



AKKAMAHADEVI WOMEN'S UNIVERSITY, VIJAYPUR
(Formerly: Karnataka State Women's University, Vijaypur)

Dept of Physics

No: AWUV/PHY/BoS/2017-18/

Date: 06-09-2017

Proceedings

Proceedings of the meeting of BoS (PG) in Physics held on 06-09-2017 in the dept of Physics
Akkamahadevi Women's University Vijaypur.

The Members are as follows:

- 1) Dr.Aziz Makandar - Chairman
Prof & Chairman Dept of Computer Science
AWU, Vijaypur.
- 2) Dr.Basavaraja Sannakki - Member
Prof, Dept of Physics Gulbarga University,
Kalaburgi.
- 3) Dr.B.G.Mulimani - Member
Prof, BLDE Deemed University,
Vijaypur.
- 4) Dr.S.R.Inamdar - Member
Prof, Dept of Physics
Karnataka University Dharwad,
Dharwad.
- 5) Dr.S.M.Hangodimath - Member
Prof, Dept of Physics Gulbarga University,
Kalaburgi.

Resolutions:

- 1) The board prepared the panel of paper setters/examiners for the M.Sc course for the academic year 2017-18 and resolved to approve the same (the list enclosed).
- 2) The board approved to continue the existing M.Sc syllabus with small modifications from the academic year 2017-18.
- 3) The board adopted the new regulation (CBCS) and prepared the revised syllabus of M.Sc Physic course in conformance with CBCS frame work for 2018-19 and onwards and approved the same.
- 4) New question paper pattern is proposed and approved by the board to be implemented from the academic year 2017-18.

Prof. Basavaraja Sannakki
(Member)

Prof. Hangodimath
(Member)

6/9/2017
Prof. Aziz Makandar
BOS Chairman



AKKAMAHADEVI WOMEN'S UNIVERSITY, VIJAYAPURA
(Formerly: Karnataka State Women's University, Vijayapura)
Department of Physics


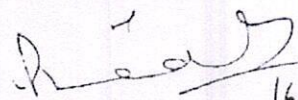
No: AWUV/PHY/BoS/2018-19/

Date: 16-06-2018

Proceedings

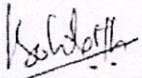
Proceedings of the meeting of Board of Studies in PG Physics held on 16-06-2018 in the department of Physics, Akkamahadevi Women's University Vijayapura.

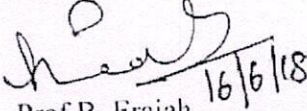
The Members are as follows:


- | | | | |
|--|---|-----------------|---|
| 1) Prof. Aziz Makandar
Chairman, Dept of Computer Science
AWU, Vijaypur. | - | Chairman |  |
| 2) Prof. M.K. Kokila
Dept of Physics, Bangalore University,
Bengaluru. | - | Member | — |
| 3) Prof. M.K. Rabinal
Dept of Physics, Karnatak University
Dharwad | - | Member = Absent | |
| 4) Prof. B. Eraiah
Dept of Physics, Bangalore University,
Bengaluru. | - | Member | 
16/6/18 |

Resolutions:

- 1) The board resolved and adopted the new uniform regulation and prepared the revised syllabus of M.Sc. course in **PHYSICS** in conformance with Choice Based Credit System (CBCS) & Continuous Assessment Grading Pattern (CAGP) frame work for 2018-19 and onwards and approved the same.
- 2) The board prepared the panel of paper setters/examiners for the M.Sc. course in **PHYSICS** for the academic year 2018-19 and resolved to approve the same (the list enclosed).
- 3) Question paper pattern is proposed and approved by the board to be implemented from the academic year 2018-19.


16/6/18
Prof. M.K. Kokila
(Member)


16/6/18
Prof. B. Eraiah
(Member)


Prof. Aziz Makandar
(BOS Chairman)



Akkamahadevi Women's University, Vijayapur
M.Sc. Physics Choice Based Credit System (CBCS) Syllabus

Course code	Course name	Credits L:T:P	Instruction Hrs./week	Duration of Exam Hrs	Marks		
					IA	Exam	Total
Semester I							
PHT-1.1	Classical Mechanics	4:0:0	4	3	30	70	100
PHT-1.2	Mathematical and Computational Methods of Physics-I	4:0:0	4	3	30	70	100
PHT-1.3	Atomic, Molecular and Optical Physics (General)	4:0:0	4	3	30	70	100
PHT-1.4	Basic Electronics	4:0:0	4	3	30	70	100
PST-1.5	(Any one to be selected) a) Instrumentation b) Astrophysics	4:0:0	4	3	30	70	100
PHP- 1.6	Practical I- General Physics and Basic Electronics Lab	0:0:4	4	4	30	70	100
O.E -1.7	Offered by Dept. of Women's Studies	4:0:0	4	3	30	70	100
	Total	28					700
Semester II							
PHT-2.1	Quantum Mechanics - I	4:0:0	4	3	30	70	100
PHT-2.2	Mathematical and Computational Methods of Physics-II	4:0:0	4	3	30	70	100
PHT-2.3	Nuclear Physics (General)	4:0:0	4	3	30	70	100
PHT-2.4	Condensed Matter Physics (General)	4:0:0	4	3	30	70	100
PST-2.5	(Any one to be selected) a) Physics of Nanomaterials b) Physics of Laser and Laser Applications	4:0:0	4	3	30	70	100
PHP-2.6	Practical II- General Physics and Numerical Methods using C Programming Lab	0:0:4	4	4	30	70	100
OE-2.7	Offered by dept. of Women's Studies	4:0:0	4	3	30	70	100
	Total	28					700
Semester III							
PHT-3.1	Quantum Mechanics -II	4:0:0	4	3	30	70	100
PHT-3.2	Statistical Mechanics	4:0:0	4	3	30	70	100
PHT-3.3	Electrodynamics	4:0:0	4	3	30	70	100

PST-3.4	(Any one to be selected) a) Nuclear Physics – I (Special) b) Condensed Matter Physics – I (Special)	4:0:0	4	4	30		
PSP-3.5	Practical III- a) General Physics Lab (Any one of the following to be selected based on PST- 3.4 a / b) b) Nuclear Physics Lab (Special) c) Condensed Matter Physics Lab (Special)	0:0:4	4	3	30	70	100
POE-3.6	Biophysics	4:0:0	4	3	30	70	100
	Total	24					600
Semester IV							
PHT-4.1	(Any one to be selected based on PST- 3.4 a / b) a) Nuclear Physics – II (Special) b) Condensed Matter Physics – II (Special)	4:0:0	04	3	30	70	100
PHT-4.2	(Any one to be selected based on PHT- 4.1 a / b) a) Nuclear Physics – III (Special) b) Condensed Matter Physics – III (Special)	4:0:0	04	3	30	70	100
PST-4.3	(Any one to be selected) a) Material Science b) Advanced Statistical Mechanics and Phase Transition	4:0:0			30	70	100
PHP-4.4	Project Work	0:0:4	04	3	30	70	100
POE-4.5	Atmospheric Science	4:0:0	04	3	30	70	100
	Total	20					500
	Programme Total						2500

L- Lecture, T- Tutorial, P- Practical.

PHT- Physics Hard Core Theory, PST- Physics Soft Core Theory, OE- Open Elective, PHP- Physics Hard Core Practical, POE- Physics Open Elective course offered to students of other department.

*The project evaluation marks 100 are a total of 50 marks for dissertation, 20 marks for presentation and viva voce and 30 marks for internal assessment.



**KARNATAKA STATE AKKAMAHADEVI WOMEN'S UNIVERSITY,
VIJAYAPURA**

(Formerly: Karnataka State Women's, University Vijayapura)

Dept of Physics

PROCEEDINGS

Proceeding of the meeting of Board of Studies in PG Physics held on Date: 02.07.19
at 4. PM. in the department of Physics, Karnataka State Akkamahadevi Women's
University, Vijayapura.

The Members are as follows:

- | | | | |
|---|---|----------|--|
| 1) Prof. Aziz Makandar
Dean, Faculty of Science & Technology
KSAWU, Vijayapura. | : | Chairman | |
| 2) Prof. Basavaraj Sannaki
Dept of Physics,
Gulbarga University, Kalburgi | : | Member | |
| 3) Prof.S.Y.Amargolkar
Dept of Physics,
Karnatak University, Dharwad. | : | Member | |
| 4) Prof. B. Eraiah
Dept. of Physics,
Bangalore University, Bengaluru. | : | Member | |
| 5) Prof.B G Mulimani
Dept of Physics,
BLDE Deemed University, Vijayapura | : | Member | |

Resolutions:

1. The board approved continuing the existing syllabus 2018-19 of M.Sc Physics Course.
2. The board prepared the panel of paper setters/examiners for the M.Sc course in Physics for the academic year 2019-20 and resolved to approve the same (the list enclosed)
3. The board scrutinized the question paper of M.Sc Physics course for the academic year ~~2018-19~~ and found correct.

Prof.S.Y.Amargolkar
(Member)

Prof.B.Eraiah
(Member)

Prof.Aziz Makandar
(Chairman BoS)

Attachment for Sl.No. 7

Syllabus Prior Revision.

DETAILED DISTRIBUTION OF COURSES AND CREDITS

Title of the Paper	Code No.	Total No. of Units	Total No. of Credits	Total Number of Marks			Duration Hours
				IA	Theory	Total	
I SEMESTER							
Classical Mechanics	PHY1.1	04	04	20	80	100	4
Quantum Mechanics	PHY1.2	04	04	20	80	100	4
Mathematical and Computational Methods of Physics-I	PHY1.3	04	04	20	80	100	4
Basic Electronics	PHY1.4	04	04	20	80	100	4
Practical-I Basic Electronics lab	PHY1.5		04	20	80	100	8
Practical-II General Physics lab - I	PHY1.6		04	20	80	100	8
II SEMESTER							
Statistical Mechanics	PHY2.1	04	04	20	80	100	4
Electrodynamics	PHY2.2	04	04	20	80	100	4
Quantum Mechanics - II	PHY2.3	04	04	20	80	100	4
Mathematical and Computational Methods of Physics- II	PHY2.4	04	04	20	80	100	4
Practical-III General Physics lab - II	PHY2.5		04	20	80	100	8
Practical-IV Numerical Methods using C Programming	PHY2.6		04	20	80	100	8
III SEMESTER							
Atomic, Molecular and Optical Physics	PHY3.1	04	04	20	80	100	4
Nuclear Physics (Gen)	PHY3.2	04	04	20	80	100	4
Condensed Matter Physics (Gen)	PHY3.3	04	04	20	80	100	4
Nuclear Physics - I (Special)	PHY3.4(a)	04	04	20	80	100	4
Condensed Matter Physics - I (Spl)	PHY3.4(b)	04	04	20	80	100	4
Practical-V General Physics lab - III	PHY3.5		04	20	80	100	8
Practical-VI Nuclear Physics lab-I (Spl)	PHY3.6(a)		04	20	80	100	8
Practical-VI Condensed Matter Physics-I (Spl)	PHY3.6(b)		04	20	80	100	8
IV SEMESTER							
Nuclear Physics - II (Spl)	PHY4.1(a)	04	04	20	80	100	4
Condensed Matter Physics - II (Spl)	PHY4.1(b)	04	04	20	80	100	4
Nuclear Physics - III (Spl)	PHY4.2(a)	04	04	20	80	100	4
Condensed Matter Physics - III (Spl)	PHY4.2(b)	04	04	20	80	100	4
Atmospheric Science	PHY4.3(a)	04	04	20	80	100	4
Material Science	PHY4.3(b)	04	04	20	80	100	4
Biophysics	PHY4.3(c)	04	04	20	80	100	4
Astrophysics	PHY4.4(a)	04	04	20	80	100	4
Physics of Laser and Laser Applications	PHY4.4(b)	04	04	20	80	100	4
Physics of Nanomaterial	PHY4.4(c)	04	04	20	80	100	4
Practical-VII Nuclear Physics lab -II (Spl)	PHY4.5(a)		04	20	80	100	8
Practical-VII Condensed Matter Physics lab -II (Spl)	PHY4.5(b)		04	20	80	100	8
Project Dissertation and viva-voce	PHY4.6		04	20	80	100	8

S. Balawaraj

Attachment for Sl. No. 7
Syllabus Post Revision.



Akkamahadevi Women's University, Vijayapur
M.Sc. Physics Choice Based Credit System (CBCS) Syllabus

Course code	Course name	Credits L:T:P	Instruction Hrs./week	Duration of Exam Hrs	Marks		
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O.E -1.7	Offered by Dept. of Women's Studies	4:0:0	4	3	30	70	100
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Semester II							
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PHT-4.2	(Any one to be selected based on PHT- 4.1 a / b) a) Nuclear Physics – III (Special) b) Condensed Matter Physics – III (Special)	4:0:0	04	3	30	70	100
PST-4.3	(Any one to be selected) a) Material Science b) Advanced Statistical Mechanics and Phase Transition	4:0:0			30	70	100
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POE-4.5	Atmospheric Science	4:0:0	04	3	30	70	100
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	Programme Total						2500

L- Lecture, T- Tutorial, P- Practical.

PHT- Physics Hard Core Theory, PST- Physics Soft Core Theory. OE- Open Elective, PHP- Physics Hard Core Practical, POE- Physics Open Elective course offered to students of other department.

*The project evaluation marks 100 are a total of 50 marks for dissertation, 20 marks for presentation and viva voce and 30 marks for internal assessment.



KARNATAKA STATE AKKAMAHADEVI WOMEN'S UNIVERSITY, VIJAYAPURA
(Formerly: Karnataka State Women's University, Vijayapura)
DEPARTMENT OF PHYSICS

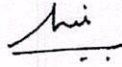
No: KSAWUV/PHY/BoS/2020-21/

Date: 08-06-2020

Proceeding of BoS(PG) in Physics

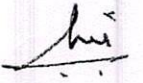
Proceedings of the meeting of Board of Studies in PG Physics held through circulation from 03-06-2020 to 08-06-2020.

The Members present:

- | | | | |
|--|---|----------|---|
| 1) Prof. G. G. Rajput
Dean, Faculty of Science and Technology
KSAWU, Vijayapura | - | Chairman |  |
| 2) Prof. M. K. Rabinal
Dept. of Physics,
Karnatak University
Dharwad | - | Member | |
| 3) Prof. Balachandra G Hegde
Dept. of Physics,
Rani Channamma University
Belagavi | - | Member | |
| 4) Dr. Aravind Chinchure
CEO of QLeap Academy
Pune | - | Member | |

Resolutions:

- 1) The board reviewed the existing syllabus of M.Sc. Physics course under CBCS scheme implemented in the academic year 2018-19 and found no correction.
- 2) The board prepared the Program Outcomes, Program Specific Outcomes and Course objectives and learning outcomes for the courses of existing M.Sc. (Physics) I-IV semesters as per NAAC criteria and resolved to approve the same.
- 3) The board prepared the panel of examiners for Physics for the academic year 2020-21 and resolved to approve the same.
- 4) The Board scrutinized the questions papers of M.Sc. Physics examination 2019-2020 and found correct.


Faculty of Science and Technology
Akkamahadevi Women's University
VIJAYAPURA-586108



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KARNATAKA STATE AKKAMAHADEVI WOMEN'S UNIVERSITY, VIJAYAPURA
(Formerly: Karnataka State Women's University, Vijayapura)
Department of Physics

No: KSAWUV/PHY/BoS/2021-22/

Date: 02-11-2021

Proceedings

Proceedings of the meeting of Board of Studies in PG Physics held through circulation from 29-10-2021 to 02-11-2021

The Members are as follows:

- | | | |
|--|---|----------|
| 1) Prof. G.G.Rajput
Dean, Faculty of Science and Technology
KSAWU, Vijayapura | - | Chairman |
| 2) Prof. M.K.Rabinal
Dept. of Physics,
Karnatak University
Dharwad | - | Member |
| 3) Prof. Balachandra G Hegde
Dept. of Physics,
Rani Channamma University
Belagavi | - | Member |
| 4) Dr. Aravind Chinchure
Reliance Innovation
Pune | - | Member |

Agenda:

1. Syllabus of M.Phil./Ph.D. coursework for the academic year 2020-21 onwards.
2. To approve question paper pattern for M.Phil./Ph.D. coursework examination from the academic year 2020-21.
3. Panel of paper setters/examiners for the M.Sc. Physics, M.Phil. and Ph.D. courses for the academic year 2021-22.

Resolutions:

- 1) The board prepared and approved M.Phil./Ph.D. coursework syllabus for the academic year 2020-21 onwards.
- 2) M.Phil./Ph.D. coursework examination Question paper pattern is proposed and approved by the board to be implemented from the academic year 2020-21.
- 3) The board prepared the panel of paper setters/examiners for the M.Sc. Physics, M.Phil. and Ph.D. courses for the academic year 2021-22 and resolved to approve the same (list enclosed).

DEAN

Faculty of Science and Technology
Karnataka State
Akkamahadevi Women's University
Vijayapura-589108.

M.Phil./Ph.D. Course Work (CBCS Scheme - 2020-21 onwards)

M.Phil./Ph.D. Course Work Structure (One semester)						
Course Code	Course Title	Credits	Examination			
			Max. Marks	IA	Term end	Passing Marks
PHDPH1	Research Methodology	4	100	30	70	50
PHDPH2	Any one based on the research area 1. Fluorescence Spectroscopy 2. Materials Science	4	100	30	70	50
PHDPH3	Literature Review	4	100*	30	70	50
PHDPH4	Research and Publication Ethics	2	50	15	35	25
Total		14	350	105	245	175

*For PHDPH3 Viva voce exam of 70 marks shall be assessed by the Doctoral Committee. 30 marks of Internal Assessment (IA) shall be allotted by the concerned Research Supervisor.

For M.Phil. programme:

Apart from the Course Work of 14 credits, a candidate admitted to M.Phil. programme shall complete the following:

i.	Dissertation	200 marks	08 Credits
ii.	Minimum of two papers presentation/publication	100 marks	04 Credits

PHDPH1: Research Methodology

(14hrs)

UNIT I: Research Methodology:

Introduction, Meaning of Research, Objectives of Research, Types of Research, Research Approaches, Significance of Research, Research Methods versus Methodology, Research and Scientific Method, Research Process, Criteria of Good Research, Problems Encountered by Researchers. Defining the Research Problem: identifying research area and topic, current national and international status of topic, developing a research plan.

(14hrs)

UNIT II: Literature Survey and Research Design

Review of Literature: literature review in research, Bringing clarity and focus to research problem, Improving research methodology, Broadening knowledge base in research area, Literature survey – Scientific Journals (full length papers and review articles), magazines, thesis, dissertation, monographs, internet browsing (through search engines), Enabling contextual findings, Review of the literature, searching the existing literature, reviewing the selected literature, Developing a theoretical framework, Developing a conceptual framework, Writing about the literature reviewed.

Research Design: Meaning of Research Design, need for Research Design, features of a Good Design, Important Concepts Relating to Research Design, Different Research Designs, Basic Principles of Experimental Designs, Important Experimental Designs.

UNIT III: Funding Agencies and IPR

(14hrs)

Idea about the funding agencies - DST, UGC, CSIR, DAE-BRNS, ISRO and student funding. Intellectual Property Rights (IPR) –importance of intellectual property and its protection, the role of IPR in research and development, IPs of relevance to physics and few case studies Patents: Definition, filing procedure, licensing, Copyright and related rights, research ethics, plagiarism, types of plagiarism.

UNIT IV: Interpretation, Report writing and Computer programming

(14hrs)

Meaning of Interpretation, Technique of Interpretation, Precaution in Interpretation, Significance of Report Writing, Different Steps in Writing Report, Layout of the Research Report, Types of Reports, Oral Presentation, Mechanics of Writing a Research Report, Precautions for Writing Research Reports.

Computer Programming – Basic components of MS Word, Origin Graphics, linear and curve fitting in origin graphics, programming in C++ (some examples), basics of MATHEMATICA and MATLAB

Reference Books:

1. C. R. Kothari, A Research Methodology, Methods and Techniques, New Age International Publisher, 2004.
2. Won Y., Yang, W. Cao, Tae-Sang Chung and John Morris, Applied Numerical Methods using MATLAB, Wiley Student Edition, 2005.
3. M. K. Jain, S. R. K., Iyengar and R. K. Jain, Numerical Methods for Scientific and Engineering Computation, Wiley Eastern Ltd.
4. Philip R. Bevington and D. Keith, Robinson, Data Reduction and Error Analysis for the Physical Science (3rd Ed), McGraw-Hill, 2003.
5. Paul G., Chapin, Research Projects and Research Proposal – A Guide for Scientists seeking funding, Cambridge University Press.
6. Bhate and Pongashe, Management of Intellectual Property, Prakashan, Pune, 1988.
7. E. Bright Wilson, An Introduction to Scientific Research.

PHDPH2.1: Fluorescence Spectroscopy

UNIT I: Introduction to Fluorescence:

(14 hours)

Phenomena of fluorescence, Jablonski diagram, characteristics of fluorescence emission, fluorescence lifetime and quantum yields, fluorescence anisotropy, Resonance energy transfer, steady-state and time-resolved fluorescence, Biochemical fluorophores, Molecular information from fluorescence: Emission Spectra and the Stokes Shift, Intrinsic or Natural Fluorophores Extrinsic Fluorophores, DNA Probes, Chemical Sensing Probes and Special Probes, other Fluorescent Proteins, Long-Lifetime Probes: Lanthanides, Transition Metal-Ligand Complexes, Proteins as Sensors. New fluorescence technologies, overview of fluorescence spectroscopy.

UNIT II: Instrumentation for Fluorescence Spectroscopy:

(14 hours)

Spectrofluorometers for Spectroscopy Research, Spectrofluorometers for High Throughput, An Ideal Spectrofluorometer, Distortions in Excitation and Emission Spectra, Different Light Sources used in Spectrofluorometers, Monochromators- Wavelength Resolution and Emission Spectra, Polarization Characteristics of Monochromators, Stray Light in Monochromators, Second-Order Transmission in Monochromators, Calibration of Monochromators, Optical Filters - Colored Filters, Thin-Film Filters, Filter Combinations, Neutral-Density Filters, Photomultiplier Tubes - Spectral Response, Design and Dynode Chains, Time Response of PMTs, Photon Counting versus Analog Detection of Fluorescence, Symptoms of PMT Failure, CCD Detectors, Corrected Excitation Spectra Using a Quantum Counter, Corrected Emission Spectra - Comparison with Known Emission Spectra, Corrections Using a Standard Lamp, Correction Factors Using a Quantum Counter and Scatterer, Conversion between Wavelength and Wavenumber, Quantum Yield Standards. Overview of Time-Domain and Frequency-Domain Measurements: Meaning of the Lifetime or Decay Time, Phase and Modulation Lifetimes, Examples of Time-Domain and Frequency-Domain Lifetimes, Time-Correlated Single-Photon Counting - Principles of TCSPC, Example of TCSPC Data, Convolution Integral, Light Sources for TCSPC.

UNIT III: Solvent and Environmental Effects:

(14 hours)

Overview of solvent polarity effects, general solvent effects: The Lippert-Mateaga equation, specific solvent effects, temperature effects, phase transitions in membranes, additional factors that affect emission spectra, effects of viscosity, Probe-Probe interactions, Biochemical applications of environment-sensitive fluorophores, advanced Solvent -Sensitive Probes, effects of solvent mixtures, summary of solvent effects.

UNIT IV: Quenching of Fluorescence:

(14 hours)

Quenchers of fluorescence, Theory of collisional quenching, Theory of static quenching, combined dynamic and static quenching, examples of static and dynamic quenching, deviations from the Stern-Volmer equation: quenching sphere of action, effects of steric shielding and charge on quenching, fractional accessibility to quenchers, application of quenching to Proteins, application of quenching to membranes, lateral diffusion in membranes, quenching -resolved emission spectra, quenching and association reactions, sensing applications of quenching, sensing applications of quenching to Molecular Biology, quenching on Gold surfaces, intermolecular quenching, quenching of phosphorescence.

Reference Books:

1. K. K. Rohatagi and Mukharjee, Fundamentals of Photochemistry.
2. J R Lakowicz, Principles of Fluorescence Spectroscopy.
3. Michael D. Limb, Luminescence Spectroscopy
4. Douglas A. Skoog, F. James Holler & Timothy A : Principles of Instrumental Analysis
5. Skoog, Moller and Nieman, Principles of Instrumental Analysis.

PHDPH2.1: Materials Science

Unit 1: Introduction to Materials

(14 Hours)

Classification and properties of materials, Significance of structure property relationship, Bonding and crystal Structure of solids materials, Imperfections in solids, Diffusion phenomenon, Principles of solidification, Nucleation and Growth process, Phase diagrams and phase transformations, various strengthening mechanism, cold working, Recovery, Recrystallization, Grain growth; Introduction to metallic, semiconductor, ceramic, superconductor, composite materials, Various Properties of materials: Electrical, Optical, Mechanical and Magnetic properties.

Unit 2: Ferroelectrics, Ferrites and Composite Materials

(14 Hours)

Ferroelectrics: Properties of ferroelectrics, classification and properties of representative ferroelectric crystals, theory of ferroelectricity, piezo and pyro electric properties, dielectric constant with temperature and frequency, hysteresis loop.

Ferrites: definitions and types of ferrites with examples, structure of cubic ferrite, saturation magnetization, molecular field theory, hexagonal ferrite, influence of temperature and field on magnetic behavior, domains, hysteresis, applications of ferrites.

Composite Materials: Introduction to composites, types of composites, single phase ME materials, composite ME materials, ME effect, properties of ME composites; sum properties, product properties, combination property, conditions for getting good ME output in composites, application of ME composites in different fields.

Unit 3: Polymer Material Science

(14 Hours)

History and basic nature of polymers, Classification of Polymers and processing techniques, the structure, and physical properties of plastics, thermoplastics and thermosets, processing techniques of polymers: Extrusion, Injection molding, Thermoforming, Compression molding and Transfer molding. Glass Transition temperature of polymers. Thermodynamics of polymerization. Polymer surfactant interactions.

Unit 4: Nanomaterials

(14 Hours)

Introduction to nanomaterials: methods based on evaporation, sputter deposition, chemical vapor deposition, electric arc deposition etc. Chemical methods of synthesis, colloidal route: metal and semiconductor nano particle synthesis, microemulsion, organic capping of nano materials. Properties of nanomaterials: mechanical, structural, melting point depression, electrical conductivity and optical properties.

Reference Books:

1. Introduction to Magnetic Materials, B. D. Cullity, C. D. Graham, (Wiley) 2nd ed.
2. Composite Materials Science and Applications, Deborah. D. L. Chung, (Springer).
3. Elementary Solid State Physics. M. All Omar, Pearson Edu. Inc, 2016
4. The Physical Principles of Magnetism, Allan. H. Morrish, (IEEE Press)
5. Polymer Science & Technology of Plastics & Rubber, P. Ghosh, Tata McGraw Hill, 2000.
6. Polymer Science V R Gowrikar et.al. New Age International Pvt. Ltd. 2005
7. Nanotechnology: Importance and applications by M H Fulekar IK Int. Pvt. Ltd 2010

Review Writing & Seminar on the Published Research Work in the Relevant Field

of study:

A minimum of 30 Articles shall be reviewed by the M.Phil./Ph.D. candidate and submit a review report, in two copies, on topic of subject or area of interest in subject, under the supervision of the research guide, and will also give a presentation/seminar of the same during term end Viva-Voce examination before the Doctoral Committee.

PHDPH4: Research and Publication Ethics (RPE)

Unit 1: Philosophy and Ethics (Theory) (03 hours)

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

Unit 2: Scientific Conduct (Theory) (05 hours)

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 3: Publication Ethics (Theory) (07 hours)

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 behaviour 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.

Unit 4: Open Access Publishing (Practice) (04 hours)

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.

Unit 5: Publication Misconduct (Practice) (04 hours)

A. Group Discussions (2 hours)

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 (2 hours)

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

Unit 6: Databases and Research Metrics (Practice) (07 hours)

A. Databases (4 hours)

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

B. Research Metrics (3 hours)

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

Theory Question Paper Pattern

Max. Marks: 70

Time: 3 Hrs.

- ❖ There shall be one compulsory question consisting of 5 sub questions each of 2 marks.
(2 x 5 = 10 marks)
- ❖ There shall be seven questions of 12 marks each.
 - Each question may have sub questions (a),(b) / (a),(b),(c)
 - The student has to answer any five full questions out of remaining seven questions
(12 x 5 = 60 marks)