AFFILIATED INSTITUTIONS

ANNA UNIVERSITY, CHENNAI

R-2008

B.E. MEDICAL ELECTRONICS ENGINEERING

II - VIII SEMESTERS CURRICULA AND SYLLABI

SEMESTER II

SL. No.	COURSE CODE	COURSE TITLE	L	T	P	C
THEORY						
1.	HS2161	Technical English – II*	3	1	0	4
2.	MA2161	Mathematics – II*	3	1	0	4
3.	PH2161	Engineering Physics – II*	3	0	0	3
4.	CY2161	Engineering Chemistry – II*	3	0	0	3
5. a	ME2151	Engineering Mechanics **(For non-circuit branches)**	3	1	0	4
5. b	EE2151	Circuit Theory **(For branches under Electrical Faculty)**	3	1	0	4
5. c	EC2151	Electric Circuits and Electron Devices **(For branches under I & C Faculty)**	3	1	0	4
6. a	GE2151	Basic Electrical & Electronics Engineering **(For non-circuit branches)**	4	0	0	4
6. b	GE2152	Basic Civil & Mechanical Engineering **(For circuit branches)**	4	0	0	4
PRACTICALS						
7.	GE2155	Computer Practice Laboratory-II*	0	1	2	2
8.	GS2165	Physics & Chemistry Laboratory - II*	0	0	3	2

9. a	ME2155	Computer Aided Drafting and Modeling Laboratory **(For non-circuits branches)**	0	1	2	2
9. b	EE2155	Electrical Circuits Laboratory **(For branches under Electrical Faculty)**	0	0	3	2
9. c	EC2155	Circuits and Devices Laboratory **(For branches under I & C Faculty)**	0	0	3	2
					TOTAL : 28 CREDITS	
10.	-	English Language Laboratory [+]	0	0	2	-

*   **Common to all B.E. / B.Tech. Programmes**

+   **Offering English Language Laboratory as an additional subject (with no marks) during 2nd semester may be decided by the respective Colleges affiliated to Anna University Chennai.**

A. CIRCUIT BRANCHES

I   Faculty of Electrical Engineering
>   1. B.E. Electrical and Electronics Engineering
>   2. B.E. Electronics and Instrumentation Engineering
>   3. B.E. Instrumentation and Control Engineering

II   Faculty of Information and Communication Engineering
>   1. B.E. Computer Science and Engineering
>   2. B.E. Electronics and Communication Engineering
>   3. B.E. Bio Medical Engineering
>   4. B.Tech. Information Technology

B. NON – CIRCUIT BRANCHES

I   Faculty of Civil Engineering
>   1. B.E. Civil Engineering

II   Faculty of Mechanical Engineering
>   1. B.E. Aeronautical Engineering
>   2. B.E. Automobile Engineering
>   3. B.E. Marine Engineering
>   4. B.E. Mechanical Engineering
>   5. B.E. Production Engineering

III   Faculty of Technology
>   1. B.Tech. Chemical Engineering
>   2. B.Tech. Biotechnology
>   3. B.Tech. Polymer Technology
>   4. B.Tech. Textile Technology
>   5. B.Tech. Textile Technology (Fashion Technology)
>   6. B.Tech. Petroleum Engineering

SEMESTER III

CODE NO.	COURSE TITLE	L	T	P	C
THEORY					
MA3203	Engineering Mathematics-III	3	1	0	4
MD3202	Human Physiology	3	0	0	3
MD3203	Instrumentation Principles	3	0	0	3
MD3204	Measuring Techniques	3	0	0	3
MD3205	Digital Electronics	3	1	0	4
EC2205	Electronics Circuits – I	3	1	0	4
PRACTICALS					
MD3208	Instrumentation Laboratory	0	0	3	2
MD3209	Digital Electronics Laboratory	0	0	3	2
BM3210	Electronics circuits Laboratory	0	0	3	2
	TOTAL	**18**	**3**	**9**	**27**

SEMESTER IV

CODE NO.	COURSE TITLE	L	T	P	C
THEORY					
MD3211	MicroProcessor and Applications	3	1	0	4
BM3212	Linear Integrated Circuits	3	0	0	3
MD3213	Signals and Systems	3	1	0	4
MD3214	Object Oriented Programming	3	0	0	3
BM3215	Bio Medical Instrumentation	3	0	0	3
MD3216	Control Systems	3	1	0	4
PRACTICALS					
MD3218	MicroProcessor and Applications Laboratory	0	0	3	2
BM3219	Linear Integrated Circuits Laboratory	0	0	3	2
MD3220	Object Oriented Programming Laboratory	0	0	3	2
	TOTAL	**18**	**3**	**9**	**27**

SEMESTER V

(Applicable to the students admitted from the Academic year 2008-2009)

CODE NO.	COURSE TITLE	L	T	P	C
THEORY					
MG3301	Principles of Management	3	0	0	3
BM3302	Digital Signal Processing	3	1	0	4
BM3303	Bio-Mechanics	3	1	0	4
CS3304	Internet and Java	3	0	0	3
BM3305	Medical Informatics	3	0	0	3
MD3306	Micro Controllers and RISC Architecture	3	1	0	4
PRACTICALS					
BM3309	Digital Signal Processing Laboratory	0	0	3	2
BM3310	Bio Medical Instrumentation Laboratory	0	0	3	2
	TOTAL	**19**	**5**	**6**	**25**

SEMESTER VI

CODE NO.	COURSE TITLE	L	T	P	C
THEORY					
GE3008	Professional Ethics And Human Values	3	0	0	3
MD3312	Bio-Signal Processing	3	1	0	4
MD3313	Bio materials And Artificial organs	3	0	0	3
BM3314	Digital Image Processing	3	1	0	4
MD3315	Neural Networks and Applications	3	1	0	4
E1**	Elective I	3	0	0	3
PRACTICALS					
MD3317	Bio Signal Processing Laboratory	0	0	3	2
BM3318	Digital Image Processing Laboratory	0	0	3	2
GE3318	Communication Skills Laboratory	0	0	4	2
	TOTAL	**18**	**3**	**10**	**28**

SEMESTER VII

CODE NO.	COURSE TITLE	L	T	P	C
THEORY					
ET3401	Embedded Systems	3	0	0	3
MD3402	Principles of Medical Imaging	3	1	0	4
MD3403	Medical Expert Systems	3	0	0	3
MD3404	Therapeutic Equipments	3	0	0	3
E2**	Elective II	3	0	0	3
E3***	Elective III	3	0	0	3
PRACTICALS					
MD3407	Medical Software Laboratory	0	0	3	2
MD3408	Expert System Laboratory	0	0	3	2
MD3409	Mini Project	0	0	3	2
	TOTAL	**18**	**1**	**9**	**25**

SEMESTER VIII

CODE NO.	COURSE TITLE	L	T	P	C
THEORY					
MD3410	Principles of Tele Medicine	3	1	0	4
MD3411	Disaster Management	3	0	0	3
	Elective IV	3	0	0	3
	Elective V	3	0	0	3
PRACTICALS					
MD3412	Project Work	0	0	12	6
MD3413	Simulation Software Laboratory	0	0	3	2
	TOTAL	**12**	**1**	**15**	**21**

LIST OF ELECTIVES

VI SEMESTER

ELECTIVE I

CODE NO.	COURSE TITLE	L	T	P	C
MD3001	Pattern Recognition and AI Techniques	3	0	0	3
MD3002	Patient Monitoring Systems	3	0	0	3
MD3003	Fiber Optics and Lasers in Medicine	3	0	0	3
MA2264	Numerical Methods	3	1	0	4
MD3005	Speech Processing	3	0	0	3
MD3006	Genetic Algorithm	3	0	0	3
MD3007	Data Structures	3	0	0	3

VII SEMESTER FOR ELECTIVE II & III

ELECTIVE II

CODE NO.	COURSE TITLE	L	T	P	C
MD3008	Bio Tech Prosthetic Equipments	3	0	0	3
MD3009	Computer Vision	3	0	0	3
MD3010	Health Care systems	3	0	0	3
MD3011	Nanotechnology in Medicine	3	0	0	3
MD3012	Medical Physics	3	0	0	3

ELECTIVE III

MD3013	Data Mining for Medical Electronics	3	0	0	3
CS3014	Soft Computing	3	0	0	3
MD3015	Advanced Microprocessors	3	0	0	3
MD3016	Opto Electronic Devices	3	0	0	3
MD3017	Operating Systems	3	0	0	3

VIII SEMESTER FOR ELECTIVE IV & V

ELECTIVE IV

CODE NO.	COURSE TITLE	L	T	P	C
MD3018	Engineering Acoustics	3	0	0	3
MD3019	Robotics	3	0	0	3
MD3020	Hospital Management	3	0	0	3
MD3021	Clinical Engineering	3	0	0	3
MD3022	Bio Medical Diagnostic Equipments	3	0	0	3
EC3023	VLSI Design	3	0	0	3

ELECTIVE V

GE3024	Intellectual Property Rights	3	0	0	3
BM3025	Advanced Digital Signal processing	3	0	0	3
CS3026	Computer Hardware and Interfacing	3	0	0	3
EC3027	Computer Networks	3	0	0	3
GE2022	Total Quality Management	3	0	0	3

HS2161   **TECHNICAL ENGLISH II**   **L T P C**
                                                                   3 1 0 4

AIM:
To encourage students to actively involve in participative learning of English and to help them acquire Communication Skills.

OBJECTIVES:
1. To help students develop listening skills for academic and professional purposes.
2. To help students acquire the ability to speak effectively in English in real-life situations.
3. To inculcate reading habit and to develop effective reading skills.
4. To help students improve their active and passive vocabulary.
5. To familiarize students with different rhetorical functions of scientific English.
6. To enable students write letters and reports effectively in formal and business situations.

UNIT I   **12**
Technical Vocabulary - meanings in context, sequencing words, Articles- Prepositions, intensive reading& predicting content, Reading and interpretation, extended definitions, Process description

Suggested Activities:
1. Exercises on word formation using the prefix 'self' - Gap filling with preposition.
2. Exercises - Using sequence words.
3. Reading comprehension exercise with questions based on inference – Reading headings
4. and predicting the content – Reading advertisements and interpretation.
5. Writing extended definitions – Writing descriptions of processes – Writing paragraphs based on discussions – Writing paragraphs describing the future.

UNIT II   **12**
Phrases / Structures indicating use / purpose – Adverbs-Skimming – Non-verbal communication - Listening – correlating verbal and non-verbal communication -Speaking in group discussions – Formal Letter writing – Writing analytical paragraphs.

Suggested activities:
1. Reading comprehension exercises with questions on overall content – Discussions analyzing stylistic features (creative and factual description) - Reading comprehension exercises with texts including graphic communication - Exercises in interpreting non-verbal communication.
2. Listening comprehension exercises to categorise data in tables.
3. Writing formal letters, quotations, clarification, complaint – Letter seeking permission for Industrial visits– Writing analytical paragraphs on different debatable issues.

UNIT III   **12**
Cause and effect expressions – Different grammatical forms of the same word - Speaking – stress and intonation, Group Discussions - Reading – Critical reading - Listening, - Writing – using connectives, report writing – types, structure, data collection, content, form, recommendations .

Suggested activities:

1. Exercises combining sentences using cause and effect expressions – Gap filling exercises using the appropriate tense forms – Making sentences using different grammatical forms of the same word. (Eg: object –verb / object – noun)
2. Speaking exercises involving the use of stress and intonation – Group discussions– analysis of problems and offering solutions.
3. Reading comprehension exercises with critical questions, Multiple choice question.
4. Sequencing of jumbled sentences using connectives – Writing different types of reports like industrial accident report and survey report – Writing recommendations.

UNIT IV   **12**

Numerical adjectives – Oral instructions – Descriptive writing – Argumentative paragraphs – Letter of application - content, format (CV / Bio-data) - Instructions, imperative forms - Checklists, Yes/No question form – E-mail communication.

Suggested Activities:

1. Rewriting exercises using numerical adjectives.
2. Reading comprehension exercises with analytical questions on content – Evaluation of content.
3. Listening comprehension – entering information in tabular form, intensive listening exercise and completing the steps of a process.
4. Speaking - Role play – group discussions – Activities giving oral instructions.
5. Writing descriptions, expanding hints – Writing argumentative paragraphs – Writing formal letters – Writing letter of application with CV/Bio-data – Writing general and safety instructions – Preparing checklists – Writing e-mail messages.

UNIT V   **9**

Speaking - Discussion of Problems and solutions - Creative and critical thinking – Writing an essay, Writing a proposal.

Suggested Activities:

1. Case Studies on problems and solutions
2. Brain storming and discussion
3. Writing Critical essays
4. Writing short proposals of 2 pages for starting a project, solving problems, etc.
5. Writing advertisements.

                                            TOTAL : 60 PERIODS

TEXT BOOK:

1. Chapters 5 – 8. Department of Humanities & Social Sciences, Anna University, 'English for Engineers and Technologists' Combined Edition (Volumes 1 & 2), Chennai: Orient Longman Pvt. Ltd., 2006. Themes 5 – 8 (Technology, Communication, Environment, Industry)

REFERENCES:

1. P. K. Dutt, G. Rajeevan and C.L.N Prakash, 'A Course in Communication Skills', Cambridge University Press, India 2007.
2. Krishna Mohan and Meera Banerjee, 'Developing Communication Skills', Macmillan
   India Ltd., (Reprinted 1994 – 2007).
3. Edgar Thorpe, Showick Thorpe, 'Objective English', Second Edition, Pearson Education, 2007

Extensive Reading:
1. Robin Sharma**, '**The Monk Who Sold His Ferrari', Jaico Publishing House, 2007

Note:
The book listed under Extensive Reading is meant for inculcating the reading habit of the students. They need not be used for testing purposes.

MA2161   **MATHEMATICS – II**   **L T P C**
                                                                      3 1 0 4

UNIT I   ORDINARY DIFFERENTIAL EQUATIONS   12
Higher order linear differential equations with constant coefficients – Method of variation of parameters – Cauchy's and Legendre's linear equations – Simultaneous first order linear equations with constant coefficients.

UNIT II   VECTOR CALCULUS   12
Gradient Divergence and Curl – Directional derivative – Irrotational and solenoidal vector fields – Vector integration – Green's theorem in a plane, Gauss divergence theorem and stokes' theorem (excluding proofs) – Simple applications involving cubes and rectangular parallelpipeds.

UNIT III   ANALYTIC FUNCTIONS   12
Functions of a complex variable – Analytic functions – Necessary conditions, Cauchy – Riemann equation and Sufficient conditions (excluding proofs) – Harmonic and orthogonal properties of analytic function – Harmonic conjugate – Construction of analytic functions – Conformal mapping : w= z+c, cz, 1/z, and bilinear transformation.

UNIT IV   COMPLEX INTEGRATION   12
Complex integration – Statement and applications of Cauchy's integral theorem and Cauchy's integral formula – Taylor and Laurent expansions – Singular points – Residues – Residue theorem – Application of residue theorem to evaluate real integrals – Unit circle and semi-circular contour(excluding poles on boundaries).

UNIT V   LAPLACE TRANSFORM   12

Laplace transform – Conditions for existence – Transform of elementary functions – Basic properties – Transform of derivatives and integrals – Transform of unit step function and impulse functions – Transform of periodic functions.

Definition of Inverse Laplace transform as contour integral – Convolution theorem (excluding proof) – Initial and Final value theorems – Solution of linear ODE of second order with constant coefficients using Laplace transformation techniques.

TOTAL : 60 PERIODS

TEXT BOOKS:

1. Bali N. P and Manish Goyal, "Text book of Engineering Mathematics", 3rd Edition, Laxmi Publications (p) Ltd., (2008).

2. Grewal. B.S, "Higher Engineering Mathematics", 40th Edition, Khanna Publications, Delhi, (2007).

REFERENCES:

1. Ramana B.V, "Higher Engineering Mathematics",Tata McGraw Hill Publishing Company, New Delhi, (2007).

2. Glyn James, "Advanced Engineering Mathematics", 3rd Edition, Pearson Education, (2007).

3. Erwin Kreyszig, "Advanced Engineering Mathematics", 7th Edition, Wiley India, (2007).

4. Jain R.K and Iyengar S.R.K, "Advanced Engineering Mathematics", 3rd Edition, Narosa Publishing House Pvt. Ltd., (2007).

PH2161   **ENGINEERING PHYSICS – II**   **L T P C**
                                                          3 0 0 3

UNIT I   CONDUCTING MATERIALS   9

Conductors – classical free electron theory of metals – Electrical and thermal conductivity – Wiedemann – Franz law – Lorentz number – Draw backs of classical theory – Quantum theory – Fermi distribution function – Effect of temperature on Fermi Function – Density of energy states – carrier concentration in metals.

UNIT II   SEMICONDUCTING MATERIALS   9

Intrinsic semiconductor – carrier concentration derivation – Fermi level – Variation of Fermi level with temperature – electrical conductivity – band gap determination – extrinsic semiconductors – carrier concentration derivation in n-type and p-type semiconductor – variation of Fermi level with temperature and impurity concentration – compound semiconductors – Hall effect –Determination of Hall coefficient – Applications.

UNIT III   MAGNETIC AND SUPERCONDUCTING MATERIALS   9

Origin of magnetic moment – Bohr magneton – Dia and para magnetism – Ferro magnetism – Domain theory – Hysteresis – soft and hard magnetic materials – anti – ferromagnetic materials – Ferrites – applications – magnetic recording and readout – storage of magnetic data – tapes, floppy and magnetic disc drives.

Superconductivity : properties - Types of super conductors – BCS theory of superconductivity(Qualitative) - High Tc superconductors – Applications of superconductors – SQUID, cryotron, magnetic levitation.

UNIT IV   DIELECTRIC MATERIALS   9

Electrical susceptibility – dielectric constant – electronic, ionic, orientational and space charge polarization – frequency and temperature dependence of polarisation – internal field – Claussius – Mosotti relation (derivation) – dielectric loss – dielectric breakdown – uses of dielectric materials (capacitor and transformer) – ferroelectricity and applications.

UNIT V   MODERN ENGINEERING MATERIALS   9

Metallic glasses: preparation, properties and applications.

Shape memory alloys (SMA): Characteristics, properties of NiTi alloy, application, advantages and disadvantages of SMA

Nanomaterials: synthesis –plasma arcing – chemical vapour deposition – sol-gels – electrodeposition – ball milling - properties of nanoparticles and applications.

Carbon nanotubes: fabrication – arc method – pulsed laser deposition – chemical vapour deposition - structure – properties and applications.

                                                        TOTAL: 45 PERIODS

TEXT BOOKS:

1. Charles Kittel ' Introduction to Solid State Physics', John Wiley & sons, 7th edition, Singapore (2007)
2. Charles P. Poole and Frank J.Ownen, 'Introduction to Nanotechnology', Wiley India(2007) (for Unit V)

REFERENCES:

1. Rajendran, V, and Marikani A, 'Materials science'Tata McGraw Hill publications, (2004) New Delhi.
2. Jayakumar, S. 'Materials science', R.K. Publishers, Coimbatore, (2008).
3. Palanisamy P.K, 'Materials science', Scitech publications(India) Pvt. LTd., Chennai, second Edition(2007)
4. M. Arumugam, 'Materials Science' Anuradha publications, Kumbakonam, (2006).

CY2161	ENGINEERING CHEMISTRY – II	L T P C
		3 0 0 3

AIM

To impart a sound knowledge on the principles of chemistry involving the different application oriented topics required for all engineering branches.

OBJECTIVES:
- The student should be conversant with the principles electrochemistry, electrochemical cells, emf and applications of emf measurements.
- Principles of corrosion control
- Chemistry of Fuels and combustion
- Industrial importance of Phase rule and alloys
- Analytical techniques and their importance.

UNIT I   ELECTROCHEMISTRY   9

Electrochemical cells – reversible and irreversible cells – EMF – measurement of emf – Single electrode potential – Nernst equation (problem) – reference electrodes –Standard Hydrogen electrode -Calomel electrode – Ion selective electrode – glass electrode and measurement of pH – electrochemical series – significance – potentiometer titrations (redox - Fe^{2+} vs dichromate and precipitation – Ag^+ vs Cl^- titrations) and conduct metric titrations (acid-base – HCl vs, NaOH) titrations,

UNIT II   CORROSION AND CORROSION CONTROL   9

Chemical corrosion – Pilling – Bedworth rule – electrochemical corrosion – different types – galvanic corrosion – differential aeration corrosion – factors influencing corrosion – corrosion control – sacrificial anode and impressed cathodic current methods – corrosion inhibitors – protective coatings – paints – constituents and functions – metallic coatings – electroplating (Au) and electroless (Ni) plating.

UNIT III   FUELS AND COMBUSTION   9

Calorific value – classification – Coal – proximate and ultimate analysis metallurgical coke – manufacture by Otto-Hoffmann method – Petroleum processing and fractions – cracking – catalytic cracking and methods-knocking – octane number and cetane number – synthetic petrol – Fischer Tropsch and Bergius processes – Gaseous fuels-water gas, producer gas, CNG and LPG, Flue gas analysis – Orsat apparatus – theoretical air for combustion.

UNIT IV   PHASE RULE AND ALLOYS   9

Statement and explanation of terms involved – one component system – water system – condensed phase rule – construction of phase diagram by thermal analysis – simple eutectic systems (lead-silver system only) – alloys – importance, ferrous alloys – nichrome and stainless steel – heat treatment of steel, non-ferrous alloys – brass and bronze.

UNIT V   ANALYTICAL TECHNIQUES   9

Beer-Lambert's law (problem) – UV-visible spectroscopy and IR spectroscopy – principles – instrumentation (problem) (block diagram only) – estimation of iron by colorimetry – flame photometry – principle – instrumentation (block diagram only) – estimation of sodium by flame photometry – atomic absorption spectroscopy – principles – instrumentation (block diagram only) – estimation of nickel by atomic absorption spectroscopy.

TOTAL: 45 PERIODS

TEXT BOOKS:
1. P.C.Jain and Monica Jain, "Engineering Chemistry" Dhanpat Rai Pub, Co., New Delhi (2002).
2. S.S.Dara "A text book of Engineering Chemistry" S.Chand & Co.Ltd., New Delhi (2006).

REFERENCES:
1. B.Sivasankar "Engineering Chemistry" Tata McGraw-Hill Pub.Co.Ltd, New Delhi (2008).
2. B.K.Sharma "Engineering Chemistry" Krishna Prakasan Media (P) Ltd., Meerut (2001).

ME2151   **ENGINEERING MECHANICS**   **L T P C**
                                                              3 1 0 4

OBJECTIVE

At the end of this course the student should be able to understand the vectorial and scalar representation of forces and moments, static equilibrium of particles and rigid bodies both in two dimensions and also in three dimensions. Further, he should understand the principle of work and energy. He should be able to comprehend the effect of friction on equilibrium. He should be able to understand the laws of motion, the kinematics of motion and the interrelationship. He should also be able to write the dynamic equilibrium equation. All these should be achieved both conceptually and through solved examples.

UNIT I   BASICS & STATICS OF PARTICLES   12

Introduction – Units and Dimensions – Laws of Mechanics – Lame's theorem, Parallelogram and triangular Law of forces – Vectors – Vectorial representation of forces and moments – Vector operations: additions, subtraction, dot product, cross product – Coplanar Forces – Resolution and Composition of forces – Equilibrium of a particle – Forces in space – Equilibrium of a particle in space – Equivalent systems of forces – Principle of transmissibility – Single equivalent force.

UNIT II   EQUILIBRIUM OF RIGID BODIES   12

Free body diagram – Types of supports and their reactions – requirements of stable equilibrium – Moments and Couples – Moment of a force about a point and about an axis – Vectorial representation of moments and couples – Scalar components of a moment – Varignon's theorem – Equilibrium of Rigid bodies in two dimensions – Equilibrium of Rigid bodies in three dimensions – Examples

UNIT III   PROPERTIES OF SURFACES AND SOLIDS   12

Determination of Areas and Volumes – First moment of area and the Centroid of sections – Rectangle, circle, triangle from integration – T section, I section, - Angle section, Hollow section by using standard formula – second and product moments of plane area – Rectangle, triangle, circle from integration – T section, I section, Angle section, Hollow section by using standard formula – Parallel axis theorem and perpendicular axis theorem – Polar moment of inertia – Principal moments of inertia of plane areas – Principal axes of inertia – Mass moment of inertia – Derivation of mass moment of inertia for rectangular section, prism, sphere from first principle – Relation to area moments of inertia.

UNIT IV   DYNAMICS OF PARTICLES   12

Displacements, Velocity and acceleration, their relationship – Relative motion – Curvilinear motion – Newton's law – Work Energy Equation of particles – Impulse and Momentum – Impact of elastic bodies.

UNIT V   FRICTION AND ELEMENTS OF RIGID BODY DYNAMICS   12

Frictional force – Laws of Coloumb friction – simple contact friction – Rolling resistance – Belt friction.

Translation and Rotation of Rigid Bodies – Velocity and acceleration – General Plane motion.

TOTAL: 60 PERIODS

TEXT BOOK:

1. Beer, F.P and Johnson Jr. E.R. "Vector Mechanics for Engineers", Vol. 1 Statics and Vol. 2 Dynamics, McGraw-Hill International Edition, (1997).

REFERENCES:

1. Rajasekaran, S, Sankarasubramanian, G., "Fundamentals of Engineering Mechanics", Vikas Publishing House Pvt. Ltd., (2000).
2. Hibbeller, R.C., "Engineering Mechanics", Vol. 1 Statics, Vol. 2 Dynamics, Pearson Education Asia Pvt. Ltd., (2000).
3. Palanichamy, M.S., Nagam, S., "Engineering Mechanics – Statics & Dynamics", Tata McGraw-Hill, (2001).
4. Irving H. Shames, "Engineering Mechanics – Statics and Dynamics", IV Edition – Pearson Education Asia Pvt. Ltd., (2003).
5. Ashok Gupta, "Interactive Engineering Mechanics – Statics – A Virtual Tutor (CDROM)", Pearson Education Asia Pvt., Ltd., (2002).

EE2151	**CIRCUIT THEORY**	**L T P C**
	(Common to EEE, EIE and ICE Branches)	**3 1 0 4**

UNIT I   BASIC CIRCUITS ANALYSIS   12

Ohm's Law – Kirchoffs laws – DC and AC Circuits – Resistors in series and parallel circuits – Mesh current and node voltage method of analysis for D.C and A.C. circuits.

UNIT II   NETWORK REDUCTION AND NETWORK THEOREMS
FOR DC AND AC   CIRCUITS: 12

Network reduction: voltage and current division, source transformation – star delta conversion.

Thevenins and Novton & Theorem – Superposition Theorem – Maximum power transfer theorem – Reciprocity Theorem.

UNIT III   RESONANCE AND COUPLED CIRCUITS   12

Series and paralled resonance – their frequency response – Quality factor and Bandwidth - Self and mutual inductance – Coefficient of coupling – Tuned circuits – Single tuned circuits.

UNIT IV   **TRANSIENT RESPONSE FOR DC CIRCUITS**   **12**

Transient response of RL, RC and RLC Circuits using Laplace transform for DC input and A.C. with sinusoidal input.

UNIT V   **ANALYSING THREE PHASE CIRCUITS**   **12**

Three phase balanced / unbalanced voltage sources – analysis of three phase 3-wire and 4-wire circuits with star and delta connected loads, balanced & un balanced – phasor diagram of voltages and currents – power and power factor measurements in three phase circuits.

TOTAL :60 PERIODS

TEXT BOOKS:

1. William H. Hayt Jr, Jack E. Kemmerly and Steven M. Durbin, "Engineering Circuits Analysis",Tata McGraw Hill publishers, 6th edition, New Delhi, (2002).

2. Sudhakar A and Shyam Mohan SP, "Circuits and Network Analysis and Synthesis",Tata McGraw Hill, (2007).

REFERENCES:

1. Paranjothi SR, "Electric Circuits Analysis," New Age International Ltd., New Delhi, (1996).
2. Joseph A. Edminister, Mahmood Nahri, "Electric circuits", Schaum's series, Tata McGraw-Hill, New Delhi (2001).
3. Chakrabati A, "Circuits Theory (Analysis and synthesis), Dhanpath Rai & Sons, New Delhi, (1999).
4. Charles K. Alexander, Mathew N.O. Sadik, "Fundamentals of Electric Circuits", Second Edition, McGraw Hill, (2003).

EC2151   **ELECTRIC CIRCUITS AND ELECTRON DEVICES**   **L T P C**
               (For ECE, CSE, IT and Biomedical Engg. Branches)   **3 1 0 4**

UNIT I   **CIRCUIT ANALYSIS TECHNIQUES**   **12**

Kirchoff's current and voltage laws – series and parallel connection of independent sources – R, L and C – Network Theorems – Thevenin, Superposition, Norton, Maximum power transfer and duality – Star-delta conversion.

UNIT II   **TRANSIENT RESONANCE IN RLC CIRCUITS**   **12**

Basic RL, RC and RLC circuits and their responses to pulse and sinusoidal inputs – frequency response – Parallel and series resonances – Q factor – single tuned and double tuned circuits.

UNIT III   **SEMICONDUCTOR DIODES**   **12**

Review of intrinsic & extrinsic semiconductors – Theory of PN junction diode – Energy band structure – current equation – space charge and diffusion capacitances – effect of temperature and breakdown mechanism – Zener diode and its characteristics.

UNIT IV   TRANSISTORS   12
Principle of operation of PNP and NPN transistors – study of CE, CB and CC configurations and comparison of their characteristics – Breakdown in transistors – operation and comparison of N-Channel and P-Channel JFET – drain current equation – MOSFET – Enhancement and depletion types – structure and operation – comparison of BJT with MOSFET – thermal effect on MOSFET.

UNIT V   SPECIAL SEMICONDUCTOR DEVICES
**   (Qualitative Treatment only)   12**
Tunnel diodes – PIN diode, varactor diode – SCR characteristics and two transistor equivalent model – UJT – Diac and Triac – Laser, CCD, Photodiode, Phototransistor, Photoconductive and Photovoltaic cells – LED, LCD.

**   TOTAL : 60 PERIODS**

TEXT BOOKS:

1. Joseph A. Edminister, Mahmood, Nahri, "Electric Circuits" – Shaum series,Tata McGraw Hill, (2001)
2. S. Salivahanan, N. Suresh kumar and A. Vallavanraj, "Electronic Devices and Circuits",Tata McGraw Hill, 2nd Edition, (2008).
3. David A. Bell, "Electronic Devices and Circuits", Oxford University Press, 5th Edition, (2008).

REFERENCES:

1. Robert T. Paynter, "Introducing Electronics Devices and Circuits", Pearson Education, 7th Education, (2006).
2. William H. Hayt, J.V. Jack, E. Kemmebly and steven M. Durbin, "Engineering Circuit Analysis",Tata McGraw Hill, 6th Edition, 2002.
3. J. Millman & Halkins, Satyebranta Jit, "Electronic Devices & Circuits",Tata McGraw Hill, 2nd Edition, 2008.

GE2151   BASIC ELECTRICAL AND ELECTRONICS ENGINEERING   L T P C
**   4 0 0 4**
        (Common to branches under Civil, Mechanical and Technology faculty)

UNIT I   ELECTRICAL CIRCUITS & MEASURMENTS   12
Ohm's Law – Kirchoff's Laws – Steady State Solution of DC Circuits – Introduction to AC Circuits – Waveforms and RMS Value – Power and Power factor – Single Phase and Three Phase Balanced Circuits.
Operating Principles of Moving Coil and Moving Iron Instruments (Ammeters and Voltmeters), Dynamometer type Watt meters and Energy meters.

UNIT II   ELECTRICAL MECHANICS   12
Construction, Principle of Operation, Basic Equations and Applications of DC Generators, DC Motors, Single Phase Transformer, single phase induction Motor.

UNIT III   SEMICONDUCTOR DEVICES AND APPLICATIONS   12

Characteristics of PN Junction Diode – Zener Effect – Zener Diode and its Characteristics – Half wave and Full wave Rectifiers – Voltage Regulation.

Bipolar Junction Transistor – CB, CE, CC Configurations and Characteristics – Elementary Treatment of Small Signal Amplifier.

UNIT IV   DIGITAL ELECTRONICS   12

Binary Number System – Logic Gates – Boolean Algebra – Half and Full Adders – Flip-Flops – Registers and Counters – A/D and D/A Conversion (single concepts)

UNIT V   FUNDAMENTALS OF COMMUNICATION ENGINEERING   12

Types of Signals: Analog and Digital Signals – Modulation and Demodulation: Principles of Amplitude and Frequency Modulations.

Communication Systems: Radio, TV, Fax, Microwave, Satellite and Optical Fibre (Block Diagram Approach only).

TOTAL : 60 PERIODS

TEXT BOOKS:

1. V.N. Mittle "Basic Electrical Engineering",Tata McGraw Hill Edition, New Delhi, 1990.
2. R.S. Sedha, "Applied Electronics" S. Chand & Co., 2006.

REFERENCES:

1. Muthusubramanian R, Salivahanan S and Muraleedharan K A, "Basic Electrical, Electronics and Computer Engineering",Tata McGraw Hill, Second Edition, (2006).
2. Nagsarkar T K and Sukhija M S, "Basics of Electrical Engineering", Oxford press (2005).
3. Mehta V K, "Principles of Electronics", S.Chand & Company Ltd, (1994).
4. Mahmood Nahvi and Joseph A. Edminister, "Electric Circuits", Schaum' Outline Series, McGraw Hill, (2002).
5. Premkumar N, "Basic Electrical Engineering", Anuradha Publishers, (2003).

GE2152   BASIC CIVIL & MECHANICAL ENGINEERING   L T P C
(Common to branches under Electrical and I & C Faculty)   **4 0 0 4**
A – CIVIL ENGINEERING

UNIT I   SURVEYING AND CIVIL ENGINEERING MATERIALS   15

Surveying: Objects – types – classification – principles – measurements of distances – angles – leveling – determination of areas – illustrative examples.

Civil Engineering Materials: Bricks – stones – sand – cement – concrete – steel sections.

UNIT II   BUILDING COMPONENTS AND STRUCTURES   15

Foundations: Types, Bearing capacity – Requirement of good foundations.

Superstructure: Brick masonry – stone masonry – beams – columns – lintels – roofing – flooring – plastering – Mechanics – Internal and external forces – stress – strain – elasticity – Types of Bridges and Dams – Basics of Interior Design and Landscaping.

TOTAL : 30 PERIODS

B – MECHANICAL ENGINEERING

UNIT III   POWER PLANT ENGINEERING   10
Introduction, Classification of Power Plants – Working principle of steam, Gas, Diesel, Hydro-electric and Nuclear Power plants – Merits and Demerits – Pumps and turbines – working principle of Reciprocating pumps (single acting and double acting) – Centrifugal Pump.

UNIT IV   I C ENGINES   10
Internal combustion engines as automobile power plant – Working principle of Petrol and Diesel Engines – Four stroke and two stroke cycles – Comparison of four stroke and two stroke engines – Boiler as a power plant.

UNIT V   REFRIGERATION AND AIR CONDITIONING SYSTEM   10
Terminology of Refrigeration and Air Conditioning. Principle of vapour compression and absorption system – Layout of typical domestic refrigerator – Window and Split type room Air conditioner.

TOTAL: 30 PERIODS

REFERENCES:

1. Shanmugam G and Palanichamy M S, "Basic Civil and Mechanical Engineering",Tata McGraw Hill Publishing Co., New Delhi, (1996).
2. Ramamrutham. S, "Basic Civil Engineering", Dhanpat Rai Publishing Co. (P) Ltd. (1999).
3. Seetharaman S. "Basic Civil Engineering", Anuradha Agencies, (2005).
4. Venugopal K and Prahu Raja V, "Basic Mechanical Engineering", Anuradha Publishers, Kumbakonam, (2000).
5. Shantha Kumar S R J., "Basic Mechanical Engineering", Hi-tech Publications, Mayiladuthurai, (2000).

GE2155   COMPUTER PRACTICE LABORATORY – II   L T P C
                                                                              0 1 2 2

LIST OF EXPERIMENTS

1. UNIX COMMANDS   15
    Study of Unix OS - Basic Shell Commands - Unix Editor

2. SHELL PROGRAMMING   15
    Simple Shell program - Conditional Statements - Testing and Loops

3. C PROGRAMMING ON UNIX   15
    Dynamic Storage Allocation-Pointers-Functions-File Handling

TOTAL : 45 PERIODS

HARDWARE / SOFTWARE REQUIREMENTS FOR A BATCH OF 30 STUDENTS

Hardware
- 1 UNIX Clone Server
- 33 Nodes (thin client or PCs)
- Printer – 3 Nos.

Software
- OS – UNIX Clone (33 user license or License free Linux)
- Compiler - C

GS2165   **PHYSICS LABORATORY – II**   **L T P C**
                                                                0 0 3 2
                         LIST OF EXPERIMENTS

1. Determination of Young's modulus of the material – non uniform bending.
2. Determination of Band Gap of a semiconductor material.
3. Determination of specific resistance of a given coil of wire – Carey Foster Bridge.
4. Determination of viscosity of liquid – Poiseuille's method.
5. Spectrometer dispersive power of a prism.
6. Determination of Young's modulus of the material – uniform bending.
7. Torsional pendulum – Determination of rigidity modulus.

- **A minimum of FIVE experiments shall be offered.**
- **Laboratory classes on alternate weeks for Physics and Chemistry.**
- **The lab examinations will be held only in the second semester.**

GS2165   **CHEMISTRY LABORATORY – II**   **L T P C**
                                                                  0 0 3 2
                         LIST OF EXPERIMENTS

1. Conduct metric titration (Simple acid base)
2. Conduct metric titration (Mixture of weak and strong acids)
3. Conduct metric titration using $BaCl_2$ vs Na_2SO_4
4. Potentiometric Titration (Fe^{2+} / $KMnO_4$ or $K_2Cr_2O_7$)
5. PH titration (acid & base)
6. Determination of water of crystallization of a crystalline salt (Copper sulphate)

7. Estimation of Ferric iron by spectrophotometry.

- **A minimum of FIVE experiments shall be offered.**

- **Laboratory classes on alternate weeks for Physics and Chemistry.**

- **The lab examinations will be held only in the second semester.**

ME2155   **COMPUTER AIDED DRAFTING AND**   **L T P C**
                                MODELING LABORATORY   **0 1 2 2**

List of Exercises using software capable of Drafting and Modeling

1. Study of capabilities of software for Drafting and Modeling – Coordinate systems (absolute, relative, polar, etc.) – Creation of simple figures like polygon and general multi-line figures.
2. Drawing of a Title Block with necessary text and projection symbol.
3. Drawing of curves like parabola, spiral, involute using Bspline or cubic spline.
4. Drawing of front view and top view of simple solids like prism, pyramid, cylinder, cone, etc, and dimensioning.
5. Drawing front view, top view and side view of objects from the given pictorial views (eg. V-block, Base of a mixie, Simple stool, Objects with hole and curves).
6. Drawing of a plan of residential building (Two bed rooms, kitchen, hall, etc.)
7. Drawing of a simple steel truss.
8. Drawing sectional views of prism, pyramid, cylinder, cone, etc,
9. Drawing isometric projection of simple objects.
10. Creation of 3-D models of simple objects and obtaining 2-D multi-view drawings from 3-D model.

Note: Plotting of drawings must be made for each exercise and attached to the records written by students.

List of Equipments for a batch of 30 students:

1. Pentium IV computer or better hardware, with suitable graphics facility -30 No.
2. Licensed software for Drafting and Modeling. – 30 Licenses
3. Laser Printer or Plotter to print / plot drawings – 2 No.

EE2155	**ELECTRICAL CIRCUIT LABORATORY**	**L T P C**
	(Common to EEE, EIE and ICE)	**0 0 3 2**

LIST OF EXPERIMENTS

1. Verification of ohm's laws and kirchoff's laws.

2. Verification of Thevemin's and Norton's Theorem

3. Verification of superposition Theorem

4. Verification of maximum power transfer theorem.

5. Verification of reciprocity theorem

6. Measurement of self inductance of a coil

7. Verification of mesh and nodal analysis.

8. Transient response of RL and RC circuits for DC input.

9. Frequency response of series and parallel resonance circuits.

10. Frequency response of single tuned coupled circuits.

TOTAL: 45 PERIODS

EC2155	**CIRCUITS AND DEVICES LABORATORY**	**L T P C**
		0 0 3 2

1. Verification of KVL and KCL

2. Verification of Thevenin and Norton Theorems.

3. Verification of superposition Theorem.

4. Verification of Maximum power transfer and reciprocity theorems.

5. Frequency response of series and parallel resonance circuits.

6. Characteristics of PN and Zener diode

7. Characteristics of CE configuration

8. Characteristics of CB configuration

9. Characteristics of UJT and SCR

10. Characteristics of JFET and MOSFET

11. Characteristics of Diac and Triac.

12. Characteristics of Photodiode and Phototransistor.

TOTAL : 45 PERIODS

ENGLISH LANGUAGE LABORATORY (Optional)   L T P C
                                                             0 0 2 -

1. Listening: 5
Listening & answering questions – gap filling – Listening and Note taking- Listening to telephone conversations

2. Speaking: 5
Pronouncing words & sentences correctly – word stress – Conversation practice.

Classroom Session   20
 1. Speaking: Introducing oneself, Introducing others, Role play, Debate-
     Presentations: Body language, gestures, postures.
        Group Discussions etc
2. Goal setting – interviews – stress time management – situational reasons

Evaluation
   (1) Lab Session – 40 marks

                   Listening   – 10 marks
                   Speaking   – 10 marks
                   Reading   – 10 marks
                   Writing   – 10 marks
   (2) Classroom Session – 60 marks
              Role play activities giving real life context – 30 marks
              Presentation   – 30 marks

Note on Evaluation
        1. Examples for role play situations:
           a. Marketing engineer convincing a customer to buy his product.
           b. Telephone conversation – Fixing an official appointment / Enquiry on availability of flight or train tickets / placing an order. etc.

         2. Presentations could be just a Minute (JAM activity) or an Extempore on simple topics or visuals could be provided and students could be asked to talk about it.

REFERENCES:

1. Hartley, Peter, Group Communication, London: Routledge, (2004).
2. Doff, Adrian and Christopher Jones, Language in Use – (Intermediate level), Cambridge University Press, (1994).
3. Gammidge, Mick, Speaking Extra – A resource book of multi-level skills activities , Cambridge University Press, (2004).
4. Craven, Miles, Listening Extra - A resource book of multi-level skills activities, Cambridge, Cambridge University Press, (2004).
5. Naterop, Jean & Rod Revell, Telephoning in English, Cambridge University Press, (1987).

LAB REQUIREMENTS
 1. Teacher – Console and systems for students
 2. English Language Lab Software
 3. Tape Recorders.

MA3203   **ENGINEERING MATHEMATICS-III**   **L   T   P   C**
                                                                       3   1   0   4

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 identify – 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 PERIODS

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," Macmillen, New York, 1988.

MD3202   **HUMAN PHYSIOLOGY**   **L   T   P   C**
                                                                 3   0   0   3

UNIT I   INTRODUCTION   9
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 PERIODS

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)

MD3203   **INSTRUMENTATION PRINCIPLES**   **L   T   P   C**
                                                                  3   0   0   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 PERIODS

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.

MD3204	MEASURING TECHNIQUES	L	T	P	C
		3	0	0	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 PERIODS

REFERENCES:

1. Cooper, "Electronic Instrumentation and Measurement Techniques : Prentice Hall of India, 1998
2. Doeblin, " 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.

MD3205   DIGITAL ELECTRONICS   L   T   P   C
**   3   1   0   4**

UNIT I   NUMBER SYSTEMS   9
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 PERIODS

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.

EC 2205   **ELECTRONIC CIRCUITS I**   **L T P C**
                                                                           3 1 0 4

AIM

The aim of this course is to familiarize the student with the analysis and design of basic transistor Amplifier circuits and power supplie s.

OBJECTIVE

- On completion of this course the student will understand
- The methods of biasing transistors
- Design of simple amplifier circuits
- Midband analysis of amplifier circuits using small - signal equivalent circuits to determine gain input impedance and output impedance
- Method of calculating cutoff frequencies and to determine bandwidth
- Design of power amplifiers
- Analysis and design of power supplies.

UNIT I   TRANSISTOR BIAS STABILITY   12

BJT – Need for biasing – Stability factor - Fixed bias circuit, Load line and quiescent point. Variation of quiescent point due to h_{FE} 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   12

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   12

General shape of frequency response of amplifiers - Definition of cutoff frequencies and bandwidth - Low frequency analysis of amplifiers to obtain lower cutoff frequency Hybrid $- \pi$ 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   12

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   12

Classification of power supplies, Rectifiers - Half-wave, full-wave and bridge rectifiers with resistive load. Analysis for V_{dc} 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 PERIODS

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 Ediion, 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.

MD3208	INSTRUMENTATION LABORATORY	L	T	P	C
		0	0	3	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

TOTAL : 45 PERIODS

MD3209   **DIGITAL ELECTRONICS LABORATORY**   L   T   P   C
                                                               0   0   3   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 voice 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 of2Bit 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 Opto Counter

TOTAL : 45 PERIODS

BM3210   **ELECTRONICS CIRCUITS LABORATORY**   L   T   P   C
                                                               0   0   3   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.

TOTAL : 45 PERIODS

MD3211	**MICROPROCESSOR AND APPLICATIONS**	**L**	**T**	**P**	**C**
		3	**1**	**0**	**4**

UNIT I   8085 CPU   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 INTERFA1CING   9
Interfacing Serial I/O (8251)- parallel I/O (8255) –Keyboard and Display controller (8279) – ADC/DAC interfacing – Inter Integrated Circuits interfacing (I^2C 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 programing – 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 PERIODS
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.

BM3212	LINEAR INTEGRATED CIRCUITS	L	T	P	C
		3	0	0	3

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 PERIODS

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.

MD3213	SIGNALS AND SYSTEMS	L	T	P	C
		3	1	0	4

UNIT I   REPRESENTATION OF SIGNALS   9

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
ESPONSE   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 PERIODS

REFERENCES:

1.   AlanV.Oppenheim, Alan S.Willsky with S.Hamid Nawab, Signals & Systems, 2nd edn., Pearson Education, 1997.
2.   John G.Proakis and Dimitris G.Manolakis, Digital Signal Processing, Principles, Algorithms and Applications, 3rd edn., PHI, 2000.
3.   M.J.Roberts, Signals and Systems Analysis using Transform method and MATLAB, TMH 2003.
4.   Simon Haykin and Barry Van Veen, Signals and Systems, John Wiley, 1999
5.   K.Lindner, "Signals and Systems", McGraw Hill International, 1999.
6.   Monson .H. Hays," Digital Signal Processing ", Schaum's outlines, Tata McGraw-Hill Co Ltd., 2004.
7.   Ashok Amhardar, "Analog and Digital Signal Processing", 2 nd Edition Thomson 2002.

MD3214   **OBJECT ORIENTED PROGRAMMING**   **L   T   P   C**
                                                                        3   0   0   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 PERIODS

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.

BM3215   **BIO MEDICAL INSTRUMENTATION**   **L   T   P   C**
                                                                        3   0   0   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, pO_2, pCo_2, $pHCo_3$, 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, O_2, CO_2 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 PERIODS

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.

MD3216	**CONTROL SYSTEMS**	**L**	**T**	**P**	**C**
		3	**1**	**0**	**4**

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 PERIODS

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

MD3218	MICROPROCESSOR AND APPLICATIONS LABORATORY	L	T	P	C
		0	0	3	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 8051microcontroller.

11. Programming and verifying Timer, Interrupts and UART operations in 8031 microcontroller.
12. Communication between 8051 Microcontroller kit and PC.

TOTAL : 45 PERIODS

BM3219	LINEAR INTEGRATED CIRCUITS LABORATORY	L	T	P	C
		0	0	3	2

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

TOTAL : 45 PERIODS

MD3220	OBJECT ORIENTED PROG4RAMMING LABORATORY	L T P C
		0 0 3 2

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

TOTAL : 45 PERIODS

MG3301   **PRINCIPLES OF MANAGEMENT**   **L T P C**
                                                                        3 0 0 3
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 PERIODS

REFERENCES:
1. Harold Kooritz & Heinz Weihrich "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.

BM3302   DIGITAL SIGNAL PROCESSING   L T P C
3 1 0 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.

TUTORIAL: 15 TOTAL: 60 PERIODS

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.Sehafer & 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

BM3303	BIO – MECHANICS	L T P C
		3 1 0 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, Myoelcctric hand, Finite Element Analysis and its Application to Problems in Biomechanics.

TUTORIAL : 15 TOTAL : 60 PERIODS

REFERENCES:

1. Sahay and Saxena,"Biomechanics",Tata McGraw Hill, New Delhi, Edition -1998.
2. Y.C Fung,"Biomechanics,Mechanical properties of Living Tissues", Springer Verlog, Edition2- 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

CS3304	**INTERNET AND JAVA**	**L T P C**
		3 0 0 3

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   9
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   9
I/O streams – the utility package – Abstract Window Toolkit (AWT) – the net package – Advanced concepts: RMI and Servlets-

TOTAL: 45 PERIODS

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)

BM3305	MEDICAL INFORMATICS	L	T	P	C
		3	0	0	3

UNIT I BIO MEDICAL INFORMATION TECHNOLOGY 9

Historical highlights of healthcare, information systems – bio medical information systems – problems and pitfalls – history and evolution of electronic resources – internet and interactive multimedia components

UNIT II OVERVIEW OF DATA STRUCTURES 9

Introduction to Data Structures: Elements, Arrays, Records, sets, Tables singly and doubly Linked Data, Stacks, Queues, Trees Etc.

UNIT III DATA BASE MANAGEMENT 9

Need for a Database, Architecture of a DBMS, Representation of Data, Physical Record Interface, Data Models, Relational, Hierarchical and network Approach. Data Modeling Techniques: Relational, Hierarchical and network Normalization techniques for Data handling, Relational, Distributed and other types of Databases.

UNIT IV HOSPITAL INFORMATION SYSTEMS 9

Structuring Medical Records to carry out Functions like Admissions, Discharges, Treatment History, etc.Computerization in Pharmacy and Billing, Automated Clinical lab System and Radiology Information system. Detailed Study of picture Archival and communication System (PACS)

UNIT V CASE STUDY 9

Case Study of any one of Application areas like Pharmacology System Or Biochemistry Lab Analysis System. (Students to take up one Development Assignment and Demonstrate the Utility of the Software).

TOTAL: 45 PERIODS

REFERENCES:

1. Mary Beth Fecko,"Electronic Resources: Access and Issues", Bowker – Saur, London, Edition -1997.
2. Edward Shortliffe, "Computer Based Medical Consultation" Elsevier Scientific, 1997.
3. John Zimmerman, "Computer for the Physicians Office" Research Studies Press, 1989.
4. Ellitz.& Howrohwithz sahni, "An Introduction to Data structures " Prentice hall of India, 2004
5. J.D.Ullman, "Principles of Database systems" Galgotia Publications, 2006

MD3306	MICRO CONTROLLERS AND RISC ARCHITECTURE	L	T	P	C
		3	1	0	4

UNIT I   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.

**   TUTORIAL: 15 TOTAL : 60 PERIODS**

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

BM3309   **DIGITAL SIGNAL PROCESSING LABORATORY**   **L T P C**
                                                                     0 0 3 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)

                                                        TOTAL : 45 PERIODS

BM3310   **BIO MEDICAL INSTRUMENTATION LABORATORY**   **L T P C**
                                                                        0 0 3 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, pO_2 and conductivity.

9. Measurement and recording of peripheral blood flow

10. Measurement of visually evoked potential.

                                                        TOTAL : 45 PERIODS

GE3008   **PROFESSIONAL ETHICS AND HUMAN VALUES**   **L T P C**
                                                                     3 0 0 3

UNIT I   HUMAN VALUES   9

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 - a balanced outlook on law - the challenger case study.

UNIT IV   SAFETY, RESPONSIBILITIES AND RIGHTS   9

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, IEEE, Institution of Engineers (India), Indian Institute of Materials Management, Institution of electronics and telecommunication engineers(IETE),India, etc.

TOTAL= 45 PERIODS

REFERENCES:

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

MD3312   **BIO-SIGNAL PROCESSING**   **L T P C**
                                                                          3 1 0 4

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 PERIODS

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

MD3313   **BIO MATERIALS AND ARTIFICIAL ORGANS**   **L T P C**
                                                                          3 0 0 3

UNIT I   STRUCTURE OF BIO-MATERIALS AND BIO-COMPATIBILITY   9
Definition and classification of bio-materilas, 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, hydrooxyapatite glass ceramics carbons, medical applications.

UNIT III POLYMERIC IMPLANT MATERIALS 9

Polymerization, polyolefin, polyamicles, acryrilic, polymers, rubbers, high strength thermoplastics, medical applications.

UNIT IV TISSUE REPLACEMENT IMPLANTS 9

Soft-tissue replacements, sujtures, 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 PERIODS

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

BM3314	DIGITAL IMAGE PROCESSING	L T P C
		3 1 0 4

UNIT I DIGITAL IMAGE FUNDAMENTALS 9

Elements of digital image processing systems- Elements of visual perception- psycho visual model- brightness- contrast- hue- saturation- mach band effect- Color image fundamentals - RGB- HSI models- Image sampling- Quantization- dither- Two-dimensional mathematical preliminaries

UNIT II IMAGE TRANSFORMS 9

1D DFT- 2D transforms – DFT- DCT- Discrete Sine, Walsh- Hadamard- Slant- Haar Wavelet Transform

UNIT III IMAGE ENHANCEMENT AND RESTORATION 9

Spatial domain enhancement: gray level transformations - histogram modification and specification techniques- Image averaging- Directional Smoothing- Median- Geometric mean- Harmonic mean- Contra harmonic and Yp mean filters- Homomorphic filtering- Color image enhancement. Image Restoration – degradation model- Unconstrained and Constrained restoration- Inverse filtering: Removal of blur caused by uniform linear motion- Wiener filtering- Geometric transformations: spatial transformations- Gray-Level interpolation

UNIT IV   IMAGE SEGMENTATION AND REPRESENTATION   9

Point- line and edge detection- Edge linking- Region based segmentation: Region splitting and merging.
Image representation: chain codes – polygonal approximations – signatures – boundary segments – skeletons

UNIT V   IMAGE COMPRESSION   9

Need for data compression-Error free compression: variable length coding, bit plane coding, LZW coding. Lossy compression: Transform coding, wavelet coding.

Compression standards: binary image compression standard, still image compression standards, video compression standards.

TUTORIAL : 15 TOTAL: 60 PERIODS

REFERENCES:

1. Rafael C- Gonzalez- Richard E-Woods- 'Digital Image Processing'- Pearson Education- Inc-- Second Edition- 2004
2. Anil K- Jain- 'Fundamentals of Digital Image Processing'- Pearson/Prentice Hall of India- 2002-
3. David Salomon : Data Compression – The Complete Reference- Springer Verlag New York Inc-- 2nd Edition- 2001
4. William K-Pratt- 'Digital Image Processing'- John Wiley- NewYork- 2002
5. Kenneth R.Castleman-"Digital Image Processing**"-**Pearson**-**2003

MD3315   NEURAL NETWORKS AND APPLICATIONS   L T P C
3 1 0 4

UNIT I   NEURON MODEL NETWORK ARCHITECTURE   9

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   9

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   9

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   9

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   9

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

TUTORIAL : 15   TOTAL: 60 PERIODS

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

MD3317	BIO SIGNAL PROCESSING LABORATORY	LT P C
		0 0 3 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.

TOTAL : 45 PERIODS

BM3318   **DIGITAL IMAGE PROCESSING LABORATORY**   **L T P C**
                                                                      0 0 3 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 – Histrogram, 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

TOTAL : 45 PERIODS

GE3318   **COMMUNICATION SKILLS LABORATORY**   **L T P C**
                                                                  0 0 4 2

Globalisation has brought in numerous opportunities for the teeming millions, with more focus on the students' overall capability apart from academic competence. Many students, particularly those from non-English medium schools, find that they are not preferred due to their inadequacy of communication skills and soft skills, despite possessing sound knowledge in their subject area along with technical capability. Keeping in view their pre-employment needs and career requirements, this course on Communication Skills Laboratory will prepare students to adapt themselves with ease to the industry environment, thus rendering them as prospective assets to industries. The course will equip the students with the necessary communication skills that would go a long way in helping them in their profession.

OBJECTIVES:
- To equip students of engineering and technology with effective speaking and listening skills in English.
- To help them develop their soft skills and interpersonal skills, which will make the transition from college to workplace smoother and help them excel in their job.
- To enhance the performance of students at Placement Interviews, Group Discussions and other recruitment exercises.

I. PC based session	**(Weightage 40%)**	**24**
periods		

    A. ENGLISH LANGUAGE LAB   **(18 Periods)**

1. LISTENING COMPREHENSION: **(6)**
Listening and typing – Listening and sequencing of sentences – Filling in the blanks - Listening and answering questions.

2. READING COMPREHENSION: **(6)**
Filling in the blanks - Close exercises – Vocabulary building - Reading and answering questions.

3. SPEAKING: **(6)**
Phonetics: Intonation – Ear training - Correct Pronunciation – Sound recognition exercises – Common Errors in English.
Conversations: Face to Face Conversation – Telephone conversation – Role play activities (Students take on roles and engage in conversation)

B.   DISCUSSION OF AUDIO-VISUAL MATERIALS   **(6 PERIODS)**
       (Samples are available to learn and practice)

1.   RESUME / REPORT PREPARATION / LETTER WRITING   **(1)**
       Structuring the resume / report - Letter writing / Email Communication - Samples.

2.   RESENTATION SKILLS: **(1)**
       Elements of effective presentation – Structure of presentation - Presentation tools – Voice Modulation – Audience analysis - Body language – Video samples

3.   SOFT SKILLS: **(2)**
       Time management – Articulateness – Assertiveness – Psychometrics –
       Innovation and Creativity - Stress Management & Poise - Video Samples

4.   GROUP DISCUSSION: **(1)**
       Why is GD part of selection process ? - Structure of GD – Moderator – led and other GDs - Strategies in GD – Team work - Body Language - Mock GD -Video samples

5.   INTERVIEW SKILLS: **(1)**
       Kinds of interviews – Required Key Skills – Corporate culture – Mock interviews-Video samples

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II. Practice Session	**(Weightage – 60%)**	**24 periods**

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1. **Resume / Report Preparation / Letter writing**: Students prepare their   **(2)**
own resume and report.

2. **Presentation Skills:** Students make presentations on given topics.   **(8)**

3. **Group Discussion**: Students participate in group discussions**.**   **(6)**

4. **Interview Skills**: Students participate in Mock Interviews   **(8)**

TEXT BOOKS:

1. Anderson, P.V, **Technical Communication**, Thomson Wadsworth, Sixth Edition, New Delhi, 2007.
2. Prakash, P, **Verbal and Non-Verbal Reasoning**, Macmillan India Ltd., Second Edition, New Delhi, 2004.

REFERENCES:

1. John Seely, **The Oxford Guide to Writing and Speaking**, Oxford University Press, New Delhi, 2004.
2. Evans, D, **Decisionmaker**, Cambridge University Press, 1997.
3. Thorpe, E, and Thorpe, S, **Objective English**, Pearson Education, Second Edition, New Delhi, 2007.
4. Turton, N.D and Heaton, J.B, **Dictionary of Common Errors**, Addison Wesley Longman Ltd., Indian reprint 1998.

LAB REQUIREMENT

1. Teacher console and systems for students.
2. English Language Lab Software
3. Career Lab Software

REQUIREMENT FOR A BATCH OF 60 STUDENTS

Sl.No.	Description of Equipment	Quantity required
1.	**Server** ○ PIV system ○ 1 GB RAM / 40 GB HDD ○ OS: Win 2000 server ○ Audio card with headphones (with mike) ○ JRE 1.3	1 No.
2.	**Client Systems** ○ PIII or above ○ 256 or 512 MB RAM / 40 GB HDD ○ OS: Win 2000 ○ ○ Audio card with headphones (with mike) ○ JRE 1.3	60 No.
3.	Handicam Video Camera (with video lights and mic input)	1 No.
4.	Television - 29"	1 No.

5.	Collar mike	1 No.
6.	Cordless mikes	1 No.
7.	Audio Mixer	1 No.
8.	DVD Recorder / Player	1 No.
9.	LCD Projector with MP3 /CD /DVD provision for audio / video facility - **Desirable**	1 No.

ET3401   **EMBEDDED SYSTEMS**   **L T P C**
                                                                      3 0 0 3

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 μC/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.

TOTAL: 45 PERIODS

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

MD3402   **PRINCIPLES OF MEDICAL IMAGING**   **LT P C**
                                                                                            3 1 0 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-Thersholding-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 PERIODS

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 Jersy-1983.
5. Avinash C.Kak, Malcolm Shaney, "Principles of Computerized Tomographic Imaging", IEEE Press, New york-1998.

MD3403   **MEDICAL EXPERT SYSTEMS**   **L T P C**
                                                                              3 0 0 3

UNIT I   INTRODUCTION TO AI   9
Definition of AI – importance of AI – problem solving, searching, heuristic searching.

UNIT II   KNOWLEDGE REPRESENTATION   9
Preposition 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 bios – 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 PERIODS

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. Elain Rich and Kevin Knight, "Artificial Intelligence", 2nd edition, Tata McGraw Hill,
   1993.
5. R.D.Lele, "Computers in Medicine," Tata McGraw Hill, NewDelhi-1989.

MD3404   **THERAPEUTIC EQUIPMENTS**   **L T P C**
                                                                              3 0 0 3

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
$pH, pO_2, pCO_2, pHCO_3$ –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 PERIODS

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.

MD3407   **MEDICAL SOFTWARE LABORATORY**   **L T P C**
0 0 3 2

IST 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

TOTAL : 45 PERIODS

MD3408   **EXPERT SYSTEM LABORATORY**   **L T P C**
                                                                    0 0 3 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

                                                    TOTAL : 45 PERIODS

MD3410   **PRINCIPLES OF TELE MEDICINE**   **L T P C**
                                                                  3 1 0 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 confidentially 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.

                                        TUTORIAL:15   TOTAL: 60 PERIODS

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" Addisson 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.

MD3411	DISASTER MANAGEMENT	L T P C
		3 0 0 3

UNIT I   INTRODUCTION   9
Introduction – Disaster preparedness – Goals and objectives of ISDR Programme- Risk identification – Risk sharing – Disaster and development: Development plans and disaster management –Alternative to dominant approach – disaster-development linkages -Principle of risk partnership

**UNIT II   APPLICATION OF TECHNOLOGY IN DISASTER RISK
                  REDUCTION   9**
Application of various technologies: Data bases – RDBMS – Management Information systems – Decision support system and other systems – Geographic information systems – Intranets and extranets – video teleconferencing. Trigger mechanism – Remote sensing-an insight – contribution of remote sensing and GIS - Case study.

UNIT III   AWARENESS OF RISK REDUCTION   9
Trigger mechanism – constitution of trigger mechanism – risk reduction by education – disaster information network – risk reduction by public awareness

UNIT IV   DEVELOPMENT PLANNING ON DISASTER   9
Implication of development planning – financial arrangements – areas of improvement – disaster preparedness – community based disaster management – emergency response.

UNIT V   SEISMICITY   9
Seismic waves – Earthquakes and faults – measures of an earthquake, magnitude and intensity – ground damage – Tsunamis and earthquakes

TOTAL: 45 PERIODS

TEXT BOOKS:
1. Pardeep Sahni, Madhavi malalgoda and ariyabandu, "Disaster risk reduction in south asia", PHI
2. Amita sinvhal, "Understanding earthquake disasters" TMH, 2010.

REFERENCE:
1. Pardeep sahni, Alka Dhameja and Uma medury, "Disaster mitigation: Experiences and reflections", PHI

MD3413   **SIMULATION SOFTWARE LABORTORY**   **L T P C**
                                                              0 0 3 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.

                                                TOTAL: 45 PERIODS

MD3001   **PATTERN RECOGNITION AND AI TECHNIQUES**   **L T P C**
                                                                     3 0 0 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 estimaters, nearest neighbour classification, maximum distance pattern clssifiers, adaptive decision boundaries.

UNIT V   CLUSTER ANALYSIS AND FEATURE EXTRACTION   9
Unsupervised learning, heirarchial clustering, graph theories approach to pattern clustering, fuzzy pattern classifiers, application of pattern recognition in medicine.

                                                TOTAL: 45 PERIODS

REFERENCES:
1. Elain Rich and Kevin Knight, "Artificial Intelligence" Tata McGraw-Hill, 2 nd 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," 3 rd Edition, Pearson Education, Edition- 1998.
5. Efrain Turban and Jay E Aranson: "Decision support systems and Intelligent Systems," 5th Edition, Pearson Education, 1998.

MD3002   **PATIENT MONITORING SYSTEMS**   **L T P C**
                                                                         3 0 0 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 PERIODS
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.

MD3003   **FIBER OPTICS AND LASERS IN MEDICINE**   **L T P C**
                                                                       3 0 0 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 PERIODS

REFERENCES:
1. Tuan Vo Dirh, "Biomedical photonics – Handbook", CRC Press, Bocaraton, 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 Brustol 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 LivingstonePublications Edition- 2001

MA2264   NUMERICAL METHODS   L T P C
                                                           3 1 0 4
AIM
With the present development of the computer technology, it is necessary to develop efficient algorithms for solving problems in science, engineering and technology. This course gives a complete procedure for solving different kinds of problems occur in engineering numerically.

OBJECTIVES
- At the end of the course, the students would be acquainted with the basic concepts in numerical methods and their uses are summarized as follows:
- The roots of nonlinear (algebraic or transcendental) equations, solutions of large system of linear equations and eigen value problem of a matrix can be obtained numerically where analytical methods fail to give solution.
- When huge amounts of experimental data are involved, the methods discussed on interpolation will be useful in constructing approximate polynomial to represent the data and to find the intermediate values.

- The numerical differentiation and integration find application when the function in the analytical form is too complicated or the huge amounts of data are given such as series of measurements, observations or some other empirical information.
- Since many physical laws are couched in terms of rate of change of one/two or more independent variables, most of the engineering problems are characterized in the form of either nonlinear ordinary differential equations or partial differential equations. The methods introduced in the solution of ordinary differential equations and partial differential equations will be useful in attempting any engineering problem.

UNIT I   SOLUTION OF EQUATIONS AND EIGENVALUE PROBLEMS   9
Solution of equation –Fixed point iteration: $x=g(x)$ method - Newton's method – Solution of linear system by Gaussian elimination and Gauss-Jordon method–   Iterative method - Gauss-Seidel method - Inverse of a matrix by Gauss Jordon method – Eigen value of a matrix by power method and by Jacobi method for symmetric matrix.

UNIT II   INTERPOLATION AND APPROXIMATION   9
Lagrangian Polynomials – Divided differences – Interpolating with a cubic spline – Newton's forward and backward difference formulas.

UNIT III   NUMERICAL DIFFERENTIATION AND INTEGRATION   9
Differentiation using interpolation formulae –Numerical integration by trapezoidal and Simpson's 1/3 and 3/8 rules – Romberg's method – Two and Three point Gaussian quadrature formulae – Double integrals using trapezoidal and Simpsons's rules.

UNIT IV   INITIAL VALUE PROBLEMS FOR ORDINARY DIFFERENTIAL
            EQUATIONS   9
Single step methods: Taylor series method – Euler method for first order equation – Fourth order Runge – Kutta method for solving first and second order equations – Multistep methods: Milne's and Adam's predictor and corrector methods.

UNIT V   BOUNDARY VALUE PROBLEMS IN ORDINARY AND PARTIAL
            DIFFERENTIAL EQUATIONS   9
Finite difference solution of second order ordinary differential equation – Finite difference solution of one dimensional heat equation by explicit and implicit methods – One dimensional wave equation and two dimensional Laplace and Poisson equations.

L = 45 , T = 15,   TOTAL: 60 PERIODS

TEXT BOOKS:

1. Veerarjan, T and Ramachandran, T. 'Numerical methods with programming in 'C' Second Editiion, Tata McGraw-Hill Publishing.Co.Ltd. (2007).
2. Sankara Rao K, 'Numerical Methods for Scientisits and Engineers' – 3rd editiion Printice Hall of India Private Ltd, New Delhi, (2007).

REFERENCES:

1. Chapra, S. C and Canale, R. P. "Numerical Methods for Engineers", 5th Edition, Tata McGraw-Hill, New Delhi, 2007.
2. Gerald, C. F. and Wheatley, P.O., "Applied Numerical Analysis", 6th Edition, Pearson Education Asia, New Delhi, 2006.
3. Grewal, B.S. and Grewal,J.S., " Numerical methods in Engineering and Science", 6th Edition, Khanna Publishers, New Delhi, 2004

MD3005   **SPEECH PROCESSING**   **L T P C**
                                                                             3 0 0 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 Authority 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 PERIODS

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

MD3006   **GENETIC ALGORITHM**   **L T P C**
                                                                            3 0 0 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 PERIODS

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'- Addision-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

MD3007   **DATA STRUCTURE**   **L T P C**
                                                                            3 0 0 3
UNIT I   PROBLEM SOLVING   **9**
Top-down Design – Implementation – Verification – Efficiency – Analysis – Algorithms – Brute force – Recursive – Divide & Conquer.

UNIT II   LISTS, STACKS AND QUEUES   **9**
Abstract Data Type (ADT) – The List ADT – The Stack ADT – The Queue ADT - Priority Queues.

UNIT III   TREES   **9**
Terminology – Binary Trees – The Search Tree ADT – Binary Search Trees – Tree Traversals – Hashing – Binary Heap.

UNIT IV   SORTING   9

General background of sorting - Bubble sort - selection sort- Insertion Sort – Shell sort –
Heap sort – Merge sort – Quick sort – External Sorting.

UNIT V   GRAPHS   9

Topological Sort – Shortest-Path Algorithms – Unweighted Shortest Paths – Dijkstra's
Algorithm – Minimum Spanning Tree – Prim's Algorithm – Depth-First Search – Breadth
first search – Undirected Graphs

TOTAL :45 PERIODS

REFERENCES:

1. R. G. Dromey, "How to Solve it by Computer" Prentice-Hall of India, 2002.
2. M. A. Weiss, "Data Structures and Algorithm Analysis in C", 2nd edition, Pearson
    Education Asia, 2002.
3. E. Horowitz & S.Sahni, "Fundamentals Of computer Algorithms", Galgotia , 2005
4. Y. Langsam, M. J. Augenstein and A. M. Tenenbaum, "Data Structures using C",
    Pearson Education Asia, 2004
5. Richard F. Gilberg, Behrouz A. Forouzan, "Data Structures – A Pseudocode
    Approach with C", Thomson Brooks / COLE, 1998.
6. Aho, J. E. Hopcroft and J. D. Ullman, "Data Structures and Algorithms", Pearson
    education Asia, 1983.
7. Robert Kruse / C. L. Tondo "Data Structures & Program design in C" Prentice Hall of
    India 2007.

**MD3008   BIO TECH PROSTHETIC EQUIPMENTS   L T P C
                                                            3 0 0 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 by-pass
pump, left ventricular bypass pump, open chest and closed chest type, Principle and
problems --Intra Aortic balloon pumping, Veno Arterial Pumping, Prosthetic Cardio
Valves, Biomaterials for purposes, its characteristics and testing.

UNIT III   ARTIFICIAL KIDNEY   9

Indication and principle of Heamodyalisis, Membrane, Dialasate, different types of
Heamodialisers, 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 Orthodic System, functional Electrical Stimulation, Sensory Assist Devices, Materials for Prosthetic and Orthodic 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 PERIODS

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

MD3009   COMPUTER VISION   L T P C
3 0 0 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 PERIODS

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.

MD3010   HEALTH CARE SYSTEMS   L T P C
                                                                      3 0 0 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 PERIODS

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.

MD3011	NANOTECHNOLOGY IN MEDICINE	L T P C
		3 0 0 3

UNIT I   INTRODUCTION   9
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 PERIODS

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. 5. Charles P.Poole and Frank J Owens. "Introduction to Nanotechnology", Wiley Interscience, Edition- 2033.

MD3012	MEDICAL PHYSICS	L T P C
		3 0 0 3

UNIT I   ATOMIC PHYSICS   10
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 IV   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.

UNIT V   LASER PHYSICS   9
Characteristics of Laser radiation, Laser speckle, biological effects, laser safety management.

TOTAL : 45 PERIODS

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.

MD3013   **DATAMINING FOR MEDICAL ELECTRONICS**   **L T P C**
                                                                    3 0 0 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 – Neutral 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 PERIODS

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

CS3014   **SOFT COMPUTING**   **L T P C**
                                                                                3 0 0 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 PERIODS

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

MD3015   **ADVANCED MICROPROCESSORS**   **L T P C**
                                                                            3 0 0 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 PERIODS

REFERENCES:
1. M. Rafiquzzaman, "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. Dougles V Hall, "Microprocessors and Interfacing: Programming and Hardware",Community College Div. Publishing, 1991

MD3016	OPTO ELECTRONIC DEVICES	L T P C
		3 0 0 3

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-

TUTORIAL : 15 TOTAL:45 PERIODS

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
3. India Pvt-Ltd-New Delhi- 2006-
4. Jasprit Singh- "Opto Electronics – As Introduction to materials and devices"-
5. McGraw-Hill International Edition- 1998
6. Joachim Piprek, Semiconductor Optoelectronic Devices, Elsavier-2003
7. S. O. Kasap, Safa Kasap, Optoelectronics and Photonics: Principles and
8. Practices,PHI-2001.

MD3017	OPERATING SYSTEMS	L T P C
		3 0 0 3

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 PERIODS

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-   Davis -"operating systems " - pearson 2005.
5. William Stallings,Operating systems: Internals and design principle-5/E PHI 2004.

MD3018   **ENGINEERING ACOUSTICS**   **L T P C**
                                                      3 0 0 3

UNIT I   FUNDAMENTAL OF ACOUSTICS   9

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 – Helmoltz 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 electrodynamics microphone piezoelectric microphone – calibration of receivers-

TOTAL: 45 PERIODS

REFERENCES :

1. Lawerence E-Kinsler- Austin- R-Frey- Alan B-Coppens- James V-Sanders- Fundamentals of Acoustics- 4ht 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)

MD3019   **ROBOTICS**   **L T P C**
                                                        3 0 0 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 PERIODS

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",
5. Prentice Hall of India Private Limied, New Delhi, 2003.
6. Forsyth and Ponce, "Computer Vision-- A modern Approach", Person Education, 2003.

MD3020	HOSPITAL MANAGEMENT	L T P C
		3 0 0 3

UNIT I   NEED AND SCOPE OF CLINICAL ENGINEERING   9
Clinical engineering program, educational responsibilities, role to performed by them in hospital, staff structure in hospital.

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 Accrediation 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 PERIODS

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.

MD3021   **CLINICAL ENGINEERING**   **L T P C**
                                                             3 0 0 3

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 PERIODS

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.

MD3022   **BIO MEDICAL DIAGNOSTIC EQUIPMENTS**   **L T P C**
                                                                                      3 0 0 3

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, opthalmic equipments, macro and micro shock, sources of shock, monitoring and interrupting circuit from leakage current, earthing scheme.

TUTORIAL: 15 TOTAL : 60 PERIODS

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.
5. Leslie Cromwell, et al, "Bio Medical Instrumentation and Measurements", Prentice Hall of India, New Delhi, 2000.

EC3023   **VLSI DESIGN**   **L T P C**
                                                                                      3 0 0 3

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 PERIODS

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

GE3024   INTELLECTUAL PROPERTY RIGHTS   L T P C
                                                           3 0 0 3

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 PERIODS

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]-

BM3025   **ADVANCED DIGITAL SIGNAL PROCESSING**   **L T P C**
                                                               3 0 0 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 PERIODS

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. Raghuveer- M- Rao- Ajit S-Bopardikar- Wavelet Transforms- Introduction to Theory and applications- Pearson Education- Asia- 2000-

CS3026 COMPUTER HARDWARE AND INTERFACING L T P C
3 0 0 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 PERIODS

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

EC3027   COMPUTER NETWORKS   L T P C
                                                               3 0 0 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 PERIODS

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.

GE2022   TOTAL QUALITY MANAGEMENT   L T P C
3 0 0 3

UNIT I   INTRODUCTION   9
Introduction - Need for quality - Evolution of quality - Definition of quality - Dimensions of manufacturing and service quality - Basic concepts of TQM - Definition of TQM – TQM Framework - Contributions of Deming, Juran and Crosby – Barriers to TQM.

UNIT II   TQM PRINCIPLES   9
Leadership – Strategic quality planning, Quality statements - Customer focus – Customer orientation, Customer satisfaction, Customer complaints, Customer retention - Employee involvement – Motivation, Empowerment, Team and Teamwork, Recognition and Reward, Performance appraisal - Continuous process improvement – PDSA cycle, 5s, Kaizen - Supplier partnership – Partnering, Supplier selection, Supplier Rating.

UNIT III   TQM TOOLS & TECHNIQUES I   9
The seven traditional tools of quality – New management tools – Six-sigma: Concepts, methodology, applications to manufacturing, service sector including IT – Bench marking – Reason to bench mark, Bench marking process – FMEA – Stages, Types.

UNIT IV   TQM TOOLS & TECHNIQUES II   9
Quality circles – Quality Function Deployment (QFD) – Taguchi quality loss function – TPM – Concepts, improvement needs – Cost of Quality – Performance measures.

UNIT V   QUALITY SYSTEMS   9

Need for ISO 9000- ISO 9000-2000 Quality System – Elements, Documentation, Quality auditing- QS 9000 – ISO 14000 – Concepts, Requirements and Benefits – Case studies of TQM implementation in manufacturing and service sectors including IT.

TOTAL: 45 PERIODS

TEXT BOOK:

1. Dale H.Besterfiled, et at., "Total Quality Management", Pearson Education Asia, Third Edition, Indian Reprint (2006).

REFERENCES:

1. James R. Evans and William M. Lindsay, "The Management and Control of Quality", 6th Edition, South-Western (Thomson Learning), 2005.
2. Oakland, J.S. "TQM – Text with Cases", Butterworth – Heinemann Ltd., Oxford, 3rd Edition, 2003.
3. Suganthi,L and Anand Samuel, "Total Quality Management", Prentice Hall (India) Pvt. Ltd.,2006.
4. Janakiraman,B and Gopal, R.K, "Total Quality Management – Text and Cases", Prentice Hall (India) Pvt. Ltd., 2006.