Chaudhary Bansi Lal University, Bhiwani

Scheme of Examination for Pre-Ph.D. Course Work

Semester-I (w.e.f. 2019-20) **Credits= 12** **Marks=300**

Sr. No.	Course/ Paper Code	Courses	Credits	Contact Hours per week	Examination Scheme		Total Marks
					End semester examination marks	Internal assessment marks	
1	19PHYPH-101	Research Methodology	4	4	80	20	100
2	19PHYPH-102	Review of Literature	4	--	100	--	100
3	19PHYPH-103	Advance Physics	4	4	80	20	100
		Total					300

Chaudhary Bansi Lal University, Bhiwani
Syllabus of Examination for Pre-Ph.D. Course Work

19PHYPH-101
Research Methodology

Maximum Marks-100
End Semester Examination -80
Internal Assessment-20
Time-3 hrs.

Note: *There shall be nine questions in all. Question no. 1 shall be compulsory, consisting of eight short answer type questions covering the entire syllabus. Two questions will be asked from each unit. Student will have to attempt one question from each unit. Each question shall carry equal marks.*

Unit-I

Introduction of Research Methodology: Meaning of research, objectives of research, types of research, significance of research, research and scientific method, research process. **Research Problem**: Definition, necessity and techniques of defining research problem. Formulation of research problem. Objectives of research problem.
Methods of data collection: Experimental data, field data, data from other sources.
Analyzing data: Error analysis, statistical analysis.

Unit-II

Scientific Communications: Publishing Research Papers, Selection of a journal; writing of paper's abstract, formulation of problem, discussion and references, submission and handling of reviewer's comment.
Writing of thesis: Format of a thesis, Review of literature, formulation, writing methods, results; preparation of tables, figures; writing discussion, writing conclusion, writing summary and synopsis, reference citing and listing/bibliography, IPR, Patent, trademarks and copyright.

Unit-III

Computer Applications in Research: Curve Fitting: Principle of least square fitting; Linear regression, Polynomial regression; Exponential and Geometric regression.
Using computers in research: Basics of operating systems – handling different operating systems.
MS Office 2007: Word Basics, Mail Merge, Macros, Math Type, Equation Editor
MS Excel 2007: Excel Basics, Data Sort, Functions.
Drawing graphs and diagrams – Origin/Xmgrace/Excel/others.

Unit-IV

Presentation: Poster and Oral. Presentation tools: Introduction to presentation tools, MS Power Point: features and functions, creating presentation, customizing presentation, showing presentation.
Web Search: Internet Basics, Internal Protocols, Pre-requisites, Search Engines, Searching Hints, Using advanced search techniques. Research ethics and Plagiarism.
References:

- Gurumani, N. (2010), Scientific Thesis Writing and Paper Presentation, MJP Publishers
- Kothari, C.R. and Garg Gourav (2014), Research Methodology (Methods and Techniques), 3rd edition New Age International Publishers.
- Gerald, C.F. and Wheatley, P.O. : Applied numerical analysis, 6th Ed. Addison Wesley (2002)

- Smith G.D.: Numerical solution of partial differential equations, Oxford University Press (1982)
- Schwartz H.R., Stiefel: Numerical analysis of symmetric E & Rustishausar matrices, Prentice Hall (1976)
- Computer Simulation in Physics, R.C. Verma, Anamaya Publ., New Delhi, 2004.
- Computer Simulation Methods, Harvey Gould and Jan Tobochnik, Addison-Wesley Publishing Company, New York, 1988.

19PHYPH102
Review of Literature:

Maximum Marks:100

The relevance of the research from perspective of the subject. Detailed review of state of the art. Scope of the work.

Note: The candidates are required to submit a copy of Review of Literature on the relevant research topic. The performance will be evaluated on the basis of submitted literature and the presentation given by the candidates before the evaluation committee.

19PHYPH-103
Experimental and other techniques

Maximum Marks-100
End Semester Examination-80
Internal Assessment-20
Max. Time- 3 hrs.

Note: *There shall be nine questions in all. Question no. 1 shall be compulsory, consisting of eight short answer type questions covering the entire syllabus. Two questions will be asked from each unit. Student will have to attempt one question from each unit. Each question shall carry equal marks.*

Unit-I

Synthesis: - Principal of radio frequency induction furnace, melt quenching, method to produce glassy materials, Solid state reactions and factors effecting, elementary concepts of physical vapour deposition, chemical vapor deposition, miscel techniques, spray pyrolysis, sol-gel and colloidal technique to synthesis nano particles.

Unit-II

X-ray diffraction: Fundamental of material characterization using x-ray technique, intensity data collection, data reduction profile fitting and refinement (Rietveld). Small angle x-ray scattering (SAXS) to study shape and size distributions.

Transmission Electron Microscopy: Working principle of transmission electron microscope (TEM). High resolution electron microscope. Electron optics kinematical theory. Bright field and dark field imagings. Phase contrast and diffraction contrast. Indexing and analysis of selected area diffraction. Elementary idea of abervation from electron microscopy. Sample preparation for TEM (Jet polishing and Ion beam milling).

Scanning Electron Microscopy: Basic of scanning electron microscopy (secondary electron and their detections). Evaluation of surface images from (SEM). Elemental analysis through energy dispersive x-ray analysis (EDX)

Unit-III

Solitary waves theory: Linear and nonlinear Dynamical system, Mathematical implications of nonlinearity. Effects of nonlinearity, The Scott Russel phenomena and KdV equation, Dispersion and Dissipation. Types of Travelling Wave Solutions, Analysis of the Methods: The Tanh-coth Method. The Sine-cosine Method, Hirota's Bilinear Method, Application of the methods to KdV equation.

Unit-IV

Density Functional Theory: Many-Body Hamiltonian; Density Functional Formalism: The Density as basic variable, The Hohenberg-Kohn theorem, The Kohn-Sham equations; The Local density approximation for the Exchange-Correlation energy.

References:

- Charles P. Poole Jr and Frank J. Owens, (2007), Introduction to Nanotechnology, John Wiley & Sons (Asia) Pvt. Ltd.
- Sulbha K. Kulkarni, (2007), Nanotechnology: Principles and practices, Capital Publishing Company, New Delhi
- B.D. Cullity, (1956), Elements of X-ray diffraction, Addison-Wesley Publishing Company
- J. Goldstein, D. Newbury, D. Joy, C.Lyman, P. Echlin, E.Lifshin, L. Sawyer and J. Michael, (2003), Scanning Electron Microscope and X-ray Microanalysis, Springer Science
- W. Demtroder, (2004) Laser Spectroscopy, Basic concept and Instrumentation, Springer
- J. M. Hollas, (1998), High Resolution Spectroscopy, John Wiley & Sons
- J.M. Hollas, (1986), Modern Spectroscopy, John Wiley & Sons
- A. Thorpe.(1999), Spectrophysics, Springer
- B. Schrader, (1993), Infrared and Raman Spectroscopy, John Wiley & Sons
- Nonlinear Dynamics by M. Lakshmanan and s. Rajasekar
- Partial Differential Equations and Solitary Waves Theory by A.M. Wazwaz
- Many Particle Physics by G. D. Mahan
- Many-Electron Theory by Stanley Raimes