DEPARTMENT OF TECHNOLOGY
FINAL YEAR B.TECH
Scheme of Teaching and Examination
Semester – VII (Electronics & Communication Technology)

Sr. No.	Subject	Teaching Scheme (Hours / Week)				Examination Scheme (Marks)					
						Theory			Practical		
		L	T	P	Total	Scheme	Max. marks	Min. Passing	Scheme	Max. marks	Min. Passing
1	Audio and Video *Engineering*	04	---	---	04	CIE	50	20	--------	-------	--------
						SEE	50	20	--------	-------	--------
2	Industrial and Power Electronics	04	---	---	04	CIE	50	20	--------	-------	--------
						SEE	50	20	--------	-------	--------
3	Microwave devices and circuits	04	---	---	04	CIE	50	20	--------	-------	--------
						SEE	50	20	--------	-------	--------
4	Multiprocessor System on chip	03	---	---	03	CIE	50	20	--------	-------	--------
						SEE	50	20	--------	-------	--------
5	Elective-I	03	---	---	03	CIE	50	20	--------	-------	--------
						SEE	50	20	--------	-------	--------
6	Seminar and Project I	---	---	---	-----	--------	-------	--------	-------	--------	-------
Laboratory											
1	Audio and Video Engineering	---	---	02	02	--------	-------	--------	IPE	25	10
						--------	-------	--------	EPE	50	20
2	Industrial and Power Electronics	---	---	02	02	--------	-------	--------	IPE	25	10
						--------	-------	--------	EPE	50	20
3	Microwave devices and circuits	---	---	02	02	--------	-------	--------	IOE	25	10
4	Multiprocessor System on chip	---	01	---	01	--------	-------	--------	IOE	25	10
5	Elective-I	---	01	---	01	--------	-------	----	IOE	25	10
6	Seminar and Project I	---	---	04	04	--------	-------	--------	IPE	50	20
						--------	--------	--------	EOE	50	20
	Total	**18**	**02**	**10**	**30**	--------	**500**	--------	--------	**300**	--------

DEPARTMENT OF TECHNOLOGY

FINAL YEAR B.TECH

Scheme of Teaching and Examination

Semester – VIII (Electronics & Communication Technology)

Sr. No.	Subject	Teaching Scheme (Hours / Week)				Examination Scheme (Marks)					
						Theory			Practical		
		L	T	P	Total	Scheme	Max. marks	Min. Passing	Scheme	Max. marks	Min. Passing
1	Broadband Communication	04	---	---	04	CIE	50	20	--------	-------	--------
						SEE	50	20	--------	-------	--------
2	Mobile and Satellite communication	04	---	---	04	CIE	50	20	--------	-------	--------
						SEE	50	20	--------	-------	--------
3	Antenna and radar engineering	04	---	---	04	CIE	50	20	--------	-------	--------
						SEE	50	20	--------	-------	--------
4	Elective-II	03	---	---	03	CIE	50	20	--------	-------	--------
						SEE	50	20	--------	-------	--------
5	Seminar and Project II	---	---	---	---	--------	-------	--------	--------	-------	--------
Laboratory											
1	Broadband Communication	---	---	02	02	--------	-------	--------	IPE	25	10
						--------	-------	--------	EPE	50	20
2	Mobile and Satellite communication	---	---	02	02	--------	-------	--------	IPE	25	10
						--------	--------	--------	EPE	50	20
3	Antenna and radar engineering	---	---	02	02	--------	--------	--------	IPE	25	10
						--------	--------	--------	--------	--------	----------
4	Elective-II	---	01	---	01	--------	--------	--------	IPE	25	10
5	Seminar and Project II	---	---	08	08	--------	--------	--------	--------	--------	---------
						--------	--------	--------	EOE	100	40
	Total	**15**	**01**	**14**	**30**	--------	**500**	--------	--------	**300**	--------

CIE – Continuous Internal Evaluation
SEE – Semester End Examination
IPE – Internal Practical Evaluation
IOE- Internal Oral Evaluation
EPE—External Practical Evaluation

EOE—External Oral Evaluation

List of Electives

Sr. No.	Elective-I	Elective-II
1	Industrial Robotics and automation	Fuzzy logic and applications
2	ARM and embedded systems	High speed digital design
3	Speech and audio processing	Digital Image Processing
4	RF circuit design	Biomedical instrumentation and technology

Detailed Examination Scheme

1. Out of total 100 theory marks, 50 marks are allotted for Continuous Internal Evaluation (CIE). In CIE minimum 20 marks are required to become eligible for Semester End Examination. (SEE).

CIE (50 marks) includes :

- Surprise Test – I, of 10 marks in 4^{th} week
- Mid Semester Test of 30 marks in 8^{th} week
- Surprise Test - II, of 10 marks in 12^{th} week

3. For the Semester End Examination (SEE), 100 marks (3 hrs.) paper will be set and finally it will be converted to 50 marks, in which student must secure minimum 40% i.e. 20 marks as an university examination passing head.

4. Final theory marks (out of 100) will be the addition of CIE (out of 50 marks) and SEE (out of 50 marks).

5. IPE means Internal Practical Evaluation in which students have to carry out practical work as an internal examination at the term end.

6. IOE means Internal Oral Evaluation in which students have to face an internal oral examination at the term end. This examination is based on the practical work carried out by them throughout the year

7. EPE means External Practical Evaluation in which students have to carry out practical work as an external examination at the term end. It is one the passing head for the final result.

8. EOE means External Oral Evaluation in which students have to face an external oral examination at the term end. It is one the passing head for the final result.

B. Tech. (E&CT)

Semester –VII

AUDIO AND VIDEO ENGINEERING

Teaching Scheme	**Examination Scheme**
Lectures: 4 hours/week	Theory: (CIE+SEE) = (50+50) =100Marks
Practical: 2 hour/week	IPE: 25 marks
	EPE: 50 marks

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1. Hi Fi Audio Amplifier (6 Hrs)

Introduction to Amplifiers: Mono, Stereo, Public Address; Difference between stereo amplifier and Mono amplifier; Block diagram of Hi Fi amplifier and explanation; Graphic equalizer concept, circuit diagram and operation. (5 Point Circuit diagram); Dolby NR recording system; Types of speaker woofer, Midrange and Tweeter; Cross over network circuit and its function.

2. CD Player (6 Hrs)

CD – material used, size; Block diagram of CD player and explanation; Principle and working of detection used in CD player; Component used for CD mechanism (i) CD pick-up assembly, (ii) gear system, (iii) drive motors, (iv) CD lens; Function of controls; Parts, function of remote control (transmitter unit) and function of receiver used in CD player; Advantages of florescent display system used in CD player.

3. TV Fundamentals (8 Hrs)

Concept of Aspect ratio, image continuity, interlace scanning, scanning periods, horizontal and vertical, vertical resolution, horizontal resolution; Vestigial sideband transmission, bandwidth for Colour signal, picture tube, brightness, contrast, viewing distance luminance, hue, saturation, compatibility; Colour theory, primary colors and secondary colors, additive Colour mixing subtractive Colour mixing; Composite Video Signal, Pedestal height, Blanking pulse, Colour burst, Horizontal sync pulse details, Vertical sync pulse details, Equalizing pulses, CCIR B standards for Colour signal transmission and reception.

4. TV Transmitters and Receiver (8 Hrs)

Audio and Video signal transmission; Positive and Negative modulation; Merits and Demerits of Negative modulation; Introduction to television camera tube (a) Vidicon; (b) Plumbicon; (c) Solid State camera based on CCD; Color Picture tube (a) PIL, (b) Delta gun picture tube; Block diagram of monochrome TV transmitter; Block diagram of Colour TV transmitter; Block diagram of monochrome TV Receiver.

5. Colour TV **(8 Hrs)**

Block Diagram and operation of color TV receiver (PAL D type); Explain –Yagi Uda Antenna; Explain block diagram of PAL-D decoder with circuit diagram of chroma signal amplifier, Burst pulse blanking, Colour killer control, Basic Circuit for Separation of U and V signals. AGC Amplifier. Colour signal matrixing, RGB drive amplifiers; EHT generation: circuit explanation for line output stage using transistor or IC in Colour TV; Comparisons between NTSC, PAL and SCAM Systems.

6. Cable Television **(6 Hrs)**

Working principle and specification of following components : Dish antenna, LNBC, Multiplexer,Attenuators Connectors (two ways and three ways), Amplifier and cable; MATV, CATV and CCTV;Design concept for cable TV network; Block diagram of dB meter with working principle; Direct to Home System (DTH) Introduction and Block Diagram.

7 High definition TV **(6 Hrs)**

Component coding, MAC signals, MAC encoding format, scanning frequencies D2-MAC Packet Signal, Duo-binary Coding, HDTV Standards & compatibility, colorimetric characteristics & parameters of HDTV systems.

Reference :

1. Television & Radio Engineering (A.M. Dhake) Tata McGraw Hill.

2. Television Engg and Video System (R.G. Gupta) Tata McGraw Hill.

3. Audio Video Systems (R.G. Gupta) Tata McGraw Hill.

4. Modern TV Pratice (R.R. Gulati) New Age International.

5. Basic Radio and Television (S. Sharma) Tata McGraw Hill.

6. Colour Television Principles and Pratice (R.R. Gulati) New Age International.

7. Basic Television and Video System (Bernard Grob) Tata McGraw Hill.

8. Mono Chrome and Colour Television (R.R. Gulati0 New Age International.

9. Modern CD Player Servicing Manual (Manohar Lotia) BPB Publication.

LIST OF PRACTICALS:

(Minimum 8 Experiments based on following TV Sections)

1. Study of circuit diagram of color TV receiver

2. CCVS for different test patterns

3. RF tuner

4. Video IF & detector

5. Video Amplifier

6. Sync separators (V & H)

7. Sound IF

8. Horizontal section

9. Vertical section

10. Trouble shooting of color TV

11. DTH

Industrial & Power Electronics

Teaching Scheme	Examination Scheme
Lectures: 4 Hours/Week	Theory: (CIE+SEE) = (50+50) =100Marks
Practical: 2 Hours/Week	IPE: 25 Marks
	EPE: 50 Marks

UNIT-1: Silicon Controlled Rectifier (7 Hrs.)

Construction- **: V-**I Characteristics, Dynamic Characteristics during turn on, turn off, gate triggering Characteristics, rating & specifications, SCR triggering methods- R, RC, UJT triggering (using pulse Transformer), PUT, SUS, SBS triggering methods. SCR Turn off method, Class A, Class B, Class C, Class D, Class E, & Class F, dv/dt & di/dt protection circuits.

UNIT-2: Power Devices & Driving Circuits (6 Hrs.)

Construction, working, V-I Characteristics, Driving Circuit of : Diac, Triac, GTO, MOSFET, IGBT.

UNIT-3: 1 Φ & 3 ΦControlled Converter (7 Hrs.)

1 Φ Half Wave Controlled Rectifier, 1 Φ Full Wave Controlled Rectifier, 3 Φ Controlled rectifier with and without freewheeling diode , 1 Φ semi converter, Full Converter & dual converter. (Derivations & Numericals expected).

UNIT 4: Inverters (9 Hrs.)

Concept of inverter, types of inverters. Thyristorised inverters: series inverter, parallel inverter, IGBT based inverters: 1-phase half and full bridge inverter. 3-phase bridge inverter (120 and 180 mode of conduction) Voltage control of 1-phase and 3-phase inverter, harmonic reduction techniques.

UNIT-5: Switching Power Circuits (7 Hrs.)

Introduction to Choppers, classification, control techniques of choppers, series turn off chopper, parallel Capacitor Turn off chopper, Jones & Morgan's Chopper; step up chopper, Multi Phase chopper (Circuits based IGBT only).

UNIT-6: A.C. Voltage Regulator (6 Hrs.)

Switch mode AC power supplies, Resonant AC power supply, Bidirectional AC power supply, Control circuits of SMPS. AC voltage Stabilizer- Relay type, Servo type, Constant Voltage Transformer.

UNIT-7: Power circuits & Systems (6 Hrs.)

AC power flasher using Triac, light dimmer using Triac and Diac, Liquid level controller, 1 Φ preventer, burglar Alarm, Product counter, SCR driving circuit using optocoupler, battery charger, proximity detector circuit.

Text Books:

1. P.C. Sen, “Power Electronics”, 1st Edition, Tata McGraw Hill.

2. M.H. Rashid, “Power Electronics”, 3rd Edition, Pearson.

3. G.E. SCR Manual.

Reference Books:

1. Mohan, Undeland, Riobbins, “Power Electronics” 3rd Edition, Wiley.

2. Dubey, Doralda, Joshi,Sinha, “Thyristorised Power Controllers”, 1st Edition, New Age International Edition.

3. M.D. Singh, K.B. Khanchandani, “Power Electronics”, 2nd Edition, Tata- McGraw Hill.

Practical List:

1. VI Characteristics of SCR.

2. SCR as Half wave controlled rectifier.

3. Triac as light dimmer.

4. A.C. Power Flasher.

5. SCR Triggering Circuits.

6. SCR Commutation Circuits.

7. Liquid level controller.

8. Single phase preventer.

9. AC voltage regulator.

10. SCR step down chopper.

11. Single phase semi- converter.

12. Single phase Full- converter.

13. Burglar Alarm.

14. Batch counter.

MICROWAVE DEVICES AND CIRCUITS

Teaching Scheme	Examination Scheme
Lectures: 4 hours/week	Theory: (CIE+SEE) = (50+50) =100Marks
Practical: 2 hour/week	IOE: 25 marks

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1. Introduction: **(3 Hrs)**
Microwave bands, microwave characteristics, microwave system, traditional, industrial and biomedical applications, microwave hazards.

2. Transmission line theory: **(4 Hrs)**
Circuit representation of transmission line, transmission line equations, sinusoidal excitation of transmission line, impedance and its Transformation, Smith Chart and its applications, impedance matching techniques.

3. Microwave Transmission lines: **(5 Hrs)**
Co-axial line, rectangular and circular wave guides, introduction to strip lines, microstrip lines and co-planar wave-guides.

4. Wave guide components: **(6 Hrs)**
Transmission line resonators, Rectangular and circular cavity resonators, introduction of s-parameters, Hybrid junctions, Directional couplers, circulators, isolators, wave, guide terminations, Attenuators, Phase-shifter

5. Microwave tubes: **(7 Hrs)**
Reflex klystrons, Multi cavity klystron, Helix TWT, Coupled cavity TWT, Backward wave oscillator, magnetron, Forward wave cross field Amplifiers.

6. Microwave semiconductor devices: **(7 Hrs)**
Point contact diodes, Schottky barrier diodes, PIN diodes, varactor diodes, tunnel diodes, Gunn devices, IMPATT diode, parametric devices, Detectors and Mixers.

7. Hybrid and Monolithic MICs: **(10 Hrs)**
Definition hybrid MIC, characteristics, comparison with conventional circuits, fields of application and limitations and criteria for the choice of substrate material; thin film hybrid circuits, thick film hybrid circuits, artwork, mask making, photolithography, resistor stabilization, sawing, brazing process, wire bonding. Definition monolithic MIC, substrate structure, doping by ion implantation ohmic contact, metal resistive layers, gate metal, dielectric second level metal, dielectric and air bridge vias, substrate vias, final wafer process steps.

8. Microwave measurements: **(6 Hrs)**
VSWR, Frequency, Power, Noise, Q Factor, Impedance, Attenuation, Dielectric Constant, antenna Gain.

Text Books:
1. Microwave engineering passive circuits - Peter A. Rizzi PHI Publication

2. Microwave Devices and circuits - Samuel Liao PHI Publication
3. Microwave Engineering - David Pozar ,John Wiley and Sons publication
4. Microwave Engineering and Applications - O.P. Gandhi Pargamon Press publication
5. Microstrip Circuit Analysis - David H. Schrader, Prentice Hall PTR, New Jersey 07458.
6. Microstrip lines and Slot lines- KC. Gupta, R. Gargand I.J. Bahl, Artech House.
7. MIIC Design: GaAs FETs and HEMTs- Peter Ladbrooke, Artech House.
8. Foundations for Microstr!p Circuit Design -T.C. Edwards, John Wiley and Sons

Reference Books:

1. Basic Microwave Techniques and laboratory manual- M.L. Sisodia, G. S. Raghuvans Wiley eastern Limited publication
2. Electromagnetic Field theory fundamentals - Guru & Hisiroglu Thomson Learning publication
3. MIC and MMIC Amplifier and Oscillator Circuit Design- Allen Sweet, Artech House.
4. Handbook of Microwave Integrated Circuits- Reinmut K Hoffman, Artech House.

LIST OF EXPERIMENTS:

1. Measurement of power using Bolo meters
2. Measurement of attenuation by substitution method
3. Measurement of impendence using slotted wave guide
4. Measurement of scattering parameters
5. Measurement of noise
6. Measurement of frequency using slotted wave guide.
7. Measurement of impedance using reflectometer
8. Measurement of Wavelength using reflectometer
9. Measurement of gain of horn antenna form radiation pattern

MULTIPROCESSOR SYSTEM ON CHIP

Teaching scheme	**Examination scheme**
Lectures: 3 hrs/week	Theory: (CIE+SEE) = (50+50) =100Marks
	IOE: 25 Marks

UNIT I- MULTIPROCESSOR SoCs (8 Hrs)

Introduction, SOC , need,challenges, design methodolies, Hardware architecture, software.

UNIT-II DESIGNING ENERGY AWARE MPSoCS (8 Hrs)

Introduction, energy aware processor design, energy aware memory system, energy aware on chip communication system design, energy aware software

UNIT III- NETWORKS ON CHIP (8 Hrs)

Introduction, signal transmission on chip,micronetwork architecture and control, software layers

UNIT IV- EMBEDDED MICROPROCESSOR ARCHITECTURE (8 Hrs)

High performance processors, pipelining, general purpose 32 bit microprocessors,virtual simple architecture integrating,

UNIT-V PERFORMANCE AND FLEXIBILITY FOR MPSoC DESIGN (8 Hrs)

ASIC design limitations,extensible processors, multiprocess SOCs, processors and disruptive technology.

UNIT-VI DESIGN OF COMMUNICATION ARCHITECTURES (8 Hrs)

On chip communication architectures, system level analysis for communication design, design space exploration for customizing communication architectures, adaptive communication architectures. Communication architecture for battery level, systems.

Text and Reference books:

1. Ahmed jerrya, wayne wolf ,"Multiprocessors systems-on-chips" Morgan Kaufman Publishers
2. Wyne wolf ,"FPGA based system design" by Prentice Hall of india.
3. Giovanni De Micheli, Rolf Ernst and Wayne Wolf "Readings in hardware/software co-design". Morgan Kaufman publishers
4. "Computers as components : principles of embedded computing system Design" Morgan Kaufman publishers
5. Core connect architecture at http://www.chips.ibm.com/products/coreconnect
6. EDK power PC tutorial at http://www.xilinx.com/EDK
7. Spartan III handbook from xilinx
8. Power PC info http://www.chips.ibm.com/productspowerPC/cores/405sde_pb.html
9. White papers form xilinx.com and http://www.chips .ibm.com

SEMINAR AND PROJECT-I

Teaching Scheme
Practical: 4 hour/week

Examination Scheme
IPE: 50 marks
EOE: 50 marks

The project work is to be carried out in two semesters of final year B. Tech. (E & CT) Part – I & Part– II. The practical batch for project will be of 15 students. The batch will be preferably divided into groups each consisting of not more than 3 students.

In semester – I, group will select a project with the approval of the guide and submit the synopsis of project in the month of August. The group is expected to complete details system design, layout etc. in semester – I, as a part of term work in the form of a joint report. In addition all students of project group will deliver the seminar on the proposed project only.

If the group of student select a project under sponsored category from industry, it is essential that they should take prior written permission & approval at the beginning of semester-I from Head of Institution through Head of Department & Concerned Guide.

ELECTIVE I
INDUSTRIAL ROBOTICS & AUTOMATION

Teaching Scheme	**Examination Scheme**
Lectures: 3 hours/week	Theory: (CIE+SEE) = (50+50) =100Marks
Tutorial: 1 hour/week	IOE: 25 marks

UNIT - I ROBOTICS AND ROBOTICS DRIVES (6 Hrs)
History, Present status and future trends in Robotics and automation, Laws of Robotics, Robot definitions, Robotics systems and robot anatomy, Specification of Robots - resolution, repeatability and accuracy of a manipulator. Robotics applications Robot drive mechanisms, hydraulic, electric, servomotor, stepper motor, pneumatic drives.

UNIT - II ROBOTICS POWER TRANSMISSION SYSTEMS (5 Hrs)
Mechanical transmission method ,Gear transmission, Belt drives, cables, Roller chains, Link , Rod systems ,Rotary-to-Rotary motion conversion, Rotary-to-Linear motion conversion, Rack and Pinion drives, Lead screws, Ball Bearing screws, End effectors - Types.

UNIT - III SENSORS (8 Hrs)
Sensor characteristics, Position sensors, Potentiometers, Encoders, Resolvers, LVDT, Velocity sensors , Tacho-generators, Encoders, Proximity sensors, Limit switches,Tactile sensors ,Touch sensors ,Force and torque sensors

UNIT - IV VISION SYSTEMS FOR ROBOTICS (8 Hrs)
Robot vision systems, Image capture cameras , vidicon and solid state, Image representation , Gray scale and colour images, image sampling and quantization , Image processing and analysis , Image data reduction , Segmentation ,Feature extraction , Object Recognition, Image capturing and communication ,JPEG, MPEGs and H.26x standards, packet video, error concealment, Image texture analysis. Motion generation.

UNIT - V PLC AND AUTOMATION (8 Hrs)
Building blocks of automation, Controllers , PLC, Role of PLC in FA ,Architecture of PLC ,Advantages , Types of PLC , Types of Programming ,Simple process control programs using Relay Ladder Logic and Boolean logic methods ,PLC arithmetic functions Flexible Manufacturing Systems concept , Automatic feeding lines, ASRS, transfer lines, automatic inspection ,Computer Integrated Manufacture , CNC, intelligent automation. Industrial networking, bus standards, HMI Systems, DCS and SCADA, Wireless controls.

TEXT AND REFERENCE BOOKS
1. Klafter, Richard D., Chmielewski, Thomas A, and Negin, Michael., "Robotics Engineering: An Integrated Approach", Prentice Hall of India, New Delhi, 1989.
2. Fu, K.S., Gomalez, R.C., and Lee C.S.G., "Robotics: Control, Sensing, Vision and Intelligence", McGraw Hill, New York, 1987.
3. Groover, Mikell P and et. al., "Industrial Robots: - Technology, Programming and Applications", McGraw Hill, New York, 1986.

4. Niku, Saeed B.,"Introduction to Robotics: Analysis, Systems, Applications" Prentice Hall of India, New Delhi, 2003.
5. Deh, S R., "Robotics Technology and Flexible Automation", Tata McGraw-Hill, New Delhi, 1994.

ELECTIVE I
ARM AND EMBEDDED SYSTEMS

Teaching Scheme	**Examination Scheme**
Lectures: 3 Hours/Week	Theory: (CIE+SEE) = (50+50) =100Marks
Tutorial: 1 Hours/Week	IOE: 25 Marks

UNIT -I EMBEDDED PROCESSORS (6 Hrs)
ARM7TDMI processor features, Comparison of features of MCS-51, PIC and ARM processor, ARM 7 architecture, LPC 21xx, registers, on chip peripherals, memory organization, CPU Bus configuration, development tools.

UNIT - II ARM INSTRUCTION SET (9 Hrs)
ARM instruction set: Data processing instruction, Load, store, Branch, interrupt instruction, program status register instruction, loading constants, conditional execution. Thumb instruction set: Thumb register usage, ARM Thumb Interworking, branch instructions, Data processing, single register load-store, multiple register load-stores, stack instructions, software interrupt instruction.

UNIT - III INTERRUPTS (3 Hrs)
Interrupts and exception handling schemes

UNIT-IV EMBEDDED SYSTEMS (8 Hrs)
Introduction, CISC and RISC architectures, features of 16/32 bit microcontrollers, device drivers, Interrupt servicing mechanisms, programming concepts in embedded c and c++, Prototype development phases, software design and implementation ,UML (unified modeling language). Hardware software co design, Case study: Adaptive cruise control system in car.

UNIT - V REAL-TIME OPERATING SYSTEMS (10 Hrs)
RTOS introduction, schedulers, objects, RTOS services , tasks, semaphores, queues, pipes, virtual sockets, other kernel objects, exceptions and interrupts, timers, I/O subsystems, memory management, remote Procedure Calls (RPCs), interprocess communication and synchronization, Priority Inversion Problem and Deadlock Situations , Case study: VxWorks RTOS

TEXT BOOKS
1. Sloss, Symes, Wright,"ARM system developers guide"Morgan Kaufman,Elsevier, publication
2. Raj Kamal, "Embedded Systems: Architecture, Programming and Design", TMH, 2003.
3. Wolf, Wayne, "Computers as Components: Principles of Embedded Computing System Design, Morgan Kaufman Publishers, 2001.
REFERENCE BOOKS
1. Vahid, Frank and Givargi, Tony, "Embedded System Design: A Unified Hardware/Software Introduction", John Wiley & Sons, New York, 2000.
2. Deshmukh, Ajay V., "Microcontroller Theory and Applications", Tata McGraw-Hill.

ELECTIVE I
SPEECH AND AUDIO PROCESSING

Teaching Scheme	**Examination Scheme**
Lectures: 3 Hours/Week	Theory: 100 Marks
Tutorial: 1 hour/week	IOE: 25 Marks

UNIT - I Digital models for the speech signal (5 Hrs)
Process of speech production, Acoustic theory of speech production, Lossless tube models, and Digital models for speech signals.

UNIT - II Time domain models for speech processing (8 Hrs)
Time dependent processing of speech, Short time energy and average magnitude, Short time average zero crossing rate, Short time autocorrelation function, Pitch period estimation using autocorrelation function, Median smoothing.

UNIT - III Short time Fourier analysis (7 Hrs)
Linear Filtering interpretation, Filter bank summation method, Gamma tone filter, other considerations in filter bank design, speech spectrum analysis using FFT.

UNIT - IV Linear predictive coding of speech (8 Hrs)
Basic principles of linear predictive analysis, Solution of LPC equations, Prediction error signal, Frequency domain interpretation, Relation between the various speech parameters, Synthesis of speech from linear predictive parameters, Applications.

UNIT - V Audio Processing (8 Hrs)
Auditory perception and psychoacoustics - Masking, frequency and loudness perception, spatial perception, Digital Audio, Audio Coding - High quality, low-bit-rate audio coding standards, Multichannel audio - Stereo, Multichannel surround sound.

Text and References book:
1. Ben gold and N Morgan, “Speech and audio signal processing”, John Wiley and sons
2. L. R. Rabiner and R. W. Schafer**,** “Digital Processing of Speech Signals," Pearson Education (Asia) Pte. Ltd., 2004.
3. D. O’Shaughnessy, “Speech Communications: Human and Machine,”Universities Press.
4. L. R. Rabiner and B. Juang,“Fundamentals of Speech Recognition,” Pearson Education (Asia) Pte. Ltd., 2004.
5. Z. Li and M.S. Drew**,** “Fundamentals of Multimedia,” Pearson Education (Asia)

ELECTIVE I
RF CIRCUIT DESIGN

Teaching Scheme	**Examination Scheme**
Lectures: 3 hours/week	Theory: (CIE+SEE) = (50+50) =100Marks
Tutorial: 1 hour/week	IOE: 25 marks

UNIT-I: RF ISSUES **(5 Hrs)**

Importance of RF design, Electromagnetic Spectrum, RF behaviour of passive components, Chip components and Circuit Board considerations, Scattering Parameters, Smith Chart and applications.

UNIT II: RF FILTER DESIGN **(8 Hrs)**

Filter types and parameters, Low pass filter, High pass filter, Bandpass and Bandstop filter, Insertion Loss. **Special Filter Realizations:** Butterworth type filter, Chebyshev type filters, Denormalization of standard low pass design.

Coupled Filters: Odd and Even Mode Excitation, Bandpass Filter Design, Cascading band pass filter elements, Design examples.

UNIT III: ACTIVE RF COMPONENTS & APPLICATIONS **(8 Hrs)**

RF diodes, BJT, RF FETs, High electron mobility transistors; Matching and Biasing Networks – Impedance matching using discrete components, Microstripline matching networks, Amplifier class's of operation and biasing networks.

UNIT IV: RF AMPLIFIER **(7 Hrs)**

Characteristics, Amplifier power relations, Stability considerations, Constant gain circles, Constant VSWR circles, Low Noise circuits, high power and multistage amplifiers.

UNIT V: OSCILLATORS AND MIXERS **(8 Hrs)**

Basic Oscillator model, High frequency oscillator configuration, Balanced modulators, Basic characteristics of Mixers, Phase Locked Loops, RF directional couplers and hybrid couplers , Detector and demodulator circuits.

Text Books:

1. Reinhold Ludwig and Powel Bretchko, RF Circuit Design ,Theory and Applications,

Pearson Education Asia, First Edition, 2001.

2. James Hardy, " High Frequency Circuit Design ", Resto Publishing Co., NewYork,

References:

1. Joseph. J. Carr, Secrets of RF Circuit Design , McGraw Hill Publishers, Third Edition, 2000.

2. Mathew M. Radmanesh, Radio Frequency & Microwave Electronics, Pearson Education Asia, Second Edition, 2002.

3. Ulrich L. Rohde and David P. NewKirk, RF / Microwave Circuit Design, John Wiley & Sons USA 2000.

4. Roland E. Best, Phase - Locked Loops : Design, simulation and applications, McGraw Hill Publishers 5TH edition 2003.

5. Ian Hickman, " RF HandBook ", Butter Worth Heinemann Ltd., Oxford, 1993.

B.Tech. (E&CT)

Semester –VIII

BROADBAND COMMUNICATION

Teaching Scheme	**Examination Scheme**
Lectures: 4 hours/week	Theory: (CIE+SEE) = (50+50) =100Marks
Practical: 2 hour/week	IPE: 25 marks
	EOE: 50 marks

UNIT 1: Fundamentals of communications Network (4 Hrs)

Switching network, circuit switching, routing In circuit switching network, control signals in circuit switching, packet switching, comparison between packet and circuit switching, other switching techniques, X.25

UNIT 2: ISDN Architecture and Interface (8 Hrs)

Integrated digital networks, concept of ISDN, transmission structure, User-Network interface, protocol architecture, addressing, Interworking, ISDN standards.

UNIT 3: ISDN protocol and Service (8 Hrs)

ISDN physical layer: user network interface, U interface; ISDN Data link layer: LAPD, terminal adaption, data link layer; ISDN Network layer: basic call control, supplementary control; ISDN service: bearer services, tele-services, basic and supplementary service

UNIT 4: Broad band ISDN: architecture and control (8 Hrs)

Architecture, B-ISDN, standards, services, requirements, protocol interface model, physical layer, SONET

UNIT 5: Asynchronous Transfer Mode (10 Hrs)

Asynchronous transfer mode, transmission of ATM cell, ATM adaption layer, ATM traffic attributes and congestion control, flow control, error detection and control.

UNIT 6: Frame relay protocol and services (10 Hrs)

Frame mode protocol architecture, call control, LAPF, congestion in frame relay, congestion control, traffic rate management, explicit congestion avoidance, implicit congestion control.

TEXT BOOK:

1.William Stallings,"**ISDN and Broadband ISDN with Frame Relay and ATM** Prentice-Hall, IVth edition.

REFERENCE BOOKS:

1. Balaji Kumar,**" Broadcast Communications"**, McGraw Hill Publication.
2. W. Stallings, **"ISDN-An Introduction",** McGraw Hill Publishing company.
3. M. Schwartz, " **Telecommunication Network "**Addison Wesley publication.
4. M. Schwartz," **Computer Communication network – Design & Analysis"** Prentice Hall India Publication.

Practical:

Minimum eight experiments should be conducted based on above syllabus.

MOBILE AND SATELLITE COMMUNICATION

Teaching Scheme	**Examination Scheme**
Lectures: 4 Hours/Week	Theory: (CIE+SEE) = (50+50) =100Marks
Practical: 2 Hours/Week	IPE: 25 Marks
	EOE: 50 Marks

1. Wireless transmission: **(2 Hrs)**

Need of wireless communication. Cellular concepts, hand of mechanism, Multipath Characteristics of radio waves signal fading.

2 GSM Technologies: **(6 Hrs)**

GSM architecture, entities, call routing in GSM, PLMN Interfaces, GSM Addresses and Identifiers, Network Aspects in GSM, GSM Frequency Allocation, Authentication and Security, 3G Networks, Applications on 3G.

3 Services over Mobile Communication: **(8 Hrs)**

Mobile computing over SMS, Short Message Services, value added services through SMS, GPRS and Packet Data Network, GPRS Network Architecture, GPRS Network Operations, Applications of GPRS, Limitations of GPRS.

4 Medium Access Control: **(2 Hrs)**

Specialized MAC, SDMA, FDMA, TDMA & CDMA

5 Wireless Data Networking: **(8 Hrs)**

IEEE Standards, Models Different layers, wireless LAN, Hyper LAN, Blue tooth. *Mobile Network Layer:* Mobile IP: Goals, assumptions & requirements, IP packet delivery, Agent discovery, Registration, tunneling and encapsulation, optimization, Reverse tunneling, Mobile ad-hoc networks. *Mobile Transport Layer:* Tradition TCP, Classical TCP improvement, TCP over 2.5G/3G wireless networks.

6. Introduction to satellite communication: **(8 Hrs)**

General background, frequency allocations for satellite services, basic satellite system, and system design considerations, applications Introduction, laws governing satellite motion, orbital parameters, orbital perturbations, geostationary orbit, antenna look angles, antenna mount, limits of visibility, Earth eclipse of satellite, sun transit outage, inclined orbits, sun-synchronous orbit, launching of geostationary satellites

7. Link Design: **(7 Hrs)**

Introduction, transmission losses, link power budget equation, system Noise, carrier to noise ratio for uplink and downlink, combined uplink and downlink carrier to noise ratio, inter modulation noise

8. Communication Satellites: (7 Hrs)

Introduction, design considerations, lifetime and reliability, spacecraft sub systems, spacecraft mass and power estimations, space segment cost estimates. *Earth Stations:* Introduction, design considerations, general configuration and characteristics

Text Books:

1. Mobile Communications - Jochen Schiller - 2nd edition, Publication-Pearson Education.
2. Mobile Computing – Ashok K Talukdar, Roopa R Yavagal, Publication-TMH publication
3. Satellite Communications - Dennis Roddy - 3rd edition, Mc-Graw Hill Publication

Reference Books:

1. Introduction to Wireless Telecommunications systems and Networks - Gary J. Mulett.
2. Mobile Communication – G.K. Behra, Lopamudra Das, Scitech Publication.
3. Sateliite Communications systems - M. Richharia - 2nd edition Mc Millan publication

Practical:

Minimum eight experiments should be conducted based on above syllabus.

ANTENNA AND RADAR ENGINEERING

Teaching Scheme	**Examination Scheme**
Lectures: 4 Hours/Week	Theory: (CIE+SEE) = (50+50) =100Marks
Practical: 2 Hours/Week	IPE: 25 Marks

1. BASIC ANTENNA CONCEPTS. (4 Hrs)

Introduction, basic antenna parameters: radiation parameters, radiation power density, radiation intensity, directivity , beam efficiency, gain, aperture concept, effective height, polarization, input impedance, radiation efficiency

2. LINEAR WIRE AND ARRAY ANTENNAS (10 Hrs)

Infinistimal dipole with radiation field , radiation resistance , radiation distance, radiation sphere, Near field , far field directivity, small dipole, finite length dipole, half wave length dipole, folded dipole , sleeve dipole and their applications. Array of isotropic point sources , non isotropic sources, principle of pattern multiplication, linear arrays of n elements , broadside , end fire radiation pattern , directivity , beam width and null directions , planar array , circular array and their application.

3. OTHER TYPES OF ANTENNAS (8 Hrs)

Loop comparison of small loop with short dipole, radiation pattern, its parameter and their applications. V antenna, rhombic antenna, yagi-uda array. Rectangular and circular aperture, horn antenna. Plane reflector, corner reflector, parabolic reflector, and their applications,basics of microstrip antenna.

4. Introduction to Radars (5 Hrs)

Basic principle, radar range equation , radar frequencies and radar applications, minimum detectable signal, receiver noise, transmitter power, pulse repetition frequency, pulse duration, system losses, and propagation effects, A scope display.

5. CW, MTI, Pulse and Tracking Radars (7 Hrs)

CW radars, FMCW radar, MFCW radar, MTI radar, Pulse Doppler radar - principles, operation, performance, limitations and applications.

6. Navigational & Remote Sensing Radars (7 Hrs)

Airport radars, meterological radars, airborne radars, Doppler navigation, remote sensing radars, pattern synthesis, phased array

7. Landing Systems & Hyperbolic Navigation (7 Hrs)

Instrument landing systems, ground controlled approach, radio altimeter, microwave landing system, loran - A, measurement delay, loran-C, DECCA.

TEXT AND REFERENCE BOOKS.

1. Antennas-John D.Kraus
2. Electromagnetics-Jordon Balmain
3. Introduction to Radar System - M. I. Skoh1ik ,Mc-Graw Hill publication

4. Radar Systems and Radio Aids to Navigation - A. K. Sen & A. B. Bhattacharya Khanna publication.
5. Robert Gagliardi, Communication satellites, CBS Publisher &amp
6. Timothy Pratt, Charles Bostian and Jeremy Allnutt, **" SatelliteCommunications",** Wiley publications, IInd Edition, 2003.
7. Dennis Roddy, **"Satellite Communications"**, McGraw Hill, IInd Edition, 1996

SEMINAR AND PROJECT-II

Teaching Scheme	**Examination Scheme**
Practical: 8 hour/week	EOE: 100 marks

The Project group in semester-I will continue. The project work in Semester- II and complete project in all respect (assembly, testing, fabrication, tabulation, test result etc.) The project work along with project report should be submitted as part of term work in Semester- II on or before the last day of the semester -II.

ELECTIVE II
FUZZY LOGIC AND APPLICATION

Teaching Scheme	**Examination Scheme**
Lectures: 3 hours/week	Theory: (CIE+SEE) = (50+50) =100Marks
Tutorial: 1 hour/week	IOE: 25 marks

UNIT 1: Introduction to Fuzzy Logic **(2 Hrs)**
Origin of Fuzzy Set Theory, Historical developments Fuzzy Logic, Benefits, Limitations of Fuzzy Logic, Application potentials and application domains of Fuzzy Logic

UNIT 2: Fuzzy Set Theory **(6 Hrs)**
Fuzzy Set: discrete and continuous domains, Crisp Set versus Fuzzy Set, Concept of membership function and its features, Types of Fuzzy Sets, Characteristic properties of Fuzzy Set, Methods of assigning membership grade values, Hedges, Labels, Fundamental operations (Union, Intersection, Complement, Containment)

UNIT 3: Fuzzy Relation and Implications **(10 Hrs)**
Classical (Crisp) and Fuzzy Relations, Fundamental operations (Union, Intersection, Complement, Containment), Properties of Fuzzy Relation, Fuzzy Proposition, Formation of Fuzzy Rules, Compound rules, Aggregation of Fuzzy rules, Fuzzy (Approximate) Reasoning, Types of Fuzzy Reasoning, Mamadani and TSK methods of Fuzzy Reasoning, Fuzzy Inference System (FIS), Types of FIS: Mamadani and Sugeno type, Comparison, Fuzzy Implication: Generalized Modus Ponens and Tolens, Types of Implications, Conversion of Fuzzy Rules into Fuzzy Relation by Zadeh and Mamadani type implications, Compositional Rule of inference.

UNIT 4: FKBC Design Parameters **(8 Hrs)**
The FKBC architecture, choice of variables & content of rules, Derivation of rules, choice of membership functions, choice of scaling factors, choice of fuzzification procedure, choice of defuzzification procedure, comparison and evaluation of defuzzification methods.

UNIT 5: Nonlinear Fuzzy Control **(4 Hrs)**
The Control Problem, The FKBC as a Non-Linear Transfer Element, Types of FKBC such as PID-like FKBC, Sliding Mode FKBC, Sugeno FKBC.

UNIT 6: Adaptive Fuzzy Control **(6 Hrs)**
Design & Performance Evaluation, Approaches to Design such as membership function tuning using gradient descent, membership function tuning using performance criteria, the self-organizing controller, model based controller.

Text books:

1. Fuzzy logic with engineering applications By T J Ross, Wiley publications
2. An introduction to fuzzy control. By D Driankov, H Hellendoorn, M Reinfrank

Reference books:

1. Introduction to fuzzy sets, fuzzy logic and fuzzy control system By Guanron Chan, Trung Pham
2. Fuzzy sets and fuzzy logic: Theory and application By Klin and Yaun

ELECTIVE II

HIGH SPEED DIGITAL DESIGN

Teaching Scheme	**Examination Scheme**
Lectures: 3 hours/week	Theory: (CIE+SEE) = (50+50) =100Marks
Tutorial: 1 hour/week	IOE: 25 marks

Unit 1 Introduction to High Speed Digital Design **(7 Hrs)**

Frequency, time and distance, Capacitance and Inductance Effects, High speed properties of logical gates, Speed and power modeling of wires, Geometry and Electrical properties of wires, Electrical model of wires, transmission lines, lossless LC transmission lines, lossy RLC transmission lines – Special transmission lines

Unit 2 Power Distribution and Noise: **(8 Hrs)**

Power supply network Local power regulation IR drops Area bonding On chip bypass capacitors Symbiotic bypass capacitors Power supply isolation –Noise sources in digital system Power supply Noise – Cross talk Inter symbol interference.

Unit 3 Signaling convention and Circuits: **(8 Hrs)**

Signaling modes for transmission lines signaling over lumped transmission media Signaling over RC interconnects driving lossy LC lines simultaneous bidirectional Signaling terminators transmitter and receiver circuits.

Unit 4 Timing Convention and Synchronization: **(8 Hrs)**

Timing fundamentals Timing properties of clocked storage elements signals and events open loop Timing , level sensitive clocking pipeline Timing closed loop Timing –clock Distribution Synchronization failure and meta stability PLL and DLL based lock aligners.

Unit 5 Ultra fast VLSI Circuits and Systems: **(5 Hrs)**

GaAs crystal structure, Technology development, Device modeling and performance estimation, Thermal design, Electromagnetic compatibility.

TEXT BOOKS

1. “Digital System Engineering”, William S.Dally & John W. Paulton, Cambridge University Press,1998.

2. “High Speed Digital Circuits”, Masakazu Shoji.,Addison Wesley Publishing Company,

1996

REFERENCES

1. “Digital Integrated Circuits: A design Perspective”, Jan M.Rabaey et al;2nd Edition 2. “Basic VLSI Design”, Douglas A.Pucknell & Kamran Eshraghian, Prentice Hall,1994.

3. “Design for Test for Digital ICs & Embedded core Systems”, Alfred L Crouch; Prentice Hall.

4. “High Speed Digital DesignA Hand book of Black Magic”, Howard Johnson & Martin Graham, Prentice Hall PTR,1993.

DIGITAL IMAGE PROCESSING

Teaching Scheme	**Examination Scheme**
Lectures: 3 hours/week	Theory: (CIE+SEE) = (50+50) =100Marks
Tutorial: 1 hour/week	IOE: 25 marks

UNIT - I DIGITAL IMAGE FUNDAMENTALS (8 Hrs)

Introduction, Image perception , light , luminance , brightness and contrast , Fundamental steps in digital image processing, pixels, image processing components , visibility function , monochrome vision models ,color representation ,color matching and reproduction ,color vision model Image sampling and quantization ,Two dimensional sampling theory ,reconstruction of images from its samples , Multi rate aliasing ,sampling theorem. Practical limits in sampling reconstruction. Image quantization, visual quantization, image sensing and acquisition, Image sampling and quantization.

UNIT - 2 IMAGE TRANSFORMS (5 Hrs)

Image transforms, two dimensional orthogonal and unitary transforms, properties of unitary transforms, one dimensional DFT, cosine, sine, Hadamad and Haar transforms.

UNIT – 3 IMAGE ENHANCEMENT AND RESTORATION (7 Hrs)

Image enhancement, Point operations ,contrast stretching , clipping and thresholding , digital negative intensity level slicing , bit extraction. Histogram modeling ,histogram equalisation ,modification. Spatial operations ,sharpening and smoothing techniques. Magnification and interpolation. Transform operations. Color image enhancement. Image Restoration , degradation model, Unconstrained and Constrained restoration, Inverse filtering - removal of blur caused by uniform linear motion, Wiener filtering.

UNIT - 4 IMAGE COMPRESSION (6 Hrs)

Image Compression, Fundamentals, Image compression models, Elements of Information Theory, Error free Compression, Lossy Compression, DCT and Wavelet based compression, Image compression standards , JPEG 2000, MPEG 4.

UNIT- 5 MORPHOLOGICAL IMAGE PROCESSING (6 Hrs)

Dilation and erosion**,** opening and closing, hit or miss transformation, morphological algorithms, extensions to grey scale images.

UNIT 6 IMAGE SEGMENTATION (4 Hrs)

Discontinuities detection, edge linking and boundary detection, thresholding, region based segmentation, segmentation by morphological watersheds, use of motion in segmentation.

TEXT BOOKS

1. Gonzalez, Rafel C. and Woods, Richard E., "Digital Image Processing", Second Edition, Prentice Hall, 2006.
2. Jain, Anil K., "Fundamentals of Digital Image Processing", Prentice Hall of India, New Delhi.

REFERENCE BOOKS

1. Rosenfield, Azriel and Kak, Avinash C., "Digital Picture Processing", Academic Press Inc, New York, 1982.
2. Salomon, David., "Data Compression: The Complete Reference", Second Edition, Springer Verlag, New York, 2001.
3. Pratt, William K., "Digital Image Processing", John Wiley & Sons, New York, 2003.

ELECTIVE II

BIOMEDICAL INSTRUMENTATION & TECHNOLOGY

Teaching Scheme	**Examination Scheme**
Lectures: 3 hours/week	Theory: (CIE+SEE) = (50+50) =100Marks
Tutorial: 1 hour/week	IOE: 25 marks

1. **Bioelectronics signal:** **(6 Hrs)**

Origins of Bioelectric signals, Electrocardiogram (ECG), Electromyogram (EMG). Recording Electrodes: Silver-silver Electrodes, Electrodes for ECG, EEG and EMG. Physiological Transducers: Pressure Transducers, Temperature sensors, Pulse sensors.

2. **Recording and monitoring instruments**: **(6 hrs)**

Biomedical Recorders: Block diagrams of electrocardiogram phonocardiograph, Electroencephalograph, Electromyography. Monitoring system, block diagram of patient monitor, measurement of heart rate, blood pressure measurement, and temperature measurement respiration rate. Basic Arrhythmia Monitoring system: Block diagram, Foetal Monitoring System: Methods of monitoring Foetal Heart Rate, Abdomen Foetal Electrocardiogram and Foetal Phonocardiogram. Biomedical Telemetry: Introduction, block diagram and description of single channel/multi channel telemetry systems.

3. Audio meters: **(4 hrs)**

Mechanism of hearting, measurement of sound, basic audiometer,pure tone audiometer, sped audiometer.

4. Image systems: **(6 hrs)**

Introduction, Basic principle and block diagram of x-ray machine,x-ray computed topography (C.T. Scanner) and Nuclear Magnetic resonance (NMR) Topography, Ultrasonic Imaging System: Introduction, medical ultrasound, block diagram of pulse echo-system, A-Scan, M-mode, B-scanner and real time ultrasound imaging systems.

5. Biomedical equipments: **(6 hrs)**

Therapeutic: Type of cardiac Pacemakers. Cardiac Defibrillator,Kidney Machine. Physiotheraphy: Short-wave Diathermy, Microwave Diathermy, Ultrasound Therapy unit.

6 X- ray machine **(6 hrs)**

Basic X-Ray components and circuits, types of X-ray machines e.g. general purpose, dental image intensifier system, table shooting and maintenance of X- Ray machine

7. Patient safety: **(2 Hrs)**

Electric shock hazard, leakage currents, Test Instruments for checking safety parameters of Biomedical Equipments.

TEXT AND REFERENCE BOOKS:

1. Handbook of Biomedical Instrumentation by R.S.Khandpur.
2. Biomedical Instruments: Theory and Design by Walter Welko- Witiz and Sid Doutsch
3. John. G. Webster,**" Medical Instrumentation"** John Wiley publication.
4. Goddes & Baker,**" Principles of Applied Biomedical Instrumentation"** John Wiley publication.
5. Carr & Brown," **Biomedical Instrumentation & Measurement"** Pearson Education
6. Cromwell, " **Biomedical Instrument"** Prentice Hall of India, New Delhi
7. R.S. Khandpur, " **Hand book of Medical instruments**" TMH, New Delhi
8. Sanjay Guha ,**"Medical Electronics and Instrumentation"** University press Publication
9. Edwand J. Bukstein," **Introduction to Biomedical electronics"**sane and Co. Inc.USA