

**PROFORMA FOR MANDATORY DISCLOSURE OF INFORMATION ABOUT ACCREDITED PROGRAMMES BY INSTITUTIONS TO BE INCLUDED IN THEIR RESPECTIVE INFORMATION BROCHURE, DISPLAYED ON THEIR WEBSITE AND TO BE SUBMITTED TO NBA EVERY YEAR WELL BEFORE THE ADMISSION PROCESS**

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The following information is to be published in the Information Brochure besides being hosted on the Institution's official Website as fixed content.

**Name of the Programme** : **B Tech Electronics & communication Engineering/Computer Science & Engineering**  
**Approved Intake** : **EC - 90**  
**CS - 90**  
**Fees charged (per annum) in Rs.** : **Merit 25000/-, Management 65,000/-**  
**NRI- 1,00000/-**  
**Pass percentage during the last 5 years** : **2007-2008 EC -18.33%**  
**CS - 48%**  
**2008-2009 EC-51.47%**  
**CS-43.75%**

**Teacher Student Ratio** : **1:17**

**No. of Faculty Members** :

<b>Cadre</b>	<b>Number</b>
Professor	: 1
Asst. Professor	: 4
Lecturer	: 23

**Faculty Profile** :

<b>Qualification</b>	<b>No. of Faculty</b>
Ph.D.	: 1
Post Graduate	: 7
Under Graduate	: 20

**Experience of Faculty** :

**Number of Faculty with**

Less than 5 years	: 13
5 to 10 years	: 7
More than 10 years	: 8

**Industrial Consultancy, Research and Development (during the past 5 years):**

Amount of Industrial Consultancy earned (in lakhs of Rupees) :

No. of sponsored research projects completed :

No. of patents produced :

No. of sponsored research projects in progress :

No. of papers published in International journals :

No. of papers published in National journals :

No. of papers presented in International Conferences / Seminars :

No. of papers presented in National Conferences / Seminars :

No. of International Conferences conducted :

No. of National Conferences conducted :

No. of Training Programmes / Short Term Courses conducted :

***Placement Record for the previous year*** :

No. of Companies who visited the Campus : 7

Names and Details of companies who visited the campus along with No. of Students placed : Infosys 14  
Wipro 09

No. of Students placed through campus recruitment : 23

Maximum salary drawn (in Rs.) : 30,000/-

Average salary drawn (in Rs.) : 20,000/-

**Budget Allocation for the Programme (in Rs.) :2,57,77,660/-**

**Recurring : 18,792,660**

**Non Recurring : 69,85,000/-**

**Note: Suppression and/or misrepresentation of information would attract appropriate penal action.**

LABORATORY:

Sl.No.	name of the laboratory/ workshop	List of Experiments	Major Equipment
1	<b>Electrical Work Shop</b>	<ol style="list-style-type: none"> <li>1. Familiarization of tools</li> <li>2. Graphic Symbols-Electrical</li> <li>3. Study of wire joints.</li> <li>4. One lamp controlled by one switch</li> <li>5. Two lamp controlled by one switch</li> <li>6. Stair case wiring</li> <li>7. Godown wiring</li> <li>8. Hospital wiring</li> <li>9. Plug point controlled by one switch</li> <li>10. Fluorescent tube wiring</li> <li>11. Emergency wiring</li> </ol>	<b>Consumables and tools required for wiring practices &amp; soldering irons</b>
2	<b>Mechanical Work Shop</b>	<ol style="list-style-type: none"> <li>1. Work shop safety</li> <li>2. Fitting <ol style="list-style-type: none"> <li>(i) Study of tools</li> <li>(ii) Cutting and fitting Practice</li> <li>(iii) Joint ( any one ) <ol style="list-style-type: none"> <li>(a) stepped joint</li> <li>(b) V - joint</li> <li>(c) N – joint</li> <li>(d) T – joint</li> </ol> </li> </ol> </li> <li>3. Carpentry <ol style="list-style-type: none"> <li>(i) Study of tools</li> <li>(ii) Planning Practice</li> <li>(iii) chisel setting Practice</li> <li>(iv) Halving Joints (cross, Tee or Dove tail)</li> </ol> </li> <li>4. Sheet Metal <ol style="list-style-type: none"> <li>(i) Study of tools</li> <li>(ii) Joints ( grooved joint Double grooved joint Locked joint Paned down joint Locked up joint Riveted joint )</li> <li>(iii) Models like tray , dust pan</li> </ol> </li> <li>5. Welding <ol style="list-style-type: none"> <li>(i) Study of tools</li> <li>(ii) Straight line Welding</li> <li>(iii) Butt Welding ( Single &amp; Double)</li> </ol> </li> </ol>	<p>3 phase Drilling M/C  1 phase Drilling M/C  3 phase Grinding M/C  1 phase Grinding M/C  Welding machine  240/440</p> <p>Hand shear 12”</p>

Sl.No.	NAME OF THE LABORATORY/ WORKSHOP	LIST OF EXPERIMENTS	Major Equipment
3	<b>Electrical Machines Lab</b>	<ol style="list-style-type: none"> <li>1. Study of AC &amp; DC Starters.</li> <li>2. Load test on DC series motor.</li> <li>3. Load test on DC compound motor.</li> <li>4. O.C &amp; S.C test on single phase transformer.</li> <li>5. Loading of single phase transformer.</li> <li>6. O.C.C of self excited dc generator</li> <li>7. Loading on self excited dc generator</li> <li>8. Load test on 3 Phase squirrel cage induction Motor</li> <li>9. Load test on 3 Phase slip ring induction motor</li> </ol>	<p>1 Phase auto transformers  2Nos - 280V, 28A  3 phase auto transformer 500v  3 phase squirrel cage I M  3.7 KW  3 phase slip ring induction motor  3.7 KW/415V  1 phase induction motor  230V/0.75KW  DC shunt motor, 3.7KW  DC Compound motor 3.7 KW  DC Generator 3.7 KW  DC series motors, 3.7KW  Static converter (220V dc, 75 A)  1 phase transformer (2 KVA &amp; 3 KVA)  Loading rheostats</p>
4	<b>Computer Lab</b>	<p><b>Computer Programming Lab</b>  Study of OS Commands  General Introduction to Application Packages  Programming Using C  Control Structures &amp; Pointers  Searching &amp; Sorting  Creation and use of data Bases in a suitable Data Bases Packages.</p> <p><b>Advanced Microprocessor Lab</b>  Introduction to IBM/PC and its DEBUG program commands  - Examining and modifying the contents of the memory  - Assembling 8086 instructions with the ASSEMBLER commands  - Executing 8086 instructions and programmes with the Trace and</p>	

	<p>GO Command.</p> <ul style="list-style-type: none"> <li>- Debugging a program</li> </ul> <p>2. Assembly language program development using IBM/PC Macro assembler</p> <ul style="list-style-type: none"> <li>- Creating an Assembler source file</li> <li>- Assembling source program with MASM</li> <li>- The link program - creating a RUN module</li> <li>- Typical programming examples.</li> </ul> <p><b><u>System Programming And HardwareLab</u></b></p> <ol style="list-style-type: none"> <li>1. Identification of components/cards and PC assembling from components</li> <li>2. Assembly language program for implementing arithmetic operations</li> <li>3. Assembly Language programs for time and date manipulation.</li> <li>4. Assembly Language programs for display /video manipulation</li> <li>5. Assembly Language program for equipment status</li> <li>6. Implementation of a file manager using DOS/BIOS interrupts</li> <li>7. TSR (Terminate and Stay Resident) Programming</li> <li>8. ADC interface</li> <li>9 .Stepper Motor interface using DAC</li> <li>10. Parallel Interface: Printer and HEX keyboard.</li> <li>11. Serial Interface: PC to PC serial interface using null modem</li> </ol> <p><b><u>Object Oriented Programming Lab</u></b></p> <p>Difference between struct and class Data abstraction Data encapsulation and information hiding Inheritance Single inheritance Multiple inheritance Multilevel inheritance Hierarchical inheritance Abstract class Operator overloading Function overloading Over-riding Pointers and arrays Files</p> <p><b><u>Data Structures Lab</u></b></p> <p>Sorting and Searching</p>	
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		<p>Linked List  Stack &amp; Queue  Trees and Graph (Using Java)  <b><u>Language Processors Lab</u></b>  Creation of Single Pass, Two Pass assembler  Macro processor.  Generation of Lexical Analyzer using tools such as Lex  Generation of Parser using tools such as YACC  Generation of LL(1) Parser  Generation of intermediate code  Creation of type checker  Developing a compiler for a subset of a programming language.</p>	
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4	<b>Computer Lab</b>	<p><b><u>Network And Operating Systems Lab</u></b></p> <p>1. Study of system level calls of a suitable multitasking operating system. Exercises involving the system calls. (E.g. fork(), exec(), create() etc. in UNIX.)</p> <p>2. Inter process communication. Shared memory, messages, Semaphores and monitors. Implementation of typical problems (E.g. Bounded buffer, Dining Philosophers. etc.)</p> <p>3. Study of Communication protocols. TCP/IP or a suitable protocol. Client server programming. Distributed algorithms. performance modelling of networks.</p> <p>4. Internet programming using a suitable programming language and Operating system (E.g. JAVA)</p> <p><b><u>Computer Graphics Lab</u></b></p> <p>1. Implementing Line, Circle and Ellipse drawing algorithms</p> <p>2. Implementing scan line polygon filling algorithm</p> <p>3. Implementing seed filling algorithms – flood fill, Boundary fill ( recursive and non recursive)</p> <p>4. Implementing line clipping methods</p> <p>5. Implementing polygon clipping methods</p> <p>6. Generation of different 2D patterns and images.</p> <p>7. 2D transformations using homogeneous coordinates</p> <p>8. Generating B-spline and B-spline curves</p> <p>9. Implementation of Hidden surface elimination techniques of 3D objects</p> <p>10. Implementation of Shading methods for 3D objects</p> <p>11. Implementation of animation methods.</p> <p>12. Programming using Open GL</p>	<b>Computer terminals and Printers</b>
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5	<b>Digital Electronics lab</b>	<ol style="list-style-type: none"> <li>1. Study of basic gates &amp; realization of basic gates using universal gates</li> <li>2. Design of Half Adder and Full Adder using NAND gate &amp; Design and realization of half and Full subtractor</li> <li>3. Design and setup RS &amp; JK flip flop using NAND Gates</li> <li>4. Design and setup code converters ( Binary to Gray and Gray to binary using mode control)</li> <li>5. Asynchronous UP/DOWN Counters using JK Flip Flop</li> <li>6. Design and realisation of sequence generators</li> <li>7. Study of shift registers and design of Johnson and Ring Counter Using it.</li> <li>8. Binary Addition &amp; Subtraction <ol style="list-style-type: none"> <li>(a) 1's Complement</li> <li>(b) 2's Complement</li> </ol> </li> <li>9. Study of IC Counters – 7490,7492,7493,74192</li> <li>10. Astable and Monostable Multivibrators Circuits Using 555</li> <li>11. Study of MUX and DeMUX Circuits using IC's</li> </ol>	<p><b>Cathode ray oscilloscopes</b>  <b>Function generators</b>  <b>Digital IC tester</b>  <b>Circuit development system</b>  <b>Over head projector</b>  Digital IC trainer kit</p>
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6	<b>Electronics Circuits lab</b>	<u><b>Basic Electronics lab</b></u> 1. Study of Passive Components (resistors, capacitors, inductors, transformers) 2. Study of Active components (Transistors diodes) 3. Study of Cathode Ray Oscilloscope 4. Study of Analog Multimeter 5. Study of Digital Multimeter 6. Study of Power Supply 7. Study of function generator 8. Semi conductor diode characteristics (rectifier diodes, zener diodes, LED) 9. Clipping Circuits 10. Clamping Circuits 11. RC integrator 12. RC differentiator 13. Study of Rectifier & filter circuits 14. Transistor characteristics (Common emitter characteristics, common base characteristics)	<b>Cathode ray oscilloscopes</b> <b>Function generators</b> <b>Automatic LCR meter</b> <b>Analog/Digital Multimeters</b>
		<u><b>Electronic Circuits Lab 1</b></u> 1. Active Differentiator and Integrator circuits 2. Biasing of Active Devices (i) Voltage Biasing, Current Biasing & Feed back biasing of BJT (ii) Biasing of JFET 3. Amplifying Circuits (i) Common emitter Amplifier configuration (ii) Common Source Amplifier 4. Feed Back Amplifier Circuits (i) Current Series (ii) Voltage shunt 5. Oscillators (i) RC phase shift (ii) Wein Bridge 6. Multivibrators (i) Astable (ii) Bistable (iii) Monostable 7. Sweep Circuits (i) Transistors sweep (ii) Bootstrap 8. Series voltage regulators Using transistor. 9. Schmitt trigger & Comparator circuits	

S L N O	NAME OF THE LABORATORY/ WORKSHOP	LIST OF EXPERIMENTS	Major Equipment
7	<b>Electronics Circuits lab</b>	<p><b><u>Electronics Circuits lab II</u></b></p> <p>1.Linear circuits: using            (i)OP-Amps-Inverting &amp; non inverting amplifiers            (ii)Summing amplifier (iii)Differential amplifier            (iv)Instrumentation amplifier (v)Integrators &amp;            Differentiators (vi)Measurements of offset voltage            and its compensation (vii)Precision rectifiers</p> <p>2. Circuits using op-amps for waveform generation            (i) Astable &amp; Monostable multivibrators (ii)Wein            bridge oscillator (iii)Triangular, square wave form            generators 3. Second order Active RC filters (i)            High pass,low pass</p> <p>4. Voltage regulators using 723 with short circuit            protection</p> <p>5.Characteristics of SCR JRIAC.MOSFET</p> <p>6.Trigger circuits for full wave / halfwave fully            controlled /half controlled thyristor circuits</p>	<p><b>Cathode rayOscilloscopes</b></p> <p><b>Function generators</b></p> <p><b>Automatic LCR Meter</b></p> <p><b>Analog / Digital multi meters</b></p>

8	Microprocessor lab	<p>1. STUDY OF 8085 MICROPROCESSOR TRAINER KIT</p> <p>2. PROGRAMMING EXERCISES USING 8085 p TRAINER KIT. (LIST OF PROGRAMMING EXAMPLES.)</p> <p>I. ADDITION &amp; SUBTRACTION</p> <p>A) 28 BIT NUMBERS</p> <p>B) 2 16 BIT NUMBERS</p> <p>C) 'N' NUMBERS II. 1 'S' &amp; 2'S</p> <p>COMPLIMENTS</p> <p>III. MULTIPLICATION OF 8 BIT NUMBERS IV. DIVISION OF 8 BIT NUMBERS</p> <p>V. PARITY CHECKING</p> <p>VI. BLOCK TRANSFER</p> <p>VII. BLOCK REVERSAL</p> <p>VIII. FACTORIAL OF A NUMBER</p> <p>IX. SQUARE ROOT OF NUMBER</p> <p>X. SORTING IN ASCENDING &amp; DESCENDING ORDER.</p> <p>XI. FINDING LARGEST &amp; SMALLEST FROM AN ARRAY OF NUMBERS CODE CONVERTERS</p> <p>XII. COUNTERS-SUCH AS HEX COUNTER, BCD COUNTERS</p> <p>XIII. DISPLAY PROGRAMS SUCH AS FLASHING DISPLAY, RUNNING DISPLAY</p> <p>XIV. WAVE FROM GENERATOR</p> <p>XV. EVALUATION OF EXPRESSIONS SUCH AS <math>Y=A+VB</math>, <math>Y=A-VB</math>, <math>Y=(A+B)^2</math>, <math>Y=(A-B)^2</math>, <math>Y=A^3</math> ETC;</p> <p>XVI. READING BYTE FROM A PORT ETC</p> <p>3. INTERFACING &amp; PROGRAMMING OF A/D BOARD</p> <p>4. INTERFACING &amp; PROGRAMMING OF D/A BOARD</p> <p>5. INTERFACING OF STEPPER MOTOR AND ITS PROGRAMMING.</p>	<p>80 85 trainer kit</p> <p>A DC Cards</p> <p>D AC Cards</p> <p>Stepper motors</p> <p>Interfacing cards and cables</p> <p>Power Supply</p>
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9	<p><b>Communication lab 1</b></p>	<p><b>1. ACTIVE FILTERS</b>  I) BAND PASS FILTER II ORDER BUTTER WORTH  II) BAND REJECT  2. AMPLITUDE MODULATOR  3. FREQUENCY MODULATOR  4. AM DEMODULATOR  5. FM DEMODULATOR  6. FREQUENCY CONVERTER - MIXER  7. IF AMPLIFIER  8. TIME DIVISION MULTIPLEXING CIRCUIT  9. PAM MODULATOR  10. PAM DEMODULATOR  11. PWM CIRCUIT  12. PWM DEMODULATOR</p>	<p><b>Cathode Ray  Osilloscopes</b></p> <p><b>DSO. Function  Generators</b></p> <p><b>Analog IC Tester</b></p> <p><b>Circuit Development  systems.</b></p> <p><b>Power supply Unit.  Consumables such as  Transistors ICs etc</b></p>
10	<p><b>Communication Engineering Lab</b></p>	<p>Study of PLL IC  Frequency Multiplier  Delta Modulation  PWM and PPM  PAM and Demodulator  ASK Generator  BPSK Generator  Notch Filter  R2R Ladder N/W  Fibre Optic communication Experiments  Microwave Experiments</p>	<p><b>Digital Multimeter</b>  <b>CRO 4 Trace, Dual Channel</b>  <b>Digital Storage Oscilloscope</b>  <b>Function Generator 20 MHz</b>  <b>Function Generator 2 MHz</b>  <b>Variable Power</b>  <b>Supply(0-30V,2A)</b>  <b>Fixed Power Supply(±5V,</b>  <b>±12V)</b>  <b>Microwave Test Bench</b>  <b>Fibre optic Trainer Kit</b>  <b>Electronic IC Tester</b></p>

<b>11</b>	<b>Signal processing lab</b>	<p>1. Familiarization of Signal processing tool box-MATLAB</p> <p>2. Familiarization of DSP trainer kit (Sampling &amp; reconstruction of signals)</p> <p>List of experiments to be implemented</p> <ol style="list-style-type: none"> <li>1. Generation of basic input signals (both discrete &amp; continuous)</li> <li>2. DFT and spectral analysis computation of DFT, properties of DFT</li> <li>3. Convolution</li> <li>4. Correlation</li> <li>5. Digital filter design- FIR &amp; IIR Filters</li> <li>6. FFT</li> <li>7. Spectral estimation</li> </ol>	<b>Computer terminals and Printers,DSP trainer Kit</b>
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COMPUTING FACILITIES:

Sl.No	Particulars	Availability	
1.	No of Computer terminals -131	131	
2.	Hardware Specification	PIV Processor (76 no's), Intel Xeon Processors (2 no's-server)	
3.	No of terminals of LAN/WAN	48	
4.	Relevant Legal Software	All the computer systems are operated on Linux platform so the requirement of application and system software packages are available on free of cost	
		<b>Application</b>	MS Office 2003
		<b>System</b>	Linux – Redhat Windows XP
5.	Peripheral(s)/ Printers	6	
6.	Internet Accessibility (in kbps & hrs)	Internet facility is available on all network connected terminals.internet facility is through Two 2 MBPS broad band connection facility.	

**Curricula and syllabi for each of the programmes as approved by the University.**

**COCHIN UNIVERSITY OF SCIENCE & TECHNOLOGY  
CENTRE FOR ENGINEERING STUDIES**

**Scheme of Examinations (2006 Admission Onwards)**

Course No	Subject	Hrs/week		Max marks		Total
		L	T/D/P			
<b>SEMESTER I&amp;II (common to all)</b>						
CE/CS/EB/EC/EE /EI/IT/ME/SE 101	Engineering Mathematics I	3		50	100	150
CE/CS/EB/EC/EE /EI/IT/ME/SE 102	Engineering Physics	2		50	100	150
CE/CS/EB/EC/EE /EI/IT/ME/SE 103	Engineering Chemistry	2		50	100	150
CE/CS/EB/EC/EE /EI/IT/ME/SE 104	Engineering Mechanics	3	1	50	100	150
CE/CS/EB/EC/EE /EI/IT/ME/SE 105	Engineering Graphics	1	3	50	100	150
CE/CS/EB/EC/EE /EI/IT/ME/SE 106	Basic Civil & Mechanical Engineering	2		50	100	150
CE/CS/EB/EC/EE /EI/IT/ME/SE 107	Basic Electrical Engineering & Electronics	2		50	100	150
CE/CS/EB/EC/EE /EI/IT/ME/SE 108	Computer Fundamentals	3		50	100	150
CE/CS/EB/EC/EE /EI/IT/ME/SE 109	Technical Communication & Social Sciences	2		50	100	150
CE/CS/EB/EC/EE /EI/IT/ME/SE 110	Computer Programming lab		3	100		100
CE/CS/EB/EC/EE /EI/IT/ME/SE 111	Electrical & Mechanical Workshops		3	100		100
<b>Total</b>		<b>20</b>	<b>10</b>	<b>650</b>	<b>900</b>	<b>1550</b>

## B. Tech. Degree in Computer Science and Engineering

### Scheme of Examinations (2006 Admission Onwards)

<b>SEMESTER III</b>						
CE/CS/EB/EC/E E/EI/IT/ME/SE	Engineering Mathematics II	4		50	100	150
CS/EE 302	Logic Design	4		50	100	150
CS/IT 303	Discrete Computational Structures	4		50	100	150
CS/IT 304	Object Oriented Programming	4		50	100	150
CS 305	Principles of Programming Languages	4		50	100	150
CS/EB/EE 306	Electronics Devices & Circuits	4		50	100	150
CS/EE 307	Electronics Circuits Lab		3	100		100
CS/IT 308	Object Oriented Programming Lab		3	100		100
	<b>Total</b>	<b>24</b>	<b>6</b>	<b>500</b>	<b>600</b>	<b>1100</b>
<b>SEMESTER IV</b>						
CE/CS/EB/EC/E E/EI/IT/ME/SE	Engineering Mathematics III	4		50	100	150
CS/EB/EC/EI 402	Microprocessors	4		50	100	150
CS403	Computer Architecture and Organization	5		50	100	150
CS/IT404	Automata Languages and Computation	4		50	100	150
CS/IT 405	Data Structures and Algorithms	4		50	100	150
CS/IT 406	Data Communication	4		50	100	150
CS/EB/EC/EE 407	Digital Electronics Lab		3	100		100
CS/IT 408	Data Structures Lab		3	100		100
	<b>Total</b>	<b>24</b>	<b>6</b>	<b>500</b>	<b>600</b>	<b>1100</b>
<b>SEMESTER V</b>						
CE/CS/EB/EC/E E/EI/IT/ME/SE	Engineering Mathematics IV	4		50	100	150
CS/IT 502	System Programming	4		50	100	150
CS/IT 503	Software Engineering	4		50	100	150
CS 504	Computer Graphics	4		50	100	150
CS/IT 505	Data base Management Systems	4		50	100	150
CS 506	Microprocessors & System Design	4		50	100	150
CS/EB/EC/EI 507	Microprocessors Lab		3	100		100
CS 508	Computer Graphics Lab		3	100		100
	<b>Total</b>	<b>24</b>	<b>6</b>	<b>500</b>	<b>600</b>	<b>1100</b>

## Semester VI

Subject Code	Subject Name	Hrs./ week		Marks		
		L	T/D/P	Internal	University	Total
EC 601	Digital Communication	4		50	100	150
EC 602	Microwave Techniques & Devices	4		50	100	150
EC/EI 603	VLSI Design	4		50	100	150
EC 604	Electronic Measurements and Instrumentation	4		50	100	150
CS/EB/EC/EI 605	Control Systems Engineering	4		50	100	150
EC/EI 606	Embedded Systems	4		50	100	150
EC 607	Communication Laboratory I	-	3	100		100
EC 608	Mini Project	-	3	100		100
	<b>Total</b>	<b>24</b>	<b>6</b>	<b>500</b>	<b>600</b>	<b>1100</b>

## Semester VII

Subject Code	Subject Name	Hrs./ week		Marks		
		L	T/D/P	Internal	University	Total
CS/EB/EC/EE/EI / IT 701	Industrial Organization & Management	4		50	100	150
EC 702	Radio Communication	4		50	100	150
EC/EI 703	Computer Communication & Networks	4		50	100	150
EC 704	Electronic Product Design	4		50	100	150
EC 705	Elective I	4		50	100	150
EC 706	Signal Processing Laboratory	-	3	100		100
EC 707	Communication Laboratory II	-	3	100		100
EC 708	Seminar	-	2	50		50
EC 709	Project Design	-	2	50		50
	<b>Total</b>	<b>20</b>	<b>10</b>	<b>550</b>	<b>500</b>	<b>1050</b>

### ELECTIVE I:

- EC/EI 705A:            **Intelligent Systems**
- EC 705B:             **Fundamentals of RF Design**
- EC 705C:             **Hardware modeling**

**Semester VIII**

Subject Code	Subject Name	Hrs./ week		Marks		
		L	T/D/P	Internal	University	Total
EC 801	Audio & Video Engineering	4		50	100	150
EC 802	Communication Systems	4		50	100	150
EC 803	Opto Electronics & Communication	4		50	100	150
EC 804	Elective II	4		50	100	150
EC 805	Project Work		14	300		300
EC 806	Viva-voce				100	100
	<b>Total</b>	<b>16</b>	<b>14</b>	<b>500</b>	<b>500</b>	<b>1000</b>
<b>Grand Total</b>					<b>8000</b>	

**ELECTIVE II:**

**CS/EC/EE/EI 804 A: Digital Image Processing**

**CS/EB/EC/IT 804 B: Bioinformatics**

**EC/EI 804 C: ASIC Design**

**EC 804 D: Mixed Signal System Design**

## **B. Tech. Degree in Computer Science and Engineering**

### **Scheme of Examinations ( 2006 Admission)**

#### **CE/CS/EB/EC/EE/EI/IT/ME/SE 101 ENGINEERING MATHEMATICS I**

##### **Module 1**

###### **Ordinary differential equations:**

First order differential equations-Methods of solution and Simple applications-

Linear differential equations of higher orders with constant co-efficients-Methods of solution of these equations. Cauchy's Linear differential equations. Simultaneous linear differential equations- Simple applications of linear differential equations in engineering problems –Electrical Circuits, Mechanical Systems

##### **Module 2**

**Infinite series** : Integral test, comparison test, ratio test, Cauchy's root test, Raabe's test, series of positive and negative terms, concept of absolute convergence, alternating series, Leibniz test(No proofs for any of the above tests)

**Power series** : Interval of convergence of power series, Taylor and Maclaurin series of functions, Leibniz formula for the nth derivative of the product of two functions (No proof),use of Leibniz formula for the determination of co-efficients of the power series.

##### **Module 3**

**Partial differentiation:** Partial differentiation-Concept of partial derivative - Chain rule- Total derivative-Euler's theorem for homogeneous functions, Differentials and their applications in errors and approximations, Jacobians - Maxima minima of functions of two variables(Proof of the result not required)- Simple applications.

Taylor's series expansion for a function on two variables-Simple problems

**Co-ordinate systems:**Rectangular co-ordinates-Polar co-ordinates-In plane and in Space-Cylindrical polar co-ordinates-Spherical polar co-ordinates.

##### **Module 4**

###### **Integral calculus:**

Application of definite integrals: Area, Volume, Arc length, Surface area.

Improper Integrals-Beta function-Gamma function

Multiple integrals : Evaluation of double integrals-Change of order of integration. Evaluation of triple integrals-Change of Variables in integrals.

Applications of multiple integrals Plane Area, Surface area & Volumes of solids

###### **Text Books:**

1. Engineering mathematics -Vol1:S.S.Sastry, PHI publishers
2. Erwin Kreyzig, Wiley Easter Advanced Engineering Mathematics:,\*\*

###### **References:**

1. Mathematical Techniques: Oxford University Press
2. T.Veerarajan Engineering Mathematics:, TMGH Publishers, \*
3. B.S.Grewal ,Higher Engineering Mathematics:, Khanna Publishers, \*

###### ***Type of questions for University Examination***

***Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module***

***Question 2-5 – There will be two choices from each module .Answer one question from each module of 15 marks***

## CE/CS/EB/EC/EE/EI/ME/IT/SE 102: ENGINEERING PHYSICS

### Module 1

Interference of light – Michelson interferometer – Applications-Interference in thin films – Antireflection coatings – Interference filters – Fringes produced by air wedge – Testing of flat surfaces- Diffraction of light – Zone plate - Plane diffraction grating - Reflection and transmission gratings – Determination of wavelength of light – Dispersive and resolving powers - Polarization of light – Double refraction – Nicol's prism – Quarter and half wave plates – Elliptically and circularly polarized light – Optical activity – Specific rotation – Half-shade polarimeter – Applications of polarized light.

### Module 2

Lasers and Holography – Properties of laser light – Coherence of light – Principles of laser action – Population inversion – Optical pumping – Metastable states – Conditions for laser action – Types of lasers – Helium-Neon, Ruby and Semiconductor lasers – Applications of lasers – Principles of holography – Recording and Reconstruction of holograms – Applications of holography- Fiber optics – Light transmission through optical fiber – Numerical aperture – Multi and single mode fibers – Step index and graded index fibers – Fiber drawing – Fiber optic communication (basic ideas) – Ultrasonics – Generation of ultrasonic waves – Applications of Ultrasound.

### Module 3

Quantum mechanics – Heisenberg's uncertainty principle - Experimental illustrations – Quantum mechanical wave equation – Time independent Schrodinger equation – Physical significance of wave function – Properties of the wave function – Solution of Schrodinger equation - Atomic and nuclear physics – The Vector atom model – Quantization of orbital angular momentum – Electron spin - Magnetic moment of orbital electron – Pauli's exclusion principle– Zeeman effect – Stark effect – Raman effect. Nuclear physics – Nuclear forces – Properties of the nucleus - Nuclear reactions-Nuclear reaction cross section-Artificial radioactivity – Nuclear reactors – Nuclear fusion – Thermonuclear reactions-Controlled thermonuclear reactions.

### Module 4

X-rays – Production of X-rays – Origin of X-rays and X-ray spectra – Moseley's law – Properties of X-rays – Applications of X-rays – Diffraction of X-rays by crystals – Bragg's law – Crystallography – Unit cell – Seven crystal systems – Bravais space lattices - Packing factor – Lattice planes and Miller indices – Energy bands in solids – Conductors, semiconductors and insulators – Intrinsic and extrinsic semiconductors – Conductivity of semiconductors – Fermi level - Applications of semiconductors – p-n junctions – solar cells – Hall effect and its applications – Superconductivity – Superconducting transition – The Meissner effect – Type I and Type II superconductors – Isotope effect - High temperature superconductors – Josephson effect – SQUIDS – Applications of superconductors

### Text and Reference Books :

1. Jacob Philip – A text book of Engineering Physics, Educational Publishers and Distributors 2002
2. A.S. Vasudeva – Modern Engineering Physics, S. Chand & Co.,\*
3. M.R. Sreenivasan – Physics for Engineers – New Age International,\*

### *Type of questions for University Examination*

**Question 1** - 8 short answer questions of 5 marks each. 2 questions from each module

**Question 2-5** – There will be two choices from each module .Answer one question from each module of 15 marks

## CE/ CS/EB/EC/EE/EI/ME/IT/SE 103 ENGINEERING CHEMISTRY

### Module 1

Solid state chemistry: Fundamentals, Bonding in solids, Born-Haber cycle, Point defects, Methods to improve reactivity of solids, Free electron theory, Band theory, Fermi level in semiconductors, Molecular field theory of magnetic materials, Conventional and organic superconductors, High temperature superconductors, Liquid crystals, Applications. Solid surface characterisation: Electron spectroscopy for chemical analysis, Chemical shift, BET isotherm, Thermodynamics of adsorption.

### Module 2

Electrochemistry: Fundamentals, Electrode potentials, Types of electrodes, Salt bridge, emf measurement, Concentration cells, Acids and bases, Buffer solutions, pH measurements, Polarisation, Overvoltage. Power generation: Secondary cells, Fuel cells, Photovoltaic effect, Solar cells. Corrosion: Different forms of corrosion, Prevention of corrosion.

Chemical Kinetics: reaction rate, rate constant, rate law, reaction order, first order, second order, pseudo-first order reactions, integrated rate laws, half-life of a reaction and its relation to rate constant.

Molecularity, simple unimolecular and bimolecular reactions. Arrhenius equation. Fast reactions – flash photolysis, flow techniques and relaxation methods.

### Module 3

Chemical Thermodynamics: Fundamentals, Molecular interpretation of internal energy, enthalpy and entropy, Heat of reaction, Kirchhoff's equation, Trouton's rule, Entropy changes accompanying different processes, Nernst heat theorem, Third-law. Free energy: Dependence on pressure and temperature, Gibbs-Helmholtz equation, Free energy changes and equilibrium constant, Chemical potential, Fugacity, Thermodynamics of biochemical reactions.

### Module 4

Engineering materials: Industrial polymers-polymerization techniques, structure-property relationships, polymer additives, polymer processing methods (extrusion, injection, compression, transfer and blow molding methods). Nanomaterials: definition, classification and applications. Nanometals and nanoceramics – examples and properties.

Lubricants: classification, functions and properties. Mechanism of lubrication.

Refractories: classification and properties. Portland cement, lime and plaster of Paris – manufacture, setting and hardening.

Chemistry of optical fibres, fullerenes and organoelectronic materials (introduction only).

### Text Books:

1. Peter Atkins and Julio de Paula *Elements of Physical Chemistry*, Oxford University Press, 2005
2. Shashi Chawla, *A Text Book of Engineering Chemistry* (3<sup>rd</sup> Edn.); Dhanpat Rai & Co, New Delhi, 2003.

### References

1. Atkins, P.W., *Physical Chemistry*, Oxford University Press, UK, 1998
2. Bhatnagar, M. S., *Textbook of Pure & Applied Physical Chemistry*, A. H. Wheeler & Co, New Delhi, 1999.
3. Geoffrey Ozin, Andre Arsenault *Nanochemistry: A Chemical Approach to Nanomaterials*; Royal Society of Chemistry, U.K. 2005.

### Type of questions for University Examination

**Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module**

**Question 2-5 – There will be two choices from each module. Answer one question from each module of 15 marks**

**A) STATICS**

**Module 1**

**Concurrent forces in a plane:** Principles of statics. Composition and resolution of forces. Equilibrium of concurrent forces in a plane. Method of projection. Method of moments. Friction.

**Parallel forces in a plane:** Two parallel forces. General case of parallel forces in a plane. Centre of parallel forces and centre of gravity, Pappus theorems, centroids of composite plane figures and curves. Distributed forces in a plane.

**Module 2**

**Properties of areas:** . Moment of inertia of a plane figure with respect to an axis in its plane. Polar moment of inertia. Product of inertia. Principal axes. Mass moment of inertia of material bodies.

**General case of forces in a plane:** Composition of forces in a plane. Equilibrium of forces in a plane. Plane trusses - Method of joints. Method of sections. Plane frames : Method of members. **Principle of virtual work:** Equilibrium of ideal systems, stable and unstable equilibrium.

**B) DYNAMICS**

**Module 3**

**Rectilinear translation:** Kinematics of rectilinear motion. Differential equation of rectilinear motion. Motion of a particle acted upon by a constant force, by a force as a function of time and by a force proportional to displacement. Simple harmonic motion. D'Alembert's principle. Momentum and impulse. Work and energy, ideal systems, conservation of energy. Impact.

**Module 4**

**Curvilinear translation:** Kinematics of curvilinear translation. Differential equations of motion. Motion of a projectile. D'Alembert's principle in curvilinear motion. Moment of momentum. Work and energy in curvilinear motion.

**Rotation of a rigid body:** Kinematics of rotation. Equation of motion of a rigid body rotating about a fixed axis. Rotation under the action of a constant moment. Compound pendulum. General case of moment proportional to the angle of rotation. D'Alembert's principle of rotation. Resultant inertia force in rotation. Principle of angular momentum in rotation. Energy equation for rotating bodies.

**Text Book & References :**

1. Timoshenko and Young -Engineering Mechanics - McGraw Hill Book Company,\*
2. Beer F. P. & Johnston E. R. - Tata McGraw Hill-Mechanics for Engineers (Vol. 1- Statics and Vol.2 -Dynamics) -. \*\*
3. Merriam H. L. & Kraige L. G. - John Wiley and Sons, Engineering Mechanics (Vol. 1- Statics and Vol.2 -Dynamics) - \*\*
4. Biju N- Engineering mechanics- Educational Publishers.\*

***Type of questions for University Examination***

***Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module***

***Question 2-5 – There will be two choices from each module .Answer one question from each module of 15 marks***

**Module 1**

**Introduction to engineering graphics.**-Drawing instruments and their use, familiarisation with current Indian Standard Code of Practice for general engineering drawing.

Scales- plain scale , vernier scale, diagonal scale.

Conic sections- Construction of ellipse, parabola, hyperbola - construction of cycloid, involute, archimedian spiral and logarithmic spiral- drawing tangents and normals to these curves.

**Module 2**

**Introduction to orthographic projections-** plane of projection- principles of first angle and third angle projections, projection of points in different quadrants.

Orthographic projection of straight lines parallel to one plane and inclined to the other plane- straight lines inclined to both the planes- true length and inclination of lines with reference planes- traces of lines.

Projection of plane laminae of geometrical shapes in oblique positions.

**Module 3**

**Projection of polyhedra and solids of revolution-** frustum, projection of solids with axis parallel to one plane and parallel or perpendicular to other plane- projection of solids with axis inclined to both the planes- projection of solids on auxiliary planes.

Section of solids by planes inclined to horizontal or vertical planes- true shape of sections.

**Module 4**

Development of surface of cubes, prisms, cylinders, pyramids and cones

Intersection of surfaces- methods of determining lines of intersection - intersection of prism in prism and cylinder in cylinder.

**Module 5**

Introduction to isometric projection- isometric scales, isometric views- isometric projections of prisms, pyramids, cylinders, cones and spheres.

Introduction to perspective projections : visual ray method and vanishing point method- perspective of circles- perspective views of prisms and pyramids.

**Text Books & References:**

1. P.I.Varghese & K.C. John -Engineering Graphics- JET Publishers \*\*
2. N.D.Bhat -Elementary engineering drawing- Charotar publishing house
3. P.S.Gill ,Geometric drawing, B.D Kataria &sons Ludhiana \*
4. P I Varghese- Engineering Graphics VIP Publishers.

**University Examination Pattern**

**Answer 5 Questions choosing one from each module-20 marks each**

**CE/CS/EB/EC/EE/EI/IT/ME/SE 106**  
**BASIC CIVIL AND MECHANICAL ENGINEERING**

**(A) CIVIL ENGINEERING**

**Module 1**

**Materials:** *Cement* - varieties and grade of cement and its uses. *Steel*- types of steel for reinforcement bars, steel structural sections. *Brick*- varieties and strength , tests on bricks.

*Aggregates*- types & requirements of good aggregates. *Concrete*- grades of concrete as per IS code, water cement ratio, workability, mixing, batching, placing, compaction and curing.

**Construction :** *Foundation*- types of foundations- isolated footing, combined footing, raft, pile & well foundations,

**Module 2**

**Super structure** : Brick masonry, English bond and Flemish bond , Stone masonry, Random rubble masonry. *Roofing*- Steel trusses, roofing for industrial buildings

**Surveying:** Principles, instruments, ranging and chaining of survey lines, errors in chaining, field work, field book, selection of survey stations, reconnaissance ,

**Levelling :** Levelling instruments, different types, temporary adjustments, mean sea level, reduced level of point, booking of field notes, reduction of levels by height of collimation method.

**Text Books & References :**

1. Rangawala - Engineering materials , \*\*
2. Punmia Building construction , \*\*
3. N.K.R. Murthy, A Text book of building construction, \*\*
4. Roy M Thomas, Fundamentals of Civil Engineering- Educational Publishers. \*
5. Jha & Sinha - A Text book of building construction,
6. T P Kanetkar, Surveying & Levelling, \*
7. Hussain - Surveying & Levelling \* :

**(B) MECHANICAL ENGINEERING**

**Module 3**

**Thermodynamics:** thermodynamic systems - open, closed and isolated systems, equilibrium state. of a system, property' and state, process, cycle, work, Zeroth law of thermodynamics-concept of temperature, temperature scales. First law - internal energy, enthalpy. Second law - Kelvin-Plank and Claussius statements, Carnot Cycle.

**Refrigeration and Air conditioning:** Vapour compression and vapour absorption refrigeration systems, summer and winter Air conditioning, Comfort and industrial Air conditioning.

Elementary ideas of simple reaction and impulse turbines, compounding of turbines.

#### **Module 4**

Internal Combustion Engines: working of two stroke and four stroke Petrol and Diesel engines, simple Carburettor, ignition system, fuel pump, fuel injector, cooling system, lubricating system.

Transmission of Power: Belt drives (open and closed), chain drives.

Metal fabrication: Welding - Arc, gas, resistance welding, Welding defects, Soldering, Brazing

#### **Text Books & References:**

1. P.K.Nag - Engineering Thermodynamics ,\*\*
2. D.B. Spalding & E.H.Cole- Engineering Thermodynamics \*
3. Van Wylon- Engineering Thermodynamics,\*
5. J.P.Holman - Thermodynamics,\*
6. Rogowsky, Tata McGraw Hill - Elements of Internal Combustion Engines \*
7. Gill, Smith & Ziurys Fundamentals of Internal Combustion Engines , Oxford & IBH \*
8. Stoecker Tata McGraw Hill - Refrigeration and Air Conditioning, \*

#### ***Type of questions for University Examination***

##### ***PartA -***

***Question 1- 4 short answer questions of 5 marks each. 2 questions from each module***

***Question 2-3 – There will be two choices from each module .Answer one question from each module of 15 marks***

##### ***Part B***

***Question 4-4 short answer questions of 5 marks each. 2 questions from each module***

***Question 5-6 – There will be two choices from each module .Answer one question from each module of 15 marks***

**(A) ELECTRICAL ENGINEERING**

**Module 1**

**Basic principles of Electric circuits:** Review of Ohms law - Definition of resistance, current, voltage and power - Series and parallel circuits- constant voltage source and constant current source.

**Network Theorems:** Kirchoff's laws- Network analysis by Maxwell's circulation currents - Thevenin's theorem - Superposition theorem -Norton's theorem - Simple illustrative problems on network theorems.

**Review of electrostatics** - Coulomb's Law- Electric field strength and Electric flux density-capacitance.

**Module 2**

**Review of electromagnetic induction** -Faraday's Law- Lenz's Law - mutually induced emf. Magnetic circuits - magnetic field of a coil - Ampere turns calculation - magnetic flux - flux density - field strength.

**Measuring instruments:** Working principle of galvanometer, Ammeter, Voltmeter, watt meter & energy meter.

**AC fundamentals:** Generation of alternating voltage and current - equations of sinusoidal voltage and current - wave form, cycle frequency, time period, amplitude, phase difference, rms value, average value, power factor & form factor. Vector diagram - addition and subtraction of vectors- sine waves in phase and out of phase. AC circuits: RC, RL, RLC circuits-series and parallel - current, voltage and power relationships. Poly phase circuits: vector representation - phase sequence - star and delta connections.

**(B) ELECTRONICS**

**Module 3**

**Passive components:** Resistor – Capacitor - Inductor - Color coding. Transformer- different types, construction.

**Semiconductors:** Energy band diagram – intrinsic & extrinsic semi conductors, doping - PN junction – Diodes, Zener diodes- Characteristics - Application of diodes. Rectifiers- Half wave, full wave and Bridge rectifiers – Ripple factor and regulation.

**Transistors:** - PNP and NPN transistors - theory of operation - Transistor configurations - characteristics - comparison.

**Special semiconductor devices** - FET - SCR - LED - LCD – V-I characteristics, applications.

**Module 4**

**Fundamentals of Instrumentation:** Transducers - Definition - Classification – Active & passive - Transducer for position, pressure, velocity, vibration and temperature measurements.

CRO – principle of operation - measurement of amplitude, frequency and phase.

**Fundamentals of Communication:** Analog communication - concept of modulation, demodulation. Types: AM - FM -PM- Block diagram of general communication system -Basic concepts of digital communication - Block diagram.

**Text Book:**

1. B. L. Theraja - Basic Electronics – Solid State –, S. Chand & Co.\*
2. Leonard S. Bobrow - Fundamentals of Electrical Engineering –Oxford University Press.\*

**Further References:**

📁👉 Edward Hughes - Electrical Technology :, Addison Wesley Publication\*

📁👉 G.K. Mithal & Ravi Mittal - Electronic Devices & Circuits , Khanna Publishers, \*

**Type of questions for University Examination**

**Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module**

**Question 2-5 – There will be two choices from each module .Answer one question from each module of 15 marks**

### Module 1

**Introduction to programming in C:** Fundamental data types- integer, floating point, and enumerated data types, typedef Expressions – arithmetic, relational and logic operators, Type conversion – simple and compound statement, Access to standard library, standard I/O-getchar, putchar, Formatted I/O, scanf, printf, error handling, line input and out put, control structures, selection statement, **IF, SWITCH, WHILE, DO WHILE, FOR, BREAK, CONTINUE, GOTO, RETURN** statements.

### Module 2

**Functions:** Declarations and functions, parameter passing mechanism, storage classes-scope, visibility, and life time of variables, AUTO, EXTERN, STATIC and REGISTER modifiers, Recursion.

### Module 3

**Arrays :** Single and multi dimensional arrays, sorting, selection sort, search-linear search and binary search, Structures and union.

### Module 4

**Pointers:** Pointers and addresses, pointer arrays, function returning pointers, pointers to function, pointer arithmetic,. pointers to structures, array of structures, preprocessor directive, command line arguments

### Text Book

1. Mullish & Cooper The Spirit of C An introduction to Modern programming Jaico Publication 1988
2. B.S. Gotfried (Schaum series, TMH)- Programming in C, \*

### References:

1. Pradeep Dey and Manas Ghosh, "Computer Fundamentals and Programming in C", Oxford 2006
2. Varghese Paul- Computer Fundamentals, \* EPD, Kochi
3. Brian W. Kernighan and Dennis M. Richie, "The C Programming Language" PHI, 2<sup>nd</sup> ed.,

### *Type of questions for University Examination*

**Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module**

**Question 2-5 – There will be two choices from each module .Answer one question from each module of 15 marks**

**CE/CS/EB/EC/EE/EI/ /IT/ ME /SE 109**

**TECHNICAL COMMUNICATION AND SOCIAL SCIENCES**

**(Module IV Environmental Studies : 1 hour per week**

**Other modules : 2 hours per week)**

## **PART - A TECHNICAL COMMUNICATION**

### **Module 1**

**(25 hours)**

**Oral Communication:** starting and ending a conversation; telling and asking people to do things; expressing opinions and ideas, decisions and intentions, offers and invitations, feelings, right and wrong, numbers and money.

Purpose and audience; dealing with customers and clients; face-to-face discussions; meetings and attending

meetings; checking understanding; raising questions; giving and receiving feedback; using body language;

leading and directing discussions; concluding discussions; using graphics in oral presentations

**Reading Comprehension and reference skills:** skimming and scanning; factual and inferential comprehension; prediction; guessing meaning of words from context; word reference; comprehending graphics in technical writing.

Reading strategies; reading speed; reading between the lines for hidden meaning; interpreting graphics; using a dictionary; using an index; using a contents list to find information; choosing the right reference source.

### **Module 2**

**(20 hours)**

**Written Communication:** note making and note taking; summarising; notes and memos; developing notes into text; organisation of ideas: cohesion and coherence; paragraph writing: ordering information in space and time; short essays: description and argument; comparison and contrast; illustration; using graphics in writing: tables and charts; diagrams and flow-charts; maps, plans and graphs.

Spelling rules and tips; writing a rough draft; editing and proof reading; writing the final draft; styling text; filling in complex forms; standard letters; CV; writing a report; writing leaflets and brochures; writing references; essay writing: expository writing; description of processes and products; classification; the instructional process; arguments and presentation of arguments; narrating events chronologically.

## **PART - B SOCIAL SCIENCES**

### **Module 3**

**(15 hours)**

#### **Science, Technology and Ethics**

Impact of science and technology on the development of modern civilization . The philosophy of modern science – scientific determinism – uncertainty principle. Relevance of scientific temper. Science and religion. Science and technology in developing nations. Technological advances of modern India. Intermediate and appropriate technology. Development of technical education in India.

Senses of Engineering Ethics – Variety of moral issues – Types of inquiry – Moral dilemmas – Moral autonomy – Kohlberg’s theory – Gilligan’s theory – Consensus and Controversy – Professional ideals and virtues - Attributes of an ethical personality – Theories about right action – Self interest.

Responsibilities and Rights of engineers – Collegiality and Loyalty – Respect for authority – Collective bargaining – Confidentiality – Conflicts of interest – Professional rights.

#### Module 4

#### Environmental Studies : ( 30 hours)

Natural resources – issues related to the use and over exploitation of forest resources , water resources, mineral resources, food resources and energy resources – role of an individual in conservation of natural resources – equitable use of resources for sustainable life styles.

Concept of an ecosystem – structure and function – energy flow in the ecosystem – ecological succession - food chains, food webs and ecological pyramids – structure and functions of a forest ecosystem and an aquatic eco system.

Definition of biodiversity – genetic, species and ecosystem diversity – biogeographical classification of India – Value of biodiversity : consumptive use, productive use, social, ethical, aesthetic and option values.

Causes, effects and control measures of air pollution, water pollution, soil pollution , noise pollution, marine pollution, thermal pollution and nuclear hazards – Causes, effects and control measures of urban and industrial solid wastes –Role of an individual in prevention of pollution - An overview of the various environmental legislations in India – Issues involved in enforcement of environmental legislation.

The concept of sustainable development – Urban problems related to energy – Water conservation, rain water harvesting, water shed management – Resettlement and rehabilitation of people ; its problems and concerns - Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust – Population growth and problems of population explosion – Environmental ethics : issues and possible solutions..

#### Text Books:

**Meenakshi Raman and Sangeetha Sharma** *Technical Communication : Principles and Practice, Oxford University Press, 2004*

**Rajagopalan. R** *Environmental Studies : From Crisis to Cure, Oxford University Press, 2005*

**Jayashree Suresh and B.S. Raghavan** *Professional Ethics, S. Chand & Company Ltd, 2005.*  
**WC Dampier** *History of Science, Cambridge University Press.*

#### References:

**Adrian Doff & Christopher Jones,** *Language in Use . Upper intermediate, self-study workbook & classroom book, Cambridge University Press,2000.*

**Krishna Mohan & Meenakshi Raman,** *Effective English Communication ,Tata Mc-Graw Hill,2000.*  
**Edmund D. Seebaur & Robert L. Barry** *Fundamentals of Ethics for Scientists and Engineers, Oxford University Press, 2001*

**Krishna Mohan & Meera Banerji,** *Developing Communication Skills Mac Millan India Ltd,2000.*

**Rajendra Pal & JS Korlahalli** *Essentials of business communication, S. Chand & Company Ltd \*\**

**Sarah Freeman,** *Study Strategies, Orient Longman, 1978.\**

**Meenambal T , Uma R M and K Murali** *Principles of Environmental Science and Engineering, S. Chand & Company Ltd, 2005*

### University Examination pattern

The question paper will have two parts. Part A (Technical Communication) will cover Modules I, II and will have a weightage of 50 marks. Part B (Social Sciences) will cover Module III and Module IV (Environmental Studies) and will have a weightage of 50 marks. Part A and Part B will have to be answered in separate answer books.

#### Part A

##### **University examination pattern**

Q I - 4 short type questions of 5 marks, 2 each from module I and II

Q II - 2 questions A and B of 15 marks from module I with choice to answer any one

Q III - 2 questions A and B of 15 marks from module II with choice to answer any one

#### Part B

##### **University examination pattern**

Q I - 5 short type questions of 4 marks, 2 from module III and 3 from module IV

Q II - 2 questions A and B of 10 marks from module III with choice to answer any one

Q III - 2 questions A and B of 20 marks from module IV with choice to answer any one

### **CE/CS/EB/EC/EE/EI/ IT/ ME/SE 110**

#### **COMPUTER PROGRAMMING LABORATORY**

1. Study of OS commands. General introduction to application packages.
2. Programming using C control structures & pointers.
3. Searching & sorting
4. Creation and use of databases in a suitable database package
5. Programming exercises in C.

**Note: 50% Marks is earmarked for continuous evaluation and 50% marks for end semester examination to be assessed by two examiners. A candidate shall secure a minimum of 50% marks separately for the two components to be eligible for a pass in that subject.**

## **CE/CS/EB/EC/EE/EI/ IT/ ME/SE 111ELECTRICAL AND MECHANICALWORKSHOPS**

### ELECTRICAL WORKSHOP

1. One lamp controlled by one switch
2. Series and parallel connections of lamps.
3. Stair case wiring.
4. Hospital Wiring.
5. Godown wiring.
6. Fluroscnt lamp.
7. Connection of plug socket.
8. Different kinds of joints.
9. Transformer winding.
10. Soldering practice.
11. Familiarisation of CRO.

### MECHANICAL WORK SHOP

1. Fitting Shop.
2. Sheet Metal Shop
3. Foundry Shop
4. Welding Shop
5. Carpentry Shop

(Preliminary exercises for beginners in all shops. Specific models may be designed by the teachers.)

Introduction to the use of concrete mix.

**Note: 50% Marks is earmarked for continuous evaluation and 50% marks for end semester examination to be assessed by two examiners. A candidate shall secure a minimum of 50% marks separately for the two components to be eligible for a pass in that subject.**

### **Module 1**

*Matrices and Vector spaces:* Rank of matrix, Echelon and normal form, Solutions of linear systems of algebraic equations, Eigen values and Eigen vectors, Cayley- Hamilton theorem (no proof). Vector Spaces-Subspaces,-Linear Independence of vectors-Linear span-Dimension and Basis. Linear transformations.

### **Module 2**

*Fourier series and Fourier integrals:* Fourier series of Periodic functions-Euler formulae for Fourier coefficients- functions having period  $2\pi$  , arbitrary period- even and odd functions-half range expansions, Fourier integral, Fourier cosine and sine transformations, linearity property, transform of derivatives, convolution theorem (no proof)

### **Module 3**

*Laplace transforms:* Linearity property, transforms of elementary functions, Laplace transforms of derivatives and integrals, differentiation and integration of transforms, convolution theorem (no proof), use of Laplace transforms in the solution of initial value problems, unit step function, impulse function - transform of step functions, transforms of periodic functions.

### **Module 4**

*Vector calculus :* Scalar and Vector point functions-Gradient and directional derivative of a scalar point functions.- Divergence and Curl of a vector point functions- their physical meanings. Evaluation of line integral, surface integral and volume integrals, Gauss's divergence theorem,. Stoke's theorem (No Proof of these theorem), conservative force fields, scalar potential.

### **Text books:**

1. R.K. Jain, S.R.K Iyengar: Advanced Engineering Mathematics, Narosa publishers.1991
2. C.R. Wilie & L.C. Barrett: Advanced Engineering Mathematics, MGH Co.

### References

1. Larry C Andrews, Ronald C Philips: Mathematical Techniques for Engineers & Scientists, PHI
2. M.C. Potter, J.L. Goldberg: Advanced Engineering Mathematics, Oxford university press
3. B. S. Grewal: Higher Engineering Mathematics, Khanna publishers,1986

### ***Type of questions for University Examination***

***Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module***

***Question 2-5 – There will be two choices from each module .Answer one question from each module of 15 marks***

## **CS 302 LOGIC DESIGN**

### **Module 1**

Number Systems and codes: Binary ,Octal and Hexa decimal number Systems-Binary arithmetic ,binary code,Excess-3 code, Gray error detection and correction.

Boolean Algebra: Postulates and theorems, representation of switching functions –SOP and POS forms –Karnaugh map representation –Minimization using K-maps.

### **Module 2**

Design of combinational circuits:-Tabular minimization:- Design of single output and multi-output functions-Design using AND,OR,NOT ,NAND NOR and EX-OR gates, Logic circuits from Boolean Expressions. Design using MSI and LSI devices-Digital Multiplexer /Selector Decoder. Demultiplexer –Design of 4 bit adder, Carry look ahead adder –BCD Converter,Logic implementation using ROM,PAL and PLA.

### **Module 3**

Introduction to Sequential Ckts: combinational Versus sequential Circuits, Asynchronous Versus Synchronous circuits-Memory elements and their Excitation function-Tff, Dff, RSff, JK ffs and their excitation requirements –Design of Sequential Circuits- Shift Registers, Counters –Synchronous and Asynchronous counters, Up—Down counters, Modular Counter, Ring Counter, Johnson counter ,Analysis of Sequential circuits-State table and Diagrams.

### **Module 4**

Logic Families: RTL ,DTL ,TTL,CMOS –Tristate logic –Specification and transfer characteristics of basic TTL interfaces,-Standard logic levels-Current and voltage parameters-fan in and fan out –Propagation delay, integrated circuit modules, noise consideration-Interfacing of CMOS to TTL and interfacing of TTL to CMOS.

### **Text Book:**

1. Yarbrough, “Digital Logic Applications And Design” , Thomson Learning, India

### **References:**

1. Taub & Schilling ,”Digital Integrated Electronics”, Mc Graw Hill
2. Samuel C Lee ,”Digital Circuits and logic Design”,Prentice Hall
3. A p Malvino , “ Digital Computer Electronics “, Tata Mc Graw Hill
4. Morris Miller ,”Design with TTL integrated Circuit”, Mc Graw hill
5. Peatman, ”Digital Hardware Design “,”, Mc Graw Hill
6. Ronald J Tocci ,”Digital Systems ,Principles and Applications”, Prentice Hall
7. Lloyd ,”Digital Fundamentals “, universal , N .Delhi
8. Mercins , “Switching Circuits “, Prentice Hall
9. MOS-LSI Circuits , Publication of Texas Instruments
10. Douglas v hall ,” Digital Circuits and Systems “, Mc Graw Hill
11. R P Jain , Principles of Digital Electronics
12. Mike Toolay, “Electronic Circuits – Fundamentals and Applications”, Elsevier, New Delhi

### ***Type of questions for University Examination***

***Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module***

***Question 2-5 – There will be two choices from each module .Answer one question from each module of 15 marks***

## CS/IT 303 DISCRETE COMPUTATIONAL STRUCTURES

### Module 1

Logics and Proofs ,propositions, conditional propositions and logical equivalences, quantifiers, proofs resolution, mathematical induction ,sets ,relations ,equivalence relations ,functions.

### Module 2

Algorithms introduction, notations, recursive algorithms, complexity of algorithm, counting methods and pigeon hole principle, recurrence relations.

### Module 3

Graph theory, paths and cycles, Hamiltonian cycles, representation of graphs, Eulerian paths, traveling sales man problem, trees, characterization, spanning trees, game trees.

### Module 4

Algebraic systems semi groups, monoid, subgroups, homomorphism, isomorphism automorphism , rings, sub rings, posets, lattice, hasse diagrams

### Text books:

1. Richard Johnsonbaugh - Discrete Mathematics Pearson Education fifth edition
2. Satinder Bal Gupta - Discrete mathematical structures Laxmi publications III edition

### References:

1. Malik D. S., Sen S. K - Discrete Mathematical Structures , Thomson Learning
2. Garry Haggard, John Schlipf, Sue Whitesides, Discrete Mathematics for Computer Science, Thomson Learning
3. Bernard Kolman, Robert C Busby, Sharon Cutler Ross, Nadeem-ur-rehman Discrete mathematical structures, Pearson Education
4. J P Tremblay and Manohar Mc Graw Hill - Discrete mathematical structures with applications to computer science -
5. John Truss Addison Wesley- Discrete mathematical structures for Computer science

### *Type of questions for University Examination*

*Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module*

*Question 2-5 – There will be two choices from each module .Answer one question from each module of 15 marks*

## **CS/IT 304 OBJECT ORIENTED PROGRAMING USING C++**

### **Module 1**

Object oriented technology, comparison with procedural programming (C and C++),key concepts of object programming, input and output in C++, declarations ,control structures, functions

### **Module 2**

Classes and Objects, declaring objects, accessing member variables, defining member functions, inline functions, static member variables and functions, friend function, overloading, constructors and destructors, overloading constructors, copy constructors anonymous objects, dynamic initialization using constructors, dynamic operators and constructors, recursive constructors encapsulation

### **Module 3**

Inheritance, types of inheritance, virtual base class, abstract class, advantages and disadvantages of inheritance, pointers and arrays, C++ and memory

### **Module 4**

Binding, polymorphism and virtual functions, generic programming with templates, exception handling, string handling and file handling

### **Text Books:**

1. Ashok N Kamthane , Pearson education - Object oriented programming with ANSI and TURBO C++ ,
2. Saurav Sahay - Object oriented programming with C++, Oxford

### **References:**

1. Malik, Thomson Learning C++ Programming :From Problem Analysis To Program Design,
2. Forouzan, Thomson Learning - Computer Science :A Structured Approach Using C++,2nd Ed.,

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***Question 2-5 – There will be two choices from each module .Answer one question from each module of 15 marks***

## CS305 PRINCIPLES OF PROGRAMING LANGUAGES

### Module 1

Programming domains. Language Evaluation. Programming paradigms -Imperative programming, Functional programming, Object oriented programming, Logic programming. Formal methods of describing syntax and semantics - Backus Naur Form, Attribute grammars. Describing semantics - Denotational semantics.

### Module 2

Data types, Names, Variables, Bindings, Scope and lifetime, Referencing Environments-Named Constants-Variable Initialization-Subprograms-Parameter Passing-Coroutines.

### Module 3

Data abstraction and encapsulation. Polymorphism and inheritance. Features of object-oriented languages - Smalltalk, C++ and Java. Design and implementation issues. Exception handling.

### Module 4

Functional programming languages - Lambda calculus - Introduction to pure LISP . Application of functional programming languages. Logic programming languages - a brief introduction to predicate calculus - Horn clauses - Logic programming. Introduction to Prolog. Applications of Logic programming.

### Text Books:

1. Robert W. Sebesta, "Concepts of Programming Languages".
2. Ravi Sethi, "Programming Languages-concepts and constructs", Addison Wesley, Second Edition , 1996.

### References:

1. Michael L. Scott, "Programming Language Pragmatics – Elsevier, New Delhi
2. Thomson Learning, Kenneth.C.Louden, "Programming Languages:Principles And Practices" ,2nd Ed.,.
3. Terence W. Pratt, "Programming Languages", Prentice Hall , Ninth edition 1996.
4. Michael J Gordon, "Programming Language Theory and its implementation", Prentice Hall ,1991
5. Bjarn Stroustrup, "Design and Evolution of C++", Addison Wesley, 1991
6. "Symbolic Logic and Logic programming", Learning Material Series, Indian Society for Tech. Education, 1996
7. James Gosling "Java Programming Language", Addison Wesley,

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## EB/EE/CS 306 ELECTRONIC DEVICES & CIRCUITS

### Module I

DC power supplies - power transformers - rectification - half wave , full wave, bridge - expression for ripple factor, efficiency, comparison, diode ratings. filters - capacitor - inductor LC filters- use of bleeder resistor - voltage multipliers - dual power supplies - zener and avalanche diodes - simple and series voltage regulator. *Special semiconductor devices*: Principles and operation of photodiodes, PIN diodes, phototransistors, LED, UJT. MOSFET- basic principles & characteristics.

### Module II

*Small Signal amplifiers: Bipolar junction transistor* – configurations, characteristics - current amplification factors - relations between alpha & beta – comparison. *BJT amplifiers*: Biasing techniques of BJT- stabilization of operating point - h-parameters - CE RC coupled amplifier - concept of load lines- frequency response of RC coupled amplifier - frequency analysis of R C coupled amplifier - lower cut-off frequency - upper cut-off frequency - 3 db bandwidth.

*FET Amplifiers*: Principle of operation, characteristics, Common source amplifier- design, frequency response-applications

### Module III

*Power amplifier* - classification - class A, B, AB and C power amplifiers-tuned amplifier- push-pull and complementary symmetry power amplifier –Harmonic distortion – Heat sinks.

*Feed-back amplifiers*: concept of Negative and positive feedback – Bark Hausen criteria -low frequency sinusoidal oscillators

*High frequency oscillators* – types- LC, Crystal oscillators –circuit diagram-description-applications

### Module IV

*Pulse Circuits*:-Different types Pulse circuits - pulse characteristics - Pulse shaping using RC circuits - Differentiating and integrating circuits –applications. Clipping and clamping circuits using diodes - *Transistor as a switch*– simple sweep circuits-bootstrap sweep.

*Multivibrators*-astable, monostable and bistable circuits using BJTs-applications

### Text book:

1. Boylestead & Neshelsky, *Electronic Devices & Circuit Theory*, Prentice Hall of India.2003
2. Millman & Halkias, *Electronic Devices & Circuits*, Tata McGraw Hill, New Delhi.1996
3. Taub &Schilling, *Pulse,digital and Switching circuits*,Tata Mc Graw Hill 2002

### References:

1. Bapat Y N, *Electronic Devices & Circuits*, Tata McGraw Hill, New Delhi.1995
2. Allan Mottorshed, *Electronic Devices & Circuits*, Prentice Hall of India, New Delhi.2003
3. Schilling & Belove, *Electronic Circuits, Discrete & Integrated*, Tata McGraw Hill, New Delhi 1989
4. Theodore F.Bogart, *Electronic Devices & Circuits* Universal Book Stall, New Delhi 1992

### *Type of questions for University Examination*

**Question 1** - 8 short answer questions of 5 marks each. 2 questions from each module

**Question 2-5** – There will be two choices from each module .Answer one question from each module of 15 marks

## EE/CS 307 ELECTRONICS CIRCUITS LABORATORY

1. Study of - Multimeter, Signal generators, CRO etc. and measurement of electrical quantities (Voltage, Current, FREQUENCY & PHASE)

1.

## 2. Characteristics of Active devices

- Forward and reverse characteristics of a diode - measurement of forward resistance
- Common base characteristics of a transistor - measurement of current gain, input resistance and output resistance, maximum ratings of the transistor.
- Common emitter characteristics of a transistor - measurement of current gain, input resistance and output resistance, relation between and study of the effect of leakage current, maximum ratings of the transistor.
- Common source characteristics of a JFET - measurement of transconductance  $g_m$  and
  - drain to source resistance  $r_{ds}$ , use of FET as VVR.

## 3. Rectifying circuits

- HW rectifier
- FW rectifier
- FW Bridge rectifier
- Filter circuits - Capacitor filter, inductor filter and Pi section filter  
(Measurement of ripple factor, maximum ratings of the devices)

4. Regulators – Simple zener voltage regulator, study of transistor series voltage regulator

5. RC coupled amplifier-Frequency response characteristics

6. Low frequency oscillators-RC phase shift or Wien Bridge oscillator

7. Differentiating and Integrating circuits

1. Clipping and clamping circuits

2. Astable multivibrator

**Note: 50% Marks is earmarked for continuous evaluation and 50% marks for end semester examination to be assessed by two examiners. A candidate shall secure a minimum of 50% marks separately for the two components to be eligible for a pass in that subject.**

## CS/IT 308 OBJECT ORIENTED PROGRAMMING LABORATORY

Exercises to make the students understand the following concepts

Difference between struct and class

Data abstraction

Data encapsulation and information hiding

Inheritance

Single inheritance

Multiple inheritance

Multilevel inheritance

Hierarchical inheritance

Abstract class

Operator overloading

Function overloading

Over-riding

Pointers and arrays

Files

**Note: 50% Marks is earmarked for continuous evaluation and 50% marks for end semester examination to be assessed by two examiners. A candidate shall secure a minimum of 50% marks separately for the two components to be eligible for a pass in that subject.**

### **EB/EC/EE/EI/CE/CS/IT/ME/SE 401 ENGINEERING MATHEMATICS III**

#### **Module 1**

*Complex Analytic functions and conformal mapping:* curves and regions in the complex plane, complex functions, limit, derivative, analytic function, Cauchy - Riemann equations, Elementary complex functions such as powers, exponential function, logarithmic, trigonometric and hyperbolic functions. *Conformal mapping:* Linear fractional transformations, mapping by elementary functions like  $Z^2$ ,  $e^z$ ,  $\sin z$ ,  $\cos z$ ,  $\sin hz$ , and  $\cos hz$ ,  $Z+1/Z$ .

#### **Module 2**

*Complex integration:* Line integral, Cauchy's integral theorem, Cauchy's integral formula, Taylor's series, Laurent's series, residue theorem, evaluation of real integrals using integration around unit circle, around the semi circle, integrating contours having poles, on the real axis.

#### **Module 3**

*Partial differential equations:* Formation of partial differential equations. Solutions of equations of the form  $F(p, q) = 0$ ,  $F(x,p,q)=0$ ,  $F(y,p,q)=0$ ,  $F(z,p,q)=0$ ,  $F_1(x,p) = F_2(y,q)$ , Lagrange's form  $Pp+Qq = R$ . Linear homogeneous partial differential equations with constant co-efficients.

#### **Module 4**

*Vibrating string:* one dimensional wave equation, D'Alembert's solution, solution by the method of separation of variables. *One dimensional heat equation,* solution of the equation by the method of separation of variables, *Solutions of Laplace's equation* over a rectangular region and a circular region by the method of separation of variables.

#### **Text Books:**

1. R.K.Jain, S.R.K.Iyengar: Advanced Engineering Mathematics, Narosa Publishers.1991
2. C.R.Wilie & L.C.Barrett: Advanced Engineering Mathematics, MGH Co.

#### **References:**

1. Ervin Kreyszig, Wiley Eastern - Advanced Engineering Mathematics
2. Churchill R.V- Complex Variables & Applications: MGH Publishers.
3. M.C.Potter - Advanced Engineering Mathematics, J.L.Goldberg Oxford University Press

#### **Type of questions for University Examination**

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**Question 2-5 – There will be two choices from each module .Answer one question from each module of 15 marks**

### **CS/EB/EC/EI 402 MICROPROCESSORS**

Introduction to 8 bit microprocessor: Microcomputers and microprocessors, 8/ 16/ 32/ 64-bit microprocessor families; Internal architecture of Intel 8085 microprocessor: Block diagram, Registers, Internal Bus Organization, Functional details of pins, Control signals, External Address / Data bus multiplexing, Demultiplexing, I/ O mapped I/ O, and memory mapped I/ O techniques. Interrupts, Serial communication and DMA features

#### **Module 2**

Assembly Language Programming: 8085 instruction set: Instructions, Classifications, Addressing modes, Stack and Subroutines, Delay routines, Counters etc. Programming examples.

#### **Module 3**

Instruction Timing and Interrupts: Timing Diagrams (of various instructions): T- state, Machine cycle (Opcode fetch, Read / Write, Interrupt Acknowledge, Bus Idle, etc), Interrupts: -types (h/ w and s/ w), Maskable / Non maskable, their organization.

#### **Module 4**

Interfacing concepts and devices:

Memory interface: Concept of memory chip/ chips interface to 8085 with appropriate examples  
Programmable interfacing devices: - Programmable peripheral interface (Intel 8255), Programmable timer interface (Intel 8253/ 54), Programmable display / Keyboard interface (Intel 8279), Programmable serial communication interface (Intel 8251)-(their architecture, register organization, initialization, hardware and software interface to 8085.

#### **Text Books:**

1. Ghosh and Sridhar: 8080 to 8085 Microprocessors for Engineers and Scientists
2. Gaonkar: Microprocessors, Architecture, Programming and Applications.

#### **References:**

1. Nagoor Kani, Microprocessors, architecture and programming, RBA Publications, 2004
2. Douglas V. Hall , Microprocessors, Interfacing and Peripherals, Tata McGraw Hill, 2nd ed.
3. S. P. Chowdhuray, Sunetra Chowdhuray, Microprocessors and Peripherals, SCITECH, 2004

#### ***Type of questions for University Examination***

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## CS 403 COMPUTER ARCHITECTURE & ORGANISATION

### Module 1

Basic structure of computers – Functional units – Basic operational concepts – Bus structures – Instructions & instruction sequencing. Hardware and software - Addressing modes – Assembly language – Stacks & Subroutines

### Module 2

Processing Unit – Fundamental concepts – Execution of a complete instruction - Hardwired control unit- micro programmed control - control signals - microinstructions- micro program sequencing- Branch address modification- Pre-fetching of micro instructions- Emulation.

Computer arithmetic - logic design for fast adders - multiplication - Booth's algorithm - Fast multiplication - integer division - floating point numbers and operations.

### Module 3

Memory organization-Semiconductor RAM memories- internal organization of memory chips- Static and Dynamic memories - cache memories - mapping functions- replacement algorithms - virtual memory - address translations – performance considerations – interleaving - Secondary storage.

### Module 4

Input-output organizations - interrupts – Enabling & Disabling interrupts - handling multiple devices - device identification - vectored interrupts - interrupt nesting – Simultaneous requests – DMA - Buses - I/O interface circuits – Standard I/O interfaces.

### Text Books:

1. Hamacher C. V., “Computer Organisation – International Edition -5th Edition”, Mc.Graw Hill, New York
2. Stallings William, “Computer Organization and Architecture”, 6th Edition, Pearson Education, 2003

### References:

1. Pal Chaudhary P, “Computer Organisation and Design “ , Prentice Hall, New Delhi,
2. Hayes J P , “Computer Organisation and Architecture - 2nd Edition “, Mc Graw Hill,
3. Tanenbaum A S , ”Structured Computer Organisation - 3rd Edition”, Prentice Hall,
4. Behrooz Parhami, Computer Architecture from Microprocessors to Supercomputers Oxford Indian Edition
5. Kai Hwang & Faye A Briggs “Computer Architecture and Parallel Processing “Mc.Graw Hill.,New York –1985
6. D.A Patterson and J.L Hennesy ,”Computer Organization and Design: The hardware/software Interface 2nd Edition”, Harcourt Asia private Ltd. (Morgan Kaufman),Singapore 1998

### *Type of questions for University Examination*

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## CS/IT 404 AUTOMATA LANGUAGES AND COMPUTATION

### Module 1

Finite state systems NFA DFA, Equivalence of NFA and DFA, Equivalence of NFA and NFA with epsilon moves, regular expression, Equivalence of regular expression and finite automata, Finite automata with output associated with state, Finite automata with output associated with transition, Equivalence of finite automata with output, applications of Finite automata, Pumping Lemma , closure properties of Regular sets, Decision algorithms , My Hill Nerode theorem , minimization of DFA

### Module 2

Context Free grammars derivations parse Trees, ambiguity Simplification CNF,GNF,PDA DPDA, equivalence of PDA and CFL, pumping lemma for CFL, Closure Properties, decision algorithms, CYK algorithm

### Module 3

Turing machine, Techniques for construction of TM , storage in finite control, multiple tracks ,shifting over ,checking of symbols ,subroutines, NDTM , undecidability, universal TM

### Module 4

Recursive and recursively enumerable languages, Properties, halting problem of TM Chomsky Hierarchy ,equivalence of regular grammar and FA , equivalence of unrestricted grammar and TM , equivalence of LBA and CSL relation between languages

### Text Books:

1. J E Hopcroft and J D Ullman Introduction to Automata Theory and Languages and Computation, Addison Wesley
2. Michael Sipser, Introduction to the Theory of Computation, Thomson Learning

### References:

1. Misra and Chandrasekharan, Theory of Computation, Prentice Hall
2. H R Lewis Papadimitrou, Elements of Theory of Computation PHI
3. John Martin, Introduction to Language and Theory of Computation, TMH
4. Peter Linz, An Introduction to Formal Languages and Automata Narosa Publucation

### *Type of questions for University Examination*

*Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module*

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## CS/IT 405 DATA STRUCTURES & ALGORITHMS

### Module 1

Introduction to Data structures - Arrays & sparse matrices – representation, Searching - linear, binary, Fibonacci – Sorting – selection, bubble, insertion, quick, merge, heap, Introduction to external sorting, Hash tables – Hashing functions

### Module 2

Linked lists – singly, doubly and circular lists, Application of linked lists – Polynomial manipulation, Stacks – Implementation of stacks using arrays and lists – Typical problems – Conversion of infix to postfix – Evaluation of postfix expression . Queues & Deques – implementation., priority queues

### Module 3

Trees, Definition and mathematical properties. Representation – sequential, lists - Binary trees – Binary tree traversals – pre-order, in-order & post-order, Expression trees . Threaded binary trees . Binary Search trees . AVL trees

### Module 4

Graphs – Graph representation using adjacency matrices and lists – Graph traversals – DFS, BFS - shortest path – Dijkstra’s algorithm, Minimum spanning tree – Kruskal Algorithm, prims algorithm – Binary search, B trees and B+ trees.

### Text Book:

1. Michael Waite and Robert Lafore, “Data Structures and Algorithms in Java” , Techmedia, NewDelhi, 1998.
2. Adam drozdek,” Data Structures and Algorithms in Java” ,Thomson Publications, 2nd Edition.
3. Sartaj Sahni, 'Data Structures, Algorithms, and Applications in Java", McGraw-Hill

### References:

1. Aaron M.Tanenbaum, Moshe J.Augenstein, “Data Structures using C”, Prentice Hall InternationalInc., Englewood Cliffs, NJ, 1986
2. Ellis Horowitz and Sartaj Sahni, “ An introduction to Data Structures”, Computer Science Press,Rockville, MA, 1984
3. Mark Allen Weiss, “Data Structures and Algorithm Analysis in C++”, Benjamin/CummingsPublishing Company Inc., Redwood City, CA, 1991
4. Jean Paul Tremblay and Paul G Sorenson, “An introduction to Data Structures with Applications”,McGraw-Hill, Singapore, 1984

### *Type of questions for University Examination*

*Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module*

*Question 2-5 – There will be two choices from each module .Answer one question from each module of 15 marks*

## CS/IT 406 DATA COMMUNICATION

### Module 1

Data transmission: Communication model-Data Transmission: Concepts and Terminology- Analog and Digital Data Transmission- Transmission Impairments- Guided transmission media- Wireless Transmission- Line-of-sight Transmission. Channel Capacity-Band width and Shannon's capacity equation

### Module 2

Signal Encoding Techniques: *Digital Data, Digital Signals*:-Unipolar. Polar: NRZ-RZ-Biphase-Manchester-Differential Manchester. Bipolar: AMI-B8ZS-HDB3.

*Digital Data, Analog Signals*:-Aspects of Digital to Analog Conversion: Bit rate and Baud rate-Constellation pattern. ASK-FSK-PSK-QPSK-QAM-Bandwidth of ASK,FSK,PSK and QAM.

Modems-Types of modem-Modem standards

*Analog Data, Digital Signals*:- Sampling principles-Quantization-Nyquist Theorem. PAM-PCM-Delta Modulation

*Analog Data, Analog Signals*:-AM-FM-PM-Bandwidth of AM,FM and PM.

*Data Compression*:- Frequency dependent coding-Huffman coding-LZW Coding

### Module 3

Digital Data Communication Techniques: Asynchronous and Synchronous Transmission-Types of Errors-single bit and burst errors-Error Detection: Redundancy- LRC-VRC-CRC-Capabilities and performance of CRC-Error Correction: single bit error correction – Hamming code- Burst error correction-convolution code. Data Link Control: Line discipline-Flow control-Error control: ARQ-stop and wait ARQ-Continuous ARQ- Line utilization of different ARQs-Link management-HDLC

### Module 4

Multiplexing: Frequency-Division Multiplexing-Synchronous Time-Division Multiplexing-Statistical Time-Division Multiplexing-Asymmetric Digital Subscriber Line-xDSL

Spread Spectrum: The Concept of Spread Spectrum-Frequency Hopping Spread Spectrum-Direct Sequence Spread Spectrum-Code-Division Multiple Access

### Text Books:

William Stallings, *Data and Computer Communication*, 8/e ,Pearson education,2006.

References:

1. Behrouz A. Forouzan, *Data Communication and Networking* 4/e, TMG,2006.
2. Fred Halsal, *Data Communication Computer Network and Open Systems*, 4/e, Person education ,2005.
3. William A. Shay, *Understanding Data Communication & Networks*, 2/e, Thomson Learning,2003
4. James Irvin & David Harle, *Data communication and Networks: an Engineering approach*, Wiley,2006.

*Type of questions for University Examination*

*Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module*

*Question 2-5 – There will be two choices from each module .Answer one question from each module of 15 marks*

1. Half adder and full adder using NAND gates.
2. Code converters - Binary to Gray and gray to Binary using mode control
3. Binary addition and subtraction (a) 1's complement (b) 2's complement(using 7483)
4. BCD adder using 7483.
5. Study of MUX, DeMUX & Decoder Circuits and ICs
6. Set up R-S & JK flip flops using NAND Gates
7. Asynchronous UP / DOWN counter using JK Flip flops
8. Design and realization of sequence generators.
9. Study of shift registers and Implementation of Johnson and Ring counter using it.
10. Study of IC counters 7490, 7492, 7493 and 74192 or the CMOS equivalent.
11. Astable and monostable multi- vibrators using TTL gates.
12. Transfer characteristics and specifications of TTL gates

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## CS/IT 408 DATA STRUCTURES LABORATORY

1. Simple programming exercises in Java
2. Study of algorithms and implementation in Java programming language for the following:
  - Searching and Sorting
  - Linked Lists- Singly and doubly
  - Stacks – various applications
  - Queues
  - Trees
  - Graphs

**Note: 50% Marks is earmarked for continuous evaluation and 50% marks for end semester examination to be assessed by two examiners. A candidate shall secure a minimum of 50% marks separately for the two components to be eligible for a pass in that subject.**

## Module 1

*Probability distributions:* random variables (discrete & continuous), probability density, mathematical expectation, mean and variance of a probability distribution, binomial distribution, Poisson approximation to the binomial distribution, uniform distribution, normal distribution. *Curve fitting:* method of least squares, correlation and regression, lines of regression.

## Module 2

*Sampling distributions:* population and samples, the sampling distribution of the mean ( $\sigma$  unknown),  $\sigma$  known), the sampling distribution of the mean ( $\sigma$ ), the sampling distribution of the variance, point estimation, interval estimation, tests of hypotheses, null hypotheses and significance tests, hypothesis concerning one mean, type I and type II errors, hypotheses concerning two means. The estimation of variances : Hypotheses concerning one variance - Hypotheses concerning two variances.

## Module 3

*Finite difference Operators:*  $\nabla$ ,  $\Delta$ ,  $E$ ,  $\delta$ ,  $\mu$ ,  $x^{(n)}$ . Newton's Forward and Backward differences interpolation polynomials, central differences, Stirlings central differences interpolation polynomial. Lagrange interpolation polynomial, divided differences, Newton's divided differences interpolation polynomial. *Numerical differentiation:* Formulae for derivatives in the case of equally spaced points. *Numerical integration:* Trapezoidal and Simpson's rules, compounded rules, errors of interpolation and integration formulae. Gauss quadrature formulae (No derivation for 2 point and 3 point formulae)

## Module 4

*Numerical solution of ordinary differential equations:* Taylor series method, Euler's method, modified Euler's method, Runge-Kutta formulae 4th order formula. *Numerical solution of boundary value problems:* Methods of finite differences, finite differences methods for solving Laplace's equation in a rectangular region, finite differences methods for solving the wave equation and heat equation.

### Text Books:

1. Irvin Miller & Freund : Probability And Statistics For Engineers, Prentice Hall Of India
2. S.S.Sastry: Numerical Methods, PHI Publishers.

### References:

1. P.Kandaswamy K.Thilagavathy, K.Gunavathy: Numerical Methods, S.Chand & Co.
2. A.Papoulis: Probability, Random Variables And Stochastic Processes, MGH Publishers

### *Type of questions for University Examination*

***Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module***

***Question 2-5 – There will be two choices from each module .Answer one question from each module of 15 marks***

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## CS/IT 502 SYSTEM PROGRAMMING

### Module 1

Assemblers: Overview of the assembly process - Machine dependent assembler features-Machine independent assembler features-Design of two pass assembler-single pass assembler.

### Module 2

Loaders and linkers -Loader functions-program relocatability- absolute and bootstrap loader-Overview of linkage editing-linking loader-Dynamic linking-Design of the linkage editor.

### Module 3

Macroprocessors - macro definition and usage-Schematics for Macro expansion-Generation of unique labels- Conditional macro expansion- Recursive macro expansion-Design of a Macro pre-processor-Design of a Macro assembler.

### Module 4

Operating Systems – Basic Operating Systems functions – Types of Operating Systems – User Interface – Run-time Environment. Operating Systems Design Options – Hierarchical Structures – Virtual Machines – Multiprocessor Operating Systems – Distributed Operating Systems – Object Oriented Operating Systems.

#### Text Books:

1. Leland L.Beck, “System Software - An Introduction to System Programming”, Addison Wesley

#### References:

1. D.M.Dhamdhare, "System Programming and Operating Systems", 2nd Ed., Tata Mcgrawhill
2. John J. Donovan, “Systems Programming”, McGraw Hill.

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## CS/IT 503 SOFTWARE ENGINEERING

### Module 1

Software Life Cycle - Water fall model – Prototyping – Spiral model – pros and cons of each model .

Requirements Analysis - SRS – DFD – ER Diagrams – Decision tables – Decision Trees – Formal specification techniques: Axiomatic and Algebraic specifications - Petrinets

### Module 2

Software Design: Design Heuristics – Cohesion and Coupling

Design Methodologies - Structured analysis and design, Architectural Design, Interface design, Component Level design.

Software Reuse and Software Maintenance issues.

### Module 3

Introduction to Software Quality Management - Software Testing - Objectives of testing – Functional and Structural testing –Generation of test data - Test Plan - Unit testing – Integration testing – System testing – Test reporting.

Overview of SQA Planning – Reviews and Audits – Software configuration management - Quality Standards - Study of ISO9000 & CMM

### Module 4

Software Project Management - Brief study of various phases of Project Management – Planning – Organizing – Staffing – Directing and Controlling

Software Project Cost Estimation – COCOMO model – Software Project Scheduling

CASE tools: CASE definitions – CASE Classifications – Analysis and Design Workbenches, Testing Workbenches

### Text Book:

1. Rajib Mall - Fundamentals of Software Engineering –, PHI.
2. Pankaj Jalote - Software Engineering –Narosa Publications

### References:

- 1.Ali Behferooz and Frederick J. Hudson - Software Engineering Fundamentals -, Oxford University Press India.
- 2.Roger S. Pressman - Software Engineering – Mc GrawHill International Edition
- 3.Ian Sommerville - Software Engineering – Pearson Education
- 4.Alka Jarvis & V. Crandall - In roads to Software quality –
- 5.Richard Thayer - Software Project Management –
- 6.Bass, Software Architecture Interactives - Pearson Education ,2003

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## CS 504 COMPUTER GRAPHICS

### **Module 1**

Graphic hardware. Graphic software Output primitives –points and lines. Line drawing algorithms - circle generating algorithms - polygon filling algorithms – Filling arcs –pattern filling Output attributes - Bundled attributes. Antialiasing. Graphical user interface - Logical classification of input devices.

### **Module 2**

Two dimensional transformations. basic transformations - translation - rotation - scaling. Matrix representation and homogeneous coordinates - composite transformations. Transformation between coordinate systems - Affine transformations. Two dimensional viewing - viewing pipeline - Windows to viewport transformations - clipping operations - point clipping - line clipping - polygon clipping.

### **Module 3**

Three dimensional object representations. polygon surfaces - curved surfaces. Spline representations - Hermite polynomials - Cubic splines - Bezier curves - B-splines. Octrees and BSP trees. Fractal geometry methods. Three dimensional transformations.. Three dimensional viewing. Projections.

### **Module 4**

Visible surface detection. Classification of visible surface detection algorithms. Back face detection - Depth buffer - A-buffer. Scan line algorithms- Depth sorting - Area subdivision methods octrees - BSP trees - octrees - Shading . Illumination models - light sources. Basic Illumination models. Polygon rendering - constant intensity - Gouraud shading - Phong shading - Animation techniques.

### **Text Book:**

1.Donald Hearn ,M Pauline Baker, *Computer Graphics C version*, 2/E Pearson Education ,2003 .

### **References:**

- 1.James D.Foley et.al., Introduction to Computer Graphics, Addison Wesley Publishing Company, 1994
- 2.Alan Watt, Mark Watt, Introduction to Animation and Rendering,, Addison Wesley Publishing Company, 1994
- 3.Newmann W and Sproull R.F., Principles of Interactive Computer Graphics, McGraw-Hill,1980
- 4.Rogers D.F., Procedural Elements for Computer Graphics, McGraw-Hill, 1985

### ***Type of questions for University Examination***

***Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module***

***Question 2-5 – There will be two choices from each module .Answer one question from each module of 15 marks***

## CS/IT 505 DATABASE MANAGEMENT SYSTEMS

### Module 1

Introduction: Characteristics of the Database approach – Data models, schemas and instances – DBMS architecture – Data independence – Database languages and interfaces – Database administrator – Data modeling using Entity - Relationship (ER), Entity sets, attributes and keys - Relationships, Relationship types, roles and structural constraints - Weak Entity types - Enhanced Entity-Relationship (EER) and object modeling. Sub classes, super classes and inheritance - Specialization and generalization.

### Module 2

Record storage and file organizations: Placing file records on disks – Fixed length and variable length records - Spanned Vs Unspanned records – Allocating file records on disk– Files of unordered records(Heap files), Files of ordered records(Sorted files).- Hashing Techniques. Indexed structures for files – Types of single level ordered index, multi- level indexes.

### Module 3

The Relational model: Relational model concepts – Relational model constraints - The Relational Algebra – Relational calculus – Tuple Relational calculus, Domain Relational calculus. - SQL. Database Design: Functional dependencies – Basic definitions – Trivial and non trivial dependencies –Closure of a set of dependencies – Closure of a set of attributes – Irreducible sets of dependencies – Nonloss decomposition and Functional dependencies. First, Second and Third normal forms – Boyce-codd normal form.

### Module 4

Transaction Management- Concurrency Control-Lost Updates- Uncommitted Data-Inconsistent Retrievals-The Scheduler-Concurrency Control with Locking Methods –Concurrency Control with Time Stamping-Concurrency Control with Optimistic Methods- Database Recovery Management.

Introduction to object oriented databases, Active databases. Data warehouses – Data mining

### Text Books:

1. Elmasri and Navathe, “*Fundamentals of Database Systems*” , 3/e, Addison - Wesley, 2001.
2. Peter Rob Carlos Coronel, Database Systems , Design, Implementation &Management , 5/e,Thomson Course Technology
3. A Silberschatz, H. F. Korth, and S Sudarshan, “*Database System Concepts*”, 3/e,Tata McGraw Hill,1997

### References:

1. Thomas Connolly ,Carolyn Begg “ Database Systems”,3/e,Pearson Education.
2. C.J Date, “ *An Introduction to Database Systems* “, Addison-Wesley
3. Margaret.H.Dunham ,”*Data Mining. Introductory and advanced topics*”, Pearson Education,2003.
4. Hector Garcia-Molina,Jeffret D. Ullman, Jenniffer Widom ,”*Database System implementation*”, Prentice Hall International, Inc, 2000.

### *Type of questions for University Examination*

**Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module**

**Question 2-5 – There will be two choices from each module .Answer one question from each module of 15 marks**

## Module 1

*Architecture of 16 bit microprocessors:* Intel 8086 Architecture — Segment registers and memory segmentation – memory address space and data organization, addressing modes, instruction set, instruction template examples, instruction execution timing. Assembly Language programming, programming examples;

*Modular programming-*Assembler instruction format, assembler directives and operators, assembly process, linking and relocation, debugging, stacks, procedures, interrupt routines, macros

## Module 2

*8086 hardware design:* minimum mode and maximum mode configurations, pin configuration of 8086, comparison with 8088; Bus structure, bus buffering, latching, system bus timing with diagram,

*Peripherals and their interfacing:* Dynamic RAM interfacing, interfacing I/O ports,, interfacing with programmable interrupt controller 8259, programmable DMA interface 8237, DMA transfer and operations

*Multiprocessor Systems: Interconnection topologies-*interfacing with 8087- architecture of 8087 and configuration- Design of a PC based multimicroprocessor system

## Module 3

*Architecture of 32 bit Microprocessors:* Intel 80386 Architecture, Block Diagram, Addressing modes, Data Types 80386, Real address mode of 80386 protected mode of 80386, segmentation, paging and Virtual modes

*Recent advances in microprocessor architectures-*Pentium families-salient features of Pentium II Pentium III and Pentium IV- a few relevant concepts of computer architecture-pipelining, CISC and RISC Architecture-Introduction to dual-Core Architecture.

## Module 4

Introduction to micro controllers - comparison with microprocessors Study of micro controller (MCS 51 family- 8051) - Architecture, instruction set, addressing modes and programming - Comparison of various families of 8bit micro controllers. Interfacing with sensors and actuators

### Text books:

1. Ajoy Kumar Ray, Kishor M. Bhurchandi, Advanced Microprocessors and Peripherals, TMH, New Delhi, 2000
2. Kenneth Ayala The 8086 Microprocessor :programming and interfacing the PC Thomson Learning
3. Mazidi, “The 8051 Microcontrollers & Embedded Systems”, Pearson Education.

### References:

1. Kenneth Ayala“, The 8051 Microcontroller”, West Publishing Company.
2. Douglas V Hall, ” Microprocessors & Interfacing-Programming and Hardware” TMH
3. Avtar Singh , “ The 8088 and 8086 Microprocessors\_programming, Interfacing, Software, Hardware and Applications” PHI
4. Barry B. Brey, "The INTEL Microprocessors - 8086/8088, 80186/80188, 80286, 80386, 80486 Pentium and Pentium pro processor, Pentium II, Pentium III and Pentium IV - Architecture, Programming and interfacing", PHI , 6 Ed, 2003.
5. YU-Cheng Liu & Glenn A Gibson, ” Microprocessor System , Architecture Programming & Design”
6. Kenneth Hintz & Daniel Tabak “Microcontroller architecture implementation and programming” , McGraw Hill.
7. Intel Users manual for 8086, 80386 & 80486, Pentium & Pentium pro
8. “Microprocessor Systems”, Learning Material Series, ISTE, New Delhi, 1997
9. John B. Peatman, "Design with microcontrollers" McGraw Hill, Singapore.

### *Type of questions for University Examination*

**Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module**

**Question 2-5 – There will be two choices from each module .Answer one question from each module of 15 marks**

## **CS/EB/EC/EI 507 MICROPROCESSOR LABORATORY**

### **PART I – 3 Lab sessions**

#### Part I A (Compulsory)

1. Study of a typical microprocessor trainer kit and its operation
2. Interfacing and programming of 8255.(eg: traffic light control, burglar alarm, stop watch)
3. Interfacing and programming of 8253/ 8254.
4. Interfacing and programming of 8279.

#### **Part I B\***

1. A/D and D/A converter interface
  2. Stepper motor interface
  3. Display interface
  4. Programming of different types of EPROM 2716, 2732 etc
- (\* At least two topics from part B has to be covered.)

### **PART II – 7 Lab sessions**

#### (Compulsory)

1. Introduction to IBM/PC and its DEBUG program commands
  - Examining and modifying the contents of the memory
  - Assembling 8086 instructions with the ASSEMBLER commands
  - Executing 8086 instructions and programmes with the Trace and GO Command.
  - Debugging a program
2. Assembly language program development using IBM/PC Macro assembler
  - Creating an Assembler source file
  - Assembling source program with MASM
  - The link program - creating a RUN module
  - Typical programming examples.
3. Interfacing Experiments with micro controllers

**Note: 50% Marks is earmarked for continuous evaluation and 50% marks for end semester examination to be assessed by two examiners. A candidate shall secure a minimum of 50% marks separately for the two components to be eligible for a pass in that subject.**

## CS 508 COMPUTER GRAPHICS LAB

1. Implementing Line ,Circle and Ellipse drawing algorithms
2. Implementing scan line polygon filling algorithm
  3. Implementing seed filling algorithms –flood fill, Boundary fill ( recursive and non recursive)
4. Implementing line clipping methods
5. Implementing polygon clipping methods
6. Generation of different 2D patterns and images.
7. 2D transformations using homogeneous coordinates
8. Generating Beizier and B-spline curves
9. Implementation of Hidden surface elimination techniques of 3D objects
10. Implementation of Shading methods for 3D objects
11. Implementation of animation methods.
12. Programming using Open GL  
(Can be done as a development of a small 2D/3D graphics package or Game using OpenGL)

### **References:**

1. Donald Hearn ,M Pauline Baker, *Computer Graphics C version, 2/E*
2. Pearson Education ,2003
3. James D.Foley ct.al., *Introduction to Computer Graphics*, Addison Wesley Publishing
4. Company, 1994.
5. Mason Woo et.al, *OpenGL Programming Guide – The official guide to OpenGL*, 3<sup>rd</sup>
6. Edition, OpenGL Architecture Review board
7. Noman Lin, *Linux 3D Graphics Programming*, Worldwide Game Development
8. Library.
9. Ron Fosner, *OpenGL programming for Windows 95 and Windows NT*

**Note: 50% Marks is earmarked for continuous evaluation and 50% marks for end semester examination to be assessed by two examiners. A candidate shall secure a minimum of 50% marks separately for the two components to be eligible for a pass in that subject.**

**Module 1**

Compiler: Introduction – Analysis of the source program – phases of a compiler – Compiler construction tools – Lexical analysis – Role of the lexical analyser – Specification of tokens – Recognition of tokens – Lexical analyser generators.

**Module 2**

Syntax Analysis – Role of the parser – Context free grammars – Top-down parsing – Bottom-up parsing – Operator precedence parsing – LR parsers (SLR, Canonical LR, LALR) – Parser generators.

**Module 3**

Syntax-directed translation – Syntax-directed definitions – S-attributed definition – L-attributed definition – Top-down and bottom-up translation – Type checking – Type systems – Specification of a type checker. Run time environment – Source language issues – Storage organization – Storage allocation strategies – Access to nonlocal names – Parameter passing – Symbol tables.

**Module 4**

Intermediate code generation – Intermediate languages – Declaration – Assignment Statement – Boolean expression – Procedure calls - Code optimisation – Introduction – Sources of optimisation – Introduction to data flow analysis. Code generator – Issues in the design of a code generator, the target machine, A simple code generator.

**Text Books:**

1. Alfred V. Aho, Ravi Sethi & Jeffrey. D. Ullman, “Compilers Principles, Techniques & Tools”.

**References :**

1. Kenneth.C.Louden, Compiler Construction:Principles And Practice, Thomson Learning, India
2. Keith D. Cooper & Linda Torczon, Engineering a Compiler, Elsevier, New Delhi.
3. S.S. Muchnick, Harcourt Asra, Advanced Compiler Design implementation, Morgan Kaufman, 1997
4. Modern Compiler Implementation in C , Cambridge Uty. Press 1997.
5. Alan Holub, Compiler Design in C, PHI
6. Kenneth C. Louden, Compiler Construction, Principle and Practice, Thomson Books

***Type of questions for University Examination***

***Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module***

***Question 2-5 – There will be two choices from each module .Answer one question from each module of 15 marks***

## CS/EE 602 DIGITAL SIGNAL PROCESSING

### Module 1

Introduction to signals & systems- Discrete time signals and systems- Properties of discrete systems- linearity, time invariance-causality-stability-convolution-difference equation representation of discrete systems -The Z transform-properties of Z transform- the inverse z transform-System Transfer function.

### Module 2

Frequency domain representation of discrete time signals. Discrete Fourier series(DFS)-properties Discrete Time Fourier Transform (DTFT) properties, Discrete Fourier Transform(DFT) properties& Fast Fourier Transform(FFT) Decimation in Time & Decimation in Frequency algorithms.

### Module 3

FIR digital Filters: Transfer function. Generalized Difference equation representation. Concept of windowing. Non Recursive realization structures-direct (Tapped delay line structure) –cascade realization-Linear phase realization.

IIR Digital Filters : - Transfer function. Difference equation representation. Recursive Realizations Direct form I , Direct form II –Cascade Realization-Parallel realization – Comparison of IIR & FIR filters in terms of computational complexity, memory requirement, hardware complexity, stability .

### Module 4

Finite word length effects in digital filters- fixed point arithmetic -Floating point arithmetic- Block floating point arithmetic - Truncation-Rounding - Quantization error in analog to digital conversion-Limit cycles. General DSP architecture- features \_ On chip subsystems- memory organization-Addressing modes- Instruction types - TMS320C54X fixed point processor- TMS320C4X floating point processor  
Applications of DSP

#### Text:

1. P.Ramesh Babu: Digital signal Processing, SCITEC Pub., 3<sup>rd</sup> ed
2. Sanjit K. Mithra, : " Digital Signal Processing", Tata Mc- Graw Hill

#### References:

1. John G Proakis & Dimitris G Manolakis : "Digital Signal Processing", PHI, New Delhi
2. Oppenheim & Ronald W Schafer : "Digital Signal Processing", Prentice Hall India
3. Steven W. Smith, Digital Signal Processing-A practical guide for Engineers and Scientists , Elsevier India Pvt.Ltd, 2006
4. Avatar Singh, Digital Signal Processing Implementations, Edition 1

#### *Type of questions for University Examination*

*Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module*

*Question 2-5 – There will be two choices from each module .Answer one question from each module of 15 marks*

## **Module I**

Introduction to Operating Systems. Processes - Interprocess Communication - Race Conditions - Critical Sections – Mutual Exclusion - Busy Waiting - Sleep And Wakeup - Semaphores - Event Counters - Monitors - Message Passing. Process Scheduling - Round Robin Scheduling - Priority scheduling -multiple queues - Shortest Job First - Guaranteed scheduling - Two- level scheduling.

## **Module II**

Memory management. Multiprogramming. Multiprogramming and memory usage - Swapping - multiprogramming with fixed and variable partitions - Memory management with bit maps, linked lists, Buddy system - allocation of swap space. Virtual memory - paging and page tables, associative memory - inverted page tables. Page replacement algorithms.

## **Module III**

File systems and I/O files. Directories - File system implementation - security and protection mechanisms. Principles of I/O hardware - I/O devices - device controllers - DMA. Principles of I/O software - interrupt handlers - device drivers - Disk scheduling - clocks and terminals. I/O Buffering - RAID- Disk Cache.

## **Module IV**

Deadlock - conditions for deadlock. Deadlock detection and recovery. Deadlock avoidance - resource trajectories - safe and unsafe states - bankers algorithm. Deadlock prevention. Two phase locking – non-resource deadlocks - starvation.

**Case Study:** UNIX / LINUX operating system

## **Text Book**

1. William Stallings, “Operating systems”, Pearson Education, Fifth edition
2. D.M.Dhamdhare, “Operating Systems”, 2<sup>nd</sup> Edition, Tata McGraw-Hill

## **Reference**

1. Garry Nutt, “Operating Systems – A Modern perspective ”, Third Edition, Pearson Education
2. Andrew S. Tanenbaum, “Modern Operating Systems”, Prentice Hall
3. Bach, M.J., “Design of UNIX Operating System”, Prentice Hall
4. Charles Crowley, “Operating systems – A Design Oriented Approach”, Tata McGrawhill, 1997
5. Michel Palmer “Guide o Operating Systems”, Vikas Thomson Learning Publishing, NewDelhi

## ***Type of questions for University Examination***

***Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module***

***Question 2-5 – There will be two choices from each module .Answer one question from each module of 15 marks***

## CS /IT 604 ANALYSIS AND DESIGN OF ALGORITHMS

### Module

1

Analyzing Algorithms and problems. Classifying functions by their asymptotic growth rate. Recursive procedures. Recurrence equations - Substitution Method, Changing variables, Recursion Tree, Master Theorem. Design Techniques- Divide and Conquer, Dynamic Programming, Greedy, Backtracking

### Module

2

Analysis of searching and sorting. Insertion sort, Quick sort, Merge sort and Heap sort. Binomial Heaps and Fibonacci Heaps, Lower bounds for sorting by comparison of keys. Comparison of sorting algorithms. Amortized Time Analysis. Red-Black Trees – Insertion & Deletion.

### Module 3

Graphs and graph traversals. Strongly connected components of a Directed graph. Biconnected components of an undirected graph.

Transitive closure of a Binary relation. Warshalls algorithm for Transitive closure. All pair shortest path in graphs. Dynamic programming. Constructing optimal binary search trees.

### Module

4

Complexity Theory - Introduction. P and NP. NP-Complete problems. Approximation algorithms. Bin packing, Graph coloring. Traveling salesperson Problem.

### Text Books:

1. T. H. Cormen, C. E. Lieserson, R. L. Rivest, Introduction to Algorithms, Prentice Hall India,2004
2. Allen Van Gelder, Sara Baase, "Computer Algorithms - Introduction to Design and Analysis", 3<sup>rd</sup> Edition,2004

### References:

- 1.Anany Levitin, "Introduction to the design and analysis of algorithms", Pearson Education
- 2.A.V.Aho, J.E.Hopcroft and J.D. Ullman, "The Design and Analysis of Computer Algorithms", Addison Wesley Publishing House, Reading, MA
- 3.E Horowitz and S Sahni, "Fundamentals of Computer Algorithms", Computer Science Press, Rockville
- 4.Jeffrey H.Kingston, "Algorithms and Data Structures - Design, Correctness and Analysis ", Addison Wesley, Singapore, 1990
- 5.Knuth, "Art of Computer Programming Vol II, Sorting and Searching,", Prentice Hall

### *Type of questions for University Examination*

*Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module*

*Question 2-5 – There will be two choices from each module .Answer one question from each module of 15 marks*

## **Module 1**

Basic idea of control systems and their classification - differential equations of systems - linear approximation - Laplace transform and transfer function of linear system - Model of physical system (Electrical, mechanical and electromechanical)- block diagram - signal flow graph - Mason's gain formula.

## **Module 2**

Time domain analysis - Representation of deterministic signals - First order system response - S-plane root location and transient response - impulse and step response of second order systems - performance - characteristics in the time domain - effects of derivative and integral control - steady state response - error constant - generalised definition of error coefficients - concepts of stability - Routh - Hurwitz criterion.

## **Module 3**

Frequency domain analysis - frequency response - Bode plot, Polar plot, Nicol's chart - closed loop frequency response and frequency domain performance characteristics. Stability in frequency domain. Nyquist criterion.

## **Module 4**

Root locus method - basic theory and properties of root loci - procedure for the construction of root loci - complete root locus diagram. Design and compensation of feed back control system: approaches to compensation - cascade compensation networks and their design in the frequency domain - simple design in S-plane.

### **Text Book:**

1.Ogata K: "Modern Control Engineering", Prentice Hall/Pearson,2002

### References:

1. Dorf: Morden Communication Systems ,Pearson Education
2. Franklin: Feed back Control Systems, Pearson Education,1994
3. Kuo B. C: "Automatic Control System", Prentice Hall, 1991
4. Nagoor Kani: Control Systems, R B P,2002
5. Ogata: Discrete Time Control Systems ,Pearson Education,1987
6. Nagarath & Gopal: "Control System Engineering", Wiley Eastern,1991
7. Ramkayan: Control Engineerng, Vikas Publications
8. M N Bandyopadhyaya: Control Theory ,PHI
9. Glad: Control Theory, Vikas Thomson Publications

### ***Type of questions for University Examination***

***Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module***

***Question 2-5 – There will be two choices from each module .Answer one question from each module of 15 marks***

## CS/IT 606 COMPUTER NETWORKS

### Module 1

#### *Evolution of Computer Networks*

Types of Networks: Broadcast and Point-to-point, LAN, MAN, WAN, Wireless networks. Protocols & Standardization, ISO/OSI Reference model, TCP/IP Reference Model.

#### *Application Layer*

Application layer protocols:-WWW and HTTP, FTP, DNS, SMTP, SNMP, RPC, P2P File sharing, Domain Name system (DNS)

### Module 2

#### *Transport layer and Network Layer*

Transport Layer Services, Relationship with Network Layer, Relationship with Application Layer, Multiplexing and De multiplexing, UDP, TCP: Header ,Segment Structure, Services, Connection establishment and termination, Flow control and window size advertising, TCP time out and re-transmission, Congestion Control, TCP Fairness, Delay Modeling.

Network layer Services, Datagram and Virtual circuit services, IP datagram format and Types of Services, Datagram encapsulation and Fragmentation, Reassembly and fragmentation

### Module 3

#### *Routing and Datalink Layer*

Routing: Link state routing, distant vector routing, hierarchical routing, multicast routing, Data link layer services: Error detect and correction techniques, Elementary Data link layer protocols, sliding window protocols, HDLC ,Multiple access protocols, TDM, FDM, CDMA Random access protocols: ALOHA, CSMA,CSMA/CD,CSMA/CA. Circuit and Packet Switching, Virtual Circuits, Switching Technology for LAN, Ethernet switches, Virtual LAN

### Module 4

#### *Physical Layer, High speed Networks and Network programming*

Physical Layer services, Transmission media, Data encoding schemes. ISDN, BISDN, Frame relay, Fast Ethernet and Gigabit Ethernet, FDDI, SONET .NETBIOS programming, TCT/IP and Socket programming. Network Performance: Analytical Approaches-Network Traffic Monitoring-simulations

### Text Book:

1. Youlu Zheng and Shakil Akhtar, *Networks for Computer Scientist and Engineers*, Oxford University Press,2006
2. James F. Kurose and Keith W. Ross, *Computer Networking – A Top-Down Approach Featuring the Internet*,2/e Pearson Education ,2003

### References:

- 1 S. Keshav, *An Engineering Approach to Computer Networking*, Pearson education ,2002
- 2 F. Halsall, *Data Communication, Computer Networks and Open Systems*, Addison Wesley, 1996
- 3 Andrew S. Tanenbaum, *Computer Networks* , 4/e, Pearson education, 2003
- 4 Behrouz A. Fourouzan ,*Data Communications and Networking*, 2/e Tat McGrawhill,2000
- 5 Leon-Garcia and I. Widjaja, *Communication Networks*, Tata McGraw Hill, 2000
- 6 Bertsekas and Gallagar , *Data Networks*, 2/e, PHI, 1992
- 7 Douglas E Comer ,*Computer Networks and Internet's*, 2/e Pearson Education,2004
5. Gallo, *Computer Communication and Networking Technologies*, Thomson Learning

### *Type of questions for University Examination*

**Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module**

**Question 2-5 – There will be two choices from each module .Answer one question from each module of 15 marks**

## CS 607 SYSTEMS PROGRAMMING AND HARDWARE LAB

1. Identification of components/cards and PC assembling from components
2. Assembly language program for implementing arithmetic operations
3. Assembly Language programs for time and date manipulation.
4. Assembly Language programs for display /video manipulation
5. Assembly Language program for equipment status
6. Implementation of a file manager using DOS/BIOS interrupts
7. TSR (Terminate and Stay Resident) Programming
8. ADC interface
- 9 .Stepper Motor interface using DAC
10. Parallel Interface: Printer and HEX keyboard.
11. Serial Interface: PC to PC serial interface using null modem

Note: Programs can be implemented using MASM /TASM

### References:

- 1.H. P. Messmer, *The Indispensable PC Hardware Book*, 3/e, Addison Wesley, 1997
- 2.S. J. Bigelow, *Troubleshooting, Maintaining, and Repairing PCs*, 2/e, Tata McGraw Hill, New Delhi, 1999
- 3.Douglas V. Hall, *Microprocessors and Interfacing*, 2/e, Tata McGraw Hill, 1988
- 4.Ytha Yu and Charles Marut , *Assembly Language Programming and Organisation of IBM PC*, International Edition , McGrawhill Inc , 1992
- 6.Barry B. Brey , *The Intel Microprocessors 8086 to Pentium 4- Architecture Programming and Interfacing*, 6/e Pearson Education ,2003

**Note: 50% Marks is earmarked for continuous evaluation and 50% marks for end semester examination to be assessed by two examiners. A candidate shall secure a minimum of 50% marks separately for the two components to be eligible for a pass in that subject.**

## CS 608 MINI PROJECT

The students are expected to develop an application using a standard DBMS package. They have to do a proper system study and prepare SRS and design documents.

Each batch comprising of 3 to 5 students shall design. Each student shall submit a project report at the end of the semester. The project report should contain the design and engineering documentation including the Bill of Materials and test results. Product has to be demonstrated for its full design specifications. Innovative design concepts, reliability considerations and aesthetics / ergonomic aspects taken care of in the project shall be given due weight.

*Guidelines for evaluation:*

i) Attendance and Regularity	10
ii) Work knowledge and Involvement	30
iii) End-Semester presentation & Oral examination	20
iv) Level of completion and demonstration of functionality/specifications	25
v) Project Report	15
<i>Total</i>	100 marks

*Note: External projects and R&D projects need not be encouraged at this level. Points (i) & (ii) to be evaluated by the project guide & co-ordinator and the rest by the final evaluation team comprising of 3 teachers including the project guide.*

### **Module 1**

Organisation: Introduction, definition of organization, system approach applied to organization, necessity of organization, elements of organization, process of organization, principles of organization, formal and informal organization, organization structure, types of organization structure .

Forms of business organization: Concept of ownership organization, types of ownership. Individual ownership, partnership, joint stock Company, private and public limited company, co-operative organizations, state ownership, public corporation

### **Module 2**

Basic concept of management: Introduction, definitions of management, characteristics of management, levels of management, management skills

Management theory: Scientific management, contribution of Gilbreth. Gantt, Neo-classical theory, modern management theories

Functions of management: Planning, forecasting, organizing, staffing, directing, motivating, controlling, co-ordinating, communicating, decision making.

### **Module 3**

Personnel management: Introduction, definition, objectives, characteristics, functions, principles and organization of personnel management

Markets and marketing: Introduction, the market, marketing information, market segmentation, consumer and industrial markets, pricing, sales, physical distribution, consumer behaviour and advertisement.

Financial management: the basics , financial accounts, inflation, profitability, budgets and controls, cost accounting, valuation of stock, allocation of overheads, standard costing ,marginal costing

### **Module 4**

Productivity and production: Measurement of productivity, productivity index productivity improvement procedure

Materials management and purchasing: Objectives, functions, importance of materials management. Stores and storekeeping

Inventory control: Classification, functions, inventory models, inventory costs, EOQ, Materials requirement planning

### **References:**

1. Fraidoon Mazda, Engineering Management-, Addison -Wesley
2. Koontz and O'Donnell, Essentials of Management, Mc Graw Hill
3. Kotlar P, Marketing Management, Prentice Hall India
4. Prsanna Chandra , Finance Management, TMH.5<sup>th</sup> ed.,
5. Monks J.G Operations Management ,MGH

### ***Type of questions for University Examination***

***Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module***

***Question 2-5 – There will be two choices from each module .Answer one question from each module of 15 marks***

## CS 702 ADVANCED ARCHITECTURE & PARALLEL PROCESSING

### Module 1

Introduction to Parallel Processing-Shared Memory Multiprocessing-Distributed Memory-Parallel Processing Architectures- Introduction-Parallelism in sequential Machines—Abstract Model of Parallel Computer – Multiprocessor Architecture- Array Processors.

### Module 2

Pipelining and Super Scalar Techniques-Linear Pipeline Processors-Non-Linear Pipeline processors-Instruction pipeline design-Arithmetic pipeline Design- Super Scalar and Super pipeline Design.

### Module 3

Programmability Issues-An Overview-Operating system support-Types of Operating Systems-Parallel Programming models-Software Tools-Data Dependency Analysis- Types of Dependencies-Program Transformations- Shared Memory Programming

### Module 4

Thread –based Implementation-thread Management-Attributes of Threads- Mutual Exclusion with Threads-Mutex Usage of Threads- Thread implementation-Events and Conditions variables-Deviation Computation with Threads-Java Threads Distributed Computing –Message Passing Model-General Model-Programming Model- PVM-Algorithms for Parallel Machines- Debugging Parallel programming –Other Parallelism Paradigms .

### Text Books:

- 1.Kai Hwang, “Advanced Computer Architecture: Parallelism, Scalability, Programmability”, McGrawHill International Edition, 1993.
- 2.M.Sasikumar, et.al., "Introduction to Parallel Processing", PHI, New Delhi, 2000

### References:

- 1.P. Pal Chaudhuri , “Computer Organisation and Design”, PHI, New Delhi, 1994.
- 2.William Stallings, “Computer Organisation and Architecture”, PHI, New Delhi, 1996.
- 3.“Proceedings of Third International Conference on High Performance Computing”, IEEE, Computer Society Press , California, USA, 1996.
- 4.4.“Parallel Processing”, Learning Material Series, Indian Society for Technical Education, New Delhi, 1996.
- 5.5.V.Rajaraman, C. Siva Ram Murthy, "Parallel Computers Architecture and Programming", PHI, New Delhi, 2000
- 6.Parthasarathi, “Advanced Computer Architecture”, Thomson Learning.

### *Type of questions for University Examination*

*Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module*

*Question 2-5 – There will be two choices from each module .Answer one question from each module of 15 marks*

## CS/IT 703 ADVANCED COMPUTER NETWORKS

### Module 1

Network Technologies : -WAN and LAN - Ethernet Technology: Fast And Gigabit Ethernet -10/100/1000 Ethernet - Properties of an Ethernet - interoperability & collision domains – Ethernet Hardware Addresses - Ethernet Frame Format - Extending An Ethernet With Bridges - Switched Ethernet -VLAN. Classful Internet Addresses: The Original Classful Addressing Scheme Dotted Decimal Notation - Subnet And Classless Extensions - IP Multicast Addresses .ARP: Resolution Through Direct Mapping - Resolution Through Dynamic Binding - ARP Protocol Format- ARP Implementation . RARP.

## Module 2

**Internet Routing: Routing Between Peers (BGP)-Routing Within An Autonomous System (RIP, OSPF).Internet Multicasting : Ethernet Multicast- IP Multicast- IGMP-DVMRP-PIM. Understanding Router Components: Ports-Queueing- Scheduling-shaping-policing-marking. QoS in IP networkk. IPv6: Frame formats-Comparison with IPv4. Introduction to ICMP,DHCP and NAT. Network Management: SNMP and RMON models**

## Module 3

Wireless transmission: Frequencies for radio transmission-Signals-Antennas-Signal propagation-Multiplexing-Modulation-Spread spectrum-Cellular systems. Medium access control: SDMA-FDMA-TDMA-CDMA-Comparison of S/T/F/CDMA.

## Module 4

Telecommunications systems. GSM,-System Architecture, Radio Interface, Protocols, Addressing-Call management and Handover. GGPRS and UMTS networks. Wireless LAN(WiFi): Infrared vs radio transmission-Infrastructure and ad-hoc network-IEEE 802.11a,b,g, 802.15 and 802.16 protocol standards – Bluetooth - Principle of WiMax . Mobile IP.

## Text Books:

1. **Douglas E.Comer, *Internetworking With TCP/IP Volume 1: Principles Protocols, and Architecture*, 5/e ,Prentice Hall,2006. (Module I and II)**
2. **Schiller, *Mobile Communication*, 2/e , Addison Wesley, 2005 (Module III and IV)**

## References:

1. **Youlu Zheng and Shakil Akhtar, *Networks for Computer Scientist and Engineers*, Oxford University Press,2006**
2. **James.F.Kurose & Keith W.Ross , *Computer Networking –A Top Down approach featuring Internet*, 3/e, Pearson Education,2005.**
3. **Douglas E.Comer, *Computer Network and Internets*, 2/e, Person education ,2003.**
4. **Andrew S.Tanenbaum, *Computer Networks* ,5/e Edition,Pearson education,2003**
5. **William Stallings, *Wireless Communicatuion Networks*, 2/e, Pearson Education,2003.**
6. **Nathan J. Muller, *Bluetooth Demystified*, McGraw-Hill Professional Publishing,2000**

## *Type of questions for University Examination*

***Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module***

***Question 2-5 – There will be two choices from each module .Answer one question from each module of 15 marks***

## CS/IT 704 DISTRIBUTED COMPUTING

### Module 1

Characterization of Distributed systems – Introduction- Examples of Distributed Systems- Challenges- System Models –Architectural models-Fundamental Models – Interprocess communication-The API for the Internet protocols-External Data representation and Marshalling-Client Server Communication- group communication. Interprocess communication in UNIX. Distributed Objects and Remote Invocation – Communication between distributed objects-Remote Procedure Call- Events and Notifications- Java RMI, Case study

### Module 2

Operating System Support-The Operating system layer – Protection- Processes and Threads-Operating System architecture  
Distributed file Systems-Introduction-File Service architecture– Case study sun NFS. Name service SNS and DNS.

### Module 3

Time and co-ordination. Synchronizing physical clocks -logical time and logical clocks. Distributed co-ordination –distributed mutual exclusion – elections. Replication – basic architectural model –consistency and request ordering.

### Module 4

Distributed DBMS Architecture- Distributed Database Design –Query Decomposition and Data Localization -Distributed transactions – concurrency control in distributed transactions– distributed deadlocks – transaction recovery.

### Text Book

1.George Coulouris, et. al., “Distributed Systems – Concepts and Design”, Third Edition., Addison Wesley, 2002

### References

- 1.M.Tamer Ozsu,Patrick Valduriez, “Principles of Distributed Database Systems”, Second Edition ,Pearson Education.
- 3.C.A.R.Hoare, “Communicating Sequential Processes”, Prentice Hall, 1980
- 4.Dimitri P.Bertsekas, John N.Tsitiklis, “Parallel and Distributed Computation : Numerical Methods”, Prentice Hall International, Inc., 1989
- 6.Douglas Comer and David L.Stevens, “Internetworking with TCP/IP Vol III: Client server Programming and Applications”, Prentice Hall, New York, 1990
7. Gerard Tel, “Introduction to Distributed Algorithms”, Cambridge University Press, 1994
8. H.S.M.Sedan, “Distributed Computer systems”, Butterworths, London, 1988
9. M.Sasikumar, et.al., "Introduction to Parallel Processing", PHI, New Delhi, 2000

### *Type of questions for University Examination*

*Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module*

*Question 2-5 – There will be two choices from each module .Answer one question from each module of 15 marks*

## CS 705 A EMBEDDED SYSTEMS

### **Module 1**

Overview of Embedded System:- Embedded System, Categories of Embedded System, Requirements of Embedded Systems, Challenges and Issues in Embedded Software Development, Applications of Embedded Systems in Consumer Electronics, Control System, Biomedical Systems, Handheld computers, Communication devices.

### **Module 2**

Embedded Hardware & Software Development Environment: - Hardware Architecture, Microcontroller Architecture, Communication Interface Standards, Embedded System Development Process, Compilers and assemblers, Embedded Operating systems, Types of Embedded Operating systems.

### **Module 3**

Introduction to Real Time Operating System : Task and task states,task and data, semaphore and shared data,message queues, mail boxes,pipes,time functions,events,Memory management,interrupt routines in RTOS environment,

Basic Design Using RTOS: Principle ,encapsulating semaphores and queues,hard real-time scheduling consideration,saving memory space,saving power,

Embedded software development tools: Host and Target machines, linker/ locator for embedded software,getting embedded software into a target system

### **Module 4**

Real Time & Database Applications: - Real-Time Embedded Software Development, Sending a Message over a Serial Link, Simulation of a Process Control System, Controlling an Appliance from the RTLinux System, Embedded Database Applications using examples like Salary Survey, Energy Meter Readings.

### **Text Books:**

1. K.V.K.K Prasad,*Programming for Embedded Systems*,Dreamtech Software Team, Wiley Dreamtech,2005
2. David E. Simon,*An Embedded Software Primer*, Pearson Education,2005

### **References:**

- 1.Daniel W Lewis - Fundamentals of Embedded Software where C and Assembly Meet
- 2.K.V.K.K Prasad, *Embedded/RealTime systems: "Concepts, Design and programming"*, Dreamtech Software Team, Wiley Dreamtech

### ***Type of questions for University Examination***

***Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module***

***Question 2-5 – There will be two choices from each module .Answer one question from each module of 15 marks***

## **CS/IT 705B INFORMATION RETRIEVAL**

### **Module 1**

Introduction – Information versus Data Retrieval. Modeling of Information retrieval. Formal characterization of Information retrieval – Alternate set theoretic models. Alternate algebraic models. Alternate probabilistic models. Structured text retrieval models. Models for Browsing. Retrieval Evaluation

### **Module 2**

Query languages. Text Operations- Document pre processing. Text compression. Indexing and searching. Inverted files. Suffix trees and suffix arrays. Boolean queries. Sequential searching. Pattern matching. Structural queries. User interface and visualization.

### **Module 3**

Parallel and Distributed Information Retrieval. Implementation of inverted files, suffix arrays and signature files in MIMD architecture. Implementation of Inverted files, suffix arrays and signature files in SIMD architecture.

### **Module 4**

Searching the web – modeling the web . Search engines –architecture, user interfaces, ranking, crawling, indices. Web Directories-Metadatas- Metasearchers-Web as graph-Hubs and Authorities- Case study - google search engine

### **Text Books:**

1. Ricardo Baeza-Yates and Berthier Ribeiro-Neto, “Modern Information Retrieval”, Addison Wesley Longman, 1999

### **References**

1. Sergey Brin and Lawrence Page, The anatomy of large scale hyper textual(Web) search engine, Computer Networks and ISDN systems, Vol 30, No 1-7
2. J Kleinberg, et. Al, The Web as a graph: Measurements, models and methods, Lecture notes in computer science , Springer Verlag, 1999

### ***Type of questions for University Examination***

***Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module***

***Question 2-5 – There will be two choices from each module .Answer one question from each module of 15 marks***

## CS/EB/IT 705 C ARTIFICIAL NEURAL NETWORKS

### Module 1

Introduction to neural networks. Artificial neural networks. Biological neural networks- Comparison , Basic building blocks of ANN. Activation functions. McCulloch-Pitts Neuron Model, Hebb net. Learning Rules- Hebbian Learning Rules, Perceptron, Delta, Competitive, Boltzmann. Perceptron networks- single layer, multilayer –algorithm.

### Module 2

Feedback Networks, Discrete Hopfield nets, Continuous Hopfield nets. Feed Forward Networks: Back Propagation Networks, Learning Rule, Architecture, training algorithm. Counter Propagation Network: Full CPN, Forward only CPN, architecture, training phases.

### Module 3

Adaptive Resonance Theory, architecture, learning in ART, Self Organizing feature maps: Kohonen SOM, Learning Vector Quantization, Max net, Mexican Hat, Hamming net. Associative memory networks Algorithms for pattern association Hetero associative networks, Auto associative memory networks Bidirectional associative memory networks Energy Function.

### Module 4

Special networks: Probabilistic neural networks, Cognitron, Simulated Annealing, Boltzmann machine, Cauchy machine, Support Vector Machine Classifiers. Application of Neural networks In Image Processing and classification. Introduction to Fuzzy systems, Neuro fuzzy systems.

### Text books:

- 1.Laurene Fausett: “*Fundamentals of neural networks*”, Prentice Hall, New Jersey,1994.
- 2.James A. Freeman, David M. Skapure: *Neural Networks Algorithms, Applications and Programming Techniques*, Addison-Wesley, 1990.

### References:

- 1.S N Sivanandan: “*Introduction to neural networks using “MATLAB”*”, TataMcGrawHill, New Delhi.,2004
- 2.Kevin Gruney: “*An Introduction to neural networks*”, CRC Press, 1997.
- 3.D. L.Hudson & M. E. Cohen: “*Neural Networks and Artificial Intelligence in Biomedical Engg.*”, Prentice Hall Of India, New Delhi.,1999
- 4.James A. Anderson, “*An Introduction to Neural Networks*”, *Prentice Hall of India,1995.*
- 5.Simon Haykin: “*Neural Networks*”, Pearson Education1998
- 6.Yegnanarayana: “*Artificial Neural Networks*”, Prentice Hall of India,2004.
- 7.Jack M. Zureda, *Introduction to Artificial Neural Systems,1992*

### ***Type of questions for University Examination***

***Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module***

***Question 2-5 – There will be two choices from each module .Answer one question from each module of 15 marks***

## CS 705D WEB-COMMERCE AND TECHNOLOGIES

### Module 1

Introduction to SGML features HTML XML HTML vs XML simple XML documents XML tags , creating XML DTD s Displaying XML data in HTML Browser as HTML tables storing XML data in HTML document XML applications converting XML to HTML with XSL style sheets

### Module 2

Java applets, java scripts, Java beans features ,designing Java Beans ,Properties of beans , creation of events , EJB basics ,types of beans ,development of session beans , steps creation and implementing interfaces

### Module 3

Electronic payment systems electronic cash, wallets , smart cards ,web auction strategies , legal environment of e commerce SSL, Firewalls

### Module 4

JSP creating JSP pages templating request and response objects, scriptlets .accessing beans via scriptlets

### References

- 1.XML by Example :Building E Commerce application SEAN Mcgrath Pearson Education, Asia
- 2.Joseph L Weber PHI ,Using JAVA 2 Platform Special edition Java2 AWT Swing XML Java Beans
- 3.Steven HolznerWiley Dream, Tech Programming Black Book
- 4.Java Server Pages Larne Pekowsky Pearson asia
- 5.JSP Barry Burd IDG Books India
- 6.Mastering Enterprise Java beans and the Java2 platform enterprise Edition EdRoman (Wiley computer publishing)
- 7.EJB Design Patterns Floyd Marinescu
- 8.Raj Kamal TMH ,Internet and Web Technologies
- 9.Frontiers of E commerce Kalakotia Addison Wesley Publication
- 10.James T Perry Electronic Commerce By Gary P Schineder and Course Technology Thomson Learning Cambridge

### *Type of questions for University Examination*

*Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module*

*Question 2-5 – There will be two choices from each module .Answer one question from each module of 15 marks*

## CS 706 LANGUAGE PROCESSOR LABORATORY

Students are expected to do the following exercises:

- Creation of Single Pass – Two Pass assembler – Macro processor.
- Generation of Lexical Analyzer using tools such as Lex
- Generation of Parser using tools such as YACC.
- Generation of LL(1) Parser
- Generation of intermediate code
- Creation of type checker
- Developing a compiler for a subset of a programming language.

**Note: 50% Marks is earmarked for continuous evaluation and 50% marks for end semester examination to be assessed by two examiners. A candidate shall secure a minimum of 50% marks separately for the two components to be eligible for a pass in that subject.**

## CS 707 NETWORK AND OPERATING SYSTEMS LABORATORY

1. Study of system level calls of a suitable multitasking operating system. Exercises involving the system calls. (E.g. fork(), exec(), create(), etc. in UNIX.)
2. Inter process communication. Shared memory, messages, Semaphores and monitors. Implementation of typical problems(E.g. Bounded buffer, Dining Philosophers. etc.)
3. Study of Communication protocols. TCP/IP or a suitable protocol. Client server programming. Distributed algorithms. performance modelling of networks.
4. Internet programming using a suitable programming language and Operating system (E.g. JAVA)

### References

1. Douglas E.Comer, Hands on Networking with Internet Technologies, Pearson Education
2. Bach, M.J., “Design of UNIX Operating System”, Prentice Hall

**Note: 50% Marks is earmarked for continuous evaluation and 50% marks for end semester examination to be assessed by two examiners. A candidate shall secure a minimum of 50% marks separately for the two components to be eligible for a pass in that subject.**

## CS 708 SEMINAR

Each student shall individually prepare and present a seminar on a topic of current relevance on a stipulated time. He/she should also submit a report of the same. Few panels consisting of two or three teachers (internal) each, should evaluate the seminar report and the presentation. Marks should be awarded considering report preparation, presentation, technical content, depth of knowledge, brevity and references and the participation in the seminar. The time allotted for each presentation is 30 minutes.

Students shall individually prepare and submit a seminar report on a topic of current relevance related to the field of Computers either hardware or software. The reference shall include standard journals, conference proceedings, reputed magazines and textbooks, technical reports and URLs. The references shall be incorporated in the report following IEEE standards reflecting the state-of-the-art in the topic selected. Each student shall present a seminar for about 30 minutes duration on the selected topic. The report and presentation shall be evaluated by a team of internal experts comprising of 3 teachers based on style of presentation, technical content, adequacy of references, depth of knowledge and overall quality of the seminar report

## CS 709 PROJECT DESIGN

The project work shall commence in the seventh semester and shall be completed by the end of eighth semester. Students are expected to identify a suitable project and complete the analysis and design phases by the end of seventh semester. For those students who are doing real life projects in the industry should also have both an external guide in the industry and an internal guide in the department. The internal guides are responsible for the continuous evaluation.

Each batch comprising of 3 to 5 students shall identify a project related to the curriculum of study. At the end of the semester, each student shall submit a project synopsis comprising of the following.

- Application and feasibility of the project
- Complete and detailed design specifications.
- Block level design documentation
- Detailed design documentation including circuit diagrams and algorithms / circuits
- Bill of materials in standard format and cost model, if applicable
- Project implementation action plan using standard presentation tools

*Guidelines for evaluation:*

i) Attendance and Regularity	10
ii) Quality and adequacy of design documentation	10
iii) Concepts and completeness of design	10
iv) Theoretical knowledge and individual involvement	10
v) Quality and contents of project synopsis	10
<i>Total</i>	50 Marks

**Note:** Points (i)-(iii) to be evaluated by the respective project guides and project coordinator based on continuous evaluation. (iv)-(v) to be evaluated by the final evaluation team comprising of 3 internal examiners including the project guide.

**Module 1**

Introduction- Security problem in computing, Security in Networks. Elementary Cryptography- Introduction- Substitution and Transposition Ciphers.  
Review of Number Theory-Modular arithmetic.

**Module 2**

Encryption Algorithms-Symmetric Key encryption- DES, AES.

**Module 3**

Public Key encryption. RSA Crypto System. Primality testing- Miller-Rabin Algorithm. Diffie- Hellman Cryptosystem.

**Module 4**

Authentication protocols, Digital Signature, Secure e-mail, SSL, IP Security. System security –Intruders, Malicious Software , Firewalls.

**Text book:**

1. Stallings W. ,Cryptography and Network Security Principles and Practice 3/e Pearson Edition Asia 2003.

**References:**

1. W. Mao Modern cryptography : Theory and Practice , PEA ,2004
2. Handbook of Applied Cryptography, CRC Press 1996.
3. .Calabrese “Information Security Intelligence : Cryptographic Principles &Applications.” Thomson Learning

***Type of questions for University Examination***

***Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module***

***Question 2-5 – There will be two choices from each module .Answer one question from each module of 15 marks***

## CS 802 ARTIFICIAL INTELLIGENCE

### Module 1

Introduction - Problem spaces and search - Production systems - Characteristics. Heuristic search techniques - Generate and Test - Hill climbing -Best fit. Graph search - A\* algorithm. Problem reduction - constraint satisfaction - Means and End analysis. Game playing - Minimax - Alpha-beta cut-off.

### Module 2

Logic and Deduction. Introduction to symbolic logic - Propositional logic - Well Formed Formula. Predicate Logic - predicates variables and constants - First order logic, Quantifiers. Forward chaining and Unification. Goal trees. Resolution by refutation.

### Module 3

Representing Knowledge. Procedural versus Declarative. Reasoning under uncertainty - Nonmonotonic reasoning - Statistical reasoning. Bayesian networks.. Fuzzy Logic . Semantic Nets, Frames, Conceptual Dependency, Scripts, CYC. Natural Language Processing - Transformational grammar, Case grammar - Semantic grammars. Learning: Learning by analysing, by explaining experience, by correcting mistakes, by recording cases

### Module 4

Software agents – agent characteristics, agent topology, agent oriented programming, Java implementation of intelligent agents

### Text Book:

1. Elaine Rich and Kevin Knight, “Artificial Intelligence”, Tata McGraw-Hill Publishing Company Ltd., New Delhi, 1990
2. Jeffrey M Bradshaw, “Software Agents”, AAAI Press/ The MIT Press(97)

### References:

1. Natural Language Processing - Transformational grammar, Case grammar - Semantic grammars.
2. Dan W.Patterson, “Introduction to Artificial Intelligence and Expert Systems”, Prentice Hall India Ltd., New Delhi, 1996
3. Winston, P.H., “Artificial Intelligence”, Addison Wesley Pub. House, Reading, MA
4. Nillson N. J., “Artificial Intelligence: A new Synthesis”, Elsevier, New Delhi
5. Eugene Charniak, Drew McDermott, “Introduction to Artificial Intelligence”, Addison Wesley , Reading, Massachusetts, 1985
6. Akshar Bharati, Vineet Chaitanya, Rajeev Sangal, “Natural Language Processing: A Paninian Perspective”, Prentice Hall India Ltd., New Delhi, 1996
7. Nils J.Nillson, ‘Principles of Artificial Intelligence’, Morgan Kauffman Publishers Inc., Palo Alto, California
8. Rober J. Schalkoft, “Artificial Intelligence, An Engineering Approach”, McGraw-Hill Publishing company, New York 1990
9. Gerhard Weiss, “Multi agent System – A modern approach to distributed AI”, MIT Press

### *Type of questions for University Examination*

*Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module*

*Question 2-5 – There will be two choices from each module .Answer one question from each module of 15 marks*

## CS 803 OBJECT ORIENTED MODELLING AND DESIGN

### Module 1

Object Oriented Programming and Design Principles: Object Oriented Concepts – Nature and purpose of models – Object Modeling – Dynamic Modeling – Functional Modeling  
System Design- Object Design

### Module 2

UML Structural Modeling: Basics of UML based object oriented analysis and design  
Classes – Relationships – Interfaces – Roles – Class diagrams – Advanced classes and relationship – Packages – Instances – Object diagrams

### Module 3

UML Behavioral Modeling: Interactions – Use cases – Interaction diagrams – Use case diagrams – Activity diagrams – Events – Signals – State Machines – Processes – Threads – State chart diagrams

### Module 4

UML Architectural Modeling: Component diagrams – Deployment diagrams – Collaborations – Unified Processes Introduction to Software Architecture:  
Design frameworks – Design pattern – Describing the architecture in Architecture description language (ADL)

### Text Book:

1. James Rumbaugh et. al., Object Modelling and Design – PHI
2. Grady Booch, James Rumbaugh, Ivar Jacobson .A.W The Unified Modeling Language User Guide –

### References:

1. Ivan Jacobson, Grady Booch, James Rumbaugh A.W The Unified Software Development Process –
2. Bruegge. Object Oriented Software Engineering using UML patterns and Java, Pearson Education ,2003 –
3. Rational Unified Process, Third Edition – Kruchten.

### *Type of questions for University Examination*

*Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module*

*Question 2-5 – There will be two choices from each module .Answer one question from each module of 15 marks*

## CS/EC/EE/EI 804 A DIGITAL IMAGE PROCESSING

### Module 1

Digital image fundamentals: representation - elements of visual perception - simple image formation model - Image sampling and quantization - basic relationships between pixels – imaging geometry. Review of matrix theory results: Row and column ordering - Toeplitz, Circulant and Block matrices. Review of Image transforms: 2D-DFT, FFT, Walsh, Hadamard, Haar, DCT and Wavelet transforms.

### Module 2

Image enhancement: Spatial domain methods: point processing - intensity transformations, histogram processing, image subtraction, image averaging; Spatial filtering- smoothing filters, sharpening filters. Frequency domain methods: low pass filtering, high pass filtering, homomorphic filtering. Generation of spatial masks from frequency domain specifications.

Image segmentation: Detection of discontinuities - point, line and edge and combined detection, Edge linking and boundary description - local and global processing using Hough transform – Thresholding - Region oriented segmentation - basic formulation, region growing by pixel aggregation, region splitting and merging - Use of motion in segmentation. Fundamentals of Representation and Description.

### Module 3

Image restoration: Degradation model - Diagonalization of circulant and Block circulant matrices - Algebraic approaches - Inverse filtering - Wiener filter - Constrained Least squares restoration - Interactive restoration - Geometric transformations. Fundamentals of Colour image processing: colour models - RGB, CMY, YIQ, HIS - Pseudo color image processing - intensity slicing, gray level to color transformation.

### Module 4

Image compression: fundamentals- redundancy: coding, inter pixel, psychovisual, fidelity criteria, Models, Elements of information theory, Error free compression- variable length, bit plane, lossless predictive, Lossy compression- lossy predictive, transform coding. Fundamentals of JPEG, MPEG, Fractals.

### Text Book:

1. Gonzalez and Woods, “Digital Image Processing”, 2 Ed, Pearson Education, 2002.

### References:

1. Anil K. Jain, “Fundamentals of Digital Image Processing”, Pearson Education, 2003.
2. Mark Nelson, Jean-Loup Gailly “The Data compression Book” 2 Ed, bpb Publications.
3. Pratt William K., “Digital Image Processing”, John Wiley & sons
4. Chanda & Majumdar, “Digital Image Processing and Analysis”, PHI.
5. M.Sonka, V. Hlavac, R. Boyle, “Image Processing, Analysis and Machine Vision”, Vikas Publishing House

### *Type of questions for University Examination*

*Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module*

*Question 2-5 – There will be two choices from each module. Answer one question from each module of 15 marks*

## CS/EB/EC/IT 804 B BIOINFORMATICS

### Module 1

Basic Concepts of Molecular Biology: Cells - Chromosomes, DNA, RNA, Proteins, Central dogma of molecular biology, Genomes and Genes - Genetic code, Transcription, Translation and Protein synthesis. Web based genomic and proteomic data bases: NCBI, GenBank

### Module 2

Sequence alignments – Dot plot-Pair-wise sequence alignments - local and global -Sequence similarity and distance measures - Smith-Waterman algorithm, Needleman-Wunch algorithm, Multiple sequence alignment –Sum-of-Pairs measure - Star and tree alignments – PAM and BLOSUM, Phylogenetic analysis

### Module 3

Informational view of Genomic data, Genomic Signal Processing, DNA Spectrograms, Identification of protein coding regions, Gene expression, Microarrays, Microarray image analysis

### Module 4

Gene structure in Prokaryotes and Eukaryotes: Molecular Structure Prediction: Basic concepts and terminologies related to molecular structures, Basic molecular Visualization, RNA secondary structure prediction, Protein folding problem, Protein Threading, Protein Visualization, Introduction to Drug Discovery.

### Case Study

Software Tools: Use of Tools for basic and specialized sequence processing such as: BLAST, FASTA, RasMol, Phylip, ClustalW

### Text Books:

1. Setubal & Meidanis, *Introduction to Computational Molecular Biology*, Thomson:Brooks/Cole, International Student Edition, 2003
2. Claverie & Notredame, *Bioinformatics - A Beginners Guide*, Wiley-Dreamtech India Pvt Ltd, 2003.

### References:

1. Lesk, *Introduction to Bioinformatics*, Oxford University Press, Indian Edition, 2003
2. Higgins and Taylor, *Bioinformatics: Sequence, structure and databanks*, Oxford University Press, Indian Edition, 2003
3. Bergeron, *Bioinformatics Computing*, Prentice hall of India, 2003
4. Jiang, Xu and Zhang, *Current topics in Computational Molecular Biology*, Ane Books, New Delhi, 2004
5. S.C Rastogi & Namitha Mendiratta, *Bioinformatics method and application Genomics,Proteinomics & drug discovery*
6. Dov Stekel, *Microarray Bioinformatics* ,Cambridge University Press

### Type of questions for University Examination

**Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module**

**Question 2-5 – There will be two choices from each module .Answer one question from each module of 15 marks**

## CS 804 C SOFTWARE ARCHITECTURE

### Module 1

Software Architecture –Introduction-Architectural Styles-Pipes and Filters-Data Abstraction and Object Oriented Organization-Event based, Implicit Invocation-Layered Systems-Repositories-Interpreters-Process Control-Process control Paradigms-Software Paradigm for Process Control-Distributed processes-Main program / subroutine organizations – Domain – specific software architecture – heterogeneous architectures .

### Module 2

Shared Information Systems – Data base integration –Batch sequential – Simple Repository –Virtual Repository – Hierarchical Layers – Evolution of Shared Information Systems in BusinessData Processing – Integration in Software Development Environments – Integration in Design of Buildings- Architectural Structures for Shared Information Systems.

### Module 3

Architectural Design Guidance- Guidance for User-Interface Architectures -Design Space and rules-Design Space for User Interface Architectures-Design. Rules for User Interface Architecture applying the Design Space – Example – A Validation Experiment – How the Design Space Was Prepared .

### Module 4

Value of Architectural Formalism – Formalizing the Architecture of a Specific System – Formalizing an Architectural Style – Formalizing an Architectural Design.Linguistic Issues – Requirements for Architecture - Description Languages - First Class Connectors – Adding Implicit Invocation to Traditional Programming Languages .  
Tool for Architectural Design – UniCon .

### Text Book:

1. Mary Shaw, David Garlan, "Software Architecture", Prentice Hall ,India, 2000

### *Type of questions for University Examination*

*Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module*

*Question 2-5 – There will be two choices from each module .Answer one question from each module of 15 marks*

## CS/IT 804(D) MOBILE COMPUTING

### Module 1

Review of wireless and mobile communication (covered in Advanced Computer Networks)-Mobile computing architecture-Pervasive Computing-Voice oriented data Communication, Operating System for Mobile Computing, Mobile Devices, cards and sensors, Mobile computing applications: messaging-SMS-MMS-GPRS applications-Mobile agents.

### Module 2

Wireless Internet-Mobile IP-wireless web-Web services and mobile web services-Wireless middleware-wireless gateway and mobile application servers-Wireless Access Protocol(WAP)-WAP protocol layers. Mobile database management:-data caching, transaction models, processing queries, Data recovery, QoS .Mobile Transport Layer

### Module 3

Cellular network- First Generation Networks-Second generation (2G): GSM-CDMA network .data over cellular network-2.5G network-GPRS-GPRS System Architecture and Protocol layers. EDGE. Third generation network(3G) network-MMS-introduction to 4G and 5G systems-Emerging wireless networks: Ultra wide band(UWB)-Free space optics(FSO)-Mobile ad-hoc network(MANET)-Wireless sensor networks-OFDM and Flash OFDM

### Module 4

Wireless security-WLAN security-cellular wireless network security-Mobile ad-hoc network security-Internet security protocols: VPNs and IPSec-Wireless middleware security-SSL for wireless web security-WAP security and WTLS. Client programming tools-using XML and UML for mobile computing –J2ME.

### Text Book:

1. Raj Kamal, *Mobile Computing*, Oxford University Press, 2007

### References:

1. Amjad Umar, *Mobile Computing and Wireless Communications*, NGE Solutions, 2004
2. Asoke Talukder, Roopa Yavagal, *Mobile Computing*, McGrawhill, 2006
3. Reza Behravanfar, Phillip Lindsay, Reza B'Far, *Mobile Computing Principles: designing and developing mobile applications with UML and XML*, Cambridge University Press, 2006.
4. U. HansMann, L Merk, M.S. Nicklous and T. Stober, *Principles of Mobile Computing*, 2/e, Spniyer, 2003
5. Schiller J, *Mobile Communications*, 2/e-Addison Wesley, 2003.

### *Type of questions for University Examination*

**Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module**

**Question 2-5 – There will be two choices from each module .Answer one question from each module of 15 marks**

## CS 805 PROJECT WORK

The project work commencing from the seventh semester shall be completed and the project report shall be submitted by each student by the end of eighth semester. There shall be an internal examination of the project that includes a presentation, demonstration and oral examination of the project work. The evaluation panel shall consist of at least two faculty members including project guide as appointed by the Head of the department.

Each batch of students shall develop the project designed during the VII semester. The implementation phase shall proceed as follows:

A detailed algorithm level implementation, test data selection, validation, analysis of outputs and necessary trial run shall be done.

Integration of hardware and software, if applicable, shall be carried out.

A detailed project report in the prescribed format shall be submitted at the end of the semester.

All test results and relevant design and engineering documentation shall be included in the report.

The work shall be reviewed and evaluated periodically

The final evaluation of the project shall be done by a team of minimum 3 internal examiners including the project guide and shall include the following.

- Presentation of the work
- Oral examination
- Demonstration of the project against design specifications
- Quality and content of the project report

*Guidelines for evaluation:*

Regularity and progress of work	30
Work knowledge and Involvement	100
End semester presentation and oral examination	50
Level of completion and demonstration of functionality/specifications	70
Project Report – Presentation style and content	50
<i>Total</i>	300 marks

**Note:** Points (i) and (ii) to be evaluated by the respective project guide and the project coordinator based on continuous evaluation. (iii)-(v) to be evaluated by the final evaluation team comprising of 3 internal examiners including the project guide.

CS 806 VIVA-VOCE

Each student is required to appear for a viva-voce examination, and he/she has to bring his seminar report and project report for the same. The evaluation panel should contain at least one external and two internal examiners appointed by the University. There can be more than one panel in case the number of students is large.

B.TECH ELECTRONICS & COMMUNICATION ENGINEERING

(2006 Admission onwards)

**Semester III**

Subject Code	Subject Name	Hrs./ week		Marks		
		L	T/D/P	Internal	University	Total
CE/CS/EB/EC/E E/EI/IT/ME/SE <b>301</b>	Engineering Mathematics II	4		50	100	150
EB/EC/EI/IT/ ME <b>302</b>	Electrical Technology	4		50	100	150
EC/EI <b>303</b>	Network Theory	4		50	100	150
EB/EC/EI <b>304</b>	Digital Electronics	4		50	100	150
EC/EI <b>305</b>	Solid State Electronics	4		50	100	150
EC/EI <b>306</b>	Electronic Circuits I	4		50	100	150
EB/EC/EI <b>307</b>	Basic Electronics Laboratory	-	3	100		100
EB/EC/EI <b>308</b>	Electrical Machines Laboratory	-	3	100		100
	<b>Total</b>	<b>24</b>	<b>6</b>	<b>500</b>	<b>600</b>	<b>1100</b>

### Semester IV

Subject Code	Subject Name	Hrs./ week		Marks		
		L	T/D/P	Internal	University	Total
CE/CS/EB/EC/EE/EI/IT/ME/SE 401	Engineering Mathematics III	4		50	100	150
CS/EB/EC/EI 402	Microprocessors.	4		50	100	150
EC/EI 403	Electronic Circuits II	4		50	100	150
EC/EI 404	Signals and Systems	4		50	100	150
EC/EE 405	Analog Communication	4		50	100	150
EB/EC/EE/EI 406	Industrial and Power Electronics	4		50	100	150
CS/EB/EC/EE/EI 407	Digital Electronics Laboratory	-	3	100		100
EC 408	Electronic Circuits Laboratory I	-	3	100		100
	<b>Total</b>	<b>24</b>	<b>6</b>	<b>500</b>	<b>600</b>	<b>1100</b>

### Semester V

Subject Code	Subject Name	Hrs./ week		Marks		
		L	T/D/P	Internal	University	Total
CE/CS/EB/EC/EE/EI/IT/ME/SE 501	Engineering Mathematics IV	4		50	100	150
EC 502	Electromagnetic Theory	4		50	100	150
EC/EI 503	Digital System Design	4		50	100	150
EC/EI 504	Advanced Microprocessors	4		50	100	150
EC/EI 505	Micro Electronics & Integrated Circuits	4		50	100	150
EC/EI 506	Digital Signal Processing	4		50	100	150
CS/EB/EC/EI 507	Microprocessor Laboratory	-	3	100		100
EC 508	Electronic Circuits Laboratory II	-	3	100		100
	<b>Total</b>	<b>24</b>	<b>6</b>	<b>500</b>	<b>600</b>	<b>1100</b>

### Semester VI

Subject Code	Subject Name	Hrs./ week		Marks		
		L	T/D/P	Internal	University	Total
EC 601	Digital Communication	4		50	100	150
EC 602	Microwave Techniques & Devices	4		50	100	150
EC/EI 603	VLSI Design	4		50	100	150
EC 604	Electronic Measurements and Instrumentation	4		50	100	150
CS/EB/EC/EI 605	Control Systems Engineering	4		50	100	150
EC/EI 606	Embedded Systems	4		50	100	150
EC 607	Communication Laboratory I	-	3	100		100
EC 608	Mini Project	-	3	100		100
	<b>Total</b>	<b>24</b>	<b>6</b>	<b>500</b>	<b>600</b>	<b>1100</b>

**Semester VII**

Subject Code	Subject Name	Hrs./ week		Marks		
		L	T/D/P	Internal	University	Total
CS/EB/EC/EE/EI / IT 701	Industrial Organization & Management	4		50	100	150
EC 702	Radio Communication	4		50	100	150
EC/EI 703	Computer Communication & Networks	4		50	100	150
EC 704	Electronic Product Design	4		50	100	150
EC 705	Elective I	4		50	100	150
EC 706	Signal Processing Laboratory	-	3	100		100
EC 707	Communication Laboratory II	-	3	100		100
EC 708	Seminar	-	2	50		50
EC 709	Project Design	-	2	50		50
	<b>Total</b>	<b>20</b>	<b>10</b>	<b>550</b>	<b>500</b>	<b>1050</b>

**ELECTIVE I:**

- EC/EI 705A:            **Intelligent Systems**  
EC 705B:              **Fundamentals of RF Design**  
EC 705C:              **Hardware modeling**  
EB/EC/EI 705D:      **Mechatronics**

**Semester VIII**

Subject Code	Subject Name	Hrs./ week		Marks		
		L	T/D/P	Internal	University	Total
EC 801	Audio & Video Engineering	4		50	100	150
EC 802	Communication Systems	4		50	100	150
EC 803	Opto Electronics & Communication	4		50	100	150
EC 804	Elective II	4		50	100	150
EC 805	Project Work		14	300		300
EC 806	Viva-voce				100	100
	<b>Total</b>	<b>16</b>	<b>14</b>	<b>500</b>	<b>500</b>	<b>1000</b>
<b>Grand Total</b>					<b>8000</b>	

**ELECTIVE II:**

- CS/EC/EE/EI 804 A: **Digital Image Processing**  
CS/EB/EC/IT 804 B:        **Bioinformatics**  
EC/EI 804 C:                **ASIC Design**  
EC 804 D:                  **Mixed Signal System Design**

**Module I**

**Matrices and Vector spaces:** Rank of matrix, Echelon and normal form, Solutions of linear systems of algebraic equations, Eigen values and Eigen vectors, Cayley- Hamilton theorem (no proof).

Vector Spaces- Subspaces,-Linear Independence of vectors-Linear span-Dimension and Basis. Linear transformations.

**Module II**

**Fourier series and Fourier integrals:** Fourier series of Periodic functions-Euler formulae for Fourier coefficients- functions having period  $2\pi$  , arbitrary period- even and odd functions-half range expansions, Fourier integral, Fourier cosine and sine transformations, linearity property, transform of derivatives, convolution theorem (no proof)

**Module III**

**Laplace transforms:** Linearity property, transforms of elementary functions, Laplace transforms of derivatives and integrals, differentiation and integration of transforms, convolution theorem (no proof), use of Laplace transforms in the solution of initial value problems, unit step function, impulse function - transform of step functions, transforms of periodic functions.

**Module IV**

**Vector calculus:** Scalar and Vector point functions-Gradient and directional derivative of a scalar point functions. - Divergence and Curl of a vector point functions- their physical meanings. Evaluation of line integral, surface integral and volume integrals, Gauss's divergence theorem, Stoke's theorem (No Proof of these theorem), conservative force fields, scalar potential.

**Text books:**

1. R.K.Jain, S.R.K.Iyengar, *Advanced Engineering Mathematics*, Narosa Publishers.
2. C.R.Wilie & L.C.Barrett, *Advanced Engineering Mathematics*, McGraw Hill Publishers

**References :**

1. Larry C Andrews,Ronald C Philips, *Mathematical Techniques For Engineers & Scientists*, Phi Publishers
2. M.C.Potter, J.L.Goldberg, *Advanced Engineering Mathematics*, Oxford University Press
3. B.S.Grewal, *Higher Engineering Mathematics*, Khanna Publishers

***Type of questions for University Examination***

***Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module***

***Question 2-5 – There will be two choices from each module .Answer one question from each module of 15 marks***

## EB/ EC / EI/IT/ ME 302 ELECTRICAL TECHNOLOGY

### Module I

**Transformers:** working principle and elementary theory of an ideal transformer, Constructional features of single phase transformer, emf equation, turns ratio, vector diagram, equivalent circuit, impedance transformation, transformer losses, flux leakage, efficiency, open circuit and short circuit test, load test. Auto transformer - working principle and saving copper, basic idea of current transformer and potential transformer, distribution and power transformer, applications, standard rating, IS specifications.

### Module II

**Basic principles of electrical machines:** Concepts of motoring and generating action,  
**DC machines-** Main constructional features, principles of operation, types of generators, emf equation, characteristics, applications, armature reaction and commutation, types of motors, torque, speed, and power, characteristics, applications, starting losses, and efficiency, speed control, testing, load test of dc machines.

### Module III

**AC Machines:** Alternator- rotating field, speed and frequency, effect of distribution of winding, coil span, characteristics, emf equation, losses and efficiency, regulation (emf method only), applications, synchronous motor- principle of operation, over excited and under excited, starting, applications, synchronous capacitor.  
**Induction Motor:** Three phase induction motor, principles of operation, and constructional features of squirrel cage and slip ring motors, torque-slip characteristics, starting, speed control, losses and efficiency.  
**Single phase induction motor:** Principle of operation, types of single phase induction motors

### Module IV

#### **Generation, transmission & distribution of electrical energy:**

Different methods of power generation- thermal, hydro-electric, nuclear, diesel, gas turbine stations (general idea only), electrical equipments in power stations, concept of bus bar, load dispatching, methods of transmission, transmission lines, overhead lines and insulators, corona and skin effect of DC & AC distribution, substation (elementary idea only)

#### **Text Books:**

1. F.S.Bimbra, *Electrical Machines*, Khanna publications

#### **References:**

1. B.L.Theraja, *Electrical Machines*, vol I & IV, Khanna Publishers
2. H.Cotton, *Advanced Electrical Technology*, Wheeler publications.
3. Nagarath & Kothari, *Electrical Machines*, Tata McGraw Hill

#### **Type of questions for University Examination**

**Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module**

**Question 2-5 – There will be two choices from each module .Answer one question from each module of 15 marks**

## Module I

Review of basic Circuit Concepts and theorems, Passive circuit components, Sources, Standard input signals; Source transformation, Mesh and Node analysis, Network equation for RLC Circuits  
Graph of a Network, Trees, Co-trees and loops, Incidence matrix, Cut-set Matrix, Tie-set Matrix and loop currents, Analysis of Networks

## Module II

Characterization of two port networks using different parameters; Interconnections of two port Networks, T &  $\pi$  representation; Steady state and transient response, DC and sinusoidal response of RL, RC and RLC circuits, Initial conditions, Rise and decay of current, Time constant, Damping.

Laplace Transforms – Concept, Laplace transform of important Network functions; Transfer function of two port networks, poles and zeros; Application of Laplace Transforms – Solutions of Network Problems.

## Module III

Passive filters – Filter fundamentals, Classification of Filters- Low Pass, High Pass, Band Pass & Band Reject Filters. Characteristic impedance, Design of Constant K and m derived filters (all four)- T and  $\pi$  - frequency response, Recursive filters- Butter worth, Chebyshev & Elliptical filters (Concept only)- Frequency response, transfer function.

## Module IV

Transmission Lines: Types, Applications, Equivalent Circuit, Primary constants, Transmission Line equations, Input impedance, Secondary Constants, Lossless Line, Distortion less line, Loading of lines, Input impedance of lossless Transmission line, RF lines, Relation between Reflection Coefficient, Load, Characteristic impedances and VSWR, Lines of Different Length -  $\lambda/8$ ,  $\lambda/4$  and  $\lambda/2$  Lines, Losses in Transmission Lines, Smith Chart and applications, Impedance matching – Single stub & double stub properties

## Text Books:

1. D.Roy Choudhury, *Networks and systems*, Wiley Eastern
2. A.Sudhakar and ShyamMohan. S. Pillai, *Circuits and Networks–Analysis and Synthesis* , Tata McGraw Hill, 2002
3. Ryder, *Network Lines and Fields*, Prentice Hall India, 3<sup>rd</sup> edition
4. G.S.N Raju, *Electromagnetic Field Theory and Transmission Lines*, 2005

## References:

1. William B.Stanley, *Network Analysis with applications*, Pearson Education. 4<sup>th</sup> edition
2. A.Usha Nandini and A.Aravamudan, *Network Theory*, Scitech Publishers, 2004.
3. Dr.D.Ganesh Rao & R.V.Srinivasa Murthy, *Network Analysis – a simplified approach*, Sanguine publishers ,2005.
4. Bruce Carlson, *Circuits*, Thomson Learning, 2006
5. Boylestead, *Introductory Circuit analysis*, 5<sup>th</sup> Ed.,UBS, 2003.
6. DeCarlo / Lin, *Linear Circuit Analysis*, - Oxford University Press, 2005.
7. *Schaum's 3000 solved Problems in Electric Circuits, Book 1,2* ,McGraw Hill

## Type of questions for University Examination

**Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module**

**Question 2-5 – There will be two choices from each module .Answer one question from each module of**

**15 marks**

## EB/EC/EI 304 DIGITAL ELECTRONICS

### Module I

**Number system and codes** : Binary , Octal, and Hexadecimal number systems - Binary arithmetic, Binary coded Decimal , Excess - 3 code, Gray Code, Error detection and correction - Boolean algebra -Minimization of Boolean function using Karnaugh Map and Quine - McClusky methods – Formation of switching functions from word statements , realisation using NAND, NOR. Combinational circuits- multiplexer demultiplexer, decoder, encoder

### Module II

**Sequential circuits:** Flip-flops - RS, JK & T & D flip- flops, shift registers - counters -Asynchronous and synchronous counters, Up-Down counter, modulo counter, Ring counter, Johnson counter - sequence generators - state tables and diagrams

### Module III

**Arithmetic circuits** : Half adder, Full adder , Subtractor, Serial and parallel addition - Carry look ahead adder - Binary multiplication and division - Multivibrators - Monostable and astable multivibrators using discrete gates . Memories –ROM, RAM, EPROM

### Module IV

**Logic families:** DCTL, RTL, DTL, TTL, ECL, CMOS - Tri-state logic - specification and transfer characteristics of basic TTL - Standard logic levels - Current and voltage parameters - fan in and fan out - Propagation delay, noise consideration- interfacing of CMOS to TTL and interfacing of TTL to CMOS

### Text Book:

1. A. Anand Kumar, *Fundamentals of Digital Circuits*, Prentice-Hall India Ltd, 3<sup>rd</sup> edition.

### References :

1. J.M.Yarbrough, *Digital Logic, Applications & Design*, Thomson Learning, I edition
2. Flyod & Jain, *Digital Fundamentals*, Pearson Education, 8<sup>th</sup> Edition,
3. R P Jain, *Modern Digital Electronics*, Tata Mc Graw Hill
4. R. K. Gaur, *Digital Electronics and Microcomputers* , Dhanpat Rai and Sons ,3<sup>rd</sup> Edition.
5. Taub & Schilling, *Digital Integrated Electronics*, Mc Graw Hill
6. Malvino and Leach, *Digital Principles and Applications*, Mc Graw Hill
7. Charles H.Roth , *Fundamentals of Logic Design*, Thomson Publishers, 5<sup>th</sup> ed.

### ***Type of questions for University Examination***

***Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module***

***Question 2-5 – There will be two choices from each module .Answer one question from each module of 15 marks***

## EC/EI 305 SOLID STATE ELECTRONICS

## **Module I**

**Band theory of solids** - Conductors, semiconductors and insulators - energy band diagram. -Semi conductor materials and their properties: elemental semiconductors- the energy band model of semiconductors. Valance band model of semiconductor equilibrium concentration of electrons and holes- the fermi level and energy distribution of carriers inside the bands- temperature dependence of carrier concentration inside the bands. - Carrier transport in semi conductors - drift of carriers in electric fields, carrier flow by diffusion - constancy of fermi level across junction, Excess carriers in semi conductors - injection of excess carriers - recombination of excess carriers - continuity equation - current flow equation.

## **Module II**

**PN junction**- Abrupt PN junction - energy band diagram - barrier potential, biasing PN junction, excess carrier calculation - current components diffusion - drift - boundary conditions for long and short diodes - PN junction characteristics - calculation of diffusion – depletion layer capacitance - simple model - transient ac condition -principle of zener and avalanche diodes - photodiodes - - tunnel diode and PIN diode -varactor diode.

## **Module III**

**Bipolar junction transistors** - NPN, PNP types, Basic structures - biasing - mechanism of carrier flow - current components in transistors boundary conditions in active region - solution for short base width - base width modulation - Transistor configurations - Characteristics - current amplification factors - relations between alpha & beta - comparison Ebers - Moll model - - basic principles of phototransistors - UJT, characteristics. Semiconductor heterojunctions - V-I characteristics - real heterojunctions - frequency limitation of transistor - transit time effect

## **Module IV**

**Field effect transistors:** JFET - basic structures - principle of operation - Characteristics and current equation, MOSFET - semiconductor surfaces - C - V characteristics - the Si - SiO<sub>2</sub> System - basic structures and operating principles - current equation - V-I characteristics - simple model – CMOS- structure, operation.

### **Text Books:-**

1. B.G.Streetman , *Solid State Electronics Devices*, Pearson Education,
2. Suresh Babu ,*Solid State Devices & Technology*, Sanguine Tech. Publishers

### **References**

1. *Electronic Devices* , Learning Material Series, ISTE, NewDelhi ,1997
2. Millman & Halkias ,*Electronic Devices & Circuits*, Mc Graw Hill
3. George B Rutkowski ,*Solid state electronics*, Mc Graw Hill ,IV<sup>th</sup> edition
4. S.S.Islam, *Semiconductor Physics and Devices*, Oxford University Press, 2006
5. Dr. Achuth & Dr. K.N.Bhatt, *Solid State Devices*, Tata Mc Graw Hill

### **Type of questions for University Examination**

**Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module**

**Question 2-5 – There will be two choices from each module .Answer one question from each module of 15 marks**

## Module I

**DC power supplies** - power transformers - rectification - half wave, full wave, bridge - expression for ripple factor, efficiency, comparison, diode ratings. Filters - capacitor - inductor LC filters- use of bleeder resistor - voltage multipliers - dual power supplies - simple voltage regulator. Series regulators - IC regulators.

## Module II

**BJT Amplifiers:** Units of gain, CE amplifier- Biasing techniques - stabilization of operating point – compensation techniques- low frequency equivalent circuits - r-parameters, h-parameters Methods of coupling - D.C coupled amplifier - CE RC coupled amplifier - concept of load lines- loading effect at the input and output - emitter follower as Buffer stage- Darlington emitter follower-Boot strapping – High frequency equivalent circuit of CE amplifier-hybrid  $\pi$  model - frequency response of RC coupled amplifier - frequency analysis of R C coupled amplifier - lower cut-off frequency - upper cut-off frequency - 3 db bandwidth - Frequency response of DC coupled amplifier.

## Module III

**FET Amplifier:** FET biasing- Low frequency equivalent circuit- RC coupled common source amplifier - expression for gain - frequency response - FET source follower- - FET as a voltage variable resistor – comparison of FET with BJT. CMOS biasing-Amplifier ckts, Multistage Amplifier.

## Module IV.

**Pulse circuits:** pulse characteristics - Pulse shaping using RC circuits - Differentiating and integrating circuits - clipping and clamping circuits using diodes and transistors - Transistor as a switch- sweep circuits - Transistor sweep circuits - voltage and current sweep - Miller sweep circuit - Bootstrap sweep circuit - UJT relaxation oscillator. Multivibrators using transistors - astable - monostable and bistable operation

### Text books:

1. Boylsted & Nashelsky, *Electronic Devices and circuits'*, Pearson Education, 9<sup>th</sup> edition.
2. Bogart, *Electronic Devices and circuits*, Pearson Education, 6<sup>th</sup> edition.
3. Milman & Taub, *Pulse Digital & Switching waveforms*, Tata Mc Graw Hill

### References:

1. Milman & Halkias, *Integrated Electronics*, Tata Mc Graw Hill
2. Sedra & Smith, *Microelectronic circuits*, Oxford University Press, 5<sup>th</sup> edition.
3. Schilling & Belove, *Electronic Circuits, Discrete & Integrated*, Tata Mc Graw Hill
4. *2000 Solved problems in Electronics: Shaum series*, Mc Graw Hill Publishers, 1990
5. Allen Mottorshed, *Electronic Devices & Circuits*, Prentice Hall of India, 2003

### *Type of questions for University Examination*

**Question 1** - 8 short answer questions of 5 marks each. 2 questions from each module

**Question 2-5** – There will be two choices from each module .Answer one question from each module of 15 marks

## **EB/EC/EI 307 BASIC ELECTRONICS LABORATORY**

1. Study of - Multimeter, Signal generators , CRO etc. and measurement of electrical quantities (V,I,FREQUENCY,PHASE)
2. Testing of Passive and Active components - Resistors , Capacitors, inductors , Transformers , diodes , Transistors, etc.
3. Characteristics of Active devices
  - i) Forward and reverse characteristics of a diode - measurement of forward resistance
  - ii) Common base characteristics of a transistor - measurement of current gain, input resistance and output resistance, maximum ratings of the transistor.
  - iii) Common emitter characteristics of a transistor - measurement of current gain, input Resistance and output resistance, relation between and study of the effect of leakage Current, maximum ratings of the transistor.
  - iv) Common source characteristics of a JFET - measurement of transconductance  $g_m$  and drain to source resistance  $r_{ds}$  , use of FET as VVR.
4. Rectifying circuits
  - i) HW rectifier
  - ii) FW rectifier
  - iii) FW Bridge rectifier
  - iv) Filter circuits - Capacitor filter, inductor filter and Pi section filter  
( Measurement of ripple factor, maximum ratings of the devices )
5. Zener Regulator
6. Design and implementation of Power supplies
7. Biasing of Active devices
  - i) Voltage biasing, current biasing and Feedback biasing of BJT
  - ii) Biasing of JFET
8. Series Voltage Regulator using transistors.

**Note: 50% Marks is earmarked for continuous evaluation and 50% marks for end semester examination to be assessed by two examiners. A candidate shall secure a minimum of 50% marks separately for the two components to be eligible for a pass in that subject.**

## **EB/EC/EI 308 ELECTRICAL MACHINES LABORATORY.**

### ***Compulsory experiments***

1. (a) Preliminary study of AC and DC Power supplies in the laboratory.  
(b) Study of instruments and their mode of use
2. Open circuit characteristics of
  - (a) Self excited generator
  - (b) Separately excited generator.
3. Load characteristic of compound generator
4. Load characteristic of shunt generator
5. Study of face plate starter and starting of DC motors
6. Load characteristics of DC series motor.
7. Swinburn's test
8. Polarity and transformation ratio test on single phase transfer.
9. O.C & SC test on single phase transformer - equivalent circuit
10. Load test on single phase transformer.
11. Study of starting methods of squirrel cage and slip ring induction motor.
12. Load test on slip ring induction motor and study of characteristics.

### ***Optional Experiments***

1. Study of single-phase motors.
2. Load test of DC shunt motor.
3. Poly phase connection of single phase transformer.
4. Load test on squirrel cage induction motor
5. Study of alternators.

**Note: 50% Marks is earmarked for continuous evaluation and 50% marks for end semester examination to be assessed by two examiners. A candidate shall secure a minimum of 50% marks separately for the two components to be eligible for a pass in that subject.**

## CE/CS / EB/ EC /EE/ EI/IT/ ME/SE 401 ENGINEERING MATHEMATICS III

### Module I

**Complex Analytic functions and conformal mapping:** curves and regions in the complex plane, complex functions, limit, derivative, analytic function, Cauchy - Riemann equations, Elementary complex functions such as powers, exponential function, logarithmic, trigonometric and hyperbolic functions.

Conformal mapping: Linear fractional transformations, mapping by elementary functions like  $Z^2$ ,  $e^z$ ,  $\sin z$ ,  $\cos z$ ,  $\sin hz$ , and  $\text{Cos } hz$ ,  $Z+1/Z$ .

### Module II

**Complex integration:** Line integral, Cauchy's integral theorem, Cauchy's integral formula, Taylor's series, Laurent's series, residue theorem, evaluation of real integrals using integration around unit circle, around the semi circle, integrating contours having poles, on the real axis.

### Module III

**Partial differential equations:** Formation of partial differential equations. Solutions of equations of the form  $F(p, q) = 0$ ,  $F(x,p,q)=0$ ,  $F(y,p,q)=0$ ,  $F(z,p,q)=0$ ,  $F_1(x,p) = F_2(y,q)$ , Lagrange's form  $Pp+Qq = R$ . Linear homogeneous partial differential equations with constant co-efficients.

### Module IV

**Vibrating string :** one dimensional wave equation, D'Alembert's solution, solution by the method of separation of variables ,One dimensional heat equation, solution of the equation by the method of separation of variables. Solutions of Laplace's equation over a rectangular region and a circular region by the method of separation of variables.

### Text Books:

1. R.K.Jain, S.R.K.Iyengar, *Advanced Engineering Mathematics*, Narosa Publishers.
2. C.R.Wilie & L.C.Barrett ,*Advanced Engineering Mathematics*, Mc Graw Hill

### References:

1. Ervin Kreyszig, *Advanced Engineering Mathematics*, Wiley Eastern
2. Churchill R.V, *Complex Variables & Applications*, Mc Graw Hill Publishers.
3. M.C.Potter, J.L.Goldberg, *Advanced Engineering Mathematics*, Oxford University Press

### *Type of questions for University Examination*

**Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module**

**Question 2-5 – There will be two choices from each module .Answer one question from each module of 15 marks**

## CS/EB/EC/EI 402 MICROPROCESSORS

### Module I

**Introduction to 8 bit microprocessor:** Microcomputers and microprocessors, 8/ 16/ 32/ 64-bit microprocessor families; Internal architecture of Intel 8085 microprocessor: Block diagram, Registers, Internal Bus Organization, Functional details of pins, Control signals, External Address / Data bus multiplexing, Demultiplexing, I/ O mapped I/ O, and memory mapped I/ O techniques. Interrupts, Serial communication and DMA features

### Module II

**Assembly Language Programming:** 8085 instruction set: Instructions, Classifications, Addressing modes, Stack and Subroutines, Delay routines, Counters etc. Programming examples.

### Module III

**Instruction Timing and Interrupts:** Timing Diagrams (of various instructions): T- state, Machine cycle (Opcode fetch, Read / Write, Interrupt Acknowledge, Bus Idle, etc), Interrupts: -types (h/ w and s/ w), Maskable / Non maskable, their organization.

### Module IV

#### **Interfacing concepts and devices:**

Memory interface: Concept of memory chip/ chips interface to 8085 with appropriate examples  
Programmable interfacing devices: - Programmable peripheral interface (Intel 8255), Programmable timer interface (Intel 8253/ 54), Programmable display / Keyboard interface (Intel 8279), Programmable serial communication interface (Intel 8251)-(their architecture, register organization, initialization, hard ware and software inter face to 8085.

#### **Text Books:**

1. Ghosh and Sridhar, *0000 to 8085 Microprocessors for Engineers and Scientists*, Prentice-Hall India, 2<sup>nd</sup> edition
2. Gaonkar , *Microprocesors, Architecture, Programming and Applications*, Wiley Eastern, 4<sup>th</sup> edition

#### **References:**

1. A.Nagoor Kani, *Microprocessors,architecture and programming*,RBA Publications
2. Douglas V.Hall , *Microprocessors,Interfacing and Peripherals*,Prentice Hall India

#### **Type of questions for University Examination**

**Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module**

**Question 2-5 – There will be two choices from each module .Answer one question from each module of 15 marks**

## EC/EI 403 ELECTRONIC CIRCUITS II

### Module I

**Feedback amplifiers:** Negative and positive feedback - Different types of negative feedback amplifier - voltage shunt-voltage series - current shunt - current series .Oscillators - Principle of sinusoidal oscillators - Barkhausen criteria - RC oscillators - phase shift- Wienbridge - LC oscillators - Hartley , Colpitts -clapp oscillator, crystal oscillator.

### Module II.

**Power amplifiers** -classification - class A , class B, Class AB, Class C and class D - Transformer coupled class AB Power amplifier - Transformerless class AB push-pull Power amplifier - complementary symmetry power amplifier - Harmonic distortion in Power amplifiers - Transistor rating -Heat sinks -Switching amplifiers

### Module III

**High frequency amplifier** – Filter Design and Tuned amplifier - coupled circuit, unilateralisation of transistor, Q-factor, single tuned, double tuned and stagger tuned amplifier (analysis not required) - Wide band amplifier: Gain-bandwidth trade off. Wide band transistor configuration cascade emitter coupled - broad banding, bandwidth trade-off, wide band transistor configuration with negative feed back, frequency compensation - low frequency RC compensation High frequency compensation (analysis not required)

### Module IV.

**Differential amplifier:-** Basic differential amplifier - dual input balanced output and unbalanced output- Internal block schematic of op amp - Biasing used in IC- Constant current source- Current mirror Circuits- Active Load – Level Shifters- Power amplifier stages. Power supply requirements.

### Text Book:-

1. Sedra & Smith , *Microelectronic circuits*, Oxford University Press, 5<sup>th</sup> edition.

### Reference :-

2. Millman & Halkias , *Electronic Devices & Circuits*, Tata Mc Graw Hill
3. Bapat K N , *Electronic Devices & Circuits* , Mc Graw Hill
4. Millman & Taub, *Pulse Digital and Switching Waveforms*, Tata Mc Graw Hill
5. Millman & Halkias , *Integrated Electronics*, Tata Mc Graw Hill
6. Boylestead & Neshelsky , *Electronic Devices & Circuits*, Pearson Education, 9<sup>th</sup> edition.
7. Schilling & Belove, *Electronic Circuits ,Discrete & Integrated* , Tata Mc Graw Hill
7. R.S.Moni, *Amplifiers*, Wiley Eastern
8. Gaykwad, *Op-amps and Linear integrated Circuits*, Pearson Education, 4<sup>th</sup> edition.

### *Type of questions for University Examination*

**Question 1** - 8 short answer questions of 5 marks each. 2 questions from each module

**Question 2-5** – There will be two choices from each module .Answer one question from each module of 15 marks

## EC/EI 404 SIGNALS AND SYSTEMS

### Module I

Continuous Time signals: Energy and Power signals, Exponential and sinusoidal signals, periodicity, Impulse and step signals. Continuous Time systems: Properties- Linearity, stability, causality, memory, invertibility, time invariance. Analysis of LTI System – impulse response- convolution-graphical analysis-properties of convolution, Differential equation representation.

Frequency analysis of CT systems - Fourier series Fourier Transform .Properties Convolution, multiplication,correlation,Parseval's relationship,Examples.Inverse relationship between time and frequency, Time- Bandwidth product, Signal Spectrum

### Module II

Discrete Time signals: Energy and Power signals, Exponential and sinusoidal signals, periodicity, Impulse and step signals. Discrete Time systems: Properties:Linearity, stability,causality,memory,invertibility time invariance.

Representation of systems- impulse response- convolution - Difference equation representation.

Frequency analysis of DT systems: Discrete Time Fourier Series Discrete Time Fourier Transforms, Z Transforms: Properties Analysis of LTI systems using Z transforms the inverse Z transform - System function. Sampling of CT and DT signals. Sampling Theorem Nyquist rate. Reconstruction -- ideal, zero order hold.

### Module III

**Random Signals and systems:** Review of random variables and pdf. Random processes, statistical averages.Stationary processes, Ergodic processes. Random processes and LTI systems. Random processes in frequency domain Power spectrum of stochastic processes, variance Auto correlation and spectral densities - Properties Power spectral density. Gaussian , Rayleigh, Rice probability density-and White processes, band limited and band pass processes.

### Module IV

**Noise:** .White noise, Narrow band noise, effective noise temperature and noise figure representation Sinewave contaminated with narrow band noise.Effect of noise in Systems; eg: Linear and angle modulation systems, threshold effect and threshold extension, pre-emphasis and de-emphasis filtering. Introduction to Detection and estimation, Matched filters

### Text Books:

1. Openheim & Wilsky, *Signals & systems* , PHI/Pearson Education
2. Simon Haykin, *Communication Systems*, John Wiely
3. Proakis & Salehi , *Communication Systems* , Pearson Education, 2006

### References :

1. A.Ambardar, *Analog & Digital Signal Processing*, Thomson Learning, 2<sup>nd</sup> Edition
2. B P Lathi , *Linear signal & Systems* ,Oxford University Press,2<sup>nd</sup> edition
3. C L Phillips .J M . Parr. E A Riskin , *Signals,Systems, And transforms* Pearson Education ,3<sup>rd</sup> Edition
4. R E Ziemer ,W H Tranter, D .R Fannin , *Signals and Systems* , Prentice Hall ,Fourth Edition
5. S S Soliman, M D Srinath, *Continuous and discrete signals and systems*, Prentice Hall India
6. Stark/Wood, *Probabilty and random process with application to Signal Processing*, Pearson Edu., 3rd ed.
7. Hwei-Hsu, *Analog & Digital Communication*, Schaums series, McGrawHill, 2<sup>nd</sup> edition

### Type of questions for University Examination

**Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module.Question 2-5 – There will be two choices from each module .Answer one question from each module of 15 marks**

## EC/EE 405 ANALOG COMMUNICATION

### Module I.

Introduction–communication process, source of information, communication channels; Modulation – need, band width requirements – electromagnetic spectrum. Amplitude modulation – principles – visual concepts, modulation factor and percentage of modulation, mathematical relationship, component phasors, frequency spectrum, band selection. Amplitude modulators – ISB modulators – VSB modulation. AM transmitters – low level, high level – SSB systems – comparisons, mathematical analysis, SSB generation –SSB transmitters – filter method, phase shift method, third method. AM receivers – TRF receivers, Super heterodyne receiver, Double Super heterodyne receiver – SSB receiver – BFO, envelope detection, multi-channel Pilot carrier.

### Module II.

Angle Modulation – mathematical analysis, principles, waveforms, frequency deviation, frequency analysis, bandwidth requirement, phasor representation–pre-emphasis, de-emphasis. FM modulators – direct, indirect, Phase modulators – direct. FM transmitters – direct FM, indirect FM; FM receivers–block diagram–demodulators – Tuned circuit frequency discriminators, slope detector, balanced slope detector, Foster-Seeley discriminators, ratio detectors – FM noise suppression; FM stereo broadcasting–stereo transmitter, stereo receiver (block level treatment only).

### Module III.

Noise – external, internal – noise calculations, multiple noise sources, equivalent noise band width – Noise figure – Effective noise temperature, noise figure in terms of available gain – Noise in AM, angle modulation, pulse modulation – Performance of Communication systems – noise representation–Comparison of coded and uncoded systems - Characteristics of receivers – sensitivity, selectivity, double spotting, SNR – AGC circuitry – Performance of communication receivers – Comparison study of AM, FM and PM.

### Module IV.

Telephony –Simple telephone communication, classification of switching systems, Basics of a switching system; Switches & Multiplexers, DTMF & Pulse signalling, Electronic switching – stored program control, centralized and distributed SPC, enhanced services, Time division, space division & combination switching, Signalling techniques; Traffic Engineering – Network traffic, load and parameters, grade of service, blocking probability, traffic congestion.

### Text Books:

1. George Kennedy, *Electronic communication systems*, McGraw Hill ,4<sup>th</sup> edition
2. Thiagarajan-Viswanathan, *Telecommunication Switching Systems and Networks*, Prentice Hall, 2001

### References:

3. Simon Haykin, *Communication Systems*, John Wiley & Sons, 2004.
4. Robert J Schoenbeck, *Electronic Communications Modulation & Transmission*, Prentice Hall, 2<sup>nd</sup> Ed.
5. Wayne Tomasi, *Electronic Communications Systems (Fundamentals through Advanced)* , Pearson Education 5<sup>th</sup> Ed.
6. B.P.Lathi, *Communication Systems*, B.S Publication, 2001
7. Taub & Schilling, *Principles of Communication Systems* ,Tata McGraw Hill, 1991
8. Roddy & Coolen, *Electronic Communications*, Pearson Education 4<sup>th</sup> Ed.
9. D.N.Krishnakumar, *Telecommunication & Switching*, Sanguine Publishers, 2006

***Type of questions for University Examination***

***Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module***

***Question 2-5 – There will be two choices from each module .Answer one question from each module of 15 marks***

EB/EC/EE/EI 406 INDUSTRIAL AND POWER ELECTRONICS

**Module I.**

Power transistors - Design of high power amplifier – switching transistors - Parallel operation of transistor - Power MOSFET - Operating principles - Structure and characteristics. Thyristors- Classification & Constructional Details. SCR - Working principle - turn on, turn off and V - I characteristics - gate characteristics, and rating: Series and parallel operation of SCR - TRIAC - characteristics, modes of operation, Trigger circuits - magnetic & solid state , half- wave and full-wave operation .

**Module II.**

Single phase controlled rectifiers - half-wave, full-wave, half-controlled and fully controlled - typical waveforms with R, RL, RL with diode and RL with voltage source - voltage and current equation for half-wave controlled rectifier. Three phase half-wave and full-wave controlled rectifier with R load, waveforms. DC motor speed control - various schemes - multi-quadrant operation - simple circuits for speed control of series, PM and separately excited motors.

**Module III.**

Commutation schemes -(different classes) waveforms - single-phase invertors - series, parallel and bridge -PWM inverter - square wave and sin wave output. Chopper circuits using SCR transistor (detailed analysis not required) - Jones Chopper. A.C Motor speed control - various schemes - electronic control of speed of induction motors and synchronous motors.

**Module IV.**

Static switches: dc & ac switches-1 $\phi$  and 3 $\phi$  switches-design of static switches-Solid state relays.

Switching regulators - Basic concepts, analysis and design of Buck, Boost, Buck-Boost and derived converters . UPS - Characteristics - Configuration – Application. Batteries: Characteristics and selection-charging circuits.

Thyristor protection - over current, over voltage, di/dt, dv/dt, gate protection.

Industrial applications: Timer circuits - Flasher circuits-Electronic ballast, dielectric heating, induction heating.

**Text Book:**

1. Muhammed H. Rashid, *Power Electronics – Circuits, Devices and Applications*, Prentice Hall of India , New Delhi, 1994.

References:-

2. *Power Electronics*, IMPACT Learning Material Series, Indian Society for Technical Education.

3. J. Michael Jacob, *Power Electronics: Principles & Applications*, Thomson, New Delhi, 2006
4. B. K. Bose, *Modern Power Electronics And AC Drives*, Pearson Education
5. Biswanth Paul, *Industrial Electronics and Control*, Prentice Hall of India, New Delhi, 2002
6. D W Hart, *Introduction to Power Electronics*, Pearson Education.
7. P C Sen, *Power Electronics*, Tata Mc Graw Hill
8. Singh & Khanchandani , *Power Electronics*, Tata Mc Graw Hill.
9. Asghar M syed , *Power Electronics* Prentice Hall of India
10. N Mohan, *Power Electronics* , John Wiely
11. Hays , *The art of Electronics* , Cambridge University Press

***Type of questions for University Examination***

***Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module***

***Question 2-5 – There will be two choices from each module .Answer one question from each module of***

***15 marks***

**CS/EB/EC/EE/EI 407 DIGITAL ELECTRONICS LABORATORY**

1. Half adder and full adder using NAND gates.
2. Code converters - Binary to Gray and gray to Binary using mode control
3. Binary addition and subtraction (a) 1's complement (b) 2's complement(using 7483)
4. BCD adder using 7483.
5. Study of MUX, DeMUX & Decoder Circuits and ICs
6. Set up R-S & JK flip flops using NAND Gates
7. Asynchronous UP / DOWN counter using JK Flip flops
8. Design and realization of sequence generators.
9. Study of shift registers and Implementation of Johnson and Ring counter using it.
10. Study of IC counters 7490, 7492, 7493 and 74192 or the CMOS equivalent.
11. Astable and monostable multi- vibrators using TTL gates.
12. Transfer characteristics and specifications of TTL gates

**Note: 50% Marks is earmarked for continuous evaluation and 50% marks for end semester examination to be assessed by two examiners. A candidate shall secure a minimum of 50% marks separately for the two components to be eligible for a pass in that subject.**

## EC 408 ELECTRONICS CIRCUITS LABORATORY I

- I Clipping and clamping circuits using diodes / transistors
- II. Study of RC and RLC circuits - Frequency responses, pulse response, Filter characteristics,
- III. Differentiating circuit and integrating circuit
- IV Amplifying circuits
  - (i) Simple common emitter amplifier configuration - gain and bandwidth.
  - (ii) Common source amplifierFunctions of each component, gain measurement, frequency responses
- V Feedback amplifier circuits - Current series and voltage shunt - gain and bandwidth..
- VI Oscillators - RC phase shift. Wein Bridge, crystal oscillator
- VII Multivibrators - Astable , Bistable, monostable.
- VIII Switch & Sweep circuits - Simple transistor sweep, bootstrap sweep.
- IX Power amplifiers

**Note: 50% Marks is earmarked for continuous evaluation and 50% marks for end semester examination to be assessed by two examiners. A candidate shall secure a minimum of 50% marks separately for the two components to be eligible for a pass in that subject.**

### Module I

**Probability distributions:** random variables (discrete & continuous), probability density, mathematical expectation, mean and variance of a probability distribution, binomial distribution, Poisson approximation to the binomial distribution, uniform distribution, normal distribution.

**Curve fitting:** method of least squares, correlation and regression, lines of regression.

### Module II

**Sampling distributions:** population and samples, the sampling distribution of the mean (unknown),  $\sigma$  known), the sampling distribution of the mean ( $\sigma$  known), the sampling distribution of the variance, point estimation, interval estimation, tests of hypotheses, null hypotheses and significance tests, hypothesis concerning one mean, type I and type II errors, hypotheses concerning two means. The estimation of variances: Hypotheses concerning one variance - Hypotheses concerning two variances.

### Module III

**Finite difference Operators:**  $\nabla, \Delta, E, \delta, \mu, x^{(n)}$

Newton's Forward and Backward differences interpolation polynomials, central differences, Stirling's central differences interpolation polynomial. Lagrange interpolation polynomial, divided differences, Newton's divided differences interpolation polynomial

**Numerical differentiation:** Formulae for derivatives in the case of equally spaced points.

**Numerical integration:** Trapezoidal and Simpson's rules, compounded rules, errors of interpolation and integration formulae. Gauss quadrature formulae (No derivation for 2 point and 3 point formulae)

### Module IV

**Numerical solution of ordinary differential equations:** Taylor series method, Euler's method, modified Euler's method, Runge-Kutta formulae 4th order formula,

**Numerical solution of boundary value problems:** Methods of finite differences, finite differences methods for solving Laplace's equation in a rectangular region, finite differences methods for solving the wave equation and heat equation.

### Text Books:

1. Irvin Miller & Freind, *Probability And Statistics For Engineers*, Prentice Hall of India
2. S.S.Sastry, *Numerical Methods*, Phi Publishers.

### References:

1. P.Kandaswamy K.Thilagavathy, K.Gunavathy, *Numerical Methods*, S.Chand & Co.
2. A.Papoulis, *Probability, Random Variables And Stochastic Processes*, Mc Graw Hill Publishers

**Type of questions for University Examination**

**Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module**

**Question 2-5 - There will be two choices from each module. Answer one question from each module of 15 marks**

### Module 1

**Vector Analysis** : Vector Algebra, Coordinate Systems and Transformation – Cartesian, Cylindrical and spherical coordinates, constant-coordinate surfaces, Vector Calculus – Differential length, area and volume, Line, surface and volume integrals, Del operator, Gradient of a scalar, Divergence of a vector, Divergence Theorem, Curl of a vector, Stoke's Theorem, Laplacian of a scalar, Classification of vector fields.

### Module 2

**Electrostatics:** Electrostatic Fields – Coulomb's Law and field intensity, Electric fields due to continuous charge distributions, Electric flux density, Gauss's Law, Applications of Gauss's Law, Electric Potential, Relationship between E and V, Electric dipole, Energy density in Electrostatic fields.

Electric fields in material space – Properties of materials, Convection and conduction currents, Conductors, Polarization in Dielectrics, Dielectric constant and strength, Linear, isotropic and homogeneous dielectrics, Continuity equation, relaxation time, Boundary conditions.

Electrostatic Boundary value problems–Poisson's and Laplace's Equations, Uniqueness Theorem, Resistance and capacitance [Parallel-plate, coaxial, spherical capacitors].

### Module 3

**Magnetostatics and Maxwell's equations:** Magnetostatic fields – Biot-Savart's Law, Ampere's circuital law, Applications of Ampere's circuital law, Magnetic flux density, Magnetic scalar and vector potentials. Magnetic forces, Materials and devices – Forces due to magnetic fields, Magnetic torque and moment, Magnetic dipole, Magnetization in materials, Classification of Magnetic Materials, Magnetic boundary conditions, Inductors and inductances, Magnetic energy, Magnetic circuits. Faraday's Law, Displacement current, Time-harmonic fields, Maxwell's equations for static fields and time varying fields, Word statement.

### Module 4

**Electromagnetic wave propagation** : Electromagnetic waves-Wave propagation in lossy dielectrics- Wave equations from Maxwell's equations, propagation constant, intrinsic impedance of the medium, complex permittivity, loss tangent, Plane waves in lossless dielectrics, Plane waves in free space – uniform plane wave, TEM wave, Plane waves in good conductors – skin effect, Poynting vector, Poynting's Theorem, Reflection of a plane wave at normal incidence – standing waves, Reflection of a plane wave at oblique incidence – parallel and perpendicular polarization, Brewster angle. Numerical Methods in Electromagnetics – Finite Difference, Finite Element and Moment method [Only the concept need be introduced – detailed study not required]

#### Text Books:

1. Matthew N. O. Sadiku, *Elements of Electromagnetics*, Oxford University press, 2004.
2. Jordan and Balmain, *Electromagnetic waves and radiating systems*, Pearson Education ,2<sup>nd</sup> Ed., 2006.

#### Reference:

1. Kraus Fleisch, *Electromagnetics with Applications* ,McGraw Hill ,1999.
2. Cheng, *Field and Wave Electromagnetics*, Pearson Education ,2005.
3. N.Narayana Rao, *Elements of Engineering Electromagnetics* ,Pearson Education, 2006.
4. William.H.Hayt, Jr and John A.Buck, *Engineering Electromagnetics*, Tata McGraw Hill, 2004.
5. Joseph A. Edminister, *Electromagnetics*, Schaum series - McGraw Hill ,1993.
6. D.GaneshRao and C.Narayanappa, *Engineering Electromagnetics*, Sanguine Technical Publishers, 2004.
7. Guru Hiziroglu, *Electromagnetic Field Theory Fundamentals* , Thomson ,2003.

#### **Type of questions for University Examination**

**Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module**

**Question 2-5 – There will be two choices from each module .Answer one question from each module of 15 marks**

## **EC/EI 503 DIGITAL SYSTEM DESIGN**

### **Module I**

Introduction to combinational modules and modular networks. Standard combinational modules, design of arithmetic modules. Programmable Logic Array, Devices- Basic ideas, PLD architecture- PAL & PLA, Implementation of combinational systems with decoder, multiplexers, ROMs and PLAs. Implementation of multimodule combinational systems- decoder networks, Mux trees, demux network, encoder network. Shifter network and barrel shifters

### **Module II**

Introduction to digital systems, Synchronous and asynchronous- state diagram, state names, Mealy and Moore machines binary description. Time behavior of synchronous sequential systems, Minimization of no. of states, Specification of various types of sequential system

### **Module III**

Canonical implementation - analysis and synthesis of networks in the canonical implementation, Flip flop modules and networks. Standard sequential modules-Registers - shift register - counters - RAM - content addressable memories and programmable sequential arrays (PSA ).

### **Module IV**

Design of sequential systems with small number of standard modules, State register and combinational networks - use of ROMs in sequential networks - Counter and combinational networks - RAM and combinational networks - SR and combinational networks. Multimodule implementation of sequential systems - Multimodule registers - Shift registers and RAMs - Multimodule counters.

### **Text Book:**

1. Milos D Ercegovac, Tomas Lang, *Digital systems and hardware / firmware algorithm*, John Wiley

### **References :**

1. Charles H.Roth , *Fundamentals of Logic Design*, Thomson Publishers, 5<sup>th</sup> ed.
2. J.M.Yarbrough, *Digital Logic, Applications & Design*, Thomson Publishers, I edition
3. Zvi Kohavi, *Switching and Finite automata Theory*, Tata Mc Graw Hill
4. Comer, *Digital Logic State Machine Design* , Oxford University Press, 3<sup>rd</sup> edition

### ***Type of questions for University Examination***

***Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module***

***Question 2-5 – There will be two choices from each module .Answer one question from each module of 15 marks***

### Module I

**Architecture 16 bit microprocessors:** Intel 8086 Architecture Memory address space and data organization Segment registers and memory segmentation I/O address space- Addressing modes Comparison of 8086 and 8088. Basic 8086/8088 configuration, Minimum mode-Maximum mode

### Module II

**Intel 8086 programming:** 8086 Instruction set. Instruction Classifications, Program development tools: editor, assembler, linker, locator, debugger and emulator. Use of DEBUG and MASM

### Module III

**Architecture of 32 bit Microprocessors:** Intel 80386 Architecture, Block Diagram, Segmentation, Paging, Real, Protected and Virtual modes, 80486 microprocessor Architecture, Block Diagram, Pentium Architecture Block Diagram, Superscalar Architecture, Branch Prediction. PentiumII, Pentium III, PentiumIV Processors (Block Diagram only).

### Module IV

**Introduction to micro controllers** - comparison with microprocessors Study of micro controller (MCS 51 family- 8051) - Architecture, instruction set, addressing modes and programming - Comparison of various families of 8bit micro controllers. Interfacing of ADC, sensors, keyboard and DAC using microcontrollers

#### Texts :

1. Barry B.Brey, *The INTEL Microprocessors - 8086/8088, 80186/80188, 80286, 80386, 80486 Pentium and Pentium pro processor, Pentium II, Pentium III, Pentium 4 - Architecture, Programming and interfacing*, Prentice Hall of India , 6 Ed, 2003.
2. Kenneth Ayala, *The 8051 Microcontroller* ,West Publishing Company.
3. Mazidi ,*The 8051 Microcontrollers & Embedded Systems*, Pearson Education.

#### References:

1. A.K.Ray &K.M.Bhurchandi, *Advanced Microprocessors and peripherals* , Tata Mc Graw Hill, 2000.
2. YU-Cheng Liu & Glenn A Gibson, *Microprocessor System , Architecture Programming & Design*, Prentice Hall, Inc., 1986.

#### *Type of questions for University Examination*

*Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module*

*Question 2-5 – There will be two choices from each module .Answer one question from each module of 15 marks*

## Module I

**Introduction to operational amplifiers** –Internal block schematic of op amp - Op-amp parameters - ideal op amp - transfer curve - equivalent circuit –Open loop gain –input and output impedance – Frequency response, frequency compensation. Slew rate and its effect; Input bias current –offset - drift - compensating networks CMRR, SVRR, finite gain bandwidth and its effect in opamp circuits' performance. Open loop configurations Op amp in closed loop configuration: Different feed back configurations- Voltage series feedback and voltage shunt feedback - concept of virtual ground- linear circuits: Summer- Subtractor Integrator and differentiator voltage follower - V/I converters, I/V converters and its applications - Differential amplifiers with one op amp and 3 op amps- Use of offset minimizing resistor ( $R_{OM}$ ) and its design. Instrumentation amplifier IC and its application

## Module II

**Op amp applications**- Log amplifier- Antilog amplifier- Comparators: zero crossing- using voltage reference- regenerative (Schmitt trigger) comparators, window detector application – OPAMP as comparators - Astable and monostable multivibrators- Triangular and saw tooth wave generators- - RC phase shift and Wien bridge oscillators-Sample and hold circuit- Peak detector circuit. Precision rectifiers.

**Filters** : Transfer functions – LPF ,HPF,BPF, BRF Approximation methods –Butter worth – Chebyshev -Active Filters - I order and II order filters, Quality factor –Design- Gyrator- Negative Impedance Converter-Filter using Simulated Inductance –Universal Active Filters –All Pass filters. Switched Capacitive Filters

## Module III

**Specialized ICs and applications:** Voltage regulator IC 723, current limiting, short circuit protection, Thermal protection -555 timers – Functional block diagram- Astable multivibrator, monostable multivibrator and its applications.- 566 VCO chip- Phase locked loop(PLL) - block diagram ,Mathematical Derivation of capture range , lock range and pull in time capture and lock range- 565 PLL - PLL applications: Frequency multiplication and division- AM demodulation- FM detection- FSK demodulation Analog multiplier circuits and applications. ADC and DAC –performance specification –weighted, R-2R ; successive approximation , flash, integrating.

## Module IV

**Introduction to Microelectronics:** Monolithic and hybrid Ics- Bipolar & MOS Technology- Fabrication of active and passive components, bonding, packaging, - Concepts of SSI, LSI, VLSI. Introduction to thick film and thin film Technology – resistors- capacitors- comparison

### Text Books:

1. R F Coughlin , *Op amps and Linear Integrated circuits* , Pearson Education/PHI
2. Sargio Franko , *Design with operational Amplifiers Analog ICs* , McGraw Hill, 2<sup>nd</sup> Edition
3. Millman & Grabel ,*Microelectronics* , Tata McGraw Hill ,2<sup>nd</sup> edition

### References:

1. Gaykwad ,*Op-amps and Linear integrated Circuits*, Pearson Education, 4<sup>th</sup> edition
2. K R Botkar , *Integrated circuits*, Khanna Publishers
3. Gray, *Analog Integrated Circuits*, John Wiley, 2<sup>nd</sup> edition
4. Horstian , *Micro Electronics*, Prentice-Hall India, 3<sup>rd</sup> edition
5. Sedra & Smith,*Microelectronic circuit* , Oxford University Press,3<sup>rd</sup> edition
6. D A Bell, *Opamps and Linear integrated Circuits* ,Prentice-Hall India ,2<sup>nd</sup> Edition .

### *Type of questions for University Examination*

**Question 1** - 8 short answer questions of 5 marks each. 2 questions from each module

**Question 2-5** – There will be two choices from each module .Answer one question from each module of

15 marks

## EC/EI 506 DIGITAL SIGNAL PROCESSING

### Module I.

Discrete Fourier Transform and properties - Fast Fourier Transform Decimation in time FFT algorithms - decimation in frequency FFT algorithms - FFT algorithms for N a composite number, Block convolution, Discrete Hilbert transform– Other discrete transforms -.Discrete Cosine transform- Wavelet transforms.

### Module II.

FIR filter design using Fourier series - window functions - frequency sampling technique-Introduction to digital filter design – specifications- FIR Digital Filters - Realizations - direct - cascade - lattice forms - hardware implementation - Finite word length effects in FIR filter design- Applications of FIR filters.

### Module III.

Analog filter approximations - Butterworth and Chebychev approximations – - IIR Digital Filters -Transformation techniques-The method of mapping of differentials - impulse invariant transformation - Bilinear transformation - Matched Z transform technique – IIR Filter Realizations - Direct - Cascade - Parallel forms - hardware implementation - - Finite word length effects in IIR filter design-effects due to truncation and rounding-limit cycles- Applications of IIR filters

### Module IV.

General DSP architecture- features \_ on chip subsystems- memory organization-Addressing modes- Instruction types - TMS320C54X fixed point processor- TMS320C4X floating point processor- ADSP21XXX share processor.

### Reference :-

1. John G Proakis & Dimitris G Manolakis , *Digital Signal Processing*, Pearson education, 3<sup>rd</sup> edition
2. Oppenheim & Ronald W Schafer, *Digital Signal Processing*, Pearson education, 2<sup>nd</sup> edition
3. Ashok Ambaradar, *Digital Signal Processing* , Thomson Learning, 2007.
4. Andreas Antoniou , *Digital Filters Analysis & Design*, Prentice Hall India , 2<sup>nd</sup> edition
5. Avtar Singh & Srinivas, *Digital Signal Processing*, Thomson Learning, 2004
6. Sanjit K.Mithra ,*Digital Signal Processing*, Tata Mc Graw Hill, 3<sup>rd</sup> edition.
7. Emmanuel C. Ifeachor & Barni W.Jerris,*Digital Signal Processing ,a practical approach*, Pearson education
8. Charles S.Williams,*Designing digital filters*, Prentice Hall
9. JAE S.Lim, Alan V.Oppenheim, *Advanced topics in signal processing*, Prentice Hall

### *Type of questions for University Examination*

**Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module**

**Question 2-5 – There will be two choices from each module .Answer one question from each module of 15 marks**

**PART I – 3 Lab sessions**

Part I A (Compulsory)

1. Study of a typical microprocessor trainer kit and its operation
2. Interfacing and programming of 8255.(eg: traffic light control, burglar alarm, stop watch)
3. Interfacing and programming of 8253/ 8254.
4. Interfacing and programming of 8279.

Part I B\*

1. A/D and D/A converter interface
2. Stepper motor interface
3. Display interface
4. Programming of different types of EPROM 2716, 2732 etc

(\* At least two topics from part B has to be covered.)

**PART II – 7 Lab sessions**

(Compulsory)

1. Introduction to IBM/PC and its DEBUG program commands
  - Examining and modifying the contents of the memory
  - Assembling 8086 instructions with the ASSEMBLER commands
  - Executing 8086 instructions and programmes with the Trace and GO Command.
  - Debugging a program
2. Assembly language program development using IBM/PC Macro assembler
  - Creating an Assembler source file
  - Assembling source program with MASM
  - The link program - creating a RUN module
  - Typical programming examples.
3. Interfacing Experiments with micro controllers

**Note: 50% Marks is earmarked for continuous evaluation and 50% marks for end semester examination to be assessed by two examiners. A candidate shall secure a minimum of 50% marks separately for the two components to be eligible for a pass in that subject.**

## EC 508 ELECTRONIC CIRCUITS LABORATORY II

### PART A (Compulsory)

- I** Linear circuits  
Circuits using OP- Amps - Inverting & non inverting amplifiers , Summing Amplifier, Differential Amplifier, Instrumentation Amplifier, Integrators & Differentiators , Measurements of offset voltage and its compensation .Precision rectifiers
- II** Circuits using op-amps for waveform generation.
  - i) Astable, monostable multivibrators .
  - ii) Wein bridge oscillator
  - iii) Triangular, square wave form generators.
- III** Second order Active RC filters  
High pass, low pass
- IV** Astable and monostable multi-vibrators circuit using 555
- V** PLL 565, voltage regulator 723
- VI** Filters using simulated inductance

### PART B (\*)

1. Characteristics of SCR, TRIAC, MOSFET
2. Trigger circuits for full wave/halfwave fully controlled / half controlled thyristor circuits.
3. Study of phase control rectifier - Resistive load, inductive load, free wheeling diode.
4. Study of motor speed control.
5. Study of UPS / SMPS

\* Atleast two topics from part B has to be covered.

**Note: 50% Marks is earmarked for continuous evaluation and 50% marks for end semester examination to be assessed by two examiners. A candidate shall secure a minimum of 50% marks separately for the two components to be eligible for a pass in that subject.**

### Module 1

**Introduction to Digital Communication:** Random variables & random process-Detection & Estimation: G-S Procedure, Geometric Interpretation of signals, Response of bank of correlators to noisy input, Detection of known signals in noise, Probability of error, correlation & matched filter receiver, detection of signals with unknown phase in noise.

**Estimation concepts & criteria:** MLE, Estimator quality measures, Cramer Rao Bound, Wiener filter for waveform estimation, Linear prediction.

### Module 2

**Sampling Process:** Sampling theorem, Interpolation Formula, signal space interpretation, statement of sampling theorem, Quadrature sampling of band pass signals, Reconstruction of a message process from its samples, signal distortion in sampling, practical aspects. PAM, PPM, PWM (Generation & Reconstruction), Multiplexing- TDM, FDM.

**Waveform Coding Techniques:** PCM, Channel noise & error probability, Quantization Noise & Signal to noise ratio, robust quantization, DPCM, Delta Modulation.

### Module 3

**Digital Modulation techniques:** Digital modulation formats, Coherent binary modulation techniques- PSK, FSK, QPSK, MSK. Non-coherent binary modulation techniques-DPSK. Comparison of binary & quaternary modulation techniques. M-ary Mod techniques- PSK, QAM, FSK( Block level treatment only)

**Base band data transmission:** Discrete PAM signals, Power spectra of discrete PAM signals, Intersymbol interference, Nyquist's criterion for distortion less base band binary transmission, Eye pattern, Adaptive equalization.

### Module 4

**Information theory & Coding:** Discrete messages, amount of information, Entropy, Information rate, Coding, Shannon's theorem, Channel capacity, Capacity of a Gaussian channel, Bandwidth-S/N Trade off, Use of orthogonal signals to attain Shannon's limit, Efficiency of orthogonal signal transmission.

**Coding:** Parity check bit coding for error detection, Coding for error detection and correction- Block codes- Coding & Decoding; Systematic and Non Systematic codes; Cyclic codes -Generator polynomial, Generator & parity check matrices, Encoding & decoding of cyclic codes, Syndrome computation & error detection; Convolutional coding - Code generation, Decoding- code tree, sequential decoding, State & Trellis diagrams, Viterbi algorithm; Burst error Correction: Block & Convolutional interleaving; ARQ- Types of ARQ, Performance of ARQ; Comparison of error rates in coded & uncoded system.

### Text Books:

1. Simon Haykin, *Digital Communication*, John Wiley & Sons, 2005
2. Simon Haykin, *Communication Systems*, John Wiley & Sons, 2004
3. Taub & Schilling, *Principles of Communication Systems*, Tata Mc Graw Hill, 1991

### Reference:

1. B.P.Lathi, *Modern Digital and analog Communication Systems*, Oxford University Press, 3<sup>rd</sup> Ed., 2005
2. Bernard Sklar, *Digital Communications Fundamentals and applications*, Pearson edu., 2006
3. Hwei Hsu, Schaum's Outline, *Analog and Digital Communications*, McGraw Hill, 2003.

### Type of questions for University Examination

**Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module**

**Question 2-5 – There will be two choices from each module .Answer one question from each module of 15 marks**

## EC 602 MICROWAVE TECHNIQUES AND DEVICES

### Module I

**Introduction to microwaves** - frequency range, significance, applications. Guided waves: TE, TM, TEM waves, Velocity of propagation.

**Rectangular Waveguide**:- TE waves, TM waves, Field configurations, Dominant mode, Degenerate mode, Impossibility of TEM.

**Rectangular Cavity resonators**:- Q factor- Unloaded, loaded and external Q - Coupling two cavities.

### Module II

Scattering matrix - Concept of N port scattering matrix representation- Properties of S matrix- S matrix formulation of two-port junction. Microwave Passive devices - Tee junctions, Magic Tee, Rat race, Corners, bends and twists - Two hole directional coupler. Ferrite Isolator-Circulator- Phase shifter- Attenuator. S matrix of microwave components (E plane Tee, H plane Tee, Magic Tee, Directional coupler, Circulator only).

### Module III

**Solid state microwave devices**:- Tunnel diodes –construction and working based on energy band diagrams- Applications. Principle of operation and applications of Varactor diode, Point contact diode, PIN diode Transferred Electron Devices -Gunn diode- Two valley theory , modes. Avalanche Transit time devices- IMPATT and TRAPATT devices. Comparison of GUNN, IMPATT and TRAPPAT . Basic principle of operation of parametric amplifiers, Manley Rowe power relations, Negative resistance amplifiers.

### Module IV

**Microwave tubes**:- High frequency limitations - Principle of operation of two cavity Klystron, Reflex Klystron, Traveling Wave Tube Amplifier, Magnetron Oscillator (detailed mathematical analysis not needed), Microwave BJT structure and performance.

**Microwave measurements**: Measurement of wavelength, frequency, SWR, impedance, power, attenuation. Basic concepts of Network Analyzer and Anechoic chamber.

### Text Books:

1. Annapurna Das and Sisir K Das, *Microwave Engineering*, Tata Mc Graw Hill ,5<sup>th</sup> reprint,2003.
2. B.Somanathan Nair, *Microwave Engineering- Theory, Analyses and Application* ,Sanguine Technical Publishers, 2005.

### References:-

1. Samuel Y Liao , *Microwave Devices & Circuits*, Pearson Education, 3<sup>rd</sup> edition.
2. George Kennedy, *Electronic Communication systems*, Tata Mc Graw Hill, 4<sup>th</sup> edition.
3. Jordan and Balmain, *Electromagnetic waves and Radiating systems*, Pearson education, 2<sup>nd</sup> edition
4. John A Seeger , *Microwave theory, components and devices*, Prentice Hall.
5. C.A Balanis, *Antenna Theory- analysis and design*, John Wiley student edition ,2<sup>nd</sup> edition.
6. Pozar, *Microwave Engineering*, Wiley.

### *Type of questions for University Examination*

**Question 1** - 8 short answer questions of 5 marks each. 2 questions from each module

**Question 2-5** – There will be two choices from each module .Answer one question from each module of 15 marks

## **EC/EI 603 VLSI DESIGN**

### **Module I.**

**VLSI process integration:** - fundamental considerations in IC processing - NMOS IC technology - CMOS IC technology - BiCMOS IC technology. - GaAs technology. Ion implantation in IC fabrication.

The MOS device : (n - channel & p- channel) - capacitance of MOS structure - accumulation, depletion and inversion, threshold voltage, current equations - characteristics, channel pinch-off.

Second order MOS device effects : short-channel effect, narrow width effect, sub-threshold current, device saturation characteristics.

### **Module II.**

Switch logic- pass transistors and transmission gates, Gate logic-The basic inverter using NMOS-circuit - current equations - pull up to pull down ratio- transfer characteristics- Alternate forms of pull up. Basic NAND, NOR circuits. The CMOS inverter, characteristics – NAND, NOR and compound circuits using CMOS. Other forms of CMOS logic : pseudo CMOS, CMOS domino logic, n-p logic. Layout design of static MOS circuits – Layout rules - general principles & steps of lay-out design - use of stick diagrams - design rules - Layout examples of NAND and NOR.

### **Module III.**

Basic circuit concepts: sheet resistance, area capacitance, delay unit, inverter delays – driving large capacitive loads, cascaded inverters, super buffers, BiCMOS drivers . Combinational circuits - clocked sequential circuit - drivers for bus lines. Scaling of MOS circuits: scaling models and scaling factors for device parameters.

### **Module IV.**

**Timing issues in VLSI system design:** timing classification- synchronous timing basics – skew and jitter-latch based clocking- self timed circuit design - self timed logic, completion signal generation, self timed signaling–synchronizers and arbiters.

### **Text Books :**

1. Douglas A Pucknell, Kamran Eshraghian , *Basic VLSI Design*, Prentice Hall India, 2<sup>nd</sup> edition.
2. Jan M. Rabaey, A. Chandrakasan, B. Nikolic, *Digital Integrated Circuits- A Design perspective*, Pearson education, 2<sup>nd</sup> edition

### **References:**

1. Thomas E. Dillinger , *VLSI Engineering* , Prentice Hall International editions.
2. S M Sze, *VLSI Technology*, Mc Graw Hill, 2<sup>nd</sup> edition
3. Weste and Eshraghian, *Principles of CMOS VLSI Design ,A Systems Perspective* ,Pearson Education 2<sup>nd</sup> edition.
4. Mead & Conway , *Introduction to VLSI System Design* , Addison-Wesley Publishing Co., 1980
5. Fabricius, *Introduction to VLSI Design*, McGraw-Hill, 1990
6. Charles H Roth Jr ,*Fundamentals of Logic Design* , Jaico Publishers,4<sup>th</sup> edition
7. Wolf, *Modern VLSI Design*, Pearson Education, 3<sup>rd</sup> edition

### **Type of questions for University Examination**

**Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module**

**Question 2-5 – There will be two choices from each module .Answer one question from each module of 15 marks**

## **EC604 ELECTRONIC MEASUREMENTS AND INSTRUMENTATION**

### **Module I.**

**General measurement system:** Static characteristics -, accuracy, precision, linearity, hysteresis, threshold, dynamic range, calibration standards. Errors – measurement of errors, error reduction.

**Dynamic characteristics:-**Transfer function-first and second order instruments-first and second order response –dynamic errors and dynamic compensation .Loading effect.

### **Module II.**

**Transducers and sensors:** Transducers- sensors- active and passive, Temperature measurements:- RTD, Thermocouples analog and digital transducers .Review of transducers for pressure, velocity, vibration, torque, temperature. LVDT, piezo electric transducers. Impedance measurement:- dc bridges for low, medium and high resistance-ac bridges for capacitance and inductance . Sources of error in bridge circuits-precautions. Vector impedance meter, digital impedance meter. Multimeters :- Principles of analog multimeter- digital multimeter (dual slope integrations)

### **Module III.**

**Signal generators:** - AF and RF generators- Function generator- sweep frequency generator- Frequency synthesizers.

**Signal analyzers:-** Wave analyzer –spectrum analyzer. Frequency and time measurement. CRO, Digital storage oscilloscope, sampling oscilloscope. Recording instruments:- self balancing system, strip chart recorders, x-y- recorders.

### **Module IV.**

**Industrial Instrumentation:** Temperature measurements:- RTD, Thermocouples-different types. Radiation thermometer, Optical pyrometer. Pressure measurements: Elastic type pressure gauges. Measurement of low pressure-McLeod gauge, Ionization gauge, solid state pressure transducers. Flow measurements:- Head type flow meters, mass flow meters. Electromagnetic flow meter, laser-Doppler anemometer, and Ultra sound flow meters. Data Acquisition System:- signal conditioning , multiplexing and demultiplexing, telemetry-block diagram, characteristics and different types. Sophisticated and virtual instrumentation systems.

### **References: -**

1. W.D. Cooper , *Modern Electronic Instrumentation and Measurement Techniques*, Prentice-Hall India
2. Bulentley, *Principles of Measurement Systems*, Pearson education, 3<sup>rd</sup> edition
3. Joseph J. Carr , *Elements of Electronic Instrumentaion and Measurement* , Pearson education , 3<sup>rd</sup> edition
4. D. Patranabis ,*Principles of Industrial Instrumentation* , Tata McGraw Hill
5. C.S. Rangan, G.R. Sharma , *Instrumentation Devices and Systems* , Tata McGraw Hill
6. Beckwith, Marangoni , *Mechanical Measurements* , Pearson education , 5<sup>th</sup> edition
7. D.V.S. Murty ,*Transducers and Instrumentation* ,Prentice-Hall India
8. AL Suttle & Jerry D, Faulk, *Industrial Instrumentation*, Thomson Learning, I edition

### **Type of questions for University Examination**

**Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module**

**Question 2-5 – There will be two choices from each module .Answer one question from each module of 15 marks**

**Module I.**

**Basic idea of control systems and their classification** - differential equations of systems - linear approximation - Laplace transform and transfer function of linear system - Model of physical system (Electrical, mechanical and electromechanical)- block diagram - signal flow graph - Mason's gain formula.

**Module II.**

**Time domain analysis** - Representation of deterministic signals - First order system response - S-plane root location and transient response - impulse and step response of second order systems - performance - characteristics in the time domain - effects of derivative and integral control - steady state response - error constant - generalised definition of error coefficients - concepts of stability - Routh - Hurwitz criterion.

**Module III.**

**Frequency domain analysis** - frequency response - Bode plot, Polar plot, Nicol's chart - closed loop frequency response and frequency domain performance characteristics. Stability in frequency domain. Nyquist criterion.

**Module IV.**

**Root locus method** - basic theory and properties of root loci - procedure for the construction of root loci - complete root locus diagram. Design and compensation of feed back control system :- approaches to compensation - cascade compensation networks and their design in the frequency domain - simple design in S-plane.

**Text Book:**

6. Ogata K, *Modern Control Engineering*, Prentice Hall/Pearson

References:

1. Dorf, *Modern Communication Systems*, Pearson Education
2. Franklin, *Feed back Control Systems*, Pearson Education
3. Kuo B. C, *Automatic Control System*, Prentice Hall
4. Nagoor Kani, *Control Systems*, R B P
5. Ogata, *Discrete Time Control Systems*, Pearson Education
6. Nagarath & Gopal, *Control System Engineering*, Wiley Eastern
7. Ramkayan, *Control Engineering*, Vikas Pub
8. M N Bandyopadhyaya, *Control Theory*, Prentice Hall
9. Glad, *Control Theory*, Thomson Pub

**Type of questions for University Examination**

**Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module**

**Question 2-5 – There will be two choices from each module .Answer one question from each module of 15 marks**

## EC/EI 606 EMBEDDED SYSTEMS

### Module I

**Overview of Embedded System:-** Embedded System, Categories of Embedded System, Requirements of Embedded Systems, Challenges and Issues in Embedded Software Development, Applications of Embedded Systems in Consumer Electronics, Control System, Biomedical Systems, Handheld computers, Communication devices.

### Module II

**Embedded Hardware & Software Development Environment:** - Hardware Architecture, Microcontroller Architecture, Communication Interface Standards, Embedded System Development Process, Compilers and assemblers, Embedded Operating systems, Types of Embedded Operating systems.

### Module III

**Embedded system Design:** Microchip PIC16 family, PIC16F873 processor architecture- features, memory organization, on chip peripherals, Watchdog timer, ADC, Data EEPROM, Asynchronous serial port, SPI mode, I2C mode.

Development systems and compilers for PIC micro controllers. Interfacing with LCD, ADC, sensors, stepper motor, key board, DAC. Examples for data acquisition and control

### Module IV

**Real Time & Database Applications:** - Real-Time Embedded Software Development, Sending a Message over a Serial Link, Simulation of a Process Control System, Controlling an Appliance from the RTLinux System, Embedded Database Applications with examples like Salary Survey, Energy Meter Readings.

### Text Books :

1. *Programming for Embedded Systems-* Dreamtech Software Team, Wiley Dreamtech
2. Rajkamal, *Microcontrollers Architecture, programming, Interfacing and system Design*, Pearson Education ,2005
3. Nebojsamatic, *The PIC Microcontroller*, Mikro Elektronika

### References:

1. Daniel W Lewis, *Fundamentals of Embedded Software where C and Assembly Meet*, Prentice Hall
2. *DS101374: National Semiconductor reference manual.*
3. *Embedded / RealTime systems: Concepts, Design and programming*, Dreamtech Software Team, Wiley Dreamtech
4. Barnett Cox & O’Cull , *Embedded C Programming and the Microchip PIC* , Thomson Learning, I edition
5. *1187D: Atmel semiconductor reference manual.*
6. [www.atmel.com](http://www.atmel.com)
7. *DS30292B: Microchip reference manual.* from [www.microchip.com](http://www.microchip.com)
8. Rajkamal, *Embedded Systems - Architecture, Programming and Design* , Tata McGraw Hill, 2005

### *Type of questions for University Examination*

**Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module**

**Question 2-5 – There will be two choices from each module .Answer one question from each module of 15 marks**

## **EC 607 COMMUNICATION LABARATORY I**

### **PART A (compulsory)**

1. Active Filters - Band Pass, Band reject (II order Butterworth)-Magnitude and phase characteristics, Q- factor.
2. Amplitude modulation - Collector and Emitter modulation schemes - measurement of modulation Indices.
3. Balanced modulator for DSB-SC signal.
4. Mixer using JFET/BJT
5. Frequency modulation using FET and VCO - Frequency deviation
6. FM generation (reactance modulator)
7. Implementation of intermediate frequency amplifier- Frequency response
8. PLL characteristics and demodulation using PLL
9. AM generation and demodulation using OP-AMPS and IC multipliers
10. SSB generation and demodulation using integrated circuits
11. AM Demodulator and Simple, Delayed and Amplified AGC
12. Time division multiplexing implementation.
13. High frequency oscillators (Any 2 from Hartely, Colpitts and Crystal oscillators)

### **PART B (\*)**

1. PAM.modulator and demodulator
2. PWM modulator and Demodulator
3. PPM modulator and Demodulator.
4. TV receiver/video system demonstration and study using demonstration kits.
5. Implementation of a communication system including a radio receiver, FM transmitter etc.

\* At least two topics from part B has to be covered

**Note: 50% Marks is earmarked for continuous evaluation and 50% marks for end semester examination to be assessed by two examiners. A candidate shall secure a minimum of 50% marks separately for the two components to be eligible for a pass in that subject.**

## EC608 MINI PROJECT

Each batch comprising of 3 to 5 students shall design, develop and realize an electronic product. Basic elements of product design must be considered. Fully software/simulation projects are not allowed. Each student shall submit a project report at the end of the semester. The project report should contain the design and engineering documentation including the Bill Of Materials and test results. Product has to be demonstrated for its full design specifications. Innovative design concepts, reliability considerations and aesthetics/ergonomic aspects taken care of in the project shall be given due weightage.

*Guidelines for evaluation:*

i) Attendance and Regularity	10
ii) Work knowledge and Involvement	30
iii) End-Semester presentation & Oral examination	20
iv) Level of completion and demonstration of functionality/specifications	25
v) Project Report	15
<i>Total</i>	100 marks

**Note:** External projects and R&D projects need not be encouraged at this level. Points (i)&(ii) to be evaluated by the project guide & co-ordinator and the rest by the final evaluation team comprising of 3 teachers including the project guide.

### **Module 1**

Organisation: Introduction, definition of organization, system approach applied to organization, necessity of organization, elements of organization, process of organization, principles of organization, formal and informal organization, organization structure, types of organization structure .

Forms of business organization: Concept of ownership organization, types of ownership. Individual ownership, partnership, joint stock Company, private and public limited company, co-operative organizations, state ownership, public corporation

### Module 2

Basic concept of management: Introduction, definitions of management, characteristics of management, levels of management, management skills

Management theory: Scientific management, contribution of Gilbreth. Gantt, Neo-classical theory, modern management theories

Functions of management: Planning, forecasting, organizing, staffing, directing, motivating, controlling, co-ordinating, communicating, decision making.

### Module 3

Personnel management: Introduction, definition, objectives, characteristics, functions, principles and organization of personnel management

Markets and marketing: Introduction, the market, marketing information, market segmentation, consumer and industrial markets, pricing, sales, physical distribution, consumer behaviour and advertisement.

Financial management: the basics , financial accounts, inflation, profitability, budgets and controls, cost accounting, valuation of stock, allocation of overheads, standard costing ,marginal costing

### **Module 4**

Productivity and production: Measurement of productivity, productivity index productivity improvement procedure

Materials management and purchasing: Objectives, functions, importance of materials management. Stores and storekeeping

Inventory control: Classification, functions, inventory models, inventory costs, EOQ, Materials requirement planning

### **References:**

6. Fraidoon Mazda, Engineering Management-, Addison -Wesley
7. Koontz and O'Donnell, Essentials of Management, Mc Graw Hill
8. Kotlar P, Marketing Management, Prentice Hall India
9. Prsanna Chandra , Finance Management, TMH.5<sup>th</sup> ed.,
10. Monks J.G Operations Management ,MGH

### ***Type of questions for University Examination***

***Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module***

***Question 2-5 – There will be two choices from each module .Answer one question from each module of 15 marks***

## EC 702 RADIO COMMUNICATION

### Module I

**Fundamentals of Electromagnetic Radiation** – Radiation Mechanism -Potential functions - Retarded potential. The Short dipole – short current element - near and far fields. Loop antenna. Basic antenna parameters -radiated power - radiation resistance - radiation efficiency - effective aperture area - radiation pattern - antenna beam width - directivity - gain - Frii's Transmission Equation

### Module II

**Antenna arrays:-** Broad side - end fire arrays. Binomial array. Radiation pattern of two element and N-element point sources, Principle of pattern multiplication, Yagi-Uda antenna.

Microwave antennas:-rectangular aperture, circular aperture - horn antenna

Reflector antennas:-corner-parabolic Reflector. Helical antennas (qualitative study only-construction, basic principle, pattern, gain) . Fundamentals of Microstrip patch antennas (structure, Radiation mechanism, pattern).

Antenna Measurements: - VSWR - Radiation pattern- Gain.

### Module III

**Propagation of radio waves:-**Ground waves - Ref lection of radio waves by surface of the earth. Space wave propagation -considerations in space wave propagation- atmospheric effects, Duct propagation. Structure of Ionosphere and mechanism of ionospheric propagation- Refraction and Reflection of sky waves by ionosphere – ray paths – skip distance – virtual height-maximum usable frequency -vertical and oblique incidence.

### Module IV

**Introduction to RADAR:-** RADAR range equation – pulse RADAR- applications of RADAR –accuracy and resolution – Doppler effect to find velocity – pulse repetition frequency – unambiguous range and velocity – factors affecting the performance of RADAR. Synthetic and Raw displays (concepts only). CW RADAR with non zero IF – FM CW RADAR - applications – MTI and Pulse Doppler RADAR

**Tracking RADAR:-**Sequential lobing- conical scanning- helical scanning- Monopulse tracking- SAR. (Basic concepts and Block diagrams only) Electronic counter measures – main beam jamming – side lobe jamming – passive ECM.

### Text Books:

1. J.D.Kraus, R.J Marhefka and Ahmed S Khan ,*Antennas for all applications*, Tata Mc Graw Hill, 3<sup>rd</sup> edition
2. Jordan and Balmain, *Electromagnetic waves and Radiating systems*, Pearson Education, 2<sup>nd</sup> edition
3. Skolnik, , *Introduction to RADAR Systems* , McGraw Hill ,3<sup>rd</sup> edition

### References:

1. C.A Balanis, *Antenna Theory, Analysis and design*, John Wiley student edition, 2<sup>nd</sup> edition
2. George Kennedy, *Electronic Communication systems*, Tata Mc Graw Hill,4<sup>th</sup> edition.
3. B.Somanathan Nair, *Microwave Engineering- Theory, Analysis and Applications*, Sanguine Technical Publishers, 2005.
4. G.S.N Raju, *Antennas and Wave Propagation*” Pearson education, 2004.
5. C.G.Christodoulou, Parveen F Wahid, *Fundamentals of Antennas: Concepts and Applications*, Prentice Hall of India.

### *Type of questions for University Examination*

**Question 1** - 8 short answer questions of 5 marks each. 2 questions from each module

**Question 2-5** – There will be two choices from each module .Answer one question from each module of 15 marks

## EC/EI 703 COMPUTER COMMUNICATION AND NETWORKS

## Module I

**Introduction to data communication:** Transmission modes –serial and parallel transmission, synchronous and asynchronous, simplex, half duplex and full duplex communication. Interface standards: RS 232, RS 449, and X.21- Circuit switching and packet switching. Introduction to Computer networks: Evolution of computer networking and internet, Types of network. OSI reference model, TCP/IP reference model.

## Module II

**Application layer:** WWW and HTTP- File transfer protocol: FTP, DNS, SMTP, SNMP, RPC

**Security in Networks:** Principles of cryptography- symmetric key, public key, authentication protocol, digital signature, firewall.

## Module -III

**Network Layer and Routing:-** Network Service model – Datagram and Virtual circuit service-Routing principles-Link state routing-distant vector routing-hierarchical routing-multicast routing-IGMP Internet Protocol (IP): IPv4 addressing-routing and forwarding datagram-datagram format-datagram fragmentation-ICMP- DHCP- Network Address Translators (NATs)- IPv6 packet format-transition from IPv4 to IPv6-

**Transport Layer:** Transport Layer Services-Relationship between Transport Layer and Network Layer-Transport Layer in Internet-Multiplexing and De multiplexing. Connectionless Transport: UDP-Segment structure-Checksum- Connection Oriented Transport: TCP-TCP connection-TCP Segment Structure-Round trip Time estimation and Time out-Reliable Data transfer-Flow control-TCP connection Management. Congestion Control: Causes and costs of congestion- Approaches to congestion control- TCP congestion control: Fairness-TCP delay modeling.

## Module IV

**Link Layer and Local Area Networks:** Service provided by data link layer-Error detection and correction Techniques-Elementary data link layer protocols - Sliding Window protocols - Data link layer in HDLC, Internet. Multiple Access protocols: Channel partitioning protocols: TDM-FDM-Code Division Multiple Access (CDMA) Random Access protocols : ALOHA, CSMA and CSMA/CD . Local area Network: LAN addresses- Address Resolution Protocol-Reverse Address Resolution Protocol. Ethernet: Ethernet Technologies-IEEE standards- Hubs-Bridges and Switches

### Text Books:

1. James F. Kurose and Keith W. Ross, *Computer Networking – A Top-Down Approach Featuring the Internet*, 2<sup>nd</sup> edition, Pearson Education ,2003
2. F. Halsall, *Data Communication, Computer Networks and Open Systems*, Addison Wesley, 1996

### References:

1. Y Zheng, S Akhtar, *Networks for computer scientists and Engineers*, Oxford Press, 2004
2. S. Keshav, *An Engineering Approach to Computer Networking*, Pearson education ,2002
3. Uyles Black, *Computer Networks - Protocols, Standards and Interfaces*, Prentice Hall India, New Delhi, 1994
4. Andrew S. Tanenbaum, *Computer Networks* , 4<sup>th</sup> edition, Pearson education, 2003
5. Behrouz A. Fourouzan ,*Data Communications and Networking*, 2<sup>nd</sup> edition ,Tata McGraw Hill,2000
6. Leon-Garcia and I. Widjaja, *Communication Networks*, Tata McGraw Hill, 2000
7. Bertsekas and Gallagar , *Data Networks*, 2<sup>nd</sup> edition, Prentice Hall India, 1992
8. Douglas Comer and David L. Stevens, *Internetworking with TCP/IP Vol. I, II, and III*,Prentice Hall, New York, 1990
9. Richard Stevens. W, *TCP/IP Utilities - Vol. I, The protocols*, Addison Wesley, 1994
10. Sidnie Feit, *TCP/IP, Architecture, Protocols and implementation*, McGraw-Hill, New York, 1993

### Type of questions for University Examination

**Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module**

**Question 2-5 – There will be two choices from each module .Answer one question from each module of 15 marks**

## **EC 704 ELECTRONIC PRODUCT DESIGN**

### **Module 1**

**From Requirement to Product :**Engineering design as real life problem solving- Requirement analysis of Electronic products- Formulation of product requirement specifications and target specifications.

The design process: Product conceptualization- Product architecture- Product synthesis- Design analysis- Portable Electronic Design Factors-Computer Aided Design.

Representation of development tasks using standard tools showing timing and dependencies- Product Life Cycle.

### **Module II**

**Product Design and documentation:** Various dimensions of Electronic Product Design- Industrial design and Engineering design- DfX methodologies in product design- Quality by design analysis- Sketches and Engineering drawing of Electronic products. Aesthetics and Ergonomics- Inputs, control and display interface.

Electronic interconnection and Packaging of components, Integrated circuits, Printed circuits and Functional products- Cables and connectors- Design, Engineering and Test Documentation – Component Specification/ Bill of materials.

### **Module III**

**Thermal Considerations in Electronic Product Design:** Heat generation and modes of heat transfer in Electronic products- Selection of Power Semiconductor Devices based on thermal considerations- Selection/ Design of Heat Sinks- Factors affecting the design of heat sinks and its cooling effectiveness- Assembly of components on heat sinks- Electrical analogue of thermal circuits- Enclosure design of Electronic Equipments and thermal considerations- Design guidelines for Ventilations- Forced cooling- Heat pipes for electronic cooling applications- Cooling of power intensive IC chips.

### **Module IV**

**EMI/EMC Considerations in Electronic Product Design:** Sources of EMI, inter/intra system EMI- Noise performance of passive components- Cabling, Shielding and Grounding - Cables, Connectors, components and equipments for interference suppression/minimization- Intrinsic noise sources and their management- EMI standards and Regulations.

**PCB design:** PCB design process-Design rules for analog, digital, high-frequency, power-electronic and MW PCBs-PCB design guidelines for EM compatibility-Designing PCBs for manufacturability- Design considerations for power efficiency-Thermal Considerations in PCB design.

Introduction to SPICE simulation of circuits- Circuit description- Modeling of active and passive circuit elements - DC, AC, Transient and Parametric circuit analysis.

### **Module V (Tutorial Only-No questions from this module for University Examination)**

**Electronic Design Automation Tools:** Introduction to PC based Electronic Design Automation Tools: Schematic Capture, Circuit Simulation, Layout Design etc. features like EMI analysis, Thermal analysis, 3d visualization etc. of such packages with reference to EDA tools such as Orcad, EDWIN XP etc. (As assignment, each student shall design and simulate an electronic product following the above syllabus using EDA tools.)

**Reference:**

1. Karl T. Ulrich & Steven D. Eppinger, *Product Design and Development*, Tata Mc Graw Hill, New Delhi, 2004
2. *Thermal Design of Electronic Equipment*- Monogram by CEDT, IISc., Bangalore.
3. Henry W. Ott, *Noise Reduction Techniques in electronic systems*, John Wiley, NY, 1988
4. Mohammed H. Rasheed, *Spice for circuits & Electronics using Pspice*, Prentice Hall India
5. V. Prasad Kodali, *Engineering Electromagnetic Compatibility-Principles, Measurements, and Technologies*, S.Chand & Company Ltd., New Delhi, 2000
6. Walter C. Bosshart, *Printed Circuit Boards- Design and Technology*, Tata Mc Graw Hill, New Delhi, 1988
7. Kim. R. Fowler, *Electronic Instrument Design*, OXFORD University Press, 2004
8. Kevin Otto, Kristin Wood, *Product Design- Techniques in Reverse Engineering and New Product Development*, Pearson Education, New Delhi, 2004
9. Richard Stillwell, *Electronic Product Design for Automated Manufacturing*, Marcel Dekker Pub
10. Bert Haskell, *Portable Electronics Product Design and Development*, Mc Graw Hill

***Type of questions for University Examination***

***Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module***

***Question 2-5 – There will be two choices from each module .Answer one question from each module of 15 marks***

## EC/EI 705A INTELLIGENT SYSTEMS

### Module I

**Artificial Intelligence:** History & Applications, Knowledge representation, reasoning, issues & acquisition, search techniques. Introduction to PROLOG & LISP, Expert Systems.

### Module II

**Artificial Neural Networks:** Biological aspects, Pitt's Neuron Model, Perception model, Learning algorithm – supervised & unsupervised multilayer perception, Back propagation algorithm, Associative memory, Feed back networks, Applications of Neural Networks.

### Module III

**Fuzzy Systems:** Fuzzy sets, Measures of fuzziness, Fuzzification, Fuzzy relations, Linguistic descriptions and their analytical forms, Defuzzification methods, Application of fuzzy logic, Fuzzy Neural Networks.

### Module IV

**Genetic algorithms and Evolutionary programming:** Genetic algorithms – operators, working, Genetic algorithm based machine learning classifier system. Swarm Intelligent Systems: Ant Colony Systems (ACO): Biological concept, artificial systems - Applications, Particle Swarm Intelligent Systems – PCO method, Applications.

### Text Book:

N.P Padhy, *Artificial Intelligence and Intelligent Systems*, Oxford University Press, 2005.

### REFERENCES:

1. Rajasekharan & Pai Neural Networks, Fuzzy Logic and Generic Algorithms, PHI
2. Elaine Rich, Kevin Knight, Artificial Intelligence, Tata McGraw Hill, 2006
3. Yegnanarayana, Artificial Neural Networks, PHI, 1999
4. E.Cherniak, D. McDermott, Introduction to Artificial Intelligence, Addison – Wesley Pub. 1987
5. Jean – Louis Ermine, Expert Systems : Theory & Practice, PHI, 1999
6. H.J Zimmermann, Fuzzy set theory and its Applications, Kluwer Academic Publishers, 2ed., 1991

### *Type of questions for University Examination*

**Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module**

**Question 2-5 – There will be two choices from each module .Answer one question from each module of 15 marks**

## EC 705B FUNDAMENTALS OF RF DESIGN

### Module I

**Passive Components for RF:** Behavior at High Frequencies: Wire, Resistors, Capacitors, Inductors, Toroids and their winding, Impedance Transformation, Coupling of resonant circuits.

**Active RF components:** RF diodes, RF transistors; The Transistor at Radio Frequencies: Equivalent Circuit, Y-Parameters, S-Parameters, and other relevant two-port parameters, RF Transistor Data Sheets. Computer-Aided Design and Analysis Interconnection of networks Analysis techniques, Optimization Use of SPICE (Practical assignments using HSPICE is recommended)

### Module II

**Microwave Printed Circuits & Microwave Solid State Devices:** Bipolar Microwave Transistor, MESFET, MODFET/HEMT Microwave IC's, Microwave Diodes, and MODAMPs, Strip lines, Micro strips, Printed Microwave Components, Surface Acoustic Wave device.

**Amplifiers:** High frequency Amplifier Design, Small Signal RF Amplifier Design- Biasing, Designs using Y and S Parameters, Broadband Amplifiers, Single Stage, Multistage designs. Gain and stability analysis using S parameters. Wide Bandwidth Design Fundamental limitations on matching Transmission line transformers. Use of feedback in RF amplifier design. Design for specified gain, bandwidth, and SWR.

### Module III

**RF Power Amplifiers:** RF Power Transistor Characteristics, Biasing, Design, Matching to Coaxial Feed lines Large Signal Amplifiers Amplifier classes and efficiency Dynamic range Inter modulation distortion Third-order intercept Design of large signal linear amplifiers. Design of large-signal class-C amplifiers Design of switch-mode amplifiers. Power combiners ,Directional couplers Hybrids.

### Module IV

**Oscillators and Mixers:** Basic oscillator model, Oscillator, Synthesizer, Phase-locked loop, Phase noise, PLL structures & Architectures. Direct Digital Synthesis; Mixer- basic concepts, single ended, single balanced and double balanced mixers. Software Radio and DSP in Radio communication.

### References:

1. Smith J, *Modern Communication Circuits*, McGraw Hill, 1986
2. Bowick, *RF Circuit Design*, H W SAMS, 1994
3. Chung & Levien, *Microwaves Made Simple: Principles & Applications*, Artech House ,1985
4. M N Radmanesh, *RF and Microwave electronics illustrated*, Pearson Education,
5. R S Carson, *High Frequency Amplifiers* ,Wiley, 1982, 2<sup>nd</sup> edition.
6. G Vendelin, *Design of amplifiers and Oscillators by the S-parameter Method*, Wiley, 1982
7. Reinhold Ludwig, Pavel Bretchko, *RF circuit Design: theory and practice*, Prentice Hall, 2000
8. Herbert L Krauss, Charles W Bostian & Frederick H Raab, *Solid State Radio Engineering*,John Wiley & Sons, 1980
9. Liao S.Y, *Microwave Devices & Circuits*, Prentice Hall , 3<sup>rd</sup> edition, 1990
10. Meyr et al, *Digital Communication Receivers, Synchronisation, Channel Estimation & Signal Processing*, Wiley, 1997.
11. Jeffrey H. Reed, *Software Radio, a modern approach to Radio Engineering*, Prentice Hall , 2002

### *Type of questions for University Examination*

**Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module**

**Question 2-5 – There will be two choices from each module .Answer one question from each module of 15 marks**

## EC 705C HARDWARE MODELING

## Module I

**Introduction:** Hardware Abstraction- Basic Terminology- Entity Declaration- Architecture Body- Configuration Declaration- Package Declaration- Package Body- Model Analysis- Simulation- Basic Language Elements –Identifiers- Data Objects- Data Types- Operators. Example designs: Basic Combinational Circuits.

## Module II

**Behavioural Modelling:** Entity Declaration- Architecture Body-Process Statement- Variable Assignment Statement- Signal Assignment Statement- Wait Statement- If Statement - Case Statement- Null Statement- Loop Statement- Exit Statement- Next Statement- Assertion Statement- Report Statement- Other Sequential Statements- Multiple Processes- Postponed Processes - Dataflow Modelling: Concurrent Signal Assignment Statement- Concurrent versus Sequential Signal Assignment- Delta Delay Revisited- Multiple Drivers- Conditional Signal Assignment Statement- Selected Signal Assignment Statement- the UNAFFECTED Value- Block Statement- Concurrent Assertion Statement- Value of a Signal. Modelling Basic Binary Arithmetic Circuits, Sequential Circuits, Registers.

## Module III

**Structural Modelling:** Component Declaration- Component Instantiation- Resolving Signal Values - Generics and Configurations: Generics- Configurations- Configuration Specification- Configuration Declaration- Default Rules - Conversion Functions - Direct Instantiation- Incremental Binding. Subprograms and Overloading: Subprograms- Subprogram Overloading- Operator Overloading- Signatures- Default Values for Parameters - Packages and Libraries. Models of RAM, Dual-Port RAM, and FIFO.

## Module IV

**Advanced Features:** Entity Statements- Generate Statements- Aliases- Qualified Expressions- Type Conversions- Guarded Signals- Attributes- Aggregate Targets- Shared Variables- Groups - Model Simulation: Simulation- Writing a Test Bench- Converting Real and Integer to Time- Dumping Results into a Text File- Reading Vectors from a Text File- A Test Bench Example- Initialising a Memory- Variable File Names- Hardware Modelling Examples: Modelling Entity interfaces- Modelling Simple Elements- - Different Styles of Modelling- Modelling Regular Structures- Modelling Delays- Modelling Conditional Operations- Modelling Synchronous Logic- State Machine Modelling- Interacting State Machines- Modelling a Moore FSM- Modelling a Mealy FSM.

## Text Book:

1. J. Bhasker, *VHDL Primer*, Pearson Education Asia, 3<sup>rd</sup> edition.

## Reference:

1. Sudhakar Yakmandhiri, *Introducing VHDL from simulation to synthesis*, Pearson Education Asia
2. Stephen Brown and Zvonko Vranesic, *Fundamentals of Digital Logic with VHDL Design*, McGraw- Hill, 2<sup>nd</sup> edition
3. K. C. Chang, *Digital Design and Modeling with VHDL and Synthesis*, IEEE Computer Society Press, 1 edition
4. Charles H. Roth Jr., *Digital Systems Design Using VHDL*, Thomson Learning, 2006

## Type of questions for University Examination

**Question 1** - 8 short answer questions of 5 marks each. 2 questions from each module

**Question 2-5** – There will be two choices from each module. Answer one question from each module of 15 marks

## EB/EC/EI 705D MECHATRONICS

### Module I

**Introduction** to Mechatronics- Elements of Mechatronic Systems.

**Sensory System:** Sensors & Transducers- Performance measure, static and dynamic characteristics- Sensing displacement, position, proximity, velocity and motion, force, pressure, flow, level, range, temperature and Light.

*Signal Conditioning and Data Acquisition:* Signal Conditioning Elements- amplification, attenuation, impedance matching, linearization, digitization, level shifting, filtering, error compensation, etc. Data acquisition and presentation in mechatronic systems- signal measurement and calibration- Design Considerations

### Module II

**Actuation System:** *Pneumatic & Hydraulic Systems:* Process Control Valves, Directional and Pressure Control valves, Linear and Rotary actuators.

*Mechanical Actuation Systems:* Translational and Rotational motions, Kinematic Chains, Cams, Gear Trains, Ratchet and Pawl, Belt and Chain drives, Bearings.

*Electrical Actuation Systems:* Mechanical and Solid State Relays, Solenoids, DC & AC motors, Servo & Stepper motors- Specifications and Selection considerations.

*Power sources* for mechatronic Systems

### Module III

**Mathematical modeling of Engineering Systems:** System Building blocks for Mechanical, Electrical, Fluid and Thermal systems.

General Engineering System Modeling: Rotational\_Translational, Electromechanical, Hydraulic\_Mechanical systems- System Transfer Function- Dynamic response of systems for standard test signals (Detailed mathematical analysis not required).

**MEMS:** Internal Structure, advantages, manufacturing, applications- Fibre Optic Devices in Mechatronics (For this module assignments on Simulation studies using computer software such as MATLAB with SIMULINK is recommended)

### Module IV

**Mechatronic System Controllers:** ON/OFF, P, I, D, PI and PID Controllers, Digital controllers, Intelligent Controllers in Mechatronics.

**Programmable Logic Controllers:** Structure, I/O processing, Programming, applications – Selection Criteria.

Typical Mechatronic Systems: Robotic Systems, CNC machines, FMC, FMS, AGV etc.

#### Text Books:

1. Bulton. N, *Mechatronics- Electronic Control systems in Mechanical and Electrical Engineering*, Pearson Education, 2006
2. Devadas Shetty, Richard A. Kolk, *Mechatronics System Design*, Thomson, New Delhi, 2007
3. S. R. Deb, *Robotics Technology and Flexible Automation*, Tata Mc Graw Hill, New Delhi, 2004

#### References:

1. M.D. Singh, J.G. Joshi, *Mechatronics*, Prentice Hall India, New Delhi, 2006
2. Dradly. D.A, Dawson.D, Burd N.C and Loader A.J, *Mechatronics – Electronics in Products & Processes*, Chapman & Hail, 1993.
3. *Mechatronics*, HMT Limited, Tata McGraw Hill, 1998.
4. James Harter, *Electromechanics- Principles concept and Devices*, Prentice Hall, 1995.

#### *Type of questions for University Examination*

**Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module**

**Question 2-5 – There will be two choices from each module .Answer one question from each module of 15 marks**

## EC /EI 706 SIGNAL PROCESSING LABORATORY

1. Familiarization of Signal processing tool box-MATLAB
2. Familiarization of DSP trainer kit (Sampling & reconstruction of signals)

List of experiments to be implemented

8. Generation of basic input signals ( both discrete & continuous)
9. DFT and spectral analysis computation of DFT, properties of DFT
10. Convolution
11. Correlation
12. Digital filter design- FIR & IIR Filters
13. FFT
14. Spectral estimation

**Note: 50% Marks is earmarked for continuous evaluation and 50% marks for end semester examination to be assessed by two examiners. A candidate shall secure a minimum of 50% marks separately for the two components to be eligible for a pass in that subject.**

## EC 707 COMMUNICATION LABORATORY II

### PART A (compulsory)

1. Sampling and reconstruction of signals
2. PCM generation
3. Differential PCM generation
4. Implementation of Delta modulator and demodulator
5. Matched filter receiver for rectangular pulse
6. Generation and detection of BASK and BFSK signals
7. Generation and detection of BPSK signals
8. Generation and detection of QAM using IC multipliers
9. Microwave Communication (Any 2 Experiments from)
  - (a) Study of Klystron source-Power, mode and impedance, SWR, guide wave length
  - (b) Gunn Source-Characteristics, Hybrid T, Directional coupler, Circulator
  - (c) FET M/W source-SWR, Impedance, Guide wavelength, Tees
  - (d) Study of Microwave links
10. Antenna characteristics- Radiation pattern and beam width, gain measurements.

### PART B (\*)

1. Communication system simulation using software tools
2. DAS using Microprocessors
3. Experiments on Computer communication
4. Development of an optical fiber communication transmitter and receiver module.
5. A small project work using ANN, image processing or biomedical instrumentation.

\* At least two topics from part B has to be covered

**Note: 50% Marks is earmarked for continuous evaluation and 50% marks for end semester examination to be assessed by two examiners. A candidate shall secure a minimum of 50% marks separately for the two components to be eligible for a pass in that subject.**

## **EC 708 SEMINAR**

Students shall individually prepare and submit a seminar report on a topic of current relevance related to the field of Electronics & Communication Engineering. The reference shall include standard journals, conference proceedings, reputed magazines and textbooks, technical reports and URLs. The references shall be incorporated in the report following IEEE standards reflecting the state-of-the-art in the topic selected. Each student shall present a seminar for about 30 minutes duration on the selected topic. The report and presentation shall be evaluated by a team of internal experts comprising of 3 teachers based on style of presentation, technical content, adequacy of references, depth of knowledge and overall quality of the seminar report.

## EC 709 PROJECT DESIGN

Each batch comprising of 3 to 5 students shall identify a project related to the curriculum of study. At the end of the semester, each student shall submit a project synopsis comprising of the following.

- Application and feasibility of the project
- Complete and detailed design specifications.
- Block level design documentation
- Detailed design documentation including circuit diagrams and algorithms / circuits
- Bill of materials in standard format and cost model, if applicable
- Project implementation action plan using standard presentation tools

*Guidelines for evaluation:*

i) Attendance and Regularity	10
ii) Quality and adequacy of design documentation	10
iii) Concepts and completeness of design	10
iv) Theoretical knowledge and individual involvement	10
v) Quality and contents of project synopsis	10
<i>Total</i>	50 Marks

**Note:** Points (i)-(iii) to be evaluated by the respective project guides and project coordinator based on continuous evaluation. (iv)-(v) to be evaluated by the final evaluation team comprising of 3 internal examiners including the project guide.

# EC 801 AUDIO & VIDEO ENGINEERING

## Module I

**Audio Engineering:** Sound waves, Complex sounds, Audio frequency range, loudness, pitch, and decibels.

Sound pick up devices (microphones): types: - condenser- carbon, piezoelectric – direction pattern- parameters of microphones: - frequency range- sensitivity-impedance- noise. Sound reproduction devices: types: - horn, cone – typical specifications- Acoustics of speech production and hearing. Recording of Sound: Magnetic recording systems –optical storage systems-Coding and decoding applied to CD – CD-R

## Module II

**Video Engineering:** Elements of Television System:- Basic Block Schematic of Monochrome TV Transmitter and receiver, Gross structure, flicker& interlaced scanning ,number of scanning lines. Horizontal and Vertical resolution, Resolution and Bandwidth. Composite video signal- Vertical and horizontal synchronization, Vestigial Sideband Transmission, transmission of Sound signal. Modulation Positive and Negative Modulation and its comparison - Picture tubes. Television Cameras, Working Principle and operation of CCD cameras,

## Module III

**Colour Television:** Compatibility considerations, Colour response of human eye, three colour theory, additive mixing of colours, chromaticity diagram, Luminance and chrominance, Block schematic explanation of Colour TV Cameras. Colour difference signal and its generation. Colour signal transmission, Modulation of colour Difference signals and colour burst signal. Basic Colour Television Systems: PAL, NTSC and SECAM.-Block Schematic, explanation and Comparison. Colour TV picture tubes: CRTs, LCD and Plasma displays.

## Module IV

**Audio and Video coding:** Introduction to Audio Coding, Audio compression, MPEG – Block diagram of audio encoder and decoder, Digital Audio Broadcasting- Block schematic explanation.

Video coding and compression: Need for compression- video image representation – quantization of image data- intra frame compression techniques: DPCM –DCT based transform coding- Motion Compensation –H261 video conference coding standard-MPEG video compression- HDTV- DVB-T

### Text Books:

1. *The Electronics Hand Book* edited by JC Whitaker ,IEEE Press
2. RR Gulati, *Monochrome and Colour Television*, New Asian Age
3. Fred Halsal , *Multimedia Communications* ,Pearson Education
4. Thomas Quatieri , *Discrete Time Speech Signal Processing: Principles and practice* , Pearson Education

### References:

1. Kinsler , Frey, Coppens, *Fundamentals of Acoustics* , Wiley Eastern, 4<sup>th</sup> edition
2. Bernad Grob, *Basic Television Engineering*, Mcgraw hill
3. A M Dhake , *Television and Video Engineering* ,McGraw hill
4. S P Bali , *Colour Television* , New Age International Publishers

5. Whitaker, Jerry, *Mastering Digital Television: The Complete Guide to the DTV Conversion*, McGraw Hill

**Type of questions for University Examination**

**Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module**

**Question 2-5 – There will be two choices from each module .Answer one question from each module of 15 marks**

## EC 802 COMMUNICATION SYSTEMS

### Module 1

**Microwave Communication :** Basic principles of microwave links- Microwave Relay Systems – Choice of frequency – line of sight and over the horizon systems – modulation methods – block schematics of terminal transmitters and receivers – microwave repeaters – microwave repeaters – microwave repeaters – microwave antennas – propagation mechanisms – propagation characteristics – path loss models – shadowing models – small scale fading and multipath fading – basic principles of design of microwave link

### Module II

**Satellite Communication** – Orbit of communication satellite – Satellite Constellation – Orbital parameters – Orbital perturbations – Geostationary orbits – Low Earth and Medium Orbits – Look Angles – Frequency selection RF Links – Propagation characteristics – Modulation methods- coding – multiple access – space craft – antennas – transponders – intersatellite link – link power budget – earth station interference – Satellite systems – Geostationary systems – Distress and Safety systems – Navigation systems – direct sound broadcast systems – Direct Television broadcast systems

### Module III

**Spread system Communication:** General concepts – Direct Sequence spread spectrum – frequency hopping – transmitter and receiver – time hopping – Antijam consideration – CDMA  
**Telemetry and Remote Sensing :** Definition of telemetry – different types – Applications – Image characteristics – Contrast Ratio – Spatial Resolution – Resolving Power – brightness – tones etc. – Remote Sensing Systems – Framing systems – Scanning systems – characteristics of aerial photographs – spatial and ground resolution – relief displacement etc – IR detection and imaging – IR image characteristics – Applications of Remote Sensing.

### Module IV

**Wireless communication systems:** Cellular concepts – Cell Splitting and Frequency Reuse - Propagation Mechanisms – Modulation techniques for wireless communication – Analog, Digital and Spread Spectrum modulation – Equalisation, Diversity and Channel coding Diversity Techniques – Multiple access techniques for Wireless Communications – FDMA, TDMA and CDMA – Wireless systems and standards – AMPS – Global System for Mobile(GSM) – CDMA – General Packet Radio Service – DECT System .

### References :

1. T.S. Rappaport, *Wireless Digital Communications : Principles and Practice* , Pearson Education/ Prentice Hall, NJ, 1996
2. Schiller, *Mobile Communications* , Pearson Education
3. Dennis Roddy, *Satellite Communications*, Prentice Hall
4. WL Prichard , *Satellite Communication Systems Engineering*, Pearson Education

5. A Grarwal and An Zeng ,*Introduction to wireless and Mobile systems* , Thomson Learning
6. B P Lathi ,*Analog and Digital Communication* ,Oxford University Press
7. Floyd F Sabins, *Remote Sensing Principle and Interpretation*, WH Freeman & C, New York
8. Dr. B C Panda, *Remote Sensing Principles and Applications*, Viva Books Private Ltd.,2005
9. D. Muples and M Reharia, *Mobile Satellite Communication*, Pearson Education
10. K Foher , *Wireless digital Communications* , Prentice Hall, NewDelhi,1995
11. Blake, *Wireless Communication Technology*, Thomson Publishers, I edition

***Type of questions for University Examination***

***Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module***

***Question 2-5 – There will be two choices from each module .Answer one question from each module of 15 marks***

**EC 803 OPTO ELECTRONICS AND COMMUNICATION**

**Module 1**

Nature of light, optical laws, optical fiber –ray analysis –wave propagation in di-electric slab wave guide – mode theory of optical fiber – multi mode and signal mode fibers – graded index fiber –NA-fabrication of optical fibers- specification of optical fiber – attenuation characteristics-dispersion- types-effect on bandwidth- dispersion shifted and polarization maintaining fiber.

**Module II**

Optical sources-direct and indirect band gap materials-LED structures- quantum efficiency- modulation. Laser diodes- rate equations- diode structure- single mode laser-modulation- temperature effects- quantum cascade lasers-vertical cavity surface emitting lasers- modal noise- partition noise- reflection noise. Photo detectors-PIN, APD, Photo detector noise - response time- structure of detectors- receiver units.

**Module III**

Light coupling-source to fiber coupling, fiber splices- fiber to fiber coupling-effect of mis-alignment-coherent detection-transceivers for fiber optic communication. Pre amplifier types-optical receiver performance calculation-noise effects-receiver modules: - Analog communication link - link power budget, rise time budget.

Optical spectrum analyzer- Applications-Measurement of attenuation-Cut back technique-Insertion Loss method, OTDR, Dispersion measurement for chromatic, polarization mode and intermodal dispersion. Eye patterns.

**Module 1V**

Components of fiber optic networks: – couplers - splitters- semiconductor optical amplifiers- Erbium doped fiber amplifiers- wavelength division multiplexers/ demultiplexers. Filters- isolators-circulators-optical switches-Wavelength converters- Fiber gratings tunable sources-tunable filters.

Optical networks:- SONET/ SDH, DWDM, Optical CDMA, FDDI, performance of various systems.

**Text Book:**

1. Gerd Kaiser , *Optical fiber communication*, Mc Graw Hill, 3<sup>rd</sup> edition.

**Reference s:**

1. John Gowar, *Optical communication systems* , Prentice Hall
2. Mynbaev and Scheiner , *Fiber optic communications technology*, Pearson education

3. Selvarajan, Kar and Srinivas, *Optical Fiber communications*, Tata Mc Graw Hill
4. John M. Senior, *Optical fiber Communication*, Prentice Hall

**Type of questions for University Examination**

**Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module**

**Question 2-5 – There will be two choices from each module .Answer one question from each module of 15 marks**

**CS/EC/EE/EI 804 A DIGITAL IMAGE PROCESSING**

**Module I**

**Digital image fundamentals:** representation - elements of visual perception - simple image formation model - Image sampling and quantization - basic relationships between pixels – imaging geometry.

**Review of matrix theory results:** Row and column ordering - Toeplitz, Circulant and Block matrices. Review of Image transforms: 2D-DFT, FFT, Walsh, Hadamard , Haar, DCT and Wavelet transforms.

**Module II**

**Image enhancement:** Spatial domain methods: point processing - intensity transformations, histogram processing, image subtraction, image averaging; Spatial filtering- smoothing filters, sharpening filters. Frequency domain methods: low pass filtering, high pass filtering, homomorphic filtering. Generation of spatial masks from frequency domain specifications.

**Image segmentation:** Detection of discontinuities - point, line and edge and combined detection , Edge linking and boundary description - local and global processing using Hough transform – Thresholding - Region oriented segmentation - basic formulation, region growing by pixel aggregation, region splitting and merging - Use of motion in segmentation. Fundamentals of Representation and Description.

**Module III**

**Image restoration:** Degradation model - Diagonalization of circulant and Block circulant matrices - Algebraic approaches - Inverse filtering - Wiener filter - Constrained Least squares restoration - Interactive restoration - Geometric transformations.

**Fundamentals of Colour image processing:** colour models - RGB, CMY, YIQ, HIS - Pseudo color image processing - intensity slicing, gray level to color transformation.

**Module IV**

**Image compression:** fundamentals- redundancy: coding, inter pixel, psycho visual, fidelity criteria, Models, Elements of information theory, Error free compression- variable length, bit plane, lossless predictive, Lossy compression- lossy predictive, transform coding. Fundamentals of JPEG, MPEG, Fractals.

**Text Book:**

1. Gonzalez and Woods, *Digital Image Processing*, Pearson Education, 2002.

**References:**

1. Anil K. Jain ,*Fundamentals of Digital Image Processing*, Pearson Education, 2003.
2. Mark Nelson, Jean-Loup Gailly ,*The Data compression Book*, BPB Publications, 2<sup>nd</sup> edition.
3. Pratt William K.,*Digital Image Processing*, John Wiley & sons
4. Chanda & Majumdar, *Digital Image Processing and Analysis* , Prentice Hall ,3<sup>rd</sup> edition
5. M.Sonka,V. Hlavac, R. Boyle, *Image Processing, Analysis and Machine Vision*, Thomson Learning,2006

**Type of questions for University Examination**

**Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module**

**Question 2-5 – There will be two choices from each module .Answer one question from each module of 15 marks**

**CS/EB/EC/IT 804 B BIOINFORMATICS**

**Module I**

Basic Concepts of Molecular Biology: Cells - Chromosomes, DNA, RNA, Proteins, Central dogma of molecular biology, Genomes and Genes - Genetic code, Transcription, Translation and Protein synthesis. Web based genomic and proteomic data bases: NCBI, GenBank

**Module II**

Sequence alignments – Dot plot-Pair-wise sequence alignments - local and global -Sequence similarity and distance measures - Smith-Waterman algorithm, Needleman-Wunch algorithm, Multiple sequence alignment –Sum-of-Pairs measure - Star and tree alignments – PAM and BLOSUM, Phylogenetic analysis

**Module III**

Informational view of Genomic data, Genomic Signal Processing, DNA Spectrograms, Identification of protein coding regions, Gene expression, Microarrays, Microarray image analysis

**Module IV**

Gene structure in Prokaryotes and Eukaryotes: Molecular Structure Prediction: Basic concepts and terminologies related to molecular structures, Basic molecular Visualization, RNA secondary structure prediction, Protein folding problem, Protein Threading, Protein Visualization, Introduction to Drug Discovery.

**Case Study**

Software Tools: Use of Tools for basic and specialized sequence processing such as: BLAST, FASTA, RasMol, Phylip, ClustalW

**Text Books:**

1. Setubal & Meidanis, *Introduction to Computational Molecular Biology*, Thomson:Brooks/Cole, International Student Edition, 2003
2. Claverie & Notredame, *Bioinformatics - A Beginners Guide*, Wiley-Dreamtech India Pvt Ltd, 2003.

**References:**

1. Lesk, *Introduction to Bioinformatics*, Oxford University Press, Indian Edition, 2003
2. Higgins and Taylor, *Bioinformatics: Sequence, structure and databanks*, Oxford University Press, Indian Edition, 2003
3. Bergeron, *Bioinformatics Computing*, Prentice hall of India, 2003
4. Jiang, Xu and Zhang, *Current topics in Computational Molecular Biology*, Ane Books, New Delhi, 2004
5. S.C Rastogi & Namitha Mendiratta, *Bioinformatics method and application Genomics,Protinomics & drug discovery*
6. Dov Stekel, *Microarray Bioinformatics* ,Cambridge University Press

**Type of questions for University Examination**

**Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module**

**Question 2-5 – There will be two choices from each module .Answer one question from each module of 15 marks**

## **EC/EI 804C ASIC DESIGN**

### **Module I**

**Introduction to ASICs:** - Types of ASICs - Design flow - Combinational Logic Cell -Sequential logic cell - Data path logic cell – I/O cells .Transistors as Resistors - Transistor Parasitic Capacitance-Logical effort.

### **Module II**

**Programmable ASICs:** - Anti fuse - static RAM - EPROM and EEPROM technology – practical issues - Programmable ASIC logic cells : Actel ACT - Xilinx LCA - Altera FLEX - Altera MAX.  
Programmable ASIC I/O cells : DC & AC inputs and outputs - Clock & Power inputs .

### **Module III**

**Programmable ASIC interconnect:** Actel ACT -Xilinx LCA - Altera MAX 5000 and 7000 –

**Testing:** Importance, Faults, Fault models, physical faults, Stuck at fault model, Logical faults, Fault collapsing, Fault simulation – serial fault simulation, parallel fault simulation, concurrent fault simulation, nondeterministic fault simulation, ATPG-D-Calculus, Basic ATPG algorithm, PODEM algorithm, controllability, observability.

### **Module IV**

**ASIC construction:** System partition - FPGA partitioning - partitioning methods – Popular algorithms  
Floor planning and placement: physical design flow- algorithms. Routing : global routing - detailed routing - special routing - circuit extraction - DRC.

#### **Text book:**

1. M.J.S .Smith, *Application Specific Integrated Circuits* , Pearson Education ,1997.

#### **References:**

1. Andrew Brown, *VLSI Circuits and Systems in Silicon* , McGraw Hill, 1991.
2. S.D. Brown, R.J. Francis, J. Rox, Z.G. Uranesic, *Field Programmable Gate Arrays*, Kluever Academic Publishers, 1992.
3. Mohammed Ismail and Terri Fiez, *Analog VLSI Signal and Information Processing*, McGraw Hill, 1994.
4. S. Y. Kung, H. J. Whilo House, T. Kailath, *VLSI and Modern Signal Processing* , Prentice Hall, 1985.
5. Jose E. France, Yannis Tsividis, *Design of Analog - Digital VLSI Circuits for Telecommunication and Signal Processing*, Prentice Hall, 1994.

#### **Type of questions for University Examination**

**Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module**

**Question 2-5 – There will be two choices from each module .Answer one question from each module of 15 marks**

## EC 804D MIXED SIGNAL SYSTEM DESIGN

### Module I

**Basic current mirrors and single-stage amplifiers** : simple CMOS current mirror, common-source amplifier, source-follower or common-drain amplifier, common-gate amplifier, source-degenerated current mirrors, high output impedance current mirrors, cascode gain stage, MOS differential pair and gain stage. Basic Opamp Design and Compensation – Two-stage CMOS opamp, Feedback and Opamp Compensation. Advanced Current Mirrors and Opamps – Folded-Cascode Opamp, Current Mirror Opamp, Fully Differential Opamps, Common-Mode Feedback Circuits, Current-Feedback Opamps.

### Module II

**Comparators using Opamp:-** Charge-Injection Errors, Latched Comparators, Examples of CMOS comparators. Sample-and-Hold Circuits, MOS Sample-and-Hold Basics, Examples of CMOS S/H Circuits, Band-Gap Reference Voltage, Switched-Capacitor circuits – Basic building blocks, operation and analysis, Charge Injection, Switched-Capacitor Gain Circuits, Correlated Double Sampling techniques.

### Module III

**Data Converter Fundamentals:** Nyquist-rate D/A and A/D Converters, Oversampling Converters with and without noise shaping, Sigma-delta A/D converters, Higher-order modulators, MASH architecture, band-pass oversampling converters, multi-bit oversampling converters, Continuous-time filters.

### Module IV

**Analog Layout considerations:**, CMOS Layout and design rules, Layout of integrated resistors, capacitors and analog switches.

### Text Book:

1. David A. Johns, Ken Martin, *Analog integrated circuit design*, Wiley & Sons, Inc., 1997.

### References:

1. Mohammed Ismail, Terri Fiez, *Analog VLSI signal and information processing*, McGraw-Hill, 1994.
2. Philip E. Allen, Douglas R. Hollberg, *CMOS analog circuit design*, Oxford University Press, 2002.
3. Behzad Razavi, *Design of analog CMOS integrated circuits*, McGraw-Hill, 2001
4. Paul R. Gray, Robert G. Meyer, *Analysis and design of analog integrated circuits*, Wiley & Sons, Inc., 4<sup>th</sup> edition, 2001.
5. Behzad Razavi, *Principles of data conversion system design*, IEEE Press, 1995

### *Type of questions for University Examination*

**Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module**

**Question 2-5 – There will be two choices from each module .Answer one question from each module of 15 marks**

## EC 805 PROJECT WORK

Each batch of students shall develop the project designed during the VII semester. The implementation phase shall proceed as follows:

- For hardware projects, practical verification of the design, PCB design, fabrication, design analysis and testing shall be done.
- For software projects, a proper front end (GUI) if applicable, shall be designed. A detailed algorithm level implementation, test data selection, validation, analysis of outputs and necessary trial run shall be done.
- Integration of hardware and software, if applicable, shall be carried out.
- A detailed project report in the prescribed format shall be submitted at the end of the semester. All test results and relevant design and engineering documentation shall be included in the report.
- The work shall be reviewed and evaluated periodically

The final evaluation of the project shall be done by a team of minimum 3 internal examiners including the project guide and shall include the following.

- Presentation of the work
- Oral examination
- Demonstration of the project against design specifications
- Quality and content of the project report

*Guidelines for evaluation:*

Regularity and progress of work	30
Work knowledge and Involvement	100
End semester presentation and oral examination	50
Level of completion and demonstration of functionality/specifications	70
Project Report – Presentation style and content	50
<i>Total</i>	300 marks

**Note:** Points (i) and (ii) to be evaluated by the respective project guide and the project coordinator based on continuous evaluation. (iii)-(v) to be evaluated by the final evaluation team comprising of 3 internal examiners including the project guide.

## **EC 806 VIVA - VOCE**

Each student is required to appear for a viva-voce examination at the end of the complete course work. The students shall produce the seminar report and project reports duly attested by the institutional authorities, before the examiners. The examination panel shall comprise of one internal examiner and one external examiner, both appointed by the University. The examiners shall evaluate the students in terms of their conceptual grasp of the course of study and practical/analysis skills in the field.

**804 B BIOINFORMATICS**

Last two references year/edition

**EC 803 OPTO ELECTRONICS AND COMMUNICATION**

References year/edition

**EC 802 COMMUNICATION SYSTEMS**

References 2-9 year/edition

**EC 801 AUDIO & VIDEO ENGINEERING**

All texts and references year/edition

**EC /EI 706 SIGNAL PROCESSING LABORATORY No changes made**

**EC/EI 705A INTELLIGENT SYSTEMS more ref to be obtained from Gopika**

**EC 704 ELECTRONIC PRODUCT DESIGN ref. 4,9,10 year/edition**

*IOM to be added*

**CS/EB/EC/EI 605 CONTROL SYSTEM ENGINEERING**

All texts and references year/edition

**EC604 ELECTRONIC MEASUREMENTS AND INSTRUMENTATION**

Ref 1,4,5,7, year/edition

**EC 602 MICROWAVE TECHNIQUES AND DEVICES**

Ref 4,6 year/edition

**EC/EI 506 DIGITAL SIGNAL PROCESSING**

Last 3 ref. year/edition ref. not obtained from RGK

**EB/EC/EE/EI 406 INDUSTRIAL AND POWER ELECTRONICS**

No year/edition

**EC/EI 403 ELECTRONIC CIRCUITS II No year/edition**

**303 TWORK THEORY**

G.S.N Raju, *Electromagnetic Field Theory and Transmission Lines*, 2005 no publisher

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