Scheme and Syllabus
w.e.f 2015-16 Session
ELECTRONICS & COMMUNICATION ENGINEERING
Third Year (5th and 6th Semester)
# SCHEME OF STUDIES & EXAMINATION
## B.TECH (Semester V)
### Electronics & Communication Engineering

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* List of Electives
  (i) Information Theory and Coding (EC-35E1)
  (ii) Bio- Medical Engineering (EC-35E2)
B.TECH V SEMESTER
CONTROL SYSTEM ENGINEERING
(EC-351)

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Time: 3 hrs
Marks: 100

NOTE: There shall be nine questions in total. The question No.1 is compulsory and will have four parts a, b, c, d covering entire syllabus. There shall be two questions from each unit and students have to attempt one question from each unit. All questions will carry equal marks. Question paper should have 25% numerical part.

UNIT-I

Introduction: The control systems: Open loop & Closed loop with examples & their comparison, Servomechanism, Stepper motor.

Mathematical Models of Physical Systems: Differential equations of physical systems (Electrical and Mechanical), Transfer function, Block diagram algebra, Signal flow-graphs, Mason’s formula & its applications.

Feedback Characteristics of control Systems: Feedback and non-feedback systems, Effects of feedback on sensitivity (to parameter variations), Stability, Overall gain etc.

UNIT-II


UNIT-III


UNIT-IV


State Variable Analysis: Concept of state, State variable, State model, Advantage of state space techniques, State space representation of electrical network, nth order differential equation and transfer function, State models for linear continuous time systems, Diagonalization solution of state equations, Transfer matrix, Computation of state transition matrix, Concept of controllability and observability.

Text Book:

Reference Books:
1. Automatic Control Systems - B.C.Kuo, PHI.
2. Modern Control Engg - K.Ogata; PHI.
3. Linear Control System - B.S. Manke, Dhanpat Rai.

B.TECH V SEMESTER

HARDWARE DESCRIPTION LANGUAGES
(EC-352)

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On Semester Evaluation: 100 Marks
End Semester Evaluation: 100 Marks

Time: 3 hrs

Marks: 100

NOTE: There shall be nine questions in total. The question No.1 is compulsory and will have four parts a, b, c, d covering entire syllabus. There shall be two questions from each unit and students have to attempt one question from each unit. All questions will carry equal marks. Question paper should have 25% numerical part.

UNIT - I

Introduction to VHDL: Introduction, Hardware abstraction, Basic language elements-Identifiers, Data objects, Data types, Operators.

Behavioral Modeling-Variable and signal assignment statements, Wait, If, Case, Null, Loop, Exit, Next, Assertion & Report statements.

UNIT – II

Dataflow & Structural Modeling:-Concurrent vs. sequential statements, Conditional and selected signal assignment statements, Block statements, Component declaration and instantiation using structural modeling

Supporting Constructs: Generics, Configurations, Functions & Procedures, Subprogram and Operator overloading.

Advanced Features: Generation of statements.

UNIT-III

Introduction To VERILOG: Basic concepts, Lexical conventions, Data types, System tasks and compiler directives, Modules and ports, Gate level modeling- Gate types, Various types of gate delay specifications.

Data flow modeling: Assignments, Delays, Expressions, Operators.

Behavioral modeling: Structured procedures, Procedural assignments, Timing controls, Conditional statements, Loops, Sequential and parallel blocks, Generation of Blocks, Tasks and Functions.

UNIT-IV


VHDL Programs: 4 bit up counter, 4 bit down counter, Shift registers.

Verilog programs: 4 bit ripple carry adder, multiplexer and demultiplexer.

Text Books:

Reference Books:
B.TECH V SEMESTER
ANTENNA AND WAVE PROPAGATION
(EC-353)

On Semester Evaluation: 100 Marks
End Semester Evaluation: 100 Marks

Time: 3 hrs

NOTE: There shall be nine questions in total. The question No.1 is compulsory and will have four parts a, b ,c ,d covering entire syllabus. There shall be two questions from each unit and students have to attempt one question from each unit. All questions will carry equal marks. Question paper should have 25 % numerical part.

UNIT – I
Basic Principles and Definitions: Retarded vector and scalar potentials, Radiation from a small current element, Induction and Radiation fields, Radiation from a half wave dipole, Linear and Sinusoidal current distribution, Antenna parameters: Radiation pattern, Radiation resistance, Beam width, Gain, Directive gain, Power gain, Antenna efficiency, Directivity, Effective aperture, Effective length, Bandwidth and Antenna Temperature.

UNIT – II
Radiating Wire Structures and Antenna Types: Folded dipole, Yagi-Uda antenna, Biconical Antenna, Helical Antenna, Horn antenna, Slot antenna, Notch antenna, Patch antenna, Turnstile antenna, Discone antenna.
Aperture Type Antennas: Radiations from rectangular aperture, Lens Antenna, Parabolic reflector antennas

UNIT – III
Antenna Array: Principle of pattern multiplication, Broadside arrays, Endfire arrays, Array pattern synthesis, Uniform Array, Binomial Array, Chebyshev Array
Broadband and Frequency Independent Antenna: Broadband antennas, The frequency independent concept: Rumsey’s principle, Frequency independent planar log spiral antenna, Frequency independent conical spiral antenna and Log periodic antenna.

UNIT – IV
Propagation of Radio Waves: Fundamental equation for free space propagation, Different modes of propagation: Ground waves, Sky waves, Space waves, Structure of atmosphere, Wave propagation in the ionosphere, critical frequency, Maximum Usable Frequency (MUF), Lowest Usable Frequency (LUF), Optimum Working Frequency (OWF), Skip distance, Virtual height, Space waves: Range, Effective Earth’s radius, Field Strength, Ionospheric Abnormalities, Duct Propagation

Text Books:

Reference Books:
B.TECH V SEMESTER
MICROPROCESSORS & INTERFACING
(EC-354)

L   T   Cr
3   1   4

On Semester Evaluation: 100 Marks
End Semester Evaluation: 100 Marks

Marks: 100

Time: 3 hrs

NOTE: There shall be nine questions. Question No. 1 is compulsory and will have four parts a, b, c, d covering entire syllabus. There shall be two questions from each unit and students have to attempt one question from each unit. All questions will carry equal marks. Question paper should have 25 % numerical part.

UNIT-I

Introduction: Evolution of microprocessors, CISC Versus RISC, Applications of microprocessors.

8085 CPU Architecture: 8085 programming model, 8085 hardware model, Microprocessor operation, 8085 architecture, 8086 pin diagram description, Bus timings: Opcode fetch, Memory read, Memory write.

8085 Instruction Set: Instruction formats, Addressing modes, Data Transfer instructions: 8 bit, 16 bit; Arithmetic instructions: 8bit, 16 bit; Logic & bit manipulation instructions, Branch instructions, Machine control instructions, Stack, Subroutine, Programming examples.

8086 CPU Architecture: 8085 versus 8086, 8086 block diagram: BIU and EU, Physical address computations, PSW with examples.

UNIT-II

8086 Pin Diagram : Description of pin diagram, Generating 8086 CLK and Reset signals using 8284, 8086 minimum mode and maximum mode CPU module.

8086 Instruction Set: Addressing modes, Data transfer instructions, String instructions, Logical instructions, Transfer of control instructions, Process control instructions, Assembler directives.

8086 Programming Techniques: Writing assembly language programs, Timing delays, Loops, Data conversions, Procedures, Modular programming, Macros.

UNIT-III

Interfacing Device: 8255 PPI Chip: Architecture, Pin diagram, Control words, Modes.


Interrupt Controller: 8259: Architecture, Pin diagram, Working, ICWs, OCWs.

UNIT-IV

Main Memory System Design of 8085 & 8086: Memory devices, 8086 CPU Read/Write timing diagrams in minimum mode and maximum mode, Address decoding techniques, Interfacing SRAMS, ROMS/PROMS, Interfacing and refreshing DRAMs.

Basic I/O Interface: Memory mapped I/O vs Isolated I/O, Interfacing 8259, ADCs, DACs, Keyboards, Multiplexed displays with 8085 & 8086 microprocessors.

Reference Books:

1. D.V.Hall: Microprocessors and Interfacing , McGraw Hill (2nd Ed.)
2. J. Uffenbeck: The 8086/8088 family, PHI.
UNIT – I

Sampling Theory & Pulse Modulation: Sampling process, PAM and TDM, Aperture effect. PPM noise in PPM, Channel bandwidth, Recovery of PAM and PPM signals, Quantization process, Quantization noise, PCM, μ-Law and A-law compressors, Encoding, Noise in PCM, DM, and Delta Sigma modulator, DPCM, ADM.

UNIT – II

Digital Baseband Pulse Transmission: Matched filter and its properties, Error rate due to noise in PCM receivers, Demodulators & detectors for optimum receiver with AWGN channel, Intersymbol interference, Nyquist criterion for distortionless base band binary transmission, Ideal Nyquist channel raised cosine spectrum, Adaptive equalization, LMS algorithm.

UNIT – III


UNIT – IV

Spread Spectrum Modulation: Pseudonoise sequence, A notion of spread spectrum, Direct sequence spread spectrum with coherent BPSK, Signal space dimensionality & processing gain, Probability of error, Jamming margin, Frequency hopping spread spectrum, CDMA.

Text Book:
1. Simon Haykin: Communication systems, John Wiley & Sons

Reference Books:
1. Taub & Schilling, Principles of Communication Systems, TMH
2. John G. Proakis, Digital Communication, PHI
B. TECH V SEMESTER
INFORMATION THEORY AND CODING
(EC-35E1)

L  T  Crt
3  1  4

On Semester Evaluation: 100 Marks
End Semester Evaluation: 100 Marks

Time: 3 hrs

Marks:100

NOTE: There shall be nine questions in total. The question No.1 is compulsory and will have four parts a, b ,c ,d covering entire syllabus. There shall be two questions from each unit and students have to attempt one question from each unit. All questions will carry equal marks. Question paper should have 25 % numerical part.

UNIT-I
Basic Concepts of Information Theory: A measure of Uncertainty, Binary Sources, Measure of Information for two-dimensional discrete finite probability Scheme, Noise characteristics of channel, Basic relationship among different entropies, Measure of mutual information, channel capacity. Capacity of channel with symmetric noise structure BSC and BEC

UNIT-II
Elements of Encoding: Purpose of encoding separable binary codes, Shannon Fano encoding, Noiseless Coding Theorem, Average length of encoding message, Shannon's 'Binary encoding, Fundamental Theorem of discrete Noiseless coding, Huffman's Minimum Redundancy codes.

UNIT-III
Introduction to Algebra: Groups, Fields Binary field Arithmetic, Construction of Galois field GF (2m)
Linear Block Codes: Introduction to Linear Block codes, Syndrome and Error detection, Minimum distance of block code, error detecting and Error correcting capabilities a block code.
Cyclic Codes: Description of Cyclic codes, Generator and parity check matrices of cyclic codes, encoding of cyclic codes syndrome computation & error detection decoding of cyclic codes.

UNIT-IV
Convolutional Codes: Encoding of convolution codes, structural properties of Convolution codes, Distance Properties of convolutional codes, Maximum likelihood decoding of convolutional codes, Viterbi decoding.
Majority logic decodable codes, Burst error correction Techniques.
Automatic Repeat Request Strategies: Stop and wait, Go back and selective repeat ARQ strategies, Hybrid ARQ Schemes

Text Book:
B.TECH V SEMESTER
BIO- MEDICAL ENGINEERING
(EC-35E2)

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On Semester Evaluation: 100 Marks
End Semester Evaluation: 100 Marks

Time: 3 hrs

Marks: 100

Note: There will be nine questions in total. Question no. 1 is compulsory and will have four parts a, b, c, d covering the entire syllabus. There shall be two questions from each unit and students have to attempt one question from each unit. All questions will carry equal marks. Question paper should have 25% numerical part.

UNIT I
Introduction to medical instrumentation system – Evolution of medical instrument, components of a medical instrumentation system, Problems encountered in a measuring system, Biofeedback instrumentation, static & dynamic characteristics of medical instruments. Biosignal, characteristics, classification of errors, statistical analysis. Reliability, accuracy, fidelity, speed of response, linearization of technique, data acquisition system; Detection of physiological parameters using impedance techniques:

UNIT II

UNIT III
Electrocardiogram (ECG), Electroencephalogram (EEG), Electromyogram (EMG), Electrooculogram (EOG), Electoretinogram (ERG), Recording Electrodes – Electrode-tissue interface, polarization, skin contact impedance, motion artifacts, Silver-Silver Chloride electrodes, Electrodes for ECG, Electrodes for EEG, Electrodes of EMG, Electrical Conductivity of electrode jellies and creams, microelectrodes, Needle electrodes.

UNIT IV

Textbooks:

References:

B.TECH V SEMESTER
MICROPROCESSORS LAB
(EC-35P1)

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On Semester Examination : 120 Marks
End Semester Examination: 80 Marks

LIST OF EXPERIMENTS:

1. Familiarization with 8085 Trainer Kit.
2. Write a program using 8085 & verify for:
   a) Addition of two 8-bit numbers.
   b) Addition of two 8-bit numbers (with carry).
3. Write a program using 8085 & verify for:
   c) Subtraction of two 8-bit numbers (display borrow).
   d) Subtraction of two 16-bit numbers (display borrow).
4. Write a program using 8085 for multiplication of two 8-bit numbers.
5. Write a program using 8085 to arrange block of data in descending order.
6. Write a program using 8085 to generate fibonacci series.
7. Write a program using 8085 to find out the smallest number in a string.
8. a) Familiarization with 8086 Trainer Kit.
    b) Familiarization with Digital I/O, ADC and DAC Cards.
    c) Familiarization with Turbo Assembler and Debugger S/Ws.
9. Write a program using 8086 to arrange block of data in ascending order.
10. Write a program using 8086 to find out any power of a number such that \( Z=X^N \), where \( N \) is programmable and \( X \) is an unsigned number.
11. Write a program using 8086 to move a block of data from 0300H-031FH to 0310H-032FH
12. Write a program using 8086 to generate fibonacci series.
13. Write a program using 8086 to find out the largest number in a string.
14. Write a programmable delay routine to cause a minimum delay = 2ms and a maximum delay = 20 minutes in the increments of 2 MS
15. Write a program using 8086 to fill 50 decimal byte block of memory in extra Segment beginning at address 2000H with data byte 20H.
Note: At least 12 experiments are to be performed from above list.

B.TECH V SEMESTER
DIGITAL COMMUNICATION LAB
(EC-35P2)

P Cr On Semester Examination : 120 Marks
2  1 End Semester Examination:  80 Marks

LIST OF EXPERIMENTS:

1. To perform Amplitude Shift Keying
2. To perform Frequency Shift Keying
3. To perform Phase Shift Keying
4. To perform Sampling Theorem
5. To perform Pulse Code Modulation
6. To perform Delta Modulation
7. To perform Adaptive Delta Modulation.
8. To perform Time Division Multiplexing of signals.
9. To set up a Fiber Optic Analog Link
10. To set up a Fiber Optic Digital Link
11. To calculate the Losses in Optical Fiber
12. To measure the Numerical Aperture in Optical Fiber

NOTE: At least 10 experiments are to be performed from above list.
B.TECH V SEMESTER
HARDWARE DESCRIPTION LANGUAGES LAB
(EC-35P3)

P  Cr  On Semester Examination: 120 Marks
2  1  End Semester Examination:  80 Marks

LIST OF EXPERIMENTS:

1. Design all logic gates using VHDL.
2. Write the code for half adder and full adder using VHDL.
3. Write a program for half subtractor and full subtractor using VHDL.
4. Design an 8:1 multiplexer and 1:8 demultiplexer using VHDL.
5. Design an odd parity generator using VHDL.
6. Write a program for detecting a Fibonacci series using VHDL.
7. Design all logic gates using VERILOG.
8. Write the code for half adder and full adder using VERILOG.
9. Write a program for half subtractor and full subtractor using VERILOG.
10. Design an m:1 multiplexer and 1:m demultiplexer using VERILOG.
11. Design an odd parity generator using VERILOG.
12. Design T and D flip/flop using VERILOG and VHDL both.

NOTE: At least 10 experiments are to be performed from the above list.
## SCHEME OF STUDIES & EXAMINATION

**B.TECH (Semester VI)**

*Electronics & Communication Engineering*

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**TOTAL** | 16 | 8 | 8 | 32 | 29 |

**List of Electives***

(i) Satellite Communication (EC-36E1)
(ii) Multimedia Communication (EC-36E2)
(iii) Audio Video Engineering (EC-36E3)
(iv) IT Foundation Program – I (CSE-340)
B.TECH VI SEMESTER  
OPTICAL COMMUNICATIONS  
(EC-361)

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On Semester Evaluation: 100 Marks  
End Semester Evaluation: 100 Marks  
Time: 3 hrs  
Marks: 100

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UNIT-I

UNIT-II


UNIT-III


UNIT-IV
Passive Components: Optical couplers / splitters, Wavelength division multiplexers and demultiplexers, Optical switches, Optical filters, Isolators, Circulators, Attenuators,

Reference Books:
1) John M. Senior, “Optical Fiber Communications”, Pearson Education

B.TECH VI SEMESTER
DIGITAL SIGNAL PROCESSING
(EC-362)

L  T  Cr On Semester Evaluation: 100 Marks
3  2  5 End Semester Evaluation: 100 Marks
Time: 3 hrs Marks: 100

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UNIT – I

UNIT – II
LTI system as Frequency Selective Filters: Introduction, Minimum phase, Maximum phase & Mixed phase systems, Introduction to IIR & FIR Filters.


UNIT-III

UNIT-IV
Design of FIR Filters: Four types of FIR Filters, Design of FIR Filters using windows, Gibbs phenomenon, Kaiser window design method, Design of FIR Filter by frequency sampling method, Design of optimum equiripple linear phase FIR Filters, Comparison of design methods for FIR Filters.

Text Books:
2) Salivahan, “Digital Signal Processing”, TMH.
Reference Books:
1) Alon V. Oppenheim, “Digital Signal Processing”, PHI.
3) Rabiner and Gold, “Digital Signal Processing”, PHI.

B.TECH VI SEMESTER
MICROCONTROLLER
(EC-363)

L T Cr On Semester Evaluation: 100 Marks
3 1 4 End Semester Evaluation: 100 Marks
Time: 3 hrs Marks:100

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UNIT-I
The 8051 Microcontrollers: Microcontrollers and embedded processors; Comparing microcontrollers and microprocessors; Four-bit to thirty-two-bit microcontrollers; Overview of the 8051 family; Pin description of 8051.

UNIT-II
8051 Architecture: Inside the 8051; Program Counter & ROM space in 8051; Data types and Directives; Flag bits & the PSW register; Register banks & stacks; I/O port programming; 8051 Timer programming; 8051 serial port programming; Interrupts programming; Oscillator & clock circuit.

UNIT-III
8051 Instruction Set and Programming: Addressing modes; Arithmetic instructions & logical instructions; Jump, loop & call subroutines; Timing subroutines; Lookup tables.

UNIT-IV
8051 Applications: LCD & keyboard interfacing; ADC, DAC & sensor interfacing; Interfacing to external memory; Interfacing with the 8255; DS12887 RTC interfacing; Motor control: relay, PWM, DC & stepper motor.

Reference Books:
B.TECH VI SEMESTER
MICROWAVE & RADAR ENGINEERING
(EC-364)

L T Cr On Semester Evaluation:100 Marks
3 1 4 End Semester Evaluation: 100 Marks
Time: 3 hrs Marks:100

NOTE: There shall be nine questions in total. The question No.1 is compulsory and will have four parts a, b, c, d covering entire syllabus. There shall be two questions from each unit and students have to attempt one question from each unit. All questions will carry equal marks. Question paper should have 25 % numerical part.

UNIT – I
Introduction to Microwaves & Waveguides: History, Microwave region and band designation, Microwave Systems, Advantages and applications of Microwaves, Comparison of waveguides with transmission lines, Types of waveguides, Propagation of waves in rectangular waveguides, Modes in rectangular waveguides.
Microwave Components: Microwave junctions, S-matrix representation of two-port & multiport network, Losses in terms of S-parameters, Properties of S-matrix, Waveguide Tees: H-plane tee, E-plane tee, E-H plane tee or Magic tee, Rat Race circuits, Directional Couplers: Structure, Properties, Parameters of a two hole directional coupler, S-matrix of a directional coupler, Circulators & Isolators, Attenuators, Phase shifters.

UNIT – II
Microwave Tubes: Introduction, High frequency limitations of conventional vaccum tubes, Principle, Construction, Operation, Performance characteristics, Mathematical analysis and applications of: Klystron, Reflex Klystron, Helix Travelling wave tubes, Cylindrical Magnetron.
Cavity Resonators: Introduction, Expression for cut-off frequency in rectangular and circular resonators and Applications of cavity resonators.

UNIT-III
Microwave Measurements: Frequency Measurement, Power measurement, Attenuation measurement, VSWR measurement, and Impedance measurement.

UNIT-IV
**Radar Basics**: Basic RADAR, Simple form of RADAR equation, RADAR block diagram, RADAR frequencies, Applications of radar, Detection of signal in noise, Pulse repetition frequency & range ambiguities, Introduction to Doppler & MTI Radar.

**Tracking Radar**: Tracking with radar, Monopulse tracking radar, Conical and Sequential Lobing.

**Reference Books**:


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**B.TECH VI SEMESTER**  
**IT FOUNDATION PROGRAM-I**  
**CSE-340**

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**Time**: 3 hrs  
**Marks**: 100

**Note**:  
1. There are NINE questions in a set of question-paper. All questions carry equal marks.  
2. Attempt five questions in all. FIRST question is compulsory which covers the whole syllabus. Attempt ONE question from each of the other four Units.

**UNIT-I**  
**Introduction to Computer Systems**

- To explain various terminologies like hardware, software (application vs. system), firmware, program and data.
- CPU: functions such as fetch, decode and execute of an instruction.
- Classification of Memory: Internal, Primary and Secondary. Volatile/Non-Volatile
- Comparison of different types of memories them with respect to speed and volume.
- Different types of information kept in each of the above mentioned memories.
- To explain the usage of I/O devices and examples. Requirement of Bus: functionality and Types.
- Computer Configuration To explain various components of computer (like processing units, memory). Execution of Instructions
- To explain various phases involved in execution of an instruction
- Language translators To make the trainees to understand the need of a Compiler, Assembler and Interpreter

**UNIT-II**  
**Problem Solving Techniques**

- Introduce essential skills for a software engineer; focusing on problem solving and analytical skills. Logic To formulate analytical and logical thinking for solving computational problems
- Introduction to problem solving Analyze and classify different problems based on control flow
Introduction to algorithms: Define algorithm and its properties, Implementation of algorithms using flowchart, Introduce flow charting using RAPTOR tool for different computational problems which involves sequence, selection and iteration concepts

Searching and sorting algorithms, Introduce standard searching and sorting algorithms with flow chart e.g. linear search, binary search, bubble sort and selection sort

Introduction and classification to Data Structures, Introduce the concept of different data structures and their usage in different applications

Basic Data Structures: Introduce array, record, link list, stack and queue Advanced Data Structures, Introduce tree, graph and hashing

UNIT-III

Programming and Testing

- To introduce Programming Paradigms and Pseudo code, To introduce the participants to algorithmic thinking, Introduction to pseudo code, trace table and dry run, Programming Style
- Basic Programming concepts, Character data type Explain the basic data types, concept of variables, constants, ASCII character set and operators
- Recap of Control structures: Bring in concept of selection/condition by the usage of if and switch statements, Bring in concept of iteration by the usage of while, do while and for loops
- To introduce coding standards and best practices that are used in real life projects, To introduce industry coding standards
- Introduction and Demonstration of basic Data Structure, 1-D and 2-D array, Introduce the concept and demonstrate the storage of data items in a 1-D Array and 2-D Array
- Demonstration of stack using Arrays To enable participants to understand and String handling functions and use of pointers Explain string manipulation functions with demo programs Revision and Practice Session
- To introduce Code Optimization techniques Ability to write optimized code
- Recap of functions Introduce the concept of modularity, reusability of code using functions, problem solving using top down approach by division into sub-problems
- To introduce SDLC Unit testing Experience Project life cycle, To introduce Unit Testing and different

Books:
3. Dromey R.G., How to solve it by Computers, PHI, 1994
9. Henry F Korth, Abraham Silberschatz, Database System Concept, 2nd
B.TECH VI SEMESTER
SATELLITE COMMUNICATION
(EC-36E1)

L   T   Cr
3   1   4

On Semester Evaluation: 100 Marks
End Semester Evaluation: 100 Marks
Marks: 100

Time: 3 hrs

NOTE: There shall be nine questions in total. The question No.1 is compulsory and will have four parts a, b, c, d covering entire syllabus. There shall be two questions from each unit and students have to attempt one question from each unit. All questions will carry equal marks. Question paper should have 25% numerical part.

UNIT- I
Introduction: Satellite communication, Brief history, Kepler’s laws, Orbits of satellite: Low, Medium and Geo-synchronous main characteristics, Orbital elements, Look angles, Propagation delay, Earth coverage and slant range, Limits of visibility, Eclipse effects and Orbital perturbations.

UNIT – II
Space Link Design: Free space loss, General link design equation, System noise temperature, G/T Ratio & Complete link design.
Satellite Subsystems: Transponder, Earth stations, Attitude and Orbit Control System (AOCS), Propulsion sub-system & Telemetry, Tracking and Command (TTC) sub-system.

UNIT-III
Radio Wave Propagation: Frequency window, Atmospheric absorption, Rainfall attenuation, Ionosphere scintillation and Faraday rotation

UNIT-IV
Satellite Access: Multiple Access Techniques, Random Access Techniques, FDMA, SPADE system, TDMA system concept and configuration, System-timing frames format, CDMA basic principles, VSAT satellite systems and Global Positioning Satellite Systems
B.TECH VI SEMESTER
MULTIMEDIA COMMUNICATIONS
(EC-36E2)

L T Cr
3 1 4

On Semester Evaluation: 100 Marks
End Semester Evaluation: 100 Marks

Time: 3 hrs
Marks: 100

NOTE: There shall be nine questions in total. The question No.1 is compulsory and will have four parts a, b, c, d covering entire syllabus. There shall be two questions from each unit and students have to attempt one question from each unit. All questions will carry equal marks. Question paper should have 25% numerical part.

UNIT- I

UNIT – II
Text Compression: Static Huffman coding, Dynamic Huffman coding, Arithmetic coding, Lempel-ziv coding.

UNIT-III
Video Compression: Basic principles, Video compression standards H.261, H.263, MPEG (Basic introduction), MPEG 4.

UNIT-IV
Multimedia & Internet: Internet, DNS, HTTP, WWW, E-mail, Web Browsers, HTML, Web page development, Design considerations for Web pages, Bandwidth and application considerations, Accessing contents on Internet.
Text Book:

Reference Books:

B.TECH VI SEMESTER
AUDIO & VIDEO ENGINEERING
(EC-36E3)

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Time: 3 hrs

NOTE: There shall be nine questions in total. The question No.1 is compulsory and will have four parts a, b, c, d covering entire syllabus. There shall be two questions from each unit and students have to attempt one question from each unit. All questions will carry equal marks. Question paper should have 25% numerical part.

UNIT- I
Audio Engineering: Sound waves, Complex sounds, Audio frequency range, Loudness, Pitch, Decibels, Sound pick up devices (microphones): ‘Condenser, Carbon, Piezoelectric’ - Direction pattern, Parameters of microphones: Frequency range, Sensitivity, Impedance, Noise, Sound reproduction devices: ‘Horn, Cone’: Typical specifications, Acoustics of speech production and hearing, Recording of Sound: Magnetic recording systems, Optical storage systems-Coding and decoding applied to CD – CD-R.

UNIT – II
Video Engineering: Elements of Television System: Basic block diagram of monochrome TV transmitter and receiver, Gross structure, Flicker & Interlaced scanning, Number of scanning lines, Horizontal and Vertical resolution, Resolution and Bandwidth, Composite video signal: Vertical and Horizontal synchronization, Vestigial sideband transmission, Transmission of sound signal, Modulation: Positive and Negative Modulation and their comparison, Picture tubes, Television cameras, Working principle and operation of CCD cameras.

UNIT-III

UNIT-IV
Audio and Video coding: Introduction to audio coding, Audio compression, MPEG: Block diagram of audio encoder and decoder, Digital audio broadcasting & its block diagram, Video coding and compression, Need for compression, Video image representation, Quantization of image data, Intra frame
compression techniques: DPCM, DCT based transform coding, Motion Compensation, Video conference coding, Standard MPEG video compression, HDTV, DVB-T

**Reference Books:**
2. Fred Halsal, “Multimedia Communications”, Pearson Education.

**B.TECH VI SEMESTER**
**DIGITAL SIGNAL PROCESSING LAB**
**(EC-36P1)**

**P Cr**

2 1  

**on Semester Examination: 120 Marks**

**End Semester Examination: 80 Marks**

**LIST OF EXPERIMENTS:**

1. Write a program to plot the following functions:
   a) impulse function b) unit step c) unit ramp d) exponential e) sinusoidal
2. Write a program to plot real, imaginary, phase and magnitude of exponential function.
3. Write a program to find the linear convolution of two sequences using in-built convolution function.
4. Define a function to compute DTFT of a finite length signal. Plot the magnitude and phase plots using subplots. Use this function to obtain DTFT of a 21 point triangular pulse over the domain -10<n<10. Plot the results over -π<w<π.
5. Design an FIR filter using different window functions available in signal processing toolbox and their controlling parameters.
7. Design an analog Chebyshev Low Pass Filter and plot its Magnitude & frequency response.
10. To study the Digital Signal Processing toolbox.
NOTE: At least 9 experiments are to be performed from above list.

B.TECH VI SEMESTER
MICROWAVE LAB
(EC-36P2)

P  Cr   On Semester Examination : 120 Marks
2  1   End Semester Examination:  80 Marks

LIST OF EXPERIMENTS

1. To study the microwave components.
2. To determine the frequency and wavelength in a rectangular waveguide working in TE\textsubscript{10} mode.
3. To determine the standing wave ratio and reflection coefficient.
4. To study E-Tee and H-Tee.
5. To study the Magic tee.
6. To study the isolator and circulator.
7. To measure the coupling coefficient and directivity of a wave guide directional coupler.
8. To study fixed and variable attenuator.
9. To study the characteristics of the Reflex Klystron tube.
10. To determine electronic tuning range of Reflex Klystron tube.
11. To study the I-V characteristics of Gunn diode.

NOTE: At least 10 experiments are to be performed from above list.