

BIJUPATNAIKUNIVERSITY OF TECHNOLOGY, ODISHA
ROURKELA



Curriculum and Syllabus

B. Tech (*Electrical Engineering*) for the Batch
2018-19

Semester (5th)


Principal
Radhakrishna Institute of Technology
and Engineering, Bhubaneswar

B. Tech in Electrical Engineering (Admission Batch: 2018-2019)

5th Semester

Theory					
Sl. No.	Category	Course Code	Course Title	L-T-P	Credit
1	PC 11		Electric Power Transmission and Distribution	3-0-0	3
2	PC 12		Control System	3-0-0	3
3	PC 13		Electrical Machines-II	3-0-0	3
4	PE 2 (Any One)		Electrical Machine Design	3-0-0	3
			Electrical Energy Conservation and Auditing	3-0-0	
			Industrial Process Control and Dynamics	3-0-0	
5	PE 3 (Any One)		Electric Drives	3-0-0	3
			Renewable Power Generating System	3-0-0	
			Sensors and Transducers	3-0-0	
6	MC 5		Universal Human Values		0
Total Credit (Theory)					15
Practical					
1	PC 14		Electric Power Transmission and Distribution Lab	0-0-3	2
2	PC 15		Control and Instrumentation Lab	0-0-3	2
3	PC 16		Electrical Machines Lab-II	0-0-3	2
4	PSI 2		Evaluation of Summer Internship	0-0-3	1
Total Credit (Practical)					7
Total Semester Credit					22


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5th Semester

Electrical Energy Conservation and Auditing

Module I:

(12 Hours)

Electrical energy conservation: Energy economics- discount rate, payback period, internal rate of return, net present value, and life cycle cost. Energy generation, energy distribution, energy usage by processes, technical and economic evaluation, understanding energy costs, classification of energy conservation measures, plant energy performance, benchmarking and energy performance, matching energy usage to requirement, maximizing energy system efficiency, optimizing the input energy requirements, fuel and energy substitution, and energy balancing.

EB billing- HT and LT supply, transformers, electric motors- motor efficiency computation, energy efficient motors, pumps, fans, blowers, compressed air systems, refrigeration and air conditioning systems, cooling towers, electric heaters (space and liquid), DG-sets, illuminating devices, power factor improvement, and harmonics.

Module II:

(12 Hours)

Electrical energy audit: Energy consumption pattern and scenario of any region; Energy auditing: Need, types, methodology and approaches; Preliminary energy audit methodology (initial site visit and preparation required for detailed auditing, detailed energy audit activities, information and data collection, process flow diagram and process steps); Procedure and techniques: Data gathering, evaluation of saving opportunities, and energy audit reporting; and Energy audit instruments.

Module III:

(06 Hours)

Illumination: Illumination, luminous flux, lumen, luminous intensity, candela power, brightness, glare, types of lighting (incandescent, CFL, and LED), requirements of lux for various purposes, determine the method of lighting, select the lighting equipments, and calculate the lighting parameters.

Text Books:

- [1] Callaghn, P. W." Design and Management for Energy Conservation", Pergamon Press, Oxford, 1981.
- [2] Dryden. I. G. C., " The Efficient Use of Energy", Butterworths, London, 1982.
- [3] Energy Economics -A. V. Desai (Wiley Eastern).
- [4] Handbook of Energy Efficiency - CRC Press

Reference Books:

- [1] Energy Technology, OP Gupta, Khanna Book Publishing
- [2] Handbook of Energy Audits Albert Thumann, William J. Younger, Terry Niehus, 2009.
- [3] Handbook on Energy Audit and Environment Management, Y P Abbi and Shashank Jain, TERI, 2006.

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5th Semester

Renewable Power Generation Systems

Module I:

(15 Hours)

Introduction: Conventional energy Sources and its Impacts, Non conventional energy–seasonal variations and availability, Renewable energy – sources and features, Distributed energy systems and dispersed generation (DG). Solar Energy: Solar processes and spectral composition of solar radiation. Solar Thermal system-Solar collectors, Types and performance characteristics, Applications-Solar water heating systems(active & passive) , Solar space heating & cooling systems , Solar desalination systems, Solar cooker.Solar photovoltaic system-Operating principle, Photovoltaic cell concepts, Cell, module, array,Losses in Solar Cell, Effects of Shadowing-Partial and Complete Shadowing, Series and parallel connections, Cell mismatching, Maximum power point tracking, Applications-Battery charging,Pumping, Lighting, Peltier cooling. Modelling of PV cell.

Module II:

(10 Hours)

Wind Energy: Wind energy, Wind energy conversion; Wind power density, efficiency limit for wind energy conversion, types of converters, aerodynamics of wind rotors, power ~ speed and torque speed characteristics of wind turbines, wind turbine control systems; conversion to electrical power: induction and synchronous generators, grid connected and self excited induction generator operation, constant voltage and constant frequency generation with power electronic control single and double output systems, reactive power compensation, Characteristics of wind powerplant, Concept of DFIG.

Module III:

(9 Hours)

Biomass Power: Principles of biomass conversion, Combustion and fermentation, Anaerobic digestion, Types of biogas digester, Wood gassifier, Pyrolysis, Applications. Bio gas, Wood stoves,Bio diesel, Combustion engine, Application.

Module IV:

(6 Hours)

Hybrid Systems: Need for Hybrid Systems, Range and type of Hybrid systems, Case studies of Diesel-PV, Wind-PV, Microhydel-PV, Biomass-Diesel systems, electric and hybrid electric vehicles.

Text Books:

- [1] Godfrey Boyle“Renewable Energy- Power for a Sustainable Future”,Oxford University Press.
- [2] B.H.Khan, “Non-Conventional Energy Resources”,Tata McGrawHill, 2009.
- [3] S. N. Bhadra, D. Kasta, S. Banerjee, “Wind Electrical Systems”,Oxford University Press, 2005.

Reference Books:

- [1] S. A. Abbasi, N. Abbasi, “Renewable Energy Sources and Their Environmental Impact”, Prentice Hall of India, New Delhi, 2006

Digital Learning Resources:

Course Name: Energy Resources and Technology
Course Link: <https://nptel.ac.in/courses/108/105/108105058/>
Course Instructor: Prof. S Banerjee, IIT Kharagpur


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5th Semester

Universal Human Values (Self, Society and Nature)

Pre-requisites: Universal Human Values: Self & Family (desirable); 4-day Harmony-2 Workshop (co-requisite). Please refer to AICTE Model Curriculum-Vol-II.

1. Objective:

The objective of the course is four-fold:

- A. Sensitization of student towards issues in society and nature.
- B. Understanding (or developing clarity) of nature, society and larger systems, on the basis of human relationships and resolved individuals.
- C. Strengthening of self reflection.
- D. Development of commitment and courage to act.

(For elaboration on some of the above, consult course description for Universal Human Values 1: Self and Family, AICTE Model Curriculum-VOL-II).

2. Course Topics :

In this Universal Human Values course, the focus is more on understanding society and nature on the basis of self and human relationships.

- i) Purpose and motivation for the course.
- ii) Recapitulation (from the previous course) on ideas of self, pre-conditioning, and natural acceptance.
- iii) Harmony in the self. Understanding human being as co-existence of self and body. Identifying needs and satisfying needs of self and body. Self-observations. Handling peer pressure.
- iv) Recapitulation on relationships. Nine universal values in relationships. Reflecting on relationships in family. Hostel and institute as extended family. Real life examples.
- v) Teacher-student relationship. Shraddha. Guidance. Goal of education.
- vi) Harmony in nature. Four orders of nature – material order, plant order, animal order and human order. Salient features of each. Human being as cause of imbalance in nature. (Film “Home” can be used.)
- vii) Human being as cause of imbalance in nature. Depletion of resources – water, food, mineral resources. Pollution. Role of technology. Mutual enrichment not just recycling.
- viii) Prosperity arising out of material goods and understanding of self. Separation of needs of the self and needs of the body. Right utilization of resources. IkekU; vkdkk {kk ,oa egRokdkk {kk, Understanding the purpose they try to fulfil.



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