TEACHING SCHEDULE & STUDY SCHEME

M. TECH. PROGRAMME

(Electronics & Communication Engineering)

PUNJAB TECHNICAL UNIVERSITY, JALANDHAR

August, 2004
DETAILED SYLLABUS AND OTHER CONDITIONS FOR THE PROPOSED COURSE
M.TECH. ELECTRONICS & COMMUNICATION ENGINEERING

### Schedule of Teaching

<table>
<thead>
<tr>
<th>Schedule of Teaching</th>
<th>Schedule of Examination</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lecture (per week)</td>
<td>Time (Hrs.)</td>
</tr>
<tr>
<td>Tutorials</td>
<td>Theory Marks</td>
</tr>
<tr>
<td></td>
<td>Sessional Viva Marks</td>
</tr>
<tr>
<td></td>
<td>Total Marks</td>
</tr>
<tr>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>0</td>
<td>100</td>
</tr>
<tr>
<td>4</td>
<td>50</td>
</tr>
<tr>
<td>All theory subjects</td>
<td>150</td>
</tr>
<tr>
<td>Project</td>
<td></td>
</tr>
<tr>
<td></td>
<td>50</td>
</tr>
<tr>
<td>Seminar</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>100</td>
</tr>
<tr>
<td>Dissertation</td>
<td>100</td>
</tr>
<tr>
<td>Satisfactory/not Satisfactory</td>
<td></td>
</tr>
</tbody>
</table>

### SEMESTER-I

- **EC-501** Advanced Mathematics for Engineers
- **EC-502** Electronics System Design
- **EC-503** Data Communication Network
- **EC-504** Advanced Comm. Systems
- **EC-505** Neural Network & Fuzzy Logic
- **EC-506** Lab-I

### SEMESTER-II

- **EC-507** Optical Communication Systems
- **EC-508** Digital Speech & Image Processing
- **EC-509** Information Theory and Coding
- **EC-** Elective-I
- **EC-** Elective-II
- **EC-516** Lab-II

### SEMESTER-III

- **EC-** Elective-III
- **EC-** Elective-IV
- **EC-580** Project
- **EC-590** Seminar

### SEMESTER-IV

- **EC-500** Dissertation

### LIST OF ELECTIVES

#### ELECTIVE-I

- **EC-510** Advanced Microprocessor & Embedded Systems
- **EC-511** VLSI Design
- **EC-512** Reliability of Electronics Comm. Systems

#### ELECTIVE-II

- **EC-513** Multimedia Comm. Systems
- **EC-514** Parallel Processing
- **EC-515** Peripheral System Design & Interfacing

#### ELECTIVE-III

- **EC-517** Modeling & Simulation of Comm. Systems
- **EC-518** Microwave Theory & Technique
- **EC-519** Detection & Estimation Theory
- **EC-520** Wireless & Mobile Communication

#### ELECTIVE-IV

- **EC-521** Microelectronics Technology
- **EC-522** Internetworking & Internet Protocols
- **EC-523** RF Microwave & Antenna Theory
- **EC-524** Computational Techniques
EC-501  Advanced Mathematics for Engineers

Max. Marks: 100
Time Allowed: 3 Hrs

Note: Eight questions of equal marks to be set covering the whole syllabus and any five to be attempted.

1. **Fourier Transforms**

2. **Z -Transforms**

3. **Matrices And Linear System Of Equations**
   Solution of linear simultaneous equations by Gaussian elimination and its modification, Crout’s triangularization method, Iterative methods-Jacobins method, Gauss-Seidal method, Determination of Eigen values by iteration.

4. **Conformal Mapping**
   Conformal mapping, linear transformations, Bi-linear transformations, Schwarz’s-Christoffel transformations.

5. **Calculus Of Variations**

**Books Recommended:**
1. Higher Engineering Mathematics - by Dr. B.S. Grewal; Khanna Publishers
2. Fourier Series and Boundary Values Problems - by Churchill; McGraw Hill.
3. Complex Variables & Applications - by Churchill; McGraw Hill.
4. Calculus of Variations - by Elsgole; Addison Wesley.
5. Calculus of Variations - by Galfand & Fomin; Prentice Hall.
EC-502       Electronics System Design

Max. Marks: 100
Time Allowed: 3 Hrs

Note: Eight questions of equal marks to be set covering the whole syllabus and any five to be attempted.

1. Review of Digital electronics concept

2. MSI and LSI Circuits And Their Applications

3. Sequential Machines

4. Multi Input System Controller Design

5. Asynchronous Finite State Machines
   Scope, Asynchronous Analysis, Design Of Asynchronous Machines, Cycle And Races, Plotting And Reading The Excitation Map, Hazards, Essential Hazards Map Entered Variable, MEV Approaches To Asynchronous Design, Hazards In Circuit Developed By MEV Method, Electromagnetic Interference And Electromagnetic Compatibility Grounding And Shielding of Digital Circuits. Interfacing digital system with different media like fiber cable, co-axial cable etc.

Books Recommended:
1. An Engineering Approach To Digital Design - by Fletcher PHI 1990
2. Designing With TTL Circuits - by Texas Instruments.
3. Related IEEE/IEE publications
EC-503 Data Communication Networks

Max. Marks: 100
Time Allowed: 3 Hrs

Note: Eight questions of equal marks to be set covering the whole syllabus and any five to be attempted.

1. Data Transmission
Overview of Data Communication and networking, Analog And Digital Data Transmission, Transmission Impairments, Various Transmission Media, Data Encoding.

2. Digital Data Communication Techniques
Asynchronous And Synchronous Transmission, Error Detection and correction techniques, Physical interfaces

3. Data Link Control
Link Configurations, Protocol principles (Error control, Flow control), Bit Oriented and character oriented protocol, Data link layer services, Link Control.

4. Multiplexing
F.D.M. Synchronous TDM, Statistical TDM

5. Switching and Computer Networks
Communication Networks, Circuit Switching, Message Switching, Packet Switching, X.25, Virtual circuits and Data gram’s, LAN/MAN Technologies, Medium Access control protocols (CSMA/CD, Token ring, FDDI, DQDB)

6. Computer Communication Architecture

7. ATM Networks
Concepts, history, Architecture, Convergence and challenges

8. Network Operating Systems
Overview of network operating systems (Windows NT/Unix/Linux), Mobile IP33N Operating System

9. Network security
Security issues, concept of firewalls, intrusion detection Systems

Books Recommended:
2. Computer Networking - by Andrew Tanenbaum.
3. Data communications and networking - by Forouzan
6. Data Networks - by Bertsekas prentice Hall
7. Related IEEE/IEE publications
EC-504  Advanced Communication Systems
Max. Marks: 100
Time Allowed: 3 Hrs

Note: Eight questions of equal marks to be set covering the whole syllabus and any five to be attempted.

1. Introduction
Introduction to communications systems, analog and digital communication systems, Applications of communication systems.

2. Digital Communication

3. Optical Networks

4. Satellite Communication

5. Mobile Communications
Mobile telephone service, Transmission protocols, Introduction to GSM, GPRS, CDMA, Switching techniques, Fading, Quality of service (QOS).

Books Recommended:
1. Advanced Communication Systems - by Wayne Tomasi; Pearson.
2. Digital Communication - by Proakis; PHI
3. Optical Networks - by Uyless Black; Pearson
4. Satellite Communication - by Timothy Pratt; Addison Wesley.
5. Related IEEE/IEE publications
EC-505 Neural Networks & Fuzzy Logics

Max. Marks: 100
Time Allowed: 3 Hrs

Note: Eight questions of equal marks to be set covering the whole syllabus and any five to be attempted.


2. Basic Hop field model, Basic learning laws, Unsupervised learning, Competitive learning, K-means clustering algorithm, Kohonen’s feature maps.


4. Applications of neural nets such as pattern recognition, Optimization, Associative memories, speech and decision-making. VLSI implementation of neural networks.


Books Recommended:
1. Neural Networks - by Simon Haykin
2. Fuzzy logic with engineering application - by ROSS J.T (Tata Mc)
3. Neural Networks & Fuzzy Logic - by Bart Kosko
5. Introduction to applied Fuzzy Electronics-Ahmad M.Ibrahim (PHI)
6. Introduction to artificial neural systems - by J.M. Zurada (Jaico Pub)
7. An introduction to Fuzzy control - by D. Driankor, H. Hellendorn, M. Reinfrank (Narosa Pub.)
8. Fuzzy Neural Control - by Junhong Nie & Derek Linkers (PHI)
9. Related IEEE/IEE publications
EC-506   Lab-I

Max. Marks: 100
Time Allowed: 2hrs

At least ten experiments are to be performed related to the subjects taught in 1st semester.
EC-507 Optical Communication Systems

Max. Marks: 100
Time Allowed: 3 Hrs

Note: Eight questions of equal marks to be set covering the whole syllabus and any five to be attempted.

1. Introduction to optical fibers
   Wave propagation Dispersion and its limitations, losses and non-linear effects

2. Optical transmitters
   LEDs Semiconductor lasers and their characteristics. Transmitter Design

3. Optical receiver
   Photo detectors and their characteristics. Receiver Design. Noise and Sensitivity in Optical Receivers Sensitivity degradation

4. Optical Amplifiers
   Semiconductor Optical Amplifier Raman Amplifier. EDFA

5. Dispersion management
   Need Pre-compensation Schemes Best Compensation Techniques. Dispersion Compensatory Fibers Optical Filters Fiber Bragg Grating

6. Multichannel Systems
   WDM Light wave Systems WDM Components System Performance tissues TDM. CDM

7. Solution Systems
   Fiber Solutions Soliton based Communications Loss Managed Solitons Dispersion - Managed Solitons High Speed Soliton Systems WDM Soliton Systems

Books Recommended:
1. Fiber-Optic Communication Systems - by GP Aggarwal - John Wiley & Sons
2. Fiber-Optic Communication Systems - by Mynbev - John Wiley & Sons
3. Related IEEE/IEE publications
EC-508  Digital Speech & Image Processing

Note: Eight questions of equal marks to be set covering the whole syllabus and any five to be attempted.


2. Speech Processing
Review of human speech and Acoustic theory, nature of sound, harmonics, resonance measurement, virtual display. Music theory, pitch, duration, intervals, rhythm. Human speech production, the vocal tract, the Larynx, the source filter. Speech signal processing-the phasor mode, Fourier transfer, DFT, FFT. The hardware use of FIR & IIR filters. Software, Elements of speech Synthesis-speech Recognition-speech in the computer-human interface.

3. Image Processing
Characterization of images as two-dimensional discrete fields, unitary transforms—DFT, Hadamard, slant and cosine transforms, compression schemes-Karhunen Loeve compression predictive coding schemes. Image enhancement-gray scale modification, edge enhancement, restoration-Wiener filtering, constrained deconvolution, recursive filtering. Segmentation, edge detection, thresholding, textural properties, geometry and shape description.

Books Recommended:
1. Digital Signal Processing - by Proakis & Manolakis
2. Speech and Audio Processing for multimedia PC’s - by Iain Murray
5. Related IEEE/IEE publications
EC-509  Information Theory & Coding

Max. Marks: 100
Time Allowed: 3 Hrs

*Note: Eight questions of equal marks to be set covering the whole syllabus and any five to be attempted.*

1. **Elements of information theory**
   Source coding theorem, Huffman coding, Channel coding theorem, channel capacity theorem, Shenonfano theorem, entropy

2. **Sampling Process**
   Base band and band pass sampling theorems reconstruction from samples, Practical aspects of sampling and signal recovery TDM

3. **Waveform Coding Techniques**
   PCM Channel noise and error probability DPCM and DM Coding speech at low bit rates Prediction and adaptive filters. Base band shaping for data transmission, PAM signals and their power spectra Nyquist criterion ISI and eye pattern Equalization.

4. **Digital Modulation Techniques**
   Binary and M-ary modulation techniques, Coherent and non-coherent detection, Bit Vs symbol error probability and bandwidth efficiency. Bit error analysis, using orthogonal Signaling

5. **Error Control Coding**
   Rationale for coding Linbear block codes, cyclic codes and convolution codes Viterbi decoding algorithm and trellis codes.

*Books Recommended:*
2. Introduction to the theory of Error correcting codes: Vera Press, 1992
4. Related IEEE/IEE publications
EC-510 Advanced Microprocessor & Embedded Systems

Max. Marks: 100
Time Allowed: 3 Hrs

Note: Eight questions of equal marks to be set covering the whole syllabus and any five to be attempted.

1. Microprocessor Architectural Concepts

2. Microprocessor Instructions And Communications
Instruction Set, Mnemonics, Basic Instruction Types, Addressing Modes, Interfacing I/O Microprocessor, Polling And Interrupts, Interrupts And DMA.

3. Microprocessor I/O

4. Embedded Controllers & Systems
Architecture of 80186 & 80188 CPU subsystems, Addressing Modes, Instruction set, Basic IO subsystems, Memory Subsystem, Example embedded controllers.

Books Recommended:
1. Intel Series Of Microprocessors: By Berry B. Bray, TMH.
2. 8086 microprocessor & Architecture by Liu, Gibson; PHI.
3. Embedded Microprocessor System Design by Kenneth L. Short, Pearson Education.
4. Embedded Controllers by Berry B. Bray Pearson Education.
5. Related IEEE/IEE publications
EC-511 VLSI Design

Max. Marks: 100
Time Allowed: 3 Hrs

Note: Eight questions of equal marks to be set covering the whole syllabus and any five to be attempted.

1. Overview
Overview of combinational and sequential circuits, timing analysis of combinational and sequential circuits, meta-stability, methods to eliminate meta-stability single synchronizer and double synchronizer, MTBF Clocking strategies.

2. Sequential Machine Design
State diagram, state minimization, state assignments, design of mealy and Moore machines, design of RAM, SDR, SRAM, DRAM, ROM. Charge Coupled Devices (CCD’s).

3. Programmable logic Devices
Basic concepts, programmable logic array (PLA), Programmable Array Logic (PAL), Structure of standard PLD’s Complex (PLD’s), Complex PLD’s (CPLD), Xilinx Xc-9500. Introduction to field programmable gate arrays-types of FPGA’s, Configurable logic Block (CLB) Input/Output Block (IOB). Introduction to Xilinx series. FPGA, XC4000 family, Implementation of Design in PLD’s.

4. VHDL
Need for HDL’s, Design flow, overview of VHDL, data types, Logic Operators, Data flow Modeling, Structural Modeling, Behavioral Modeling, Mixed Modeling, Modeling of combinational and sequential circuits.

5. Verilog
Verilog as HDL, HDL model abstraction-behavioral, RTL, structural, switch model, verification, Modeling of combinational logic, sequential logic, tasks and functions, Advanced Modeling concepts, User defined primitives.

Books Recommended:
5. Verilog HDL: Digital Design & Synthesis – by Samir Palnitker
6. Documents of Xilinx
7. Related IEEE/IEE publications
EC-512 Reliability of Electronics & Communication Systems

Max. Marks: 100
Time Allowed: 3 Hrs

Note: Eight questions of equal marks to be set covering the whole syllabus and any five to be attempted.

1. Concept of reliability
Failures of systems and its modes. Measure of Reliability, Reliability function, Hazard rate MTBF and their interrelations.

2. Reliability Data and Analysis
Data sources. Data collection, use of Reliability Data, Reliability Analysis, Performance Parameters, calculation of failure rate, Application of Weibull distribution.

3. System Reliability and Modeling
Series systems, Parallel system, series parallel systems. Time dependence, Reliability Determination, Stand by systems, r out of n, Configurations, Methods of tie set and cut sets of Or reliability evaluation, simulation and Reliability prediction. Monte Carlo method, concepts of network topology. Overall reliability evolution.

4. Maintainability and Availability

5. Life Testing of Equipments

6. Value Engineering
Techniques in value Engg; Structure of value Engg. Reliability Management.

Books Recommended:
3. Related IEEE/IEE publications
EC-513  Multimedia Communication Systems

Max. Marks: 100
Time Allowed: 3 Hrs

Note: Eight questions of equal marks to be set covering the whole syllabus and any five to be attempted.

1. Multimedia Communications
Introduction to various multimedia comm. Techniques, Applications, Networks, Protocols and Standards, bandwidth and compression issues.

2. Digital Communication basics
Source encoding, Channel encoding, Circuit switched Networks; Packet switched networks, ATM, Frame Relay.

3. Multimedia Information Representation
Different types of multimedia information, Information representation.

4. Compression Techniques
Encoding and decoding techniques, Text compression techniques, Image compression techniques, Audio and Video Compression, Standards for Multimedia Compression, Huffman, Run length, Variable length, Lossy/ Lossless compression.

5. Multimedia File Formats
Various files formats for multimedia and their applications, BMP, PNG, TIFF, JPEG, DFX, AVI, MPEG Audio/ Video Standards, Challenges for encryption and decryption.

6. World Wide Web

Books Recommended:
1. Multimedia Communications by Fred Halsall, Prentice Hall.
3. Internet Resources.
4. Related IEEE/IEE publications
EC-514 Parallel Processing

Max. Marks: 100
Time Allowed: 3 Hrs

Note: Eight questions of equal marks to be set covering the whole syllabus and any five to be attempted.

1. Theory Of Parallelism
Parallel computer models - the state of computing, Multiprocessors and Multicomputers and Multivectors and SIMD computers, PRAM and VLSI models, Architectural development tracks. Program and network properties Conditions of parallelism, Program partitioning and scheduling, Program flow mechanisms, System interconnect architectures. Principles of scalable performance - performance matrices and measures, parallel processing applications, speedup performance laws, scalability analysis and approaches.

2. Hardware Technologies
Processor and memory hierarchy advanced processor technology, superscalar and vector processors, memory hierarchy technology, virtual memory technology, bus cache and shared memory - backplane bus systems, cache memory organisations, shared memory organisations, sequential and weak consistency models.

3. Pipelining And Superscalar Technologies
Parallel and scalable architectures, Multiprocessor and Multicomputers, Multivector and SIMD computers, Scalable, Multithreaded and data flow architectures.

4. Software And Parallel Programming
Parallel models, Languages and compilers, Parallel program development and environments, UNIX, MACH and OSF/1 for parallel computers.

Books Recommended:
6. Related IEEE/IEE publications
EC-515 Peripheral System Design & Interfacing

Max. Marks: 100
Time Allowed: 3 Hrs

Note: Eight questions of equal marks to be set covering the whole syllabus and any five to be attempted.

1. Bus system
Bus systems in microcomputers ST 100 bus, Multi bus, EISA, PCI Bus, HP IB/GPIB Bus, Bus and their applications. I/O

2. Interface

3. Design criterion with PCs
Application of PC buses (ISA, EISA, PCI, VESA-VL) and associated signals, Handshakes, I/O and Interrupt map, Programming methodology for input/output application, GPIB signals and GPIB programming techniques operating system calls.

4. Peripherals
Peripherals like CRT controller, Communication controllers, DMA controller, Programmable keyboard/Display interfaces and Associated circuitries.

5. Controllers
PID controllers, Programmable logic controllers, PC based data acquisition system, Interfacing PC to various cards- Stepper motor milli volts, Milliamps.

6. Development tools
Microprocessor development system, cross compilers, Simulator In circuit emulators, Automated test equipments etc.

Books Recommended:
1. Intelligent Instrumentation by George C. Barney, PHI.
4. Interfacing A Laboratory Approach by Deonzo, PHI
5. Related IEEE/IEE publications
EC-516       Lab-II

At least ten experiments are to be performed related to the subjects taught in 2\textsuperscript{nd} semester.
EC-517  Modeling & Simulation of Communication Systems
Max. Marks: 100
Time Allowed: 3 Hrs

Note: Eight questions of equal marks to be set covering the whole syllabus and any five to be attempted.

1. Introduction
Concept of Simulation, System, Model, Types of Model, Univariate & Multivariate Models, Deterministic & Stochastic models, Continuous & Discrete Models, Analog & Digital Simulation, Real Time Simulation, Hybrid Simulation, Advantages & Limitations of Simulation, Steps in Simulation Study

2. Random Number
Psedue Random Numbers, Generation of random numbers, properties & testing of random numbers, generation of random variables using common distributions, Bounds and approximations of Random processes.

3. Review of signals and systems, Continuous & discrete LT systems. Simulation of random variables & random processors, Transformation functions, transformations of random processes, sampling & quantization for simulation

4. Modeling of communication system
Information sources encoding/decoding, base band modulation and mapping, RF and optical modulation demodulation, Filtering communication channels and models, Noise interference and error, Control coding, Synchronization, Spread spectrum techniques.

5. Simulation and modeling methodology
Simulation environment, Modeling consideration, Performance evaluation techniques, Error sources in simulation, design of simulation experiment – length of run, replication, elimination of initial bias, variance reduction techniques.

6. PSpice
Simulation of analog systems using PSpice

7. Case studies
Case study of 64-OAM equalized digital radio link in a fading environment and satellite system.

Books Recommended:
2. Modern Digital and Communication Systems by Lathi B.P.
3. System Simulation – by DS Hira
5. Related IEEE/IEE publications
EC-518    Microwave Theory and Techniques

Max. Marks: 100
Time Allowed: 3 Hrs

Note: Eight questions of equal marks to be set covering the whole syllabus and any five to be attempted.

1. Electromagnetic Waves

2. Transmission Lines


3. Elementary Theory of Wave guides

4. Microwave components

Books Recommended:
1. Field Theory of guided waves by R.E.Collin
2. Theory of Guided Electromagnetic waves by R.A. Waldron
3. Microwave Propagation & Techniques by D.C. Sarkar
4. Related IEEE/IEE publications
EC-519  Detection & Estimation Theory

Max. Marks: 100
Time Allowed: 3 Hrs

Note: Eight questions of equal marks to be set covering the whole syllabus and any five to be attempted.

1. Statical communication theory

2. Review of random processes

3. Optimum filtering
Matched filters for deterministic signals in white and coloured gaussian noise. Wiener filters for random signals in white and coloured gaussian noise. Discrete and continuous time filters.

4. Detection and estimation theory
Hypothesis testing- Bayes, Minimax and Neyman-Pearson criteria, Types of estimates and error bounds, General gaussian problem, Detection and estimation in coloured noise, Elements sequential and non-parametric detection. Wiener-Hopf and Kalman filtering. Applications to communication, radar and sonar systems

Books Recommended:
2. Introduction to Statistical Signal Processing with Application - by MD Srinath, PK. Rajasekran, R.Viswamathan (PHI)
3. Signal detection theory - by Hancock and Wintz.
4. Detection of signals and noise - by AD Whalen.
5. Related IEEE/IEE publications
EC-520 Wireless and Mobile Communication

Max. Marks: 100
Time Allowed: 3 Hrs

Note: Eight questions of equal marks to be set covering the whole syllabus and any five to be attempted.

1. Introduction
Technical Background, Transmission Fundamentals, Communication Networks, Protocols and TCP/IP Suite

2. Wireless Communication Technology
Antennas and Propagation Signal, Encoding Techniques, Spread Spectrum Coding and Error Control

3. Wireless Networking
Satellite Communications, Cellular Transmission Principles, Cordless Systems and Wireless Local Loop Mobile IP and Wireless access protocol

4. Wireless LANs

5. CDMA Standards
System Architecture for CDMA, Network and Data Link Layers of CDMA. Signaling Applications in CDMA System. Voice Applications in CDMA System.

6. RF Engineering and Facilities

Books Recommended:
1. Applications of CDMA in Wireless/Personal Communications - by V K Garg, K Smolik
2. Principles and Applications of GSM - by V K Garg Prentice Hall
3. Wireless Communication and Networks - by Stallings
4. Mobile Communication Schiller Prentice Hall
5. Mobile Communication - by Lee, Pearson
6. Related IEEE/IEE publications
EC-521  Microelectronics Technology

Note: Eight questions of equal marks to be set covering the whole syllabus and any five to be attempted.

1. Review of MOS technology
Basic MOS transistors, enhancement and depletion model transistors, N-MOS and C-MOS processor, thermal aspects of processing, and production of masks.

2. Electrical properties of MOS circuit
Parameters of MOS transistors, pass transistor, N-MOS inverter, pull-up to pull down ratio for an N-MOS inverter, C-MOS inverters, MOS transistor circuit model, latch up on C-MOS circuits.

3. Design processes
MOS layers, stick diagram, design rules, AWA OX C-MOS process description, double metal single poly silicon C-MOS process.

4. Basic circuit concepts
Sheets resistance, area capacitance delay unit, inverter delay, super buffers, propagation delays.

5. Subsystem design & layout
Architectural issues, switch logic, gate logic, examples of combinatorial logic, clocked sequential circuits, and other system consideration.

6. Scaling of MOS circuits
Scaling factor, limitations, scaling of wires and inter connections

Books Recommended:
3. Related IEEE/IEE publications
EC-522 Internetworking and Internet Protocols

Max. Marks: 100
Time Allowed: 3 Hrs

Note: Eight questions of equal marks to be set covering the whole syllabus and any five to be attempted.

1. Introduction and Overview
The need of Internet, TCP/IP Internet, Internet services, History & scope, Protocol standardization.

2. Review of Underlying Technologies
LAN, WAN, MAN, Ethernet Topology, Token Ring, ARPANET, PRO net technology, FDDI. Internetworking concepts and architectural model, application level Internet connection, Interconnection through IP gateway, users view.

3. Internet Addresses
Universal Identifiers, Three Primary Classes of IP Addresses, Structure of IP packets, network and broadcast addresses, class less addressing, supernet/ subnet addressing, Addressing Conventions, Mapping Internet Addresses to Physical Addresses (ARP/ RARP), Determining Internet Addresses at Startup (DHCP, Bootp).

4. Internetworking
Internet as a virtual network, Internetworking devices (routers, bridges, gateways), Protocol layering, routing algorithms, congestion control techniques, ICMP, IP fragmentation, difference between X.25 and Internet layering, Gateway to Gateway Protocol (GGP), OSPF, Exterior Gateway Protocol (EGP). Managing Internet.

5. Security Issues
Reliable Transactions and Security on Internet, Data encryption, IPsec, SSL, Concept of Firewalls, Intrusion Detection Systems, Denial of Service Attacks.

Books Recommended:
1. Internetworking with TCP/IP vol-1 by Comer, PHI.
2. TCP/IP Illustrated by Stevan; Pearson.
3. TCP/IP Suite by Forouzan; TMH.
4. Related IEEE/IEE publications
EC-523  RF Microwave and Antenna Theory

Max. Marks: 100
Time Allowed: 3 Hrs

Note: Eight questions of equal marks to be set covering the whole syllabus and any five to be attempted.

1. Introduction

2. RF and Microwave Circuit design
Low RF Circuit design considerations, high RF and microwave circuits, lumped and distributed circuit elements. S-parameters description of passive and active networks, Network concepts: obstacles in wave guides, waveguide function, excitations of wave guides and cavities.

3. RF Electronic concepts

4. Microwave Antenna Theory

Books Recommended:
1. Radio Frequency & Microwave Electronics-Mathew. M. Radmanesh (Pearson Education Asia)
2. Foundation of Microwave Engineering - by RE Collin
3. Antenna and Radio Wave Propagation – by RE Collin
4. Antennas: Theory and Practice – by R Chatterjee
5. Related IEEE/IEE publications
EC-524 Computational Techniques

Max. Marks: 100
Time Allowed: 3 Hrs

Note: Eight questions of equal marks to be set covering the whole syllabus and any five to be attempted.

1. Errors in Numerical Calculation
   Introduction, Numbers and their accuracy, errors, Absolute, Relative and percentage errors and their analysis, general error formula

2. Interpolation

   Numerical Differentiation, Numerical Integration, Trapezoidal rule, Simpson’s Rule, Gaussian quadrature,

3. Numerical Solution of Ordinary differential equations


   Finite element method, Weighted Residual Method, Variational Methods. Finite elements, Application to boundary value problems

Books Recommended:
2. Introduction methods of Numerical analysis S.S Sastry, Prentice Hall of India
3. Numerical Mathematical Analysis, J.B. Scarborough, Oxford
5. Introduction to Finite Element Method, By Desai & Abel, Van Nostrand
7. Numerical Methods By Dr. B.S. Grewal, Khanna Publisher