

BIJU PATNAIK UNIVERSITY OF TECHNOLOGY, ODISHA
ROURKELA



Curriculum and Syllabus

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

Semester (6th)

Principal
Radhakrishna Institute of Technology
and Engineering, Shubaneswar

Sixth Semester							
Theory							
Sl No	Category	Course Code	Course Title	L-T-P	Credit	University Marks	Internal Evaluation
1	PC	REL6C001	Power System operation and Control	3-0-0	3	100	50
2	PC		Microprocessor and Micro controllers	3-0-0	3	100	50
3	BS		Optimization in Engineering	3-0-0	3	100	50
4	PE	REL6D001	Electric Power System Protection	3-0-0	3	100	50
		REL6D002	Electric and Hybrid Vehicles				
			Biomedical Instrumentation				
5	OE		Artificial Intelligence and Machine Learning	3-0-0	3	100	50
			Communication Engineering				
			Computer Organisation and Architecture				
6	MC*	RIK6F001	Essence of Indian Knowledge Tradition - I	3-0-0	0		100 (Pass Mark is 37)
Total Credit (Theory)					15		
Total Marks						500	250
Practical							
1	PC		Power System Operation and Control Lab	0-0-3	2		100
2	PC		Microprocessor and Micro controllers Lab	0-0-3	2		100
3	PSI		Future-ready Contributor Program	0-0-3	2		100
4	PSI		Seminar - I	0-0-3	1		100
Total Credit (Practical)					7		
Total Semester Credit					22		
Total Marks							400
SUMMER INTERNSHIP TRAINING FOR 45 DAYS							

***Mandatory Non-Credit Courses (MC) result will be reflected with Pass (P) / Fail (F) grade. Thus the grade obtained will not be affecting the grade point average. However it shall appear on the grade sheet as per AICTE rule.**


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6 th Semester	REL6D002	Electric and Hybrid Vehicles	L-T-P 3-0-0	3 Credits
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Module I:**(10 Hours)**

Introduction to Hybrid Electric Vehicles: History of hybrid and electric vehicles, social and environmental importance of hybrid and electric vehicles, impact of modern drive-trains on energy supplies. Conventional Vehicles: Basics of vehicle performance, vehicle power source characterization, transmission characteristics, and mathematical models to describe vehicle performance.

Module II:**(10 Hours)**

Hybrid Electric Drive-trains: Basic concept of hybrid traction, introduction to various hybrid drive-train topologies, power flow control in hybrid drive-train topologies, fuel efficiency analysis. Electric Drive-trains: Basic concept of electric traction, introduction to various electric drive-train topologies, power flow control in electric drive-train topologies, fuel efficiency analysis.

Module III:**(10 Hours)**

Electric Propulsion unit: Introduction to electric components used in hybrid and electric vehicles, Configuration and control of DC Motor drives, Configuration and control of Induction Motor drives. Energy Storage: Introduction to Energy Storage Requirements in Hybrid and Electric Vehicles, Battery based energy storage and its analysis, Fuel Cell based energy storage and its analysis, Hybridization of different energy storage devices.

Module IV:**(10 Hours)**

Sizing the drive system: Matching the electric machine and the internal combustion engine (ICE), Sizing the propulsion motor, sizing the power electronics, selecting the energy storage technology. Battery Management System(BMS)/Energy Management System (EMS): Need of BMS, Rule based control and optimization based control, Software- based high level supervisory control, Mode of power transfer, Behaviour of drive motor. Electric Vehicles charging station: Type of Charging station, Selection and Sizing of charging station.

Books:

- [1] Iqbal Hussein, Electric and Hybrid Vehicles: Design Fundamentals, CRC Press, 2003
- [2] James Larminie, John Lowry, Electric Vehicle Technology Explained, Wiley, 2003.
- [3] Mehrdad Ehsani, Yimi Gao, Sebastian E. Gay, Ali Emadi, Modern Electric, Hybrid Electric and Fuel Cell Vehicles: Fundamentals, Theory and Design, CRC Press, 2004.

Digital Learning Resources:


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6 th Semester	RIK6F001	Essence of Indian Knowledge Tradition - I	L-T-P 3-0-0	0 Credits
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Course Objective:

The course aims at imparting basic principles of thought process, reasoning and inferencing. Sustainability is at the core of Indian Traditional Knowledge Systems connecting society and nature. Holistic life style of Yogic-science and wisdom capsules in Sanskrit literature are also important in modern society with rapid technological advancements and societal disruptions. The course focuses on introduction to Indian Knowledge System, Indian perspective of modern scientific world-view and basic principles of Yoga and holistic health care system.

Course Outcomes:

- Ability to understand, connect up and explain basics of Indian Traditional knowledge modern scientific perspective.

Course Content:

- Basic Structure of Indian Knowledge System (i) वेद, (ii) उपवेद (आयुर्वेद, धनुर्वेद, गन्धर्ववेद, स्थापत्य आदि) (iii) वेदांग (शिक्षा, कल्प, निरुत, व्याकरण, ज्योतिष छंद), (iv) उपाङ्ग (धर्म शास्त्र, मीमांसा, पुराण, तर्कशास्त्र)
- Modern Science and Indian Knowledge System
- Yoga and Holistic Health care
- Case Studies.

Books:

1. V. Sivaramakrishna (Ed.), Cultural Heritage of India-Course Material, Bharatiya Vidya Bhavan, Mumbai, 5th Edition, 2014
2. Swami Jitatmanand, Modern Physics and Vedant, Bharatiya Vidya Bhavan
3. Fritzo Capra, Tao of Physics
4. Fritzo Capra, The wave of Life
5. V N Jha (Eng. Trans.), Tarkasangraha of Annam Bhatta, International Chinmay Foundation, Velliarnad, Amaku,am
6. Yoga Sutra of Patanjali, Ramakrishna Mission, Kolkatta
7. GN Jha (Eng. Trans.) Ed. R N Jha, Yoga-darshanam with Vyasa Bhashya, Vidyanidhi Prakasham, Delhi, 2016
8. RN Jha, Science of Consciousness Psychotherapy and Yoga Practices, Vidyanidhi Prakasham, Delhi, 2016
9. P R Sharma (English translation), Shodashang Hridayam