INSTITUTE OF ENGINEERING & MANAGEMENT

(A NACC "**A**" Graded Autonomous Institution affiliated

to Maulana Abul Kalam Azad University of Technology (MAKAUT), West Bengal)

AUTONOMOUS SYLLABUS (REV- 2020)

FROM ACADEMIC YEAR 2021 -2022

AUTOMOMUS CURRICULUM AND DETAILED SYLLABI

FOR

B.TECH. DEGREE (Electrical & Electronics Engineering) PROGRAM

As per **Partial Choice Based Credit System (PCBCS)**

4th YEAR:

Eighth Semester

Serial No	Course Code	Course Name	Continuous Assessment Marks	Final Examination Marks	Total Marks	Contact Hours			Credit
						L	T	P	C
Theory									
1.	PCC-EEE 801	Digital signal processing	30	70	100	3	1	0	4
2.	PEC-EEE 801	A.Fiber Optic Communications/ B.Mobile Communication and Networks	30	70	100	3	0	0	3
3.	OEC-801	A.Electrical Materials/ B.Power Plant Engineering	30	70	100	3	0	0	3
4.	HSMC-801	Essential Studies For Professionals VIII	30	70	100	0	0	2	0
Practical/ Sessional									
5.	PCC-EEE891	Digital signal processing Lab	40	60	100	0	0	2	1
6.	PW-EEE881	Project stage-II			100	0	0	8	3
7.	PW-EEE882	Grand Viva			100	0	0	0	3
8.	HSMC-881	Skill Development For Professionals VIII			100	0	0	2	

									0
		Total			**1000**				**17**

Detailed Syllabus for B.Tech in Electrical & Electronics Engineering

Eighth Semester

Name of the Course/ Subject:	**Digital Signal Processing**	**Subject Code:**	**PCC-EEE 801**
Semester	**VIII**	**Course Nature**	**Theory**
Pre-Requisite(s):	Signals and Systems.		
Lecture Periods/Week	Tutorial Periods/Week	Practical Periods/Week	Credits
3	**1**	**0**	**4**

Course Objective(s):

The purpose of learning this course is to-

Serial No	**Course Objectives**
1.	Represent signals mathematically in continuous and discrete-time, and in the frequency domain. Analyze discrete-time systems using z-transform.
2.	Understand the Discrete-Fourier Transform (DFT) and the FFT algorithms. Design digital filters for various applications.
3.	Apply digital signal processing for the analysis of real-life signals.

Detailed Syllabus

Module No.	Description	Number of Lectures
1.	**Discrete-time signals and systems** Discrete-time signals and systems (6 hours) Discrete time signals and systems: Sequences; representation of signals on orthogonal basis; Representation of discrete systems using difference equations, Samplingand reconstruction of signals - aliasing; Sampling theorem and Nyquist rate.	6
2.	**Z-transform** Z-Transform, Region of Convergence, Analysis of Linear Shift Invariant systems using z-transform, Properties of z-transform for causal signals, Interpretation of stability in z-domain, Inverse z-transforms.	6
3.	**Discrete Fourier Transform** Frequency Domain Analysis, Discrete Fourier Transform (DFT), Properties of DFT, Convolution of signals, Fast Fourier Transform Algorithm, Parseval's Identity, Implementation of Discrete Time Systems.	10
4.	**Design of Digital filters** Design of FIR Digital filters: Windowmethod, Park-McClellan's method. Design of IIR Digital Filters: Butterworth, Chebyshev and Elliptic Approximations;Low-pass, Band-pass, Band-stop and Highpass filters. Effect of finite register length in FIR filter design. Parametric and non-parametric spectral estimation. Introduction to multi-rate signalprocessing.	12
5.	**Applications of Digital Signal Processing** Correlation Functions and Power Spectra, Stationary Processes, Optimal filtering using ARMA Model, Linear Mean-Square Estimation, Wiener Filter.	6

Course outcomes:

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

CO1. Represent signals mathematically in continuous and discrete-time, and in the frequency domain.

CO2. Analyze discrete-time systems using z-transform.

CO3. Understand the Discrete-Fourier Transform (DFT) and the FFT algorithms.

CO4. Design digital filters for various applications and apply digital signal processing for the analysis of real-life signals.

Suggested Learning Resources:

Text Books:

1. S. K. Mitra, "Digital Signal Processing: A computer based approach", McGraw Hill, 2011.

Reference Books:

1. A.V. Oppenheim and R. W. Schafer, "Discrete Time Signal Processing", Prentice Hall, 1989.
2. J. G. Proakis and D.G. Manolakis, "Digital Signal Processing: Principles, Algorithms And Applications",
   Prentice Hall, 1997.
3. L. R. Rabiner and B. Gold, "Theory and Application of Digital Signal Processing", Prentice Hall, 1992.
4. J. R. Johnson, "Introduction to Digital Signal Processing", Prentice Hall, 1992.
5. D. J. DeFatta, J. G. Lucas andW. S. Hodgkiss, "Digital Signal Processing", John Wiley & Sons, 1988.

Name of the Course/ Subject:	**Fiber Optic Communications**	**Subject Code:**	**PEC- EEE 801**
Semester	**VIII**	**Course Nature**	**Theory**
Pre-Requisite(s):	Analog & Digital Communication		
Lecture Periods/Week	Tutorial Periods/Week	Practical Periods/Week	Credits
3	**0**	**0**	**3**

Course Objective(s):

The purpose of learning this course is to-

Serial No	**Course Objectives**
1.	Understand the properties of the optical fibers and optical components and the operation of lasers, LEDs, and detectors.
2.	Analyze system performance of optical communication systems.
3.	Design optical networks and understand non-linear effects in optical fibers.

Detailed Syllabus

Module No.	**Description**	**Number of Lectures**
1.	Introduction to vector nature of light, propagation of light, propagation of light in a cylindrical dielectric rod, Ray model, wave model.	6
2.	Different types of optical fibers, Modal analysis of a step index fiber. Signal degradation on optical fiber due to dispersion and attenuation. Fabrication of	6

	fibers and measurement techniques like OTDR.	
3.	Optical sources - LEDs and Lasers, Photo-detectors - pin-diodes, APDs, detector responsivity, noise, optical receivers. Optical link design - BER calculation, quantum limit, power penalties.	10
4.	Optical switches - coupled mode analysis of directional couplers, electro-optic switches. Optical amplifiers - EDFA, Raman amplifier. WDM and DWDM systems. Principles of WDM networks.	12
5.	Nonlinear effects in fiber optic links. Concept of self-phase modulation, group velocity dispersion and solition based communication.	6

Course outcomes:

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

CO1. Understand the principles fiber-optic communication, the components and the bandwidth advantages.

CO2. Understand the properties of the optical fibers and optical components.

CO3. Analyze system performance of optical communication systems.

CO4. Analyze system performance of optical communication systems and design optical networks and understand non-linear effects in optical fibers

Suggested Learning Resources:

Text Books

1. J. Keiser, Fibre Optic communication, McGraw-Hill, 5th Ed. 2013 (Indian Edition).

Reference Books:

1. T. Tamir, Integrated optics, (Topics in Applied Physics Vol.7), Springer-Verlag, 1975.
2. J. Gowar, Optical communication systems, Prentice Hall India, 1987.
3. S.E. Miller and A.G. Chynoweth, eds., Optical fibres telecommunications, Academic Press, 1979.
4. G. Agrawal, Nonlinear fibre optics, Academic Press, 2nd Ed. 1994.
5. G. Agrawal, Fiber optic Communication Systems, John Wiley and sons, New York, 1997
6. F.C. Allard, Fiber Optics Handbook for engineers and scientists, McGraw Hill, New York (1990).

Name of the Course/ Subject:	Mobile Communication and Networks	Subject Code:	PEC- EEE 801
Semester	**VIII**	**Course Nature**	**Theory**
Pre-Requisite(s):	Digital communication.		
Lecture Periods/Week	Tutorial Periods/Week	Practical Periods/Week	Credits
3	**0**	**0**	**3**

Course Objective(s):

The purpose of learning this course is to-

Serial No	Course Objectives
1.	Understand the working principles of the mobile communication systems.
2.	Understand the relation between the user features and underlying technology
3.	Analyze mobile communication systems for improved performance

Detailed Syllabus

Module No.	Description	Number of Lectures
1.	Cellular concepts-Cell structure, frequency reuse, cell splitting, channelassignment, handoff, interference, capacity, power control; Wireless Standards: Overview of 2G and 3G cellular standards.	6
2.	Signal propagation-Propagation mechanism- reflection, refraction, diffraction and scattering, large scale signal propagation and lognormal shadowing. Fading channels-Multipath and small-scale fading- Doppler shift, statistical multipath channel models, narrowband and wideband fading models, power delay profile, average and rms delay spread, coherence bandwidth and coherence time, flat and frequency selective fading, slow and fast fading, average fade duration and level crossing rate.	10
3.	Capacity of flat and frequency selective channels. Antennas-Antennas for	6

	mobile terminal- monopole antennas, PIFA, base station antennas and arrays. Multiple access schemes-FDMA, TDMA, CDMA and SDMA. Modulation schemes- BPSK, QPSK and variants, QAM, MSK and GMSK, multicarrier modulation, OFDM.	
4.	Receiver structure- Diversity receivers- selection and MRC receivers, RAKE receiver, equalization: linear-ZFE and adaptive, DFE. Transmit diversity-Altamonte scheme.	4
5.	MIMO and space time signal processing, spatial multiplexing, diversity/multiplexing tradeoff.Performance measures- Outage, average snr, average symbol/bit error rate. System examples- GSM, EDGE, GPRS, IS-95, CDMA 2000 and WCDMA.	6

Course outcomes:

At the end of the course, the students will be able to-

CO1. Understand the relation between the user features and underlying technology.

CO2. Analyze mobile communication systems for improved performance.

CO3. Understand the working principles of the mobile communication systems.

CO4. Understand the different application of mobile communication system.

Suggested Learning Resources:

Text Books:

1. WCY Lee, Mobile Cellular Telecommunications Systems, McGraw Hill, 1990.

Reference Books:

1. Raymond Steele, Mobile Radio Communications, IEEE Press, New York, 1992.
2. AJ Viterbi, CDMA: Principles of Spread Spectrum Communications, Addison Wesley, 1995.
3. VK Garg &JE Wilkes, Wireless & Personal Communication Systems, Prentice Hall, 1996.

Name of the Course/ Subject:	Electrical Materials	Subject Code:	OEC-801
Semester	**VIII**	**Course Nature**	**Theory**
Pre-Requisite(s):	General Properties of materials.		
Lecture Periods/Week	Tutorial Periods/Week	Practical Periods/Week	Credits
3	**0**	**0**	**3**

Course Objective(s):

The purpose of learning this course is to-

Serial No	Course Objectives
1.	Understand the general properties of any electrical materials used for engineering and technologies.

Detailed Syllabus

Module No.	Description	Number of Lectures
1.	Conductivity of Metal: Introduction, factors affecting the resistivity of electrical materials, motion of an electron in an electric field, Equation of motion of an electron, current carried by electrons, mobility, energy levels of a molecule, emission of electrons from metals, thermionic emission, photo electric emission, field emission, effect of temperature on electrical conductivity of metals, electrical conducting materials, thermal properties, thermal conductivity of metals, thermoelectric effects.	8
2.	Dielectric Properties: Introduction, effect of a dielectric on the behavior of a capacitor, polarization, the dielectric constant of monatomic gases, frequency dependence of permittivity, dielectric losses, significance of the loss tangent, dipolar relaxation, frequency and temperature dependence of the dielectric constant, dielectric properties of polymeric system, ionic conductivity in insulators, insulating materials, ferroelectricity, piezoelectricity.	10
3.	Magnetic properties of Materials: Introduction, Classification of magnetic materials, diamagnetism, paramagnetism, ferromagnetism, magnetization curve, the hysteresis loop, factors affecting permeability and hysteresis loss, common magnetic materials, magnetic resonance.	8
4.	Semiconductors: energy band in solids, conductors, semiconductors and insulators, types of semiconductors, Intrinsic semiconductors, impurity type semiconductor, diffusion, the Einstein relation, hall effect, thermal conductivity of semiconductors, electrical conductivity of doped materials.	8

Course Outcomes:

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

CO1. Understand the Conductivity of the metal for different application.

CO2. Understand the dielectric properties of materials.

CO3. Understand the magnetic properties of materials.

CO4. Understand the concept of semiconductors

Suggested Learning Resources:

Text Books:

1. C.S.Indulkar and S. Thiruvengadam, S., "An Introduction to Electrical Engineering.

Reference Books:

1. Kenneth G. Budinski,, "Engineering Materials: Prentice Hall of India, New Delhi.

Name of the Course/ Subject:	**Power Plant Engineering**	**Subject Code:**	**OEC-801**
Semester	**VIII**	**Course Nature**	**Theory**
Pre-Requisite(s):	Thermal Power Engineering		
Lecture Periods/Week	Tutorial Periods/Week	Practical Periods/Week	Credits
3	**0**	**0**	**3**

Course Objective(s):

The purpose of learning this course is to-

Serial No	**Course Objectives**
1.	Understand the principles of operation for different power plants and their economics.

Detailed Syllabus

Module No.	Description	Number of Lectures
1.	Coal based thermal power plants, basic Rankine cycle and its modifications, layout of modern coal power plant, super critical boilers, FBC boilers, turbines, condensers, steam andheating rates, subsystems of thermal power plants, fuel and ash handling, draught system, feed water treatment, binary cycles and cogeneration systems.	6
2.	Gas turbine and combined cycle power plants, Brayton cycle analysis and optimization, components of gas turbine power plants, combined cycle power plants, Integrated Gasifier based Combined Cycle (IGCC) systems.	4
3.	Basics of nuclear energy conversion, Layout and subsystems of nuclear power plants, Boiling Water Reactor (BWR), Pressurized Water Reactor (PWR), CANDU Reactor, Pressurized Heavy Water Reactor (PHWR), Fast Breeder Reactors (FBR), gas cooled and liquid metal cooled reactors, safety measures for nuclear power plants.	6
4.	Basics of nuclear energy conversion, Layout and subsystems of nuclear power plants, Boiling Water Reactor (BWR), Pressurized Water Reactor (PWR), CANDU Reactor, Pressurized Heavy Water Reactor (PHWR), Fast Breeder Reactors (FBR), gas cooled and liquid metal cooled reactors, safety measures for nuclear power plants. Hydroelectric power plants, classification, typical layout and components, principles of wind, tidal, solar PV and solar thermal, geothermal, biogas and fuel cell power systems	10
5.	Energy, economic and environmental issues, power tariffs, load distribution parameters, load curve, capital and operating cost of different power plants, pollution control technologies including waste disposal options for coal and nuclear plants.	6

Course Outcomes:

At the end of the course, the students will be able to-

CO1. Understand the concept of coal based thermal power plant.

CO2. Understand the concept of gas turbine and different power plants.

CO3. Understand the basic of nuclear energy conversion.

CO4. Understand the concept of energy economics.

Suggested Learning Resources:

Text Books

1. Nag P.K., Power Plant Engineering, 3rd ed., Tata McGraw Hill, 2008.

Reference Books:

1. El Wakil M.M., Power Plant Technology, Tata McGraw Hill, 2010.
2. Elliot T.C., Chen K and Swanekamp R.C., Power Plant Engineering, 2nd ed., McGraw Hill, 1998.

Theory: ESSENTIAL STUDIES FOR PROFESSIONALS VIII
Paper Code: HSMC802
Contacts: 2L
Credits: 0

Course Objective:

1. To learn about basic of History to know about our past and to implement it in our daily life.

2. To learn about the Political System of Our Country.

3. To learn the concepts of Basics of Geography and Economics from which Students will acquire knowledge for Competitive exams.

Course Content:

Module No.	Description	Hours	Blooms Level	PO(1..12) Mapping
1.	**Laws of Society:** Evolution of Indian Constitution, Part -II and Part - III.	10	L1 (Remember) L2 (Understand) L4 (Analyze)	PO6, PO7, PO8

2	**Our Freedom Struggle:** Indian National Congress, National Movement-1905- 1947.	10	L1 (Remember) L2 (Understand)	PO6, PO7, PO8
3	**Know Our Country:** Physiography of India.	10	L1 (Remember) L2 (Understand)	PO6, PO7, PO8
1.	**Economics:** Capital and Money Market, Fiscal System of India.	15	L1 (Remember) L2 (Understand) L4 (Analyze)	PO6, PO7, PO8
2.	**India and World:** Monthly Current Affairs Magazine	2	L1 (Remember) L2 (Understand)	PO6, PO7, PO8
3.	**Universal Human Values:** Nature acceptance of Human Values, Competence in Professional Ethics, Strategies for transition towards value-based life and profession.	1	L1 (Remember) L2 (Understand)	PO6, PO7, PO8

Course Outcomes:

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

1. To inculcate human values and ethical thinking among students.
2. To prepare the stage for facing different levels of civil service and other competitive examinations.
3. To prepare the ground for making them aware of the happenings, cultural historical and developmental aspects of the country as well as global affairs

Learning Resources:

• Indian Constitution- M. Laxmikant

- Indian Economy-Ramesh Singh
- History of Modern India- Bepan Chandra
- Geography of India- Majid Hussain
- Current Affairs Magazine of IEM-UEM

Name of the Course/ Subject:	**Digital Signal Processing Lab**	**Subject Code:**	**PCC-EEE 891**
Semester	**VIII**	**Course Nature**	**Laboratory**
Pre-Requisite(s):	Digital Signal Processing		
Lecture Periods/Week	Tutorial Periods/Week	Practical Periods/Week	Credits
3	**0**	**0**	**1**

Course Objective(s):

The purpose of learning this course is to-

Serial No	**Course Objectives**
1.	Implement Linear and Circular Convolution.
2.	Implement FIR and IIR filters.
3.	Study the architecture of DSP processor.
4.	Demonstrate Finite word length effect.

Detailed Syllabus:

Module No.	Description	Number of Hours
1. Simulation Laboratory using standard Simulator	1. Sampled sinusoidal signal, various sequences and different arithmetic operations. 2. Convolution of two sequences using graphical methods and using commands- verification of the properties of convolution. 3. Z-transform of various sequences – verification of the properties of Z-transform. 4. Twiddle factors – verification of the properties. 5. DFTs / IDFTs using matrix multiplication and also using commands. 6. Circular convolution of two sequences using graphical methods and using commands, differentiation between linear and circular convolutions 7. Verifications of the different algorithms associated with filtering of long data sequences and Overlap – add and Overlap-save methods. 8. Butterworth filter design with different set of parameters. 9. FIR filter design using rectangular, Hamming and Blackman windows	18
2. Hardware Laboratory using either 5416 or 6713 Processor and Xilinx FPGA	1. Writing & execution of small programs related to arithmetic operations and convolution using Assembly Language of TMS320C 5416/6713 Processor, study of MAC instruction. 2. Writing of small programs in VHDL and downloading onto Xilinx FPGA. 3. Mapping of some DSP algorithms onto FPGA.	6

Course Outcome(s) (COs):

After completion of this course, the learners will be able to

CO1. Carry out simulation of DSP systems.

CO2. Demonstrate their abilities towards DSP processor-based implementation of DSP systems.

CO3. Analyze Finite word length effect on DSP systems.

CO4. Demonstrate the applications of FFT to DSP and to implement adaptive filters for various applications of DSP.

Paper Name:-SKILL DEVELOPMENT FOR PROFESSIONALS VIII

Paper Code: HSMC882

Contacts: 2L

Credits: 0

Course Objective:

1. To learn about basic of Mathematics to apply for Engineering problems as well as in daily life.
2. To learn about the Basics Grammatical English and Vocabulary.
3. To sharpen and develop the basic Aptitude skill.

Course Content:

Module No.	Description	Hours	Blooms Level	PO(1..12) Mapping
1.	**Laws of Society:** Evolution of Indian Constitution, Part -II and Part - III.	10	L1 (Remember) L2 (Understand) L4 (Analyze)	PO6, PO7, PO8
2	**Our Freedom Struggle:** Indian National Congress, National Movement-1905- 1947.	10	L1 (Remember) L2 (Understand)	PO6, PO7, PO8
3	**Know Our Country:** Physiography of India.	10	L1 (Remember) L2 (Understand)	PO6, PO7, PO8
1.	**Economics:** Capital and Money Market, Fiscal System of India.	15	L1 (Remember) L2 (Understand) L4 (Analyze)	PO6, PO7, PO8
2.	**India and World:** Monthly Current Affairs Magazine	2	L1 (Remember) L2 (Understand)	PO6, PO7, PO8
3.	**Universal Human Values:**	1	L1 (Remember)	PO6, PO7,

	Nature acceptance of Human Values, Competence in Professional Ethics, Strategies for transition towards value-based life and profession.		L2 (Understand)	PO8

Course Outcomes:

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

1. Revision of entire Syllabus along with specific type of Mock Tests for the competitive exams like UPSC, IBPS, SBI PO/SO, SSC, RAIL, INSURANCE etc.

2. Learning Advance quantitative Aptitude Techniques on Algebra, Geometry, Menstruation, Trigonometry etc. which is very essential for appearing in different competitive Exams along with SSC.

3. Solving Puzzle based problems & learning different Analytical techniques.

4. Misc Practice sets on different Competitive Exams mains level papers.

5. Introduction to Critical reasoning.

6. Full Length Mock tests of different Competitive Exams (Prelims & Mains).

Learning Resources:

Text Books:

1. Objective General English- S.P Bakshi
2. English Grammar and Competition-S.C Gupta
3. Fast Track Objective Arithmetic- Rajesh Verma
4. Quantitative Aptitude– S.Chand

Reference Books:

1. Advance Maths- Rakesh Yadav
2. Verbal and Non-Verbal Reasoning- R.S Agarwal
3. A new approach to Reasoning- BS Sijwali
4. Quantitative Aptitude-R. S Agarwal