

PERIYAR UNIVERSITY  
SALEM-636 011



M.Phil. DEGREE  
PHYSICS  
(Choice Based Credit System (CBCS))

REGULATIONS AND SYLLABUS

(Effective from the academic year 2008-2009 and thereafter)

DEGREE OF MASTER OF PHILOSOPHY (M.Phil)  
REGULATIONS  
FULL-TIME

**1.Eligibility:**

Candidates who have qualified for post graduate degree of this University or any other University recognised by the Syndicate as equivalent thereto shall be eligible to register for the Degree of Master of Philosophy (M.Phil.) in their respective subject and undergo the prescribed course of study in an approved institution or department of this University.

Candidates who have qualified their postgraduate degree on or after 1st January 1991 shall be required to have obtained a minimum of 55 % of marks in their respective postgraduate degree to become eligible to register for the Degree of Master of Philosophy (M.Phil.) and undergo the prescribed course of study in an approved institution or department of this University.

In the case of teachers (or) others registering for part-time registration, the minimum percentage of marks for registration is 50 %.

For the candidates belonging to SC / ST community and those who have qualified for the Master's degree before 01.01.1991 the minimum eligibility marks shall be 50 % in their Master's Degree.

**2. Duration:**

The duration of the M.Phil. Course shall extend over a period of one year from the commencement of the course.

**3. Course of Study:**

The course of study for the degree shall consist of (a) Part-I comprising three written papers according to the Syllabus prescribed from time to time; and (b) Part-II Dissertation.

Part-I shall consist of Paper-I Research Methodology and Paper-II an advanced paper in the main subject. There shall also be a third paper which shall be the background paper relating to the proposed. Dissertation conducted internally by the College/Departments.

#### 4. Structure of the Course

<b>Subject Code</b>	<b>Title of the Course</b>	<b>Credits L T P C</b>	<b>Total Marks</b>
	PART-I Scientific Research and Methodology	4 0 0 4	100
	Advanced Physics	4 0 0 4	100
	Optional Paper	4 0 0 4	100
	PART-II Project and Viva-voce	12 0 0 12	200

\* 150 Project 50 Viva-voce

#### 5. Scheme of Examinations

Part-I Written Examination: Paper I, II & III

The examination of papers I, II and III shall be held at the end of first semester. The duration for each paper shall be 3 hours carrying a maximum of 100 marks.

Paper - III examination will be conducted by the College / Departments and the marks obtained by the candidate along with the question paper and valued answer scripts shall be sent to the University at least 15 days before the commencement of the examinations of paper I and II.

The examiners will be appointed from the panel of four names of each paper (I and II) submitted by the College / Departments concerned. If one examiner awards a pass mark and the other fail mark the, paper will be valued by a third examiner whose award of marks will be final.

## **Part - II - Dissertation:**

The exact title of the Dissertation shall be intimated with in one month after the completion of the written examination. Candidates shall submit the Dissertation to the University through the Supervisor and Head of the Department at the end of the year from the commencement of the course which shall be valued by internal examiner (supervisor) and one external examiner appointed by the University from a panel of four names sent by the Supervisor through the Head of the Department / Principal at the time of submitting the dissertation.

The examiners who value the Dissertation shall report on the merit of candidates as "Highly Commended" (75 % and above) or "Commended" (50 % and above and below 75 %) or "Not Commended" (below 50 %).

If one examiner commends the Dissertation and the other examiner, does not commend, the Dissertation will be referred to a third examiner and the third valuation shall be final.

Submission or resubmission of the Dissertation will be allowed twice a year.

## **06. QUESTION PAPER PATTERN**

Question paper pattern for University Examinations

Time	-	3 Hours
Maximum	-	100 marks
Passing Minimum	-	50 marks

### **Part - A (5x5=25 Marks)**

Answer all questions  
(Either or Type)

### **Part - B (5x15=75 Marks)**

Answer all questions  
(Either or Type)

# Periyar University

## Syllabus for M.Phil (Physics) Degree Course

### Paper – I - Scientific Research and Methodology

#### UNIT – I

**Method of Research:** Identification of the problem – Literature Survey – Reference Collection – Internet Browsing – Assessing the current status – Mode of approach actual investigation – Results and Discussion – Conclusion – Presenting a Scientific Seminar – Synopsis writing - Art of Writing a Research Paper and Thesis – Multimedia techniques in papers presentation - Power point – presentation and Chart.

#### UNIT – II

**Computer Oriented Numerical Methods:** Solution of equations – Simple iterative method – Newton – Raphson method – Numerical integration – Simpson's rule – Runge-Kutta Method - Gaussian quadrature - Solution of simultaneous equations – Gauss – Jordon elimination method – Eigen values and eigen vectors by matrix diagonalisation (Jacobian method)

#### UNIT – III

**Statistical Methods:** Interpolation – Lagrange and Newton interpolation – Linear interpolation – Higher order interpolation – Finite difference operators – Interpolating polynomials using finite differences – Least square approximation – curve fitting – Multivariant technique for data analysis.

#### UNIT – IV

**Programming in C:** Basic structure of C programming – Character set – constants – keywords and identifiers – variables – data declaration of variables – assigning values to variables – defining symbolic constants.

Operators (Arithmetic, relational, logical, assignment, increment, decrement, conditional and special) type conversion in expressions.

#### UNIT V

**Functions of C:** Arrays (One, two, multi dimensional arrays) - initiating two - dimensional arrays declaring and initialing string variables - reading and writing strings on the screen - arithmetic operations on strings. User defined functions-their needs – multiplication programme - the form of C function - return values and their types – calling functions – category of functions - no arguments and no return value – Sample programs: Matrix multiplication, diagonalisation and inversion – solution to simultaneous equation – differential equations.

## REFERENCES:

1. Multimedia Communications – Directions & Innovation – Jerry D.Gibson – Academic Press – Harcourt Asia Company. **(For unit-I)**
2. Multimedia Systems – John F.Koegel Buford – Twelfth Edition – Pearson Education – 2005 **(for unit –I)**
3. Thesis and assignment writing – J.Anderson, B.H.Durstun and M.Poole, Wiley Eastern (1977)
4. How to write a research paper - Berry
5. Form and style in the thesis writing – W. G.Campbell
6. A handbook of Methodology of Research – Rajammal P.Devadas, R.M.M. Vidyalaya Press (1976)
7. Computer Oriented Numerical Methods – V.Rajaraman, Prentice – Hill (1985)
8. Introduction to Numerical Methods – P.A.Stark, Macmillan (1970)
9. Programming in C – E.Balagurusamy, Tata McGraw.Hill Publishing Company.
10. Programming in C – Schaum’s Series – Tata Mc Graw Hill Publishing Company.
11. Numerical methods for scientific and Engineering Computation - N.K.Jain, S.R.K.Iyengar and R.K.Jain – New Age International Publisher (2004)
12. Numerical methods – E.Balagurusamy - Tata Mc Graw Hill Publishing Company.

# Periyar University

## Syllabus for M.Phil (Physics) Degree Course

### Paper – II – Advanced Physics

#### Unit: I

**Solar Energy:** Energy sources and their availability – Prospects of renewable energy sources. Solar cells: Solar cells for direct conversion of solar energy to electric powers – Solar cell parameter – Solar cell electrical characteristics – Efficiency – Single crystal silicon solar cells – Polycrystalline silicon solar cells – cadmium sulphide solar cells. Applications of solar energy: Solar water heating – space heating and space cooling – solar photo voltaics – agricultural and industrial process heat – solar distillation – solar pumping – solar furnace – solar cooking – solar green house.

#### Unit: II

**X-ray – Diffraction:** X-rays - X-ray sources – conventional generators - construction and geometry - sealed tube – rotating anode generators – choice of radiation - Synchrotron radiation – X-ray optics: filters– monochromators – collimators – mirrors - safety. Crystals – Lattice planes - Miller indices – Space lattice - X-ray diffraction reciprocal lattice – relation between direct and reciprocal space – Bragg’s law in reciprocal lattice – X-ray Powder diffraction method.

#### Unit: III

##### **Lasers and Non-linear Optics:**

**Lasers:** Basic principles of Lasers - Nd:YAG Laser – He-Ne Laser – Semi-conductor diode Laser – Dye Laser – Co-Chemical Laser – Tunable Laser – Colour center Lasers. Applications of Lasers in medicine – industry – communication and Holography.

**Non-linear Optics:** Harmonic generation – Second and higher order harmonics generation – phase matching - Optical Mixing – Optical parametric oscillations - Multi-photon processing.

#### Unit: IV

##### **Vibrational Spectroscopy:**

Infrared Spectroscopy-Vibrational study of diatomic molecules – IR rotation – Vibrational spectra of gaseous diatomic molecules – simple gaseous polyatomic molecules –vibrational frequencies and qualitative analysis – Quantitative IR analysis – determination of bond length and bond moment – determination of interstellar atoms and molecules – FT technique in IR spectroscopy – Non-linear phenomena in Raman Spectroscopy - SERS – CARS – FT technique in Raman spectroscopy - Application of vibrational Spectroscopy in structural elucidations.

## **Unit: V**

### **Non-Linear Dynamics:**

Introduction to Nonlinear Dynamical Systems The notion of nonlinearity- superposition principle and its validity- linear and nonlinear oscillators- autonomous and non autonomous systems- equilibrium points- phase space- classification of equilibrium points.- Chaos – Solitons – Definitions.

### References

1. Kreith and Kreider, Principles of solar Engineering, Mc Graw Hill Pub.,
2. A.B.Meinel and A.P.Meinel, Applied Solar Energy.
3. M.P.Agarwal, Solar Energy, S.Chand & Co.,
4. S.P.Sukhatme, Solar Energy, TMH.
5. G.D.Rai, Non-conventional Energy sources, Khauna Publications, Delhi.
6. X-ray Structure Determination (2<sup>nd</sup> Edition) - Stout and Jensen – John Wiley Publications (1989)
7. Fundamentals of Crystallography –(2<sup>nd</sup> Edition)- C. Giacovazzo- Oxford Press
8. Structure Determination by X-ray Crystallography (2<sup>nd</sup> Edition)- Ladd and Palmer
9. William Silfvast, Laser Fundamentals, Cambridge University Press, London (1996).
10. B.B.Laud, Lasers and Non-linear Optics, New Age International (P) Ltd., (Second Edition) New Delhi (1991).
11. Demtrodos, Laser – Spectroscopy Basic concepts and Instrumentations. - Third Edition – Springer – International Edition.
12. Ajoy Ghatak, Optics – (2<sup>nd</sup> Edition) Tata Mc Graw Hill Publishing Company.
13. C.N.Banwell, Fundamentals of Molecular Spectroscopy, Tata Mc Graw Hill (1972)
14. B.P.Straughan and Walkar.S, Spectroscopy Vol.2, Chapman & Hall (1976)
15. D.N.Sathyanarayana, Vibrational Spectroscopy, New Age International (2004)
16. M. Lakshmanan and S. Rajasekar, Nonlinear Dynamics: Integrability Chaos and Patterns, Springer-Verlag, Berlin (2003)



# **Periyar University**

**Syllabus for M.Phil (Physics) Degree Course**

## **Paper – III – Optional Paper**

III (a) Material Science

III (b) Crystallography and Molecular Biophysics

III (c) Laser Physics

III (d) Spectroscopy

III (e) Nonlinear Dynamics

III (f) Advanced Crystallography

III (g) Quantum Theory of Atoms in Molecules

III (h) Non Linear Optics

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