PERIYAR UNIVERSITY

PERIYAR PALKALAI NAGAR

SALEM-636 011

M.Phil. DEGREE

PHYSICS

REGULATIONS AND SYLLABUS

CBCS PATTERN

(Effective from the academic year 2012-2013 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

Subject Code	Title of the Course	Credit L	T	P	C	Internal	External	Total Marks
	PART - I Scientific Research and Methodology	4	0	0	4	25	75	100
	Advanced Physics	4	0	0	4	25	75	100
	Optional Paper	4	0	0	4	25	75	100
	PART - II Project and Viva-voce	8	0	0	8			
	Dissertation							
	Viva - Vose	4	0	0	4			
	Dissertation				24	150 Marks		
	Vivo – Voce					50 Marks		
						200 Marks		

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 the year. 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 atleast 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 an 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)

7. Passing Minimum:

A candidate shall be declared to have passed Part-I of the examination if he / she secures not less than 50 % of the marks in each paper including Paper – III for which examination is conducted internally.

A candidate shall be declared to have passed Part – II of the examination if his / her dissertation is atleast commended.

All other candidates shall be declared to have failed in the examination.

8. Restriction in number of chances:

No candidate shall be permitted to reappear for the written examination in any paper on more than two occasions or to resubmit a Dissertation more than once. Candidates shall have to qualify for the degree passing all the written papers and dissertation within a period of three years from the date of commencement of the course.

9. Conferment of Degree:

No candidate shall be eligible for conferment of the M.Phil. degree unless he / she is declared to have passed both the parts of the examinations as per the Regulations.

10.Qualifications for persons conducting the M.Phil. Course:

No teacher shall be recognised as a Supervisor unless he possesses Ph.D. degree or two years of PG teaching experience after qualifying for M.Phil. Or M.Litt. Degree.

Only the postgraduate departments of affiliated colleges and departments of the University will be recognised for conducting the M.Phil. Course, provided however, the Syndicate shall have the power to decide any other institutions of higher learning / research within the University area for conducting the M.Phil. Course on merits.

PART – TIME

11. Eligibility:

(i) Teacher candidates working in the University Departments

(ii) Teacher candidates working in the affiliated colleges and whose qualifications are approved by the University

(iii) Teachers candidates working in Polytechnics approved by the Director of Technical Education or in Higher Secondary Schools and High Schools approved by State Board or Central Board of Secondary Education or Educational Institutions of IAF (within Periyar University area) who possess a Master's Degree. For the Master's Degree qualified prior to 01.01.1991, no minimum marks is prescribed; but on or after 01.01.1991, a minimum of 55 % of the marks is prescribed, provided that for the candidates belonging to SC/ST community a concession of 5 % marks will be given in the minimum eligibility marks prescribed.

12. Duration:

The course of study shall extend over a period of two years from the commencement of the course. The examinations for Part-I shall be taken at the end of the first year and Part-II Dissertation at the end of the second year.

13. Regulation:

The Regulations governing the full-time M.Phil. Course with regard to course of study, scheme of examinations passing minimum, etc and qualifications of guide conducting the M.Phil. Course shall apply to part-time candidates also.

14.Restriction in number of chances:

No candidate shall be permitted to reappear for the written examination in any paper on more than two occasions or to resubmit a Dissertation more than once. Candidates shall have to qualify for the degree passing all the written papers and dissertation within a period of four years from the date of commencement of the course.

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 interactive 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 – Multivarient 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.

Books for 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.Durston 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.

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.

Books for References:

1. Kreith and Kreider, Principles of solar Engineering, Tata McGraw Hill Publication.
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 (2nd Edition) - Stout and Jensen – John Wiley Publications (1989)

7. Fundamentals of Crystallography –(2nd Edition)- C. Giacovazzo- Oxford Press
8. Structure Determination by X-ray Crystallography (2nd 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. Demtrodes, Laser – Spectroscopy Basic concepts and Instrumentations. - Third Edition – Springer – International Edition.
12. Ajoy Ghatak, Optics – (2nd Edition) Tata Mc Graw Hill Publishing Company.
13. C.N.Banwell, Fundamentals of Molecular Spectroscopy, Tata McGraw 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)

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