

**M.Phil., ENERGY STUDIES (CBCS)
REGULATIONS, SCHEME &
SYLLABUS
WITH EFFECTIVE FROM 2017-2018
ONWARDS**

DEPARTMENT OF ENERGY STUDIES



PERIYAR UNIVERSITY

PERIYAR PALKALAI NAGAR

SALEM – 636 011

TAMILNADU

**DEGREE OF MASTER OF PHILOSOPHY (M.Phil)
REGULATIONS WITH EFFECTIVE FROM
2017-18 ONWARDS**

FULL-TIME

1. Eligibility:

Candidates who have qualified for post graduate degree (M.Sc.,- Energy Studies, Physics, Chemistry, Geology & Electronics or M.E/M.Tech-Mechanical, Mechatronics, EEE, ECE, Auto & Chemical) of this University or any other University recognized 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	CREDITS L T P C	TOTAL MARKS
17MPERS01	PART-I Scientific Research and Methodology	4 0 0 4	100
17MPERS02	Energy Resources and Conversion Techniques	4 0 0 4	100
17MPERS03	Optional Paper (Guide Paper)	4 0 0 4	100
17MPERS04	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 five 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 area of the Dissertation, which should be relevant to the specialization course, shall be intimated to the office of the controller of examinations within a month from the date of the commencement of the second semester. Candidates shall submit two copies of the Dissertation to the controller of examination through the Supervisor and Head of the Department concerned at the end of the second semester. The supervisor should submit a panel of five examiners along with the dissertation for the evaluation of specialization course, dissertation and to conduct the viva voce. The respective supervisors shall be an internal examiner. The viva board should consist of the research supervisor, head of the department and external examiner.

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 %).

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 secure 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 at least 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. Eligibility for research supervisors conducting the M.Phil. Programme:

As per the regulations of Periyar University.

PAPER I – RESEARCH METHODOLOGY

UNIT-I - OBJECTIVES AND TYPES OF RESEARCH

Motivation and objectives – Research methods *vs* Methodology. Types of research – Descriptive *vs*. Analytical, Applied *vs*. Fundamental, Quantitative *vs*. Qualitative, Conceptual *vs*. Empirical.

UNIT-II - RESEARCH FORMULATION

Defining and formulating the research problem - Selecting the problem - Necessity of defining the problem - Importance of literature review in defining a problem – Literature review – Primary and secondary sources – reviews, treatise, monographs-patents – web as a source – searching the web - Critical literature review – Identifying gap areas from literature review - Development of working hypothesis.

UNIT-III - RESEARCH DESIGN AND METHODS

Research design – Basic Principles- Need of research design — Features of good design – Important concepts relating to research design – Observation and Facts, Laws and Theories, Prediction and explanation, Induction, Deduction, Development of Models. Developing a research plan - Exploration, Description, Diagnosis, Experimentation. Determining experimental and sample designs.

UNIT-IV - DATA COLLECTION AND ANALYSIS

Execution of the research - Observation and Collection of data - Methods of data collection – Sampling Methods- Data Processing and Analysis strategies - Data Analysis with Statistical Packages - Hypothesis-testing - Generalization and Interpretation.

UNIT-V - REPORTING AND THESIS WRITING

Structure and components of scientific reports - Types of report – Technical reports and thesis – Significance – Different steps in the preparation – Layout, structure and Language of typical reports – Illustrations and tables - Bibliography, referencing and footnotes - Oral presentation – Planning – Preparation – Practice – Making presentation – Use of visual aids - Importance of effective communication – Plagiarism - Citation and acknowledgement- Reproducibility and accountability.

REFERENCES

1. Garg, B.L., Karadia, R., Agarwal, F. and Agarwal, U.K., 2002. An introduction to Research Methodology, RBSA Publishers.
2. Kothari, C.R., 1990. Research Methodology: Methods and Techniques. New Age International. 418p.
3. Sinha, S.C. and Dhiman, A.K., 2002. Research Methodology, Ess Ess publications. 2 volumes.
4. Trochim, W.M.K., 2005. Research Methods: the concise knowledge base, Atomic Dog Publishing. 270p.
5. Wadehra, B.L. 2000. Law relating to patents, trademarks, copyright designs and geographical indications. Universal Law Publishing.
6. Carlos, C.M., 2000. Intellectual property rights, the WTO and developing countries: the TRIPS agreement and policy options. Zed Books, New York.
7. Coley, S.M. and Scheinberg, C. A., 1990, "Proposal Writing", Sage Publications.
8. Day, R.A., 1992. How to Write and Publish a Scientific Paper, Cambridge University Press.

PAPER- II - ENERGY RESOURCES AND CONVERSION TECHNIQUES

UNIT I –GLOBAL AND INDIAN ENERGY SCENARIO

Role of energy in economic development and social transformation - Energy sources - overall Energy demand and availability - Energy consumption in various sectors and its changing pattern - Depletion of energy sources

Energy resources & Consumption-Commercial and noncommercial forms of energy- fossil fuels- renewable sources in India- Sector wise energy Consumption - impact of energy on economy – Need for use of new and renewable energy sources-present status and future of nuclear and renewable energy -Renewable Energy-Power sector reforms-restructuring of energy supply sector-energy strategy for future.

UNIT- II ENERGY CONVERSION SYSTEM

Conventional energy conversion cycles - Reversible and irreversible cycles – Thermodynamics analysis of Carnot – Stirling – Ericsson – Otto – Diesel – Dual – Lenoir – Atkinson – Brayton – Rankine-Thermoelectric Converters – Thermionic converters – MHD – Ferro electric converter – Nernst effect generator

UNIT-III SOLAR ENERGY

Solar radiation at the earth's surface – solar radiation measurements – estimation of average solar radiation - solar thermal flat plate collectors - concentrating collectors – solar thermal applications - heating, cooling, desalination, drying, cooking– solar thermal electric power plant - principle of photovoltaic conversion of solar energy-types of solar cells - Photovoltaic applications: battery charger, domestic lighting, street lighting, water pumping-solar PV power plant – Net metering concept.

UNIT-IV WIND ENERGY

Nature of the wind – power in the wind – factors influencing wind – wind data and energy estimation - wind speed monitoring - wind resource assessment - Betz limit - site selection - wind energy conversion devices - classification, characteristics, applications – offshore wind energy - Hybrid systems - safety and environmental aspects – wind energy potential and installation in India - Repowering concept.

UNIT IV - OTHER TYPES OF ENERGY

Biomass resources and their classification - Biomass conversion processes – thermo-chemical conversion- bio diesel production – urban waste to energy conversion -ocean energy resources - principle of ocean thermal energy conversion (OTEC) - ocean thermal power plants - ocean wave energy

conversion - tidal energy conversion – small hydro - geothermal energy - geothermal power plants – hydrogen production and storage - Fuel cell – principle of working - various types - construction and applications.

REFERENCES:

1. J. Goldemberg, T.B. Johansson, A.K.N. Reddy and R.H. Williams: Energy for a Sustainable World, Wiley Eastern, 1990.
2. World Energy Resources : Charles E. Brown, Springer, 2002.
3. Sukhatme, S.P., Solar Energy, Tata McGraw Hill, 1984.
4. Twidell, J.W. and Weir, A., Renewable Energy Sources, EFN Spon Ltd.,1986.
5. Kishore VVN, Renewable Energy Engineering and Technology, Teri Press, New Delhi, 2012.
6. Peter Gevorkian, Sustainable Energy Systems Engineering, McGraw Hill,2007.
7. Kreith, F and Kreider, J. F., Principles of Solar Engineering, McGraw Hill, 1978.
8. Godfrey Boyle, Renewable Energy, Power for a Sustainable Future, Oxford University Press, U.K, 1996.
9. Veziroglu, T.N., Alternative Energy Sources, Vol 5 and 6, McGraw Hill, 1990.
10. Anthony San Pietro, Biochemical and Photosynthetic aspects of Energy Production, Academic Press, 1980.
11. Bridgurater, A.V., Thermochemical processing of Biomass, Academic Press, 1981.
12. Bent Sorensen, Renewable Energy, Elsevier, Academic Press, 2011.

PAPER – III – OPTIONAL PAPER

- III (a) Solar Energy Technologies
- III (b) Wind Energy System
- III (c) Advanced Energy Storage Technologies
- III (d) Thermodynamic Analysis of Energy Systems
- III (e) Fluid Mechanics and Heat Transfer
- III (f) Advanced Crystallography
- III (g) Thin Film Technology
- III (h) Non Linear Optics
- III (i) Bio Energy Conversion Techniques
- III (j) Thermodynamic Analysis of Energy Systems
- III (k) Nanotechnology for Energy systems
- III (l) Imaging techniques for Nanotechnology