

**SYLLABI**  
**OF**  
**PhD (Electrical Engineering)**

**2020 - 2021**



**DEPARTMENT OF ELECTRICAL ENGINEERING**

**J.C. BOSE UNIVERSITY OF SCIENCE &  
TECHNOLOGY, YMCA, FARIDABAD**

**J.C. Bose University of Science and Technology, YMCA, Faridabad**  
**Ph.D. (Electrical Engineering)**

**Scheme of Studies / Examination**

Course No.	Course Title	Teaching Schedule			Marks for sessionals	Marks for End Term Examination	Total Marks	Credits
		L	T	P				
PHD-100A	Research Methodology	4	0	0	25	75	100	4
CPE-RPE	Research and Publication Ethics	2	0	0	25	75	100	2
PHEL-04	Electric and Hybrid Vehicles	4	0	0	25	75	100	4
	Total	10	0	0	75	225	300	10

**PHD – 100A**  
**RESEARCH METHODOLOGY**  
*PhD (Common Subject)*

No. of Credits: 4	Sessional:	25 Marks
L   T   P   Total	Theory:	75 Marks
4   0   0   4	Total:	100 Marks
	Duration of Exam:	3 Hours

**Course Objectives:**

- Understand research process in order to plan a research proposal
- Learn methods to devise and design a research set-up
- Plan and perform data collection methods and its analysis
- Conclude research in report writing

**Course Outcomes: The research scholar shall be able to**

- CO1 Plan a research proposal and design the research.
- CO2 Collect data through experiments or surveys as per research requirement.
- CO3 Understand and apply sampling and sampling distributions.
- CO4 Understand and perform quantitative and qualitative data analysis.
- CO5 Write research report with proper citations.

**Unit 1 Introduction to Research:** Definition, need and purpose of research, types of research, research process, approaches to research, planning a research proposal, literature review.

**Unit 2 Measurement Scales:** Indexes vs. Scales, Types of Scale, construction of Scale, Bogardus social distance scale, Thurstone Scale, Likert Scale, Semantic Differential Scale, Guttman Scale.

**Unit 3 Data Collection Methods:** Experiments and Surveys, Experiments: Classical Experiments, Independent & Dependent Variables, Pre Testing & Post Testing, Double Blind Experiment, Subject Selection, Variation on Experiment Design. Survey Research: Topics appropriate for survey research, Guidelines for asking questions, Questionnaire Construction, Strengths & Weakness of Survey Research,

Types of Surveys.

**Unit 4 Sampling:** Types of sampling methods: Non Probability Sampling, Probability Sampling, Theory & Logic of Probability Sampling, Sampling Distributions & Estimates of Sampling Error.

**Unit 5 Data Analysis:** Qualitative v/s Quantitative data analysis, Qualitative Data Analysis: Discovering Patterns, Grounded Theory Method, Semiotics, Conversation Analysis, Qualitative Data Processing. Quantitative Data Analysis: Quantification of Data, Univariate Analysis, Bivariate Analysis, Multivariate Analysis, Regression Analysis, Description Analysis. Hypothesis. Multiple Attribute Decision Making.

**Unit 6 Report Writing, Ethical Issues and Outcomes:** Report Preparation, Structure of Report, Report Writing Skills, Citations, Research Papers, Intellectual Property Rights, Plagiarism, Patent, Commercialization, Ethical Issues.

**References:**

1. Research Methodology by R. Panneerselvam, 2<sup>nd</sup> Ed. PHI
2. Research Methodology by C.R. Kothari & Gaurav Garg, 3<sup>rd</sup> Ed. New Age Publishers
3. Research Methodology and Scientific Writing by C. George Thomas, Ane Books
4. The practice of social research by Earl Babbie, 14<sup>th</sup> Ed. Cengage
5. Multiple Attribute Decision Making, Gwo-Hshiung Tzeng and Jih-Jeng Huang, CRC Press

**PHD – CPE-RPE**  
**RESEARCH AND PUBLICATION ETHICS**  
*PhD (Common Subject)*

**Course structure**

- The course comprises of six modules listed in table below. Each module has 4-5 units.

Modules	Unit title	Teaching hours
<b>Theory</b>		
RPE 01	Philosophy and Ethics	4
RPE 02	Scientific Conduct	4
RPE 03	Publication Ethics	7
<b>Practice</b>		
RPE 04	Open Access Publishing	4
RPE 05	Publication Misconduct	4
RPE 06	Databases and Research Metrics	7
	<b>Total</b>	<b>30</b>

**Syllabus in detail**

**THEORY**

- **RPE 01: PHILOSOPHY AND ETHICS (3 hrs.)**
  1. Introduction to philosophy: definition, nature and scope, concept, branches
  2. Ethics: definition, moral philosophy, nature of moral judgements and reactions

- **RPE 02: SCIENTIFIC CONDUCT (5hrs.)**

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

- **RPE 03: PUBLICATION ETHICS (7 hrs.)**

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 behavior 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

**PRACTICE**

- **RPE 04: OPEN ACCESS PUBLISHING(4 hrs.)**

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.

- **RPE 05: PUBLICATION MISCONDUCT (4hrs.)**

**A. Group Discussions (2 hrs.)**

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 hrs.)**

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

- **RPE 06: DATABASES AND RESEARCH METRICS (7hrs.)**

**A. Databases (4 hrs.)**

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

**B. Research Metrics (3 hrs.)**

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

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<b>PHEL-04</b>	<b>ELECTRIC AND HYBRID VEHICLES</b>
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**L T P Cr**  
**4 0 0 4**

**Sessional - 25**  
**End Sem – 75**  
**Total – 100**

<p><b>Course Objectives:</b> Students will be able to:</p> <ol style="list-style-type: none"> <li>1. To understand upcoming technology of hybrid system.</li> <li>2. To understand different aspects of drives application.</li> <li>3. Learning the Electric traction.</li> </ol>
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### Syllabus

Units	Content	Hours
<b>1.</b>	History of hybrid and electric vehicles, Social and environmental importance of hybrid and electric vehicles, Impact of modern drivetrains on energy, Basics of vehicle performance, Vehicle power source characterization transmission characteristics.	<b>8</b>
<b>2.</b>	Basic concept of hybrid traction, Introduction to various hybrid drive train topologies, Power flow control in hybrid drive-train topologies, Fuel efficiency analysis.	<b>8</b>
<b>3.</b>	Introduction to electric components used in hybrid and electric vehicles, Configuration and control of DC motor drives, Configuration and control of Induction motor drives motor drives, Configuration and control of permanent magnet motor drives, Configuration and control of Switch Reluctance motor drives, drive system efficiency.	<b>10</b>
<b>4.</b>	Fundamental of batteries, different types of batteries, dry cell and wet cell battery, Construction and working of Li-ion, Zinc Chloride and lead acid batteries, Vehicle charging technologies, Battery management system, Electric vehicle cooling system.	<b>8</b>
<b>5.</b>	Introduction to energy management and their strategies in hybrid and electric vehicles, Classification of different energy management strategies, Comparison of different energy management strategies	<b>6</b>

### Suggested Reading

1. Iqbal Husain, ELECTRIC and HYBRID VEHICLES, Design Fundamentals, CRC Press, 2003.
2. M. Ehsani, Y. Gao, S. Gay and A. Emadi, Modern Electric, Hybrid Electric, and Fuel Cell Vehicles, CRC Press, 2005.

### Course Outcomes:

- Students will be able to;
1. Acquire knowledge about fundamental concept, principles, analysis and design of hybrid and electric vehicles.
  2. To learn electric drives in vehicles/ traction.







