



**List of Courses Focus on Employability/ Entrepreneurship/
Skill Development**

Department : Electronics and Communication Engineering

Programme Name : B.Tech.

Academic Year : 2017-18

List of Courses Focus on Employability/ Entrepreneurship/Skill Development

Sr. No.	Course Code	Name of the Course
01.	ENATHS01	Professional Communication English
02.	CHATBS01	Engineering Chemistry
03.	MEATES01	Engineering Mechanics
04.	CSATES02	Fundamental of Computers
05.	EMATBS02	Engineering Mathematics-I
06.	CHALBS01	Engineering Chemistry Lab
07.	MEALES01	Engineering Mechanics Lab
08.	MEALES03	Engineering Drawing
09.	CHBTHS02	Environmental Studies
10.	MEBTES04	Engineering Thermodynamics
11.	EEBTES05	Basic Electrical & Electronics Engineering
12.	PHBTBS03	Engineering Physics
13.	EMBTBS04	Engineering Mathematics-II
14.	EEBLES05	Basic Electrical & Electronics Engineering Lab
15.	PHBLBS03	Engineering Physics Lab
16.	MEBLES06	Workshop Practices
17.	EC3THS03	Engineering Economics
18.	EC3TPC01	Signals and Systems
19.	EC3TBS01	Engineering Mathematics-III
20.	EC3TES01	Network Analysis And Synthesis
21.	EC3TES02	Electronic Devices
22.	EC3TPC02	Digital Logic Circuits
23.	EC3PES02	Electronics Devices Lab
24.	EC3PPC02	Digital Logic Circuits Lab
25.	EC4TBS02	Numerical Analysis
26.	EC4TPC03	Automatic Control Systems



27	EC4TPC04	Analog Circuits
28	EC4TPC05	Communication System-I
29	EC4TPC06	Electronics Measurements & Instrumentation
30	EC4PPC04	Analog Circuits Lab
31	EC4PPC05	Communication System-I Lab
32	EC4PPC06	Electronic Measurements & Instrumentation Lab
33	EC5TPC07	Lic & Its Application
34	EC5TPC08	Communication System- II
35	EC5TPC09	Electromagnetic Field Theory
36	EC5TPE01	Microprocessor & Its Application
37	EC5TPE02	Data Structure & Operating System
38	EC5TOE11	Computer Architecture
39	EC5TOE12	OOP in C++
40	EC5TOE13	Introduction to Information Security
41	EC5TOE14	Project Management
42	EC5TOE15	Rural Technology and Community Development
43	EC5PPC07	LIC & ITS APPLICATION Lab
44	EC5PPE01	Microprocessor & Its Application Lab
45	EC5PPC08	Communication System -II Lab
46	EC6TPC10	Digital Signal Processing
47	EC6TPC11	Antenna & wave propagation
48	EC6TPE03	Data Communication & Computer Networking
49	EC6TPE04	Fundamental of VLSI Design
50	EC6T0E21	UNIX, Operating System
51	EC6T0E22	Probability & Stochastic Process
52	EC6T0E23	Advanced Instrumentation
53	EC6T0E24	Knowledge management
54	EC6T0E25	Engineering System Design Optimization
55	EC6PPE02	VHDL Lab
56	EC6PPC06	Digital Signal Processing Lab
57	EC6PSP01	Seminar
58	ECETH4101	Wireless and Mobile Communication
59	ECETH4102	VLSI Design & VHDL
60	ECETH4103	Power Electronics
61	ECETH4104	Microwave Engineering



62	ECETH4105	Embedded System
63	ECETH4106	Multirate Systems and Filter Banks
64	ECETH4107	Speech Signal Processing
65	ECETH4108	Wireless Sensor Network
66	ECETH4109	Artificial Intelligence & Expert Systems
67	ECETH4110	Neural Network & Fuzzy Logic System
68	ECETH4111	Biomedical Instrumentation
69	ECETH4112	Semiconductor Devices Modeling & Simulation
70	ECEPr4101	Project-I
71	ECEPr4102	Seminar
72	ECEPr4103	VLSI Design & VHDL Lab
73	ECEPr4104	Microwave Engineering Lab
74	ECETH4201	Radar & Satellite Communication
75	ECETH4202	Principle of Management
76	ECETH4203	Optical Fiber Communication
77	ECETH4204	Digital Image Processing
78	ECETH4205	Cryptography & Network Security
79	ECETH4206	Radar Engineering
80	ECETH4207	Mobile Computing
81	ECETH4208	Nano Technology
82	ECETH4209	Vacuum Technology
83	ECETH4210	Optimization Techniques
84	ECETH4211	Stochastic Process
85	ECEPr4201	Project-II
86	ECEPr4202	Comprehensive Viva-voce
87	ECEPr4203	Circuit Simulation Lab
88	ECEPr4204	Optical Fiber Communication Lab
89	IT7100	Research Methodology in engineering
90	ECE7102	Vacuum Technology
91	ECE7103	Finite Element Method
92	ECE7104	Sensors Measurement Science & Technology
93	ECE7105	Artificial Intelligence

व्यभागाध्यक्ष (इले. एवं संचार अभियंत्रिकी)
H.O.D. (Elect. & Comm. Engineering)
प्रौद्योगिकी संस्थान
Institute of Technology
गु. घा. वि., बिलासपुर (छ.ग.)
G. G. V. Bilaspur (C.G.)



ELECTRONICS & COMMUNICATION ENGINEERING

Effective From 2017-18 (CBCS)

Sub Code	L	T	P	Duration	IA	ESE	Credits
EC6TOE21	3	0		3 hours	40	60	3

Course outcomes:

Objective of this subject to familiarizes the students with concept, design and structure of UNIX operating system and also learn the file management.

UNIX Operating System

UNIT-I

The Operating System, The UNIX Operating System, Knowing Your Machine, A Brief Session [Logging in with Username and Password, The Command, Displaying Both Date and Time, Clearing the Screen, The Calendar, Viewing Processes, Listing Files, Directing Output to a File, Counting Number of Lines in a File].

UNIT-II

The UNIX Architecture [Division of Labor : Kernel and Shell, The File and Process, The System Calls], Features of UNIX [Multiuser System, Multitasking System, Building Block Approach, UNIX Toolkit, Pattern Matching, Programming Facility, Documentation], Locating Commands [The PATH], Internal and External Commands, Command Structure [Options, Filename Arguments, Exceptions], Flexibility of Usage, Browsing the Manual Pages [man].

UNIT-III

General Purpose Utilities [The Calendar, Displaying The System Date, Displaying A Message, An Alternative To Echo, The Calculator, Recording Your Session, Email Basics, The Universal Mailer, Changing Your Password, Who, Uname, Tty, Stty, Changing The Settings]

UNIT-IV

The File [Ordinary, Directory, Device], The Parent Child Relationship, The Home Directory, Checking Your Current Directory, Changing The Current Directory, Making Directories, Removing Directories, Absolute Path Names, Relative Pathnames, Listing Directory Contents.

UNIT-V

Displaying And Creating Files, Copying A File, Deleting Files, Renaming Files, Paging Output, Printing A File, Knowing The File Types, Counting Lines/Words/Characters, Displaying Data In Octal, Comparing Two Files, Comm, Converting One File To Other, Compressing And Archiving Files, Compressing And Decompressing Files

SUGGESTED BOOKS & REFERENCE:-

1. S. Das, UNIX CONCEPTS AND APPLICATIONS, TMH.
2. H. Hahn, HARLEY HAHN'S STUDENT GUIDE TO UNIX, McGraw Hill Companies.
3. S.M. Sarwar, R. Korektsy AND S.A. Sarwar, UNIX : THE TEXTBOOK, Addison-Wesley Longman.



ELECTRONICS & COMMUNICATION ENGINEERING

Effective From 2017-18 (CBCS)

Sub Code	L	T	P	Duration	IA	ESE	Credits
EC6TOE22	3	0		3 hours	40	60	3

Course Objective

The main objective of this course is to provide students with the foundations of probabilistic and statistical analysis mostly used in varied applications in engineering and science like disease modeling, climate prediction and computer networks etc.

Probability & STOCHASTIC PROCESS

UNIT-I

Probability Theory Refresher: Axiomatic construction of probability spaces, random variables and vectors, probability distributions, functions of random variables; mathematical expectations, transforms and generating functions, modes of convergence of sequences of random variables, laws of large numbers, central limit theorem.

UNIT-II

Introduction to Stochastic Processes (SPs): Definition and examples of SPs, classification of random processes according to state space and parameter space, types of SPs, elementary problems.

UNIT-III

Discrete-time Markov Chains (MCs): Definition and examples of MCs, transition probability matrix, Chapman-Kolmogorov equations; calculation of n-step transition probabilities, limiting probabilities, classification of states, ergodicity, stationary distribution, transient MC; random walk and gambler's ruin problem, applications.

Continuous-time Markov Chains (MCs): Kolmogorov-Feller differential equations, infinitesimal generator, Poisson process, birth-death process, Applications to queueing theory, inventory analysis, communication networks, finance and biology.

Brownian Motion: Wiener process as a limit of random walk; first -passage time and other problems, applications to finance.

UNIT-IV

Branching Processes: Definition and examples branching processes, probability generating function, mean and variance, Galton-Watson branching process, probability of extinction. Renewal Processes: Renewal function and its properties, elementary and key renewal theorems, cost/rewards associated with renewals, Markov renewal and regenerative processes, applications.

Stationary Processes: Weakly stationary and strongly stationary processes, moving average and auto regressive processes.



ELECTRONICS & COMMUNICATION ENGINEERING Effective From 2017-18 (CBCS)

Sub Code	L	T	P	Duration	IA	ESE	Credits
EC6TOE23	3	0		3 hours	40	60	3

Course objective

1. To familiarizes the student with general concept of instrumentation and measurement.
2. To introduce the concept of Temperature and flow measurement.

ADVANCED INSTRUMENTATION

UNIT – I

Generalized Performance Characteristics of Instruments-I: Static Characteristics and static calibration, Measured Value and True Value, Some Basic Statistics, Least Square calibration Curves, $2\text{-}\sigma$ limits in defining imprecision, Chi-square test, Calibration Accuracy and Installed accuracy, Static sensitivity, Linearity, Threshold, Noise Floor, Resolution, Hysteresis, Dead Space, Span, Loading Effect.

UNIT – II

Generalized Performance Characteristics of Instruments-II: Dynamic Characteristics, Generalized model of measurement system, Digital simulation method, Operational Transfer Function, Sinusoidal Transfer Function, Zero order instrument.

UNIT – III

Generalized Performance Characteristics of Instruments-III: 1st order instrument - Step Response, Frequency Response, Impulse Response, 2nd order instruments - Step Response, Frequency Response, Impulse Response, Loading effect under dynamic conditions.

UNIT – IV

Temperature Measurement: Thermal Expansion Method, Thermo-electric Sensors, Electrical Resistance Sensors, Junction Semiconductor Sensors, Digital Thermometers, Radiation Methods.

UNIT – V

Flow Measurement: Flow visualization, Pitot-Static Tube, Dynamic Wind-Vector Indicator, Hot-Wire and Hot-Film Anemometers, Hot-Film Shock-Tube Velocity Sensor.

SUGGESTED BOOKS & REFERENCE:-

1. Measurement Systems, Ernest O Doebelin & Dhanesh N Manik, Mc Graw Hill publication
2. Electronic Instrumentation, 3 edition by H. S. Kalsi Tata Mc Graw Hill publication
3. A Course in Electronic Measurements and Instrumentation, A.K.Sahani, Dhanpat Rai & Sons



ELECTRONICS & COMMUNICATION ENGINEERING

Effective From 2017-18 (CBCS)

Sub Code	L	T	P	Duration	IA	ESE	Credits
EC6TOE24	3	0		3 hours	40	60	3

Course Objective

- Promoting enhanced knowledge dissemination within the organization with the help of internal as well as external learning processes and systems.
- Transforming individual knowledge into the structural capital of the enterprise and organization.
- Aligning business strategy with the existing core competencies of the organization and its capabilities.

Knowledge Management

Unit 1: Introduction: Definition, evolution, need, drivers, scope, approaches in Organizations, strategies in organizations, components and functions, understanding knowledge; Learning organization: five components of learning organization, knowledge sources, and documentation.

Unit 2: Essentials of Knowledge Management; knowledge creation process, knowledge management techniques, systems and tools.

Unit 3: Organizational knowledge management; architecture and implementation strategies, building the knowledge corporation and implementing knowledge management in organization.

Unit 4: Knowledge management system life cycle, managing knowledge workers, knowledge audit, and knowledge management practices in organizations, few case studies.

Unit 5: Futuristic KM: Knowledge Engineering, Theory of Computation, Data Structure.

SUGGESTED BOOKS & REFERENCE:-

- Knowledge Management – a resource book – A Thothathri Raman, Excel, 2004.*
- Knowledge Management- Elias M. Awad Hasan M. Ghazri, Pearson Education*
- The KM Toolkit – Orchestrating IT, Strategy & Knowledge Platforms, Amrit Tiwana, Pearson, PHI, II Edn.*
- The Fifth Discipline Field Book – Strategies & Tools For Building A learning Organization – Peter Senge et al. Nicholas Brealey 1994*
- Knowledge Management – Sudhir Warier, Vikas publications*
- Leading with Knowledge, Madanmohan Rao, Tata Mc-Graw Hill.*



ELECTRONICS & COMMUNICATION ENGINEERING

Effective From 2017-18 (CBCS)

Sub Code	L	T	P	Duration	IA	ESE	Credits
EC6TOE25	3	0		3 hours	40	60	3

Course Objective

Objective of this course to introduce

1. the multidisciplinary character of engineering systems,
- 2 design of these complex systems, and
3. Introduce the various concept of optimization.

Engineering System Design Optimization

Unit 1: Introduction- Optimization problem formulation, optimization algorithms, applications and examples, different optimization methods available.

Unit 2: Single Variable optimization-Optimization criteria, bracketing methods – Exhaustive search method, bound phase method; Region Elimination methods – Fibonacci search method, Golden search method; Gradient based methods – Newton Raphson method, Bisection method; Root finding using optimization technique.

Unit 3: Multi objective optimization- Optimization criteria, Different search methods, Unidirectional search, Direct search method – Evolutionary optimization method, Powell's 74 conjugate direction method; Gradient based methods – Newton's method and Variable metric method.

Unit 4: Specialized Methods- Integer programming, Geometric programming, simulated annealing, Global optimization using - steep descent method, simulated annealing.

Unit 5: Genetic algorithms and evolutionary approaches-Differences and similarities between genetic algorithms and traditional techniques, operators of GA's, Computer program for simulated annealing, Newton Raphson method, Evolutionary optimization method.

SUGGESTED BOOKS & REFERENCE:-

1. Kalyanmoy Deb, "Optimization for Engineering design", Prentice Hall, India, 2005.
2. Kalyanmoy Deb, "Multi objective optimization using Evolutionary algorithms", John Wiley, 2001.
3. Taha, Operations Research, TMH 2010

Subject outcomes:

1. Engineering systems modeling for design and optimization.
2. Selection of design variables, objective functions and constraints.
3. Overview of principles, methods and tools in multidisciplinary design optimization (MDO) for systems.
4. Subsystem identification, development and interface design.
5. Review of linear and non-linear constrained optimization formulations.



Sub Code	L	T	P	Duration	IA	ESE	Credits
EE-111101	3	1		3 hours	40	60	4

WIRELESS & MOBILE COMMUNICATION

UNIT - I

Introduction to Wireless Communication System Evolution mobile communications, Mobile radio around the world, Types of Wireless communication system, comparison of Common wireless system, Trend in Cellular radio and personal Communication Second generation Cellular Networks, Third Generation (3G) Wireless Networks, Wireless Local Loop(WLL), Bluetooth and Personal Area Networks.

The Cellular Concept-System design Fundamentals:
Cellular System, Hexagonal geometry cell and frequency reuse concept, channel assignment strategies, Distance to frequency reuse ratio, channel & Co-channel interference reduction factor, S/I ratio consideration and calculation for minimum Co-channel and adjacent interference, Handoff strategies, Umbrella Cell Concept, Trunking and Grade Of Service(GOS), Improving Coverage & Capacity in cellular System-splitting, cell sectorization, Repeaters, Micro cell zone concept.

UNIT - II

Mobile Radio Propagation: Large Scale Path Loss : Free space propagation model. The three basic propagation Mechanism: reflection, diffraction, scattering, Practical link budget design, Outdoor Propagation models, Indoor propagation models, Small scale Multipath propagation, Impulse response model of a Multipath Channel, Small scale Multipath measurements, parameters of Mobile multipath channels, types of small scale fading, Rayleigh and Ricean Distributions, Statistical for models multipath fading channels and diversity techniques in brief.

UNIT-III

Modulation Techniques: Orthogonal Frequency Division Multiplexing, Performance of Digital Modulation in Slow-Flat Fading Channels and Frequency Selective Mobile Channels, Equalization: Survey of Equalization Techniques, Linear Equalization, Non-linear Equalization, Algorithms for Adaptive Equalization

UNIT - IV

Multiple Access Techniques for Wireless Communication: Introduction, FDMA, TDMA, CDMA: DS-SS, FH-SS, space division multiple access, packet radio, capacity of a cellular systems.

UNIT - V

GSM: System architecture, GSM subsystems, GSM communication frame, 3G system. GSM: Services: Mobile services, Bearer Services, Tele Services, Supplementary Services, Components & Working of WLAN, Transmission Media for WLAN, Modulation Techniques for WLAN (DSSS, FHSS), IEEE 802.11 Standards, & Protocol for WLAN.

The future of mobile communications, 3G, 4G, 802.11n/b/g, 802.16 concepts of adhoc network and mobile computing.

SUGGESTED BOOKS & REFERENCES:-

1. Kamilo Feher. "Wireless Digital Communications", PII
2. Rapport T.S., "Wireless Communications, Principles and Practice", PII
3. Lee W.C.Y., "Mobile Cellular Telecommunication", MGH
4. Panjha R, Mobile & Personal Communication System, PII
5. Haykins S & Moher M, Modern Mobile Wireless Communication, Pearson Ed.

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Syllabus Code	L	T	P	Duration	IA	ESE	Credits
ECETh4102	3	1		3 hours	10	60	4

VLSI DESIGN & VHDL

UNIT I

Evolution of VLSI, VLSI Design Methodology, VLSI Design Flow, Full Custom & Semi-custom Design Approach, FPGA Design, CAD Technology, MOS structure, MOS system under external bias condition, Structure and operation of MOSFET, N-MOS and P-MOS technology, Accumulation, Depletion, Inversion, I-V characteristics, Threshold voltage, Body Effect, MOSFET Capacitance, Latch-up, Second order Effects.

UNIT II

CMOS Fabrication process flow, CMOS N-well process, Layout design rules, stick diagram, CMOS design rules, Diagram for N-MOS and CMOS inverter & Gates, P-well process, Twin-Tub process, Fabrication of bipolar Transistor.

UNIT III

MOS Inverter static characteristics, CMOS inverter, Voltage transfer characteristics, Noise margin, CMOS inverter circuit operation, Switching characteristics, Delay time definitions, Power dissipation- static and dynamic power, BiCMOS Inverter.

UNIT IV

Combinational MOS logic circuit, CMOS logic circuits, Complex logic circuit, CMOS Transmission Gate, Pseudo NMOS logic, Sequential MOS logic circuits, Latches and Flip Flop circuits, Dynamic CMOS logic circuits, Domino CMOS logic, NORA, ZIPPER logic

UNIT V

Introduction to VHDL, EDA tools, Entity and Architecture declaration, Data Objects, Data Types, Operators, Concurrent and Sequential Statements, Various Architecture Styles of Modeling, Design of Combinational and Sequential Circuits.

SUGGESTED BOOKS & REFERENCE:-

1. S.M. Kang & Y. Leblebici, CMOS digital integrated circuits: analysis and design, MH
2. S.M. Sze, VLSI Technology, MH
3. Neil Weste & Kamran Eshraghian, CMOS VLSI design, Pearson
4. W. Wolf, Modern VLSI Design, Pearson Edu.
5. J Bhaskar, A VHDL Primer, Pearson Edu.
6. Fundamental of Digital Logic Design with VHDL, Brown & Pranesic, MGH Pub.

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Slr. Code	L	T	P	Duration	IA	ESE	Credits
ECETH4103	3	1		3 hours	10	60	4

POWER ELECTRONICS

UNIT - I

Thyristor characteristics, Two transistor model of Thyristor, Thyristor Turn-On di/dt protection, d/dt protection, Thyristor Turn-On, Series operation of Thyristor, Parallel operation of thyristor, Thyristor Commutation Technique, Natural Commutation, Forced Commutation, Self Commutation, External pulse Commutation, Load side Commutation, Line side Commutation.

UNIT - II

Inverters:- Classification of Inverters, Depending upon the various types of Commutation, Series and Parallel inverters, Self Commutation inverters, Single and three phase bridge inverters, Voltage Control of three phase inverters, Harmonic reductions.

UNIT - III

DC Choppers:- Introduction, Principle of Step-Down operation, Step Down chopper with RL load, Principle of Step-Up operation, Performance parameters, Switch mode regulators, Thyristor based chopper circuit, Impulse commutated choppers, Effects of Source and Load inductance, Impulse commutated three thyristor chopper, Resonant pulse choppers.

UNIT - IV

Controlled Rectifiers:- Introduction, Principle of Phase controlled converter operation, Single Phase semi converter with RL load, Single Phase full converter with RL load, Single phase dual converters, Single phase series converters, Three phase half wave converters, Three phase semi converters with RL load, Three phase full converter with RL load, Three phase Dual converters, Power factor improvements, Excitation angle control, PWM control, Sinusoidal Pulse Width Modulation, Design of converter circuits.

UNIT - V

AC Voltage Controllers:- Introduction, Principle of On-Off control, Principle of Phase control, Single Phase Bidirectional controller with resistive loads, Single Phase controller with inductive loads, Three phase half wave controller, Three phase full wave Controller, Three phase bidirectional delta connected controllers, Cycloconverters, Single phase to single phase, Single phase to three phase & Three phase to three phase cycloconverter, Reduction of output harmonics, AC Voltage controller with PWM control, Design of AC voltage controller circuits, Effect of Source and Load inductances.

SUGGESTED BOOKS & REFERENCE:-

1. P.S.Bhimbra, "Power Electronics",
2. Rashid, "Power Electronics", Pearson Publication.
3. H.C.Rai, "Power Electronics", Galgotia Publication.



Sl. Code	L	T	P	Duration	IA	ESE	Credits
EEETH-110-4	3	1		3 hours	10	60	4

MICROWAVE ENGINEERING

UNIT - I

Microwave Waveguides: Introduction, Types of waveguides, TE and TM modes in Rectangular wave guide, Dominant mode, Various field components of TE and TM modes, Cut off frequency of a wave guide, Phase velocity, Group velocity, Guide wave length, Wave impedance, Power transmission in rectangular wave guide, TE and TM modes for Circular wave guide.

UNIT - II

Microwave tubes and Measurements: Introduction, High frequency limitation of conventional tubes, Two cavity Klystron amplifier, Bunching process, Applegate diagram, Analysis of two cavity Klystron, Reflex Klystron: Performance characteristics, Travelling Wave Tube (TWT): Constructional features and operating principle of TWT, Magnetron: Construction and operating principle of cavity magnetron, Analysis of Cylindrical Magnetron, Mode jumping.

UNIT - III

Solid State Microwave Devices: Introduction to Microwave Transistors, MESFETs Varactor Diode, Parametric Amplifiers, Masers, PIN diode: Equivalent circuit, Operation and Application; Schottky Barrier Diodes, Tunnel Diode, Transferred Electron Devices: Gunn Effect, Gunn diode as an amplifier & Oscillator, Avalanche transit time devices: IMPATT diode, TRAPATT diode, BARITT diode.

UNIT - IV

Microwave Network Analysis: Scattering Matrix, Properties of Scattering Matrix, Microwave T junctions: H-plane Tee, E-plane Tee, Magic Tee junction and its applications, Directional Couplers: Introduction and Scattering Matrix of a Directional Coupler; Wave guide Joints, Bends, Corners, Twists, Posts and Tuning Screws, Rat Race Junction, Isolator, Circulator, Attenuator, Phase Shifters, Ferrite Devices, Faradays rotation in ferrites.

UNIT - V

Microwave measurements & MMIC: Microwave Bench, Measurement of Power, Wavelength, Frequency, Impedance, SWR, Attenuation, Q and Phase Shift, Microwave Integrated Circuits: MMIC's, Strip Lines, Micro strip Lines.

SUGGESTED BOOKS & REFERENCE:-

1. Microwave Circuits and Devices, S Y Lio, PHI
2. Foundation of Microwave Engineering, R E Collin, McGraw Hill
3. Microwave Engineering, Annapurna Das & Sisir K Das, TMII
4. Microwave Engineering, d m Pozar, John Wiley & Sons
5. Microwave and Radar Engineering, M Kulkarni, Umesh Publication

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LIST OF ELECTIVE SUBJECTS

Sub Code	L	T	P	Duration	IA	ESE	Credits
ECETh110	3	1		3 hours	40	60	4

1. EMBEDDED SYSTEMS

- UNIT-I** Introduction to embedded systems: Classification, Characteristics and requirements
- UNIT-II** Timing and clocks in Embedded systems, Task Mapping and management, Real time operating system issues
- UNIT-III** Signals, frequency spectrum and sampling, digitization (ADC, DAC), Signal Conditioning and Processing, Modeling and Characterization of Embedded Computation System
- UNIT-IV** Embedded Control and Control Hierarchy, Communication strategies for embedded systems, Encoding and Flow control.
- UNIT-V** Fault-Tolerance, Formal Verification.
- SUGGESTED BOOKS & REFERENCE:-**
1. H.Kopetz, "Real-Time Systems", Kluwer, 1997.
 2. R.Gupta, "Co-synthesis of Hardware and Software for Embedded Systems", Kluwer 1995.

2. MULTIRATE SYSTEM & FILTER BANKS

- UNIT-I**
Fundamentals of Multi-rate Systems: Basic multi rate operations, interconnection of building blocks, poly-phase representation, multistage implementation, applications of multi-rate systems, special filters and filter banks.
- UNIT-II**
Maximally decimated filter banks: Errors created in the QMF bank, alias-free QMF system, power symmetric QMF banks, M-channel filter banks, poly-phase representation, perfect reconstruction systems, alias-free filter banks, tree structured filter banks, trans-multiplexers.
- UNIT-III**
Para-unitary Perfect Reconstruction Filter Banks: Lossless transfer matrices, filter bank properties induced by paraunitariness, two channel Para-unitary lattices, M-channel FIR Para-unitary QMF banks, transform coding.
- UNIT-IV**
Linear Phase Perfect Reconstruction QMF Banks: Necessary conditions, lattice structures for linear phase FIR PR QMF banks, formal synthesis of linear phase FIR PR QMF lattice.
- UNIT-V**
Cosine Modulated Filter Banks: Pseudo-QMF bank and its design, efficient poly-phase structures, properties of cosine matrices, cosine modulated perfect reconstruction systems.
- SUGGESTED BOOKS & REFERENCE:-**
1. P. P. Vaidyanathan, "Multirate Systems and Filter Banks" Pearson Education (Asia) Pte. Ltd. 1994.
 2. Gilbert Strang and Truong Nguyen, "Wavelets and Filter Banks" Wellesley-Cambridge Press. 1996.
 3. N. J. Fliege, "Multirate Digital Signal Processing" John Wiley & Sons USA, 2000.



SPEECH SIGNAL PROCESSING

UNIT - I

Speech: Production, Perception and Acoustic-Phonetic Characterization: Introduction, Speech production process, Time and frequency domain representation of speech, Speech sounds and features, The vowels, Diphthongs, Semivowels, Nasal Consonants, Unvoiced Fricatives, Voiced Fricatives, Voiced & Unvoiced Stops, Acoustic-Phonetic Approach to Speech Recognition, Statistical Pattern-Recognition Approach to Speech Recognition, AI Approaches to Speech Recognition, Neural Networks and their Application to Speech Recognition.

UNIT - II

Spectral Analysis of Speech: Short time Fourier analysis, filter bank design, speech coding, subband coding of speech, transform coding, channel vocoder, formant vocoder, cepstral vocoder, vector quantizer coder.

UNIT - III

Speech Synthesis: Pitch extraction algorithms, Gold Rabiner pitch trackers, autocorrelation pitch trackers, voice/unvoiced/unvoiced detection, homomorphic speech processing, homomorphic systems for convolution, complex cepstrums, pitch extraction using homomorphic speech processing.

UNIT - IV

Automatic speech recognition systems: Isolated word recognition, connected word recognition, large vocabulary word recognition systems, pattern classification, DTW, HMM, speaker recognition systems, speaker verification systems, speaker identification systems.

UNIT - V

Hidden Markov Models: Discrete-Time Markov Processes, Extensions to HMMs, Con-to-s Models, The Urn-and-Ball Model, Elements of an HMM, HMM generator of observations, Three Basic problems for HMMs and their solutions, Probability Evaluation, 'Optimal' State sequence, Parameter estimation, Re-estimation procedure, HMM types, continuous observation densities in HMMs, Autoregressive HMMs, Variants on HMM structures, Inclusion of Explicit State Duration Density in HMMs, Optimization Criterion - ML, MMI and MDI, Comparisons of HMMs.

SUGGESTED BOOKS & REFERENCE:-

1. *Fundamentals of Speech Recognition*, Rabiner L. and Juang B., Pearson Education
2. Owens F.J., "Signal Processing of Speech", Macmillan New Electronics

4. WIRELESS SENSOR NETWORK

UNIT-I

Wireless Sensor Network: Introduction, Architecture, Hardware and Software used in Wireless Sensor Network.

UNIT-II

Sensor network application: Motion monitoring, Environmental monitoring, Generic Architecture, Sensor network Evolution.

UNIT-III

Wireless Sensor Network: Design, Goals and Issues, Sensor deployment, Scheduling and coverage issues, self configuration and topology control, Querying, data collection and processing, Collaborative information processing and group connectivity.

UNIT-IV

Wireless Sensor Routing Protocols: Data Centric, Hierarchical, Location based, Energy efficient routing.

UNIT-V

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Sensor Network Challenges: Minimization, power management, scalability, standardization and security. System Challenges: Time for Service, Sensor Platform

SUGGESTED BOOKS & REFERENCE:-

1. *Building Wireless Sensor Networks* by Robert Fuhdi Binding: Paperback & Publisher: Prentice Hall Released: 2011
2. *Wireless Sensor Networks* by Zhao Feng, Guibao Leuandis Binding: Paperback Publisher: Elsevier India Released: 2004
3. *Wireless Sensor Networks* by C. S. Raghavendra, Krishna M. Sivalingam, Tarek Znati Binding: Paperback Publisher: Springer/bsp Books Released: Rpt.2010

5. ARTIFICIAL INTELLIGENCE & EXPERT SYSTEMS

UNIT - I

Definition of AI, Brief history of AI, General problem Solving Approaches in AI- Learning Systems, Knowledge representation and reasoning, Planning, Knowledge Acquisition, Intelligence search, Logic Programming, Soft computing, Applications of AI techniques, Characteristic requirement for the realization of intelligent system, Programming languages for AI, Architecture for AI machine

UNIT - II

Cognitive perspective of pattern recognition- Template Matching, Prototype matching, feature based approach, Computational approach; Cognitive models of memory- Atkinson-Shiffrin's model, Tulving's model, Parallel distributed processing approach; Understanding of problem; Cybernetic view to cognition

UNIT - III

Production rules, Working memory, Control Unit/Interpreter, Conflict Resolution strategies, Types of production systems-Commutative Production system, Decomposable Production system, Forward versus Backward reasoning, Merits of a Production system- Isolation of knowledge and control strategy, Direct Mapping onto State-space, Modular Structure of Production rules, Knowledge base Optimization in production system.

UNIT - IV

Production Solving by Intelligent Search: General problem solving approaches- Breadth first search, depth first search, Iterative deepening search, Hill Climbing, Simulated annealing, Heuristic Search- for OR Graph, Iterative deepening algorithm, AND-OR Graph, Adversary Search- MINIMAX algorithm, Alpha-Beta heuristics.

UNIT - V

Logic of Propositions and Predicates- Formal definition, Propositional Logic-Semantic method for theorem proving, Syntactic method for theorem proving, Resolution in Propositional Logic, Predicate Logic, Unification of Predicates, Robinson's Inference Rule. Types of Resolution, Soundness and Completeness of Logic.

SUGGESTED BOOKS & REFERENCE:-

1. *Artificial Intelligence and Soft Computing*, Amit Konar
2. *Journal of Artificial Intelligence*, ScienceDirect, Elsevier Publication
3. *IEEE Transaction on Computational Intelligence and AI*
4. *Artificial Intelligence* By Elaine Rich and Kevin Knight, Tata McGraw Hill.
5. *Introduction to AI and Expert Systems* by Dan W. Patterson, PHI.

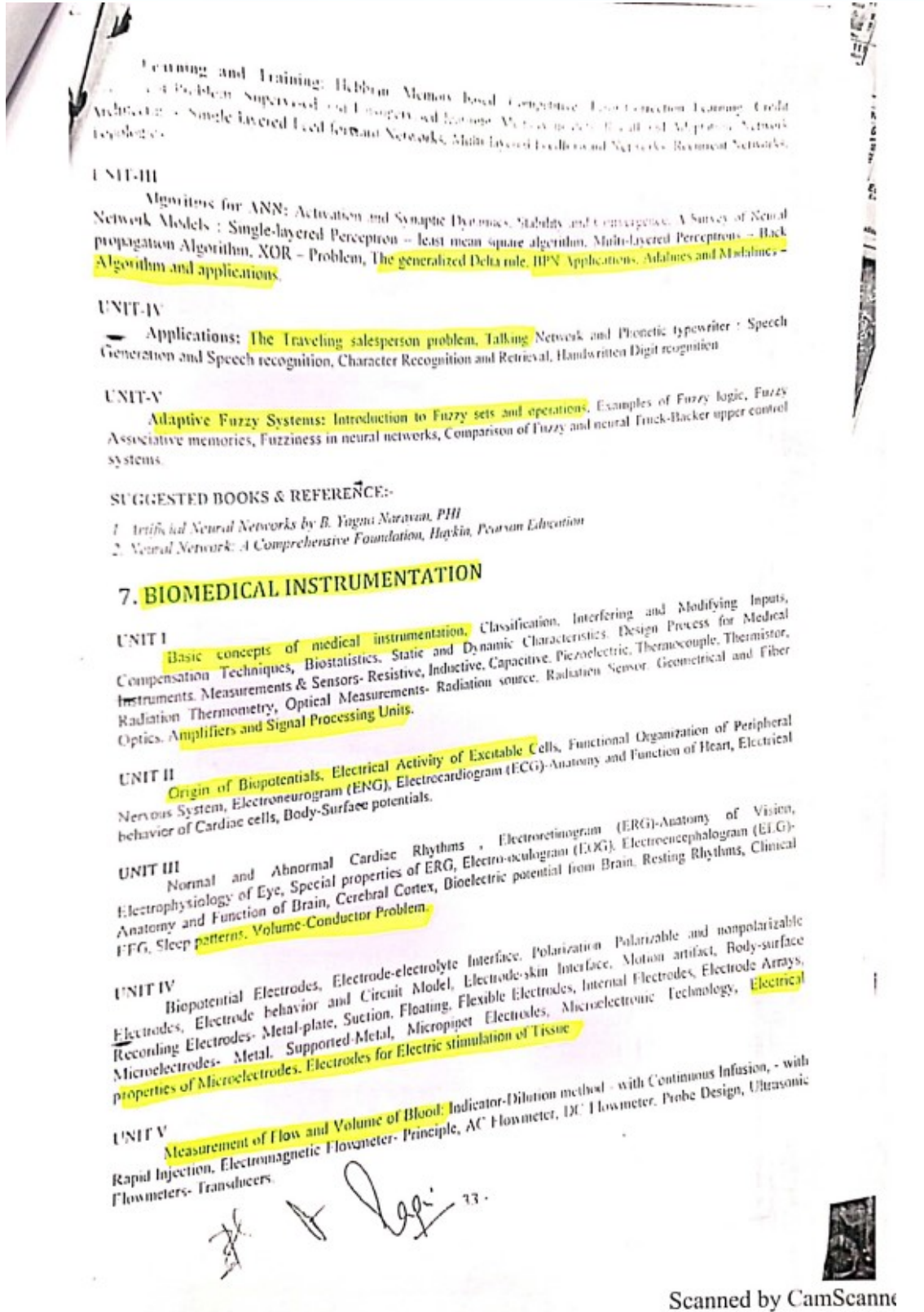
6. NEURAL NETWORK & FUZZY LOGIC SYSTEM

UNIT-I

Introduction to ANS Technology: Elementary Neurophysiology, Models of a Neuron, Neural Networks viewed as directed graphs. Feedback, from neurons to ANS, Artificial Intelligence and Neural Networks.

UNIT-II

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SUGGESTED BOOKS & REFERENCE:-

1. *The Handbook of Biomedical Instrumentation*, R S Khandpur, J. C. McGraw Hill Publications
2. *Medical Instrumentation: Application and Design*, J. G. Webster, Wiley Student Edition
3. *Biomedical Instrumentation*, J. G. Webster, Wiley Student Edition
4. *Relevant papers in journals in Elsevier.*
5. *Biomedical Instrumentation and Measurements*, Leslie Croninelli
6. *Principles of Bio medical Instrumentation*, Richard Aston

8. SEMICONDUCTOR DEVICE MODELING & SIMULATION

UNIT I

Semiconductor Electronics Review: Elements of Semiconductor Physics, Physical Operation of a *PN* Junction, MOS Junction, MIS Junction.
PN-Junction Diode and Schottky Diode: DC Current-Voltage Characteristics, Static Model, Large-Signal Model, Small-Signal Model, Schottky Diode and its Implementation in SPICE2, Temperature and Area Effects on the Diode Model Parameters, SPICE3, HSPICE and PSPICE Models.

UNIT II

Bipolar Junction Transistor (BJT): Transistor Convention and Symbols, Ebers-Moll Static Model, Ebers-Moll Large-Signal Model, Ebers-Moll Small-Signal Model, Gummel-Poon Static Model, Gummel-Poon Large-Signal Model, Gummel-Poon Small-Signal Model, Temperature and Area Effects on the BJT Model Parameters, Power BJT Model, SPICE3, HSPICE and PSPICE Models

UNIT III

Junction Field-Effect Transistor (JFET): Static Model, Large-Signal Model and its Implementation in SPICE2, Small-Signal Model and its Implementation in SPICE2, Temperature and Area Effects on the JFET Model Parameters, SPICE3, HSPICE and PSPICE Models
Metal-Oxide-Semiconductor Transistor (MOS): Structure and Operating Regions of the MOST, LEVEL 1 Static Model, LEVEL 2 Static Model, LEVEL 1 and LEVEL 2 Large-Signal Model, LEVEL 3 Static Model, LEVEL 3 Large-Signal Model, The Effect of Series Resistances, Small-Signal Models, The Effect of Temperature, BSIM1, BSIM2, SPICE3, HSPICE and PSPICE Models

UNIT IV

BJT Parameter Measurements: Input and Model Parameters, Parameter Measurements.
MOST Parameter Measurements: LEVEL 1 Model Parameters, LEVEL 2 Model (Long-Channel) Parameters, LEVEL 2 Model (Short-Channel) Parameters, LEVEL 3 Model Parameters, Measurements of Capacitance, BSIM Model Parameter Extraction.
Noise and Distortions: Noise, Distortion.

UNIT V

Metal-Semiconductor Field-Effect Transistor (MESFET), Ion-Sensitive Field-Effect Transistor (ISFET) and Semiconductor-Controlled Rectifier (Thyristor): The MESFET, The ISFET, The Thyristor.

SUGGESTED BOOKS & REFERENCE:-

1. *Paolo Antognetti and Giuseppe Massobrio, Semiconductor Device Modeling with SPICE, 2nd edn., McGraw-Hill, New York.*
2. *Richard S. Muller, Theodore I. Kamins, and Manisun Chen, Device Electronics for Integrated Circuits, 3rd edn., John Wiley and Sons, New York, 2003, ISBN: 0-471-39398-2.*
3. *H. Craig Casey, Devices for Integrated Circuits: Silicon and III-V Compound Semiconductors, John Wiley, New York.*
4. *Dieter K. Schroder, Semiconductor Material and Device Characterization, John Wiley and Sons, New York.*

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Sl. No.	L	T	P	Duration	LA	LP	Credits
ECETB-4201	3	1	1	3 hours	40	60	1

SATELLITE & RADAR COMMUNICATION

UNIT - I

INTRODUCTION: Origin and brief history of satellite communication. Elements of satellite communication link; Current status of satellite communication.

ORBITAL MECHANISM AND LAUNCHING OF SATELLITES: Equation of orbit. Describing the orbit, Look angle determination, Azimuth and elevation calculation, Geostationary and other orbit, Orbital perturbation, Orbit determination, Mechanics of launching a synchronous satellite, selecting a launch vehicle.

UNIT - II

SPACE CRAFT: Satellite subsystem, power supply altitude and orbit control system, Telemetry and Command, Thermal control system communication subsystem, Space craft antennas, Frequency reuse antennas.

UNIT - III

SATELLITE CHANNEL & LINK DESIGN: Basic transmission theory. Noise temperature. Calculation of system noise temperature. Noise figure, G/T Ratio of earth station, Design of down and uplink using C/I ratio, FM improvement factor for multi channel signal, Link design for FDM/FM, TV signal and Digital signals.

UNIT - IV

MULTIPLE ACCESS TECHNIQUES & EARTH STATION TECHNOLOGY: Frequency Division Multiple Access (FDMA), FDM/FM/FDMA, Time Division Multiple Access, Frame structure and synchronization, Code Division Multiple Access, Space qualification and Equipment Reliability, random Access, Earth station design requirement, earth station subsystem, Monitoring and control, Antenna noise temperature, Tracking, Design of Small earth station, Low noise amplifier, high noise amplifier, VSAT's, Satellite Television Receiver, INMARSAT & INSAT System.

UNIT - V

RADAR: Introduction, Radar block diagram and Operation, Radar Frequencies, Simple form of Radar Equation, Prediction of Range Performance, Minimum Detectable Signals, CW Radar, Tracking Radar, MTI Radar.

SUGGESTED BOOKS & REFERENCE:-

1. Pratt, I & Bastion, C.W. "Satellite Telecommunication", John Wiley & Sons.
2. Roshdy, D. "Satellite communication", Prentice Hall, of India Private Limited, New Delhi.
3. Manojit Mitra "Satellite Communication" PHI



Sub Code	L	T	P	Duration	IA	ESE	Credits
ECETH4202	3	1		3 hours	40	60	4

PRINCIPLE OF MANAGEMENT

UNIT - I

Management concepts, Nature, Scope, Significance, Function and Principle of Management Concepts. Evolution of Management: Early Contribution, Taylor and Scientific management, Fayol's administrative management, Bureaucracy, Hawthorne Experiments and Human Relations.

UNIT - II

Planning- Concepts, Objectives, Goals, Components and Steps involved in planning process, MBO. Decision making process, Individual and Group Decision Making.

UNIT - III

Organizing- principles, Organization theories, Line & Staff Authority, Centralization, Decentralization, Delegation, Employee's empowerment, Span of control, Departmentation, Authority and Responsibility.

UNIT - IV

Staffing: Recruitment & Selection, Training & Development, Performance Appraisal Directing: Concept Direction and Supervision, Co-ordination.

UNIT - V

Communication: Communication Process, Importance of Communication, Barriers to Communication. Controlling: nature, scope, functions, steps and process, control techniques.

SUGGESTED BOOKS & REFERENCE:

1. Management, Stoner & Freeman, PHI
2. Principles of Management, Koontz, O'Donnell Wehrich, McGraw Hill
3. The Practice of Management, P F Drucker, Allied Pub
4. Essentials of Management, Massie, AITBS
5. Principles of Management, Terry and Franklin, AITBS
6. Organization and Management, R D Agarwal, TMH
7. Management, H Koontz, McGraw Hill
8. Fundamentals of Management, Robbins & Dinzo, Pearson India