Syllabus of

BE (EC / E & TC/ IE /E & Comm.)

[ Effective from July-2009 ]
Dr. B.A.M.U. Aurangabad
Revised Structure of B.E. (Electronics/ Electronics & Telecommunication/ Industrial Electronics / Electronics and Communication)

Part-I

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Subject Code</th>
<th>Name of Subject</th>
<th>Teaching Scheme</th>
<th>Examination Scheme</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Th.</td>
<td>Pr.</td>
</tr>
<tr>
<td>01</td>
<td>EC4101</td>
<td>Computer Networks</td>
<td>04</td>
<td>02</td>
</tr>
<tr>
<td>02</td>
<td>EC4102</td>
<td>Embedded Systems</td>
<td>04</td>
<td>02</td>
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<tr>
<td>03</td>
<td>EC4103</td>
<td>Optical and Microwave Communications</td>
<td>04</td>
<td>02</td>
</tr>
<tr>
<td>04</td>
<td>EC4104</td>
<td>Voice Network(ECT)</td>
<td>04</td>
<td>02</td>
</tr>
<tr>
<td>05</td>
<td>EC4105</td>
<td>Advanced Digital Signal Processing (EC/IE)</td>
<td>04</td>
<td>02</td>
</tr>
<tr>
<td>06</td>
<td>EC4106</td>
<td>Telecommunication Networks and Management</td>
<td>04</td>
<td>02</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(Electronics &amp; Communication)</td>
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<tr>
<td>07</td>
<td>EC4107</td>
<td>Elective-I</td>
<td>04</td>
<td>02</td>
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<tr>
<td>08</td>
<td>EC4108</td>
<td>Project Part-I</td>
<td>--</td>
<td>02</td>
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<td><strong>Total</strong></td>
<td><strong>20</strong></td>
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Elective –I

<table>
<thead>
<tr>
<th>ECT</th>
<th>Subject Code</th>
<th>Name of Subject</th>
<th>EC/IE</th>
<th>Electronics &amp; Communication</th>
</tr>
</thead>
<tbody>
<tr>
<td>EC41071</td>
<td>Network Security</td>
<td>EC41074 Advanced Power Electronics System</td>
<td>EC41077 Voice Network</td>
<td></td>
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<tr>
<td>EC41072</td>
<td>Digital Image Processing</td>
<td>EC41075 Simulation and Analysis</td>
<td>EC41078 Information Security</td>
<td></td>
</tr>
<tr>
<td>EC41073</td>
<td>Artificial Neural Network &amp; Fuzzy Logic</td>
<td>EC41076 Audio Video Engineering</td>
<td>EC41072 Digital Image Processing</td>
<td></td>
</tr>
</tbody>
</table>

Prof. Prashant S. Kolhe  
Chairman,  
Electronics Board  
Dr. B.A.M.U.Aurangabad.
# Part-II

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Subject Code</th>
<th>Name of Subject</th>
<th>Teaching Scheme</th>
<th>Examination Scheme</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td>Th.</td>
<td>Pr.</td>
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<tr>
<td>01</td>
<td>EC4201</td>
<td>VLSI Design</td>
<td>04</td>
<td>02</td>
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<td>02</td>
<td>EC4202</td>
<td>Audio Video</td>
<td>04</td>
<td>02</td>
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<tr>
<td></td>
<td></td>
<td>Engineering (ECT)</td>
<td></td>
<td></td>
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<tr>
<td>03</td>
<td>EC4203</td>
<td>Digital Image</td>
<td>04</td>
<td>02</td>
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<td></td>
<td></td>
<td>Processing (EC/IE)</td>
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<tr>
<td>04</td>
<td>EC4204</td>
<td>Radar and Satellite</td>
<td>04</td>
<td>02</td>
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<tr>
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<td></td>
<td>Communications (ECT /Electronics &amp; Communication)</td>
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<td></td>
</tr>
<tr>
<td>05</td>
<td>EC4205</td>
<td>Robotics (EC/IE)</td>
<td>04</td>
<td>02</td>
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<tr>
<td>06</td>
<td>EC4206</td>
<td>Wireless</td>
<td>04</td>
<td>02</td>
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<tr>
<td></td>
<td></td>
<td>Communication and Networks (Electronics &amp; Communication)</td>
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<tr>
<td>07</td>
<td>EC4207</td>
<td>Elective-II</td>
<td>04</td>
<td>02</td>
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<tr>
<td>08</td>
<td>EC4208</td>
<td>Project Part-II</td>
<td>--</td>
<td>06</td>
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</tbody>
</table>

| Total   | 16   | 14  | 30  | 400 | 100 | 250 | 750 |

## Elective –II

**ECT**

- EC42071 Advanced Digital Signal Processing
- EC42072 Mobile Computing
- EC42073 Artificial Intelligence

**EC/IE**

- EC42074 Network Security
- EC42075 Systems Programming
- EC42072 Mobile Computing

**Electronics & Communication**

- EC42071 Advanced Digital Signal Processing
- EC42072 Mobile Computing
- EC42073 Artificial Intelligence

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**Prof. Prashant S. Kolhe**

Chairman, Electronics Board
Dr. B.A.M.U.Aurangabad.
EC4101 Computer Network

Teaching Scheme:

<table>
<thead>
<tr>
<th>Lectures:</th>
<th>4 Hrs. / Week</th>
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<tbody>
<tr>
<td>Practical:</td>
<td>2 Hrs. / Week</td>
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Exam Scheme:

<table>
<thead>
<tr>
<th>Paper:</th>
<th>100 Marks</th>
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<tbody>
<tr>
<td>Practical:</td>
<td>50 Marks</td>
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<tr>
<td>Term Work:</td>
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</table>

Topics and Contents

1. **Introduction to Computer Networks**
   - Objective components of Communication Networks, topologies, centralized and distributed networks, LAN, MAN, WAN, Broadcast vs Point to Point networks,
   - Overview of network model: ISO - OSI and TCP/IP. Network design issues, layered architecture, interfaces and services, service primitives and relationships of services to protocols.

2. **Physical Layer & Data Link Layer**

3. **Networks and Transport Layer**

4. **Application Layer**
   - Introduction to Cryptography, Secret key and public key algorithm, Security issues for Intranet and Internet, DNS (Domain name System), Electronic mail, World wide Web, Writing a web page in HTML.

5. **TCP/IP Protocol Suite**

6. **Digital Networks**
Text Books:

Reference Books:
1. D. Comer, “Computer Networks and Internet TCP/IP”.

Practical Examination:
The practical examination will be of three hours duration. It will consist of one experiment conducted during the course and an Oral examination based on the syllabus.

Term work:
Term work will consist of record of minimum 8 experiments out of the following list.

List of Experiments:
1. Study of TCP/IP & Internet
2. Study of LAN transmission medias, topologies, interconnection devices & LAN standards.
3. Study of LAN.
4. Write a program in C for PC to PC communication using RS232 port.
5. Study of errors & error correction Techniques.
6. Write a program for encryption & description using monoalphabetic substitution or polyalphabetic substitution.
7. Write a program to implement Huffman data compression algorithm to generate prefix codes & encoded text.
8. Study of web page design using HTML.
10. Study of FTP & SMTP.
11. Study of windows socket programming (UDP&TCP).
EC4102 Embedded Systems

Teaching Scheme :
Lectures: 4 Hrs. / Week
Practical: 2 Hrs. / Week

Exam Scheme :
Paper: 100 Marks
Practical: 50 Marks
Term Work: --

Topics and Contents

1 Embedded system Introduction:
Introduction to Embedded System, History, Design challenges, optimizing design metrics, time to market, applications of embedded systems and recent trends in embedded systems, embedded design concepts and definitions, memory management, hardware and software design and testing, communication protocols like SPI, I2C, CAN etc

2 System Architecture:
Introduction to ARM core architecture, ARM extension family, instruction set, thumb Instruction set, Pipeline, memory management, Bus architecture, study of on-chip peripherals like I / O ports, timers, interrupts, on-chip ADC, DAC, RTC modules, WDT, PLL, PWM, USB, I2C, SPI, CAN etc. Use 2148/2368/2378 as reference micro-controllers

3 Interfacing and Programming:
Basic embedded C programs for on-chip peripherals studied in system architecture. Need of interfacing, interfacing techniques, interfacing of different displays including Graphic LCD, interfacing of input devices including touch screen etc, embedded communication using SPI, I2C, GSM modem for AT command study etc.

4 Real Time Operating System Concept:
Architecture of kernel, task scheduler, ISR, Semaphores, mailbox, message queues, events, memory management, RTOS services in contrast with traditional OS. Introduction to Ucos II RTOS, study of kernel structure of Ucos II, synchronization in Ucos II, Inter-task communication in Ucos II, memory management in Ucos II, porting of RTOS.

Text/Reference Books:

1. Rajkamal - Embedded Systems, TMH.
2. David Simon - Embedded systems software primer, Pearson
5. DR.K.V.K.K. Prasad - Embedded / real time system, Dreamtech
6. Iyer, Gupta - Embedded real systems Programming, TMH
7. Steve Heath - Embedded System Design, Neuwans
8. ARM System Developers Guide – Andrew Sloss
Practical Examination:
The practical examination will be of three hours duration. It will consist of one experiment conducted during the course and an Oral examination based on the syllabus.

Term work:
Term work will consist of record of minimum 8 experiments based on the syllabus.
EC4103 Optical and Microwave Communication

**Teaching Scheme:**

<table>
<thead>
<tr>
<th>Lectures:</th>
<th>4 Hrs. / Week</th>
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<tbody>
<tr>
<td>Practical:</td>
<td>2 Hrs. / Week</td>
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</table>

**Exam Scheme:**

<table>
<thead>
<tr>
<th>Paper:</th>
<th>100 Marks</th>
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</thead>
<tbody>
<tr>
<td>Practical:</td>
<td>50 Marks</td>
</tr>
<tr>
<td>Term Work:</td>
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**Topics and Contents**

<table>
<thead>
<tr>
<th>1</th>
<th><strong>Introduction to OFC &amp; its components:</strong></th>
<th>08</th>
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<tbody>
<tr>
<td></td>
<td>Optical Fiber Communication system, Advantages over other communication systems. Ray theory, types of fibers, fiber materials, fiber fabrication (double crucible method) and their mechanical properties, Fiber cable, Basics of light sources (LED and LASER), light detectors (PIN and APD), Numericals based on above topics.</td>
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</tbody>
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<thead>
<tr>
<th>2</th>
<th><strong>Signal Degradation in Optical Fiber:</strong></th>
<th>06</th>
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<tbody>
<tr>
<td></td>
<td>Various degradation mechanisms: Attenuation, Dispersion-Intermodal and Intra modal, Pulse broadening in GI fibers, Mode coupling, Coupling losses, Fiber splicing, connectorization, coupling methods and their losses, Numericals based on above topics.</td>
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<tr>
<th>3</th>
<th><strong>FOC System:</strong></th>
<th>06</th>
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<tbody>
<tr>
<td></td>
<td>Analog: Overview of analog links, Digital: Point-to-point links, system consideration, Link power budget, Rise time budget, Wavelength Division Multiplexing, Optical networks: SONET/SDH, Photonic switching and sensor applications., OTDR (Principle, concept &amp; applications) Numericals based on above topics</td>
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<tr>
<th>4</th>
<th><strong>Microwave Wave-guides and Components:</strong></th>
<th>08</th>
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<tbody>
<tr>
<td></td>
<td>Rectangular wave-guide, Wave equation, Modes (TE and TM), Excitation of modes, Power transmission and losses, Microwave cavity resonator, Wave guide Tees (E, H, Magic), Circulators, Isolators, Bends, Twists, Matched termination, Attenuators, Phase shifters, Co-axial to wave guide transitions, microwave filters, concept of Scattering parameters, S-matrix of above components, Numericals based on above topics.</td>
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<tr>
<th>5</th>
<th><strong>Microwave Tubes:</strong></th>
<th>06</th>
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<tbody>
<tr>
<td></td>
<td>High frequency limitations of conventional vacuum tubes (triode, Tetrode, Pentode), Klystrons (multi cavity, reflex): velocity modulation, bunching process, applications, TWT: slow-wave structure, wave modes, gain, and applications, Magnetron oscillator, types, Numericals based on above topics.</td>
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<tr>
<th>6</th>
<th><strong>Solid-State Microwave Devices:</strong></th>
<th>06</th>
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<tbody>
<tr>
<td></td>
<td>Principle of operation, construction, characteristics, parameters with analysis of Microwave transistor, Varactor Diode, Tunnel, PIN Diode, Gunn Diode.</td>
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</table>

**Text Books:**

2. D. C. Aggarwal, “Fiber Optical Communication”.

Reference Books:

Practical Examination:
The practical examination will be of three hours duration. It will consist of one experiment conducted during the course and an Oral examination based on the syllabus.

Term work:
Term work will consist of record of minimum 8 experiments out of the following list.

List of Practicals
1. Study of transmission & reception of different types of signals (any two) through optical fiber.
4. Study of splicing & connectorization.
5. Application of optic fiber.
6. Study of microwave components.
7. To plot modes (characteristics) of reflex klystron.
8. Study of microwave Tee’s.
# EC4104 Voice Network (ECT)

<table>
<thead>
<tr>
<th><strong>Teaching Scheme</strong></th>
<th><strong>Exam Scheme</strong></th>
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<tbody>
<tr>
<td>Lectures: 4 Hrs. / Week</td>
<td>Paper: 100 Marks</td>
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<tr>
<td>Practical: 2 Hrs. / Week</td>
<td>Practical: --</td>
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<td></td>
<td>Term Work: 25 Marks</td>
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### Topics and Contents

<table>
<thead>
<tr>
<th><strong>Hours</strong></th>
<th><strong>Topics and Contents</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>06</td>
<td><strong>1 Introduction to Telephone Signaling &amp; Switching:</strong> Evolution of Telecommunication, Simple telephone communication, basics of switching Systems, electronic switching, digital switching system, circuit switching, message switching, packet switching, switch signaling - subscriber loop, Interoffice (Common Channel signaling, Signaling System No.7)</td>
</tr>
<tr>
<td>06</td>
<td><strong>2 Telecommunication Traffic Engineering:</strong> Introduction, service level, Traffic usage, traffic measurement units, traffic distribution, Grade of service, Blocking Probability: Erlang Distribution, Poisson's distribution, Numericals on above topics.</td>
</tr>
<tr>
<td>08</td>
<td><strong>3 Data and Voice Integration:</strong> Demand for Integration, Problems of Integration, ISDN, basic structure, and narrowband ISDN, ISDN interfaces- ISDN terminals, Non-ISDN terminals, ISDN Services, packet Switched data, voice over frame relay, Broadband ISDN, ATM and its interfaces, public ATM networks.</td>
</tr>
<tr>
<td>07</td>
<td><strong>4 Global System for Mobile Communication:</strong> Standards for wireless communication systems, Access technologies, Cellular Communication fundamentals, GSM architecture and interfaces, Radio link features in GSM system, GSM logical channels and frame structure, Speech coding in GSM, Data services in GSM, Value added services, Privacy and Security in GSM.</td>
</tr>
<tr>
<td>06</td>
<td><strong>5 Code Division Multiple Access:</strong> CDMA standards, IS-95 system architecture, Air Interface, Physical and logical channels of IS-95, CDMA call processing, CDMA 2000 system</td>
</tr>
<tr>
<td>07</td>
<td><strong>6 IP Telephony:</strong> Introduction to VoIP, low level protocols -RTP/RTCP/UDP, speech coding technologies PCM, ADPCM, LPC, speech codes (ITU series and wireless codes including fixed and variable rare, trans-coder technologies including; DTMF generation &amp; detection, Echo Cancellation, Voice activity detection and discontinuous transmission (VAD/DTX), Packet Loss Conceal meat (PLC) IP Telephony Protocols - H.323, Session Initiation Protocol (SIP)</td>
</tr>
</tbody>
</table>
Text Books:

Reference Books:

Term work:
Term work will consist of record of minimum 8 experiments / Assignments based on the syllabus.
# EC4105 Advanced Digital Signal Processing (EC/IE)

## Teaching Scheme:
- **Lectures:** 4 Hrs. / Week
- **Practical:** 2 Hrs. /Week

## Exam Scheme:
- **Paper:** 100 Marks
- **Practical:** 2 Hrs. /Week
- **Term Work:** 25 Marks

### Topics and Contents

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<th>No.</th>
<th>Topic</th>
<th>Hours</th>
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<tbody>
<tr>
<td>1</td>
<td><strong>Random Signals</strong></td>
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<tr>
<td></td>
<td>Characterization of random signals: review of deterministic signals, random signals, correlation function, power spectra, DT random signals, time averages for DT random process. filters in sampling rate alteration systems, digital filter banks and their analysis and applications, multi level filter banks, estimations of spectra from finite – duration observation of signals. sample rate conversion using poly-phase filter structures, Efficient D/A conversion in Hi-Fi systems.</td>
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<tr>
<td>2</td>
<td><strong>Adaptive filters</strong></td>
<td>08</td>
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<tr>
<td></td>
<td>Need of adaptive filters, adaptive filters as noise cancellation, configuration of adaptive filters, main components of adaptive filters, Adaptive Algorithms: LMS adaptive algorithms, recursive least square algorithms, Adaptive filtering of ocular artifacts from the human EEG, adaptive telephone echo cancellation.</td>
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</tr>
<tr>
<td>3</td>
<td><strong>Linear prediction and optimum linear filters</strong></td>
<td>06</td>
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<tr>
<td></td>
<td>Lattice structures, innovation representation of random process, rational power spectra, AR, MA &amp; ARMA, forward &amp; backward linear prediction, Wiener filter for filtering and prediction, Solution of the normal equation- Levinson - Durbin algorithm.</td>
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<tr>
<td>4</td>
<td><strong>Power Spectrum Estimation</strong></td>
<td>08</td>
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<tr>
<td></td>
<td>Estimation of Spectra From Finite duration observation of signals, Estimation of autocorrelation and power spectrum of random signal, Non parametric methods for power spectrum estimation- Bartlett window and Welch method.</td>
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<tr>
<td>5</td>
<td><strong>Architectures for DSPs</strong></td>
<td>06</td>
</tr>
<tr>
<td></td>
<td>Basic Generic Architectures for DSPs, Harward Architecture, Introduction to SHARC, Pipelining, MAC, special Instructions, on chip memory, Fixed and Floating point DSPs, Selection of DSPs, case study of TMS320c54XX, Implementation of Basic DS algorithms, like FIR, IIR Filters.</td>
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</tr>
<tr>
<td>6</td>
<td><strong>Applications of DSP using MATLAB</strong></td>
<td>06</td>
</tr>
<tr>
<td></td>
<td>Mobile communication, medical, image processing, Acoustic Noise Canceler, Dynamic range compression, LPC analysis and synthesis, SSB modulation, Radar tracking implementetion</td>
<td></td>
</tr>
</tbody>
</table>

### Text Books:

**Reference Books:**
1. P. P. Vaidyanathan, “Multirate Systems and filter banks”, PHI.
6. [www.dspguide.com](http://www.dspguide.com)
8. S.K. Mitra, “dsp”tmh
10. Applications to DSP Using Matlab by proakis

**TERMWORK:** Term work will consist of record of minimum 8 practicals out of the following using matlab.

1. Generate random signals and plot their realization.
2. Implementation of Least Mean Square (LMS) Algorithm.
3. Determination of FIR prediction filters using Forward and Backward prediction.
4. To implement Levinson Durbin Algorithm for Solution of Normal equations.
5. Realization of cascade Lattice of FIR Filter.
7. Demonstration of Hardware and Software utilities for DSP starter kits (Texas, ADSP or Motorola).
8. Implementation of any one application
   Implementation of the following DSP Algorithms on DSP processors:
10. Implementation of IIR Filter
### EC4106 Telecommunication Networks And Management
(Electronics & Communication)

#### Teaching Scheme:
- Lectures: 4 Hrs. / Week
- Practical: 2 Hrs. /Week

#### Exam Scheme:
- Paper: 100 Marks
- Practical: --
- Term Work: 25 Marks

#### Topics and Contents

<table>
<thead>
<tr>
<th></th>
<th>Topics and Contents</th>
</tr>
</thead>
</table>
| 1 | **Introduction to switching and telecom networks:**
  | Introduction to crossbar & electronics exchange, Types of networks, Network design issues, Design tools, switching technologies (circuit switching and packet switching) |
| 2 | **Broadband telecom networks:**
  | ISDN, Basic structure, ISDN Interfacing & functions, transmission structure Protocol architecture, Narrow band & Broadband ISDN |
| 3 | **Frame Relay & ATM:**
  | Frame Relay introduction, Protocol, architecture frame, mode call control, LAPF core Protocol, frame Relay congestion control. ATM, ATM Protocols, Public ATM networks, ATM cells their details and transmission, AAL, Traffic congestion and control. |
| 4 | **Broadband access And Routing technologies:**
  | DSL, ADSL, Cable modems, WLL, Optical wireless, Leased lines. Routing Algorithms for shortest path centralized routing, Distributed, Static and dynamic routing. |
| 5 | **QOS and Reliability Issues of telecom networks:**
  | Delay, Jitter, Throughput/Bandwidth, Crosstalk/Interference Issues, Network reliability and survivability Issues, Network protection mechanisms. |
| 6 | **Telcom network management:**

#### Text Books:

1. Aaron kershenbaumj “Telecommunication Networks Design Algorithms”, MGH.
2. Mischa schwatriz, “Telecommunication Networks protocols modelling and analysis” Pearson Education
3. Data and computer communication – William stallings- PHI.

Reference Books:-
1. Introduction to Telecommunications: Voice, data & internet- Pearson Education
2. OSS For telecom Networks By Kundan Mishra – Springer.
3. Telecommunication network and management – R.C. Jaiswal
4. Telecom technology by Tyagrajan vishwanathan – PHI
5. ATM Networks by Rainer handel Manfred N. Huber 3rd Edition 2001
6. Computer Networks by Andrew s. tanenbaum.

TERMWORK: Term work will consist of record of 08 experiments, and assessment will be based on
1. performing an experiment
2. Records of experiments submitted by the candidate.
3. Viva-voce on syllabus.
EC41071 Network Security (Elective-I for ECT)

Teaching Scheme :
Lectures: 4 Hrs. / Week
Practical: 2 Hrs. /Week

Exam Scheme :
Paper: 100 Marks
Practical: --
Term Work: 25 Marks

Topics and Contents

1. **Overview:**

2. **Designing:**
   Design issues, Cost justification and consideration, Design principle of Block Ciphers and Block Cipher Algorithms, Authenticating architectural design issues.

3. Digital signatures, Certificates and standards, setting and definitional issues, Length-restricted signature scheme, Constructions of signature schemes, planning techniques.

4. Electronic mail security, IP and Web security protocols, SSL and HTTP

5. **System security:**
   Computer Virus, Firewall and Intrusion detection, Electronic commerce security, Cyber laws related to E-commerce

6. **Maintenance:**
   Configuring secure access, Management, ongoing maintenance, standards development, ensuring site security.

7. **Results and Future directions:**

Text/Reference Books:

TERMWORK: Term work will consist of record of minimum 8 experiments based on the syllabus.
EC41072 Digital Image Processing (Elective-I for ECT)

Teaching Scheme :
Lectures:  4 Hrs. / Week
Practical:  2 Hrs. /Week

Exam Scheme :
Paper:  100 Marks
Practical:  --
Term Work:  25 Marks

Topics and Contents

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</thead>
<tbody>
<tr>
<td>1</td>
<td><strong>Digital Image Fundamentals</strong></td>
<td>Elements of visual perception, Image sampling &amp; Quantization, Some basic relationships between pixels, colour fundamentals, colour models, pseudo colour image processing</td>
<td>04</td>
</tr>
<tr>
<td>2</td>
<td><strong>Image Enhancement</strong></td>
<td>Basic grey level transformations, histogram processing, enhancement using arithmetic and logic operations, spatial filtering – smoothing and sharpening filters. Smoothing and sharpening frequency domain filters</td>
<td>06</td>
</tr>
<tr>
<td>3</td>
<td><strong>Morphological Image Processing</strong></td>
<td>Neighbourhood concepts, adjacency and distance measures, dilation &amp; erosion, opening &amp; closing operations, basic morphological operations such as region filling, thinning, thickening, skeletons, pruning for binary and gray scale images.</td>
<td>06</td>
</tr>
<tr>
<td>4</td>
<td><strong>Image Segmentation</strong></td>
<td>Detection of discontinuities, edge linking and boundary detection, thresholding, region based segmentation, use of watersheds, image representation- chain codes, boundary descriptors &amp; regional descriptors</td>
<td>08</td>
</tr>
<tr>
<td>5</td>
<td><strong>Image Transforms &amp; compression</strong></td>
<td>Coding, interpixel and psychovisual image redundancy, fidelity criteria, Error free compression 2-D Discrete Fourier Transform, Discrete Cosine Transform – its application in Baseline JPEG , Walsh Hadamard Transform, Fast Walsh Transform, sub band coding Haar Transform – it’s application as a Wavelet, multi resolution expansions, 1-D Wavelet Transform, Fast Wavelet Transform; Introduction to Gabor Transform, Introduction to Radon Transform</td>
<td>10</td>
</tr>
<tr>
<td>6</td>
<td><strong>Image Processing Applications</strong></td>
<td>Applications of transforms in fingerprinting, Medical applications such as tumour detection, Magnetic Resonance Imaging analysis using transforms, Morphological applications.</td>
<td>06</td>
</tr>
</tbody>
</table>

Text Books:

**Reference Books:**


**TERMWORK:** Term work will consist of record of minimum 8 experiments out of the following list.

**List of Practicals**

1. Image negation, power Law correction
2. Histogram mapping & equalisation, stretching
3. Image smoothing, sharpening
4. Edge detection – use of Sobel, Prewitt and Roberts operators
5. Morphological operations on binary images
6. Morphological operations on Gray scale images
7. Pseudo coloring
8. Chain coding
9. Image statistics
10. DCT/IDCT computation
11. Transform application assignment.

**Comments:**

C / C++ and MATLAB may be used for the Practical
# EC41073 Artificial Neural Networks and Fuzzy Logic (Elective-I for ECT)

**Teaching Scheme:**
- Lectures: 4 Hrs./Week
- Practical: 2 Hrs./Week

**Exam Scheme:**
- Paper: 100 Marks
- Practical: --
- Term Work: 25 Marks

### Topics and Contents

<table>
<thead>
<tr>
<th></th>
<th>Introduction</th>
<th>Supervised Learning Neural Networks</th>
<th>Feedback Neural Networks</th>
<th>Unsupervised Learning Networks</th>
<th>Architectures For Pattern Recognition</th>
<th>Applications Of Neural Networks</th>
<th>Fuzzy Set Theory</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>06</td>
<td>06</td>
<td>06</td>
<td>06</td>
<td>06</td>
<td>05</td>
<td>05</td>
</tr>
</tbody>
</table>

### Text Books
1. B. Yegnanarayana, “Artificial Neural Networks”, PHI
Ref. Books

1. Haykin, “Neural Network a comprehensive Foundation”, PHI
2. Mohan, Ranka, “Elements of Artificial Neural Networks”, Penram International

TERMWORK: Term work will consist of record of minimum 8 experiments based on the syllabus.
EC41074 Advanced Power Electronics (Elective-I for EC/IE)

Teaching Scheme:
Lectures: 4 Hrs. / Week
Practical: 2 Hrs. /Week

Exam Scheme:
Paper: 100 Marks
Practical: --
Term Work: 25 Marks

Topics and Contents

1 **Power Electronics Converters:**

2 **Resonant Converters:**

3 **Choppers:**
   Step-down : Type A(1 quadrant), C(2 quadrant), E(4 quadrant) choppers. Chopper drive for separately excited DC motors, derivation of current ripple in the output of chopper. Source filter design.

4 **Speed control of separately excited DC motor:**
   Phase controlled converter; control circuit; control modeling of 3-phase converter; converter configuration for four quadrant DC motor; steady state analysis of 3-phase converter controlled DC motor drive.
   Speed controller design of PM Brushless DC motor; sensorless control.

5 **Control of Induction Motor:**
   Stator voltage control; static frequency changer; VSI driven I.M.; vector control scheme; tuning of vector controller; performance and application.

6 **Applications:**
   Disturbances in commercial power supplies: their types, Power Quality and power conditioners. Dual feeders with static transfer switches, EMI and Radio frequency interference and their suppression. Transient suppression.
   UPS: Design of static UPS, Battery for UPS. Power factor correctors, PLC’s, Industrial automation and Embedded systems.

Text/Reference books:
2. Electric Drives- Vedam Subrahmanyam, TMH
3. Power Electronics- Mohd. Rashid, PHI
4. Power Electronics- Jagannathan, PHI.

**TERMWORK:** Term work will consist of record of minimum 8 experiments out of the following list.

**List of practical**

1. Verify the input (R, V, I) – output (firing angle) characteristics of different firing circuits.
2. To plot firing angle V/S output voltage of three phase half/full converter with R and R-L load.
3. Plot firing angle V/S RPM of 0.1 HP universal motor using TRIAC/SCR based control circuit.
4. Study operation of chopper drive.
5. To plot torque-speed characteristics of thyristor based I.M. drive with V/F constant.
7. Study of various parameters of UPS/SMPS.
8. Thyristor alarm circuits
9. Time delay relay circuits.
10. Case study: Industrial automation,
    PLC,
    Fire / security system.
11. Development of power Electronics system using embedded technique.
EC41075 System Simulation & Anyalsis (Elective-I for EC/IE)

Teaching Scheme:
Lectures: 4 Hrs. / Week
Practical: 2 Hrs. / Week

Exam Scheme:
Paper: 100 Marks
Practical: --
Term Work: 25 Marks

<table>
<thead>
<tr>
<th>No.</th>
<th>Topics and Contents</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Introduction: System concepts , system analysis, need for system analysis, system</td>
<td>06</td>
</tr>
<tr>
<td></td>
<td>simulation, system optimization</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>System simulation: Circuit simulation using LAB VIW, EDA tools, Multisim, PSPSICE,</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>PSIM, MATLAB</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Time domain analysis: Input output approach, discrete signal model, discrete time</td>
<td>08</td>
</tr>
<tr>
<td></td>
<td>convolution, Response of linear discrete-time system, continuous(analog) signal</td>
<td></td>
</tr>
<tr>
<td></td>
<td>model, continuous time convolution, response of linear continuous time system</td>
<td></td>
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<tr>
<td></td>
<td>Analysis of linear systems with stochastic inputs, stochastic process</td>
<td></td>
</tr>
<tr>
<td></td>
<td>characterization basic definition correlation function</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Data analysis: Types of measured quantities central tendency of data, Estimation of</td>
<td>08</td>
</tr>
<tr>
<td></td>
<td>true value of data measures of dispersion, standard deviation of the mean. Graphical</td>
<td></td>
</tr>
<tr>
<td></td>
<td>representation of data: Equations of approximating curves, Graphical representation</td>
<td></td>
</tr>
<tr>
<td></td>
<td>of functional relationships, Determination of parameters in linear relationships.</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Computer analysis tools: General approach in computer problem solving, Logic</td>
<td>08</td>
</tr>
<tr>
<td></td>
<td>analyzer, Spectrum analyzer, Debugging using emulator.</td>
<td></td>
</tr>
</tbody>
</table>

Text/Reference Books:
2. Introductory Methods of Numerical Analysis: S.S. Sastry (PHI)
3. Instrumentation, Measurement and Analysis: Nakra, Chaudhary
4. Simulation, Madeling and Analysis: Law, Averill (TMH)

TERMWORK: Any eight experiments based on the syllabus.
EC41076 Audio Video Engineering (Elective-I for EC/IE)

**Teaching Scheme:**

<table>
<thead>
<tr>
<th>Lectures:</th>
<th>4 Hrs. / Week</th>
</tr>
</thead>
<tbody>
<tr>
<td>Practical:</td>
<td>2 Hrs. / Week</td>
</tr>
</tbody>
</table>

**Exam Scheme:**

<table>
<thead>
<tr>
<th>Paper:</th>
<th>100 Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Practical:</td>
<td>--</td>
</tr>
<tr>
<td>Term Work:</td>
<td>25 Marks</td>
</tr>
</tbody>
</table>

**Topics and Contents**

<table>
<thead>
<tr>
<th>Hours</th>
<th></th>
</tr>
</thead>
</table>
| 06    | 1 Basic TV system:-
|       | B/W TV system, scanning, composite video signal, TV standards, colour fundamentals, mixing of colours, chromaticity diagram, video signal for colour, luminance signal, colour difference signals, formation of chrominance signal. |
| 06    | 2 TV cameras & picture tubes:-
|       | Vidicon, Plumbicon, Saticon, CCD image scanner, monochromatic picture tube, colour TV camera & picture tubes, Display devices-LCD,TFT etc. |
| 04    | 3 TV signal transmission & propagation:-
|       | Propagation of TV signal, TV broadcast channels, TV transmission & reception antennas. |
| 06    | 4 Monochrome TV receiver:-
|       | RF tuner, IF subsystem, video amplifier, sound section, Horizontal & vertical deflection circuits, functional requirement of receiver stages. |
| 04    | 5 Colour TV system:-
|       | NTSC ,PAL, SECAM, Systems, (Encoder& decoder), Colour transmitter, Colour TV receiver. |
| 04    | 6 Allignment, testing & servicing of TV receivers:-
|       | Study & use of swip generator, wobuloscope, pattern generator, test charts, field strength meter, Allignment & fault finding in TV receiver. |
| 06    | 7 Advanced Television Systems:-
|       | 3D TV,HDTV, standards & systems, Digital TV ,Satellite TV,DTH TV, Video on demand, CCTV,CATV, Conditional Access systems,LCD TV,Mobile TV. |
| 04    | 8 Sound recording & reproduction:-
|       | Magnetic recording,Optical recording,CD recording,CD,DVD, MP3 player, Audio Std.MPEG, PA system for auditorium, Cord less microphone system. |

**Text Book:-**

3. Video Demisified –Kelth Jack, PI publication

**Reference Book:-**

2. Basic TV & Video Systems-Bernard Grobb.

**Term work :**

Term work will consist of record of minimum 8 experiments / Assignments based on the syllabus.
EC41077 Voice Network (Elective-I for Electronics & Communication)

### Teaching Scheme:
- Lectures: 4 Hrs. / Week
- Practical: 2 Hrs. / Week

### Exam Scheme:
- Paper: 100 Marks
- Practical: --
- Term Work: 25 Marks

#### Topics and Contents

<table>
<thead>
<tr>
<th></th>
<th>Topics</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Introduction to Telephone Signaling &amp; Switching:</td>
<td>06</td>
</tr>
<tr>
<td></td>
<td>Evolution of Telecommunication, Simple telephone communication, basics of switching Systems, electronic switching, digital switching system, circuit switching, message switching, packet switching, switch signaling - subscriber loop, Interoffice (Common Channel signaling, Signaling System No.7)</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Telecommunication Traffic Engineering:</td>
<td>06</td>
</tr>
<tr>
<td></td>
<td>Introduction, service level, Traffic usage, traffic measurement units, traffic distribution, Grade of service, Blocking Probability: Erlang Distribution, Poisson's distribution, Numericals on above topics.</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Optical Networks and Switching:</td>
<td>08</td>
</tr>
<tr>
<td></td>
<td>Optical links-WDM systems, cross connects, optical LAN’s, optical paths and networks; TDS and SDS: modular switch designs-packet switching, distributed, shared, input and output buffers.</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Global System for Mobile Communication:</td>
<td>07</td>
</tr>
<tr>
<td></td>
<td>Standards for wireless communication systems, Access technologies, Cellular Communication fundamentals, GSM architecture and interfaces, Radio link features in GSM system, GSM logical channels and frame structure, Speech coding in GSM, Data services in GSM, Value added services, Privacy and Security in GSM.</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Code Division Multiple Access:</td>
<td>06</td>
</tr>
<tr>
<td></td>
<td>CDMA standards, IS-95 system architecture, Air Interface, Physical and logical channels of IS- 95, CDMA call processing, CDMA 2000 system</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>IP Telephony:</td>
<td>07</td>
</tr>
<tr>
<td></td>
<td>Introduction to VoIP, low level protocols -RTP/RTCP/UDP, speech coding technologies PCM, ADPCM, LPC, speech codes ('ITU series and wireless codes including fixed and variable rare, trans-coder technologies including: DTMF generation &amp; detection, Echo Cancellation, Voice activity detection and discontinuous transmission (VAD/DTX), Packet Loss Conceal meat (PLC) IP Telephony Protocols - H.323, Session Initiation Protocol (SIP)</td>
<td></td>
</tr>
</tbody>
</table>
Text Books:

Reference Books:

Term work:
Term work will consist of record of minimum 8 experiments / Assignments based on the syllabus.
EC41078 Information Security (Elective-I for Electronics & Communication)

Teaching Scheme:
Lectures: 4 Hrs. / Week
Practical: 2 Hrs. / Week

Exam Scheme:
Paper: 100 Marks
Practical: --
Term Work: 25 Marks

Topics and Contents

1. **Information Security**:
   Attacks on information, components of Information Security, Cryptographic techniques, public & private key, mathematical tools of cryptography, Cryptography techniques, Authentication access control, Digital signature, Certificates & standards.

2. **Cypher Algorithm**:
   Design principles of block ciphers & Block Cipher Algorithms, Electronic mail security, RSA algorithm, MD5, IDEA, RC2, RC5 algorithm, Stenography techniques.

3. **Web Security**:

4. **Mobile Attacks**:
   3 GPP security, Mobile Virtual Private n/w, Smart Card security, RFID security, Mobile Agent security, Mobile virus, mobile worms.

5. **Database Security systems**:
   Network security concept, Trojans, Intrusion detection, Firewall, Cyber law related to E-commerce.

Text/Reference Books:
1. Stallings, William- “Cryptography & n/w security. Principles & Practice”
2. Asoke K Talukder “ Mobile Computing”

Term work:
Term work will consist of record of minimum 8 experiments / Assignments based on the syllabus.
EC41072 Digital Image Processing (Elective-I for Electronics & Communication)

**Teaching Scheme:**
- Lectures: 4 Hrs. / Week
- Practical: 2 Hrs. /Week

**Exam Scheme:**
- Paper: 100 Marks
- Practical: --
- Term Work: 25 Marks

### Topics and Contents

<table>
<thead>
<tr>
<th></th>
<th>Digital Image Fundamentals:</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Elements of visual perception, Image sampling &amp; Quantization, Some basic relationships between pixels, colour fundamentals, colour models, pseudo colour image processing</td>
<td>04</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Image Enhancement:</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Basic grey level transformations, histogram processing, enhancement using arithmetic and logic operations, spatial filtering – smoothing and sharpening filters. Smoothing and sharpening frequency domain filters</td>
<td>06</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Morphological Image Processing:</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>Neighbourhood concepts, adjacency and distance measures, dilation &amp; erosion, opening &amp; closing operations, basic morphological operations such as region filling, thinning, thickening, skeletons, pruning for binary and gray scale images.</td>
<td>06</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Image Segmentation:</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Detection of discontinuities, edge linking and boundary detection, thresholding, region based segmentation, use of watersheds, image representation- chain codes, boundary descriptors &amp; regional descriptors</td>
<td>08</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Image Transforms &amp; compression:</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>Coding, interpixel and psychovisual image redundancy, fidelity criteria, Error free compression 2-D Discrete Fourier Transform, Discrete Cosine Transform – its application in Baseline JPEG , Walsh Hadamard Transform, Fast Walsh Transform, sub band coding Haar Transform – it’s application as a Wavelet, multi resolution expansions, 1-D Wavelet Transform, Fast Wavelet Transform; Introduction to Gabor Transform, Introduction to Radon Transform</td>
<td>10</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Image Processing Applications:</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>Applications of transforms in fingerprinting, Medical applications such as tumour detection, Magnetic Resonance Imaging analysis using transforms, Morphological applications.</td>
<td>06</td>
</tr>
</tbody>
</table>

**Text Books:**

Reference Books:-


TERMWORK: Term work will consist of record of minimum 8 experiments out of the following list.

List of Practicals

1. Image negation, power Law correction
2. Histogram mapping & equalisation, stretching
3. Image smoothing, sharpening
4. Edge detection – use of Sobel, Prewitt and Roberts operators
5. Morphological operations on binary images
6. Morphological operations on Gray scale images
7. Pseudo coloring
8. Chain coding
9. Image statistics
10. DCT/IDCT computation
11. Transform application assignment.

Comments:

C / C++ and MATLAB may be used for the Practical
EC4108 Project Part-I

Practical: 2 Hrs. /Week  Practical Exam: 50 Marks

The project work will be carried out by a batch of at the most 3 students (preferably 2 students) working on a topic related to the electronics and allied fields. The topic may be from one of the following.

1. Laboratory work involving constructional theoretical and design aspects of the project/system.
2. Modification aspect of an existing electronics systems.
3. It can be practical need of the industry, which should involve system design aspect.

It shall consist of the term work in the form of hand written typed report not less than 25 pages. This should include the literature survey technical details related data that is collected & design that are required for project work part-I.

The candidate shall give a seminar on the subject chosen above in the presence of Guide and External examiner preferably from industry or the university.

Prof. Prashant S. Kolhe
Chairman,
Electronics Board
Dr. B.A.M.U.Aurangabad.
# Part -II

## EC4201 VLSI Design

<table>
<thead>
<tr>
<th>Topics and Contents</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Teaching Scheme:</strong></td>
<td></td>
</tr>
<tr>
<td>Lectures: 4 Hrs. / Week</td>
<td></td>
</tr>
<tr>
<td>Practical: 2 Hrs. / Week</td>
<td></td>
</tr>
<tr>
<td><strong>Exam Scheme:</strong></td>
<td></td>
</tr>
<tr>
<td>Paper: 100 Marks</td>
<td></td>
</tr>
<tr>
<td>Practical: 50 Marks</td>
<td></td>
</tr>
<tr>
<td>Term Work: --</td>
<td></td>
</tr>
</tbody>
</table>

1. **MOS Devices:**
   - Introduction to MOST, I – V Characteristics of NMOS and PMOS, Second order effects – CLM, Body bias, Short Channel Effects – VT roll off, DIBL, Mobility Degradation, Transfer Characteristics Of CMOS Inverter, Detailed analysis of CMOS Inverter with parasitics
   - 06 hours

2. **CMOS Design**
   - CMOS logic families - static, dynamic including their timing analysis and power consumption, CPL, Pass Transistor Logic, Transmission gate, Circuits using CPL and Pass transistor logic
   - 08 hours

3. **Fabrication And Layout**
   - Basic CMOS Technology: Self aligned CMOS process, N well, P well, Twin tub, Layout of CMOS Inverter, Design rules, Verification of Layout
   - 06 hours

4. **Introduction To VHDL**
   - Introduction, EDA Tool- VHDL, Design flow, Introduction to VHDL, Elements of VHDL, Modeling styles: Sequential, Structural and data flow modeling, sequential and concurrent statements
   - 06 hours

5. **Circuit Design Using FPGA & CPLD**
   - Function, procedures, Attributes, Test benches, synthesizable and Non-synthesizable statements, Packages and configurations, The State diagram, Modeling in VHDL with examples such as counters, Registers and Bidirectional bus. Introduction, study of Architecture of CPLDs and FPGAs
   - 08 hours

6. **Testability**
   - Need of Design for testability, introduction to fault coverage, Testability, Design-for -testability, controllability and absorbability, stuck-at Fault Model, stuck-Open and Stuck-short faults, Boundary Scan check, JTAG technology, TAP controller and TAP controller state diagram, Scan path, Full and partial scan
   - 08 hours

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**Text Books**

5. Bushnell Agrawal Essentials of Electronic Testing for digital memory and mixed signal VLSI circuits, Kulwar Academec Publisher

**Reference Books**

1. Boyce and Baker “CMOS” EEE Press.
2. Xilinx FPGA /CPLD Data Book
3. VHDL Primer Addison Wesley Longman,2000,J Bhaskar

**Practical Examination :**

The practical examination will be of three hours duration. It will consist of one experiment conducted during the course and an Oral examination based on the syllabus.

**Term work :**
Term work will consist of record of minimum 8 experiments based on the syllabus.
## EC4202 Audio Video Engineering (ECT)

### Teaching Scheme:
- Lectures: 4 Hrs. / Week
- Practical: 2 Hrs. / Week

### Exam Scheme:
- Paper: 100 Marks
- Practical: 50 Marks
- Term Work: --

### Topics and Contents

<table>
<thead>
<tr>
<th></th>
<th></th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td><strong>Basic TV system:</strong></td>
<td>06</td>
</tr>
<tr>
<td></td>
<td>B/W TV system, scanning, composite video signal, TV standards, colour fundamentals, mixing of colours, chromaticity diagram, video signal for colour, luminance signal, colour difference signals, formation of chrominance signal.</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td><strong>TV cameras &amp; picture tubes:</strong></td>
<td>06</td>
</tr>
<tr>
<td></td>
<td>Vidicon, Plumbicon, Saticon, CCD image scanner, monochromatic picture tube, colour TV camera &amp; picture tubes, Display devices-LCD, TFT etc.</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td><strong>TV signal transmission &amp; propagation:</strong></td>
<td>04</td>
</tr>
<tr>
<td></td>
<td>Propagation of TV signal, TV broadcast channels, TV transmission &amp; reception antennas.</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td><strong>Monochrome TV receiver:</strong></td>
<td>06</td>
</tr>
<tr>
<td></td>
<td>RF tuner, IF subsystem, video amplifier, sound section, Horizontal &amp; vertical deflection circuits, functional requirement of receiver stages.</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td><strong>Colour TV system:</strong></td>
<td>04</td>
</tr>
<tr>
<td></td>
<td>NTSC, PAL, SECAM, Systems, (Encoder &amp; decoder), Colour transmitter, Colour TV receiver.</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td><strong>Alignment, testing &amp; servicing of TV receivers:</strong></td>
<td>04</td>
</tr>
<tr>
<td></td>
<td>Study &amp; use of swip generator, wobuloscope, pattern generator, test charts, field strength meter, Alignment &amp; fault finding in TV receiver.</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td><strong>Advanced Television Systems:</strong></td>
<td>06</td>
</tr>
<tr>
<td></td>
<td>3D TV, HDTV, standards &amp; systems, Digital TV, Satellite TV, DTH TV, Video on demand, CCTV, CATV, Conditional Access systems, LCD TV, Mobile TV.</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td><strong>Sound recording &amp; reproduction:</strong></td>
<td>04</td>
</tr>
<tr>
<td></td>
<td>Magnetic recording, Optical recording, CD recording, CD, DVD, MP3 player, Audio Std.MPEG, PA system for auditorium, Cordless microphone system.</td>
<td></td>
</tr>
</tbody>
</table>

### Text Book:
3. Video Demisified – Kelth Jack, PI publication

### Reference Book:
2. Basic TV & Video Systems - Bernard Grobb.

### Practical Examination:
The practical examination will be of three hours duration. It will consist of one experiment conducted during the course and an Oral examination based on the syllabus.

### Term work:
The term work will consist of record of minimum 8 experiments / Assignments based on the syllabus.
# EC4203 Digital Image Processing (EC/IE)

**Teaching Scheme:**
- Lectures: 4 Hrs. / Week
- Practical: 2 Hrs. /Week

**Exam Scheme:**
- Paper: 100 Marks
- Practical: 50 Marks
- Term Work: --

### Topics and Contents

<table>
<thead>
<tr>
<th></th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
</tr>
<tr>
<td><strong>Digital Image Fundamentals</strong></td>
<td>04</td>
</tr>
<tr>
<td>Elements of visual perception, Image sampling &amp; Quantization, Some basic relationships between pixels, colour fundamentals, colour models, pseudo colour image processing</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
</tr>
<tr>
<td><strong>Image Enhancement</strong></td>
<td>06</td>
</tr>
<tr>
<td>Basic grey level transformations, histogram processing, enhancement using arithmetic and logic operations, spatial filtering – smoothing and sharpening filters. Smoothing and sharpening frequency domain filters</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
</tr>
<tr>
<td><strong>Morphological Image Processing</strong></td>
<td>06</td>
</tr>
<tr>
<td>Neighbourhood concepts, adjacency and distance measures, dilation &amp; erosion, opening &amp; closing operations, basic morphological operations such as region filling, thinning, thickening, skeletons, pruning for binary and gray scale images.</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
</tr>
<tr>
<td><strong>Image Segmentation</strong></td>
<td>08</td>
</tr>
<tr>
<td>Detection of discontinuities, edge linking and boundary detection, thresholding, region based segmentation, use of watersheds, image representation- chain codes, boundary descriptors &amp; regional descriptors.</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
</tr>
<tr>
<td><strong>Image Transforms &amp; compression</strong></td>
<td>10</td>
</tr>
<tr>
<td>Coding, interpixel and psychovisual image redundancy, fidelity criteria, Error free compression 2-D Discrete Fourier Transform, Discrete Cosine Transform – its application in Baseline JPEG , Walsh Hadamard Transform, Fast Walsh Transform, sub band coding Haar Transform – it’s application as a Wavelet, multi resolution expansions, 1-D Wavelet Transform, Fast Wavelet Transform; Introduction to Gabor Transform, Introduction to Radon Transform</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td></td>
</tr>
<tr>
<td><strong>Image Processing Applications</strong></td>
<td>06</td>
</tr>
<tr>
<td>Applications of transforms in fingerprinting, Medical applications such as tumour detection, Magnetic Resonance Imaging analysis using transforms, Morphological applications.</td>
<td></td>
</tr>
</tbody>
</table>

### Text Books:


Reference Books:-


Practical Examination:

The practical examination will be of three hours duration. It will consist of one experiment conducted during the course and an Oral examination based on the syllabus.

TERMWORK: Term work will consist of record of minimum 8 experiments out of the following list.

List of Practicals

1. Image negation, power law correction
2. Histogram mapping & equalisation, stretching
3. Image smoothing, sharpening
4. Edge detection – use of Sobel, Prewitt and Roberts operators
5. Morphological operations on binary images
6. Morphological operations on Gray scale images
7. Pseudo coloring
8. Chain coding
9. Image statistics
10. DCT/IDCT computation
11. Transform application assignment.

Comments:

C / C++ and MATLAB may be used for the Practical
EC4204 Radar and Satellite Communications  
(ECT/Electronics & Communication)

**Teaching Scheme:**
- Lectures: 4 Hrs. / Week
- Practical: 2 Hrs. /Week

**Exam Scheme:**
- Paper: 100 Marks
- Practical: 50 Marks
- Term Work: --

**Topics and Contents**

1. **Introduction to Radar**

2. **MTI and Pulse Doppler Radar**
   Introduction to Doppler and MTI Radar- Delay –Line Cancelers- Staggered Pulse Repetition Frequencies –Doppler Filter Banks - Digital MTI Processing - Moving Target Detector - Limitations to MTI Performance - MTI from a Moving Platform (AMIT) - Pulse Doppler Radar – Other Doppler Radar Topics- Tracking with Radar –Monopulse Tracking –Conical Scan and Sequential Lobing - Limitations to Tracking Accuracy - Low-Angle Tracking - Tracking in Range - Other Tracking Radar Topics -Comparison of Trackers - Automatic Tracking with Surveillance Radars (ADT).

3. **Detection of Signals in Noise**
   Radar Receivers - The Radar Receiver - Receiver noise Figure - Superheterodyne Receiver - Duplexers and Receiver Protectors- Radar Displays.

4. **Overview Of Satellite Systems, Orbits And Launching Methods**

5 **Geostationary Orbit & Space Segment**


6 **Earth Segment & Space Link**


**Text/Reference Books:**

2. Taub and Schilling, Principles of Communication, Tata Mc Graw Hill
3. Satellite Communication by Gagliardi, Robert M.
4. Satellite Communication by Agrawal D.C.
5. Electronic Communication Systems, Blake
6. Antenna and Wave Propagation, K.D.Prasad

**Practical Examination :**

The practical examination will be of three hours duration. It will consist of one experiment conducted during the course and an Oral examination based on the syllabus.

**Term work :**

Term work will consist of record of minimum 8 experiments based on the syllabus.
**EC4205 Robotics (EC/IE)**

**Teaching Scheme:**
- Lectures: 4 Hrs. / Week
- Practical: 2 Hrs. / Week

**Exam Scheme:**
- Paper: 100 Marks
- Practical: 50 Marks
- Term Work: ---

**Topics and Contents**

1. **Introduction:**
   Automation and Robotics, Definition, Basic Structure of Robots, Classification of Robots based on co-ordinate system, Present trends and future trends in robotics, Overview of robot subsystems, Components of Robot system- Manipulator, Controller, Power conversion unit etc, Specifications of robot.

2. **Dynamics & Kinematics:**

3. **End Effectors and Actuators:**
   Different types of grippers, vacuum & other methods of gripping, overview of actuators, Internal & External sensors, position, relocking and acceleration sensors, proximity sensors, force sensors, touch slip laser range tinder, camera.

4. **Motion Planning and Controllers:**
   On-off trajectory, relocking and acceleration profile, Cartesian motion of manipulator, joint interpolated control, Jacobian in terms of D-H matrix, Obstacle avoidance, Basic control system, control loops of robotic system, Fuzzy controllers.

5. **Robot Vision:**

**Text Books:**
2. Robotic Engineering – *Klafter, Thomas, Negin*, PHI, New Delhi

**Reference Books:**

4. MEMS and Microsystems Design and Manufacture- HSU, TMH, NewDelhi

**Practical Examination:**
The practical examination will be of three hours duration. It will consist of one experiment conducted during the course and an Oral examination based on the syllabus.

**Term work:**
Term work will consist of record of minimum 8 experiments out of the following list

**List of Practicals:**

1. Study of motion conversion (rotary to rotary, rotary to linear) using mechanical components.
2. To build robot arms using mechanical components and applying motor drive.
3. To build robot for given configuration and degrees of freedom.
4. Motion of robot for each degree of freedom. Teaching a sequence to robot using Teach Pendant.
5. To perform pick and place operation using Simulation Control Software.
6. Robot path planning using Simulation & Control Software.
8. 2D simulation of a 3 DOF robot arm. (C / C++ OR MATLAB)
9. Direct Kinematics analysis of 4-axis robot. (C / C++ OR MATLAB)
EC4206 Wireless Communication & Networks
(Electronics & Communication)

Teaching Scheme:
Lectures: 4 Hrs. / Week
Practical: 2 Hrs. /Week

Exam Scheme:
Paper: 100 Marks
Practical: 50 Marks
Term Work: --

Topics and Contents

1. Introduction of wireless communication:
Overview, evolution of cellular system, Cellular system architecture & operation, Performance criteria.
Multiple access schemes for wireless communication - TDMA, FDMA, CDMA, SDMA

2. Wireless Network Planning And Operation:
frequencies management, channel assignments, frequency reuse, System capacity & its improvement, Handoffs & its types, roaming, co channel & adjacent channel interference.

3. Digital cellular networks:
GSM architecture & interfaces, signal processing in GSM, frame structure of GSM, Channels used in GSM.

4. Wireless LAN Technology:
Overview, WLAN technologies, infrared LANs, Spread Spectrum LANs Narrowband Microwave LANs
IEEE 802.11- Architecture, protocols, MAC layer, MAC frame, MAC management,

5. Bluetooth:
Overview, Radio specification, Base band specification, Link manager specification, logical link control & adaptation protocol.

6. Mobile data networks:
Introduction, Data oriented CDPD networks, GPRS

7. Wireless Access Protocol:

Text Books:
1. Mobile communication Engg- Lee W.C.Y
2. Wireless Communication, principles & practice-T.S.Rappaport
3. Mobile communication”, Pearson Education- Schiller

Reference Books:
1. Wireless Communication & networking-William Stalling
2. Mobile communication –Rampantly
3. Wireless digital communication”, PHI, 1999- Kamilo Feher

**Practical Examination**: Practical Examination will be of 3 hrs duration. It Will consist of one experiment conducted during the course and oral exam based on syllabus.

**TERMWORK**: Term work will consist of record of minimum 08 experiments on the syllabus
EC42071 Advanced Digital Signal Processing (Elective-II for ECT)

Teaching Scheme:

<table>
<thead>
<tr>
<th>Lectures:</th>
<th>4 Hrs. / Week</th>
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</thead>
<tbody>
<tr>
<td>Practical:</td>
<td>2 Hrs. /Week</td>
</tr>
</tbody>
</table>

Exam Scheme:

<table>
<thead>
<tr>
<th>Paper:</th>
<th>100 Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Practical:</td>
<td>--</td>
</tr>
<tr>
<td>Term Work:</td>
<td>50 Marks</td>
</tr>
</tbody>
</table>

Topics and Contents

1. **Random Signals**
   - Characterization of random signals: review of deterministic signals, random signals, correlation function, power spectra, DT random signals, time averages for DT random process. filters in sampling rate alteration systems, digital filter banks and their analysis and applications, multi level filter banks, estimations of spectra from finite – duration observation of signals. sample rate conversion using poly-phase filter structures, Efficient D/A conversion in Hi-Fi systems.

2. **Adaptive filters**
   - Need of adaptive filters, adaptive filters as noise cancellation, configuration of adaptive filters, main components of adaptive filters, Adaptive Algorithms: LMS adaptive algorithms, recursive least square algorithms, Adaptive filtering of ocular artifacts from the human EEG, adaptive telephone echo cancellation.

3. **Linear prediction and optimum linear filters**
   - Lattice structures, innovation representation of random process, rational power spectra, AR, MA & ARMA, forward & backward linear prediction, Wiener filter for filtering and prediction, Solution of the normal equation- Levinson -Durbin algorithm.

4. **Power Spectrum Estimation**
   - Estimation of Spectra From Finite duration observation of signals, Estimation of autocorrelation and power spectrum of random signal, Non parametric methods for power spectrum estimation- Bartlett window and Welch method.

5. **Architectures for DSPs**
   - Basic Generic Architectures for DSPs, Harward Architecture, Introduction to SHARC, Pipelining, MAC, special Instructions, on chip memory, Fixed and Floating point DSPs, Selection of DSPs, case study of TMS320c54XX, Implementation of Basic DS algorithms, like FIR, IIR Filters.

6. **Applications of DSP using MATLAB**
   - Mobile communication, medical, image processing, Acoustic Noise Canceler, Dynamic range compression, LPC analysis and synthesis, SSB modulation, Radar tracking implementation

Text Books:


Reference Books:
1. P. P. Vaidyanathan, “Multirate Systems and filter banks”, PHI.
6. www.dspguide.com
8. S. k mitra, “dsp”tmh
10. Applications to DSP Using Matlab by proakis

TERMWORK: Term work will consist of record of minimum 8 practicals out of the following using matlab.

1. Generate random signals and plot their realization.
2. Implementation of Least Mean Square (LMS) Algorithm.
3. Determination of FIR prediction filters using Forward and Backward prediction.
4. To implement Levinson Durbin Algorithm for Solution of Normal equations.
5. Realization of cascade Lattice of FIR Filter.
7. Demonstration of Hardware and Software utilities for DSP starter kits (Texas, ADSP or Motorola).
8. Implementation of any one application

Implementation of the following DSP Algorithms on DSP processors:
10. Implementation of IIR Filter
EC42072 Mobile Computing (Elective-II for ECT)

**Teaching Scheme:**
- Lectures: 04 Hrs. / Week
- Practical: 02 Hrs. /Week

**Exam Scheme:**
- Paper: 100 Marks
- Practical: --
- Term Work: 50 Marks

**Topics and Contents**

<table>
<thead>
<tr>
<th>Topic</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Communication Architecture.</td>
<td>10</td>
</tr>
<tr>
<td>Principle of Wireless Communication, Overview 1G,2G,2.5G,3G and 4G technologies, Introduction to CT2, DECT, PHS, PACS, GSM, GPRS, ATM, CDMA, GSM architecture, signaling techniques in network, GSM mobility management and Handoff management, challenges of mobile computing, Cellular system &amp; related concepts.</td>
<td></td>
</tr>
<tr>
<td>Protocol Architecture:</td>
<td>08</td>
</tr>
<tr>
<td>CDPD, VoIP, GPRS services, WLL system, IPv6 &amp; its application in mobile computing.</td>
<td></td>
</tr>
<tr>
<td>Wireless Application Protocol (WAP)</td>
<td>10</td>
</tr>
<tr>
<td>Cellular Technologies:</td>
<td>08</td>
</tr>
<tr>
<td>Overview of Spread Spectrum, Bluetooth scenario, architecture, various layers of Bluetooth &amp; link manager protocol, IEEE 802.11 network topology, Adhoc network MAC &amp; its management. HIPERLAN &amp; its types, HIPERLAN2 &amp; its features.</td>
<td></td>
</tr>
<tr>
<td>Distributed Mobile Computing:</td>
<td>04</td>
</tr>
<tr>
<td>Distributed OS &amp; file system, Mobile computing software (pervasive computing), Data management for mobile computing.</td>
<td></td>
</tr>
</tbody>
</table>

**Text/Reference Books:**
2. Schiller, “Mobile Communication” Pearson Education.
4. Asoke K Talukder -“Mobile Computing” TMH.

**TERMWORK:** Term work will consist of record of minimum 08 experiments on the syllabus.
EC42073 Artificial Intelligence (Elective-II for ECT)

Teaching Scheme:
- Lectures: 4 Hrs. / Week
- Practical: 2 Hrs. /Week

Exam Scheme:
- Paper: 100 Marks
- Practical: --
- Term Work: 50 Marks

Topics and Contents

<table>
<thead>
<tr>
<th>Topic</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1 Introduction To Artificial Intelligence</strong></td>
<td>07</td>
</tr>
<tr>
<td>Definition, AI Applications, AI representations, properties of internal representations Heuristic Search Techniques, Best File Search, Mean and End Analysis, A* and AO* Algorithms</td>
<td></td>
</tr>
<tr>
<td><strong>2 Game Playing &amp; Predicate Logic</strong></td>
<td>07</td>
</tr>
<tr>
<td>Minimax search procedure, Alpha-beta cut-offs, Waiting for Quiescence, Secondary Search, Predicate Calculus, Predicate and arguments, ISA Hierarchy, Frame Notation, Resolution, Natural Deduction</td>
<td></td>
</tr>
<tr>
<td><strong>3 Knowledge Representation Using Non-Monotonic Logic</strong></td>
<td>07</td>
</tr>
<tr>
<td><strong>4 Planning</strong></td>
<td>07</td>
</tr>
<tr>
<td>Block world, strips, Implementation using goal stack, Non-linear planning using goal stacks, Hierarchical planning, List commitment strategy</td>
<td></td>
</tr>
<tr>
<td><strong>5 Neural Networks</strong></td>
<td>07</td>
</tr>
<tr>
<td>Learning by training neural networks, Introduction to neural networks, Neural net architecture &amp; applications, Natural language processing &amp; understanding &amp; paragramatic, Syntactic, Semantic, Qualities, finite state machines, RTN, ATN, understanding sentences</td>
<td></td>
</tr>
<tr>
<td><strong>6 Expert Systems</strong></td>
<td>07</td>
</tr>
<tr>
<td>Utilization and functionality, Architecture of expert systems, Knowledge representation, Two case studies on expert systems</td>
<td></td>
</tr>
</tbody>
</table>

Text Books
1. Elain Rich and Kerin Knight, “Artificial Intelligance”

Reference Books

TERMWORK: Term work will consist of record of minimum 08 experiments out of the following list
List of Practicals

1. Implement the game ‘Tic-Tac-Toe’ by using intelligent algorithm (or magic square method)
2. Implement A* algorithm to solve the problem of 8-puzzle (consider any initial state and final state)
3. Shoe the working of A0 algorithm
4. Implement the game using 8 tile puzzle using depth first search technique
5. Implement the game using 8 tile puzzle using Breadth first search technique
7. Implement the prolog for Family history management
8. Implement the authentication program
9. Implement the program for graphics (Individual)
10. Implement the expert system (Mini project : Group task)
EC42074 Network Security (Elective-II for EC/IE)

Teaching Scheme :
Lectures: 4 Hrs. / Week
Practical: 2 Hrs. /Week

Exam Scheme :
Paper: 100 Marks
Practical: --
Term Work: 50 Marks

Topics and Contents

1 Overview:

2 Designing:
Design issues, Cost justification and consideration, Design principle of Block Ciphers and Block Cipher Algorithms, Authenticating architectural design issues.

3 Digital signatures, Certificates and standards, setting and definitional issues, Length-restricted signature scheme, Constructions of signature schemes, planning techniques.

4 Electronic mail security, IP and Web security protocols, SSL and HTTP

5 System security:
Computer Virus, Firewall and Intrusion detection, Electronic commerce security, Cyber laws related to E-commerce

6 Maintenance:
Configuring secure access, Management, ongoing maintenance, standards development, ensuring site security.

7 Results and Future directions:

Text/Reference Books:

TERMWORK: Term work will consist of record of minimum 8 experiments based on the syllabus.
EC42075 Systems Programming (Elective-II for EC/IE)

Teaching Scheme : 
Lectures:  4 Hrs. / Week  
Practical:  2 Hrs. /Week  

Exam Scheme : 
Paper: 100 Marks  
Practical: --  
Term Work:  50 Marks  

<table>
<thead>
<tr>
<th>Topics and Contents</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Basics of System programming:</td>
<td>10</td>
</tr>
<tr>
<td>Language processes, Language processing activities, Fundamentals of language processing, Language processes development tools.</td>
<td></td>
</tr>
<tr>
<td>Data structures of language processing:</td>
<td>9</td>
</tr>
<tr>
<td>search data structure, Allocation data structures. Need of system software, translated types, compiles, assembles, loaders linker and preprocessor</td>
<td></td>
</tr>
<tr>
<td>Introduction to compliers:</td>
<td>9</td>
</tr>
<tr>
<td>Basic compliers function, Phases of compilers with a simple, example of assignment statement in C- shoring how each phase of complier)</td>
<td></td>
</tr>
<tr>
<td>2 Assemblers and Microprocessor:</td>
<td>10</td>
</tr>
<tr>
<td>Assemblers: structures of assembler assembly process, machine dependents, In dependents assemblers features. Pass-I &amp; Pass-II of assemblers design (with 8086), Design of single pass assemblers, Advantages of and Disadvantages of dingle pass Assemblers.</td>
<td></td>
</tr>
<tr>
<td>Microprocessor:</td>
<td>9</td>
</tr>
<tr>
<td>Macro definition and call, macro expansion, Machine Independent macro processor features, Nested macro calls, advanced macro facilities, Design of microprocessor.</td>
<td></td>
</tr>
<tr>
<td>3 Loaders and Linkers:</td>
<td>06</td>
</tr>
<tr>
<td>Basic loaders functions, central loaders scheme Absolute loaders, Subroutine linkers, relocation Loader, Direct linking loader, Dynamic linking loader, Design of absolute loaders direct linking loader, Implantation of MS DOS linker,</td>
<td></td>
</tr>
<tr>
<td>Memory management</td>
<td>08</td>
</tr>
<tr>
<td>Contiguous memory allocation, Non-Contiguous memory allocation, Virtual memory using paging, Virtual memory using Segmentation, File Systems: Directory structure , file protection , allocation of disk space, Implementing file access , File sharing , File system reliability, Case study FAT 32 NFS.</td>
<td></td>
</tr>
<tr>
<td>I/O Organization and I/O Programming:</td>
<td>06</td>
</tr>
</tbody>
</table>

Text Books:

Reference Books:


TERMWORK: Term work will consist of record of minimum 08 experiments based on the syllabus.
EC42072 Mobile Computing (Elective-II for EC/IE)

Teaching Scheme:
Lectures: 04 Hrs. / Week
Practical: 02 Hrs. /Week

Exam Scheme:
Paper: 100 Marks
Practical: --
Term Work: 50 Marks

Topics and Contents

1. **Communication Architecture.**
   Principle of Wireless Communication, Overview 1G, 2G, 2.5G, 3G and 4G technologies, Introduction to CT2, DECT, PHS, PACS, GSM, GPRS, ATM, CDMA, GSM architecture, signaling techniques in network, GSM mobility management and Handoff management, challenges of mobile computing, Cellular system & related concepts.

2. **Protocol Architecture:**
   CDPD, VoIP, GPRS services, WLL system, IPv6 & its application in mobile computing.

3. **Wireless Application Protocol (WAP)**

4. **Cellular Technologies:**
   Spread Spectrum principle, DSSS, FHSS, Bluetooth scenario, architecture, various layers of Bluetooth & link manager protocol, IEEE 802.11 network topology, Adhoc network MAC & its management. HIPERLAN & its types, HIPERLAN2 & its features.

5. **Distributed Mobile Computing:**
   Distributed OS & file system, Mobile computing software (pervasive computing), Data management for mobile computing.

Text/Reference Books:
2. Schiller, “Mobile Communication” Pearson Education.
4. Asoke K Talukder –“ Mobile Computing”TMH.

TERMWORK: Term work will consist of record of minimum 08 experiments on the syllabus.
EC42071 Advanced Digital Signal Processing
(Elective-II for Electronics & Communication)

Teaching Scheme :
Lectures: 4 Hrs. / Week
Practical: 2 Hrs. / Week

Exam Scheme :
Paper: 100 Marks
Practical: --
Term Work: 50 Marks

Topics and Contents Hours
1 Random Signals 06
Characterization of random signals: review of deterministic signals, random
signals, correlation function, power spectra, DT random signals, time averages
for DT random process. filters in sampling rate alteration systems, digital filter
banks and their analysis and applications, multi level filter banks, estimations of
spectra from finite – duration observation of signals. sample rate conversion
using poly-phase filter structures, Efficient D/A conversion in Hi-Fi systems.
2 Adaptive filters 08
Need of adaptive filters, adaptive filters as noise cancellation, configuration of
adaptive filters, main components of adaptive filters, Adaptive Algorithms:
LMS adaptive algorithms, recursive least square algorithms, Adaptive filtering
of ocular artifacts from the human EEG, adaptive telephone echo cancellation.
3 Linear prediction and optimum linear filters 06
Lattice structures, innovation representation of random process, rational power
spectra, AR, MA & ARMA, forward & backward linear prediction, Wiener
filter for filtering and prediction, Solution of the normal equation- Levinson
-Durbin algorithm.
4 Power Spectrum Estimation 08
Estimation of Spectra From Finite duration observation of signals, Estimation
of autocorrelation and power spectrum of random signal, Non parametric
methods for power spectrum estimation- Bartlett window and Welch method.
5 Architectures for DSPs 06
Basic Generic Architectures for DSPs, Harward Architecture, Introduction to
SHARC, Pipelining, MAC, special Instructions, on chip memory, Fixed and
Floating point DSPs, Selection of DSPs, case study of TMS320c54XX,
Implementation of Basic DS algorithms, like FIR, IIR Filters.
6 Applications of DSP using MATLAB 06
Mobile communication, medical, image processing, Acoustic Noise Canceler,
Dynamic range compression, LPC analysis and synthesis, SSB modulation,
Radar tracking implementetion

Text Books:-
Applications”, Pearson education.
Microprocessors with examples from TMS 320C54XX”, Thomas Publication.

Reference Books:
1. P. P. Vaidyanathan, “Multirate Systems and filter banks”, PHI.
6. www.dspguide.com
8. S.k mitra, “dsp”tmh
10. Applications to DSP Using Matlab by proakis

TERMWORK: Term work will consist of record of minimum 8 practicals out of the following using matlab.

1. Generate random signals and plot their realization.
2. Implementation of Least Mean Square (LMS) Algorithm.
3. Determination of FIR prediction filters using Forward and Backward prediction.
4. To implement Levinson Durbin Algorithm for Solution of Normal equations.
5. Realization of cascade Lattice of FIR Filter.
7. Demonstration of Hardware and Software utilities for DSP starter kits (Texas, ADSP or Motorola).
8. Implementation of any one application
Implementation of the following DSP Algorithms on DSP processors:
10. Implementation of IIR Filter
EC42072 Mobile Computing
(Elective-II for Electronics & Communication)

Teaching Scheme:
Lectures: 04 Hrs. / Week
Practical: 02 Hrs. /Week

Exam Scheme:
Paper: 100 Marks
Practical: --
Term Work: 50 Marks

Topics and Contents

1 **Communication Architecture.**
Principle of Wireless Communication, Overview 1G, 2G, 2.5G, 3G and 4G technologies, Introduction to CT2, DECT, PHS, PACS, GSM, GPRS, ATM, CDMA, GSM architecture, signaling techniques in network, GSM mobility management and Handoff management, challenges of mobile computing, Cellular system & related concepts.

2 **Protocol Architecture:**
CDPD, VoIP, GPRS services, WLL system, IPv6 & its application in mobile computing.

3 **Wireless Application Protocol (WAP)**

4 **Cellular Technologies:**
Spread Spectrum principle, DSSS, FHSS, Bluetooth scenario, architecture, various layers of Bluetooth & link manager protocol, IEEE 802.11 network topology, Adhoc network MAC & its management. HIPERLAN & its types, HIPERLAN2 & its features.

5 **Distributed Mobile Computing:**
Distributed OS & file system, Mobile computing software (pervasive computing), Data management for mobile computing.

Text/Reference Books:
2. Schiller, “Mobile Communication” Pearson Education.
4. Asoke K Talukder – “Mobile Computing” TMH.

**TERMWORK:** Term work will consist of record of minimum 08 experiments on the syllabus
**EC42073 Artificial Intelligence**  
*(Elective-II for Electronics & Communication)*

<table>
<thead>
<tr>
<th>Teaching Scheme</th>
<th>Exam Scheme</th>
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<tbody>
<tr>
<td>Lectures: 4 Hrs. / Week</td>
<td>Paper: 100 Marks</td>
</tr>
<tr>
<td>Practical: 2 Hrs. / Week</td>
<td>Practical: --</td>
</tr>
<tr>
<td>Term Work:</td>
<td>Term Work: 50 Marks</td>
</tr>
</tbody>
</table>

**Topics and Contents**

1. **Introduction To Artificial Intelligence**
   - Definition, AI Applications, AI representations, properties of internal representations
   - Heuristic Search Techniques, Best File Search, Mean and End Analysis, A* and AO* Algorithms

2. **Game Playing & Predicate Logic**
   - Minimax search procedure, Alpha-beta cut-offs, Waiting for Quiescence, Secondary Search, Predicate Calculus, Predicate and arguments, ISA Hierarchy, Frame Notation, Resolution, Natural Deduction

3. **Knowledge Representation Using Non-Monotonic Logic**

4. **Planning**
   - Block world, strips, Implementation using goal stack, Non-linear planning using goal stacks, Hierarchical planning, List commitment strategy

5. **Neural Networks**
   - Learning by training neural networks, Introduction to neural networks, Neural net architecture & applications, Natural language processing & understanding & paragmatic, Syntactic, Semantic, Qualities, finite state machines, RTN, ATN, understanding sentences

6. **Expert Systems**
   - Utilization and functionality, Architecture of expert systems, Knowledge representation, Two case studies on expert systems

**Text Books**

1. Elain Rich and Kerin Knight, “Artificial Intelligence”

**Reference Books**


**TERMWORK:** Term work will consist of record of minimum 08 experiments out of the following list
List of Practicals

1. Implement the game ‘Tic-Tac-Toe’ by using intelligent algorithm (or magic square method)
2. Implement A* algorithm to solve the problem of 8-puzzle (consider any initial state and final state)
3. Show the working of A0 algorithm
4. Implement the game using 8 tile puzzle using depth first search technique
5. Implement the game using 8 tile puzzle using Breadth first search technique
7. Implement the prolog for Family history management
8. Implement the authentication program
9. Implement the program for graphics (Individual)
10. Implement the expert system (Mini project: Group task)
EC4208 Project Part-II

Practical: 6 Hrs. /Week  
Practical Exam : 100 Marks
Term –work : 50 Marks

Term –work:

Project part II will be continuation of project part-I under taken by the candidates in the first term. The term work shall consist of a typed report of about 60 pages on the work carried out by a batch of students in respect of the project assigned during the first term part-I and the second term Part-II.

Practical Examination:

It shall consist of an oral examination based on the report submitted by the candidates and or the demonstration of the fabricated design project. The said examination will be conducted by a panel of two examiners consisting of preferably the guide working as a senior and other external examiner preferably from Industry or the university.

Note:

The candidate must bring the project part-I report and the final report completed in all respect while appearing for practical examination of the project.