

Annexure - A

Chaudhary Ranbir Singh University, Jind

(A State University established under Haryana Act No. 28 of 2014 and recognized under section 12 (B) & 2f of UGC act, 1956)



DEPARTMENT OF PHYSICS

Examination Scheme

&

Syllabus

For

Ph.D. Course work

(w.e.f. 2020-21)

3M

Chaudhary Ranbir Singh University, Jind
Scheme of Examination for Ph.D. Course Work

Semester-I (w.e.f. 2020-21)

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	20PHYPH-101	Research Methodology	4	4	80	20	100
2	20PHYPH-102	Experimental & Computational Techniques	4	4	80	20	100
3	20PHYPH-103 (A)	Research & Publication Ethics (RPE)	2	2	40	10	50
	20PHYPH-103 (B)	Review of Literature & Seminar	2	-	-	-	50
Total							300

300

Chaudhary Ranbir Singh University, Jind
Syllabus of Examination for Ph.D. Course Work

20PHYPH-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 four/five 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

Concept 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, validity and reliability of research.

Unit-II

Methods of data collection and analysis: Experimental data, field data, data from other sources. Error analysis, statistical analysis.

Web search: Internet Basics, Internal Protocols, Pre-requisites, Search Engines, Searching Hints, Using advanced search techniques,

Unit-III

Computer Applications in Research: Curve Fitting: Principle of least square fitting; Linear regression, Polynomial regression; Exponential and Geometric regression.

Operating system and uses

MS Office: Word Basics, Mail Merge, Macros, Math Type, Equation Editor

MS Excel: Excel Basics, Data Sort, Functions.

MS Power Point: Features and function, basics of presentation: Poster and Oral presentation.

Drawing graphs and diagrams – Origin/Xmgrace/Excel.

Unit-IV

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, 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.
- Schwartz H.R., Stiefel: Numerical analysis of symmetric & Hermitian 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.



20PHYPH102

Experimental & Computational 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 four/five 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 to Materials Science: Classification of materials, Glass and glass ceramics, Nanoparticles, Production control & planning, Annealing, Thermal treatment, Chemical treatment, Structural, Optical, Mechanical, Magnetic properties.

Unit II

Synthesis of Materials: Synthesis of Nano Materials (Wet Chemical Method, Solid State Reaction, Ball Milling, etc.), Glasses and their formation by different techniques, Properties of glasses, Modification in glass properties using various approaches

Unit-III

Characterization: XRD (principle, brief idea of set up), SEM/TEM (principle, brief idea of set up, Photoluminescence (PL) spectroscopy (principle and idea of instrumentation), UV-NIR/absorption: (principle and idea of instrumentation), Raman Spectroscopy (principle and idea of instrumentation), FTIR (principle, brief idea of set up), DSC/TGA (principle and idea of instrumentation), VSM (principle and idea of instrumentation).

Unit-IV

Computational Techniques: The MATLAB environments, Algorithms and structures, Basic arithmetic, Scalars, Arrays, Vectors, Matrices, Matrix operations, built in functions, user defined functions, scripts and functions (m-files), Controlling Command Window Input and Output, Control Structures (if... then, loops), Graphics functions: 2D and 3D plotting, MATLAB toolboxes, Eigenvalues and Eigenvectors, Doing Integration and Differentiation using MATLAB in built functions. Solution of Linear system of equations, Numerical Simulation of differential equations: Ordinary differential and partial differential equations. Introduction to Origin for data analysis, Mathematica (Introduction), LaTeX.

References:

- A Guide to MATLAB for Beginners and Experienced Users, Brian R. Hunt, Ronald L. Lipsman, Jonathan M. Rosenberg, 2nd Edition, Cambridge University Press
- Getting started with Matlab, Rudra Pratap, 2010, Oxford University Press.
- W.D Callister Jr (2001), Materials Science and Engineering: An Introduction, John Wiley & Sons, Inc
- Principles of Fluorescence Spectroscopy, Joseph R. Lakowicz, Springer; 3rd Edition 2006
- B.D. Cullity, (1956), Elements of X-ray diffraction, Addison-Wesley Publishing Company
- B. Schrader, (1993), Infrared and Raman Spectroscopy, John Wiley & Sons
- J.M. Hollas, (1986), Modern Spectroscopy, John Wiley & Sons
- W. Demtroder, (2004) Laser Spectroscopy, Basic concept and Instrumentation, Springer



RESEARCH AND PUBLICATION ETHICS
19PHYPH-103(A)

Max Marks: 50
Ext Marks: 40
Int Marks: 10

THEORY

Note: *There shall be nine questions in all. Question no. 1 shall be compulsory, consisting of four/five short answer type questions covering the entire syllabus.*

Unit I: PHILOSOPHY AND ETHICS

1. Introduction to philosophy: definition, nature and scope, concept, branches
2. Ethics: definition, moral philosophy, nature of moral judgements and reactions

Unit II: SCIENTIFIC CONDUCT

1. Ethics with respect to science and research,
2. Intellectual honesty and research integrity,
3. Scientific misconducts: Falsification, Fabrication, and Plagiarism (FFP)
4. Redundant publications: duplicate and overlapping publications, salami slicing
5. Selective reporting and misrepresentation of data

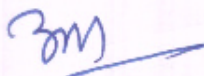
Unit III: PUBLICATION ETHICS

1. Publication ethics: definition, introduction and importance
2. Best practices / standards setting initiatives and guidelines: COPE, WAME, etc
3. Conflicts of interest
4. Publication misconduct: definition, concept, problems that lead to unethical behavior and vice versa, types,
5. Violation of publication ethics, authorship and contributorship
6. Identification of publication misconduct, complaints and appeals
7. Predatory publishers and journals

PRACTICE (INTERNAL EST.)

OPEN ACCESS PUBLISHING:-

1. Open access publications and initiatives
2. SHERPA/RoMEO online resource to check publisher copyright & self archiving policies
3. Software tool to identify predatory publications developed by SPPU
4. Journal finder / journal suggestion tools viz. JANE, Elsevier Journal Finder, springer Journal Suggester, etc.



PUBLICATION MISCONDUCT:-

A. Group Discussions:-

1. Subject specific ethical issues, FFP, authorship,
2. Conflicts of interest,
3. Complaints and appeals: examples and fraud from India and abroad

B. Software tools

Use of plagiarism software like Turnitin, Urkund and other open source software tools.

DATABASES AND RESEARCH METRICS:-

A. Databases

1. Indexing databases,
2. Citation databases: Web of Science, Scopus, etc.

B. Research Metrics

1. Impact Factor of journal as per Journal Citation Report, SNIP, SJR, IPP, Cite Score
2. Metrics: h-index, g index, i10 index, altmetrics

Suggested Reading:

Bird, A. (2006). Philosophy of Science. Routledge.

Chaddah, (2018) Ethics in Competitive Research: Do not get scooped; do not get plagiarized

MacIntyre, Alasdair (1967) A Short History of Ethics London

National Academy of Sciences, National Academy of Engineering and Institute of Medicine.

(2009). On Being a Scientist: A Guide to Responsible Conduct in Research: Third Edition.

National Academies Press

Resnik, D. B. (2011). What is ethics in research & why is it important. National Institute of Environmental Health Sciences, 1-10. Retrieved from

<https://www.niehs.nih.gov/research/resources/bioethics/whatis/index.cfm>

3/2/20

REVIEW OF LITERATURE AND SEMINAR
19PHYPH-103(B)

Max Marks: 50

Review of Literature

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

Note: The scholars shall review at least 25 research papers and shall submit the report as well as a presentation before three members committee duly constituted by the Dean of the Faculty and headed by the Chairperson of the concerned department for evaluation.

30/11