ASSAM DON BOSCO UNIVERSITY

Modified Course Structure/Syllabus in SPRING 2019

SCHOOL OF TECHNOLOGY
DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING
BACHELOR OF TECHNOLOGY (BATCH 2017-18, 2016-17, 2015-16)

Type	Course Code	Course Name	Credits	Category
Semester 6				
Theory	EEAD0040	Analog and Digital Communication	3	DC
	EEPD0026	Power Electronics and Drives	4	DC
	EEPS0027	Electrical Power Systems II	4	DC
	ECRS0039	Renewable Energy Systems	4	DC
	ECAC0019	Analog Integrated Circuits	4	SC
	MTOM0071	Production and Operations Management	2	IE
Lab	EEPD6021	Power Electronics and Drives Lab	2	DC
	ECAC6011	Analog Integrated Circuits Lab	2	SC
	ECSP6028	Signal Processing Lab	2	SE
Project	EEMI6022	Mini project III	2	DC
AP	BTEAP6	Extra Academic Programmes	NC	IC
Total Credits			29	
Semester 8 (Spring 2019)				
	ECRS0039	Renewable Energy Systems	4	DC
	EEED0033	Electrical Drives	4	DC
	PYTW0021	Thoughts That Shaped the World	2	IE
	MTFC0073	Financial Management and Accounting	3	IC
	One elective to be opted			
	EEAM0034	Energy Audit and Management	3	DE
	ECOD0039	Optoelectronic Devices		SE
	EEOC0035	Power System Operation and Control		DE
Project	EEMP6026	Major Project (Phase II) and Viva Voce	8	DC

Total Credits			**24**	
Semester 8 (Spring 2020)				
Theory	**EEHV0028**	**High Voltage Engineering**	**3**	**DC**
	EEED0033	Electrical Drives	4	DC
	PYTW0021	Thoughts That Shaped the World	2	IE
	MTFC0073	Financial Management and Accounting	3	IC
	One elective to be opted			
	EEAM0034	Energy Audit and Management	3	DE
	ECOD0039	Optoelectronic Devices		SE
	EEOC0035	Power System Operation and Control		DE
Project	EEMP6026	Major Project (Phase II) and Viva Voce	8	DC
Total Credits			**23**	

EERS0039: RENEWABLE ENERGY SYSTEMS

(4 credit - 60 hours)

Module I: Physics of Wind Power (6 Hours)

History of wind power, Indian and Global statistics, Wind physics, Betz limit, Tip speed ratio, stall and pitch control, Wind speed statistics-probability distributions, Wind speed and power-cumulative distribution functions.

Module II: Wind generator topologies (11 Hours)

Review of modern wind turbine technologies, Fixed and Variable speed wind turbines, Induction Generators, Doubly-Fed Induction Generators and their characteristics, Permanent-Magnet Synchronous Generators, Power electronic converters. Generator-Converter configurations, Converter Control.

Module III: The Solar Resource (5 Hours)

Introduction, solar radiation spectra, solar geometry, Earth Sun angles, observer Sun angles, solar day length, Estimation of solar energy availability.

Module IV: Solar Photovoltaic (10 Hours)

Technologies-Amorphous, monocrystalline, polycrystalline; V-I characteristics of a PV cell, PV module, array, Power Electronic Converters for Solar Systems, Maximum Power Point Tracking (MPPT) algorithms. Converter Control.

Module V: Network Integration Issues (12 Hours)

Overview of grid code technical requirements. Fault ride-through for wind farms - real and reactive power regulation, voltage and frequency operating limits, solar PV and wind farm behavior during grid disturbances. Power quality issues. Power system interconnection experiences in the world. Hybrid and isolated operations of solar PV and wind systems, Integration in Smart Grid System.

Module VI: Solar thermal power generation (4 Hours)

Technologies, Parabolic trough, central receivers, parabolic dish, Fresnel reflector, solar pond,

elementary analysis.

Module VII: Micro Hydel Generation (9 Hours)

Operating principles. Power and Efficiency of Micro Hydel plant. Control, Automation and Monitoring in a Small Hydro Plant. Components of a microhydel power plant. Types, specifications and characteristics of turbines, generator and governors. Selection and modification. Load balancing.

Module VIII: Bioconversion (3 Hours)

Biomass, physical and biological thermal methods of bioconversion.Solid fuels, ethanol, methanol, vegetable oils. Biomass fuels in IC engines. Alcohol fuels, vegetable oils, producer gas.

COURSE/LEARNING OUTCOMES

At the end of the course students will be able to:

CO1:Understand the energy scenario and the consequent growth of the power generation from renewable energy sources.
CO2: Understand the basic physics of wind and solar power generation.
CO3: Understand the power electronic interfaces for wind and solar generation.
CO4: Understand the issues related to the grid-integration of solar and wind energy systems.

Suggested Readings

1. T. Ackermann, "Wind Power in Power Systems", John Wiley and Sons Ltd., 2005.
2. G. M. Masters, "Renewable and Efficient Electric Power Systems", John Wiley and Sons, 2004.
3. G.D. Rai, Non-conventional energy sources, Khanna publishers.
4. S. P. Sukhatme, "Solar Energy: Principles of Thermal Collection and Storage", McGraw Hill, 1984.
5. H. Siegfried and R. Waddington, "Grid integration of wind energy conversion systems", John Wiley and Sons Ltd., 2006.
6. G. N. Tiwari and M. K. Ghosal, "Renewable Energy Applications", Narosa Publications, 2004.
7. J. A. Duffie and W. A. Beckman, "Solar Engineering of Thermal Processes", John Wiley & Sons, 1991.

EEAD0040: ANALOG AND DIGITAL COMMUNICATION

(3 credit - 45 hours)

Module I: Analog Modulation Techniques (12 Hours)

Review of signals and systems, Introduction to Communication Systems, Frequency domain representation of signals, Principles of Amplitude Modulation Systems- DSB, SSB and VSB modulations. Angle Modulation, Representation of FM and PM signals, Spectral characteristics of angle modulated signals. Review of probability and random processes. Gaussian and white noise characteristics, Noise in amplitude modulation systems, Noise in Frequency modulation systems. Pre-emphasis and De-emphasis, Threshold effect in angle modulation.

Module II: Pulse and Data Communication (7 Hours)

Pulse modulation. Sampling process. Pulse Amplitude and Pulse code modulation (PCM), Differential pulse code modulation. Delta modulation, Noise considerations in PCM, Time Division multiplexing, Data Communication Circuits – Data Communication Codes – Data communication Hardware – serial and parallel interfaces.

Module III: Signal Detection (7 Hours)

Elements of Detection Theory, Optimum detection of signals in noise, Coherent communication with waveforms- Probability of Error evaluations. Baseband Pulse Transmission- Inter symbol Interference and Nyquist criterion.

Module IV: Digital Modulation (12 Hours)

Pass band Digital Modulation schemes- Phase Shift Keying, Frequency Shift Keying, Quadrature Amplitude Modulation, Continuous Phase Modulation and Minimum Shift Keying. Digital Modulation tradeoffs. Optimum demodulation of digital signals over band-limited channels- Maximum likelihood sequence detection (Viterbi receiver). Equalization Techniques. Synchronization and Carrier Recovery for Digital modulation.

Module V: Multi-User Radio Communication (7 Hours)

Global System for Mobile Communications (GSM), Code Division Multiple Access (CDMA), Cellular Concept and Frequency Reuse, Channel Assignment and Handover Techniques.

COURSE/LEARNING OUTCOMES

At the end of the course students will be able to:

CO1: Analyze and compare different analog modulation schemes for their efficiency and bandwidth.
CO2: Analyze the behavior of a communication system in presence of noise.
CO3: Investigate pulsed modulation system and analyze their system performance.
CO4: Analyze different digital modulation schemes and can compute the bit error performance.

Suggested Readings

1. Haykin S., “Communications Systems”, John Wiley and Sons, 2001.
2. Proakis J. G. and Salehi M., “Communication Systems Engineering”, Pearson Education, 2002.
3. Taub H. and Schilling D.L., "Principles of Communication Systems”, Tata McGraw Hill, 2001.
4. Wozencraft J. M. and Jacobs I. M., “Principles of Communication Engineering”, John Wiley, 1965.
5. Barry J. R., Lee E. A. and Messerschmitt D. G., “Digital Communication”, Kluwer Academic Publishers, 2004.
6. Proakis J.G., “Digital Communications”, 4th Edition, McGraw Hill, 2000.