References:

1. Wakerly, "Digital Design: Principles and Practices", 3rd edition, Pearson Education, 2004.
2. Charles H. Roth, "Fundamentals of Logic Design", 4th Edition, Jaico Publication
3. Lee S.C,"Digital Circuits and Logic Design", PHI.

4ETp8 – DIGITAL ELECTRONICS – LAB.

Course Requisite:

1. (3ET3) Electronic Devices & Circuits.
2. (4ET4) Digital Electronics.

Course Objectives:

1. To impart the concepts of digital electronics practically.
2. To provide students basic experimental experiences in the operation of various digital logic Families.
3. To learn the operation of various logic gates and their implementation using digital IC's.
4. To learn the realization of various combinational and sequential circuits.

Course Outcomes:

After successfully completing the course, the students will be able to :

1. Apply practically the concepts of digital electronics.
2. Explain the operation and characteristics of various digital logic families.
3. Understand the operation of various logic gates and their implementation using digital IC's.
4. Design and implement various combinational logic circuits.
5. Design and implement various sequential logic circuits.

Exp.No.	Expeeriment List :
Exp-1	To study and verify the operation of various digital logic families.
Exp -2	To study and verify the operation of logic gates.
Exp -3	Design and implementation of Adders and Subtractors using logic gates.
Exp -4	Design and implementation of code converters using logic gates.
Exp -5	Design and implementation of multiplexer using logic gates and IC.
Exp -6	Design and implementation of demultiplexer using logic gates and IC.
Exp -7	Design and implementation of code converters using logic gates.
Exp -8	Design and implementation of Magnitude Comparator using logic gates and IC.
Exp -9	Design and implementation of odd/even parity checker /generator using IC.
Exp -10	Implementation of SISO, SIPO, PISO and PIPO shift registers using Flip- flops.
Exp -11	Construction and verification of ripple counters.
Exp -12	Design and implementation of 3-bit synchronous up/down counter.

* Minimum 10 experiments based on/relevant to the above list.

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NOTIFICATION

No. 79 /2019 Date : 26/07/2019

Subject :- Continuation of Prospectus No. 181712 prescribed for Sem. V & VI B.E. (Electronnics & Telecommunications) (CGS) for the session 2019-2020& onwards.

It is notified for general information of all concerned that the Prospectus No. 181712 prescribed for Semester **V & VI B.E. (Electronics & Telecommunication Engg.) (CGS)** for the session 2018-2019 shall be continued for the academic session 2019-2020 & onwards with substitution of the following subjects as per **Appendix –A** given below :

The remaining subjects in the syllabi of B.E. Sem. V & VI **(**Electronics & Telecommunication Engg**.)** shall remain unchanged.

Sd/-
(Dr.H.R. Deshmukh)
I/c. Registrar
Sant Gadge Baba Amravati University

Appendix – A

SEMESTER - V

Subject (Th): 5ET2- POWER ELECTRONICS AND DRIVES		
Course Requisite: 1. (3ET3) Electronic Devices and Circuits. 2. (1B4) Electrical Engineering.		
Course Objectives: To introduce power electronics devices; SCR, TRIAC, IGBT, MOSFET and to learn their characteristics. 1. To develop the ability to analyze the dynamics in power electronic converters/drives systems. 2. To study AC-AC, DC-AC, DC-DC converters. 3. To understand the operation of various DC and AC motors. 4. To study different speed control techniques for DC and AC motors.		
Course Outcomes: By the end of the course the student will be able to: 1. Analyze the characteristics of various power electronics devices . 2. Understand SCR firing circuits, commutation techniques. 3. Design and develop power electronic circuits for various applications. 4. To illustrate the operation of various DC and AC motors. 5. Know various applications of power converters in AC and DC drives.		
Unit-I	SCR, Triac, Diac-construction, characteristics, two transistor analogy for turning ON-OFF a SCR, different methods of turning ON of a SCR, turn OFF mechanism, Thyristor firing circuit using UJT. Introduction to GTO, power transistor, power MOSFET, IGBT - their construction & characteristics,	**10**
Unit-II	Principle of phase control, half wave controlled rectifier, half controlled bridge & fully controlled bridge rectifier for resistive and RL load, derivation for output voltage and current, effect of freewheeling diode, single phase dual converters. Three phase half controlled bridge and fully controlled bridge rectifier	**7**
Unit-III	Classification of circuit for forced commutation, series inverter, improved series inverter, parallel inverter, output voltage and waveform control, principle of operation for three phase bridge inverter in 120 deg. and 180 deg. mode, single phase transistorized bridge inverter.	**9**
Unit-IV	Basic principles of chopper, time ratio control and current limit control techniques, voltage commutated chopper circuit, Jones chopper, step-up chopper and AC chopper. Basic principle of cycloconverter, single phase to single phase cycloconverter.	**8**
Unit-V	**DC Motor**: Principle of Operation, Types of Motor, Speed Control of Shunt Motor: Flux Control, Armature voltage control, using phase controlled rectifier, Speed Control of Series Motor: Flux Control, Rheostatic Control, chopper control. **Stepper Motor**: Construction, Working, characteristics and applications.	**8**
Unit-VI	**Single phase induction motor:** Construction, Working, characteristics and applications. **Three phase induction motor**: Working, characteristics, speed control method using Armature voltage and slip power recovery scheme and applications. **AC servo motor**: Principal of operation and characteristic.	**8**
	TOTAL	**50**
	Text Boo□s: 1.M. Ramamoorthy, Thyristor and their applications. 2.B.L. Theraja: “Electrical Technology”, Volume-2, S. Chand Publications.	
	References: 1. M. H. Rashid, “Power Electronics Circuits, Devices and Application”, Pearson Edu. 2. Joseph Vithayathil, “Power Electronics: Principles and Applications”, McGraw-Hill. 3. M.D.Singh, K.B.Khanchandani, “Power Electronics”, Tata McGraw-Hill. 4. Devdatta Y. Shingare, “A Text book of Industrial & Power Electronics”, Electrotech Pub. 5. Nagrath Kothari, “Electrical Machines”, TMH Publications.	
	5ET3 - MICRO PROCESSOR & MICRO CONTROLLER	**L**
	Course Requisite: 1. (4ET3) Digital Electronics.	
	Course Objectives: 1. To study fundamentals of microprocessor systems. 2. Understanding microprocessor Assembly Language Programming concepts and different data transfer schemes**.** 3. To deal interfacing of different peripheral devices with Microprocessor. 4. To study fundamentals of microcontroller systems. 5. Understanding microcontroller Assembly Language Programming concepts. 6. To get knowledge of interfacing different peripheral devices with Microcontroller.	

	Course Outcomes: Upon completion of this course, students will demonstrate the ability to : 1. Understand architectural difference between Microprocessor and Microcontroller. 2. Equipped with Assembly Language Programming concepts of Microprocessor & Microcontroller. 3. Capable of interfacing of different peripheral devices with Microprocessor and Microcontroller.	
Unit-I	**Introduction to Microprocessor** 8085: Architecture and Pin Diagram, Register Structure, Addressing modes, Instruction set of 8085, Timing diagrams of data transfer instructions.	**8**
Unit-II	**Assembl Language Programming** Assembly Language Programming of 8085, Stack, Subroutine, Data transfer schemes, Address space partitioning schemes, Interrupt system of 8085.	**8**
Unit-III	**I O Interfacing and programming of 8085** Architecture, Programming and interfacing of: PPI 8255, PIT 8254, USART 8251.	**8**
Unit-IV	**Introduction to 8051 Microcontroller** Introduction to 8051 microcontroller; Pin diagram, architecture, memory organization, SFR's, Counters/Timers, Serial port of 8051. Interrupt structure.	**8**
Unit-V	**Assembl Language Programming of 8051** Addressing modes, Instruction set of 8051, Assembly language programming examples, counter/timer programming in various modes. Serial communication and its Operating modes.	**8**
Unit-VI	**Interfacing and programming of 8051** Interfacing and programming of external RAM &ROM, Stepper motor, DC Motor; Architecture, Interfacing and programming of ADC 0808 & DAC 0808.	**10**
	TOTAL	**50**
	Text Boo s: 1. Gaonkar R.S. : Microprocessor Architecture Programming and Applications with the 8085, Penram International Pub. 2. M.A. Mazidi, J.G. Mazidi and R.D. McKinley: "The 8051Microcontroller and Embedded Systems using Assembly and C", Pearson Education (2nd Ed.)	
	Reference: K.J. Ayala: "The 8051 Microcontroller", Penram Int. Pubs., 1996.	
	Subject (Th): 5ET4 - COMMUNICATION ENGINEERING – II	**L**
	Course Requisite: 1. (4ET1) Signals & Systems 2. (IA1) Engineering Mathematics-I	
	Course Objectives: 1. To understand the fundamentals of Probability theory and random processes. 2. To study principles of Electromagnetic Wave propagation. 3. To study various pulse modulation and demodulation techniques used in transmission of analog signal. 4. To understand the concept of sampling and quantization in digital transmission system. 5. To study multiplexing and basics of telephone switching system.	
	Course Outcomes: Upon successful completion of this course, the student will be able to: 1. Apply the concepts of Probability theory in communication systems. 2. Understand the propagation of electromagnetic waves in free space. 3. Analyze the performance of various pulse modulation schemes. 4. Develop the ability to compare and contrast the strengths and weaknesses of various pulse communication systems. 5. Understand switching in telephone networks.	
Unit-I	**Probabilit Theor and Basics of Random Variables:** Introduction to Probability Theory, Axioms of probability. Elementary properties of Probability, Conditional probability, Random variables, Several random variables, Statistical averages, Joint moments, Guassian distribution. [T1,R2]	**8**
Unit-II	**Random Processes:** Introduction, Random vectors obtained from random processes, Stationary, Mean, Correlation & Covariance function, Properties of autocorrelation function, Time averages and Ergodicity, Properties of Power spectral density, Cross correlation function, Cross spectral densities. [T1,R2]	**8**

Unit-III	**Wave Propagation :** Electromagnetic waves, Ground waves, Sky waves, ground waves, space waves, Ionosphere, critical frequency, maximum usable frequency, virtual height, skip distance, LOS communication, fading, single hop and multi hop propagation, duct propagation. [R1,R3]	**8**
Unit-IV	**Pulse Analog Modulation:** Band limited & time limited signals, Narrowband signals and systems, Sampling theorem in time domain, Nyquist criteria, Types of sampling- ideal, natural, flat top, Aliasing & Aperture effect. PAM PWM & PPM. [T1,R4]	**8**
Unit-V	**Digital Transmission of Analog Signal:** Digital representation of Analog signal, PCM Generation and Reconstruction: Quantization, Companding, Quantization Noise, Differential Pulse Code Modulation, Delta Modulation, Adaptive Delta Modulation. [T1,T2,R4]	**10**
Unit-VI	**Multiplexing and Telephone switching:** Time Division multiplexing, TDM-PCM telephone system, Frequency Division multiplexing, Comparison of TDM and FDM. Telephone switching: Elemental phone system, Central switching, Time Division Switching , Space Division Switching, Combined Space and Time Switching. [T2,R4]	**10**
	TOTAL	**52**
	Text Books: 1.Simon Haykin, "Communication System, John Wiley, Eastern Ltd., New York, (3rd Ed.) 1994. 2.K. Shammugham, "Digital and Analog Communication".	
	References: 1.Wayne Tomasi, "Electronic Communication Systems" Pearson Education, (Fifth Edition). 2. B. P. Lathi, "Modern Digital and Analog Communication systems" 3rd Ed., Oxford Uni. Press, New Delhi. 3.Kennedy G.,"Electronic Communication System" Tata Mc-Graw Hill Co.,New Delhi(3rd Ed.). 4.Taub and Schilling D.L., "Principles of Communication Systems", Mc-Graw Hill Co., New Delhi (Second Ed.).	

	5ETp7- POWER ELECTRONICS & DRIVES – LAB	
	Course Requisite: 1. (1B4) Electrical Engineering. 2. (3ET3) Electronic Devices and Circuits. 3. (5ET2) Power Electronics & Drives.	
	Course Objectives: The course aims to: 1. To understand the characteristics of power electronic devices like SCR, TRIAC, MOSFET. 2. To verify the effect of firing angle in phase controlled converters. 3. To understand the turn off mechanism of SCR. 4. To examine the basic working principle of DC and AC Motors. 5. To understand speed control techniques of DC and AC motors.	
	Course Outcomes: Upon successful completion of this course, students will be able to: 1. Analyze the characteristics of various power electronics devices . 2. Understand SCR firing circuits, commutation techniques.. 3. Design and develop power electronic circuits for various applications. 4. Illustrate the operation of various DC and AC motors. 5. Use different speed control techniques for DC and AC motors. 6. Understand the operation of various DC and AC motors.	
	Experiment List :	
Expt- 01	To verify the characteristics of SCR. Obj: 1. To plot V-I characteristics of SCR. 2. To measure Latching and Holding current of SCR.	
Expt- 02	To verify the characteristics of DIAC/TRIAC. Obj: 1.To plot V-I characteristics of DIAC/TRIAC when MT1 is +ve w.r.t. MT2. 2. To plot V-I characteristics of DIAC/TRIAC when MT1 is -ve w.r.t. MT2.	
Expt -03	To verify the characteristics of Power MOSFET. Obj: 1. To plot V-I characteristics of Power MOSFET	
Expt -04	To verify the effect of firing angle on output voltage in single phase half wave/ Full wave controlled rectifier Obj:- 1. To study basic working of single phase half wave/ Full wave controlled rectifier 2. To study the effect of firing angle on output voltage	

Expt -05	To verify the working of SCR Commutation Obj:- 1. To examine class A, class B, class C, class D and class E commutation of SCR 2. To draw the waveforms at different points for commutation circuit	
Expt -06	To verify the working of basic /improved series inverter Obj:- 1. To examine the basic working principle of series inverter 2. To examine the basic working principle of improved series inverter	
Expt -07	To verify the working of parallel inverter Obj:- 1. To examine the basic working principle of parallel inverter 2. To analyze working of parallel inverter with class C commutation	
Expt -08	To verify the basic working principle of Jones chopper Obj:- 1. To examine the basic working principle of Jones chopper 2. To observe & plot waveforms at different points	
Expt -09	To verify the speed control of D.C. shunt motor. Obj:- 1. To examine the basic method of speed controlling of D.C. motor. 2. To observe and plot the speed vs. current characteristics.	
Expt-10	To perform load test on D.C. series motor. Obj:- 1. To examine the basic working principle of D.C. series motor. 2. To observe and plot the various characteristics of D.C. Series motor.	
Expt-11	To use TRIAC in the speed control of universal motor. Obj: 1. To observe and plot speed Vs. voltage characteristics of universal motor.	
Expt-12	To perform load test on 3 phase Induction Motor. Obj:- 1. To study the basic working of 3 phase Induction Motor. 2. To examine various characteristics of 3 phase Induction Motor.	
	* Minimum 10 experiments based on/relevant to the above list.	
	5ETp8 MICROPROCESSOR & MICROCONTROLLER - LAB	
	Course Requisite: (5ET3) Microprocessor and Microcontroller.	
	Course Objectives: 1. To become familiarize the students with the architecture and Instruction set of Intel 8085microprocessor and 8051 microcontroller. 2. To provide practical hands on experience with Assembly Language Programming of 8085 and 8051. 3. To familiarize the students with interfacing of various peripheral devices with 8085 and 8051.	
	Course Outcomes: 1. Develop skill of writing programs in ALP for various applications of 8085 & 8051. 2. Interface various peripherals with 8085 & 8051.	
	E□PERIMENT LIST :	
Expt- 01	Write and execute 8085 µp ALP for Addition and Subtraction of two 8 bit numbers from memory& Store result at next location of memory.	
Expt- 02	Write and execute 8085 µp ALP for Multiplication of two 8 bits from memory & Store result in memory.	
Expt -03	Write and execute 8085 µp ALP for addition of series of 8 bit numbers from memory & Store result in memory.	
Expt -04	Write and execute 8085 µp ALP for smallest / largest number from an array of memory.	
Expt -05	Write and execute ALP for sorting array in ascending/descending order from memory.	
Expt -06	Interface 8255 PPI with 8085, CWR address is 0BH & write ALP to generate square wave of 50% duty cycle on port A.	
Expt -07	Write a program in assembly language for 8051 to toggle port P1 continuously and debug and simulate it using Keil software.	
Expt -08	Write a Program to interface LED to any one pin of port P1 and ON & OFF it 100 times.	
Expt -09	Write a program to interface SEVEN SEGMENT display to 8051 and display all hexadecimal number repeatedly on it.	
Expt-10	Interface a DC Motor with Microcontroller 8051 and rotate it clockwise and anticlockwise for same duration using assembly language.	
Expt-11	Write a program to interface STEPPER Motor with 8051 and rotate it clockwise and anticlockwise for same duration using assembly language.	
Expt-12	Write a program to interface 16x2 LCD Display with 8051 and Display a word/sentence on it.	
Expt- 13	Interface Matrix Hex Keypad with 8051 Microcontroller using assembly language.	
	* Minimum 5 experiments each on 8085 and 8051 respectively based on/relevant to the above list.	

	SEMESTER - VI	
	6ET1 MICRO CONTROLLER PROGRAMMING & APPLICATIONS	**L**
	Course Requisite: 1. (4ET4) Digital Electronics. 2. (5ET3) Micro Processor & Micro Controller. 3. (3ET2) Object Oriented Programming.	
	Course Objectives: 1. To familiarize with various members of AVR family and its architecture. 2. To understand AVR assembly language instructions. 3. To develop logic in assembly and C programming for AVR. 4. To understand in built peripherals of AVR microcontroller. 5. To make a system by interfacing different IO devices. 6. To be familiar with advanced serial protocols.	
	Course Outcomes: After completing the course, the students will be able to: 1. Use various members of AVR family. 2. Program AVR Microcontroller in assembly language and C language. 3. Use different inbuilt block of AVR. 4. Implement a system for dedicated applications. 5. Understand different serial protocols and IDE tools for AVR.	
Unit-I	Introduction to AVR Microcontroller: AVR microcontroller, History, Features and AVR family and its inbuilt Peripherals, Architecture of ATMega 32: signal description, registers of AVR, Data Memory, data formats and directives, RISC architecture in AVR.	**8**
Unit-II	Instruction Set, Addressing Modes and ALP: Load and Store instruction, Data transfer instruction, Arithmetic instruction, logical and compare instruction rotate and shift instruction, branch instruction and looping, call instruction and stack, bit-accessible instruction, accessing EEPROM, and addressing modes of AVR.	**8**
Unit-III	AVR programming in C: Data types, I/O programming, logical operation, data convergence program, data serialization and memory allocation in C.	**8**
Unit-IV	Interfacing and programming Peripherals of AVR Microcontroller in C : Memory, Flash, SRAM, EEPROM, Timer Structure, Watch dog timer, UART, Interrupt Structure, Analog to Digital convertors.	**8**
Unit-V	AVR Application and Programming in C: LCD and keyboard, Sensors, relay, opto-isolator and stepper motor, Timer, Interrupts and serial port programming, Input capture and wave generation, PWM programming and DC motor control.	**8**
Unit-VI	Serial Bus Protocol: SPI bus protocol, SPI programming in AVR, MAX2221 interfacing and programming, I2C bus protocol, I2C programming in AVR, DS1307 RTC interface and Programming.	**8**
	TOTAL	**48**
	Text Boo□s: 1. "AVR Microcontroller and Embedded systems using assembly and C", Muhammad Ali Mazidi, Sarmad Naimi and Sephers Naimi, Pearson Education, Inc. publishing as Prentice Hall 2013. 2. "Programming and Customizing the AVR Microcontroller", Dhananjay V. Gadre, McGraw Hill Education (India) Private Limited 2003.	
	References: 1. "Tiny AVR microcontroller Projects for the Evil Genius", Dhananjay V. Gadre and Nehul Malhotra, Tata McGraw Hill Education (India) Private Limited. 2. "Embedded C Program and the Atmel AVR", Bartnett. Cox and O'Cull, Delmar Cengage learning. 3. "Embedded C", Michal J. Pont, Addison Wesley Pearson Education.	
	Subject (Th): 6ET3- DIGITAL COMMUNICATION	**L**
	Course Requisite: 1. (4ET1) Signal and System 2. (4ET5) Communication Engineering I 3. (5ET4) Communication Engineering II	

	Course Objectives: 1. To study basic building blocks of digital communication system. 2. To learn information theory and theoretical bounds on the data rates of digital communication. 3. To understand and analyze communication channel. 4. To study and analyze different digital modulation techniques. 5. To study baseband transmission of the signal. 6. To understand importance of channel encoding and decoding in digital communication. 7. To study multiple access schemes and spread spectrum communication system.	
	Course Outcomes: Upon successful completion of this course, the student will be able to: 1. Understand basic building blocks of digital communication system and formatting of digital signal. 2. Understand concepts of information theory and analyze information transmission over communication channel. 3. Analyze performance of different digital modulation techniques. 4. Understand methods to mitigate inter symbol interference in baseband transmission system. 5. Implement different error control coding schemes for the reliable transmission. 6. Understand various multiple access schemes and spreading techniques.	
Unit-1	**Introduction to Digital Communication S□stem:** Functional Blocks of Digital Communication System; Source Encoder and Decoder, Channel Encoder and Decoder, Modulator and Demodulator. **Line Coding:** Need for Line coding, Properties of Line Coding, Unipolar RZ and NRZ, Polar RZ and NRZ, Bipolar NRZ (AMI), Split Phase Manchester Coding, Polar Quaternary NRZ Coding, HDB3 Coding, Scrambler and Unscrambler.	**8**
Unit-2	**Information Theor□:** Measure of Information, Entropy and Information Rate of Long Independent and Dependent Sequences. Source Encoding: Huffman Encoding, Shannon's Encoding Algorithm, Shannon-Fano Algorithm. **Discrete Communication Channel:** Noiseless Channel, Deterministic Channel, Binary Symmetric Channel, Rate of Information Transfer over Discrete Channel, Capacity of Discrete Memoryless Channel. **Continuous Channel:** Shannon Hartley Theorem for channel capacity, Signal to Noise Ratio – Bandwidth Tradeoff.	**10**
Unit-3	**Bandpass Modulation and Demodulation techniques:** BPSK, BFSK, ASK and DPSK generation and reception, Signal space diagram, PSD and Bandwidth of BPSK and BFSK systems, QPSK. Transmitter and Receiver, Signal space diagram, PSD and Bandwidth of QPSK, Probability of Error of ASK, BPSK and BFSK systems, Comparison of Digital modulation systems. **Coherent Detection:** Matched Filter (Impulse response and Probability of Error).	**10**
Unit-4	**Base Band Transmission:** Base Band Binary PAM systems, Inter Symbol Interference, Base Band Pulse Shaping and Nyquist Criterion, Eye Diagram, Correlative Coding: Duobinary Encoder with Pre-coder, Modified Duobinary Encoder, Modified Duobinary Encoder with Pre-coder. **Equali□ation:** Need for equalization, Transversal Equalizer (Problems Expected), Preset Equalizer, Adaptive Equalizer, Clock and Carrier Synchronization.	**8**
Unit-5	**Error Control Coding:** Introduction to Error Control Coding, Types of Errors, Methods of Controlling Errors, **Linear Bloc□ Codes:** Matrix Description of Linear Block codes, Hamming Distance, Hamming Weight, Minimum Hamming Distance, Hamming Codes, Encoder for Linear Block code, Syndrome Decoding, Syndrome Decoder for (n, k) Linear Block Code, Error Detection and Correction capability of Linear Block Codes (Derivation expected). **C□clic Codes:** Properties of Cyclic Codes, Systematic and Non-Systematic generator Matrix, Parity Check Matrices for Cyclic Codes, Encoders for Cyclic Codes, Syndrome Decoding for Cyclic Codes. **Convolution Codes:** Time Domain Approach and Transform domain approach for convolution code generation, Code Tree and Code Trellis for Convolution code.	**10**

Unit-6	**Multiple Access Schemes and Spread Spectrum Communication:** Multiple Access schemes: Time Division Multiple Access, Frequency Division Multiple Access, Code Division Multiple Access, Space Division Multiple Access. **Spread Spectrum S□stems:** Notion of Spread Spectrum, PN Sequence Generation (Problems Expected), Direct Sequence Spread Spectrum (DSSS), Jamming Margin, Processing Gain, Eb/No Ratio, Frequency Hopped Spread Spectrum, Slow and Fast frequency Hopping.	**6**
	TOTAL	**52**
	Text Boo□s : 1. Shanmugam K.S., "Digital & Analog Communication Systems", John Wiley & Sons, New York, 1996. 2. Lathi B. P., "Modern Digital and Communication Systems", Holt Rinchart and Winston Inc., New York, 1993. 3. Simon Haykin, "Digital Communication", John Wiley and Sons,Pvt. Ltd., Singapore.	
	References: 1. Proakis J. K., "Digital Communication", Mc-Graw Hill Book Co., London (Second Edition). 2. Taub, Herbert, Schilling D. L., "Principles of Communication Systems", Mc-Graw Hill International Book Co., Tokyo. 3. W.C.Y. Lee, "Mobile Cellular Telecommunications Systems", Mc-Graw Hill International Editions, 1990. 4. Glover and Grant, "Digital Communication", Prentice Hall Publication.	
	6ETp7 – DIGITAL COMMUNICATION – LAB	
	Course Requisite: 1. (4ET5) Communication Engineering I 2. (5ET4) Communication Engineering II 3. (6ET3) Digital Communication	
	Note: Lab includes the experiments on the contents of following subjects : 1. (5ET4) Communication Engineering II, 2. (6ET3) Digital Communication.	
	Course Objectives: 1. To understand various Pulse communication systems for transmission of analog signals. 2. To enable the students to understand different line coding used for representation of digital wave forms. 3. To understand operation of Scrambler and Unscrambler. 4. To study error correction and detection methods used in digital communication systems. 5. To understand Bandpass Modulation and Demodulation techniques. 6. To understand baseband transmission of signal.	
	E□PERIMENT LIST :	
Expt-1	To verify the operation of Pulse Amplitude Modulation PAM and Demodulation.	
Expt -2	To verify the operation of Pulse Width Modulation (PWM) and Demodulation.	
Expt -3	To verify the operation of Pulse Code Modulation (PCM) and Demodulation.	
Expt -4	To verify the output of Delta Modulation and Demodulation process.	
Expt -5	To explore Time Division Multiplexing (TDM) Technique as a application of PAM.	
Expt -6	To implement various line coding schemes in MATLAB/SCILAB and observe their spectrum.	
Expt -7	Implementation of Scrambler and Unscrambler.	
Expt -8	Extraction and recovery of data in Base Band digital Transmission and Measurement of bit error rate.	
Expt -9	To analyze the performance of baseband system using Eye diagram.	
Expt -10	Implementation of cyclic Encoding and Decoding of BCD bit Sequence.	
Expt -11		
Expt -12	To analyze the performance of Amplitude Shift keying (ASK).	
Expt -13	To analyze and compare performance of 1) Phase Shift Keying (PSK). 2) Differential Phase Shift Keying (DPSK). 3) Quadrature Phase Shift Keying (QPSK)	
Expt -14	Generation of PN sequence and to determine auto and cross correlation..	
Expt -15	To implement Shanon-Fano / Huffman coding using MATLAB.	
	* Minimum 10 experiments based on/relevant to the above list.	
	FE6ET5 Free Elective – II (2) INTRODUCTION TO WIRELESS TEC□NOLOGY	**L**

	Course Objectives: 1. To be aware of evolution in wireless technology. 2. To study the fundamentals of cellular radio system. 3. To understand operation of various 2nd and 3rd generation cellular systems; GSM, IS95, CDMA2000, WCDMA. 4. To study wireless data communication networks.	
	Course Outcomes: Upon successful completion of this course, the student will be able to: 1. Describe evolution of wireless networks. 2. Understand fundamentals of cellular radio system. 3.Demonstrate various 2nd and 3rd generation wireless cellular and data communication networks.	
Unit-1	**Overview of Wireless Networks:** Evolution of wireless networks, different generations of wireless networks (1G, 2G, 3G & beyond), comparison of wired and wireless media, radio propagation mechanism. [T1]	**8**
Unit-2	**Cellular Technology:** Cellular Topology- cellular concept, cellular hierarchy, cell fundamentals, Concept of Signal-to-interference ratio. Capacity Expansion: cell splitting and cell sectoring. Basic concept of Channel assignment techniques: Fixed, Dynamic. Handoff types. [T1]	**8**
Unit-3	**GSM System:** GSM Network Architecture, GSM Call Procedures: Registration procedure, call establishment, Handoff in GSM, GSM Signaling Protocol Architecture: Physical layer: power and power control, physical packet burst, frame hierarchy in GSM, Hand Off Procedures, Logical channels in GSM. [T1]	**8**
Unit-4	**CDMA Digital Cellular Standard (IS-95):** IS-95 Forward Channel, IS-95 Reverse Channel, packet and frame formats, mobility and radio recourse management: soft handoff and power control. **CDMA2000 and WCDMA:** Forward and Reverse Channel in CDMA2000 and WCDMA, Hand Off and Power Control in CDMA2000 and WCDMA. [T1]	**8**
Unit-5	**Wireless Local Area Network (WLAN):** IEEE 802 architecture, IEEE 802.11 architecture and Services, IEEE 802.11 medium access control, MAC frame format, 802.11 physical layer, 802.11 standards. [T2]	**8**
Unit-6	**Wireless PAN (WPAN-802.15):** Overview of 802.15, Bluetooth, Bluetooth protocol stack, usage models, piconets and scatternets, radio specification, baseband specifications: physical links, packets, payload format, error correction, logical channels, channel control, link manager specification. [T2]	**8**
	TOTAL	**48**
	Text Books: 1. K. Pahlavan and P. Krishnamurthy, "Principles of Wireless Networks", Pearson Education Asia Publication (2002). 2. William Stallings, "Wireless Communications & Networks", Prentice-Hall India, 2nd Edition.	
	6ETp7 – DIGITAL COMMUNICATION – LAB.	
	Course Requisite: 1. (4ET5) Communication Engineering I 2. (5ET4) Communication Engineering II 3. (6ET3) Digital Communication	
	Note: Lab includes the experiments on the contents of following subjects 1. (5ET4) Communication Engineering II, 2. (6ET3) Digital Communication.	
	Course Objectives: 1. To understand various Pulse communication systems for transmission of analog signals. 2. To enable the students to understand different line coding used for representation of digital wave forms. 3. To understand operation of Scrambler and Unscrambler. 4. To study error correction and detection methods used in digital communication systems. 5. To understand Bandpass Modulation and Demodulation techniques. 6. To understand baseband transmission of signal.	
	Experiment List :	
Expt-1	To verify the operation of Pulse Amplitude Modulation PAM and Demodulation.	
Expt -2	To verify the operation of Pulse Width Modulation (PWM) and Demodulation.	
Expt -3	To verify the operation of Pulse Code Modulation (PCM) and Demodulation.	
Expt -4	To verify the output of Delta Modulation and Demodulation process.	
Expt -5	To explore Time Division Multiplexing (TDM) Technique as a application of PAM.	
Expt -6	To implement various line coding schemes in MATLAB/SCILAB and observe their spectrum.	
Expt -7	Implementation of Scrambler and Unscrambler.	
Expt -8	Extraction and recovery of data in Base Band digital Transmission and Measurement of bit error rate.	

Expt -9	To analyze the performance of baseband system using Eye diagram.	
Expt -10	Implementation of cyclic Encoding and Decoding of BCD bit Sequence.	
Expt -11		
Expt -12	To analyze the performance of Amplitude Shift keying (ASK).	
Expt -13	To analyze and compare performance of 1) Phase Shift Keying (PSK). 2) Differential Phase Shift Keying (DPSK). 3) Quadrature Phase Shift Keying (QPSK)	
Expt -14	Generation of PN sequence and to determine auto and cross correlation..	
Expt -15	To implement Shanon-Fano / Huffman coding using MATLAB.	
	* Minimum 10 experiments based on/relevant to the above list.	

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NOTIFICATION

No. 80 /2019 Date : 26 /07/2019

Subject :- Implementation of revised S□llabi prescribed for Sem. VII & VIII B.E. (Electronics & Telecommunication Engg.) (CGS) for the session 2019-2020 & onwards.

It is notified for general information of all concerned that the authorities of the University has accepted the revised syllabi of Semester **VII & VIII B.E. (Electronics & Telecommunication Engg.) (CGS)** from the session 2019-2020 and onwards as per **Appendix – A** given below :-

Sd/-
(Dr.H.R.Deshmukh)
I/c. Registrar
Sant Gadge Baba Amravati University

Appendix – A

SEMESTER – VII

Subject (Th): 7ET1- VLSI DESIGN

Course Pre-requisites: 1. (3ET3) Electronic Devices & Circuits.
2. (4ET4) Digital Electronics

Course Objectives:
1. To study CMOS transistor theory and performance parameters.
2. To learn design of digital VLSI circuits, computer aided simulation and synthesis tools on programmable chips (FPGA/CPLD) using Verilog HDL.
3. To be aware of manufacturing process in VLSI technology.
4. To study layout design rules for size & power optimization.

Course Outcomes: After successfully completing the course, the students will be able to:
1.Gain knowledge about the trends in VLSI semiconductor technology and it's impacts on scaling and performance.
2. Draw Layout, Stick diagrams of simple CMOS Circuits.
3. Understand Front & Back end design aspects of simple VLSI Digital circuits.
4. Model digital circuits with Verilog HDL, simulate, synthesize and prototype in PLDs.

Unit-1 : CMOS Circuit Design-I: Moore's Law□MOS structure capacitance, Channel capacitance, Junction capacitance, MOS Transistor Switches, CMOS Logic gates, CMOS Inverter - DC Characteristics, CMOS combinational logic design, Intoroduction to Delays in CMOS, Power consumption / Dissipation Issues. [T1, T2, R1] (09)

Unit-2 CMOS Circuit Design-II: Clocked Latch and Flip-Flop Circuits, CMOS Transmission Gates (Pass Gates), Static Read - Write Memory (SRAM) Circuits, Dynamic Read-Write Memory (DRAM) Circuits.. [T1, T2, R1] (08)

Unit-3 CMOS Technolog□ & Design Rules: CMOS fabrication processing steps, p-well CMOS Process, n-well CMOS Process, Twin well process, Silicon-on-Insulator Process, CMOS Process enhancements –Interconnect, Circuit Elements, CMOS Lambda-based Design Rules, Stick Diagrams, Physical layout of simple CMOS Logic Gates. [T1, T2, R2, R3, R6] (08)