ShriShankaracharya Technical Campus, Bhilai

(AnAutonomousInstitute AffiliatedtoCSVTUBhilai)

SchemeofTeaching&Examination(Effectivefrom2020-2021Batch)

B.Tech. (Electronics &Telecommunication Engineering)FifthSemester

Sl.No.	Boardof Studies(BOS)	Courses(Subject)	Course Code	Periodper Week			Schemeof Examination			Total Marks	Credit
				L	T	P	Theory/Lab				
							ESE	CT	TA		
1.	Electronics&Telecommunication	Digital Communication	**ET105501**	2	1	-	100	20	30	150	3
2.	Electronics&Telecommunication	Design of Electronics Circuits	**ET105502**	2	1	-	100	20	30	150	3
3.	Electronics& Telecommunication	Antenna & Wave Propagation	**ET105503**	2	1	-	100	20	30	150	3
4.	Electronics&Telecommunication	VLSI System Design	**ET105504**	2	1	-	100	20	30	150	3
5.	Electronics&Telecommunication	Professional Elective-1	(Refer Table-1)	3	-	-	100	20	30	150	3
6.	Electronics& Telecommunication	Digital Communication Lab	**ET105591**	-	-	2	25	-	25	50	1
7.	Electronics&Telecommunication	Design of Electronics Circuits Lab	**ET105592**	-	-	2	25	-	25	50	1
8.	Electronics&Telecommunication	VLSI System Design Lab	**ET105593**	-	-	2	25	-	25	50	1
9	Electronics&Telecommunication	Minor Project – I	**ET105594**	-	-	2	25	-	25	50	1
10.	Electronics&Telecommunication	Practical Training/ Internshipassessment (Report&Seminar)	**ET105595**	-	-	2	-	-	25	25	1
11.	Electronics&Telecommunication	ConstitutionofIndia	**ET100596**	-	-	-	-	-	25	25	-
Total				**11**	**4**	**10**	**600**	**100**	**300**	**1000**	**20**

Note:

(a)Abbreviationsused:L-Lecture,T-Tutorial, P-Practical, ESE-EndSemesterExam,CT-ClassTest,TA-Teacher'sAssessment

(b)Thedurationof endsemesterexaminationofalltheorypaperswillbeofthreehours.

(c)ConstitutionofIndiawillbeconductedby/relevantdisciplineasdecidedbytheDirector.

Table1:ProfessionalElective-I			
Sl.No.	**BoardofStudies(BOS)**	**Course(Subject)**	**CourseCode**
1.	Electronics&Telecommunication	Computer Network	**ET105521**
2.	Electronics&Telecommunication	Wireless Communication	**ET105522**
3.	Electronics&Telecommunication	Nano Electronics	**ET105523**
4.	Electronics&Telecommunication	Optoelectronic devices and circuits	**ET105524**
5.	Electronics&Telecommunication	Advanced Data Structures and Algorithms	**ET105525**

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SchemeofTeaching&Examination(Effectivefrom2020-2021Batch)

B.Tech.(Electronics&Telecommunication Engineering)SixthSemester

Sl.No.	Boardof Studies(BOS)	Courses(Subject)	Course Code	Periodper Week			Schemeof Examination			Total Marks	Credit
				L	T	P	Theory/Lab				
							ESE	CT	TA		
1.	Electronics&Telecommunication	Digital System Design using VHDL	**ET105601**	2	1	-	100	20	30	150	4
2.	Electronics&Telecommunication	Control Systems	**ET105602**	2	1	-	100	20	30	150	3
3.	Electronics& Telecommunication	Digital Signal Processing	**ET105603**	2	1	-	100	20	30	150	3
4.	Electronics& Telecommunication	Professional Elective-II	(Refer Table-1)	2	1	-	100	20	30	150	3
5.	(Refer Table-2)	Open Elective-1	(Refer Table-2)	3	-	-	100	20	30	150	3
6.	Electronics& Telecommunication	Digital System Design using VHDL LAB	**ET105691**	-	-	2	25	-	25	50	1
7.	Electronics&Telecommunication	Digital Signal Processing LAB	**ET105692**	-	-	2	25	-	25	50	1
8.	Electronics&Telecommunication	Soft Computing LAB	**ET105693**	-	-	2	25	-	25	50	1
9	Electronics&Telecommunication	Minor Project – II	**ET105694**	-	-	2	50	-	25	75	1
10.	Electronics&Telecommunication	Essence of Indian Knowledge Tradition	**ET100595**	-	-	-	-	-	25	25	-
Total				**11**	**4**	**8**	**625**	**100**	**275**	**1000**	**20**

Table1 : Professional Elective-II

Sl.No.	BoardofStudies(BOS)	Course(Subject)	CourseCode
1.	Electronics&Telecommunication	Information Theory and coding	**ET105621**
2.	Electronics&Telecommunication	Biomedical Electronics	**ET105622**
3.	Electronics&Telecommunication	Electronic Engineering Materials &	**ET105623**
4.	Electronics&Telecommunication	Advanced Semiconductor Devices	**ET105624**
5.	Electronics&Telecommunication	Digital System Design using Verilog	**ET105625**

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SchemeofTeaching&Examination(Effectivefrom2020-2021Batch)

B.Tech.(Electronics&Telecommunication Engineering)SixthSemester

Table2 : OpenElective-I				
Sl.No.	**BoardofStudies(BOS)**	**Course(Subject)**	**CourseCode**	**Link**
1.	Civil Engineering	Project Construction Planning and Control	CE1006441	https://archive.nptel.ac.in/courses/105/106/105106149/
2.	Civil Engineering	Remote Sensing Principle & Application	CE1006442	https://nptel.ac.in/courses/105101206
3.	Computer Science & Engineering	Robotics	CSE1006443	https://onlinecourses.nptel.ac.in/noc22_me109/preview
4.	Computer Science & Engineering	Data Visualization	CSE1006444	https://onlinecourses.nptel.ac.in/noc22_cs72/preview
5.	Computer Science & Engineering	Pattern Recognition and Visual Recognition	CSE1006445	https://onlinecourses.nptel.ac.in/noc22_ee119/preview
6.	Computer Science & Engineering	Predictive Analysis	CSE1006446	
7.	Electrical & Electronics Engineering	Hybrid Electric Vehicle	EEE1006447	
8.	Electrical & Electronics Engineering	Grid Integration of Renewable Energy Sources	EEE1006448	
9.	Electrical Engineering	Renewable Energy Systems	EE1006449	nptel.ac.in/courses/1031032061
10..	Electrical Engineering	Industrial Automation and PLC	EE1006450	nptel.ac.in/courses/108105062
11.	Electronics & Telecommunication Engineering	Introduction to Wireless and Cellular Communications		https://nptel.ac.in/courses/106106167
12.	Electronics & Telecommunication Engineering	Cryptography & Network Security		https://nptel.ac.in/courses/106105162
13.	Information Technology	Human Computer Interaction		https://nptel.ac.in/courses/106106177
14.	Information Technology	Virtual reality		https://nptel.ac.in/uacourses/10
15.	MBA	Management for Technocrats		https://nptel.ac.in/courses/110105146
				https://onlinecourses.swayam2.ac.in/nou22_mg07/
16.	MBA	Industrial Management		https://onlinecourses.swayam2.ac.in/nou22_mg06/preview
				https://onlinecourses.nptel.ac.in/noc22_mg81/preview
17.	Mechanical Engineering	Operation Research		https://nptel.ac.in/courses/110106062
18.	Mechanical Engineering	Engineering Economics		https://nptel.ac.in/courses/112107209

Note:

(a) Abbreviationsused:L-Lecture, T-Tutorial, P-Practical, ESE-EndSemesterExam,CT-ClassTest,TA-Teacher'sAssessment

(b) 1/4thoftotalstrengthofstudentssubjecttominimum of20studentsisrequiredtoofferanelectiveinthedepartmentina particularacademicsession.

(c) Choiceof electivecourseoncemadeforanexaminationcannotbechanged infutureexaminations.

(d) Thedurationof endsemesterexaminationofalltheorypaperswillbeofthreehours.

SYLLABUS

B.TECH. (ELECTRONICS &TELECOMMUNICATIONENGINEERING)

FIFTHSEMESTER

ShriShankaracharya Technical Campus, Bhilai

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SYLLABUS

B. Tech. (Electronics&TelecommunicationEngineering) FifthSemester

Subject Code :- ET105501	Digital Communication	L = 2	T = 1	P = 0	Credits = 3
Evaluation Scheme	ESE	CT	TA	Total	ESE Duration
	100	20	30	150	3 Hours

Course Objective	Course Outcomes
1. To study signal space representation of signals and discuss the process of sampling, quantization that is fundamental to the digital transmission of analog signals. **2.** To Study digital modulation methods and optimum receiver. **3.** To Study the Spread Spectrum Techniques and its practical application.	**CO1.** Student will be able to understand the analog to digital conversion effectively using theorems. **CO2.** Student will be able toanalyze the performance of a digital communication in terms of probability of error of digital modulation Technique. **CO3.** Student will be able to understand the various formats of line codes and its applications. **CO4.** Student will be able to understand high distance digital signal transmission techniques. **CO5.** Students gain knowledge of spread spectrum techniques.

UNIT- I: Basics of Digital Communication: **[CO1]**

Sampling theorem: Low pass signal, Band-pass signal, Aliasing effect, Interpolation Formula, Natural sampling, Flat-top sampling, Signal recovery through holding, Generation and Detection of PAM, PWM, PPM. TDM-PAM, Aperture Effect, Channel bandwidth for PAM signal, TDM, Multiplexing T1 Lines-The T2, T3, T4 Lines. **[8Hrs]**

UNIT-II: Digital transmission of analog data: **[CO2]**

Quantization: Quantization of signals, PCM, TDM-PCM system, DPCM, Delta modulation, Adaptive delta modulation, Continuously variable slope delta modulator (CVSD). Noise in PCM and DM: PCM transmission: Calculation of SNR in PCM. Delta modulation transmission: signals to quantization noise ratio Calculation. **[7Hrs]**

UNIT-III: Principle of digital data transmission: **[CO3]**

Digital communication system, Line coding: PSD of various line codes, Polar signaling, On-Off signaling, Bipolar signaling, Pulse shaping: Nyquist criterion for zero ISI, Scrambling, Regenerative repeater: Eye diagram, Detection error probability for polar signal, ON-Off and bipolar signals.[**7Hrs]**

UNIT-IV:Digital modulation techniques: **[CO4]**

Fundamentals of BASK, BPSK and BFSK, Generation, detection, spectrum and geometrical representation of BPSK and BFSK, Fundamentals of DPSK, DEPSK and QPSK, Generation and detection of DPSK, DEPSK and QPSK, Signal space representation of QPSK. M-ary PSK.**[7Hrs]**

UNIT-V: Spread spectrum modulation :[CO5]

Introduction , Direct sequence (DS) Spread Spectrum, use of spread spectrum with CDMA, ranging using DS spread spectrum, Frequency hopping spread spectrum, generation and characteristics of PN sequences, acquisition of FH signal, tracking of FH signal, acquisition and tracking of a DS signal.[**7Hrs]**

Text Books:

S.No	Title	Authors	Publisher
1	Principles of communication system	Taub& Schilling, 3 rd Ed.	McGraw-Hill Education
2	Modern Digital and Analog Communication Systems	B.P. Lathi,3 rd Ed	Oxford university press

Reference Books:

S.No	Title	Authors	Publisher
1	Fundamentals of communication systems	John.G. Proakis	Pearson education
2	Communication system	A. Bruce Carlson, Paul Crilly, Paul B. Crilly	McGraw-Hill Education

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SYLLABUS

B. Tech. (Electronics&TelecommunicationEngineering) FifthSemester

Subject Code :- ET105502	Design of Electronics Circuits	L = 2	T = 1	P = 0	Credits = 3
Evaluation Scheme	ESE	CT	TA	Total	ESE Duration
	100	20	30	150	3 Hours

Course Objective	Course Outcomes
1. To design simple circuits like amplifiers using op-amps. 2. To design linear and non-linear applications of operational amplifiers. 3. To Gain knowledge about A/D and D/A converters 4. To gain knowledge in principles of designing filter circuits 5. To become familiar with Multivibrator and Timer circuits.	**CO1**. Gain knowledge about Differential amplifier and operational amplifier. **CO2**. Designing circuits for op-amp applications. **CO3**. Gain knowledge about A/D and D/A converters. **CO4**. Get knowledge about filter design **CO5**. Understand Multivibrator and Timer circuits.

UNIT-I: Fundamentals of differential amplifiers and operational amplifiers: [CO1]

Fundamentals of differential amplifiers and operational amplifiers: BJT differential amplifier, Introduction to operational amplifier :op-amp Symbol , Block schematic of op-amp, Ideal op-amp characteristics, Open loop configuration of op-amp, Closed loop configuration of op-amp: Voltage series feedback amplifier, Voltage shunt feedback amplifier, Differential amplifier. **[7Hrs]**

UNIT-II: Operational amplifier applications: [CO2]

Basic op-amp circuits: Summing, Scaling and Averaging amplifiers. Current to voltage and Voltage to current converter, Differentiator, Integrator, Non-linear Circuits: Logarithmic Amplifiers, Peak Detector,Zero-crossing detector. OP-AMP as Comparator, Schmitt Trigger. **[7Hrs]**

UNIT-III :Analog to digital and digital to analog converters:[CO3]

Sample and hold circuits and sample and hold IC (LF 398), Types of D/A converter : The binary weighted resistor network, The R-2R ladder network, Theinverted ladder, D/A specification. A/D converter : Parallel-comparator type, Dual slope, Successiveapproximation, Voltage to time and Voltage to frequency converters, A/D specification.**[7Hrs]**

UNIT-IV: Principles of Active Filters: **[CO4]**

Bilinear Transfer Function, Parts of T(jw), Classification of Magnitude and Phase Response, Bode plots and Design. Cascading: Inverting and Non-inverting OP –AMP Circuits,Cascade Design, All pass Circuits: Phase shaping, Design parameters: ω_o and Q. **[8Hrs]**

UNIT-V Multivibrators: **[CO5]**

Transistor as Switch, Types of Multivibrator (bistable, astable&monostable), use of Commutating Capacitor, improving resolution.

Timer and its application: 555 Timer, Functional Diagram, Monostable mode operation,Astable mode operation **[7Hrs].**

Text Books:

S.No.	Title	Authors	Publisher
1	Integrated Circuits	K. R. Botkar	Khanna Publications
2	Operational Amplifiers	R. Gayekwad,	Pearson Education
3	Analog Filter Design	Van –Valkenburg	Holt –Standers International Edn.
4	Linear Integrated Circuits	D.RoyChoudhary and Shail B Jain	New Age International
5	Digital integrated Electronics	Herbert Taub and Donald Schilling	McGraw Hill

Reference Books:

S. No.	Title	Authors	Publisher
1	Integrated Electronics	Millman&Halkias	TMH Publishing
2	Operational Amplifiers and Linear Integrated Circuits	Coughlin and Driscoll	PHI

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SYLLABUS

B. Tech. (Electronics&TelecommunicationEngineering) FifthSemester

Subject Code :- ET105503	Antenna & Wave Propagation	L = 3	T = 0	P = 0	Credits = 3
Evaluation Scheme	ESE	CT	TA	Total	ESE Duration
	100	20	30	150	3 Hours

Course Objective	Course Outcomes
1. To study uniform plane wave propagation in different media and wave polarization 2.To study radio wave propagation 3. To study the concept of radiation and analyze radiation characteristics of a current element and dipole 4. To study antenna fundamentals and antenna arrays: uniform and tapered and their design 5. To study some practical antennas like Rhombic, Loop antenna.	On successful completion of the course, the student will be able to: **CO1**. Students will be able to understand the guided and unguided wave propagation. **CO2**. Students will acquire knowledge of different propagation medium. **CO3**. Students will acquire knowledge of Basic antennas, their radiation and characteristics. **CO4**. Students will knowledge of antenna arrays and their design. **CO5**. Students will able to understand some different practical antennas

UNIT-I:Waveguides: **[CO1]**

Wave propagation between two infinite parallel conducting plane: TE and TM modes; Properties of TE and TM modes, TEM waves; Rectangular waveguides: TE and TM modes, dominant modes, characteristics: attenuation and phase constants, phase and group velocities, cut-off wavelengths and frequencies, guide wavelength, field pattern and wave impedance.**[7Hrs]**

UNIT-II: Wave Propagation:[CO2]

Sky wave, surface wave and space wave; Ionospheric propagation refractive index at high frequencies; Mechanism of radio wave bending, critical frequency; effect of earth's magnetic field; Effective dielectric constants and conductivity, MUF, skip distance **[8Hrs]**

UNIT-III :Antennas and Radiation:[CO3]

Electromagnetic radiation; Retarded potentials;, radiation from a small current element, radiated power and radiation resistance; Isotropic radiator; radiation pattern; Radiation Intensity; Antenna Gain: directive gain and power gain; Antenna directivity **[7Hrs]**

UNIT-IV:Antenna Arrays and their design:[CO4]

Various form of array: broadside, end fire, collinear and parasitic arrays; Arrays of two isotropic point sources; Principle of pattern multiplication; linear arrays with 'n' isotropic point sources of equal amplitude and spacing**[7Hrs]**

UNIT-V Practical Antennas: [CO5]

Effect of earth on antenna performance; Grounded and ungrounded antennas; Antenna top loading and tuning; Resonant and non-resonant antennas; Beverage antenna; Tower radiator; Long-wire antenna; V-antenna; Rhombic antenna; Loop antenna **[7Hrs]**

Text Books:

S.No.	Title	Authors	Publisher
1	Engineering Electromagnetic	William H. Hyat, Jr. John A. Buck	. TMH
2	Antennas and Wave Propagation	K. D. Prasad,	SatyaPrakashan
3	Antenna and Wave Propagation	G. S. N. Raju	Pearson
4	Antennas and Radio Propagation	R.E. Collins	McGraw-Hill

Reference Books:

S. No.	Title	Authors	Publisher
1	Antenna Theory	Balanis	John Wiley & Sons
2	Antenna and Wave Propagation	R.L. Yadava	PHI

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SYLLABUS

B. Tech. (Electronics&TelecommunicationEngineering) FifthSemester

Subject Code :- ET105504	VLSI System Design	L = 3	T = 0	P = 0	Credits = 3
Evaluation Scheme	ESE	CT	TA	Total	ESE Duration
	100	20	30	150	3 Hours

Course Objective	Course Outcomes
1. To understand the VLSI system and working of MOS transistor. 2. To understand the designing of CMOS schematic of logic gates. 3. To understand the IC design aspects, basic fabrication steps. 4. To understand the layout design of few combinational circuits.. 5. To understand the layout design of few sequential circuits.	**CO1.**Students will understand about the various logic families. **CO2.** Students are expected to understand VLSI system and working of MOS transistor. **CO3.** Students will be able to design of CMOS schematic of logic gates. **CO4.**Students are expected to understand CMOS fabrication details**.** **CO5.** Students are expected to understand schematic, layout of combinational and sequential circuits.

UNIT-I: Digital Logic Families: : **[CO1]**

Introduction; Logic Families: TTL NAND gate, Specifications, Noise margin, Propagation delay, fan-in, fan-out, Tristate TTL, TTL subfamilies: IIL, ECL, MOS Logic, CMOS Logic, Comparison Among Various Logic Families, Manufacturer's Specification. **[7Hr]**

UNIT-II:Introduction to VLSI Systems & MOS Transistors[CO2]

Introduction to VLSI Systems: Historical Perspective, Introduction to IC Technology, Types of Integrated Circuits, Design Methodology, Design Domains—Y-Chart, Hierarchical Abstraction, Design Flow, Design Styles.

MOS Transistors: Introduction,Construction,Symbol, Basic Operation, V-I Characteristics. MOSFET Types: Depletion MOSFET, Enhancement MOSFET, their characteristics andparameters, MOSFETs as Switch: FET Threshold Voltages, Pass Characteristics. **[7Hr]**

UNIT-III: Logic Gates in CMOS: [CO3]

Basic Logic Gates in CMOS: NOT Gate, NOR Gate, NAND Gate; Complex Logic Gates in CMOS: Structured Logic Design, XOR and XNOR Gates; Transmission Gate Circuits: Multiplexers, OR Gate, XOR/XNOR Gate. DC characteristics of the CMOS inverter, Switching Characteristics: Fall Time, Rise Time, Propagation Delay; Power Dissipation. **[7Hrs]**

UNIT-IV : Fabrication & Physical Design of CMOS Integrated Circuits: [CO4]

CMOS Layers; Designing FET Arrays; Basic Gate Designs; Complex Logic Gates; Euler Graph; Overview of Silicon Processing; Material Growth and Deposition; Lithography; CMOS Process Flow; CMOS Design Rules; Layout of Basic Structures: nWell, Active Areas, Doped Silicon Regions, MOSFETs, Active Contacts, Metal, Vias; Physical Design(Stick diagram &Layout Design) of Logic Gates: NOT, NAND & NOR. **[7Hrs]**

UNIT-V: CMOS Subsystem Design[CO5]

Combinational Circuits: Schematic and Layout of CMOS Combinational Circuits: Half Adder circuit, Full adder circuit, Halfsubtractor circuit, Full Subtractor circuit, 2:1 Multiplexer, 4:1 Multiplexer, Parity Generator.
Sequential Circuits: Schematic and Layout of CMOS Sequential Circuits: SR Flip-Flop, JK Flip-Flop, T-Flip-Flop & D Flip-Flop, 4x4 NOR based ROM Array, 4x4 NAND based ROM Array; Schematic of SRAM Schematic and operation of DRAM: 3-T DRAM 6-T DRAM. **[8Hrs].**

Text Books:

S.No.	Title	Authors	Publisher
1	Introduction to VLSI Circuits and Systems	John P. Uyemura	John Wiley & Sons
2	CMOS Digital Integrated Circuits: Analysis & Design	Sung-Mo Kang & Yusuf Leblebici	TMH
3	CMOS VLSI Design: A Circuits and Systems Perspective	Weste	Pearson Education

Reference Books:

S. No.	Title	Authors	Publisher
1	Basic VLSI Design	Pucknell&Eshar ghian	PHI
2	CMOS circuit design, layout and simulation	Jacob Baker	PHI
3	*Modern Digital Electronics*	R.P. Jain	McGrawHill Education

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SYLLABUS

B. Tech. (Electronics&TelecommunicationEngineering) FifthSemester

Subject Code: ET105591	Digital Communication Lab	L = 0	T = 0	P = 2	Credits = 1
Evaluation Scheme	ESE	CT	TA	Total	Lab Period
	25	00	25	50	24Hrs

Course Objective	Course Outcomes
1. How various Signals Generated for the Signal Transmission. **2**. How these signals are affected by the noise Signal **3**. How can analysis the Performance of Continuous Signal communication	The student will be able to **CO1:-**Understand the Calculation of Amplitudes and Frequency of Various forms of Digital Signals. **CO2:-**Understand the use of Cathode Ray Oscilloscope for the Representation of the Continuous and Discrete Signal. **CO3.**Understand the Modulation Process in the Transmitter side by using differ Orders of Digital Filters. **CO4.**Understand the Demodulation Process in the Receiver side by Eliminating the Noise and Extracting the Modulating Signal again. **CO5.**Understand the Multiplexing Techniques.

List of Experiments: (At least Ten experiments are to be performed by each student)

1. To study Signal sampling and reconstruction techniques.
2. To study the effect on reconstructed waveform of the use of sample / hold circuit.
3. To study the TDM Pulse Amplitude Modulation / Demodulation & to draw their waveforms.
4. To study Time Division Multiplexing of Pulse Code Modulation /Demodulation
5. To perform experiment with delta modulation techniques and to study the waveforms.
6. To perform experiment with adaptive delta modulation techniques and to study the waveforms.

7. To study ASK Modulation.
8. To study FSK Modulation.
9. To study PSK Modulation.
10. To study ASK Demodulation.
11. To study FSK Demodulation.
12. To study PSK Demodulation.
13. To study DPSK generation and detection.
14. To study QPSK generation and detection.
15. To study the effect of Noise in digital modulation techniques.

Laboratory Project:

1. Design FM Transmitter Circuit.
2. Design FM Receiver Circuit.
3. Design Filter Circuit to Eliminate Noise.

*Note: Laboratory Project is compulsory to all students.

List of Equipments/Machine Required:

1. Communication Trainer Kits, Function Generator, Power Supply, CRO, Discrete Components.

2. Experiments can be implemented in hardware circuits or Simulated using C, C++, and Simulation Software

Reference Books:

S. No.	Title	Authors	Publisher
1	Principles of Communication Systems	Taub and Shilling	Tata McGraw Hill
2	Handbook of Experiments in Electronics and Communication Engineering	Rao	Vikas Publishing House Pvt. Ltd.

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SYLLABUS

B. Tech. (Electronics&TelecommunicationEngineering) FifthSemester

Subject Code: ET105592	Design of Electronics Circuits Lab	L = 0	T = 0	P = 2	Credits = 1
Evaluation Scheme	ESE	CT	TA	Total	Lab Period
	25	00	25	50	24Hrs

Course Objective	Course Outcomes
• To gain hands on experience in designing electronic circuits. • To learn the fundamental principles of amplifier ,filter and multivibrator circuits • To apply operational amplifiers in linear and nonlinear applications • To learn and design ADC and DAC circuits • Students are made familiar with theory and applications of 555 time	**CO1.** Students will have a thorough understanding of operational amplifier (741). **CO2.** Students will be able to design circuits using operational amplifiers for various applications. **CO3.** Students will be able to design filters using Opamp and perform experiment on frequency response. **CO4.** Students will be able to design ADC and DAC circuits. **CO5.** Students will be able to design multivibrator using 555 timer

List of Experiments: (At least Ten experiments are to be performed by each student)

1. To design an inverting amplifier using OPAMP (741) and study its frequency response.
2. To design a non-inverting amplifier using OPAMP (741) and study its frequency response.
3. To design a summing amplifier using op-amp (741).
4. To design a differential amplifier using op-amp (741) and find its CMRR.
5. To design an op-amp integrator circuit and analyze outputs for different input signals.
6. To design an op-amp Differentiator circuit and analyze outputs for different input signals.
7. To design and study comparator circuit using op-amp (741).
8. To measure the input impedance of an voltage follower using op-amp (741)
9. To design a DAC using Weighted Resistor method.
10. To design a ADC using parallel comparator method

			1.00	Applicablefor AY2022-23 Onwards
Chairman (AC)	Chairman (BoS)	DateofRelease	Version	

11. To design a LPF using R & C and to study its characteristics
12. To design a HPF using R & C and to study its characteristics
13. To design a BPF using R & C and to study its characteristics
14. To design HPF using OPAMP.
15. To design LPF using OPAMP.
16. To design an astablemultivibrator using 555 timer
17. To design a monostablemultivibrator using 555 timer

Laboratory Project* : i) Triangular Waveform Generator Circuit with Op-Amp IC 741

ii) Square Waveform Generator Circuit with Op-Amp IC 741

***Note: Laboratory Project is compulsory to all students.**

List of Equipments/Machine Required: Discrete components, Power Supply, Function Generator, CRO,AVO Meter, Multimeter, Voltmeter

Reference Books:

S. No.	Title	Authors	Publisher
1	**Laboratory Manual for Operational Amplifiers and Linear ICs**	**David Bell**	**PHI**

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SYLLABUS

B. Tech. (Electronics&TelecommunicationEngineering) FifthSemester

Subject Code: ET105593	VLSI System Design Lab	L = 0	T = 0	P = 2	Credits = 1
Evaluation Scheme	ESE	CT	TA	Total	Lab Period
	25	00	25	50	24Hrs

Course Objective	Course Outcomes
1. To understand the VLSI system and working of MOS transistor. 2. To understand the designing of CMOS schematic of logic gates. 3. To understand the IC design aspects, basic fabrication steps. 4. To understand the layout design of few combinational circuits.. **5.** To understand the layout design of few sequential circuits.	**CO1:-** Students are expected to understand VLSI system and working of MOS transistor. **CO2:-**Students will be able to design of CMOS schematic of logic gates. **CO3.** Students are expected to understand CMOS fabrication details**.** **CO4.** Students are expected to understand schematic, layout of combinational circuits.. **CO5.** Students are expected to understand schematic, layout of sequential circuits.

List of Experiments: (At least Ten experiments are to be performed by each student)

1. To Prepare and Verify the Layout for NOT Gate.
2. To Prepare and Verify the Layout for NAND Gate.
3. To Prepare and Verify the Layout for NOR Gate.
4. To Prepare and Verify the Layout for XOR Gate.
5. To Prepare and Verify the Layout for XNOR Gate.
6. To Prepare the Layout for the logic equation (a * (b+c))’
7. To Prepare and Verify the Layout for half adder circuit.
8. To Prepare and Verify the Layout for Half Subtractor circuit.

7. To study ASK Modulation.

8. To study FSK Modulation.

9. To study PSK Modulation.

10. To study ASK Demodulation.

11. To study FSK Demodulation.

12. To study PSK Demodulation.

Laboratory Project : To Prepare and Verify the Layout for 4 bit Binary to Gray code convertor.*****

***Note: Laboratory Project is compulsory to all students.**

List of Equipments/Machine Required:

Front End: Modelsim, FPGA Advantage, Xilinx, EdWinXP, Active HDL.

Back End: Cadence, Zeni-EDA, Calibre, Tanner, Synopsis, H-Spice

Reference Books:

S. No.	Title	Authors	Publisher
1	VLSI DESIGN LABORATORY	DrPoonguzhali M	Eleyon Publishers

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SYLLABUS

B. Tech. (Electronics&TelecommunicationEngineering) FifthSemester

Subject Code: ET105594	Minor Project – I	L = 0	T = 0	P = 2	Credits = 1
Evaluation Scheme	ESE	CT	TA	Total	Lab Period
	25	00	25	50	24Hrs

Course Objective	Course Outcomes
1.To understand why Python is a useful scripting language for developers. 2.To learn how to design and program Python applications. 3.To learn how to use lists, tuples, and dictionaries in Python programs. 4.To define the structure and components of a Python program. 5.To learn how to write loops and decision statements in Python	**CO1.**Develop algorithmic solutions to simple computational problems. **CO2.**Demonstrate programs using simple Python statements and expressions. **CO3.**Explain control flow and functions concept in Python for solving problems. **CO4.**Use Python data structures – lists, tuples & dictionaries for representing compound data. **CO5.**Explain files, exception, modules and packages in Python for solving problems.

List of Experiments: (At least Ten experiments are to be performed by each student)

1. Write a program to demonstrate basic data type in python.
2. Write a program to takes 2 numbers as command line arguments and perform their arithmetic operation (addition, subtraction, multiplication, division).
3. Write a program for checking whether the given number is an even number or not.
4. Write a program to calculate the Simple Interest and Compound Interest.
5. Write a program to find the largest of three numbers. (Without MAX or MIN function call).
6. Write a Python program to convert binary to decimal and decimal to binary.
7. Write a program to compute the exponential series.
8. Write a program for checking whether a given string is palindrome or not.
9. Write a program to Compute a sine series and plot the same using matplotlib module.
10. Write a program to Compute a cosine series and plot the same using matplotlib module.
11. Write a program to find a factorial of a number.
12. Write a program to generate a Fibonacci series.

			1.00	Applicablefor
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13. Write a program to calculate the GCD of two numbers.
14. Write a program to demonstrate while loop and While loop with else in python.
15. Write a program to construct a pyramid of digits.
16. Write a program to illustrate the function with no arguments and no return value.
17. Write a program to illustrate the function with arguments and no return value.
18. Write a program to illustrate the function with arguments and return value.
19. Write a program to illustrate the function to compute the standard deviation of a list of numbers.
20. Write a program to print all the odd, even and prime numbers up to 100 in a table like format.
21. Write a program to open a website.
22. Write a program to count the numbers of characters in the string and store them in a dictionary data structure.
23. Write a program to compute the number of characters, words and lines in a file.
24. Write a program to count frequency of characters in a given file, Can you use character frequency to tell whether the given file is a Python program file, C program file or a text file?

Laboratory Project : *1. Write a function nearly equal to test whether two strings are nearly equal. Two strings a and b are nearly equal when a can be generated by a single mutation.

2. Write a program to implement Merge sort.

***Note: Laboratory Project is compulsory to all students.**

List of Equipments/Machine Required:

- Software Tools: Anaconda, Python(x,y)
- Online Compiler
  1. https://www.w3schools.com/python/python_compiler.asp
  2. https://www.programiz.com/python-programming/online-compiler/

Reference Books:

S. No.	Title	Authors	Publisher
1	Beginning Python,	Peter Norton, Alex Samuel, David Aitel, Eric Foster-Johnson, Leonard Richardson, Jason Diamond, Aleatha Parker, Michael Roberts	Publisher: Wiley Publishing, Inc
2	Python For Beginners: A Crash Course Guide To Learn Python in 1 Week,	Timothy C. Needham	White flower publishing

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SYLLABUS

B. Tech. (Electronics&TelecommunicationEngineering) FifthSemester

Subject Code :- ET105521	Computer Network	L = 3	T = 0	P = 0	Credits = 3
Evaluation Scheme	ESE	CT	TA	Total	ESE Duration
	100	20	30	150	3 Hours

Course Objective	Course Outcomes
1. To make students understand the basic model of data communication, OSI Model, TCP/IP suite and various concepts of networking. 2. To make students acquainted with Data Link Layer and various flow control and error control protocol. 3. To familiarize students with different LAN protocols like Ethernet, Token ring and Token Bus and FDDI. 4. To teach students about connecting devices, Network and transport layer protocols. 5. To give knowledge of the Application layer functions, protocols, switching and switched networks like ATM.	**CO1.** Students will be able to understand the working of internet based on OSI model and TCP/IP protocol suite. **CO2.** Students will be able to analyze practical requirements of LAN on the basis of various topologies , signaling techniques and various interfaces. **CO3**. Students will be able to analyze various Ethernet standards, other standards and will be able to choose an appropriate standard according to requirement of LAN. **CO4**. Students will be able to identify various internetworking devices and formation of Headers of IP and TCP. **CO5.** Students will get idea about various Application layer functions and some protocols along with switching techniques and ATM.

UNIT-I: Introduction to Data Communication, Data networking and Internet: [**CO1]**

Communication System Model, Data Communication Networks, Protocol, Need of Protocol, TCP/IP Protocol Suite, OSI Model, Transmission Modes, Categories of Network, Topologies of Network. Signal Encoding Techniques: Digital to Digital Conversion- Unipolar, Polar: NRZ, RZ, Biphase, Bipolar, Transmission of Digital Data: DTE DCE Interface, EIA-232D,Null Modem, Modems: Traditional Modem, 56KModem **[7Hrs]**

UNIT-II: Data Link Control Protocol: [**CO2]**

Data Link Layer: Design Issues, Framing, Error Detection and Correction: CRC, Elementary Protocols-Flow Control: Stop and Wait, Sliding Window, Error Control: Stop-and-Wait, Go Back-N, Selective Repeat. HDLC: Modes, Frames, Data Transparency, Bit Stuffing. **[8Hrs]**

UNIT-III Local Area Network:[CO3]

Project802,Basicof–IEEE802.1,LLC,MAC,PDU;ETHERNET:Access Method: CSMA/CD, Implementation: Thick Ethernet, Thin Ethernet, Twisted Pair Ethernet, Switched Ethernet, Fast Ethernet, Gigabyte Ethernet, Token Ring, FDDI, Introduction to Wireless LAN-IEEE802.11 : Architecture, MAC: CSMA/CA. **[7Hrs]**

			1.00	Applicablefor
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UNIT-IV : Internet and Transport Protocol: **[CO4]**

Principle of Internet working, Connecting devices: Repeaters, Hubs, Bridges, Routers. Internet Protocol: IP Addressing, IPV4Header,Comparison ofIPV4andIPV6, Sub netting, ARP,RARP, ICMP, IGMP. Transport Layer Protocols: UDP, TCP: TCP Header format, ISDN services.**[7Hrs]**

UNIT-V Application layer and Wide Area Network: **[CO5]**

Application Layer: The Web and HTTP, FTP, SMTP, DNS, WAN: Circuit and Packet switching, Asynchronous Transfer Mode-ATM architecture: Virtual Connection, Identifiers, Cells, Connection Establishment and Release. Switching: VPC switch; ATM Layers: AAL **[7Hrs].**

Text Books:

S. No.	Title	Authors	Publisher
1	Data Communication and Computer Networking	B. A. Forouzan	Tata McGraw Hill
2	Data and Computer Communications	William Stalling	Pearson Education.

Reference Books:

S. No.	Title	Authors	Publisher
1	Computer Networks	Andrew S Tanenbaum,	Pearson Education
2	An Engineering Approach to Computer Networks-	S.Keshav	Pearson Education
3	Understanding communications and Networks,	W.A Shay	Thomson

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SYLLABUS

B. Tech. (Electronics&TelecommunicationEngineering) FifthSemester

Subject Code :- ET105522	Wireless Communication	L = 3	T = 0	P = 0	Credits = 3
Evaluation Scheme	ESE	CT	TA	Total	ESE Duration
	100	20	30	150	3 Hours

Course Objective	Course Outcomes
1. To give students brief history of the evolution of mobile communications throughout the world. 2. To give knowledge of cellular concepts and its designing aspects. 3. To give students a detailed overview of GSM, its architecture, inter faces, frames etc. 4. To Familiarize students about advanced modulation techniques used in mobile communications. 5. To teach students about the practical limitations on the performance of wireless communication systems.	**CO1:** Students will have idea about the grow thin mobile communications that gives rise to technological improvements. **CO2:** Students will be able to visualize the use off frequency reuse to increase the system capacity and also the designing aspects. **CO3:** Students will be able to understand the architecture of the GSM and mechanism to support mobility of the GSM terminals. **CO4:** Students will see how modulation techniques are used to transport the message signal via radio channel with best possible quality with minimum radio spectrum. **CO5:** Students will be able to understand various trans mission problems and their counter measures.

UNIT-I: Introduction to wireless communications:[CO1]

Evolution of Mobile Radio Communication, Comparison of Various Wireless Communication System, Applications and History of Wireless Communication. **[7Hrs]**

UNIT-II: Wireless Transmission and Cellular Concepts:[CO2]

Frequencies for radio transmission, Signals, Antennas, Signal Propagation, Multiplexing, Modulation, Spread Spectrum, Cellular System: System Architecture. Localization and Calling, Cellular Concepts and Frequency Reuse, Channel Assignment Strategies and Hand off Strategies. **[7Hrs]**

UNIT-III : Medium Access Control :[CO3]

Motivation for Specialized MAC : Hidden and exposed terminal problem, Near and far terminal, SDMA, FDMA,TDMA : Fixed TDM, Classical Aloha, Slotted Aloha, CSMA, DAMS, PRMA, Reservation TDMA, Multiple access with collision avoidance, Polling, Inhibit sense multiple access. CDMA, Comparisons.**[7Hrs]**

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UNIT-IV: Wireless LAN and Mobile IP:[CO4]

Infra redVs Radio transmission, Infrastructure and ad-hoc network, IEEE802.11: System architecture, Protocol architecture, Physical layer, Medium access control layer, MAC management. Mobile IP: Goal, assumption and requirements, Entities and terminology, IP packet delivery, Agent discovery, Registration, Tunneling and encapsulation, Optimizations, Reverse Tunneling, IPv6, IP mobility support.**[8Hrs]**

UNIT-V Satellite and Broadcast System:**[CO5]**

History,Application,Basics,Routing,Localization,Handover,Cyclical repetition of data, Digital audio broadcast, Digital Video broadcast ,Convergence of broadcasting and mobile communication. **[7Hrs].**

Text Books:

S. No.	Title	Authors	Publisher
1	Wireless Communication	T. S. Rappaport, Pearson Education	Pearson Education
2	Principle sand Application of GSM	Vijay K. Garg	Pearson Education.

Reference Books:

S. No.	Title	Authors	Publisher
1	Mobile Communications	Schiller, Jochen;	Pearson Education
2	Mobile Communication Engineering	W. C. Lee,	TMH Pub.

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SYLLABUS

B. Tech. (Electronics&TelecommunicationEngineering) FifthSemester

Subject Code :- ET105523	Nano Electronics	L = 3	T = 0	P = 0	Credits = 3
Evaluation Scheme	ESE	CT	TA	Total	ESE Duration
	100	20	30	150	3 Hours

Course Objective	Course Outcomes
1. Fundamentals, fabrication technologies and applications of nanoscale structures. 2. Device application of nanostructures in electronics. 3. Concepts of Carbon nanotubes and their applications. 4. Fundamentals of molecular electronics and their applications.	Upon the successful completion of the course, students will be able to: **CO1.** Discuss the types of nanotechnology, molecular technology and the preparation of nano materials. **CO2.**Explain the fundamentals of electron transport, semiconductor nanostructures and devices such as logic devices, field effect devices, and spintronics. **CO3.** Describe the concepts of silicon MOSFET and Quantum Transport Devices and single electron devices. **CO4.** Explain the functionalization as well as summarize the types, synthesis, interconnects and applications of carbon nano tubes. **CO5.**Explain the concepts, functions, fabrications and applications of molecular electronics.

UNIT I -INTRODUCTION TO NANOTECHNOLOGY : **[CO1]**

Background to Nanotechnology: General concepts in Nanotechnology, Introduction to the principles of quantum mechanics, Quantization effects, Wave-particle duality, Classification of different areas of Nanotechnology, Top- down and Bottom -up approach. Nano material preparation- Plasma Arcing, Chemical Vapor Deposition, Sol-Gels, Electro deposition, Ball Milling, Molecular Beam Epitaxy. Characterization techniques: Electron Microscopy, Scanning Probe Microscopy, Raman Microscopy, UV-Vis absorption spectroscopy, Fourier Transform Infra- red Spectroscopy **[8Hrs]**

UNIT II -FUNDAMENTALS OF NANOELECTRONICS :[CO2]

Electron transport in semiconductors and nanostructures: Time and length scales of the electrons in solids, Statistics of electrons in solids and lowdimensional structures - Electron transport in nanostructures. Two-dimensional semiconductor nanostructures, Quantum wells, wires and dots, Strained layers, Effect of strained layers, MOSFET structures, Heterojunctions, Superlattices. Fundamentals of logic devices: requirements, dynamic properties, threshold gates, classifications of logic devices: two terminal devices, field effect devices, coulomb blockade devices, spintronics. **[7Hrs]**

UNIT III SILICON MOSFETs & QUANTUM TRANSPORT DEVICES : [CO3]

Silicon MOSFETS - Novel materials and alternate concepts: -Scaling rules, Silicon-dioxide based gate dielectrics, Metal gates, Junctions & contacts, Advanced MOSFET concepts. Quantum transport devices based on resonant tunneling: Electron tunneling – resonant tunneling diodes, Resonant tunneling devices; Single electron devices for logic applications, applications of single electron devices to logic circuits.**[7Hrs]**

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UNIT IV-CARBON NANOTUBES : [CO4]

Fullerenes, types of nanotubes, Formation of nanotubes, Assemblies, Purification of carbon nanotubes, Electronic properties, Synthesis of carbon nanotubes. Functionalization of Carbon Nanotubes: covalent functionalization of CNTs, non-covalent functionalization of CNTs, Carbon nanotube interconnects, Carbon nanotube FETs, Nanotube for memory applications, Prospects of all carbon nanotube nanoelectronics, Graphene transistors and circuits. Sensor applications of CNTs. Computer applications (Nano chip), Optical and telecommunication applications **[7Hrs]**

UNIT V-MOLECULAR ELECTRONICS [CO5]

Electrodes & contacts, Functions, Molecular electronic devices, First test systems, Simulation and circuit design, Fabrication, Future applications: MEMS, NEMS, Robots, Random access memory – mass storage devices. Electronic Circuits & Applications: Vertical Transistors: Fin-FET circuits and applications, Surround Gate FET,MODFETs. Heterojunction bipolar transistor, Hybrid Nano/CMOS circuits and applications, Nanowire arrays, Quantum dot lasers, Quantum Well modulators, OLED'S. **[7Hrs].**

Text Books:

S. No.	Title	Authors	Publisher
1	Nano-electronic Circuit Design,	N.K Jha, D Chen,	Springer
2	Nanotechnology and Nanoelectronics,	W.R.Fahrner,	Springer
3.	Nanotechnology inMicroelectronics& Optoelectronics,	J.M Martine Duart, R.J Martin Palma, F. Agullo Rueda,	Elsevier

Reference Books:

S. No.	Title	Authors	Publisher
1	Nanoelectronics,	K. Iniewski	Tata McGraw-Hill
2	Nanoelectronics and Information Technology: Advanced Electronic Materials and Novel Devices,	Rainer Waser	Wiley-VCH
3	NANO: The Essentials – Understanding Nanoscience and Nanotechnology,	T. Pradeep	TMH

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SYLLABUS

B. Tech. (Electronics&TelecommunicationEngineering) FifthSemester

Subject Code :- ET105524	Optoelectronic devices and circuits	L = 3	T = 0	P = 0	Credits = 3
Evaluation Scheme	ESE	CT	TA	Total	ESE Duration
	100	20	30	150	3 Hours

Course Objective	Course Outcomes
1 Explain key concepts in quantum and statistical mechanics relevant to physical, electrical and optoelectronic properties of materials and their applications to optoelectronic devices and photonic integrated circuits that emit, modulate, switch, and detect photons 2. Describe fundamental and applied aspects of optoelectronic device physics and its applications to the design and operation of laser diodes, light-emitting diodes, and photo detectors. 3. Describe techniques to improve the operation of optoelectronic devices and device characteristics that have to be optimized for new applications by employing their understanding of optoelectronic device physics	By the end of the course, students are expected to learn **CO1**.The skill of designing and setting up experiments to characterize LEDs, laser diodes, optical amplifiers, photodiodes, solar cells and electro-optics modulators. **CO2**Understand the basic working mechanism of the devices, **CO3** Have the practical knowledge and an understanding of the trade-offs when using these devices in their respective applications. **CO4** The skill of designing and setting up experiments to optical switching and logic devices . **CO5** The skill of designing and setting up experiments of Optoelectronic ICs.

UNIT I -Optical processes in semiconductors: **[CO1]**

Electron hole recombination, absorption, Franz-Keldysh effect, Stark effect, quantum confined Stark effect, deep level transitions, Auger recombination**[8Hrs]**

UNIT II- Lasers: **[CO2]**

Threshold condition for lasing, line broadening mechanisms, axial and transverse laser modes, hetero junction lasers, distributed feedback lasers, quantum well lasers, tunneling based lasers, modulation of lasers. **[7Hrs]**

UNIT- III Optical detection: [CO3]

PIN, APD, modulated barrier photodiode, Schottky barrier photodiode, wavelength selective detection, microcavity photodiodes. **[7Hrs]**

			1.00	Applicablefor AY2022-23 Onwards
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UNIT-IV Optoelectronic modulation: **[CO4]**

Franz-Keldysh and Stark effect modulators, quantum well electroabsorption modulators, electro-optic modulators, quadratic electro-optic effect quantum well modulators, optical switching and logic devices **[7Hrs]**

UNIT V Optoelectronic ICs: **[CO5]**

Hybrid and monolithic integration, materials and processing, integrated transmitters and receivers, guided wave devices **[7Hrs].**

Text Books:

S. No.	Title	Authors	Publisher
1	Semiconductor Optoelectronic Devices	Pallab Bhattacharya	Pearson Education
2	Photonics: Optical Electronics in modern communication	AmnonYariv&PochiYeh,	Oxford Univ. Press,

Reference Books:

S. No.	Title	Authors	Publisher
1	Fundamentals of Photonics	B E Saleh and M C Teich	Wiley-Inter-science

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SYLLABUS

B. Tech. (Electronics&TelecommunicationEngineering) FifthSemester

Subject Code :- ET105525	Advanced Data Structures and Algorithms	L = 3	T = 0	P = 0	Credits = 3
Evaluation Scheme	ESE	CT	TA	Total	ESE Duration
	100	20	30	150	3 Hours

Course Objective	Course Outcomes
1. Understand and apply linear data structures-List, Stack and Queue. 2. Understand the graph algorithms. 3. Learn different algorithms analysis techniques. 4. Apply data structures and algorithms in real time applications 5. Able to analyze the efficiency of algorithm	By the end of the course, students are expected to learn **CO1:** Describe, explain and use abstract data types including stacks, queues and lists **CO2:** Design and Implement Tree data structures and Sets **CO3:** Able to understand and implement non linear data structures - graphs **CO4:** Able to understand various algorithm design and implementation **CO5**: Able to understand various advance algorithm design and implementation

UNIT I Linear Data Structures : [CO1]

Introduction - Abstract Data Types (ADT) – Stack – Queue – Circular Queue - Double Ended Queue - Applications of stack – Evaluating Arithmetic Expressions - Other Applications - Applications of Queue - Linked Lists - Singly Linked List - Circularly Linked List - Doubly Linked lists – Applications of linked list – Polynomial Manipulation. **[8Hrs]**

UNIT II Non - linear Tree Structures: **[CO2]**

Binary Tree – expression trees – Binary tree traversals – applications of trees – Huffman Algorithm - Binary search tree - Balanced Trees - AVL Tree - B-Tree - Splay Trees – Heap operations- -Binomial Heaps - Fibonacci Heaps- Hash set.**[7Hrs]**

UNIT III Graphs: [CO3]

Representation of graph - Graph Traversals - Depth-first and breadth-first traversal - Applications of graphs - Topological sort – shortest-path algorithms - Dijkstra‟s algorithm – Bellman-Ford algorithm – Floyd's Algorithm - minimum spanning tree – Prim's and Kruskal's algorithms.**[7Hrs]**

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UNIT IV Algorithm and Analysis:[CO4]

Algorithm Analysis – Asymptotic Notations - Divide and Conquer – Merge Sort – Quick Sort - Binary Search - Greedy Algorithms – Knapsack Problem – Dynamic Programming – Optimal Binary Search Tree - Warshall‟s Algorithm for Finding Transitive Closure. **[7Hrs]**

UNIT V Advanced Algorithm Design and Analysis:[CO5]

Backtracking – N-Queen's Problem - Branch and Bound – Assignment Problem - P & NP problems – NP-complete problems – Approximation algorithms for NP-hard problems – Traveling salesman problem-Amortized Analysis. **[7Hrs]**

Text Books:

S. No.	Title	Authors	Publisher
1	Introduction to the Design and Analysis of Algorithms	AnanyLevitin	Pearson Education
2	Fundamentals of Data structures in C++	E. Horowitz, S. Sahni and Dinesh Mehta,	University Press
3	Computer Algorithms/C++	E. Horowitz, S. Sahni and S. Rajasekaran	University Press

Reference Books:

S. No.	Title	Authors	Publisher
1	Fundamentals of Algorithms	Gilles Brassard	Pearson Education
2	Algorithms Design and Analysis 6	Harsh Bhasin	Oxford University Press
3	Data Structures with Java	John R. Hubbard	Pearson Education

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SYLLABUS

B. Tech. (Electronics&TelecommunicationEngineering) FifthSemester

MinorProject-1					
CourseCode	**ET105594**	**L =0**	**T=0**	**P=2**	**Credits=1**
Examination Scheme	**ESE**	**CT**	**TA**	**Total**	**ESE Duration**
	25	**-**	**25**	**25**	**-**

CourseObjectives	CourseOutcomes
The objective of this course is to improve student's ability to analyze, design and solve complex engineering problems through pedagogies (Project Based Learning) that support them in developing these skills. To develop and enhance student's practical ability to map Program Outcome of analyzing complex engineering problems and design its solution to meet specified need with appropriate considerations for practical problem statementsTo engage actively in team and to use modern tools for implementation.	**On Successful Completion of course the student should be able to** **CO1**: Identify, discuss and justify the technical aspects of the chosen project with a comprehensive and systematic approach. **CO2**: Reproduce, improve and refine technical aspects of engineering projects applying appropriate techniques, resources, and modern engineering and IT tools. **CO3**: Work as an individual and as a member or leader in teams in development of technical projects. **CO4**: Follow management principle and value health, safety and ethical practices during project. **CO5**: Communicate and report effectively project related activities and findings.

The process to be followed to maintain the quality of student projects is

a) **Project allotment in identified technology/area/subject**
b) **Continuous Monitoring**
c) **Mid And Final Evaluation**

a) Project allotment in identified technology/area/subject

i. Team formation- max. 3-4 students
ii. Mentor allotment- as per the problem statement identified

b) Continuous Monitoring

i) Progress monitoring by Mentor as per time table.
ii) Submission of progress report by student every 15 days

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c) Mid & Final Evaluation

i. Project assessment presentation two times during the semester
ii. Rubrics for assessment, real time problem statement (health, safety, social utility, ethical Practices etc), technical skill implementation, use of modern tools, work distribution in team.
iii. Final submission of report to be submitted by student for end semester practical examination based on demonstration.
iv. Display of final projects at the end of semester, date of display to intimated to all for viewing and feedbacks

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SYLLABUS

B. Tech. (Electronics&TelecommunicationEngineering) FifthSemester

INTERNSHIPASSESSMENT(REPORT&SEMINAR)					
CourseCode	**ET105595**	**L =0**	**T=0**	**P=2**	**Credits=1**
Examination Scheme	**ESE**	**CT**	**TA**	**Total**	**ESE Duration**
	-	**-**	**25**	**25**	**-**

CourseObjectives	CourseOutcomes
Thepurpose ofinternshipistoexpose studentstorealworkenvironmentand at thesame timegaintheknowledge throughhands onobservationandjob execution. From the internship, the studentswill also developskillsinwork ethics, communication, management and others. This practical training program allowsstudentstointegrate classroom theory with workplace practice and develop greater clarity aboutacademic,careergoals andneed to update knowledge. Students are provided withthe opportunity to test their interest in a particular career before permanent commitments are made.	**Onsuccessful completionofthecourse, the student willbeableto:** **CO1:** Discuss the organizational structure, tools/software/technology, production activities/service, of theindustry/company. **CO2:**Identify,formulateandmodelindustrialproblemsand find solution applying fundamental principles of engineering. **CO3**:Demonstrateanawarenessofsocial,cultural,global, environmentalresponsibilityandskillsincommunication, management,leadershipandentrepreneurship. **CO4:**Updatewithallthelatestchangesintechnological world, develop capability and enthusiasm for self-improvement throughcontinuous professionaldevelopment andlife-longlearning. **CO5:** Present seminar and submit internship report to communicateandreport effectivelytheinternshiprelated activitiesandfindings.

FORMATFORINTERNSHIP REPORT

1. CoverPage (colorprint)
2. InnerPages
   a) CertificatebyCompany/Industry
   b)Declarationbystudent
   c) Acknowledgement
3. Abstract
4. TableofContents
5. ListofTables
6. ListofFigures
7. AbbreviationsandNomenclature(ifany)
8. Chapters
   I. Introduction(Anoverviewofthewholereport)
   II. Formal Trainingprovided(ifapplicable) [Thissectiondescribesthetraining providedthroughformalclassroomtraining environment.Briefdescription ofeachtrainingsessionandits benefittowardsthetraining program]

			1.00	Applicablefor
Chairman (AC)	Chairman (BoS)	DateofRelease	Version	AY2022-23 Onwards

III. IndustrialTraining[Thesection shoulddescribethefollowing:
- Objectives
- Tools&Technology Used
- TechniquesStudied inDifferent Departments
- Software&ToolsUsed
- HighlightsofTrainingExposure(Area,Scope)] IV. ProblemIdentification/Casestudy(Discussions)

V. Recommendations

9. References
10. Appendices
    i. DataSheets(ifany)
    ii. Snapshots(ifany)

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SYLLABUS

B. Tech. (Electronics&TelecommunicationEngineering) FifthSemester

CONSTITUTIONOF INDIA					
CourseCode	**ET100596**	**L =0**	**T=0**	**P=0**	**Credits=-**
Examination Scheme	**ESE**	**CT**	**TA**	**Total**	**ESEDuration**
	-	**-**	**25**	**25**	**-**

CourseObjectives	CourseOutcomes
The objective of this course is to introduce studentstotheConstitutionofIndia.	**Onsuccessfulcompletionofthecourse,the studentwillbeableto:** **CO1:**Display understandingabout thehistory and philosophy ofIndianConstitution. **CO2:** Demonstrate clarity about the premises informingthetwinthemesoflibertyand freedom from civil rightsperspective. **CO3:** Display understanding about powers and functionsofIndiangovernment. **CO4:**Exhibitunderstandingabout emergencyrule. **CO5:**Demonstrate understandingaboutstructure andfunctionsoflocal administration.

UNIT–I **CO1)**

Introduction: Historical PerspectiveofConstitutionofIndia;Philosophy ofIndianConstitution; Meaningoftheconstitutionlawandconstitutionalism;SalientfeaturesandPreamble.

UNIT–II **(CO2)**

ContoursofConstitutionalRightsandDuties: Fundamentalrights;SchemeoftheFundamental Dutiesanditslegal status.

UNIT–III **(CO3)**

OrgansofGovernance: ParliamentaryFormofGovernmentinIndia;Theconstitutionalpowers andstatusofthePresidentofIndia;Judiciary-PowersandFunctions;LocalSelfGovernment– Constitutional SchemeinIndia.

UNIT–IV **(CO4)**

EmergencyProvisions: National Emergency;PresidentRule;Financial Emergency.

UNIT–V **(CO5)**

Local Administration: Federal structure and distribution of legislative and financial powers betweentheUnionandtheStates;TheDirectivePrinciplesofStatePolicy–Itsimportanceand implementation.

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Text Books:

S. No.	Title	Author(s)	Publisher
1.	IntroductiontotheConstitution ofIndia	BasuD D	LexisNexis
2.	PrinciplesofPublic Administration	Dr SN Myneni	AllahabadLawAgency

ReferenceBooks:

S. No.	Title	Author(s)	Publisher
1.	Dr. B.R.Ambedkar Framingof IndianConstitution	BusiSN	AvaPublishers
2.	TheoryandPractices ofModern Government	MGGupta	CentralBookDepot