SCHEME OF EXAMINATION

&

SYLLABUS OF

Course Work for Ph.D. (PHYSICS)

UNDER

FACULTY OF SCIENCE

Approved by Board of Studies in Physics

EFFECTIVE FROM JULY 2016

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Approved by Board of Studies in Physics on 25th Feb 2016
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SCHEME OF EXAMINATION & SYLLABUS PRESCRIBED FOR THE
EXAMINATION OF Ph.D. Course Work (Physics)

EFFECTIVE FROM JULY 2016

Scheme of Examination

The Course Work for Ph.D degree in Physics is a six month course after completion of P.G.

degree in the subject. There shall be two compulsory papers based on the research areas of

Physics. The structure of the course is given below:

S.No.	Theory Paper	Marks
1.	Research Methodology, Quantitative Methods & Computer Applications	100
2.	Review of Literature in Concerned Subject, Seminar/ Project Report	100
Total		**200**

Paper – I

Research Methodology& Quantitative Methods and Computer Applications

UNIT- I

Techniques for Structural, Microscopic, and Spectroscopic Characterization

X-ray diffraction: coherent scattering of X-rays, reflected intensities, experimental methods of crystallography, particle size determination.

Microscopy: Scanning Electron Microscopy (SEM), Transmission Electron Microscopy (TEM), Scanning Transmission Electron Microscopy (STEM), Scanning Tunneling Microscopy (STM), Atomic Force Microscopy (AFM).

Spectroscopy: Fourier Transform Infrared (FTIR) and Raman spectroscopy, Nuclear Magnetic Resonance (NMR), Electron Spin Resonance (ESR).

UNIT – II

Techniques for Characterization of Solid State Ionic and Luminescent Materials

Solid State Ionic Materials: Characterization of ion transport properties; AC Impedance Spectroscopy (IS) for conductivity of (σ) measurements; DC polarization methods viz, Tubandt's method, Wagher's method, Transient Ionic Current (TIC) method for ionic mobility (μ), ionic transference number (t_{ion}),mobile ion concentration (n) and ionic drift velocity (v_d) measurements. Temperature dependent studies on σ, μ, n, v_d etc. and computation of respective energies.

Techniques for ML measurement and TL measurements. Measurement techniques to study Photoluminescence response, UV-visible spectrometry.

Thermal analysis: Differential Thermal Analysis (DTA), Differential Scanning Calorimetry (DSC), Thermal Gravimetric Analysis (TGA).

UNIT – III

Astrophysical Techniques for Astronomical Observations

Photometry: Instrumental magnitudes and colors, seeing and atmospheric effects, extinction correction. Standard photometric systems: UBV and other systems. Transformation to a standard photometric systems. Absolute and differential photometry.

Spectroscopy: Basics of prism and grating spectroscopes.

Basics of CCD data reduction: Plate scale, readout noise and gain, signal-to-noise ratio. correction for bias, dark and flat fielding, fringing and cosmetic effects.

UNIT – IV

(I) Programming in C

Getting Started: Elementary idea about C Language, Getting Started with C,the First C Program, Compilation and Execution, Receiving Input; C Instructions: Type Declaration Instruction, Arithmetic Instruction, Integer and Float Conversions, Type Conversion in Assignments, Hierarchy of Operations, Associativity of Operators. Control Instructions in C.

The Decision Control Structure: If Statement, If-else Statement, Use of Logical Operators, The Conditional Operators.

The Loop Control Structure: Loops, the while Loop, the for Loop, the Odd Loop, the break Statement, the Continue Statement, the do-while Loop.

The Case Control Structure: Decisions Using switch, switch Versus if-else Ladder The goto Keyword.

UNIT – V

(II) Programming in C

Functions & Pointers : What is a Function, Passing Values between Functions, Scope Rule of Functions calling Convention, Advanced Features of Functions; Function Declaration and Prototypes Call by Value and Call by Reference , An Introduction to pointers, Pointer Notation, Back to Function Calls, Conclusions, Recursions, Recursion and Stack. Adding Functions to the Library.

Storage Classes in C: Automatic Storage Class, Register Storage Classes, Static Storage Classes, External Storage Classes, Which to Use When.

The C Preprocessor: Features of C Preprocesor, Macro Expansion, File Inclusion, Conditional Compilation, #if and #elif Directives, Miscellaneous Directives.

Arrays: What are Arrays; A Simple Program using Array. More on Arrays; Array Initialization, Bounds Checking, Passing Array Elements to a Function. Pointers and Arrays; Passing an Entire Array to a Function.

Recommended Text and Reference books:

1. Characterization of Materials: Wachtman J B (Butterworth-Heinemann)
2. Introduction to Nanotechnology by Charles P. Poole Jr. and Frank J. Owens (Willey Inter. Science Pub. 2003)
3. Condensed Matter Physics by Michal P. Marder (Willy Inter. Science Pub., 2000)
4. Superionic Solids- Principle and applications by S. Chandra (NH Pub., 1980)
5. Luminescence of Solids : R Vij (Plenum Press)
6. Digital Image processing: Gonzalez R. C. and Woods R. E. (Addision-Wesley)
7. Astronomical Photometry: Henden A. A. and Kaitchuck R H (Willmann-Bell)
8. Astrophysical techniques: Kitchin C R , third edition (IOP publishing)
9. Optical Astronomical Spectroscopy: Kitchin C R (IOP Publishing).
10. Let us C by Yaswant Kanitkar
11. C Programming by Dennis Riche and Brian Karnighan
12. C Programming by Schauam Series

Paper – II
Review of Literature in Concerned Subject, Seminar/ Project Report

Approved by Board of Studies in Physics on 20th September 2013