

**RIMT UNIVERSITY MANDI GOBINDGARH
PUNJAB**



RIMT
UNIVERSITY

**Pattern of Course Work & Detailed Syllabus
For
Ph.D Programme
In
Electrical Engineering**

Pattern of Course Work for Ph.D Programme in Electrical Engineering

Name of Course		Contact Hours/Week			Credit	Evaluation Scheme (% of Total Marks)					Exam Duration (Hours)
Code	Title	L	T	P		CWA	LWA	MTE	ETE	Total	
PHDRM 1101	Research Methodology & Statistical Technique	5	0	0	5	16	---	24	60	100	
PHDCA 1102	Computer Applications in Research	3	0	0	3	16	---	24	60	100	
PHDEE 1103 Y	*Core Subject of the Discipline in which Ph.D degree to be Awarded	5	0	0	5	16	---	24	60	100	
PHD 1104	Mini Project/Term Paper	-	-	-	2	---	---	---	100	100	
Total											

*This course is to be suggested by guide/supervisor in specific domain area of research undertaken by the research candidate. Concerned Department/Faculty will provide a list of core subjects offered by the department. The candidate will select any one from them.

List of Core Subjects for PhD Program

The candidates need to select any one course from the following elective courses.

Name of Course		Contact Hours/Week			Credit	Evaluation Scheme (% of Total Marks)					Exam Duration (Hours)
Code	Title	L	T	P		CWA	LWA	MTE	ETE	Total	
PHDEE 1103 A	NON-CONVENTIONAL ENERGY RESOURCES	5	0	0	5	16	---	24	60	100	
PHDEE 1103 B	ELECTRIC TRACTION SYSTEM	5	0	0	5	16	---	24	60	100	
PHDEE 1103 C	ADVANCED TRANSDUCERS TECHNOLOGY	5	0	0	5	16	---	24	60	100	

PHDEE 1103A- NON- CONVENTIONAL ENERGY RESOURCES

Section-A

INTRODUCTION: Limitation of conventional energy sources, need and growth of alternative energy source, basic scheme and application of direct energy conservation.

MHD GENERATORS: Basic principles, gaseous, conduction and hall effect, generator and motor effect, different types of Magneto-Hydro-Dynamic (MHD) generator, types of MHD material, conversion effectiveness, analysis of constant area MHD generator, practical MHD generator, application and economic aspects

Section-B

THERMO-ELECTRIC GENERATORS: Thermoelectric effects, Seebeck effect, Peltier effect, Thomson effect, thermoelectric converters, figures of merit, properties of thermoelectric material, brief description of the construction of thermoelectric generators, application and economic aspect

Section-C

PHOTOVOLTAIC EFFECT AND SOLAR ENERGY: Photovoltaic effect, different types of photovoltaic cells, cell fabrication, characteristics of photovoltaic cells, conversion efficiency, solar batteries, application, solar radiation analysis, solar energy in India, solar collectors, solar furnaces and applications.

Section-D

FUEL CELLS: Principle of action, Gibb's free energy, general description of fuel cells, types, construction, operational characteristics and application.

MISCELLANEOUS SOURCES: Geothermal system, hydro-electric plants, wind power, tidal energy, Bio-mass energy

Recommended Books:

1. Rai, G.D., *Non Conventional Energy Sources*, Khanna Publishers (2005).
2. Chakrabarti A., Soni M. L., Gupta P. V. and Bhatnagar U. S., *Power System Engineering*, Dhanpat Rai and Co.
3. Gupta B. R., *Generation of Electrical Energy*, S. Chand.
4. Simon, Christopher A., *Alternate Source of Energy*, Rowman and LittleField Publishers Inc.(2007).
5. Venikov, V.A. and Putyain, E.V., *Introduction to Energy Technology*, Mir Publishers (1990).

PHDEE 1103B- ELECTRIC TRACTION SYSTEM

Section-A

INTRODUCTION: Definitions, Classification and symbolization of electric vehicles on land. The general structure of an electric drive system, Concept of electrical drives, Basic features of industrial drives, review of operating and starting characteristics of different types of electric motors for various drives (AC and DC motors).

Section-B

THEORETICAL FOUNDATION: Movement of a convoy, the equation of motion of the convoy, making the thrust, making braking force, Drag the convoy, Principles of construction diagrams walk.

Section-C

DRIVE MOTOR UNIT: Electric traction motors (DC motors, induction motors, synchronous motors with electromagnetic excitation, as permanent magnet motors, linear motors) and electric drive systems specific electric traction. Units powered engines nip DC (possible solutions; engine control unit).

Section-D

DRIVES SPECIFICATION: Estimation of rating and heating of motors, load equalization (Fly wheel effect), drives for particular services, units powered motors in AC line contact (possible solutions, engine control units), Diesel Electric units (specific problems, possible solutions, engine control units), specific aspects of electrical drive systems for high-speed trains.

BOOKS RECOMMENDED:

1. Tripathy S. C., *Electric Energy Utilization and Conservation*, Tata McGraw Hill
2. Taylor E.O., *Utilization of Electric Energy*, Orient Blackswan
3. Hughes Austin, *Electric Motors and Drives: Fundamentals, Types and Applications*, Newnes, (2005)
4. Partab H., *Modern Electric Traction*, Dhanpat Rai
5. De N.K. and Sen P.K., *Electric Drives*, PHI publication
6. Berde M.S., *Electric Motor Drives*, Khanna Publishers
7. Gupta J.B., *Utilization of Electric Power and Electric Traction*, S.K. Kataria and Sons

PHDEE 1103C- ADVANCED TRANSDUCERS TECHNOLOGY

Section A

Introduction to Transducers and Its Classification. Characteristics of Transducers. Selection Criteria of Transducers. Errors in measurement. Types of errors – Statistical analysis of measurement data – Mean, Standard Deviation, Probability errors.

Section B

Variable Resistance transducers and its types. Concept of Three Wire and Four Wire RTDs. Potentiometers, strain gauges, resistance thermometers, thermistors, hotwire anemometers, Variable Inductance and variable capacitance transducers. Piezoelectric, Magnetostrictive, Electromagnetic transducers, thermo-electric sensor, semiconductor temperature sensors. Force balance transducers.

Section C

Analog Signal Conditioning techniques: Bridge Amplifier, Carrier Amplifiers, Charge Amplifiers and Impedance Converters, Modulation and demodulation Techniques, dynamic compensation, linearization, multiplexing and de-multiplexing.

Section D

Digital Interfacing techniques:- Interfaces, processors, code converters, liberalizers. Single transmission. Cable transmission of analog and digital signal, fiber optic signal transmission, radio, telemetry, pneumatic transmission. Signal Display/Recording systems. Graphic display systems, storage oscilloscope, recorders-ink, thermal, UV. Smart Sensors.

Recommended Books:

1. *Doebelin, E.O.–Measurement Systems: Application and Design, Mc Graw Hill International.*
2. *Patranabis, D – Sensors and Transducers, Wheeler Pub., New Delhi.*
3. *Murthy, D.V.S., Transducers and Instrumentation, PHI, New Delhi.*
4. *Swobada, G. – Telecontrol: Methods and Applications of Telemetry and Remote Control. Van Nostrand.*
5. *Newbert, H. K. – Instrument Transducers, Oxford University Press.*