BACHELOR OF TECHNOLOGY

Electrical and Computer Science Engineering Department

Semester - VI

Course Scheme

Course Code	Course Name	Lecture hours	Tutorial hours	Practical hours	Credit
HS XXXX	HSS (Elective)	3	0	0	3
EE XXXX	Department Elective-1	3	0	3	4.5
EE 213001	Electrical Infrastructure	3	1	0	4
EE 213002	Communication Systems	3	1	3	5.5
EE 213005	Digital Signal Processing	3	1	3	5.5
EE 224600	Seminar	0	0	0	2
	Total	**15**	**3**	**6**	**24.5**

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<tr><td>I</td><td>Course Code</td><td colspan="4">EE 213001</td></tr>
<tr><td>II</td><td>Course Title</td><td colspan="4">Electrical Infrastructure</td></tr>
<tr><td rowspan="2">III</td><td rowspan="2">Credit Structure</td><td>L</td><td>T</td><td>P</td><td>C</td></tr>
<tr><td>3</td><td>1</td><td>0</td><td>4</td></tr>
<tr><td>IV</td><td>Prerequisite(If any for the student)</td><td colspan="4"></td></tr>
<tr><td>V</td><td>Course Content</td><td colspan="4">

Illumination:
Nature of light, Definitions, Laws of illumination, Different types of lamps, Tungsten lamp, discharge lamp, Sodium vapor lamp, Fluorescent lamp, Design of lighting scheme, methods of lighting, Calculations, examples., Flood lighting, Factory lighting and street lighting, Examples., Conservation approach to be considered.
Electric Traction:
Principles and History, Mechanics of train movement, Adhesion, Traction motor, traction motor drives, Protection of electric locomotive and circuits, Traction sub systems, Railway signalling, traction substation, MAGLEV.
Hybrid Electric Vehicles:
Introduction, History of hybrid and electric vehicles, social and environmental importance of hybrid and electric vehicles, impact of modern drive-trains on energy supplies. 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.
Electrolytic Process:
Principle, Faradays laws of electrolysis, Current efficiency, Energy efficiency etc., Rating of metals, Production of chemicals, Electro-deposition, Electroplating, Power supply for electrolytic processes.

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<tr><td>VI</td><td>Text/References</td><td colspan="4">

H1.J. B. Gupta (2013), “Utilization of Electric Power and Electric Traction”, S.K. Kataria & Sons.
Chris Mi, M. A. Masrur and D. W. Gao (2011), “Hybrid Electric Vehicles: Principles and Applications with Practical Perspectives”, John Wiley & Sons.

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I	Course Code	**EE 213002**			
II	Course Title	**Communication Systems**			
III	Credit Structure	**L**	**P**	**T**	**C**
		3	1	3	5.5
IV	Prerequisite(If any for the student)				
V	Course Content	Review of signals and spectra, band-limited signals, analysis of signals, distortion in transmission; linear CW modulation, methods of generation, bandwidth efficiency, synchronous and asynchronous detection, frequency division multiplexing; exponential modulation, narrowband PM and FM, transmission bandwidth, generation and detection, de-emphasis and pre-emphasis filtering; pulse modulation, sampling theorem, aliasing, PAM, PWM, PPM, time division multiplexing; pulse code modulation, delta modulation, DPCM; review of random processes and power spectral density, signal space; Noise analysis; Digital communications basic, line codes and their spectra, pulse shaping, inter-symbol interference, Nyquist criterion for distortion less transmission, equalization; Basics of digital band pass modulation, ASK, PSK, FSK.			
VI	Text/References	1. Haykin S., Communications Systems, John Wiley and Sons, 2001. 2. Taub H. and Schilling D.L., Principles of Communication Systems, Tata McGraw Hill, 2001			

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<tr><td>I</td><td>Course Code</td><td colspan="4">EE 213005</td></tr>
<tr><td>II</td><td>Course Title</td><td colspan="4">Digital Signal Processing</td></tr>
<tr><td rowspan="2">III</td><td rowspan="2">Credit Structure</td><td>L</td><td>P</td><td>T</td><td>C</td></tr>
<tr><td>3</td><td>1</td><td>0</td><td>4</td></tr>
<tr><td>IV</td><td>Prerequisite(If any for the student)</td><td colspan="4">Signals and Systems</td></tr>
<tr><td>V</td><td>Course Content</td><td colspan="4">Review of Discrete Time Signals and systems: Systems attributes, Z transform, Sampling and Reconstruction. Frequency Domain Analysis of Discrete-Time LTI Systems: Transfer function definition for LTI systems—rational transfer functions corresponding to systems described by linear constant-coefficient difference equations—frequency response—geometric interpretation of frequency response—magnitude response of single complex pole or zero—second order resonator—comb filters—notch filter—phase response—principal phase—phase unwrapping—group delay— importance of linear phase—conditions under which a digital filter has linear phase—Type I, Type II, Type III, and Type IV linear phase FIR filters— relationship between two zeros of an FIR filter—constrained zeros of FIR filters. DFT and FFT: Definition of the DFT and inverse DFT—relationship to discrete-time Fourier series—matrix representation—DFT as the samples of the DTFT and the implied periodicity of the time-domain signal—recovering the DTFT from the DFT—circular shift of signal and the “index mod N” concept—properties of the DFT—circular convolution and its relationship with linear convolution—sectioned convolution methods: overlap add and overlap save—effect of zero padding—introduction to the estimation of frequencies of sinusoids—windowing and spectral leakage—introduction to the Fast Fourier Transform (FFT) algorithm—decimation-in-time and decimation-in-frequency algorithms IIR Filter Design: Review of classical Analog filter design (Butterworth, Chebyshev, Elliptic)–design of digital filters based on continuous-time filters–mapping of differentials–impulse invariant transformation–modified impulse invariant transformation–bilinear transformation. FIR filters: Design Techniques:(a) windowing method,(b) frequency sampling,(c) Park-McClellan’s method. Effect of finite register length in FIR filter design. Structures for Discrete-Time Systems: IIR filter structures (direct form, cascade form, parallel form)—FIR filter structures (direct form for linear phase systems, frequency sampling structure)—signal flow graphs—lattice structures for FIR and all-pole IIR systems—state-space representation—introduction to coefficient quantization.</td></tr>
<tr><td>VI</td><td>Text/References</td><td colspan="4">1. S. K. Mitra: Digital Signal Processing- A Computer based Approach, McGraw Hill. 2nd edition
2. John. G. Proakis and Monolakis: Digital Signal Processing, Pearson Education</td></tr>
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