

ANNA UNIVERSITY COIMBATORE
BE - MEDICAL ELECTRONICS ENGINEERING

Regulations 2007- 08

SEMESTER III

Code No.	Course Title	L	T	P	M	C
THEORY						
	Engineering Mathematics-III *	4	1	0	100	5
	Human Physiology~	4	0	0	100	4
	Instrumentation Principles	3	0	0	100	3
	Measuring techniques	3	0	0	100	3
	Digital Electronics *	3	1	0	100	4
	Electronics Circuits – I*	4	0	0	100	4
PRACTICAL						
	Instrumentation Lab	0	0	3	100	2
	Digital Electronics lab *	0	0	3	100	2
	Electronics circuits - I Lab *	0	0	3	100	2
	Total	21	2	9	-	

* Common with ECE

~ Medical Electronics Branch related Subject

SEMESTER IV

Code No.	Course Title	L	T	P	M	C
THEORY						
	Micro Processor & Applications *	4	1	0	100	5
	Linear Integrated Circuits *	3	1	0	100	4
	Signals and Systems *	3	1	0	100	4
	Object Oriented Programming	3	0	0	100	3
	Bio Medical Instrumentation	3	0	0	100	3
	Control Systems *	4	1	0	100	5
PRACTICAL						
	Micro Processor and Applications Lab	0	0	3	100	2
	Linear Integrated Circuits Lab *	0	0	3	100	2
	Object Oriented Programming Lab	0	0	3	100	2
	Total	20	4	11	--	

* Common with ECE

SEMESTER V

Code No.	Course Title	L	T	P	M	C
THEORY						
	Principles of Management *	4	1	0	100	5
	Digital Signal Processing *	3	1	0	100	4
	Bio-Mechanics	3	1	0	100	4
	Internet and Java *	3	1	0	100	4
	Medical Informatics	3	0	0	100	0
	Micro Controllers & RISC Architecture *	3	1	0	100	4
PRACTICAL						
	Communication Skills and Personality Development I *	0	0	3	100	2
	Digital Signal Processing Lab *	0	0	3	100	2
	Bio Medical Instrumentation Lab	0	0	3	100	2
	Total	19	5	9	-	

* Common with ECE

SEMESTER VI

Code No.	Course Title	L	T	P	M	C
THEORY						
	Professional Ethics & Human Values	4	0	0	100	4
	Bio-Signal Processing	3	1	0	100	4
	Bio materials & Artificial organs	3	0	0	100	3
	Digital Image Processing *	3	0	0	100	3
	Neural Networks and Applications*	3	0	0	100	3
	Elective I	3	0	0	100	3
PRACTICAL						
	Bio Signal Processing Lab	0	0	3	100	2
	Digital Image Processing Lab *	0	0	3	100	2
	Communication Skills and Personality Development II *	0	0	3	100	2
	Total	19	1	9		

* Common with ECE

SEMESTER VII

Code No.	Course Title	L	T	P	M	C
THEORY						
	Embedded Systems *	3	1	0	100	4
	Principles of Medical Imaging	3	1	0	100	4
	Medical Expert Systems	3	0	0	100	3
	Therapeutic Equipments	4	0	0	100	4
	Elective II	3	0	0	100	3
	Elective III	3	0	0	100	3
PRACTICAL						
	Medical Software Lab	0	0	3	100	2
	Expert System Lab	0	0	3	100	2
	Project Phase I +	0	0	3	---	2
	Total	19	3	9	-	

* Common with ECE

SEMESTER VIII

Code No.	Course Title	L	T	P	M	C
THEORY						
	Principles of Tele Medicine	3	1	0	100	4
	Disaster Management *	3	0	0	100	3
	Elective IV	3	0	0	100	3
	Elective V	3	0	0	100	3
PRACTICAL						
	Project Work Phase II +	0	0	12	200	6
	Simulation Software Lab	0	0	3	100	2
	Total	12	0	15	-	

* Common with ECE

+ 50 % of Marks

LIST OF ELECTIVES FOR SEMESTER VI

Code No.	Course Title	L	T	P	M	C
	Pattern Recognition and AI Techniques	3	0	0	100	3
	Patient Monitoring Systems	3	0	0	100	3
	Fiber Optics and Lasers in Medicine	3	0	0	100	3
	Numerical Methods *	3	0	0	100	3
	Speech Processing *	3	0	0	100	3
	Genetic Algorithms *	3	0	0	100	3
	Data Structures *	3	1	0	100	4

* Common with ECE

SEMESTER VII

Code No.	Course Title	L	T	P	M	C
	Bio Tech Prosthetic Equipments	3	0	0	100	3
	Computer Vision	3	0	0	100	3
	Health Care systems	3	0	0	100	3
	Nanotechnology in Medicine	3	0	0	100	3
	Medical Physics	3	0	0	100	3
	Data Mining for Medical Electronics	3	0	0	100	3
	Soft Computing *	3	0	0	100	3
	Advanced Microprocessors	3	0	0	100	3
	Opto Electronic Devices *	3	0	0	100	3
	Operating Systems *	3	0	0	100	3

* Common with ECE

SEMESTER VIII

Code No.	Course Title	L	T	P	M	C
	Engineering Acoustics *	3	0	0	100	3
	Robotics	3	0	0	100	3
	Hospital Management	3	1	0	100	4
	Clinical Engineering	4	1	0	100	4
	Bio-Medical Diagnostic Equipments	3	1	0	100	4
	VLSI Design *	3	1	0	100	4
	Intellectual Property Rights *	3	0	0	100	3
	Advanced Digital Signal processing *	3	0	0	100	3
	Computer Hardware and Interfacing *	3	0	0	100	3
	Computer Networks *	3	0	0	100	3
	Total Quality Management *					

* Common with ECE

SEMESTER –III
ENGINEERING MATHEMATICS III *

L	T	P	M	C
4	1	0	100	5

UNIT I PARTIAL DIFFERENTIAL EQUATIONS

9

Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions – Solution of standard types of first order partial differential equations – Lagrange's linear equation – Linear partial differential equations of second and higher order with constant coefficients.

UNIT II FOURIER SERIES

9

Dirichlet's conditions – General Fourier series – Odd and even functions – Half range sine series – Half range cosine series – Complex form of Fourier Series – Parseval's identity – Harmonic Analysis.

UNIT III BOUNDARY VALUE PROBLEMS

9

Classification of second order quasi linear partial differential equations – Solutions of one dimensional wave equation – One dimensional heat equation – Steady state solution of two-dimensional heat equation (Insulated edges excluded) – Fourier series solutions in Cartesian coordinates.

UNIT IV FOURIER TRANSFORM

9

Fourier integral theorem (without proof) – Fourier transform pair – Sine and Cosine transforms – Properties – Transforms of simple functions – Convolution theorem – Parseval's identity.

UNIT V Z TRANSFORMS

9

Z-transforms - Elementary properties – Inverse Z-transform – Convolution theorem - Formation of difference equations – Solution of difference equations using Z-transform.

TUTORIAL 15

TOTAL : 60

REFERENCES :

1. Grewal, B.S., "Higher Engineering Mathematics", Thirty Sixth Edition , Khanna Publishers, Delhi, 2001.
2. Kandasamy, P., Thilagavathy, K., and Gunavathy, K., "Engineering Mathematics Volume III", S. Chand & Company Ltd., New Delhi, 1996.
3. Kenneth, Hoffman and Ray.Kunz, Linear Algebra," 2nd Edition, Prentice Hall India,2000.
4. Wylie C. Ray and Barrett Louis, C., "Advanced Engineering Mathematics", Sixth Edition, McGraw-Hill, Inc., New York, 1995.
5. Andrews, L.A., and Shivamoggi B.K., "Integral Transforms for Engineers and Applied Mathematicians," Macmillan, New York, 1988.

*** Common with ECE**

HUMAN ANATOMY AND PHYSIOLOGY~

L	T	P	M	C
4	0	0	100	4

9

UNIT I INTRODUCTION

Structure of cell – Function of each components of the cell – Membrane potential – Action potential – Generation and Conduction – Electrical simulation. Blood Cell – Composition – origin of RBC – Blood Groups – Estimation of RBC, WBC and Platelet

UNIT II CARDIAC AND NERVOUS SYSTEM 10

Anatomy of Human heart - Cardiac cycle – ECG – Blood pressure – Feedback control for blood pressure – Nervous control of heart. Cardiac output – Coronary and peripheral circulation – anatomy, structure and function of nervous tissue – Reflex action – Velocity of conduction of nerve impulses. Electro Encephalograph – Autonomic Nervous system.

UNIT III RESPIRATORY SYSTEM 8

Anatomy an Physiological aspects of respiration. Exchange off gases – Regulation of Respiration. Disturbance of respirating function. Pulmonary function test.

UNIT IV DIGESTIVE AND EXCRETORY SYSTEM 9

Anatomy and physiological aspects of GI system, Digestion and absorption – Movement of GI tract –anatomy of human kidney - Structure of Nephron – Mechanism of urine formation – urine reflex – skin and sweat gland – Temperature regulation.

UNIT V SPECIAL SENSES 9

Optics of Eye – Retina – Photochemistry of vision – Accommodation Neurophysiology of vision – EOG. Physiology of Internal Ear – Mechanism of Hearing – Auditory pathway, Hearing Tests.

TOTAL:45

REFERENCES :

1. Sarada subramanyam, K. Madhavan Kutty and H.D. Singh – Text book of 'Human Physiology'-S.Chand & Company, 1996. (Unit 1 – 4).
2. Arthur.C.Guyton – Text book of Medical Physiology – Prism Book (P) Ltd.1996.
3. Webster J.C. and Albert M.Cook,"Clinical Engineering Principle and Practice", Printice Hall Inc.Englewood cliffs, New jersey, 1979.
4. Sujit K. Chaudhuri – Concise Medical Physilogy – New Central Book agency, 1997. (unit 5)

INSTRUMENTATION PRINCIPLES

L T P M C
3 0 0 100 3

UNIT I BASIC MEASUREMENT CONCEPTS 9

Measurement systems – Static and dynamic characteristics – units and standards of measurements – error analysis – moving coil, moving iron meters – multimeters – True RMS meters – Bridge measurements – Maxwell, Hay, Schering, Anderson and Wien bridge.

UNIT II BASIC ELECTRONIC MEASUREMENTS 9

Electronic multimeters – Cathode ray oscilloscopes – block schematic – applications – special oscilloscopes – Q meters – Vector meters – RF voltage and power measurements.

UNIT III SIGNAL GENERATORS AND ANALYZERS 9

Function generators – RF signal generators – Sweep generators – Frequency synthesizer – wave analyzer – Harmonic distortion analyzer – spectrum analyzer.

UNIT IV DIGITAL INSTRUMENTS 9

Comparison of analog and digital techniques – digital voltmeter – multimeters – frequency counters – measurement of frequency and time interval – extension of frequency range – measurement errors.

UNIT V DATA ACQUISITION SYSTEMS AND FIBER OPTIC MEASUREMENTS 9

Elements of a digital data acquisition system – interfacing of transducers – multiplexing – computer controlled instrumentation – IEEE 488 bus – fiber optic measurements for power and system loss – optical time domains reflectometer.

TOTAL : 45

REFERENCES :

1. Albert D.Helfrick and William D.Cooper – Modern Electronic Instrumentation and Measurement Techniques, Prentice Hall of India, 2003.
2. Joseph J.Carr, Elements of Electronics Instrumentation and Measurement, Pearson education, 2003.
3. Alan. S. Morris, Principles of Measurements and Instrumentation, Prentice Hall of India, 2nd edn., 2003.
4. Ernest O. Doebelin, Measurement Systems- Application and Design-Tata McGraw-Hill-2004.

MEASURING TECHNIQUES

L T P M C
3 0 0 100 3

UNIT I TRANSDUCERS

9

Classifications and characteristics of transducers, transducers for measurement of pressure, flow and temperature, optical sensors, principle of operation of resistance potentiometer, LVDT, strain gauge and Piezo electric transducers, encoders.

UNIT II DIGITAL DISPLAY AND RECORDING DEVICES

9

Digital storage oscilloscope – digital printers and plotters – CD ROMS – digital magnetic tapes, Dot matrix and LCD display CROs, color monitor, digital signal analyzer and digital data acquisition.

UNIT III SIGNAL ANALYSIS

9

Amplifiers, filters, transmitter, receiver, wireless base, and mobile station test sets, noise figure meters, RF network analyzer and high frequency signal sources.

UNIT IV CURRENT TRENDS IN DIGITAL INSTRUMENTATION

9

Introduction to special function add on cards – resistance card – input and output cards – counter, test and time of card and digital equipment construction with modular designing.

UNIT V ELECTRONIC LABORATORY INSTRUMENTS

9

Strip chart and X-Y recorders, field bus instrumentation, measurement of earth resistance, transformer ratio bridges, measurement of resistance using transformer ratio bridges.

TOTAL : 45

REFERENCES:

1. Cooper, "Electronic Instrumentation and Measurement Techniques : Prentice Hall of India, 1998
2. Doebelin, " Measurement Systems", Mc Graw Hill, 1990
3. C.Barney, " Intelligent Instrumentation", Prentice Hall of India, 1985
4. C.S.Rangan, "Instrumentation Devices and Systems", Tata Mc Graw Hill 1998
5. John Lenk, D., "Handbook of Micro Computer Base Instrumentation and Control", Prentice Hall,1984.
6. Product Catalogue, Hewlet Packard, 1996.

DIGITAL ELECTRONICS *

L	T	P	M	C
3	1	0	100	4

9

UNIT I NUMBER SYSTEMS

Binary, Octal, Decimal, Hexadecimal-Number base conversions – complements – signed Binary numbers. Binary Arithmetic- Binary codes: Weighted –BCD-2421- Gray code-Excess 3 code-ASCII –Error detecting code – conversion from one code to another-Boolean postulates and laws –De-Morgan’s Theorem- Principle of Duality- Boolean expression – Boolean function- Minimization of Boolean expressions – Sum of Products (SOP) –Product of Sums (POS)-Minterm-Maxterm- Canonical forms – Conversion between canonical forms –Karnaugh map Minimization – Don’t care conditions.

UNIT II LOGIC GATES 9

AND, OR, NOT, NAND, NOR, Exclusive – OR and Exclusive – NOR- Implementations of Logic Functions using gates, NAND –NOR implementations – Multi level gate implementations- Multi output gate implementations. TTL and CMOS Logic and their characteristics –Tristate gates.

UNIT III COMBINATIONAL CIRCUITS 9

Design procedure – Adders-Subtractors – Serial adder/ Subtractor - Parallel adder/ Subtractor- Carry look ahead adder- BCD adder- Magnitude Comparator- Multiplexer/ Demultiplexer- encoder / decoder – parity checker – code converters. Implementation of combinational logic using MUX, ROM, PAL and PLA.

UNIT III SEQUENTIAL CIRCUIT 9

Flip flops SR, JK, T, D and Master slave – Characteristic table and equation – Application table – Edge triggering –Level Triggering –Realization of one flip flop using other flip flops –Asynchronous / Ripple counters – Synchronous counters – Modulo – n counter –Classification of sequential circuits – Moore and Mealy - Design of Synchronous counters: state diagram- State table –State minimization – State assignment- ASM-Excitation table and maps-Circuit implementation - Register – shift registers- Universal shift register – Shift counters – Ring counters.

UNIT IV ASYNCHRONOUS SEQUENTIAL CIRCUITS 9

Design of fundamental mode and pulse mode circuits – primitive state / flow table – Minimization of primitive state table –state assignment – Excitation table – Excitation map- cycles – Races –Hazards: Static –Dynamic –Essential –Hazards elimination.

UNIT V MEMORY DEVICES 9

Classification of memories –RAM organization – Write operation –Read operation – Memory cycle - Timing wave forms – Memory decoding – memory expansion – Static RAM Cell-Bipolar RAM cell – MOSFET RAM cell –Dynamic RAM cell –ROM organization - PROM –EPROM –EEPROM –EAPROM –Programmable Logic

Devices –Programmable Logic Array (PLA)- Programmable Array Logic (PAL)-
Field Programmable Gate Arrays (FPGA).

TUTORIAL 15

TOTAL : 60

REFERENCES :

1. M. Morris Mano, Digital Design, 3.ed., Prentice Hall of India Pvt. Ltd., New Delhi, 2003/Pearson Education (Singapore) Pvt. Ltd., New Delhi, 2003 – (Unit I, II, V)
2. John .M Yarbrough, Digital Logic Applications and Design, Thomson- Vikas publishing house, New Delhi, 2002. (Unit III, IV)
3. Charles H.Roth. “Fundamentals of Logic Design”, Thomson Publication Company, 2003.
4. Donald P.Leach and Albert Paul Malvino, Digital Principles and Applications, 5 ed., Tata McGraw Hill Publishing Company Limited, New Delhi, 2003.
5. R.P.Jain, Modern Digital Electronics, 3 ed., Tata McGraw–Hill publishing company limited, New Delhi, 2003.

*** Common with ECE**

ELECTRONIC CIRCUITS I *

L T P M C
3 1 0 100 4

UNIT I TRANSISTOR BIAS STABILITY 9

BJT – Need for biasing – Stability factor - Fixed bias circuit, Load line and quiescent point. Variation of quiescent point due to $FE h$ variation within manufacturers tolerance - Stability factors - Different types of biasing circuits - Method of stabilizing the Q point - Advantage of Self bias (voltage divider bias) over other types of biasing, Bias compensation – Diode, Thermister and Sensistor compensations, Biasing the FET and MOSFET.

UNIT II MIDBAND ANALYSIS OF SMALL SIGNAL AMPLIFIERS 9

CE, CB and CC amplifiers - Method of drawing small-signal equivalent circuit – Midband analysis of various types of single stage amplifiers to obtain gain, input impedance and output impedance - Miller's theorem - Comparison of CB, CE and CC amplifiers and their uses - Methods of increasing input impedance using Darlington connection and bootstrapping - CS, CG and CD (FET) amplifiers - Multistage amplifiers. Basic emitter coupled differential amplifier circuit - Bisection theorem. Differential gain – CMRR - Use of constant current circuit to improve CMRR - Derivation of transfer characteristic.

UNIT III FREQUENCY RESPONSE OF AMPLIFIERS 9

General shape of frequency response of amplifiers - Definition of cutoff frequencies and bandwidth - Low frequency analysis of amplifiers to obtain lower cutoff frequency Hybrid – equivalent circuit of BJTs - High frequency analysis of BJT amplifiers to obtain upper cutoff frequency – Gain Bandwidth Product - High frequency equivalent circuit of FETs - High frequency analysis of FET amplifiers - Gain-bandwidth product of FETs - General expression for frequency response of multistage amplifiers - Calculation of overall upper and lower cutoff frequencies of multistage amplifiers - Amplifier rise time and sag and their relation to cutoff frequencies.

UNIT IV LARGE SIGNAL AMPLIFIERS 9

Classification of amplifiers, Class A large signal amplifiers, second harmonic distortion, higher order harmonic distortion, transformer-coupled class A audio power amplifier – efficiency of Class A amplifiers. Class B amplifier – efficiency - push-pull amplifier - distortion in amplifiers - complementary-symmetry (Class B) push-pull amplifier, Class C, Class D amplifier – Class S amplifier – MOSFET power amplifier, Thermal stability and heat sink.

UNIT V RECTIFIERS AND POWER SUPPLIES 9

Classification of power supplies, Rectifiers - Half-wave, full-wave and bridge rectifiers with resistive load. Analysis for dc V and ripple voltage with C, L, LC and

CLC filters. Voltage multipliers, Voltage regulators - Zener diode regulator, principles of obtaining a regulated power supply, regulator with current limiting, Over voltage protection, Switched mode power supply (SMPS), Power control using SCR.

TUTORIAL = 15
TOTAL : 60

TEXT BOOKS

1. Millman J and Halkias .C., Integrated Electronics, TMH, 2007.
2. S. Salivahanan, N. Suresh Kumar and A. Vallavaraj, Electronic Devices and Circuits, 2nd Edition, TMH, 2007.

REFERENCES

1. Robert L. Boylestad and Louis Nashelsky, Electronic Devices and Circuit Theory, 9th Edition, Pearson Education / PHI, 2007.
2. David A. Bell, Electronic Devices & Circuits, 4th Edition, PHI, 2007
3. Floyd, Electronic Devices, Sixth Edition, Pearson Education, 2002.
4. I.J. Nagrath, Electronic Devices and Circuits, PHI, 2007.
5. Anwar A. Khan and Kanchan K. Dey, A First Course on Electronics, PHI, 2006.
6. B.P. Singh and Rekha Singh, Electronic Devices and Integrated Circuits, Pearson Education, 2006.
7. Rashid M, Microelectronics Circuits, Thomson Learning, 2007.

*** Common with ECE**

PRACTICALS

INSTRUMENTATION LAB

L P T M C
0 0 3 100 2

List of Experiments:

1. Study of displacement and pressure transducer.
2. AC bridges
3. DC bridges
4. Instrumentation amplifiers
5. A/D and D/A converters
6. Study of transients
7. calibration of single phase energy meter
8. Measurement of three phase power and power factor
9. Measurement of Iron loss

DIGITAL ELECTRONICS LAB *

L P T M C
0 0 3 100 2

List of Experiments:

1. Design and implementation of Adders and Subtractors using logic gates.
2. Design and implementation of code converters using logic gates
 - (i) BCD to excess-3 code and vice versa
 - (ii) Binary to gray and vice-versa
3. Design and implementation of 4 bit binary Adder/ subtractor and BCD adder using IC 7483
4. Design and implementation of 2Bit Magnitude Comparator using logic gates
8 Bit Magnitude Comparator using IC 7485
5. Design and implementation of 16 bit odd/even parity checker generator using IC74180.
6. Design and implementation of Multiplexer and De-multiplexer using logic gates and study of IC74150 and IC 74154
7. Design and implementation of encoder and decoder using logic gates and study of IC7445 and IC74147
8. Construction and verification of 4 bit ripple counter and Mod-10 / Mod-12 Ripple counters
9. Design and implementation of 3-bit synchronous up/down counter
10. Implementation of SISO, SIPO, PISO and PIPO shift registers using Flip-flops
11. Study of OptoCounter

***Common with ECE**

ELECTRONIC CIRCUITS – I LAB *

L P T M C
0 0 3 1 0 0 2

Expt No.1 Fixed Bias amplifier circuit using BJT

1. Waveforms at input and output without bias.
2. Determination of bias resistance to locate Q-point at center of load line.
3. Measurement of gain.
4. Plot the frequency response & Determination of Gain Bandwidth Product

Expt No.2 Design and construct BJT Common Emitter Amplifier using voltage divider bias (self-bias) with and without bypassed emitter resistor.

1. Measurement of gain.
2. Plot the frequency response & Determination of Gain Bandwidth Product

Expt No.3 Design and construct BJT Common Collector Amplifier using voltage divider bias (self-bias).

1. Measurement of gain.
2. Plot the frequency response & Determination of Gain Bandwidth Product

Expt No.4 Darlington Amplifier using BJT.

1. Measurement of gain and input resistance.
2. Comparison with calculated values.
3. Plot the frequency response & Determination of Gain Bandwidth Product

Expt No.5 Source follower with Bootstrapped gate resistance

1. Measurement of gain, input resistance and output resistance with and without Bootstrapping.
2. Comparison with calculated values.

Expt No.6 Differential amplifier using BJT

1. Measurement of CMRR.

Expt No.7 Class A Power Amplifier

1. Observation of output waveform.
2. Measurement of maximum power output.
3. Determination of efficiency.
4. Comparison with calculated values.

Expt No.8 Class B Complementary symmetry power amplifier

1. Observation of the output waveform with crossover Distortion.

2. Modification of the circuit to avoid crossover distortion.
3. Measurement of maximum power output.
4. Determination of efficiency.
5. Comparison with calculated values.

Expt No.9 Power Supply circuit - Half wave rectifier with simple capacitor filter.

1. Measurement of DC voltage under load and ripple factor, Comparison with calculated values.
2. Plot the Load regulation characteristics using Zener diode.

Expt No.10 Power Supply circuit - Full wave rectifier with simple capacitor filter

1. Measurement of DC voltage under load and ripple factor, Comparison with calculated values.
2. Measurement of load regulation characteristics. Comparison with calculated values.

*** Common with ECE**

SEMESTER –IV
MICROPROCESSORS AND ITS APPLICATIONS

		L	T	P	M	C	
UNIT I	8085 CPU	3	1	0	100	4 9	
8085 Architecture – Instruction set – Addressing modes – Timing diagrams – Assembly language programming – Counters – Time Delays – Interrupts – Memory interfacing – Interfacing, I/O devices.							
UNIT II	PERIPHERALS INTERFACING						9
Interfacing Serial I/O (8251)- parallel I/O (8255) –Keyboard and Display controller (8279) – ADC/DAC interfacing – Inter Integrated Circuits interfacing (I ² C Standard)-Bus: RS232C-RS485-GPIB							
UNIT III	8086 CPU						9
Intel 8086 Internal Architecture – 8086 Addressing modes- Instruction set- 8086 Assembly language Programming–Interrupts.							
UNIT IV	8051 MICROCONTROLLER						9
8051 Micro controller hardware- I/O pins, ports and circuits- External memory – Counters and Timers-Serial Data I/O- Interrupts-Interfacing to external memory and 8255.							
UNIT V	8051 PROGRAMMING AND APPLICATIONS						9
8051 instruction set – Addressing modes – Assembly language programming – I/O port programming -Timer and counter programming – Serial Communication – Interrupt programming –8051 Interfacing: LCD, ADC, Sensors, Stepper Motors, Keyboard and DAC.							

TUTORIAL : 15
TOTAL : 60

REFERENCES :

1. Ramesh S Gaonkar, Microprocessor Architecture, Programming and application with 8085, 4th Edition, Penram International Publishing, New Delhi, 2000. (Unit I, II)
2. John Uffenbeck, The 80x86 Family, Design, Programming and Interfacing, Third Edition. Pearson Education, 2002.
3. Mohammed Ali Mazidi and Janice Gillispie Mazidi, The 8051 Microcontroller and Embedded Systems, Pearson Education Asia, New Delhi, 2003. (Unit IV, V)
4. A.K. Ray and K.M.Burchandi, Intel Microprocessors Architecture Programming and Interfacing, McGraw Hill International Edition, 2000
5. Kenneth J Ayala, The 8051 Microcontroller Architecture Programming and Application, 2nd Edition, Penram International Publishers (India), New Delhi, 1996.
6. M. Rafi Quazzaman, Microprocessors Theory and Applications: Intel and Motorola prentice Hall of India, Pvt. Ltd., New Delhi, 2003.

LINEAR INTEGRATED CIRCUITS *

L T P M C
3 1 0 100 4

UNIT I CHARACTERISTICS OF OPERATIONAL AMPLIFIER 9

Analysis of difference amplifiers with active loads, current sources — Characteristics of OP AMP –Open Loop OP AMP–Frequency response of OP AMP – Slew Rate - Monolithic IC operational amplifier.

UNIT II APPLICATIONS OF OPERATIONAL AMPLIFIERS 9

Inverting and Non inverting Amplifiers- Differentiator- Integrator- Voltage to current converter- Instrumentation amplifier-Sine wave Oscillator- Low-pass and band-pass filters- Comparator- Multivibrators and Schmitt trigger- Triangular wave generator- Precision rectifier- Log and Antilog amplifiers.

UNIT III ANALOG MULTIPLIER AND PLL 9

Analysis of four quadrant (Gilbert cell) and variable transconductance multipliers-Voltage controlled Oscillator- Closed loop analysis of PLL, AM, PM and FSK modulators and demodulators-Frequency synthesizers- Compander ICs.

UNIT IV ANALOG TO DIGITAL & DIGITAL TO ANALOG CONVERTERS 9

Analog switches-High speed sample and hold circuits -sample and hold ICs-Types of D/A converter- Current driven DAC- Switches for DAC- A/D converter-Flash-Single slope- Dual slope-Successive approximation- Delta Sigma Modulation-Voltage to Time converters.

UNIT V SPECIAL FUNCTION ICs 9

Astable and Monostable Multivibrators using 555 Timer-Voltage regulators-linear and switched mode types- Switched capacitor filter- Frequency to Voltage converters- Tuned amplifiers- Power amplifiers and Isolation Amplifiers- Video amplifiers.

TOTAL: 45

REFERENCES

1. Ramakant A.Gayakwad, 'OP-AMP and Linear IC's', Prentice Hall / Pearson Education, 1994
2. D.Roy Choudhry, Shail Jain, "Linear Integrated Circuits", New Age International Pvt. Ltd., 2000.
3. Sergio Franco, 'Design with operational amplifiers and analog integrated circuits', McGraw-Hill, 1997.
4. David L.Terrell,"Op Amps-Design,Application,and Troubleshooting",II edition,Elsevier publications.
5. Taub and Schilling, Digital Integrated Electronics, McGraw-Hill, 1997.
6. Gray and Meyer, 'Analysis and Design of Analog Integrated Circuits', Wiley International, 1995.
7. J.Michael Jacob, 'Applications and Design with Analog Integrated Circuits', Prentice Hall of India, 1996.
8. William D.Stanely, 'Operational Amplifiers with Linear Integrated Circuits'. Pearson Education, 2004.

*** Common with ECE**

SIGNALS AND SYSTEMS *

L	T	P	M	C
3	1	0	100	4
				9

UNIT I REPRESENTATION OF SIGNALS

Continuous and discrete time signals: Classification of Signals – Periodic aperiodic even – odd – energy and power signals – Deterministic and random signals – complex exponential and sinusoidal signals – periodicity – properties of discrete time complex exponential unit impulse – unit step impulse functions – Transformation in independent variable of signals: time scaling, time shifting. Determination of Fourier series representation of continuous time and discrete time periodic signals – Explanation of properties of continuous time and discrete time Fourier series.

UNIT II ANALYSIS OF CONTINUOUS TIME SIGNALS AND SYSTEMS 9

Continuous time Fourier Transform and Laplace Transform analysis with examples – properties of the Continuous time Fourier Transform and Laplace Transform basic properties, Parseval's relation, and convolution in time and frequency domains.

Basic properties of continuous time systems: Linearity, Causality, time invariance, stability, magnitude and Phase representations of frequency response of LTI systems -Analysis and characterization of LTI systems using Laplace transform: Computation of impulse response and transfer function using Laplace transform.

UNIT III SAMPLING THEOREM AND z-TRANSFORMS 9

Representation of continuous time signals by its sample - Sampling theorem – Reconstruction of a Signal from its samples, aliasing – discrete time processing of continuous time signals, sampling of band pass signals Basic principles of z-transform - z-transform definition – region of convergence – properties of ROC – Properties of z-transform – Poles and Zeros – inverse z-transform using Contour integration - Residue Theorem, Power Series expansion and Partial fraction expansion, Relationship between z-transform and Fourier transform.

UNIT IV DISCRETE TIME SYSTEMS 9

Computation of Impulse & response & Transfer function using Z Transform. DTFT Properties and examples – LTI-DT systems -Characterization using difference equation – Block diagram representation – Properties of convolution and the interconnection of LTI Systems – Causality and stability of LTI Systems.

UNIT V SYSTEMS WITH FINITE AND INFINITE DURATION IMPULSE RESPONSE 9

Systems with finite duration and infinite duration impulse response – recursive and non-recursive discrete time system – realization structures – direct form – I, direct form – II, Transpose, cascade and parallel forms.

TUTORIAL: 15
TOTAL : 60

REFERENCES

1. Alan V. Oppenheim, Alan S. Willsky with S. Hamid Nawab, Signals & Systems, 2nd edn., Pearson Education, 1997.

1. John G. Proakis and Dimitris G. Manolakis, Digital Signal Processing, Principles, Algorithms and Applications, 3rd edn., PHI, 2000.

2. M. J. Roberts, Signals and Systems Analysis using Transform method and MATLAB, TMH 2003.

3. Simon Haykin and Barry Van Veen, Signals and Systems, John Wiley, 1999

4. K. Lindner, "Signals and Systems", McGraw Hill International, 1999.

5. Monson .H. Hays, "Digital Signal Processing", Schaum's outlines, Tata McGraw-Hill Co Ltd., 2004.

6. Ashok Amhardar, "Analog and Digital Signal Processing", 2nd Edition Thomson 2002.

* **Common with ECE**

OBJECT ORIENTED PROGRAMMING

L T P M C
3 0 0 100 3

UNIT I OVERVIEW 9

Why Object-Oriented Programming in C++ - Native Types and Statements - Functions and Pointers-Implementing ADTs in the Base Language-

UNIT II BASIC CHARACTERISTICS OF OOP 9

Data Hiding and Member Functions- Object Creation and Destruction- Polymorphism-data abstraction: Iterators and Containers.

UNIT III ADVANCED PROGRAMMING 9

Templates, Generic Programming, and STL-Inheritance-Exceptions-OOP Using C++

UNIT IV OVERVIEW OF JAVA 9

Data types, variables and arrays, operators, control statements, classes, objects, methods – Inheritance

UNIT V EXCEPTION HANDLING 9

Packages and Interfaces, Exception handling, Multithreaded programming, Strings, Input/Output

TOTAL : 45

REFERENCES :

1. Ira Pohl, "Object-Oriented Programming Using C++", Pearson Education Asia, 2003.
2. Herbert Schildt, "The Java 2: Complete Reference", Fourth edition, TMH, 2002 (Chapters 1-11,13,17)
3. Bjarne Stroustrup, "The C++ Programming Language", Pearson Education, 2004.
4. Stanley B. Lippman and Josee Lajoie , "C++ Primer", Pearson Education, 2003.
5. K.R.Venugopal, Rajkumar Buyya, T.Ravishankar, "Mastering C++", TMH, 2003.
6. H.M.Deitel, P.J.Deitel, "Java : how to program", Fifth edition, Prentice Hall of India private limited, 2003.

BIO MEDICAL INSTRUMENTATION

L T P M C
3 0 0 100 3

UNIT I BIO POTENTIAL ELECTRODES 9

Electrode electrolyte interface, half cell potential, polarization and non polarisable electrode, calomel electrode, needle and wire electrode, micro electrode – metal micro pipette .

UNIT II RECORDING SYSTEM 9

Low noise pre amplifier, main amplifier and driver amplifier, ink jet recorder, thermal array recorder, photographic recorder, magnetic tape recorder, X – Y recorder, medical oscilloscope, ECG, EMG, EEG. PCG, EOG-lead system and recording methods typical wave forms, frequency spectrums, abnormal wave form, evoked response.

UNIT III BLOOD FLOW AND BIO CHEMICAL MEASUREMENT 9

pH, pO₂, pCO₂, pHCO₃, electro phoresis, calorimeter, spectro photometer, flame photometer, auto analyzer. Electro magnetic and ultra sonic blood flow meter, indicator dilution method, thermo dilution method manual and automatic counting of RBC, WBC and platelets.

UNIT IV NON ELECTRICAL PARAMETER AND RESPIRATORY MEASUREMENTS 9

Respiration, Heart rate, temperature, pulse blood pressure, cardiac output, O₂, CO₂ measurements, spirometer, BMR apparatus

UNIT V MODERN IMAGING SYSTEMS 9

X-Ray machines and computer Tomography – magnetic resonance imaging systems – basic NMR components – ultrasonic imaging systems – medical thermography – electron microscopy – blood gas analysers – computer application in medical field.

TOTAL : 45

REFERENCES:

1. Leslie Cromwell, "Bio medical instrumentation and measurement", Prentice Hall of India, New Delhi 2003
2. Khandpur RS, "Hand book of Bio-Medical Instrumentation", Third Edition, TMH Publication, New Delhi 2005.
3. Webster J.G., "Medical Instrumentation application and design", Third Edition, John Wiley and sons, New York, 1999
4. Richard A. Normann, "Principle of Bio- Instrumentation", John Wiley and sons, New York, 1988.

CONTROL SYSTEMS

L T P M C
4 1 0 100 5

UNIT I CONTROL SYSTEM MODELLING 9

System concept, differential equations and transfer functions. Modelling of electric systems, translational and rotational mechanical systems, Simple electromechanical systems.

Block diagram representation of systems – Block diagram reduction methods – Closed loop transfer function, determination of signal flow graph. Mason's gain formula – Examples.

UNIT II TIME DOMAIN ANALYSIS 9

Test signals – time response of first order and second order systems – time domain specifications – types and order of systems – generalised error co-efficients – steady state errors – concepts of stability – Routh-Hurwitz stability – root locus.

UNIT III FREQUENCY DOMAIN ANALYSIS 9

Introduction – correlation between time and frequency response – stability analysis using Bode plots, Polar plots, Nichols chart and Nyquist stability criterion – Gain margin – phase margin.

UNIT IV COMPENSATORS 9

Realization of basic compensators – cascade compensation in time domain and frequency domain and feedback compensation – design of lag, lead, lag-lead compensator using Bode plot and Root locus. Introduction to P, PI and PID controllers.

UNIT V CONTROL SYSTEM COMPONENTS AND APPLICATION OF CONTROL SYSTEMS 9

Stepper motors – AC servo motor – DC servo motor – Synchros – sensors and encoders – DC tacho generator – AC tacho generator – Hydraulic controller – Pneumatic controller – Typical application of control system in industry.

TUTORIAL :15

TOTAL : 60

REFERENCES :

1. Ogata.K, Modern Control Engineering, Prentice Hall of India, 4th Edition, 2003 (UNIT I – IV)
2. Nagrath & Gopal, Control System Engineering, 3rd Edition, New Age International Edition, 2002. (UNIT V)
3. Benjamin.C.Kuo, Automatic Control Systems, 7th Edition – Prentice Hall of India, 2002.
4. M.Gopal, Control Systems, Tata McGraw-Hill, 1997

PRACTICALS
MICROPROCESSOR AND APPLICATIONS LAB

L P T M C
0 0 3 100 2

List of Experiments:

1. Programs for 8/16 bit Arithmetic operations (Using 8085).
2. Programs for Sorting and Searching (Using 8085, 8086).
3. Programs for String manipulation operations (Using 8086).
4. Programs for Digital clock and Stop watch (Using 8086).
5. Interfacing ADC and DAC.
6. Parallel Communication between two MP Kits using Mode 1 and Mode 2 of 8255.
7. Interfacing and Programming 8279, 8259, and 8253.
8. Serial Communication between two MP Kits using 8251.
9. Interfacing and Programming of Stepper Motor and DC Motor Speed control.
10. Programming using Arithmetic, Logical and Bit Manipulation instructions of 8051 microcontroller.
11. Programming and verifying Timer, Interrupts and UART operations in 8031 microcontroller.
12. Communication between 8051 Microcontroller kit and PC.

LINEAR INTEGRATED CIRCUITS LAB *

L T P M C
0 3 0 100 3

- 1 Linear Op-Amp circuits – Inverting and Non inverting Amplifiers, Voltage Follower, Differentiator, Integrator, Subtractor, summer.
- 2 Comparator circuits – zero crossing detector, Window detector and Schmitt trigger.
- 3 Sample and hold circuits.
- 4 Multivibrators using Op-Amp.
- 5 Multivibrators using IC 555.
- 6 DAC Circuits –R – 2R, ladder type.
- 7 Successive approximation type ADC.
- 8 Active filters using Op-Amps – 2nd order LPF, HPF, BPF and BSF.
- 9 Multiplier as Analog divider, squarer and square rooter.
- 10 Oscillators using Op-Amps
- 11 Study of Voltage Regulator using IC 723

*** Common with ECE**

OBJECT ORIENTED PROGRAMMING LAB

L	T	P	M	C
0	0	3	100	3

List of Experiments:

C++:

1. program using functions
 - functions with default arguments
 - implementation of call by value, address, reference
2. simple classes for understanding objects, member functions & constructors
 - classes with primitive data members,
 - classes with arrays as data members
 - classes with pointers as data members
 - classes with constant data members
 - classes with static member functions
3. compile time polymorphism
 - operator overloading
 - function overloading
4. run time polymorphism
 - inheritance
 - virtual functions
 - virtual base classes
 - templates
5. file handling
 - sequential access
 - random access

JAVA:

6. simple java applications
 - for understanding references to an instant of a class
 - handling strings in JAVA
7. simple package creation
 - developing user defined packages in java
8. interfaces
 - developing user defined interfaces
 - use predefined interfaces
9. threading
 - creation of threading in java applications
 - multi threading
10. exception handling mechanism in java
 - handling predefined exceptions
 - handling user defined exceptions

SEMESTER –V
PRINCIPLES OF MANAGEMENT *

L T P M C
4 1 0 100 5

UNIT-I FOUNDATIONS 9
Historical developments –approaches to management– Management and Administration – Development of Management Thought – Contribution of Taylor and Fayol – Functions of Management – Types of Business Organization-

UNIT-II MANAGERS & ENVIRONMENT 9
Social responsibility–Planning – Objectives – Setting Objectives – Process of Managing through Objectives – Strategies- Policies & Planning Premises- Forecasting – Decision-making-

UNIT-III FUNCTIONAL AREA OF ORGANISATION 9
Formal and informal organization – Organization Chart – Structure and Process – Departmentation by difference strategies – Line and Staff authority – Benefits and Limitations – De-Centralization and Delegation of Authority – Staffing – Selection Process - Techniques – HRD – Managerial Effectiveness-

UNIT –IV MOTIVATION & DIRECTIONS 9
Objectives– Human Factors – Creativity and Innovation – Harmonizing Objectives – Leadership – Types of Leadership Motivation – Hierarchy of needs – Motivation theories – Motivational Techniques – Job Enrichment – Communication

UNIT-V CONTROLLING STRATEGIES 9
System and process of Controlling – Requirements for effective control – The Budget as Control Technique – Information Technology– Computers in handling the information – Productivity – Problems and Management – Control of Overall Performance – Direct and Preventive Control – Reporting – The Global Environment – Globalization and Liberalization – International Management and Global theory of Management

TOTAL : 45

REFERENCES:

1. Harold Kooritz & Heinz Wehrich “Essentials of Management”- Tata McGraw-Hill- 7th Edition-2007.
2. Joseph L Massie “Essentials of Management”- Prentice Hall of India- (Pearson) 4th Edition- 2003.
3. Tripathy PC And Reddy PN- “ Principles of Management”- Tata McGraw-Hill- 1999.
4. Decenzo David- Robbin Stephen A- ”Personnel and Human Reasons Management”- Prentice Hall of India- 1996 .
5. Robbins-“ Principles of Management” Pearson education -2005.

DIGITAL SIGNAL PROCESSING *

L T P M C
3 1 0 100 4

UNIT I FAST FOURIER TRANSFORM

9

Introduction to DFT – Efficient computation of DFT- Properties of DFT – FFT algorithms – Radix-2 FFT algorithms – Decimation in Time – Decimation in Frequency algorithms – fast convolution- overlap save method.

UNIT II FINITE IMPULSE RESPONSE DIGITAL FILTERS

9

Amplitude and phase responses of FIR filters – Linear phase filters – Windowing techniques for design of linear phase FIR filters: Rectangular- Hamming- Hanning- Blackman and Kaiser Windows. Gibbs phenomenon –principle of frequency sampling technique- principle of optimum equiripple approximation. Realization - FIR filters.

UNIT III INFINITE IMPULSE RESPONSE DIGITAL FILTERS

9

Review of design of analogue Butterworth and Chebychev Filters- Frequency transformation in analog domain – Design of IIR digital filters using impulse invariance technique – Design of IIR digital filters using bilinear transformation – pre warping – Frequency transformation in digital domain – Realization - Direct form I, Direct form II, cascade and parallel.

UNIT IV FINITE WORD LENGTH EFFECTS

9

Quantization noise – derivation for quantization noise power – Binary fixed point and floating point number representations – Comparison – truncation and rounding error – input quantization error-coefficient quantization error – limit cycle oscillations-dead band-Overflow error-signal scaling.

UNIT V DIGITAL SIGNAL PROCESSORS

9

Architectural Features – DSP Building Blocks – Multiplier- Shifter- MAC Unit- ALU –Bus Architecture and Memory – Addressing Modes – Address Generation Unit -Hardware architecture – pipelining- Overview of instruction set of TMS320C50.

TOTAL: 45
TUTORIAL: 15

REFERENCES

1. John G Proakis- Dimtris G Manolakis- Digital Signal Processing Principles- Algorithms and Application- Pearson/PHI- 4th Edition- 2007-
2. S.K.Mitra- “Digital Signal Processing- A Computer based approach”- Tata McGraw-Hill- 1998- New Delhi
3. Allan V.Openheim, Ronald W.Shafer & John R.Buck-“Discrete Time Signal Processing”,second edition-Pearson/Prentice Hall.
4. B.Venkataramani & M-Bhaskar- Digital Signal Processor Architecture- Programming and Application- TMH 2002-
5. Johny R-Johnson: Introduction to Digital Signal Processing- Prentice Hall- 1984
6. Emmanuel Ifeachor “Digital Signal Processing: A Practical Approach”, 2/E - Prentice Hall-2002
7. Li Tan “ Digital Signal Processing” Elsevier-2008

* Common with ECE

07 ML503 BIOMECHANICS

L	T	P	M	C
3	1	0	100	4

UNIT I INTRODUCTION

9

Material Science and Classes of Materials used in Medicine: Polymers, Metals and Plastics, Ceramics. Treated Natural Materials, Tissue Reaction. Sterilization of Biomaterials. Steam Sterilization. Ethylene Oxide Treatment, Gamma Irradiation, Formaldehyde Treatment.

UNIT II BIO MATERIALS

9

Mechanical Properties of Materials - Experimental Stress Analysis and Material Testing. Tissue Reactions and Blood Compatibility. Practical Aspects of Biomaterials Cardio Vascular Implants. Implants and Device Failure. Product Development and Regulations

UNIT III SCOPE OF MECHANICS IN MEDICINE

9

Orthopaedics, Cardiology, Exercise Physiology, Surgery, Biomechanics in Orthopaedics - Principles, Joints, Fracture, Internal and External Fixation, Prosthetic Design.

UNIT IV BIO FLUID MECHANICS

9

Biomechanics of Degenerative Disorders, Gait Analysis, Biofluid Mechanics, Mathematical Models. Biomechanics and Accident Investigation.

UNIT V INTRODUCTION TO REHABILITATION ENGINEERING

9

Introduction to Rehabilitation Engineering: Artificial Limb, Myoelectric hand, Finite Element Analysis and its Application to Problems in Biomechanics.

TUTORIAL : 15

TOTAL : 60

REFERENCES:

1. Sahay and Saxena, "Biomechanics", Tata McGraw Hill, New Delhi, Edition - 1998.
2. Y.C Fung, "Biomechanics, Mechanical properties of Living Tissues", Springer Verlag, Edition 2- 1993
3. J.B.Park, "Bio-materials - Science and Engineering" Plenum Press, Edition 1984.
4. Hench and Etheridge. "Bio-materials" Vol. 1,2,3,4, Plenum Press, Edition 1998.
5. D.N. Ghista and Roaf, "Orthopedic Mechanics" Academic Press, Edition 1999

07 ML 504 /07 EC7B INTERNET AND JAVA

L T P M C
3 1 0 100 4

UNIT I

9

Internet connection concepts – Dialup Internet access – High speed connections – Connecting LANs to Internet – Email Concepts – Email Commands – Sending and receiving files by email - Security in Email-

UNIT II

Online chatting and conferencing concepts – Mailing lists – Usenet Newsgroups – Internet Relay Chat (IRC) – Voice and video conferencing – WWW concepts – Searching on the Web-

UNIT III

9

Website creation concepts – Creating web pages by hand and Web page editors – Web Graphics – Web audio files – Advanced web options – File Transfer concepts – FTP programs – Downloading and installing software-

UNIT IV

9

The Java programming language – Basics – Classes – Packages – Interfaces – Inheritance - Exception handling – Multithreading – String and String buffer – Applets-

UNIT V

I/O streams – the utility package – Abstract Window Toolkit (AWT) – the net package – Advanced concepts: RMI and Servlets-

TOTAL: 45

REFERENCES:

1. Margaret Levine Young et al- “Internet – The Complete Reference”- Millennium edition- Tata McGraw Hill publishing company- New Delhi- 2002.
2. Patrick Schilt- “JAVA 2- The Complete Reference”- Tata McGraw Hill Publishing Company- New Delhi- 2003 .
3. Deitel & Deitel- “Java – How to Program”- 6th Edition PHI- New Delhi- 2005
4. [R. Krishnamoorthy](#), Internet and Java Programming, New Age International (P) Ltd. (2004)

07 ML506 / 07EC603 MICROCONTROLLER AND RISC ARCHITECTURES *

L	T	P	M	C
3	1	0	100	4

UNIT 1 THE 8051 ARCHITECTURE 9

8051 Microcontroller Hardware-Input/Output pins- ports and circuits-External memory-Counters and Timers-Serial Data Input/Output-Interrupts

UNIT II THE 8051 INSTRUCTION SET AND PROGRAMMING 9

8051 Addressing Modes-Arithmetic Instructions-Logical Instructions-Single bit Instructions-Timer/Counter-Serial Communication-Interrupts Programming-Assembly Language programming

UNIT III THE 8051-REAL WORLD INTERFACING 9

Interfacing LCD-ADC and sensors to 8051-8051 interfacing to a stepper motor-keyboard and DAC-8051 interfacing to external memory-8051 interfacing to the 8255

UNIT IV THE ARM RISC ARCHITECTURE 9

The RISC revolution-The reduced instruction set computer –Design for low power consumption-The ARM architecture basics-Architectural inheritance-The ARM programmers model-ARM organization and implementation-3 stage and 5 stage pipeline ARM organization-ARM instruction execution-ARM implementation-ARM processor cores-ARM7 TDMI-ARM8 TDMI-ARM9 TDMI-ARM development tools-Architectural support for system development

UNIT V ARM INSTRUCTION AND ASSEMBLY LANGUAGE PROGRAMMING 9

Exceptions-Conditional execution-Branch and branch with link and exchange-Software interrupt-Data processing instructions-Single word and unsigned byte data transfer and half word and signed byte data transfer instructions-Multiple register transfer instructions-Swap instructions-Architectural support for high level languages-The thumb instruction set-Thumb implementation-Thumb applications-Writing simple assembly language programs.

Total : 45
TUTORIAL: 15

REFERENCES:

1. "Muhammad Ali Mazidi-Jamice Gillispit Mazidi-"The 8051 micro controller and Embedded System" Pearson Education,2002.
2. Ajay.V.Deshmukh, Mircro controllers Theory and applications, TMH,2004.
3. Kenneth J-Ayala-"The Microcontroller Architecture-Programming & Applications"Pearson International,2003.
4. Krishnakant "Microprocessors and Microcontrollers Architecture-programming and system design 8085- 8086- 8051- 8096"- PHI 2007- New Delhi
5. Steve Furber "ARM System-on-chip-architecture "2nd edition Addison Wesley 2000
6. Alan Clements "The Principles of Computer Hardware" 3rd edition Oxford University Press 2000

* **Common with ECE**

**07ML507/07EC409 COMMUNICATION SKILLS & PERSONALITY
DEVELOPMENT-I ***

L T P M C
0 0 3 100 2

1. LANGUAGE DEVELOPMENT THROUGH READING

TOFEL based reading comprehension –Cur rent affairs –Vocabulary building –
Idioms and phrases –Basic phonetics.

2. SPEAKING PRACTICE

Dialogue / Conversation – Types of conversations – Public Speaking -
Debate

3. LISTENING SKILLS

4. TELEPHONE ETIQUETTE

5. SELF ASSESSMENT

Identifying strength and weakness

6. PERSONALITY DEVELOPMENT

Body Language-Non Verbal Skills-Leadership qualities-Emotional
Quotient-Effective Time Management-Surviving Stress-Overcoming failure.

7. VERBAL COMMUNICATION

Social Exchanges-Planned Speech-Extempore-Basics of attending and
organizing meetings-Informal Discussions.

*** Common with ECE**

07 ML508/07 EC508 DIGITAL SIGNAL PROCESSING LABORATORY *

L	T	P	M	C
0	0	3	100	2

LIST OF EXPERIMENTS

USING TMS320C5X

- 1- Generation of Signals
- 2- Linear Convolution
- 3- Implementation of a FIR filter
- 4- Implementation of an IIR filter
- 5- Calculation of FFT

USING MATLAB

- 1- Generation of Discrete time Signals
- 2- Verification of Sampling Theorem
3. FFT and IFFT
4. Time & Frequency response of LTI systems
- 5- Linear and Circular Convolution through FFT
- 6- Design of FIR filters (window design)
- 7-Design of IIR filters (Butterworth &Chebychev)

* **Common with ECE**

07 ML 509 BIO MEDICAL INSTRUMENTATION LAB

L	T	P	M	C
0	0	3	100	2

List of Experiments:

1. Study of biological pre amplifiers
2. Recording of ECG signal and analysis
3. Recording of Audio gram
4. Recording of EMG-Signal
5. Recording of EEG-Signal
6. Recording of EOG-Signal
7. Recording of various physiological parameters using patient monitoring system and telemetry units.
8. Measurement of pH, pO₂ and conductivity.
9. Measurement and recording of peripheral blood flow
- 10.Measurement of visually evoked potential.

SEMESTER –VI

07 ML601/07EC7I PROFESSIONAL ETHICS AND HUMAN VALUES *

L	T	P	M	C
4	0	0	100	4

UNIT I HUMAN VALUES 8

Morals- Values and Ethics – Integrity – Work Ethic – Service Learning – Civic Virtue – Respect for Others – Living Peacefully – caring – Sharing – Honesty – Courage – Valuing Time – Co-operation – Commitment – Empathy – Self-Confidence – Character – Spirituality

UNIT II ENGINEERING ETHICS 9

Senses of 'Engineering Ethics' - variety of moral issued - types of inquiry - moral dilemmas - moral autonomy - Kohlberg's theory - Gilligan's theory - consensus and controversy – Models of Professional Roles - theories about right action - Self-interest - customs and religion - uses of ethical theories-

UNIT III ENGINEERING AS SOCIAL EXPERIMENTATION 9

Engineering as experimentation - engineers as responsible experimenters - codes of ethics –industrial standards- a balanced outlook on law - the challenger case study

UNIT IV SAFETY- RESPONSIBILITIES AND RIGHTS 10

Safety and risk - assessment of safety and risk - risk benefit analysis and reducing risk - the three mile island and chernobyl case studies- Collegiality and loyalty - respect for authority - collective bargaining - confidentiality - conflicts of interest - occupational crime - professional rights - employee rights - Intellectual Property Rights (IPR) - discrimination-

UNIT V GLOBAL ISSUES 9

Multinational corporations - Environmental ethics - computer ethics - weapons development - engineers as managers-consulting engineers-engineers as expert witnesses and advisors -moral leadership-sample code of Ethics like ASME- ASCE- I-E-E-E- Institution of Engineers (IEI) India- Institution of Electronics and Telecommunication engineers(IETE) India- etc-

TOTAL: 45
TUTORIAL : 15

REFERENCES :

1. Mike Martin and Roland Schinzinger- "Ethics in Engineering"- Tata McGraw-Hill- - 1996-3 e.
2. Govindarajan M- Natarajan S- Senthil Kumar V- S- "Engineering Ethics"- Prentice Hall of India- New Delhi- 2004.
3. R-S Nagarazan -"A textbook on Professional Ethics and Human Values" New Age International Publishers- New Delhi 2006.
4. Charles D- Fleddermann- "Engineering Ethics"- Pearson Education / Prentice Hall- New Jersey- 2004 (Indian Reprint).
5. Charles E Harris- Michael S- Protchard and Michael J Rabins- "Engineering Ethics – Concepts and Cases"- Wadsworth Thompson Learning- United States- 2000 (Indian Reprint now available).
6. John R Boatright- "Ethics and the Conduct of Business"- Pearson Education- New Delhi- 2003.

* **Common with ECE**

O7 ML602 BIO SIGNAL PROCESSING

L T P M C
3 1 0 100 4

Pre requisite: Digital Signal Processing.

UNIT-I BIO SIGNAL WAVE SHAPES 10

Introduction to Biomedical signals - overview and characteristics of ECG, ,EMG, EEG, EGG, PCG, Carotid pulse, EOG, VMG,VAG, and Otto acoustic emission signals

UNIT-II TIME SERIES ANALYSIS AND SPECTRAL ESTIMATION 5

Time series analysis-linear prediction models-Time variant systems- Adaptive segmentation-Spectral Estimation-Blackman Tuckey method-Periodogram and model based estimation.

UNIT-III REMOVAL OF ARTIFACTS 10

Noise sources in biomedical signals-Review of optimal filtering-adaptive filters-LMS&RLS Adaptive filters-Removal of Artifacts in ECG-Maternal-Fetal ECG-Muscle contraction interference-use of adaptive filters for segmentation in ECG and PCG Signals.

UNIT-IV BIO SIGNAL PATTERN CLASSIFICATION AND DIAGNOSTIC DECISION 10

Pattern classification as applied to Bio signals-supervised pattern classification-unsupervised pattern classification-Probabilistic models and statistical training and test steps-Neural networks-measures of diagnostic accuracy and cost-Reliability of classifiers and decisions.

UNIT-V SPECIAL TOPICS IN BIO SIGNAL PROCESSING 10

Application of wavelet transform-TFR representation-ECG Characterization-wavelet networks-data compression of ECG and EEG signals

TUTORIAL: 15

TOTAL: 60

REFERENCES:

1. Rangaraj.M.Rangayyan, "Biomedical Signal Analysis-A Case Study Approach,"IEEE Press- John Wiley&Sons Inc, New York-2002.
2. Arnon-Cohen, "Bio-Medical Signal Processing," Vol I&II, CRC Press.1995.
3. W.J.Tompkins, "Biomedical Digital signal processing," Prentice Hall, New Jersey-1993.
4. Vallaru Rao and Hayagriva Rao, "C++, Neural Networks and fuzzy logic, BPS Publication, New Delhi, 1996.
5. D.C.Reddy, "Biomedical Signal Processing- principles and techniques", Tata McGraw-Hill, Edition- 2005

07 ML 603 BIO MATERIALS AND ARTIFICIAL ORGANS

L	T	P	M	C
3	0	0	100	3

UNIT I STRUCTURE OF BIO-MATERIALS AND BIO-COMPATIBILITY 9

Definition and classification of bio-materials, mechanical properties, visco elasticity, wound-healing process, body response to implants, blood compatibility.

UNIT II IMPLANT MATERIALS 9

Metallic implant materials, stainless steels, Co-based alloys, Ti-based alloys, ceramic implant materials, aluminum oxides, hydroxyapatite glass ceramics carbons, medical applications.

UNIT III POLYMERIC IMPLANT MATERIALS 9

Polymerization, polyolefin, polyamides, acrylic, polymers, rubbers, high strength thermoplastics, medical applications.

UNIT IV TISSUE REPLACEMENT IMPLANTS 9

Soft-tissue replacements, sutures, surgical tapes, adhesives, percutaneous and skin implants, maxillofacial arguments, blood interfacing implants, hard tissue replacement implants, internal fracture fixation devices, joint replacements.

UNIT V ARTIFICIAL ORGANS 9

Artificial Heart, Prosthetic Cardiac Valves, Limb Prosthesis, Externally Powered limb Prosthesis, Dental Implants.

TOTAL : 45

REFERENCES:

1. PARK.J.B., "Biomaterials Science and Engineering", Plenum Press, 1984
2. Robinson.C.J., Rehabilitation Engineering, Handbook of electrical engineering, CRC Presss, BocaRaton, 1993.
3. Kolff .W.J., Artificial Organs, John Wiley Sons, New York, 1979.
4. Biomedical Engineering Handbook-Volume 2 (2nd Edition) by J.D.Bronzino (CRC Press / IEEE Press, 2000)
5. R.S.Khandpur "Handbook of Biomedical Instrumentation" Tata McGraw Hill, 2nd Edition, Edition- 2003

07 ML605/07EC6H NEURAL NETWORKS AND APPLICATIONS *

L	T	P	M	C
3	0	0	100	3

Unit I Neuron model network architecture

Neuron model – single input neuron –activation function – multiple input neuron neural networks viewed as directed graphs -feedback - network architectures – knowledge representation – linear and non- linear separable problem(XOR)

Unit II Learning process

Error – correction learning – memory based learning - hebbian learning-competitive learning-Boltzmann learning-credit assignment problem-supervised and unsupervised learning-adaptation-statistical learning theory.

Unit III Perceptions

Single layer perception-Adaptive filtering-unconstrained optimization-Least-mean square algorithm-Leaning curve-Annealing Technique-perception convergence theorem-Relationship between perception and Baye's classifier-Back propagation algorithm- Network pruning techniques-supervised learning viewed as an optimization problem-convolutional network. Application to Adaptive Prediction and character recognition.

Unit IV Attractor neural Network and ART

Hopfield model-BAM model-BAM stability-Adaptive BAM -Lyapunov function-effect of gain-Hopfield design-Application to TSP problem-ART- layer 1-layer 2-orienting subsystem-Leaning lawL1-L2-Leaning law L2-L1-ART algorithm-ARTMAP

Unit V Principal Component Analysis and Self Organization

Principle of self organization-Principle Component analysis-Adaptive PCA using Lateral inhibition-Two classes of PCA algorithm-Two basic feature- mapping model-self organizing map-SOM Algorithm-properties of the feature map-LVQ-Hierarchical vector Quantization. Applications of self-organizing maps: The Neural Phonetic Typewriter-Learning Ballistic Arm Movements

TOTAL: 45

TUTORIAL : 15

REFERENCES

1. Simon Haykin, "Neural Networks and Learning Machines" -3/E - Pearson/ Prentice Hall 2009
2. Satish Kumar- "Neural Networks : A Classroom Approach"-TMH-2008
3. Freeman J.A., Skapura D.M."Neural networks, algorithms, applications, and programming techniques" -Addition Wesley, 2005.
4. Laurene Fausett,"Fundamentals of Neural Networks: Architectures, Algorithms, and Applications" - Pearson/ Prentice Hall
5. Robert J Schalkoff-"Artificial Neural Networks,McGraw Hill"-1997

* **Common with ECE**

PRACTICALS

07 ML 607 BIO-SIGNAL PROCESSING LAB

L	T	P	M	C
0	0	3	100	2

List of Experiments:

1. Measurement of ECG signal using DSP
2. Measurement of EMG signal using DSP
3. Measurement of EEG signal using DSP
4. Analysis of adaptive filters for segmentation in ECG and PCG signals
5. Analysis of Bio signal acquisition
6. Non parametric analysis of EEG signals (ARMA, AR) Models
7. Measures of Diagnostic accuracy
8. Data compressions of EEG, ECG and EOG signals.
9. Parametric extraction in ECG signals using wavelet transforms (Haar, dB4, Sym4)
10. Design and test FIR filter using Windowing method (Hamming window and Kaiser Window) for the given order and cut-off frequency.

07 ML 608 DIGITAL IMAGE PROCESSING LAB *

L	T	P	M	C
0	0	3	100	2

List of Experiments:

Simulation using MATLAB (Image processing Tool Box)

1. Image sampling and quantization
2. Transforms (Walsh, Hadamard, DCT, Haar)
3. Image Enhancement – Histogram, equalization, Spatial filtering
4. Image segmentation – Edge detection, line detection and point detection
5. Basic morphological algorithms

Mini Projects

1. Applications to Biometric and security
2. Applications to Medical Images

* Common with ECE

**07 ML609/07EC507 COMMUNICATION SKILLS AND PERSONALITY
DEVELOPMENT II ***

L T P M C
0 0 3 100 2

DEXTERITY IN WRITING

Importance of Writing –Writing vs Spoken Language – Formal & Informal styles of Writing – Report writing-Resources for improving Writing – Grammar and Usage – Application Essays – Project Proposals

1. COMPOSITION ANALYSIS

Technical and non technical passages (GRE based) - Differences in American and British English – Analyzing Contemporary issues – Expanding terminology

2. PRESENTATION SKILLS

Collecting and organizing materials- audience – Content – Rehearsing – Delivering matter – Questions – Seminar Presentations (Subject Oriented/ General Topics)

3. RESUME PREPARATION

4. GROUP DISCUSSIONS / ACTIVITIES

Preparation – Participation – Group Dynamics – Intra / Inter Dept-- Group Discussion – Team Work – Negotiation Skills – Organizational Behavior

5. INTERVIEWS

Verbal and Non verbal Skills – Rehearsing – Taking the Interview – Facing the Questions – Mock Interviews -

6. PSYCHOMETRIC TESTS - APTITUDE TESTS AND PUZZLES

Logical reasoning - problem solving – verbal- sharpening the skills

*** Common with ECE**

SEMESTER –VII
ACADEMIC YEAR 2007– 2008

07 ML 701/07EC701 EMBEDDED SYSTEMS *

L	T	P	M	C
3	1	0	100	4

UNIT I ARCHITECTURE OF EMBEDDED SYSTEMS **9**

Categories of Embedded Systems-Specifications of Embedded systems-Resent trends in Embedded Systems-Hardware Architecture-Software Architecture-Communication software-Process of generation of executable image-development/testing tools.

UNIT II PROGRAMMING FOR EMBEDDED SYSTEMS **9**

Getting the most of C-data types-manipulating bits in memory and I/O ports-accessing memory mapped I/O devices – structures-variant access-mixing C to assembly-register usage-use of addressing options-instruction sequencing – procedure call and return-parameter passing –retrieving parameters memory management-scope-automatic allocation-static allocation-dynamic allocation-shared memory-recognizing shared objects-reentrant functions-accessing shared memory device drivers- productivity tools.

UNIT III HARDWARE PLATFORM **9**

PIC microcontroller- Architecture of PIC 16c6x/7x- FSR- Reset action-Oscillatory connection- Memory organization- Instructions- Addressing modes- I/O ports-Interrupts-Timers- ADC- Assembly language programming.

UNIT IV REAL-TIME OPERATING SYSTEM CONCEPTS **9**

Architecture of the Kernel-task and task scheduler-Interrupt Service Routines-Semaphores-Mutex-Mailboxes-Message Queues-Event Registers-Pipes-Signals-Timers-Memory Management – Priority Inversion Problem

UNIT V REAL-TIME OPERATING SYSTEM TOOLS AND CASE STUDIES **9**

Use of μ C/OS-II- Case study of coding for an Automatic Chocolate Vending Machine using MUCOS RTOS- Case study of an Embedded system for an Adaptive Cruise Control Systems in a Car- Case study of an Embedded Systems for a Smart Card.

REFERENCES:

- 1.K.V.K.K.Prasad “Embedded /Real-Time Systems:Concepts,Design and Programming”Dream tech,Wiley 2003.
2. Ajay V Deshmukh “Microcontroller Theory and Applications” Tata McGraw Hill 2005
3. Raj Kamal “Embedded Systems Architecture Programming and Design” 2nd Edition TMH,2008
- 4.David E Simon “An Embedded Software Primer ” Pearson Education 2003
- 5.Daniel 5.W Lewis, “Fundamentals of Embedded Software” Pearson Education-2001
6. Peatman “ Designing with PIC Micro Controller”,Pearson 2003

* **Common with ECE**

07 ML702 PRINCIPLES OF MEDICAL IMAGING

L T P M C
3 1 0 100 4

UNIT I INTRODUCTION

9

Introduction to imaging modalities-Image quality X-rays in Diagnostic imaging-X-ray production-X-ray interactions-X-ray spectra-X-ray dosimetry-X-ray detection-radiography-mammography-fluoroscopy. Computed tomography systems- Scanner design-reconstruction techniques-image quality artifacts-multi slice imaging-scanner performance.

UNIT II MAGNETIC RESONANCE IMAGING

9

Basic principles of nuclear magnetic resonance-Image creation- Slice selection, Frequency encoding, Phase Encoding, pulse sequence, Image characteristics and artifacts, Hardware and software components.

UNIT III ULTRASOUND IMAGING

9

The wave equation-Impedance, Power and reflection-Acoustic properties of Biological tissues-Transducers, beam patterns and resolution-Diagnostic imaging modes –Doppler principles.

UNIT IV SEGMENTATION

9

Image preprocessing-Thresholding-Edge based techniques-Region based segmentation-Classification-deformable models-Image Registration-Geometrical Transformations-Point based methods-Surface based methods-Intensity based methods

UNIT V 3D VISUALIZATION

9

Pre processing-Scene-based visualization-object based visualization-Manipulation. Medical Applications and Systems– Diagnostics-Therapeutics-Interventions.

TUTORIAL 15

TOTAL: 60

REFERENCES:

1. Isaac Bankman, I. N. Bankman , “Handbook of Medical Imaging: Processing and Analysis (Biomedical Engineering)”,Academic Press,2000
2. K.Krish Shung, Micheal B. Smith, Benjamin Tsui, “Principles of Medical Imaging”, Academic Press Inc; London 1992.
3. Jacob Beutel (Editor), M. Sonka (Editor), “Handbook of Medical Imaging”, Volume 2. Medical Image Processing and Analysis , SPIE Press 2000:
4. Albert Macowski, “Medical Imaging Systems”, Prentice hall New Jersey-1983.
5. Avinash C.Kak, Malcolm Shaney, “Principles of Computerized Tomographic Imaging”, IEEE Press, New York-1998.

L	T	P	M	C
3	0	0	100	0

UNIT I INTRODUCTION TO AI**9**

Definition of AI – importance of AI – problem solving, searching, heuristic searching.

UNIT II KNOWLEDGE REPRESENTATION**9**

Proposition Logic – Clause form – Predicate logic – Resolution – Inference Rules – Unification – Semantic networks – frames – conceptual dependency – Scripts – knowledge representation using rules – rule based systems.

UNIT III EXPERT SYSTEMS**9**

Expert system architecture - non-production systems architecture– knowledge acquisition and validation - Knowledge system building tools

UNIT IV LEARNING & DECISION MAKING**9**

Types of learning – general learning model – learning by induction – generalization & specialization – inductive bias – explanation based learning

UNIT V CASE STUDY**9**

Study of medical expert systems – MYCIN, EMYCIN - development of medical expert systems – sample Case studies

TOTAL: 45**REFERENCES:**

1. Dan W. Patterson, "Introduction to Artificial Intelligence and Expert Systems", Prentice Hall of India, Delhi, 2001.
2. Watterman. "Expert Systems", Mc-Graw Hill, New York, 1991
3. George F Luger, "Artificial Intelligence, structures and strategies for complex problem solving", Pearson Education Delhi, 2001.
4. Elaine Rich and Kevin Knight, "Artificial Intelligence", 2nd edition, Tata McGraw Hill, 1993.
5. R.D.Lele, "Computers in Medicine," Tata McGraw Hill, NewDelhi-1989.

07 ML704

THERAPEUTIC EQUIPMENTS

L T P M C

4 0 0 100 4

UNIT-I REVIEW OF RECORDING AND MONITORING INSTRUMENTS 9

The origin of Bio electric signals ECG,EEG,EMG,PCG and EOG, lead systems and recording methods, typical waveforms and signal characteristics-Electrodes-Medical display systems- Patient monitoring systems.

UNIT-II DIAGNOSTIC TECHNIQUES 9

pH,pO₂,pCO₂,pHCO₃ –Electrophoresis-Auto analyzers- Blood flow meters-Cardiac output measurement-Blood cell counters- pulmonary function analyzers.

UNIT-III THERAPEUTIC EQUIPMENTS 9

Cardiac pacemakers-Cardiac defibrillators-Dialysers-Surgical Diathermy-LASER-Physiotherapy and Electrotherapy equipments-Oxygenators-Heart-Lung Machines-Hearing aids.

UNIT-IV MEDICAL IMAGING 9

X-Ray and Computer Axial Tomography-Positron Emission Tomography-MRI and NMR-Ultrasonic Imaging systems-Medical Thermograph.

UNIT-V COMPUTER APPLICATIONS IN MEDICAL FIELD 9

Bio medical Telemetry-Radio pill-Tele stimulation-Physiological parameter monitoring in space station-Arrhythmia monitoring system-EEG signal analysis-Role of Expert Systems(Cadiag,Mycin)-Pattern recognition techniques-E-health-Concepts of Bio technology, Bio Informatics and Genetic Engineering -Application of model sim VLSI design tool for diagnostic fuzzy processor.

TOTAL : 45

REFERENCES:

1. Albert M.Cook and Webster.J.G., "Therapeutic Medical Devices", Prentice Hall Inc., New Jersey, 1982
2. Leslie Cromwell, Fred. J. Weibel, Erich.A.Pferffer, "Biomedical Instrumentation and Measurements," Prentice Hall India, NewDelhi-2001.
3. R.S.Khandpur, "Hand book of Biomedical Instrumentation,"Tata McGraw Hill, NewDelhi-1998.
4. Rangaraj.M.Rangayyan, "Biomedical Signal Analysis-A Case Study Approach,"IEEE Press- John Wiley&Sons Inc, New York-2002.
5. Joseph .J.Carr and John .M.Brown, "Introduction to Biomedical Equipment Technology," John Wiley&Sons Inc, New York-2002.

PRACTICALS

07 ML707

MEDICAL SOFTWARE LAB

L	T	P	M	C
0	0	3	100	2

List of Experiments:

1. Study of Software related to Clinical instrumentation.
2. Study and simulation of Apnea Monitoring software.
3. Study and simulation of Drip Rate Control software
4. Study and simulation of Pulse Oximetric software
5. Study of Hospital Management Software.
6. Study of software in cancer monitoring

Mini Project:

1. creation of Medical software for Medical Informatics

07 ML708

EXPERT SYSTEMS LAB

L	T	P	M	C
0	0	3	100	2

List of Experiments:

EXPERT SYSTEMS LAB:

1. Study of Medical Expert systems.
 1. MYCIN
 2. PUFF
 3. Fuzzy diagnostic systems
 4. Neural network based Expert systems
 5. Support vector Machine – Expert systems
2. Development of Medical Expert systems
 1. Hospital Management
 2. Respiratory disorder
 3. Fetal Monitoring System
 4. Heart rater variability monitoring
 5. Monitoring in Diabetes Milletes

07ML7 0 9

PROJECT PHASE I +

SEMESTER –VIII

07 ML 801

PRINCIPLES OF TELE MEDICINE

L	T	P	M	C
3	1	0	100	4

UNIT I INTRODUCTION

9

History and advances in telemedicine. Benefits of telemedicine

UNIT II COMMUNICATION INFRASTRUCTURE FOR TELEMEDICINE

9

Communication infrastructure for telemedicine – LAN and WAN technology. Satellite communication. Mobile hand held devices and mobile communication.

UNIT III INTERNET TECHNOLOGY

9

Internet technology and telemedicine using world wide web (www). Video and audio conferencing.

UNIT IV MEDICAL INFORMATION AND MANAGEMENT

9

Medical information storage and management for telemedicine- patient information medical history, test reports, medical images diagnosis and treatment. Hospital information- Doctors, paramedics, facilities available. Pharmaceutical information. .

UNIT V RECENT TRENDS IN TELEMEDICINE

9

Security and confidentiality of medical records and access control. . Cyber laws related to Telemedicine. . Telemedicine access to health care services – health education and self care. Introduction to Robotics and telesurgery. Use of RF – ID in telemedicine.

TOTAL: 45
TUTORIAL:15

REFERENCES:

1. R.S.Khandpur, "Principles of Telemedicine,"Tata McGraw Hill, New Delhi, Edition -1998.
2. .H.D.Covveyet At, "Computer in the Practice of Medicine" Addison Wesley. Edition - 2001
3. .Edward Shortliffe, "Computer Based Medical Consultation" Elsevier Scientific. Edition-1998
4. John Zimmerman, "Computer for the Physicians Office" Research Studies Press Edition-2000.
5. J.D.Ullman,"Principles of Database systems" Galgotia Publications, Edition-1990.

07 ML802/07EC802 DISASTER MANAGEMENT * 3 0 0 100 3

COMMON WITH ECE

07 ML805 PROJECT WORK + 0 0 12 200 6

07ML806 SIMULATION SOFTWARE LAB 0 0 3 100 2

1. Simulation HDP Medical Software
2. Simulation MYCIN Medical Software
3. Simulation TEIRESIAS Medical Software
4. Simulation ANSYS Medical Software
5. Simulation PUFF Medical Software.

**SEMESTER –VI
ELECTIVES**

07 ML 6A PATTERN RECOGNITION AND AI TECHNIQUES

L	T	P	M	C
3	0	0	100	3

UNIT I INTRODUCTION

9

Definition of AI, Intelligent agents, perception and language processing, problem solving, searching, heuristic searching, game playing, logics, logical reasoning.

UNIT II BASIC PROBLEMS SOLVING METHODS

9

Forward Vs background, knowledge representation, frame problems, heuristic functions, weak methods of matching.

UNIT III PRINCIPLES OF PATTERN RECOGNITION

9

Patterns and features, training and learning in pattern recognition approach, different types of pattern recognition.

UNIT IV DECISION MAKING

9

Baye's theorem, multiple features, decision boundaries, estimation of error rates, histogram, kernels, window estimators, nearest neighbour classification, maximum distance pattern classifiers, adaptive decision boundaries.

UNIT V CLUSTER ANALYSIS AND FEATURE EXTRACTION

9

Unsupervised learning, heirarchical clustering, graph theories approach to pattern clustering, fuzzy pattern classifiers, application of pattern recognition in medicine.

TOTAL: 45

REFERENCES:

1. Elain Rich and Kevin Knight, "Artificial Intelligence" Tata McGraw-Hill, 2nd Edition, Edition- 1993.
2. Dan W. Patterson, "Introduction to Artificial Intelligence and Expert Systems", Prentice Hall of India, Delhi, Edition- 2001.
3. Earl Gose, Richard Johnsonbaugh, Steve Jost, "Pattern Recognition and Image Analysis", Prentice Hall of India Pvt. Ltd., New Delhi, Edition- 1999.
4. G.F. Luger & W.A Stubble Field, "Artificial intelligence structures and Strategies f or complex problem solving," 3rd Edition, Pearson Education, Edition- 1998.
5. Efrain Turban and Jay E Aranson: "Decision support systems and Intelligent Systems," 5th Edition, Pearson Education, 1998.

07 ML 6B PATIENT MONITORING SYSTEMS

L	T	P	M	C
3	0	0	100	3

UNIT I INTRODUCTION 9
Computers in data – computer evolution – structure of medical informatics – hospital information system – security of computer records – sources of data for decision making

UNIT II COMPUTERIZED SYSTEM DESIGN 9
Computerized database management system – dialogue of computer method of history taken by computer – computerized medical records evolution –

UNIT III COMPUTERS IN PATIENT MONITORING 9
Computers in clinical laboratory – automated hematology laboratory – information flow in A CLINICAL LAB - physiological monitoring – automated ICU – computerized arrhythmia monitoring – interfacing to hospital information system (HIS)

UNIT IV COMPUTERS IN MEDICAL IMAGING & DECISION MAKING 9
Computer assistant medical imaging – nuclear medicine computer systems – data acquisition modes – X-ray, CT scan, – medical decision making: - Computer assisted decision making – general model, algorithms – fuzzy set theory

UNIT V RECENT TRENDS 9
Computer aids for handicapped: – computer for deaf – computers for the blind – speech generation and recognition -Computer assisted instructions:- Introduction - telemedicine, INDONET in medicine – role of Expert systems

TOTAL: 45

REFERENCES:

1. R D Lee, "Computers in Medicine", Tata McGraw Hill, 1999
2. Harold sack man , " Biomedical Information Technology", Academic Press, New York, Edition -1997.
3. R.S.Khandpur "Handbook of Biomedical Instrumentation", 2nd Edition, Tata McGraw Hill, Edition -2003
4. Tatsuo Togawa "Biomedical Transducers and Instruments", Toshiyo Tamura And P. Ake Oberg, CRC Press, Edition-1997.
5. Leslie Cromwell, Fred J. Weibell and Erich A. Pfeiffer, "Biomedical Instrumentation and Measurement", Prentice-Hall India Pvt. Ltd, 1996.

07 ML 6C FIBER OPTICS AND LASERS IN MEDICINE

L T P M C
3 0 0 100 3

UNIT I	OPTICAL PROPERTIES OF THE TISSUES	9
Refraction, scattering, absorption, light transport inside the tissue, tissue properties, Light interaction with tissues, optothermal interaction, fluorescence, speckles.		
UNIT II	INSTRUMENTATION IN PHOTONICS	9
Instrumentation for absorption, scattering and emission measurements, excitation light sources – high pressure arc lamp, solid state LEDs, optical filters, polarisers, time resolved and phase resolved detectors.		
UNIT III	APPLICATIONS OF LASERS	9
Laser in tissue welding, lasers in dermatology, lasers in ophthalmology, otolaryngology, urology.		
UNIT IV	OPTICAL HOLOGRAPHY	9
Wave fronts, interference patterns, principle of hologram, optical hologram, applications.		
UNIT V	SPECIAL TECHNIQUES	9
Near field imaging of biological structures, in-vitro clinical diagnostic, fluorescent spectroscopy, photodynamic therapy.		

TOTAL: 45

REFERENCES:

1. Tuan Vo Dirh, "Biomedical photonics – Handbook", CRC Press, Boca Raton, 2003 (Unit I – III, V)
2. Leon Goldman, M.D., & R. James Rockwell, Jr., "Lasers in Medicine", Gordon and Breach, Science Publishers Inc., New York, 1975.
3. Glasser, O., "Medical Physics -- Vol 1, 2, 3 "Adam Hilgar Bristol Inc, 1987.
4. Abraham Katzir, "Lasers and Optical Fibers in Medicine", Academic Press, Edition-1998.
5. G. David Baxter "Therapeutic Lasers – Theory and practice", Churchill Livingstone Publications Edition- 2001

07 ML 6D/07EC6F NUMERICAL METHODS *

L	T	P	M	C
3	0	0	100	3

UNIT I: Curve Fitting and Theory of Equations: 9

Empirical laws and curve fitting- linear law- method of group averages- principle of Least squares- fitting straight line, parabola, exponential curve- method of moments- theory of equations- Relation between the roots and coefficients of polynomial equation- equations with real coefficients and imaginary roots- equations with rational coefficients and irrational roots- symmetric of roots- Transformation of equations- Reciprocal equations.

UNIT II: Solution of Equations: 9

Solution of numerical algebraic and transcendental equations- the Bisection method- Iteration method- RegulaFalsi method- Newton Raphson method- Horner's method- Solution of Simultaneous Linear algebraic equations- Gauss Elimination method- Gauss Jordan method- Crout's method- Gauss Jacobi method- Gauss Seidel method- Relaxation method.

UNIT III: Difference Calculus: 9

Finite differences- Forward, Backward and central difference operator- shifting operator- Properties and relation between operators- Interpolation- Newton's forward and Backward difference interpolation formula- Gauss forward and backward difference interpolation formula- Bessel's Laplace and Everett formula.

UNIT IV: Interpolation, Numerical differentiation and Integration: 9

Interpolation with unequal intervals- Divided differences- Newton's divided Difference formula- Lagrange's interpolation formula-inverse interpolation- Numerical Differentiation- Newton's forward and backward differentiation formula- Numerical Integration- The trapezoidal rule- Simpson's 1/3rd and 3/8th rule- Difference equations- solution of linear homogeneous difference equation with constant coefficients.

UNIT V: Numerical Solution of Differential equation: 9

Numerical solutions of ordinary differential equations- Taylor series method- Picards method- Euler's Method- Fourth order Runge Kutta method- Milne's and Adam's predictor- Corrector methods- Numerical solution of elliptic equation by Leibmann's method- solution of parabolic equation by Bender – Schmidt method- Solution of hyperbolic equation.

Mat lab : Toolkits – the course content will be augmented by the usage of Mat lab tool box.

References:

1. Curtis.F.Gerald, Patrick.O Wheatly, Applied Numerical Analysis, 6th Edition, Pearson Education New Delhi 2002.
2. John Mathews, Kurtis.D. Fink, Numerical Methods using MATLAB, PHI 1998.
3. Kandasamy.P , Thilagavathy.K and Gunavathy.k, Numerical methods, S.Chand and company Ltd., New Delhi, 2003.
4. Jain.M.k. Iyengar, S.R.K.Jain, Jain.R.K, Numerical Methods for Scientific and Engineering Computation, 4th Edition New age International Publishers, New delhi, 2003.
5. Sastry.S.S, Introductory Methods of Numerical analysis, PHI , 2001.

07ML 6E/07EC6D SPEECH PROCESSING *

L T P M C
3 0 0 100 3

UNIT I ANALYTICAL BACKGROUND AND TECHNIQUES 9

Analysis of Discrete – Time speech signals – Time frequency analysis of speech-
Analysis based on Linear predictive loading- Cepstral Analysis of Speech- Automatic
Extraction and Tracking of Speech Formants- Automatic extraction of voicing pitch-
Auditory Model for speech Analysis-

Linear Model and Dynamic System Model-Linear Model- Time-Varying Linear Model-
Linear Dynamic System Model- Time-Varying Linear Dynamic Systems Model-
Nonlinear Dynamic System Model

UNIT II FUNDAMENTALS OF SPEECH SCIENCE 9

Phonetic Process – Introduction- Articulatory Phonetics and Speech generation-
Acoustic Models of Speech Production- Coarticulation- Acoustic – Phonetics and
characterization of speech signals- Introduction to Auditory Phonetics- Sound
Perception- Speech Perception Phonological process – phonemes- Features-
Articulatory Phonology

UNIT III MODELS FOR AUDITORY SPEECH PROCESSING 9

Models for the Cochlear function- Frequency Domain Solution of the Cochlear Model-
Time Domain Solution of the Cochlear Model- Stability Analysis for Time Domain
Solution of the Cochlear Model- Models for inner hair cells and for synapses to Auditory
nerve fibres- Interval based speech feature extraction from the cochlear model outputs-
Interval-Histogram representation for the speech sound in Quiet in noise- models for
network structures in the auditory pathway.

UNIT IV SPEECH CODING 9

Introduction- Statistical Models- Scalar Quantization- Vector Quantization (VQ)-
Frequency-Domain Coding- Model-Based Coding- LPC Residual Coding

UNIT V SPEECH TECHNOLOGY IN SELECTED AREAS 9

Speech Recognition – Introduction- Mathematical formulation- Acoustic Pre-processor-
Use of HMMs in Acoustic Modelling- Use of higher order statistical models in acoustic
modelling- case study – speech recognition using a Hidden Markov Model - Robustness
of Acoustic Modelling and Recognizer Design- Speed synthesis – Introduction- Basic
approaches- Synthesis Methods- Databases- Case Study – Automatic unit selection for
waveform speech synthesis

TOTAL: 45

REFERENCES:

1. Li Deng Douglas O'Shaughnessy- "Speech Processing: A Dynamic and Optimization oriented Approach"- Signal Processing and Communication Series- Printed in USA- 2003
 2. Thomas F-Quatieri- "Discrete Time Speech Signal Processing: Principles and Practice"- Pearson Education- New Delhi- 2006
 3. Rabiner and Schaffer Pearson
 4. [John R., Jr. Deller](#) , Discrete-Time Processing of Speech Signals , Wiley-IEEE Press- 1999
 5. [Quatieri](#), Discrete-Time Speech Signal Processing: Principles and Practice, PHI-2006
- * **common with ECE**

07ML 6F/07EC8N GENETICS ALGORITHMS *

L T P M C
3 0 0 100 3

UNIT I **9**

Fundamentals of genetic algorithm: A brief history of evolutionary computation-biological terminology-search space -encoding- reproduction-elements of genetic algorithm-genetic modeling-comparison of GA and traditional search methods-

UNIT II **9**

Genetic technology: steady state algorithm - fitness scaling - inversion- Genetic programming - Genetic Algorithm in problem solving

UNIT III **9**

Genetic Algorithm in engineering and optimization-natural evolution –Simulated annealing and Tabu search -Genetic Algorithm in scientific models and theoretical foundations-

UNIT IV **9**

Implementing a Genetic Algorithm – computer implementation - low level operator and knowledge based techniques in Genetic Algorithm-

UNIT V **9**

Applications of Genetic based machine learning-Genetic Algorithm and parallel processors- composite laminates- constraint optimization- multilevel optimization- real life problem-

TOTAL: 45

REFERENCES:.

- 1- Melanie Mitchell- 'An introduction to Genetic Algorithm'- Prentice-Hall of India- New Delhi- Edition: 2004
- 2- David-E-Golberg- 'Genetic algorithms in search- optimization and machine learning'- Addison-Wesley-1999
- 3- S-Rajasekaran and G-A Vijayalakshmi Pai-'Neural Networks- Fuzzy logic and Genetic Algorithms- Synthesis and Applications'- Prentice Hall of India- New Delhi-2003
- 4- Nils-J-Nilsson- "Artificial Intelligence- A new synthesis'- Morgan Kauffmann Publishers Inc- San Francisco-California-1998

* **Common with ECE**

**SEMESTER –VII
ELECTIVES**

07 ML7A BIO TECH PROSTHETIC EQUIPMENTS

L T P M C
3 0 0 100 3

UNIT I HEART LUNG MACHINE AND ARTIFICIAL HEART 9
Condition to be satisfied by the H/L system. Different types of oxygenators, pumps, pulse and continuous types, monitoring process, shunting, the indication for cardiac transplant, driving mechanism, blood handling system, functioning and different types of Artificial heart, mock test setup for assessing its functions.

UNIT II CARDIAC ASSIST DEVICES 9
Synchronous counter pulsation, assisted through respiration right ventricular bypass pump, left ventricular bypass pump, open chest and closed chest type, Principle and problems --Intra Aortic balloon pumping, Venous Arterial Pumping, Prosthetic Cardio Valves, Biomaterials for purposes, its characteristics and testing.

UNIT III ARTIFICIAL KIDNEY 9
Indication and principle of Hemodialysis, Membrane, Dialysate, different types of Hemodialysers, monitoring systems, wearable artificial kidney, implanting type.

UNIT IV PROSTHETIC AND ORTHODIC DEVICES 9
Hand and Arm replacement – Different Types of Models Externally Powered Limb Prosthesis Feedback in Orthotic System, functional Electrical Stimulation, Sensory Assist Devices, Materials for Prosthetic and Orthotic devices.

UNIT V RESPIRATORY AND HEARING AIDS 9
Intermittent positive pressure, breathing apparatus operating sequence, electronic IPPB unit with monitoring for all respiratory parameters, audiograms , types of deafness, conductive and nervous, hearing aids, constructional and functional characteristics.

TOTAL: 45

REFERENCES:

1. Levine S.N.(Ed.), "Advances in Biomedical Engineering and Medical Physics," Vol:1,2 & 4, Inter University Publications, New York, Edition- 1968
2. Kolff W.J." Artificial Organs", John Wiley and Sons, New York, Edition- 1979
3. Andreas.F. Von racum, "Hand book of Bio material Evaluation," Mc.Millan Publishers, Edition- 1980
4. Albert M.Cook and WebsterJ.G., "Therapeutic Medical Devices", Prentice Hall Inc., New Jersey, Edition- 1992
5. R.S.Khandpur ,"Handbook of Biomedical Instrumentation", Tata McGraw Hill, 2 nd Edition, Edition- 2003

07 ML7B COMPUTER VISION

	L	T	P	M	C
	3	0	0	100	3
UNIT I DIGITAL IMAGE PROCESSING FUNDAMENTALS					9
Digital image representation – an image model – digital image processing transforms – overview of L-transforms – transforms and Fourier Transforms					
UNIT II IMAGE PROCESSING & SEGMENTATION					9
Image enhancement and image restoration – histogram modification techniques – image smoothening – image sharpening – algebraic approach to restoration – constrained and unconstrained restoration – image encoding – image segmentation and description – point and region dependent techniques.					
UNIT III BOUNDARY DETECTION					9
Edge finding – surface orientation – optical flow – design – growing					
UNIT IV IMAGE REPRESENTATION					9
Texture – texture as pattern recognition problem – two and three dimensional geometric structures – boundary representation- regions representation – shape properties-knowledge representation and use					
UNIT V MATCHING AND INFERENCE					9
Semantic nets – matching – inference – computer reasoning – production systems – active knowledge – goal achievement					
				TOTAL :	45

REFERENCES:

1. Forsyth and Ponce, "Computer Vision,- Modern Approach ", Pearson Education, Edition- 2003.
2. Rosenfeld .A and Kak A.C., "Digital Picture Processing", Academic Press, Edition- 1982
3. Ballard B and Brown B, "Computer Vision", Prentice Hall of India, Edition- 1982
4. Mallot, "Computational Vision: Information Processing in Perception and Visual Behavior",. Cambridge, MA: MIT Press, Edition- 2000.
5. Gonzalez.R and Wintz.P," Digital Image Processing", Addison Wesley Publishing Co. USA, Edition- 1987.

07 ML7C HEALTH CARE SYSTEMS

L T P M C
3 0 0 100 3

UNIT I PLANNING AND DEVELOPMENT AND ITS STRATEGY 9

Introduction-Mission of IT in Health Care: Creating a system – Managing the IT Strategic Planning – Process-Strategies in consulting for the 21st Century-Baylor Health Care-Clarian Health care.

UNIT II PREPARING FOR ORGANIZATIONAL CHANGE 9

Informatics in Health Care: Managing Organizational change-the Role of ethics in IT decisions-memorial Hermann health care system; redesign and implementation of a multi facility clinical information system.

UNIT III IT TRANSFORMATION 9

IT: transition fundamentals in Health care Transformation --- home and hospital life care system.

UNIT IV PATIENT – CENTERED TECHNOLOGIES 9

Patient outcomes of health care-six sigma excellence – electronic health record-interviewing patient with a computer-nursing administration: a growing role in systems development – computer-enhanced radiology – information technology and the New culture of patient Safety- A Component Based Clinical Information and Electronic Health Record.

UNIT V OUTLOOK ON FUTURE TECHNOLOGIES 9

Technologies in progress – Evidence –Based Medicine – Aligning Process and Technology-Clinical Decision Support Systems-Quality Information and care-Role for Health Information Systems-Clinical Practice-Connecting the Community for Better Health.

TOTAL: 45

REFERENCES:

1. Ball, Marion; Weaver, Charlotte A.; Kiel, Joan M. (Eds), "Healthcare Information Management Systems Cases, Strategies and Solutions Sries: Health Informatics", 3rd Editon., Springer Berlin Heidelberg New York, 2004
2. Webster.J.G. and Albert M.Cook, "Clinical Engineering Principles and Practices" Prentice Hall Inc., Englewood Cliffs, New Jersey, 1979.
3. Hans Pfeiff, Vera Dammann (Ed), "Hospital Engineering in Developing Countries, Z Report", Eschborn, 1986.
4. Jacob Kline, "Handbook of Bio Medical Engineering", Academic Press Inc., San Diego 1988.
5. Tatsuo Togawa, Toshiyo Tamura and P. Ake Oberg," Biomedical Transducers and Instruments", CRC Press, 1997.

07 ML7D NANO TECHNOLOGY IN MEDICINE

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3	0	0	100	3

9

UNIT I – INTRODUCTION

What Is Nanotechnology, Nanotechnology Products and Applications, Future Applications of Nanotechnology, Fields of Study That Influence Nanotechnology, Risks of Nanotechnology, Science of Nanotechnology, Matter, Properties of Matter, Atom and Molecules, Polymers and Nanotechnology,

UNIT II - CARBON NANOTUBES, NANOWIRES, AND NANOCRYSTALS 9

The Element Carbon, Fullerenes and Nanotechnology, Buckyballs, Carbon Nanotubes, Manufacturing of Carbon Nanotubes, Applications of Carbon Nanotubes AFM Probe Tips, Nanowires, Nanocrystals, and Quantum Dots, Nanoshells

UNIT III - NANOTECHNOLOGY IN MEDICINE AND HEALTH 9

Cardiovascular Diseases, Cancer Detection and Diagnosis, Diabetes and Nanotechnology, Implants and Prosthetics Nanotechnology and Burn Victims, Diagnosis and Therapy, Drug Delivery Using Nanoparticles, Nanotechnology Fights Infections, Pharmaceutical Nanotechnology Research.

UNIT IV - NANOMATERIALS AND NANOSYSTEMS FOR BIOMEDICAL APPLICATIONS 9

Micro and Nano Systems in Biomedicine and Drug Delivery, Artificial Implants – New Developments and Associated Problems, Niosomes as Nanocarrier Systems, Alternative Applications for Drug Delivery: Nasal and Pulmonary Routes.

UNIT V – RISKS, ETHICS AND LAWS 9

Microsystems and Nanoscience for Biomedical Applications, Nanotechnoscience and Complex Systems, From Biotechnology to Nanotechnology, Risk Management and Regulation in an Emerging Technology, Nanotechnology and Nanoparticle Toxicity, The Global Ethics of Nanotechnology, Risk, Trust and Public Understanding of Nanotechnologies, Nanotechnologies and the Law of Patents, Nanotechnologies and Civil Liability, Nanotechnologies and the Ethical Conduct of Research Involving Human Subjects

Total : 45

REFERENCES:

1. John Mongillo, "Nanotechnology", Greenwood Press, United States of America, Edition – 2007.
2. M. Reza Mozafari , "Nanomaterials and Nanosystems for Biomedical Applications", Springer, Edition – 2007
3. Geoffrey Hunt and Michael D. Mehta, "Nanotechnology - Risks, Ethics and Laws" James and James- Earthscan Edition – 2005
4. Jones, Richard A.L., "Soft Machines: Nanotechnology and Life", Oxford University Press, Edition- 2004.
5. Charles P.Poole and Frank J Owens. "Introduction to Nanotechnology",. Wiley Interscience, Edition- 2033.

07 ML7E MEDICAL PHYSICS

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3	0	0	100	3

10

UNIT I ATOMIC PHYSICS

Traditional definition of atom, periodic system of elements, mechanical properties of atom, emission of light and its frequencies. Electromagnetic spectra.

Principles of Nuclear Physics – Natural radioactivity, Decay series, type of radiation and their applications, artificially produced isotopes and its application, accelerator principles; Radiionuclides used in Medicine and technology.

UNIT II INTERACTION WITH LIVING CELLS 8

Target theory, single hit and multi target theory, cellular effects of radiation, DNA damage, depression of Macro molecular synthesis, Chromosomal damage.

UNIT III SOMATIC EFFECT OF RADIATION 8

Radio sensitivity protocol of different tissues in human, LD 50/30 effect of radiation on skin, blood forming organs, lenses of eye, embryo and Endocrinal glands.

UNIT V ADVANCES IN MEDICAL PHYSICS 10

PHOTO MEDICINE – Synthesis of Vitamin D in early and late cutaneous effects, Phototherapy, Photo hemotherapy, exposure level, hazards and maximum permissible exposures.

LASER PHYSICS – Characteristics of Laser radiation, Laser speckle, biological effects, laser safety management.

TOTAL : 45

REFERENCES:

1. Glasser,O., "Medical Physics -- Vol 1,2,3 " Adam Hilgar Brustol Inc, Edition- 1987.
2. Moselly, " Non ionizing Radiation ",Adam Hilgar Brustol Inc, Edition- 1988.
3. Leon Goldman, M.D, & R.James Rockwell,Jr. , "Lasers in Medicine ", Gordon & Breach , Science Publishers Inc; New York, Edition- 1975
4. Tuan Vo Dirh, "bio medical photonics – hand book ", CRC Press,bocaraton, Edition- 2003.
5. Branski .S, & Cherski, P "Biological effects of Microwave "Hutchson & Ross Inc., Edition- 1980.

07 ML7F DATAMINING FOR MEDICAL ELECTRONICS

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3	0	0	100	3

UNIT I INTRODUCTION

9

Data mining – introduction – information and production factor – Data mining Vs Query tools-Data mining in marketing-self learning in computer systems-concept learning-data learning- data mining and data ware house.

UNIT II KNOWLEDGE DISCOVERY PROCESS

9

Knowledge discovery process- data selection –cleaning- enrichment-coding-preliminary analysis of the data set using traditional query tools – Visualization techniques – OLAP tools – Decision trees – Association rules – Neural networks – Genetics algorithms – KDD(knowledge Discover in Database) environment.

UNIT III DATA MINING

9

Analysis of descriptive mining of complex data objects, text database, time series and sequence data, applications to medical data

UNIT IV DATA MINING IN BIOMEDICAL ENGINEERING

9

Conceptual models for Biological and medical data – Biomedical Data in integration analysis and interoperability – Biomedical Query processing, query optimization and information retrieval – ontology – driver Biomedical systems – Biomedical data privacy and security.

UNIT V RECENT TRENDS

9

Data mining application in Bio – informatics, Bio medicine, healthcare and other Biomedical domain areas.

TOTAL : 45

REFERENCES:

1. J.Han, M.Kambe, "Data mining: concepts and techniques", Harcourt India / Morgan Kauffman, Edition- 2001.
2. Margaret H.Dunham, "Data mining: Introductory and Advanced Topics", Pearson Education Edition- 2004.
3. "Annual review of Bio-medical Knowledge discovery and data mining: data integration for Bio informatics", Springer, Edition- 2006 2nd ed.
4. Berson,"Data warehousing, data mining and OLAP". Edition- 2000
5. Bronzino, Joseph D, "The Biomedical Engineering Hand book", 2nd ed, Tata McGraw Hill. Edition-2003

07 ML 7G/07EC7H SOFT COMPUTING *

L T P M C
3 0 0 100 3

UNIT I ARTIFICIAL NEURAL NETWORKS

9

Basic-concepts-single layer perception-Multi layer perception-Supervised and unsupervised learning back propagation networks- Application

UNIT II FUZZY SYSTEMS

9

Fuzzy sets and Fuzzy reasoning-Fuzzy Matrices-Fuzzy functions-decomposition-Fuzzy automata and languages-Fuzzy control methods-Fuzzy decision making- Applications

UNIT III NEURO-FUZZY MODELLING

9

Adaptive networks based Fuzzy interfaces-Classification and Representation trees-Data clustering algorithm-Rule base structure identification-Neuro-Fuzzy Controls

UNIT IV GENETIC ALGORITHM

9

Survival of the fittest-pictures computations-cross over mutation-reproduction-rank method-rank space method- Application

UNIT V APPLICATIONS

9

ANFIS Applications - Introduction- Printed Character Recognition- Nonlinear System Identification- Channel Equalization- Adaptive Noise Cancellation - Fuzzy sets and GA in Game playing-Introduction- Variants of GA- using GA in game playing- simulation results of the Basic Models- using Fuzzy characterized features-

TOTAL: 45

REFERENCES:

1. Jang J-S-R-- Sun C-T and Mizutani E- "Neuro Fuzzy and Soft Computing"- Pearson/Prentice Hall India P Ltd-- New Delhi- 2006
2. Timothy J-Ross –"Fuzzy Logic Engineering Applications"-Tata McGraw Hill- 1997-
3. S- Rajasekaran and G A Vijayalakshmi Pai- "Neural Networks- Fuzzy Logic and Genetic Algorithms Synthesis and Applications"- Prentice Hall India P Ltd- New Delhi- 2007
4. David E-Goldberg- "The Design of Innovation (Genetic Algorithm and Evolutionary Computation) "- Kluwer Academic publisher- 2002

* **Common with ECE**

07 ML 7H ADVANCED MICROPROCESSORS*

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3	0	0	100	3

UNIT - I THE 8086 MICROPROCESSOR

9

Introduction - architecture, addressing modes, Instruction Format, Data transfer, Arithmetic, Bit and Logical manipulation, string, program transfer and processor control instructions, dependent instructions, Pseudo instructions - Use of assembler and assembler directives, simple math programme, moving block of data , arrange ablock of data in ascending / descending order.

UNIT - II SYSTEM DESIGN USING 8086

9

Pins and signals, Basic system concepts, interfacing with memories, I/O ports - Programmed I/O - Input / Output processor - Interrupts - DMA - 8086 based microcomputer - Math co processor 8087.

UNIT - III MOTOROLA 68000

9

Introduction - Registers - Memory addressing - Instruction format – addressing modes - Instruction set - Pins and signals - Memory interface - System diagram. Programmed I/O - Interrupt system - DMA - 68000 based microcomputer.

UNIT - IV OTHER MICROPROCESSOR

9

Intel 80386, 80486, Pentium microprocessor - SUN's SPARC microprocessor – AMD microprocessor - MOTOROLA 68040, MC88100.

UNIT - V PERIPHERAL INTERFACING AND BUS STANDARDS

9

Parallel versus serial transmission, USART, Interfacing of hexadecimal keyboard and Display unit to a microprocessor - CRT, Printer interface - DMA Controllers. ISA bus, PCI bus, USB - RS232C, RS423A, RS-449, IDE, ATA, SCSI, IEEE-488 bus.

Total 45

References

- 1 M. Rafiqzaman, "Microprocessors - Theory and applications", Prentice Hall of India private Limited, 2005.
- 2 Barry B.Brey, "The Intel Microprocessor", Prentice Hall International Inc., 2000.
- 3 Badri Ram, "Advance Microprocessors and Interfacing", Tata McGraw Hill Publishing Company limited, 2007.
- 4 Douglas V Hall, "Microprocessors and Interfacing: Programming and Hardware",Community College Div. Publishing, 1991

* **Common with ECE**

UNIT I	ELEMENTS OF LIGHT AND SOLID STATE PHYSICS	9
Wave nature of light- Polarization- Interference- Diffraction- Light Source- review of Quantum Mechanical concept- Review of Solid State Physics- Review of Semiconductor Physics and Semiconductor Junction Device-		
UNIT II	DISPLAY DEVICES AND LASERS	9
Introduction- Photo Luminescence- Cathode Luminescence- Electro Luminescence- Injection Luminescence- Injection Luminescence- LED- Plasma Display- Liquid Crystal Displays- Numeric Displays- Laser Emission- Absorption- Radiation- Population Inversion- Optical Feedback- Threshold condition- Laser Modes- Classes of Lasers- Mode Locking- laser applications-		
UNIT III	OPTICAL DETECTION DEVICES	9
Photo detector- Thermal detector- Photo Devices- Photo Conductors- Photo diodes- Detector Performance-		
UNIT IV	OPTOELECTRONIC MODULATOR	9
Introduction- Analog and Digital Modulation- Electro-optic modulators- Magneto Optic Devices- Acoustoptic devices- Optical- Switching and Logic Devices-		
UNIT V	OPTOELECTRONIC INTEGRATED CIRCUITS	9
Introduction- hybrid and Monolithic Integration- Application of Opto Electronic Integrated Circuits- Integrated transmitters and Receivers- Guided wave devices-		

TOTAL: 45**TUTORIAL : 15****REFERENCES:**

1. J- Wilson and J-Haukes- "Opto Electronics – An Introduction"- Pearson/Prentice Hall of India Pvt- Ltd-- New Delhi- 2007-
2. Bhattacharya "Semiconductor Opto Electronic Devices"- Pearson/Prentice Hall of India Pvt-Ltd-New Delhi- 2006-
3. Jasprit Singh- "Opto Electronics – As Introduction to materials and devices"- McGraw-Hill International Edition- 1998
4. Joachim Piprek, Semiconductor Optoelectronic Devices, Elsevier-2003
5. [S. O. Kasap](#), [Safa Kasap](#), Optoelectronics and Photonics: Principles and Practices, PHI-2001

* **Common with ECE**

07ML 7J /07EC6B OPERATING SYSTEMS *

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UNIT I INTRODUCTION AND TYPES OF OPERATING SYSTEMS 9

Introduction - Mainframe systems – Desktop Systems – Multiprocessor Systems – Distributed Systems – Clustered Systems – Real Time Systems – Handheld Systems - Hardware Protection - System Components – Operating System Services – System Calls – System Programs - Process Concept – Process Scheduling – Operations on Processes – Cooperating Processes – Inter-process Communication-

UNIT II PROCESS SCHEDULING AND SYNCHRONIZATION 9

Threads – Overview – Threading issues - CPU Scheduling – Basic Concepts – Scheduling Criteria – Scheduling Algorithms – Multiple-Processor Scheduling – Real Time Scheduling - The Critical-Section Problem – Synchronization Hardware – Semaphores – Classic problems of Synchronization – Critical regions – Monitors-

UNIT III DEADLOCK 9

System Model – Deadlock Characterization – Methods for handling Deadlocks - Deadlock Prevention – Deadlock avoidance – Deadlock detection – Recovery from Deadlocks - Storage Management – Swapping – Contiguous Memory allocation – Paging – Segmentation – Segmentation with Paging-

UNIT IV MEMORY MANAGEMENT 9

Virtual Memory – Demand Paging – Process creation – Page Replacement – Allocation of frames – Thrashing - File Concept – Access Methods – Directory Structure – File System Mounting – File Sharing – Protection

UNIT V FILE MANAGEMENT 9

File System Structure – File System Implementation – Directory Implementation – Allocation Methods – Free-space Management- Kernel I/O Subsystems - Disk Structure – Disk Scheduling – Disk Management – Swap-Space Management-

TOTAL: 45

REFERENCES:

1. Abraham Silberschatz- Peter Baer Galvin and Greg Gagne- “Operating System Concepts”- Sixth Edition- John Wiley & Sons (ASIA) Pvt- Ltd- 2003.
2. Dhamhdere, Operating System 2nd Edition, TMH,2006.
3. Harvey M- Deitel- “Operating Systems”- Second Edition- Pearson Education Pvt- Ltd- 2002-
4. Andrew S- Tanenbaum- “Modern Operating Systems”- Pearson/Prentice Hall of India Pvt- Ltd- 2003-
- 4 Davis -”operating systems “ - pearson 2005
5. William Stallings,Operating systems: Internals and design principle-5/E PHI 2004

* **Common with ECE**

**SEMESTER –VIII
ELECTIVES**

07 ML 8A/07EC8I ENGINEERING ACOUSTICS

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3	0	0	100	3
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UNIT I FUNDAMENTAL OF ACOUSTICS

Acoustics waves – Linear wave equation – sound in fluids – Harmonic plane waves – Energy density – Acoustics intensity – Specific acoustic impedance – spherical waves – Describer scales-Transmission from one fluid to another normal and oblique incidence – method of images-

UNIT II RADIATION AND RECEPTION

9

Radiation from a pulsating sphere – Acoustic reciprocity – continuous line source - radiation impedance - Fundamental properties of transducers- Absorption from viscosity – complex sound speed and absorption – classical absorption coefficient

UNIT III HEARING & SPEECH- PIPES RESONATORS AND FILTERS

9

Physiology of speech and hearing- fundamental properties of hearing – loudness level and loudness – pitch and frequency – voice- Noise- spectrum level and band level – combing band levels and tones – detecting signals in noise – detection threshold - Resonance in pipes - standing wave pattern absorption of sound in pipes – long wavelength limit – Helmholtz resonator - acoustic impedance - reflection and transmission of waves in pipe - acoustic filters – low pass- high pass and band pass.

UNIT IV ARCHITECTURAL ENVIRONMENTAL ACOUSTICS

9

Sound in enclosure – A simple model for the growth of sound in a room – reverberation time - Sabine- sound absorption materials – measurement of the acoustic output of sound sources in live rooms – acoustics factor in architectural design-Weighted sound levels speech interference – highway noise – noise induced hearing loss – noise and architectural design specification and measurement of some isolation design of portions-

UNIT V LOUD SPEAKERS & MICROPHONES

9

Transducer network – canonical equation for the two simple transducers transmitters – moving coil loud speaker – loudspeaker cabinets – horn loud speaker- receivers – condenser – microphone – moving coil electrodynamic microphone piezoelectric microphone – calibration of receivers-

TOTAL: 45

REFERENCES :

1. Lawrence E-Kinsler- Austin- R-Frey- Alan B-Coppens- James V-Sanders- Fundamentals of Acoustics- 4th edition- Wiley- 2000-
2. L-Berarek - "Acoustics" - McGraw-Hill 2000-
3. Frank J. Fahy ,Foundations of engineering Acoustics
- 4 [Michael Möser](#), Engineering Acoustics, Springer; 1 edition (March 19, 2004)

07 ML 8B ROBOTICS

L T P M C
3 0 0 100 3

UNIT I INTRODUCTION TO ROBOTICS

9

Motion - Potential Function, Road maps, Cell decomposition and Sensor and sensor planning. Kinematics. Forward and Inverse Kinematics - Transformation matrix and DH transformation. Inverse Kinematics - Geometric methods and Algebraic methods. Non-Holonomic constraints.

UNIT II COMPUTER VISION

9

Projection - Optics, Projection on the Image Plane and Radiometry. Image Processing - Connectivity, Images-Gray Scale and Binary Images, Blob Filling, Thresholding, Histogram. Convolution - Digital Convolution and Filtering and Masking Techniques. Edge Detection - Mono and Stereo Vision.

UNIT III SENSORS AND SENSING DEVICES

9

Introduction to various types of sensor. Resistive sensors. Range sensors - Ladar (laser distance and ranging), Sonar, Radar and Infra-red. Introduction to sensing - Light sensing, Heat sensing, Touch sensing and Position sensing.

UNIT IV ARTIFICIAL INTELLIGENCE

9

Uniform Search strategies - Breadth first, Depth first, Depth limited, Iterative and deepening depth first search and Bidirectional search. The A* algorithm . Planning - State-Space Planning , Plan-Space Planning, Graphplan/SatPlan and their Comparison, Multi-agent planning , and Multi-agent planning , Probabilistic Reasoning - Bayesian Networks, Decision Trees and Bayes net inference .

UNIT V INTEGRATION TO ROBOTICS

9

Building of 4 axis or 6 axis robot - Vision System for pattern detection - Sensors for obstacle detection - AI algorithms for path finding and decision making

Total:45

REFERENCES :

1. Duda, Hart and Stork, "Pattern Recognition", Wiley-Interscience, 2000.
2. Mallot, "Computational Vision: Information Processing in Perception and Visual Behavior", Cambridge, MA: MIT Press, 2000.
3. Stuart Russell and Peter Norvig, "Artificial Intelligence-A Modern Approach" Pearson Education Series in Artificial Intelligence, 2004
4. Robert Schilling and Craig , "Fundamentals of Robotics, Analysis and control", Prentice Hall of India Private Limited, New Delhi, 2003.
5. Forsyth and Ponce, "Computer Vision-- A modern Approach", Person Education, 2003.

07 ML 8C/ HOSPITAL MANAGEMENT

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UNIT I NEED AND SCOPE OF CLINICAL ENGINEERING	3	1	0	100	4
Clinical engineering program, educational responsibilities, role to performed by them in hospital, staff structure in hospital.					9
UNIT II NATIONAL HEALTH POLICIES					9
Need for evolving health policy, health organization in state, health financing system, health education, health insurance, health legislation.					
UNIT III TRAINING AND MANAGEMENT OF TECHNICAL STAFF IN HOSPITAL					9
Difference between hospital and industrial organization, levels of steps of training, developing training program, evaluation of training, wages and salary, employee appraisal method.					
UNIT IV STANDARDS AND CODES IN HEALTH CARE					9
Necessity for standardization, FDA, joint Commission of Accreditation of hospitals, ICRP and other standard organization, methods to monitor the standards.					
UNIT V COMPUTER IN MEDICINE					9
Computer application in ICU, X-Ray department, laboratory administration, patient data, medical records, communication, simulation.					
					TUTORIAL: 15
					TOTAL : 60

REFERENCES :

1. Webster J.C. and Albert M.Cook, "Clinical Engineering Principle and Practice", Prentice Hall Inc., Englewood Cliffs, New Jersey, 1979(Unit I)
2. Goyal R.C., "Handbook of hospital personal management", Prentice Hall of India, 1996(Unit II-V)
3. Hans Pfeiff, Vera Dammann (Ed), Hospital Engineering in Developing Countries, Z Report, Eschborn, 1986.
4. R.D.Lee, "Computers in Medicine", Tata Mcgraw Hill, New delhi, 1999.

07 ML 8D CLINICAL ENGINEERING

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4	1	0	100	5

UNIT I INTRODUCTION TO BIOCHEMISTRY 9

The cell and its components. The plasma membrane. Membrane transport (diffusional processes, active transport systems, ion channels and gates). Mitochondrial function (ATP generation; metabolism). The nervous system. The nerve cells - neurons, glia. Functions and geometry including myelinations, giant neurones, dendrites, synapses. The brain - summary of anatomy and function.

UNIT II INTRODUCTION TO ANATOMY 9

Surface and regional anatomy, cells, tissues and organs. Terminology.

UNIT III PHYSIOLOGICAL MEASUREMENT 9

Introduction to physiological measurement. Common parameters to be measured. Special considerations for measurement. Measurement examples: electro cardiology, audio logy.

UNIT IV CARDIO VASCULAR SYSTEM MEASUREMENT 9

The heart's specialized conduction system. Use of the electrocardiogram in the diagnosis of various conditions of the cardiovascular system. Human hearing. Audio logical testing in diagnosis and remediation.

UNIT V MANUFACTURE, MANAGEMENT AND SAFETY OF MEDICAL EQUIPMENT 9

An introduction to the requirement for the manufacture, management and safety of medical equipment. The Medical Devices Regulations and Medical Devices Directive. The General Safety Standard: EN 60601.1 for electro medical equipment. Routine safety checking: procedure for acceptance testing of electro medical equipment and guidelines for the management of equipment

TUTORIAL: 15
TOTAL : 60

REFERENCES:

1. Ross & Wilson , "Anatomy and Physiology in Health and Illness," Churchill Livingstone, ISBN0-443-04243-8.
2. Fein Berg B.N., "Applied Clinical Engineering," Prentice Hall Inc., New Jersey, 1986.
3. Khandpur.R.S., "Handbook of Bio Medical Instrumentation", Tata McGraw Hill Publishing, New Delhi, 1999.
4. Jacobson .B. and Webster J.G., "Medicine and Clinical Engineering", Prentice Hall of India, New Delhi, 1999.
5. Fein Berg B.N., "The Management of Clinical Equipment, DB 9801". MDA,

DOH.

07 ML 8E BIO MEDICAL DIAGNOSTIC EQUIPMENTS

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3	1	0	100	4

UNIT I CARDIAC CARE UNITS 9

Pace makers – different types, batteries for pace makers. AC defibrillators, asynchronous and synchronous DC defibrillators, patient monitoring systems.

UNIT II NEUROLOGICAL EQUIPMENTS 9

Stereo toxic unit, depth recording system, dot scanners, transcutaneous nerve stimulator, anesthesia monitor, EEG controlled anesthesia, bio feed back equipments, spinal reflex measurements.

UNIT III DIATHERMY AND STIMULATOR 9

Depth of penetration and physiological effects of H.F. radiation, short wave, ultra sonics and microwave diathermy, surgical diathermy, physiological effects of stimulation, galvanic, faradic and surged types, interferential therapy.

UNIT IV BIO TELEMETRY 9

Principle, frequency selection for telemetry, radio pills, multiplexing and tracking techniques, telestimulation.

UNIT V RECENT TRENDS AND ELECTRICAL SAFETY 9

Principles of thermography, detecting circuits, it's application in medicine, principles of cryogenic techniques, it's application in medicine, principles of fibre optic cable, endoscopy, laproscopy, ophthalmic equipments, macro and micro shock, sources of shock, monitoring and interrupting circuit from leakage current, earthing scheme.

TUTORIAL: 15

TOTAL : 60

REFERENCES:

1. Albert M.Cook and Webster.J.G., "Therapeutic Medical Devices", Prentice Hall Inc., New Jersey, 1982.
2. Fein Berg B.N., "Applied Clinical Engineering," Prentice Hall Inc.,New Jersey, 1986.
3. Khandpur.R.S., "Handbook of Bio Medical Instrumentation," Tata McGraw Hill Publishing, New Delhi, 1999.
4. Jacobson .B. and Webster J.G., "Medicine and Clinical Engineering", Prentice Hall of India, New Delhi, 1999.
6. Leslie Cromwell, et al, "Bio Medical Instrumentation and Measurements", Prentice Hall of India, New Delhi, 2000.

UNIT I MOS TECHNOLOGY**9**

Chip Design Hierarchy- IC Layers –Photolithography and Pattern Transfers- Basic MOS Transistors-CMOS Fabrication – Submicron CMOS Process –Masks and Layout – CMOS Design Rules: Lambda based layout- Types of rules- SCMOS Design Rule set II-

UNIT II MOSFET TRANSISTOR**9**

MOSFET operation - MOSFET switch model and square law model – MOSFET parasitic-- MOSFET SPICE Modeling-CMOS Inverter: Voltage Transfer curve- Layout- Body Effect-Latch up problem in CMOS circuits-Latch up prevention-

UNIT III CMOS LOGIC GATES DESIGN AND LAYOUT**9**

NAND and NOR Gates – Complex Logic Gates –Tri state circuits – Large FETs- Transmission Gate and Pass Transistor Logic-Standard Cell design: Cell hierarchy-Cell libraries-

UNIT IV STORAGE ELEMENTS AND DYNAMIC LOGIC CIRCUITS**9**

SR Latch- Bit Level Register –D Type Flip Flop –Dynamic D Flip Flop –The Static RAM Cell –Dynamic Logic – Domino Logic – SR Logic –Dynamic Memories

UNIT V VHDL**9**

VHDL Program Structure- concurrent code – sequential code - Variables- signals and Constants-VHDL Operators -VHDL Description of Combinational Networks: Adders – Modeling Flip Flop using VHDL Processes – VHDL Model for Multiplexer –Modeling a sequential Machine-

TOTAL: 45**REFERENCES**

- 1- John P Uyemura- “ Chip Design for Submicron VLSI:CMOS layout and simulation” Thomson India Edition- 2006(unit I to IV)
- 2- Charles H Roth-”Digital System Design Using VHDL”- Thomson business Information India Pvt Ltd-2006 (Unit V)
- 3- Kamran Eshraghian- Douglas A Pucknell Sholeh Eshraghian “Essentials of VLSI Circuits and Systems”- Prentice Hall of India Pvt Ltd- 2006
- 4- Volnei A Pedroni-”Circuit design with VHDL”- Prentice Hall of India Pvt Ltd- 2005
- 5 Wayne Wolf,” Modern VLSI Design – System On Chip”, PHI 2006, 3e, New Delhi

* **Common with ECE**

07 ML 8G/07EC8J INTELLECTUAL PROPERTY RIGHTS *

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UNIT I IMPORTANCE OF INTELLECTUAL PROPERTY RIGHTS

5

Introduction – Tangible and Intangible Properties- Intellectual property- an intangible wealth and a product of creative mind – IPR and its significance- Types of IPRs-

UNIT II COPYRIGHTS AND RELATED ISSUES

10

Works protected by copyright- Reproduction rights-moral rights-translation and adaptation rights-copyright issues-Piracy- civil -criminal remedies-Infringement- Patents – Copyrights of designs and related rights – Trade Marks and rights arising from Trademark registration – Definitions – Industrial Designs and Integrated circuits – Protection of Geographical Indications at national and International levels – Application Procedures-

UNIT III INTERNATIONAL AGREEMENT FOR THE PROTECTION OF IPR

10

Berne convention-Madrid agreement-Hague agreement-Patent cooperation treaty-Paris convention-Lisbon Agreement - Establishment of WIPO – UPOV and WTO-Mission and Activities – History – General Agreement on Trade and Tariff (GATT)-

UNIT IV PATENTED INVENTION AND ADMINISTRATION

10

Significance of Patent information-classification of invention according to technology- Novelty search and state of art search-Indian Position Vs WTO and Strategies – Indian IPR legislations – commitments to WTO-Patent Ordinance and the Bill – Draft of a national Intellectual Property Policy – Present against unfair competition-

UNIT V APPLICATIONS

10

Case Studies on – Patents (Basumati rice- turmeric- Neem- etc-) – Copyright and related rights – Trade Marks – Industrial design and Integrated circuits – Geographic indications – Protection against unfair competition- Patent agents-Examiner of Patents- IPR Managers-

TOTAL: 45

REFERENCES:

1. Prabuddha Ganguli, "Intellectual Property Rights,"TMH, 2001.
2. Subbaram N-R- " Handbook of Indian Patent Law and Practice "- S- Viswanathan (Printers and Publishers) Pvt- Ltd—1998.
3. Richard Stim, "Intellectual Property Copyrights, trademarks, and Patents," Cengage Learning India Private Ltd, 2004.
4. Deborah E. Bouchoux, "Intellectual Property Rights," Cengage Learning India Private Ltd, 2005.
5. Dr.Radhakrishnan & Balasubramani" IPR
6. Eli Whitney- United States Patent Number : 72X- Cotton Gin- March 14- 1794-
7. Intellectual Property Today : Volume 8- No- 5- May 2001- [www-iptoday-com]-

* **Common with ECE**

07 ML 8H /07EC7D ADVANCED DIGITAL SIGNAL PROCESSING*

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3 0 0 100 3

UNIT I DISCRETE RANDOM PROCESS 9

Discrete Random Processes- Expectation- Variance- Co -Variance- Uniform- Gaussian and Exponentially distributed noise - Hilbert space and inner product for discrete signals -Energy of Discrete Signals- Parseval's Theorem- Wiener Khintchine Relation- Power Spectral Density- Sum Decomposition Theorem- Spectral Factorization Theorem - Discrete Random Signal Processing by Linear Systems - Simulation of White Noise - Low Pass Filtering of White Noise-

UNIT II POWER SPECTRUM ESTIMATION 9

Sample auto correlation–Periodogram- Use of DFT in power spectrum estimation- Non–parametric methods:-Bartlett- Welch and Blackman-Tukey method- Parametric methods:- Model based Approach - AR- MA- ARMA Signal Modeling-Parameter Estimation using Yule-Walker Method- Solutions using Durbin's algorithm

UNIT III ADAPTIVE & MULTIRATE SIGNAL PROCESSING 9

FIR adaptive filters – steepest descent adaptive filter – LMS algorithm – convergence of LMS algorithms – Application: noise cancellation – channel equalization – adaptive recursive filters – recursive least squares-
Decimation by a factor D – Interpolation by a factor I – Filter Design and implementation for sampling rate conversion: Direct form FIR filter structures – Polyphase filter structure-

UNIT IV SPEECH SIGNAL PROCESSING 9

Digital models for speech signal : Mechanism of speech production – model for vocal tract- radiation and excitation – complete model – time domain processing of speech signal:- Pitch period estimation – using autocorrelation function – Linear predictive Coding: Basic Principles – autocorrelation method – Durbin recursive solution-

UNIT V ADVANCED TRANSFORMS 9

Fourier Transform : Its power and Limitations – Short Time Fourier Transform – The Gabor Transform - Discrete Time Fourier Transform and filter banks – Continuous Wavelet Transform – Wavelet Transform Ideal Case – Perfect Reconstruction Filter Banks and wavelets – Recursive multi-resolution decomposition – Haar Wavelet – Daubechies Wavelet-

TOTAL: 45

REFERENCES

1. Monson H-Hayes – Statistical Digital Signal Processing and Modeling- Wiley-2002
 2. John G-Proakis- Dimitris G-Manobakis- Digital Signal Processing- Principles- Algorithms and Applications- Third edition- (2000) Pearson/PHI-
 3. L-R-Rabiner and R-W-Schaber- Digital Processing of Speech Signals- Pearson Education (1979)-
 4. Roberto Crist- Modern Digital Signal Processing- Thomson Brooks/Cole (2004)
 5. Raghuv eer- M- Rao- Ajit S-Bopardikar- Wavelet Transforms- Introduction to Theory and applications- Pearson Education- Asia- 2000-
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07 ML 81 /07EC7C COMPUTER HARDWARE AND INTERFACING *

L	T	P	M	C
3	0	0	100	3

UNIT I CPU AND MEMORY 9

CPU essentials- processor modes- modern CPU concepts- Architectural performance features- CPU over clocking- Over clocking the system- Over clocking the Intel processors- Essential memory concepts- memory organizations- memory packages-modules- Logical memory organizations- memory types- memory techniques- selecting and installing memory-

UNIT II I/O AND VIDEO PERIPHERALS 9

Input- Output devices - Keyboard and mouse interfaces- Display - Video and LCD displays - CRT controller - Graphics controller- Audio / Video cards- printers- Interface standards

UNIT III STORAGE DEVICES 9

Storage Devices - Floppy Disks - Controllers and Standards - Hard disks - Formats- Controllers and Interface Standards- Optical disks - CDROM disks and drive formats- High capacity Magnetic storage techniques - RAID- Magnetic Tapes – Standards

UNIT IV PC ARCHITECTURE 9

Operating systems and boot process-BIOS–personal computer architecture-Motherboard-Chipsets-Interfacing peripheral devices-Device drivers-Introduction to other personal computers/work stations/Network computers-

UNIT V SYSTEM BUS 9

Standards in PC Architecture - BUS standards- System Bus- I/O bus- communication Interface- Plug and play Systems- Current topics in PC architecture / standards-

TOTAL: 45

REFERENCES:

1. Stephen J-Bigelow-"Troubleshooting-Maintaining & repairing of PCs"- TMH, 2007.
2. Craig Zacker & John Rourke- "The complete reference: PC hardware"- Tata McGraw-Hill- New Delhi- 2007-
3. Mike Meyers- "Introduction to PC Hardware and Trouble shooting"- Tata McGraw-Hill- New Delhi- 2005-
4. B-Govindarajulu- "IBM PC and Clones hardware trouble shooting and maintenance"- Tata McGraw-Hill- New Delhi- 2007-
5. Mueller-S- Upgrading and repairing PCS- 4th Edition- Prentice Hall- 1995
6. D-V-Hall- Microprocessors and Interfacing Programming and Hardware- Mc Graw Hill-2006

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07ML 8J /07EC506 COMPUTER NETWORKS *

L	T	P	M	C
3	0	0	100	3

UNIT I	APPLICATION LAYER	9
The Network Edge- The Network Core- Delay- Loss- and Throughput in Packet-Switched Networks-Protocol Layers and Their Service Models- Networks Under Attack- - Principles of Network Applications-The Web and HTTP-File Transfer: FTP-Electronic Mail in the Internet- DNS—The Internet’s Directory Service-Peer-to-Peer Applications		
UNIT II	TRANSPORT LAYER	9
Introduction and Transport-Layer Services-Multiplexing and Demultiplexing-Connectionless Transport: UDP-Principles of Reliable Data Transfer-Connection-Oriented Transport: TCP-Principles of Congestion Control-TCP Congestion Control		
UNIT III	THE NETWORK LAYER	9
Introduction-Virtual Circuit and Datagram Networks- Inside a Router- The Internet Protocol (IP): Forwarding and Addressing in the Internet-Routing Algorithms Routing in the Internet-Broadcast and Multicast Routing- Mobile IP		
UNIT IV	THE LINK LAYER AND LOCAL AREA NETWORKS	9
Link Layer: Introduction and Services-Error-Detection and -Correction Techniques-Multiple Access Protocols-Link-Layer Addressing-Ethernet-Link-Layers Switches- The Point-to-Point Protocol-Link Virtualization: A Network as a Link Layer- WiFi: 802-11 Wireless LANs		
UNIT V	NETWORK SECURITY AND MANAGEMENT	9
Principles of Cryptography- Message Integrity- End-Point Authentication- Securing E-mail- Securing TCP Connections: SSL-Network-Layer Security: IPsec- Securing Wireless LANs- Operational Security: Firewalls and Intrusion Detection Systems-elements of QOS		
		TOTAL: 45

REFERENCES:

1. James .F.Kurose & W.Ross "Computer Networking: A Top down approach "- Pearson education-4 /E 2007
2. Behrouz A.Forouzan- "Data communication and Networking"- Tata McGraw-Hill- 4/E-2007.
3. Alberto Leon Garcia, Communication Networks, 2nd Edition TMH, 2004.
4. Larry L-Peterson & Peter s-Davie-"Computer Networks "-Harcourt Asia Pvt-Ltd- 2/E.
5. Andrew S.Tannenbaum-"Computer Networks"- PHI/Pearson – 4/E 2003.
6. Dougles comer 'Computer networks with Internet applications" Pearson edition 2005.

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07 ML802/07EC802 TOTAL QUALITY MANAGEMENT *

L	T	P	M	C
3	0	0	100	3

1. INTRODUCTION

9

Definition of Quality, Dimensions of Quality, Quality Planning, Quality costs - Analysis Techniques for Quality Costs, Basic concepts of Total Quality Management, Historical Review, Principles of TQM, Leadership – Concepts, Role of Senior Management, Quality Council, Quality Statements, Strategic Planning, Deming Philosophy, Barriers to TQM Implementation.

2. TQM PRINCIPLES

9

Customer satisfaction – Customer Perception of Quality, Customer Complaints, Service Quality, Customer Retention, Employee Involvement – Motivation, Empowerment, Teams, Recognition and Reward, Performance Appraisal, Benefits, Continuous Process Improvement – Juran Trilogy, PDSA Cycle, 5S, Kaizen, Supplier Partnership – Partnering, sourcing, Supplier Selection, Supplier Rating, Relationship Development, Performance Measures – Basic Concepts, Strategy, Performance Measure-Business Excellence Model-Rajiv Gandhi National Quality Award

3. STATISTICAL PROCESS CONTROL (SPC)

9

The seven tools of quality, Statistical Fundamentals – Measures of central Tendency and Dispersion, Population and Sample, Normal Curve, Control Charts for variables and attributes, Process capability, Concept of six sigma, New seven Management tools.

4. TQM TOOLS

9

Benchmarking – Reasons to Benchmark, Benchmarking Process, Quality Function Deployment (QFD) – House of Quality, QFD Process, Benefits, Taguchi Quality Loss Function, Total Productive Maintenance (TPM) – Concept, Improvement Needs, FMEA – Stages of FMEA.

5. QUALITY SYSTEMS

9

Introduction, Consensus, Scope, Selection and Use of the ISO 9000:2000 , The ISO 9000 Family, Implementing the ISO 9001:2000 Quality Management System.– Elements, Implementation of Quality System, Documentation, Quality Auditing, QS 9000, ISO 14000 – Concept, Requirements and Benefits.

TOTAL: 45

REFERENCES:

1. Subburaj Ramasamy, Total Quality Management, Tata McGraw Hill, New Delhi, 2007.
2. Dale H. Besterfield, et al., Total Quality Management, Pearson Education Asia, 1999. (Indian reprint 2002).
3. James R. Evans & William M. Lidsay, The Management and Control of Quality, (6th Edition), South-Western (Thomson Learning), 2005 (ISBN 978-81-315-0136-8)
4. Narayana V. and Sreenivasan, N.S. Quality Management – Concepts and Tasks, New Age International 1996.

5. Zeiri. "Total Quality Management for Engineers ,Wood Head Publishers, 1991.
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ANNA UNIVERSITY OF TECHNOLOGY, COIMBATORE REGULATIONS-2007 CURRICULAM & SYLLABI B.E Civil Engineering
SEMESTER " VII Code No. 3 070100071 Computer Aided Design of Structures 3 1 0 100 4 070100072 Industrial Structures 3 1 0
100 4 070100073 Introduction to Soil Dynamics and Machine Foundations 3 1 0 100 4 070100074 Smart materials and Smart Structures
3 1 0 100 4 070100075 Earthquake Engineering 3 1 0 100 4 070100076 Repair and Rehabilitation of Structures 3 0 0 100 3. 5 2 2 1.
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devices and products within the regulatory framework of European markets and the ability to consider FDA regulations. Application
areas are medical imaging systems, assisted medical robotics, pacemakers, bionic prostheses, artificial intelligence based support
systems and many more. Essential Information. Degree: Dipl.-Ing. Contact. Head of Studies: FH-Prof. Dr. Martin Zauner. Programme
Administration: Elisabeth Differenz, Julia DÄ¶berl, Gabriele Rosenthaler. University of Applied Sciences Upper Austria School of Medical
Engineering and Applied Social Sciences Garrisonstrasse 21 4020 Linz/Austria Phone: +43 5 0804 52100 Email: mme@fh-linz.at Web:
www.fh-ooe.at/mme. Spotlights.