks or its equivalent grade points in aggregate in the course work in order to be eligible to continue in the Ph.D. programme.
2. If candidate obtains ·**F**· or ·**Ab.** grade in the course/ subject. He/ she will be treated to have failed in that course. He/ She has to reappear in the examination in the next semester.

Paper-I PHYSICS-CW-101 Research methodology Credit-4 (70+30)

UNIT-1 Primary and Secondary data, Graphical representation of data, Measures of Central tendency: Arithmetic mean Propentics of arithmentic mean, Merits and Demerits of arithmetic mean, Geometric Mean, Median and Mode.

UNIT-2 Measures of Discription : Range, Quartile deviation, Mean deviation, Standard decviation, Coefficient ofdispersion, Coefficientof variation, Skewness and Kurtosis.

Reference Books:

1. Gupta S. C. and Kapoor V.K.(2010): Fundamentals of Mathermatical Statistics: Suitan Chand & Sons.
2. Gupta S. C. and Kapoor V.K.(2010): Fundamentals of Applied Statistics: Suitan Chand & Sons.

UNIT-3 General defimition of research, Components of research problems, Scientific hyporhesis, Research Purpose, Research design, Literature Searching, Aims and objectives, Expected outcome Methodology to Purpose BE ADOPTED , Planning of experiment/theory.

UNIT-4 Paper writing and report generation: Basic concepts of paper/thesis writing and report generation, writing research abstract, Introdection and references, Significance of report writing, Tyees of research reports, Methods of presentation for report, Format of publication in research journals.

Reference Books:

1. Day A. and Gastel T : How to write and publish (Cambridge UNIV. Press)
2. Blaster L, Hughes C. and Tight M.:How to research (Vive Books)
3. Kothari C.R.: Reasearch Methodology: M ethods and Techniques (New Age Publ.)

Dy. Registrar
Hemchandracharya
North Gujarat University, Patan

Paper-II PHYSICS-CW-102 Plasma Physics and Nonlinear Optics Credit-4 (70+30)

UNIT-1 **Plasma Theory:** Concept of plasma, Collective behavior, Debye shielding, Plasma parameters, Fluid description of plasma, Fundamental equations.

Waves and Oscillations in Plasma: Plasma oscillations, Electron plasma waves, Ion waves.

UNIT-2 **Plasma Diagnostic Techniques:** Single probe technique: Meastrement of electron temperature and electron temperature of plasma Double probe technique: Meastrement of electron temperature and density of plasma.

Reference Books:

1) Plasma Physics and Controlled Fusion: F. F. Chen.
2) Plasma Bhoutiki: S. K. Ghosh.
3) Plasma Mechanics: Vishwanath Chakrobarty.

UNIT-3 **Nonlinear Optics:** Nonlinear optical susceptibllity, Second and third order susceptibilities, Phase matching, sum freaquency and harmonic generation, Difference freaquency generation and parametric excitation, stimulated Brillouin and Raman scatterings.

UNIT-4 **Optical Waveguides:** Asymmetric waveguide, Rectangular wave guide, Channel waveguide, Strip loaded waveguide, Couple d mode theory and Couple mode devices.

Reference Books:

1) The Priciples of Nonlinear Optics- Y. R. Shen.
2) Quantum Electronics, 3 Editions- A. Yariv
3) Semiconductor optoelectronic devices- P. Bhattacharya.

Paper-III PHYSICS-CW-103 Computer Application in the subject Credit-4 (70+30)

UNIT-1 Computer Arithmetic: Floting Point Representation of numbers, Arithmetic operations with normalized floating point numbers, Consquences of normalized floting point reprensentatin of numbers, Some pitfalls in computing, Errors in number, Binary representation of numbers.

UNIT-2 Iterative Methods: Beginning of an iterative method, Method of successive bisection, Method of False position, Newton Raphson iterative method, Comparison of iterative methods.

UNIT-3 Least Square Approximation of Functions: Linear regression, Algorithm for linear regression, polynomial regression, Fitting exponential and trigonometric funcations.

UNIT-4 Diffierential and Intergration: Forms for numerical differentiation, Numerical integration, Simpson's rule, Errors in integration formulae, Gaussian quadrature formulae, comparison of intedration formulae.

Reference Books: "Numerical Methods" by Rajaram (Chapter 2, 3, 6 and 8).

Paper-IV PHYSICS-CW-104 Review of published research in the relevant field Credit-4 (70+30)

For this paper candidates will have to review literature in an area of research, prepare a research proposal and submit a report to the University at the end of the course work. The selection of the problem and preparation of the proposal will be in consultation with research guide.

Paper-V PHYSICS-CW-105 Comprchensive viva voce Credit-4 (100)

Candidate will face a Comprehensive Viva-Voce of 4 credits on the subject of Research Methodology, Plasma Physics and Nonlinear Optics and literature review report submitted to the university. The Presentation will have to be made by the candidate and it will need to be prepared in consultation with research guide.

==========

Hemchandracharya North Gujarat University

Dy. Registrar
Hemchandracharya
North Gujarat University, Patan