

ACADEMIC REGULATIONS COURSE STRUCTURE AND DETAILED SYLLABUS

BIO-MEDICAL ENGINEERING

Shri

B.TECH FOUR YEAR DEGREE COURSE
(Applicable for the batches admitted from 2005-2006)



JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY
KUKATPALLY, HYDERABAD - 500 072.

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY,
HYDERABAD**

B.TECH BIOMEDICAL ENGINEERING
1 Year

COURSE STRUCTURE

Code	Subject	T	P	C
HS05231	English	2+1*	-	4
MA05363	Mathematics - I	3+1*	-	6
MA05361	Mathematical Methods	3+1*	-	6
PY05047	Applied Physics	2+1*	-	4
CS05106	C Programming and Data Structures	3+1*	-	6
EC05422	Network Analysis	2+1*	-	4
EC05210	Electronic Devices and Circuits	3+1*	-	6
ME05220	Engineering Drawing Practice Lab.	-	3	4
CS05144	Computer Programming Lab.	-	3	4
CS05337	IT Workshop	-	3	4
EC05211	Electronic Devices and Circuits Lab.	-	3	4
HS05232	English Language communication skills Lab.	-	3	4
TOTAL		25	15	56

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY,
HYDERABAD
B. TECH. BIO-MEDICAL ENGINEERING
COURSE STRUCTURE**

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II Year**Ist Semester**

Code	Subject	T	P	C
EE05200	Electrical Technology	4+1*	-	4
EE05339	Switching Theory and Logic Design	4+1*	-	4
EC05517	Signals and Systems	4+1*	-	4
CM05045	Applied Chemistry and Biochemistry	4+1*	-	4
BM05039	Anatomy and Physiology	4+1*	-	4
BM05082	Bioelectricity and Electrodes	4+1*	-	4
BM05043	Applied Biochemistry lab	-	3	2
BM05040	Anatomy and Physiology lab	-	3	2
TOTAL		30	6	28

II Year**IInd Semester**

Code	Subject	T	P	C
HS05353	Managerial Economics and Financial Analysis	4+1*	-	4
CE05239	Environmental Studies	4+1*	-	4
EC05497	Pulse and Digital Circuits	4+1*	-	4
EC05471	Principles of Communications	4+1*	-	4
BM05064	Basic Clinical Sciences I	4+1*	-	4
BM05101	Biotransducers and Applications	4+1*	-	4
EC05498	Pulse and Digital Circuits lab	-	3	2
BM05557	Transducers Lab	-	3	2
TOTAL		30	6	28

III Year**Ist Semester**

Subject Code	Subject	T	P	C
EC05176	Digital Signal Processing	4+1*	-	4
EC05342	Linear and Digital IC Applications	4+1*	-	4
BM05292	Hospital System Management	4+1*	-	4
BM05065	Basic Clinical Sciences - II	4+1*	-	4
BM05083	Biofluids and Mechanics	4+1*	-	4
BM05088	Biomedical Equipment	4+1*	-	4
EC05301	IC Applications Lab.	-	3	2
BM05089	Biomedical Equipment Lab.	-	3	2
TOTAL		30	6	28

III Year**IInd Semester**

Subject Code	Subject	T	P	C
EC05574	VLSI Design	4+1*	-	4
EC05400	Microprocessors and Interfacing	4+1*	-	4
BM05086	Biological Control Systems	4+1*	-	4
BM05340	Lasers and Fiber Optics in Medicine	4+1*	-	4
BM05091	Biomedical Signal Processing	4+1*	-	4
BM05380	Medical Imaging Techniques	4+1*	-	4
EC05401	Microprocessors Lab	-	3	2
BM05092	Biomedical Signal Processing lab	-	3	2
TOTAL		30	6	28

Subject Code	Subject	T	P	C
CS05138	Computer Networks	4+1*	-	4
CS05049	Artificial Neural Networks	4+1*	-	4
CS05303	Image Processing and Pattern Recognition	4+1*	-	4
BM05503	Rehabilitation Engineering	4+1*	-	4
	ELECTIVE-I	4+1*	-	4
CS05435	Operating Systems			
EC05399	Micro controllers and Applications			
BM05202	Electro Magnetic Interference and Compatibility techniques			
	ELECTIVE-II	4+1*		4
EC05215	Embedded and Real time Systems			
BM05382	Medical Informatics			
BM05452	Physiological Systems Modeling			
BM05381	Medical Imaging Techniques Lab	0	3	2
EC05174	Digital Image Processing Lab.	0	3	2
	TOTAL	30	6	28

Subject Code	Subject	T	P	C
BM05093	BIOMEMS	4+1*	-	4
	ELECTIVE-III	4+1*	-	4
EC05171	Digital Design through Verilog			
BM05087	Biomaterials			
BM05562	Transportation Phenomena in living systems			
	ELECTIVE-IV	4+1*	-	4
ME05508	Robotics and Automation			
EC05183	DSP Processors and Architectures			
BM05499	Quantitative Engineering Physiology			
CA05515	Seminar			2
CA05315	Industry Oriented Mini Project			2
CA05495	Project work			12
	TOTAL	15	-	28

NOTE: All University Examinations (Theory and Practical) are of 3 hours duration.

* : Tutorials

T : Theory periods per week P: Practical /Drawing Periods per week

C : Total Credits for the subject

1. INTRODUCTION :

In view of the growing importance of English as a tool for global communication and the consequent emphasis on training students to acquire communicative competence, the syllabus has been designed to develop linguistic and communicative competence of Engineering students. The prescribed books and the exercises are meant to serve broadly as students' handbooks, to encourage them to develop their language skills. The two textbooks identified by the Board of Studies serve the purpose of illustrating the conceptual framework within which the syllabus is to be administered in the classroom. When a textbook is prescribed content is generally paid attention to. However, the stress in this syllabus is on language acquisition and skill development, calling for both the teacher and the taught to go beyond the prescribed texts and innovative exercises and tasks.

2. OBJECTIVES :

- To promote the language proficiency of the students with emphasis on improving their LSRW skills.
- To impart training to the students through the syllabus and its theoretical and practical components.
- To improve communication skills in formal and informal situations.

3. SYLLABUS :

Listening Skills :

- Listening for general content
- Listening to fill up information gaps
- Intensive listening
- Listening for specific information
- Note-taking - guided and unguided
- Post-listening testing

Speaking Skills :

- Oral practice
- Developing confidence
- Introducing oneself/others
- Asking for/ giving information
- Describing objects/offering solutions
- Describing situations
- Role play
- Expressing agreement/disagreement

Reading Comprehension

- Skimming the text
- Understanding the gist of an argument
- Identifying the topic sentence
- Inferring lexical and contextual meaning
- Understanding discourse features
- Recognizing coherence/sequencing of sentences

NOTE : The student, through the training imparted to him/her by means of the text-based approach, will be examined in answering questions on an unseen passage.

Writing Skills :

- Writing a sentence
- Use of appropriate vocabulary
- Paragraph writing
- Coherence and cohesiveness
- Narration / description
- Interpreting data
- Formal and informal letter writing
- Sending e-mails
- Information transfer
- Editing a passage

4. TEXTBOOKS PRESCRIBED :

In order to improve the proficiency of the student in the acquisition of the four skills mentioned above, the following texts and course content, divided into Eight Units, are prescribed:

1. **LEARNING ENGLISH:** A Communicative Approach, Hyderabad: Orient Longman, 2005. (Selected Lessons)
2. **WINGS OF FIRE:** An Autobiography – APJ Abdul Kalam, Abridged version with Exercises, Hyderabad: Universities Press (India) Pvt. Ltd., 2004.

The following lessons from the prescribed texts are recommended for study :

A. STUDY MATERIAL :**Unit – I**

1. **Astronomy from LEARNING ENGLISH: A Communicative Approach,** Orient Longman, 2005.
2. Chapters 1-4 from Wings of Fire: An Autobiography – APJ Abdul Kalam, an abridged version with Exercises, Universities Press (India) Pvt. Ltd., 2004

Unit – II

3. Information Technology from LEARNING ENGLISH: A Communicative Approach, Orient Longman, 2005.
4. Chapters 5-8 from Wings of Fire: An Autobiography – APJ Abdul Kalam, an abridged version with Exercises, Universities Press (India) Pvt. Ltd., 2004

Unit – III

5. Humour from LEARNING ENGLISH: A Communicative Approach, Orient Longman, 2005.
6. Chapters 9-12 from Wings of Fire: An Autobiography – APJ Abdul Kalam, an abridged version with Exercises., Universities Press (India) Pvt. Ltd., 2004

Unit – IV

7. Environment from LEARNING ENGLISH: A Communicative Approach, Orient Longman, 2005.

8. Chapters 13-16 from Wings of Fire: An Autobiography – APJ Abdul Kalam, an abridged version with Exercises, Universities Press (India) Pvt. Ltd., 2004

Unit – V

9. Inspiration from LEARNING ENGLISH: A Communicative Approach, Orient Longman, 2005.

10. Chapters 17-20 from Wings of Fire: An Autobiography – APJ Abdul Kalam, an abridged version with Exercises, Universities Press (India) Pvt. Ltd., 2004.

Unit – VI

11. Human Interest from LEARNING ENGLISH : A Communicative Approach, Orient Longman, 2005.

12. Chapters 21-24 from Wings of Fire: An Autobiography – APJ Abdul Kalam, an abridged version with Exercises, Universities Press (India) Pvt. Ltd., 2004.

* Exercises from the lessons not prescribed shall also be used for classroom tasks.

Unit – VII

Reading and Writing Skills
Reading Comprehension
Situational dialogues
Report writing

Letter writing

Essay writing

Information transfer

Unit – VIII

Remedial English

Common errors

Subject-Verb agreement

Use of Articles and Prepositions

Tense and aspect

Vocabulary – Synonyms & Antonyms, one-word substitutes, prefixes & suffixes, Idioms & phrases, words often confused.

Books Recommended :

1. **Effective Technical Communication**, M Ashraf Rizvi, Tata McGraw-Hill Publishing Company Ltd.
2. **Everyday Dialogues in English**, Robert J Dixon, Prentice Hall of India Pvt Ltd., New Delhi.
3. **Strengthen Your English**, Bhaskaran & Horsburgh, Oxford University Press
4. **English for Technical Communication**, K R Lakshminarayana, SCITECH
5. **Strategies for Engineering Communication**, Susan Stevenson & Steve Whitmore (John Wiley and sons).
6. **English for Engineers: With CD**, Sirish Chaudhary, Vikas Publishing House Pvt. Ltd. With CD.
7. **Basic Communication Skills for Technology**, Andrea J Rutherford, Pearson Education Asia.
8. **Murphy's English Grammar with CD**, Murphy, Cambridge University Press
9. **A Practical Course in English Pronunciation, (with two Audio cassettes)**, Sethi, Sadanand & Jindal , Prentice –Hall of India Pvt Ltd., New Delhi.
10. **English for Professional Students**, by S S Prabhakara Rao.
11. **The Oxford Guide to Writing and Speaking**, John Seely, Oxford.
12. **Grammar Games**, Renvolucr Mario, Cambridge University Press.

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HYDERABAD

I Year B.Tech. BME

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(MA 05363) MATHEMATICS – I

UNIT – I

Sequences – series – Convergences and divergence – Ratio test – Comparison test – Integral test – Cauchy's root test – Raabe's test – Absolute and conditional convergence. Rolle's theorem – Lagrange's Mean Value Theorem – Cauchy's Mean Value Theorem – Generalized Mean Value theorem (Taylor's Theorem).

UNIT – II

Functions of several variables – Functional dependence- Jacobian- Maxima and Minima of functions of two variables with constraints or without constraints- Radius, Centre and Circle of Curvature – Evolutes and Envelopes.

UNIT – III

Curve tracing – Cartesian , polar and Parametric curves - Applications of integration to lengths, volumes and surface areas in Cartesian and polar coordinates.

UNIT – IV

Differential equations of first order and first degree – exact, linear and Bernoulli. Applications to Newton's Law of cooling, Law of natural growth and decay, Orthogonal trajectories-Non-homogeneous linear differential equations of second and higher order with constant coefficients with RHS term of the type e^{ax} , $\sin ax$, $\cos ax$, polynomials in x , $e^{ax}V(x)$, $xV(x)$, method of variation of parameters.

UNIT – V

Laplace transform of standard functions – Inverse transform – first shifting Theorem, Transforms of derivatives and integrals – Unit step function – second shifting theorem – Dirac's delta function – Convolution theorem – Periodic function - Differentiation and integration of transforms-Application of Laplace transforms to ordinary differential equations.

UNIT – VI

Multiple integrals - double and triple integrals – change of variables – change of order of integration.

UNIT – VII

Vector Calculus: Gradient- Divergence- Curl and their related properties of sums- products- Laplacian and second order operators. Vector Integration - Line integral – work done – Potential function – area- surface and volume integrals.

UNIT – VIII

Vector integral theorems: Green's theorem- Stoke's and Gauss's Divergence Theorem. Verification of Greens- Stokes and Gauss's Theorems – Cylindrical, Spherical coordinates-Expressions Grad, div, curl in spherical and cylindrical coordinates.

TEXT BOOKS :

1. A text book of Engineering Mathematics Volume – 1, 2005
T.K.V.Jyengar, B.Krishna Gandhi and others, S.Chand and Company.
2. Engineering Mathematics, B.V.Ramana, Tata McGraw-Hill 2003.

REFERENCES :

1. Engineering Mathematics-I, 2002, P.Nageswara Rao, Y.Narsimulu, Prabhakara Rao, Deepthi Publishers
2. Engineering Mathematics- I, 2004, Dr.Shahnaz Bathul, Right Publishers.
3. Engineering Mathematics, S.K.V.S. Sri Rama Chary, M.Bhujanga Rao, Shankar, B.S. Publications 2000.
4. Engineering Mathematics-I Rukmangadhachary, Pearson Education.
5. A Text book of Engineering Mathematics, VP Mishra, Galgotia Publications.
6. Engineering Mathematics – I, Sankarajah, VGS Book Links, Hyderabad.

HYDERABAD

I Year B.Tech. BME

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3+1 0 6**(MA 05361) MATHEMATICAL METHODS**

UNIT - I

Solution of Algebraic and Transcendental Equations : Introduction – The Bisection Method – The Method of False Position – The Iteration Method – Newton-Raphson Method.

Interpolation : Introduction- Errors in Polynomial Interpolation – Finite differences- Forward Differences-Backward differences –Central differences – Symbolic relations and separation of symbols- Differences of a polynomial-Newton's formulae for Interpolation – Central difference Interpolation Formulae – Gauss' Central Difference Formulae –Interpolation with unevenly spaced points-Lagrange's Interpolation formula.

UNIT - II

Fitting a straight line –Nonlinear curve fitting –Curve fitting by a sum of exponentials-Weighted least squares approximation-Linear weighted least squares approximation-Nonlinear weighted least squares. Numerical Differentiation and Integration: The Cubic Spline Method – Trapezoidal rule – Simpson's 1/3 Rule –Simpson's 3/8 Rule- Boole's and Weddle's Rules .

UNIT - III

Numerical solution of Ordinary Differential equations: Solution by Taylor's series-Picard's Method of successive Approximations-Euler's Method-Runge-Kutta Methods –Predictor-Corrector Methods- Adams-Moulton Method –Milne's Method.

UNIT – IV

Matrices and Linear systems of equations: Elementary row transformations-Rank-Echelon form, Normal form – Solution of Linear Systems – Direct Methods- LU Decomposition- LU Decomposition from Gauss Elimination –Solution of Tridiagonal Systems-Solution of Linear Systems.

UNIT - V

Eigen values, eigen vectors – properties – Cayley-Hamilton Theorem - Inverse and powers of a matrix by Cayley-Hamilton theorem – Diagonalization of matrix. Calculation of powers of matrix – Modal and spectral matrices.

UNIT - VI

Real matrices – Symmetric, skew - symmetric, orthogonal, Linear Transformation - Orthogonal Transformation. Complex matrices: Hermitian, Skew-Hermitian and Unitary – Eigen values and eigen vectors of complex matrices and their properties.

Quadratic forms- Reduction of quadratic form to canonical form – Rank - Positive, negative definite - semi definite - index - signature - Sylvester law.

UNIT -VII

Fourier Series: Determination of Fourier coefficients – Fourier series – even and odd functions – Fourier series in an arbitrary interval – even and odd periodic continuation – Half-range Fourier sine and cosine expansions.

Fourier integral theorem (only statement)– Fourier sine and cosine integrals. Fourier transform – Fourier sine and cosine transforms – properties – Inverse transforms – Finite Fourier transforms.

UNIT - VIII

Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions – solutions of first order linear (Lagrange) equation and nonlinear (standard type)equations . Method of separation of variables.

z-transform – inverse z-transform - properties – Damping rule – Shifting rule – Initial and final value theorems. Convolution theorem – Solution of difference equation by z-transforms.

TEXT BOOKS :

1. A Text book of Engineering Mathematics Volume – II, 2005 T.K.V.Jengar, B.Krishna Gandhi and others, S.Chand and Company.
2. Engineering Mathematics, B.V.Ramana, Tata McGraw-Hill 2003.

REFERENCES :

1. Engineering Mathematics–II, 2002, P.Nageswara Rao, Y.Narsimhulu, Prabhakara Rao
2. Engineering Mathematics, S.K.V.S. Sri Rama Chary, M.Bhujanga Rao, Shankar, B.S.Publications 2000.
3. Advanced Engineering Mathematics (eighth edition), Erwin Kreyszig, John Wiley & Sons (ASJA) Pvt. Ltd. 2001.
4. Advanced Engineering Peter V.O'Neil Thomson Brooks/Cole.
5. Advanced Engineering Mathematics, Merle C.Potter, J.L.Goldberg, E.F.Abrufadel, Oxford University Press. Third Edition 2005.
6. Numerical Methods: V N Veddumurthy ,Jengar N Ch N Vikas pub. Reprint 2005
7. Numerical Methods: S.Arnumugam & others. Scitech pub.
8. Elementary Numerical Analysis : An Algorithmic Approach: S.D.Conte and Carl.D.E.Boor, Tata Mac-Graw Hill.
9. Introductory Methods of Numerical Analysis: S.S.Sastry, Prentice Hall of India, Pvt Ltd.,
10. Engineering Mathematics – II, 2005, Sankaralah, VGS Book Links, Hyderabad.
11. Numerical Methods for Scientific and Engineering Computation: M.K.Jain, S.R.K. Jengar, R.K.Jain, New Age International (P) Ltd.

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I Year B.Tech. BME

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(PY 05047) APPLIED PHYSICS

UNIT I

BONDING IN SOLIDS : Introduction - Types of Bonding - Ionic bond - Covalent bond - Metallic bond - Cohesive energy - Calculation of Cohesive energy.

CRYSTAL STRUCTURES : Introduction - Space lattice - Basis - Unit cell - Lattice parameter - Crystal systems - Bravais lattices - Structure and Packing fractions of Simple cubic - Body Centred Cubic - Face Centred Cubic crystals - Structures of Diamond, ZnS, NaCl, CsCl.

UNIT II

CRYSTAL PLANES & X-RAY DIFFRACTION : Directions and Planes in crystals – Miller Indices - Separation between successive {h k l} planes - Diffraction of X-rays by Crystal planes - Bragg's Law - Laue method - Powder method.

UNIT III

DEFECTS IN SOLIDS : Imperfections in Crystals - Point defects - Schottky and Frenkel defects - Energy for formation of a Vacancy - Equilibrium concentration of Schottky and Frenkel defects - Line defects - Edge and Screw dislocations - Burger's Vectors.

PRINCIPLES OF QUANTUM MECHANICS : Waves and Particles - Planck's quantum theory - de-Broglie hypothesis – Matter waves - Davission and Germer experiment - Schroedinger's Time Independent Wave equation - Physical significance of the Wave function - Particle in a one dimensional potential box.

UNIT IV

ELECTRON THEORY OF METALS : Classical free electron theory - Mean free path - Relaxation time and drift velocity - Fermi-Dirac distribution (descriptive) - Quantum free electron theory - Sources of electrical resistance - Kronig-Penney model (qualitative treatment) - Origin of energy band formation in solids - Concept of effective mass.

UNIT V

DIELECTRIC PROPERTIES:Introduction - Dielectric constant - Electronic, Ionic and Orientation polarizabilities - Internal fields - Clausius-Mossotti equation – Frequency dependence of the polarizability - Ferro and Piezo electricity.

MAGNETIC PROPERTIES : Permeability - Magnetization - Origin of magnetic moment - Classification of magnetic materials - Dia, Para and Ferro magnetism - Hysteresis curve - Soft and Hard magnetic materials - anti-Ferro and Ferri magnetism - Ferrites and their applications.

UNIT VI

SEMICONDUCTORS : Introduction - Intrinsic semiconductor and carrier concentration – Equation for conductivity - Extrinsic semiconductor and carrier concentration - Drift and diffusion - Einstein's

equation - Hall effect.

SUPERCONDUCTIVITY : General properties - Meissner effect - Penetration depth - Type I and Type II superconductors - Flux quantization - Josephson Effect - BCS Theory - Applications of superconductors.

UNIT VII

LASERS : Introduction - Characteristics of Lasers - Spontaneous and Stimulated Emission of radiation - Einstein's coefficients - Population inversion - Ruby Laser - Helium-Neon Laser - Semiconductor Laser - Applications of Lasers in Industry, Scientific and Medical fields.

UNIT VIII

FIBER OPTICS : Introduction - Principle of optical fiber - Acceptance angle and Acceptance cone - Numerical aperture - Step-Index fiber and transmission of signal in SI fiber - Graded-Index fiber and transmission of signal in GI fiber - Attenuation in optical fibers - Advantages of optical fibers in communication - Application of optical fibers in Medicine and Sensors.

TEXTBOOKS :

1. Applied Physics by Dr. M.Chandra Shekar & Dr.P.Appala Naidu: V.G.S. Book links.
2. Solid State Physics by P.K. Palanisamy: Scitech Publications (India) Pvt.ltd.

REFERENCES :

1. Materials Science and Engineering by V. Raghavan: Prentice-Hall India
2. Materials Science by M.Anunugam: Anuradha Agencies
3. Solid State Physics by N.W. Ashcroft & N.David Merwin, Thomson Learning
4. Solid State Physics by Dr. B.S.Bellubbi & Dr. Adeel Ahmad: Premier Publishing house
5. Solid State Physics by Mani Naidu: Vijayam Publications
6. Materials Science by M.S.Vijaya & G. Rangarajan: Tata McGraw Hill
7. Introduction to Solid State Physics by C.Kittel: Wiley Eastern limited

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I Year B.Tech. BME

T	P	C
3+1	0	6

(CS 05106) C PROGRAMMING AND DATA STRUCTURES

UNIT - I

Algorithm, flowchart, program development steps, basic structures of C language, C tokens, data types and sizes, declaration of variables, assigning values, arithmetic, relational and logical operator, increment and decrement operators, conditional operator, bit-wise operators, type conversions, expressions, evaluation, input-output statements, blocks, if and switch statement, while, do-while and for statements, C programs covering all the above aspects.

UNIT - II

One dimensional & Two dimensional arrays, initialization, string variables-declaration, reading, writing, Basics of functions, Parameter passing, String handling function, user-defined functions, recursive functions, variables and storage classes, scope rules, block structure, header files, C preprocessor, example C programs.

UNIT - III

Pointer and Arrays : Pointers and addresses, Pointers and Arrays, Pointers And function arguments, Address arithmetic, character pointers and functions, pointers to pointers, multi-dimensional arrays, initialization of pointer arrays, command line arguments, pointers to functions.

UNIT - IV

Structures : Definition, initializing, assigning values, passing of structures as arguments, Arrays of structures, pointers to structures, self referential structures. Unions, typedef, bit fields, C program examples.

UNIT - V

Console & File I/O : Standard I/O, Formatted I/O, opening & closing of files, I/O operations on files.

UNIT - VI

Linear DataStructures : Introduction to DataStructures, representing stacks and queues in C using arrays, Infix, Postfix & Prefix programs, circular queues.

UNIT - VII

Linked Lists : Singly linked list, Doubly linked list, Circular List, representing stacks and Queues in C using linked lists

Non-Linear Data Structures : Binary trees: Representation, tree traversals, graph representation, graph traversal, Spanning trees.

UNIT - VIII

Sorting & Searching : Searching Methods- Linear and binary search methods, Sorting methods- Ex:

Bubble sort, Selection sort, Insertion sort, heap sort, quick sort.

TEXT BOOKS :

1. C And Data structures – P.Padmanabham, BS Publications
2. C & Data Structures, Ashok N.Kamthane, Pearson Education

REFERENCES :

1. C & Data Structures – Prof. P.S.Deshpande, Prof. O.G.Kakde, Wiley Dreamtech Pvt. Ltd, NewDelhi.
2. DataStructures Using C – A.S.Tanenbaum, PHI/Pearson education
3. The C Programming Language, B.W. Kernighan, Dennis M.Ritche, PHI/Pearson Education

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY,**HYDERABAD****I Year B.Tech. BME**

T	P	C
2+1	0	4

(EC 05422) NETWORK ANALYSIS**UNIT I**

Basic Voltage and Current relationships for R, L and C, 1st order Circuits, RL & RC, Initial conditions for L and C, Kirchoffs' Laws, Ideal Voltage and Current sources. Network Topology: Definitions, Graph, Tree, Basic Cutset and Basic Treset Matrices for planar networks, Formulation of network equations using loop and nodal methods of Analysis with dependent and independent Voltage and Current sources. Duality and Dual networks.

UNIT II

Magnetic Circuits, Self and Mutual inductances, dot convention, impedance, reactance concept, Impedance transformation and coupled circuits, co-efficient of coupling, equivalent T for Magnetically coupled circuits, Ideal Transformer.

UNIT III

Steady state and transient analysis of RC, RL and RLC Circuits, Circuits with switches, step response, 2nd order series and parallel RL C Circuits, Root locus, damping factor, over damped, under damped, critically damped cases, quality factor and bandwidth for series and parallel resonance, resonance curves

UNIT IV

Network Analysis using Laplace transform techniques, step, impulse and exponential excitation, response due to periodic excitation, RMS and average value of periodic waveforms.

UNIT V

Network theorems, Tellegens, Superposition, Reciprocity, Thevinin's, Norton's, Max Power Transfer theorem. Milliman's Theorem (All without proof but with applications to network analysis) Complex Power, j Notation, phasor diagram, Sinusoidal steady state analysis, Duality in networks.

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T	P	C
3+1	0	6

(EC 05210) ELECTRONIC DEVICES AND CIRCUITS

Two port network parameters, Z, Y, ABCD, h and g parameters, Characteristic impedance, Image transfer constant, image and iterative impedance, network function, driving point and transfer functions – using transformed (S) variables, Poles and Zeros.

UNIT VII

Standard T, p, L Sections, Characteristic impedance, image transfer constants, Design of Attenuators, impedance matching network, T and p Conversion

UNIT VIII

LC Networks and Filters: Properties of LC Networks, Foster's Reactance theorem, design of constant K, LP, HP and BP Filters, Composite filter design.

TEXT BOOKS :

1. Network Analysis – ME Van Valkenburg, Prentice Hall of India, 3rd Edition, 2000.
2. Networks, Lines and Fields - JD Ryder, PHI, 2nd Edition, 1999.

REFERENCES :

1. Engineering Circuit Analysis – William Hayt and Jack E Kemmerly, MGH, 5th Edition, 1993.
2. Network Analysis and Synthesis – N.C.Jagan and C.Lakshminarayana, B.S. Publications, 2004.
3. Electric Circuits – J.Edminister and M.Nahvi – Schaum's Outlines, TMH, 1999.
4. Network Theory – Sudarshan and Shyam Mohan, TMH.
5. Communication Engineering Networks – Everitt and Anner.

UNIT-I

ELECTRON DYNAMICS AND CRO : Motion of charged particles in electric and magnetic fields. Simple problems involving electric and magnetic fields only. Electrostatic and magnetic focusing. Principles of CRT, deflection sensitivity (Electrostatic and magnetic deflection). Applications of CRO: Voltage, Current and Frequency Measurements.

UNIT - II

JUNCTION DIODE CHARACTERISTICS : Review of semi conductor Physics – n and p –type semi conductors, Mass Action Law, Continuity Equation, Hall Effect, Open-circuited p-n junction, The p-n junction as a rectifier (forward bias and reverse bias), The current components in p-n diode, Law of junction, Diode equation, Energy band diagram of p-n diode, Volt-ampere characteristics of p-n diode, Temperature dependence of V_i characteristic, Transition and Diffusion capacitances, Breakdown Mechanisms in Semi Conductor Diodes, Zener diode characteristics, Characteristics of Tunnel Diode, Varactor Diode.

UNIT - III

RECTIFIERS, FILTERS AND REGULATORS : Half wave rectifier, ripple factor, full wave rectifier, Harmonic components in a rectifier circuit, Inductor filter, Capacitor filter, L- section filter, π - section filter, Multiple L- section and Multiple π section filter, and comparison of various filter circuits in terms of ripple factors, Simple circuit of a regulator using zener diode, Series and Shunt voltage regulators

UNIT - IV

TRANSISTOR CHARACTERISTICS : Construction, principle of operation, V-I characteristics, symbol, equivalent circuit, parameter calculations, applications, and specifications of – BJT, FET, and MOSFETS, Enhancement and Depletion mode MOSFET, Salient features of different configuration of BJT and FET. Introduction to SCR, UJT, LED and Photodiode.

UNIT-V

BIASING AND STABILISATION : BJT biasing, DC equivalent model, criteria for fixing operating point, methods of Bias stabilization, Thermal runaway, Thermal stability, Biasing of JFET and MOSFET, Comparison of BJT, JFET and MOSFET devices.

UNIT - VI

AMPLIFIERS : Small signal low frequency transistor amplifier circuits: h-parameter representation of a transistor, Analysis of single stage transistor amplifier using h-parameters: voltage gain, current gain, Input Impedance and Output impedance. FET and MOSFET Small signal model. (C, G, C, D, C, S configurations) R, C Coupled Amplifiers using BJT and JFET, Concepts of f_{α} , f_{β} and f_{τ} .

UNIT - VII

FEEDBACK AMPLIFIERS : Concept of feedback, Classification of feedback amplifiers, General characteristics of negative feedback amplifiers, Effect of Feedback on Amplifier characteristics, Simple problems.

UNIT -VIII

OSCILLATORS : Condition for oscillations, RC and LC type Oscillators, Crystal oscillators, Frequency and amplitude stability of oscillators, Generalized analysis of LC oscillators, Quartz, Hartley, and Colpitts Oscillators, RC-phase shift and Wien-bridge oscillators.

TEXT BOOKS :

1. Electronic Devices and Circuits – J.Millman and C.C.Halkias, Tata McGraw Hill, 1998.
2. Electronic Devices and Circuits – R.L. Boylestad and Louis Nashelsky, Pearson/Prentice Hall, 9th Edition, 2006.

REFERENCES :

1. Electronic Devices and Circuits – T.F. Bogart Jr., J.S.Beasley and G.Rico, Pearson Education, 6th edition, 2004.
2. Principles of Electronic Circuits – S.G.Burns and P.R.Bond, Galgotia Publications, 2nd Edn., 1998.
3. Microelectronics – Millman and Grabel, Tata McGraw Hill, 1988.
4. Electronic Devices and Circuits – K. Lal Kishore, B.S. Publications, 2nd Edition, 2005.

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(ME 05220) ENGINEERING DRAWING PRACTICE LAB

UNIT - I

Introduction to engineering graphics – construction of ellipse, parabola and hyperbola – cylindrical curves.

UNIT - II

Orthographic projections of points, lines and planes – axis inclined to one planes and inclined to both the planes.

UNIT - III

Orthographic projections of solids :

Cylinder, cone, prism, pyramid and sphere positions and axis inclined to both the planes.

UNIT - IV

Isometric projections of lines, planes and simple solids

UNIT - V

Conversion of orthographic views into isometric views and vice-versa.

TEXT BOOKS :

1. Engineering graphics By K.L. Narayana & P.Kannaya
2. Engineering drawings By N.D.Bhatt

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(CS 05144) COMPUTER PROGRAMMING LAB

1. Write a C program to evaluate the following algebraic expressions after reading necessary values from the user:
 - a) $ax+b/ax-b$
 - b) $2.5 \log x + \cos 32^0 + |x^2 - y^2| + v \ 2xy$
 - c) $1/\alpha \sqrt{2\pi} e^{- (x-m/\sqrt{2\sigma})^2}$
2. Write a C program for the following
 - a) Printing three given integers in ascending order
 - b) Sum of $1 + 2 + 3 + \dots + n$
 - c) $1 + x^2/2! + x^2/4! + \dots$ upto ten terms
 - d) $x + x^3/3! + x^5/5! + \dots$ upto 7th digit accuracy
 - e) Read x and compute $Y = 1$ for $x > 0$
 $Y = 0$ for $x = 0$
 $Y = -1$ for $x < 0$
3. Write C program using FOR statement to find the following from a given set of 20 integers.
 - i) Total number of even integers. ii) Total number of odd integers.
 - iii) Sum of all even integers. iv) Sum of all odd integers.
4. Write a C program to obtain the product of two matrices A of size (3X3) and B of size (3X2). The resultant matrix C is to be printed out along with A and B. Assume suitable values for A & B.
5. Using switch-case statement, write a C program that takes two operands and one operator from the user, performs the operation and then prints the answer. (consider operators +, -, /, * and %).
6. Write C procedures to add, subtract, multiply and divide two complex numbers (x+iy) and (a+ib). Also write the main program that uses these procedures.
7. The total distance traveled by vehicle in 't' seconds is given by distance = $ut + 1/2at^2$ where 'u' and 'a' are the initial velocity (m/sec.) and acceleration (m/sec²). Write C program to find the distance traveled at regular intervals of time given the values of 'u' and 'a'. The program should provide the flexibility to the user to select his own time intervals and repeat the calculations for different values of 'u' and 'a'.

8. A cloth show room has announced the following seasonal discounts on purchase of items.

PURCHASE	Discount (Percentage)	Handloom items
Amount	Mill Cloth	
1-100	-	5.0
101-200	5.0	7.5
201-300	7.5	10.0
Above 300	10.0	15.0

Write a C program using Switch and If statements to complete the net amount to be paid by a customer.

9. Given a number, write a C program using while loop to reverse the digits of the number. Example 1234 to be written as 4321.
10. The Fibonacci sequence of numbers is 1, 1, 2, 3, 5, 8... based on the recurrence relation
 $f(n) = f(n-1) + f(n-2)$ for $n > 2$.
 Write a C program using do-while to calculate and print the first n fibonacci numbers.
11. Write C programs to print the following outputs using For loop.

1	1	1
2	2	2
3	3	3
4	4	4
5	5	5
5	5	5
5	5	5
5	5	5
5	5	5
12. Write a C program to extract a portion of a character string and print the extracted string. Assume that m characters are extracted starting with the nth character.
13. A Maruthi Car dealer maintains a record of sales of various vehicles in the following form:

Vehicle type	Month of Sales	Price (Rs).
Maruthi – 800	02/87	75,000
Maruthi – DX	07/87	95,000
Gypsy	04/88	1,10,000
Maruthi Van	08/88	85,000

- Write a C program to read this data into a table of strings and output the details of a particular vehicle sold during a specified period. The program should request the user to input the vehicle type and the period (Starting month & ending month).
14. Write a function that will scan a character string passed as an argument and convert all lower case characters into their upper case equivalents.
 15. Implement the following data structures using Arrays
 - i) Stacks ii) Linear Queues iii) Circular queues
 16. Implement binary search tree using linked list and perform the following operations.
 - i) Insertion ii) Deletion iii) Inorder Traversal iv) Preorder Traversal v) Post Order Traversal.
 17. Singly linked list and doubly linked lists
 - i) Insertion ii) Deletion iii) Lookup
 18. i) Implement stack using singly linked list.
ii) Implement queue using singly linked list.
 19. Implement the following sorting techniques.
 - i) Bubble sort ii) Insertion Sort iii) Quick Sort iv) Heap Sort.
 20. Implement the following searching method.
 - i) Sequential Search ii) Binary Search
 21. i) Conversion of infix expression to Postfix notation.
ii) Simple expression evaluator, that can handle +, -, / and *.
 22. Implement the algorithms for the following iterative methods using C to find one root of the equation

$$9x_1 + 2x_2 + 4x_3 = 0$$

$$x_1 + 10x_2 + 4x_3 = 6$$

$$2x_1 - 4x_2 + 10x_3 = -15.$$
 23. Write Computer programs to implement the Lagrange Interpolation and Newton-Gregory forward Interpolation.
 24. Implement in 'C' the linear regression and polynomial regression algorithms.
 25. Implement Traezoidal and Simpson methods.

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(CS 05337) IT WORKSHOP

Objectives :

The IT Workshop for engineers is a 6 training lab course spread over 90 hours. The modules include training on PC Hardware, Internet & World Wide Web and Productivity tools including MS Word, Excel, Power Point and Publisher.

PC Hardware introduces the students to a personal computer and its basic peripherals, the process of assembling a personal computer, installation of system software like Windows XP, Linux and the required device drivers. In addition hardware and software level troubleshooting process, tips and tricks would be covered.

Internet & World Wide Web module introduces the different ways of hooking the PC on to the internet from home and workplace and effectively usage of the internet. Usage of web browsers, email, newsgroups and discussion forums would be covered. In addition, awareness of cyber hygiene, i.e., protecting the personal computer from getting infected with the viruses, worms and other cyber attacks would be introduced.

Productivity tools module would enable the students in crafting professional word documents, excel spread sheets, power point presentations and personal web sites using the Microsoft suite of office tools and LaTeX.

PC Hardware

Week 1 – Task 1 : Identify the peripherals of a computer, components in a CPU and its functions. Draw the block diagram of the CPU along with the configuration of each peripheral and submit to your instructor.

Week 2 – Task 2 : Every student should disassemble and assemble the PC back to working condition. Lab instructors should verify the work and follow it up with a Viva. Also students need to go through the video which shows the process of assembling a PC. A video would be given as part of the course content.

Week 3 – Task 3 : Every student should individually install windows XP on the personal computer. Lab instructor should verify the installation and follow it up with a Viva.

Week 4 – Task 4 : Every student should install Linux on the computer. This computer should have windows installed. The system should be configured as dual boot with both windows and Linux. Lab instructors should verify the installation and follow it up with a Viva

Week 5 – Task 5 : Several mini tasks would be that covers Basic commands in Linux and Basic system administration in Linux which includes: Basic Linux commands in bash, Create hard and symbolic links, Text processing, Using wildcards

Week 6 – Task 6 : Hardware Troubleshooting : Students have to be given a PC which does not boot due to improper assembly or defective peripherals. They should identify the problem and fix it to get the computer back to working condition. The work done should be verified by the instructor and followed up with a Viva

2005-2006

Week 7 – Task 7 : Software Troubleshooting : Students have to be given a malfunctioning CPU due to system software problems. They should identify the problem and fix it to get the computer back to working condition. The work done should be verified by the instructor and followed up with a Viva.

Week 8 – Task 8 : The test consists of various systems with Hardware / Software related troubles, Formatted disks without operating systems.

Internet & World Wide Web

Week 9 - Task 1 : Orientation & Connectivity Boot Camp : Students should get connected to their Local Area Network and access the Internet. In the process they configure the TCP/IP setting. Finally students should demonstrate, to the instructor, how to access the websites and email. If there is no Internet connectivity preparations need to be made by the instructors to simulate the WWW on the LAN.

Week 10 - Task 2 : Web Browsers, Surfing the Web : Students customize their web browsers with the LAN proxy settings, bookmarks, search toolbars and pop up blockers. Also, plug-ins like Macromedia Flash and JRE for applets should be configured.

Week 11 - Task 3 : Search Engines & Netiquette : Students should know what search engines are and how to use the search engines. A few topics would be given to the students for which they need to search on Google. This should be demonstrated to the instructors.

Week 12 - Task 4 : Cyber Hygiene : Students would be exposed to the various threats on the Internet and would be asked to configure their computer to be safe on the Internet. They need to first install an anti virus software, configure their personal firewall and windows update on their computer. Then they need to customize their browsers to block pop ups, block active x downloads to avoid viruses and/or worms.

Week 13 Module Test A test which simulates all of the above tasks would be crafted and given to the students.

LaTeX and Microsoft Word

Week 14 – Word Orientation : The mentor needs to give an overview of LaTeX and Microsoft word : Importance of LaTeX and MS Word as word Processors, Details of the four tasks and features that would be covered in each, Using LaTeX and word – Accessing, overview of toolbars, saving files, Using help and resources, rulers, format painter in word.

Task 1 : Using LaTeX and word to create project certificate. Features to be covered:- Formatting Fonts in word, Drop Cap in word, Applying Text effects, Using Character Spacing, Borders and Colors, Inserting Header and Footer, Using Date and Time option in both LaTeX and Word.

Week 15 - Task 2 : Creating project abstract Features to be covered:-Formatting Styles, Inserting table, Bullets and Numbering, Changing Text Direction, Cell alignment, Footnote, Hyperlink, Symbols, Spell Check , Track Changes.

Week 16 - Task 3 : Creating a Newsletter : Features to be covered:- Table of Content, Newspaper columns, Images from files and clipart, Drawing toolbar and Word Art, Formatting Images, Textboxes and Paragraphs

Week 17 - Task 4 : Creating a Feedback form - Features to be covered- Forms, Text Fields, Inserting objects, Mail Merge in Word.

2005-2006

Week 18 - LaTeX and Word Module Test - Replicate the given document inclusive of all features

Microsoft Excel

Week 19 - Excel Orientation : The mentor needs to tell the importance of MS Excel as a Spreadsheet tool, give the details of the four tasks and features that would be covered in each. Using Excel – Accessing, overview of toolbars, saving excel files, Using help and resources

Task 1 : Creating a Scheduler - Features to be covered:- Gridlines, Format Cells, Summation, auto fill, Formatting Text

Week 20 - Task 2 : Calculating GPA - Features to be covered:- Cell Referencing, Formulae in excel – average, std. deviation, Charts, Renaming and Inserting worksheets, Hyper linking, Count function, HLOOKUP/VLOOKUP

Week 21 - Task 3 : Performance Analysis - Features to be covered:- Split cells, freeze panes, group and outline, Sorting, Boolean and logical operators, Conditional formatting

Week 22 - Task 4 : Cricket Score Card - Features to be covered:-Pivot Tables, Interactive Buttons, Importing Data, Data Protection, Data Validation,

Week 23 – Excel Module Test - Replicate the given document inclusive of all features

LaTeX and Microsoft Power Point

Week 24 - Task1 : Students will be working on basic power point utilities and tools which help them create basic power point presentation.

Topic covered during this week includes :- PPT Orientation, Slide Layouts, Inserting Text, Word Art, Formatting Text, Bullets and Numbering, Auto Shapes, Lines and Arrows in both LaTeX and Powerpoint.

Week 25 - Task 2 : Second week helps students in making their presentations interactive.

Topic covered during this week includes : Hyperlinks, Inserting –Images, Clip Art, Audio, Video, Objects, Tables and Charts

Week 26 - Task 3 : Concentrating on the in and out of Microsoft power point and presentations in LaTeX. Helps them learn best practices in designing and preparing power point presentation.

Topic covered during this week includes :- Master Layouts (slide, template, and notes), Types of views (basic, presentation, slide slotter, notes etc), Inserting – Background, textures, Design Templates, Hidden slides.

Week 27 - Task 4 : Entire week concentrates on presentation part of LaTeX and Microsoft power point.

Topic covered during this week includes -Using Auto content wizard, Slide Transition, Custom Animation, Auto Rehearsing

Week 28 - Task 5 : Power point test would be conducted. Students will be given model power point presentation which needs to be replicated (exactly how it's asked).

Week 29 : Help students in preparing their personal website using Microsoft publisher.

Topic covered during this week includes - Publisher Orientation, Using Templates, Layouts, Inserting text objects, Editing text objects, Inserting Tables, Working with menu objects, Inserting pages, Hyper linking, Renaming, deleting, modifying pages, Hosting website.

REFERENCES :

1. Comdex Information Technology course tool kit 'Vikas Gupta, WILEY Dreamtech
2. The Complete Computer upgrade and repair book,3rd edition Cheryl A Schmidt, WILEY Dreamtech
3. Introduction to Information Technology, ITL Education Solutions limited, Pearson Education.
4. PC Hardware and A+Handbook – Kate J. Chase PHI (Microsoft)
5. LaTeX Companion – Leslie Lamport, PHI/Pearson.
6. All LaTeX and others related material is available at
 - (a) www.sssolutions.in and
 - (b) www.sontisoftsolutions.org

I YEAR B.Tech. BME

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(EC 05211) ELECTRONIC DEVICES AND CIRCUITS LAB

PART A : (Only for viva voce Examination)

ELECTRONIC WORKSHOP PRACTICE (in 6 lab sessions) :

1. Identification, Specifications, Testing of R, L, C Components (Colour Codes), Potentiometers, Switches (SPDT, DPDT, and DIP), Coils, Gang Condensers, Relays, Bread Boards.
2. Identification, Specifications and Testing of Active Devices, Diodes, BJTs, Lowpower JFETs, MOSFETs, Power Transistors, LEDs, LCDs, Optoelectronic Devices, SCR, UJT, DIACs, TRIACs, Linear and Digital ICs.
3. Soldering practice – Simple Circuits using active and passive components.
4. Single layer and Multi layer PCBs (Identification and Utility).
5. Study and operation of
 - Multimeters (Analog and Digital)
 - Function Generator
 - Regulated Power Supplies
6. Study and Operation of CRO.

PART B : (For Laboratory examination – Minimum of 16 experiments)

1. PN Junction diode characteristics
 - A. Forward bias
 - B. Reverse bias.
2. Zener diode characteristics
3. Transistor CB characteristics (Input and Output)
4. Transistor CE characteristics (Input and Output)
5. Rectifier without filters (Full wave & Half wave)
6. Rectifier with filters (Full wave & Half wave)
7. FET characteristics
8. Measurement of h parameters of transistor in CB, CE, CC configurations
9. CE Amplifier
10. CC Amplifier (Emitter Follower).
11. Single stage R-C coupled Amplifier.
12. FET amplifier (Common Source)
13. Wien Bridge Oscillator
14. RC Phase Shift Oscillator
15. Feed back amplifier (Current Series).
16. Feed back amplifier (Voltage Series).
17. Hartley Oscillator.
18. Colpitts Oscillator.
19. SCR characteristics.

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I Year B.Tech. BME	T	P	C
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(HS 05232) ENGLISH LANGUAGE COMMUNICATION SKILLS LAB

The language Lab focuses computer-aided multi-media instruction and language acquisition to achieve the following targets :

- To expose the students to a variety of self-instructional, learner-friendly modes of language learning.
- To help the students cultivate the habit of reading passages from the computer monitor, thus providing them with the required facility to face computer-based competitive exams such GRE, TOEFL, GMAT etc.
- To enable them to learn better pronunciation through stress on word accent, intonation, and rhythm.
- To train them to use language effectively to face interviews, group discussions, public speaking.
- To initiate them into greater use of the computer in resume preparation, report writing, format-making etc.

However depending upon the available infrastructure and budget, the above targets can also be achieved by procuring the minimum required equipment suggested for the establishment of a Conventional Lab the details of which are given below. The lab should cater to the needs of the students to build up their confidence to help them develop leadership qualities through their communicative competence.

SYLLABUS :

The following course content is prescribed for the English Language Laboratory Practice :

1. Introduction to Phonetics.
2. Introduction to Vowels and Consonants and associated Phonetic symbols.
3. Introduction to Accent, Intonation and Rhythm.
4. Situational Dialogues / Role Play.
5. Public Speaking.
6. Debate
7. Group discussions
8. Facing Interviews
9. Resume preparation
10. e-correspondence

Minimum Requirement :

- Computer aided multi media language lab with 30 systems with LAN facility.
- Conventional Language Lab. with audio and video systems, speakers, head phones and a teacher console to accommodate 30 students.

Suggested Software :

- Cambridge Advanced Learners' Dictionary with exercises
- The Rosetta Stone English Library
- Clarity/Pronunciation Power
- Mastering English in Vocabulary, Grammar, Spellings, Composition
- Dorling Kindersley series of Grammar, Punctuation, Composition etc.
- Language in Use, Foundation Books Pvt Ltd
- Learning to Speak English - 4 CDS
- Microsoft Encarta
- Murphy's English Grammar, Cambridge
- Time series of IQ Test, Brain-teasers, Aptitude Test etc.
- English in Mind, Herbert Puchta and Jeff Stranks with Meredith Levy,Cambridge.

BOOKS SUGGESTED FOR ENGLISH LAB :

1. Developing Communication Skills by Krishna Mohan & Meera Benjerji (Macmillan)
2. Speaking English Effectively by Krishna Mohan & NP Singh (Macmillan)
3. Better English Pronunciation by JDO Connor (UBS – Cambridge)
4. Oxford Practice Grammar with Answers. John Eastwood, Oxford
5. Handbook of English Grammar and Usage. Mark Lester and Larry Beason, Tata McGraw-Hill
6. A text book of English Phonetics for Indian Students by TBalasaubramanian (Macmillan)
7. Lingua TOEFL CBT Insider, by Dreamtech
8. TOEFL & GRE (KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS)
9. English Skills for Technical Students, WBSCTE with British Council, OL
10. A Handbook of English for Competitive Examinations, by B Shyamala Rao, Blakie Books, Chennai.

DISTRIBUTION AND WEIGHTAGE OF MARKS :

ENGLISH LANGUAGE LABORATORY PRACTICE

1. The practical examinations for the English Language Laboratory practice shall be conducted as per the University norms prescribed for the core engineering practical sessions.
2. For the English Language lab sessions, there shall be a continuous evaluation during the year for 25 sessional marks and 50 End Examination marks. Of the 25 marks, 15 marks shall be awarded for day-to-day work and 10 marks to be awarded by conducting Internal Lab Test(s). The End Examination shall be conducted by the teacher concerned with the help of another member of the staff of the same department of the same institution.

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II Year B.Tech. BME – I Semester

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(EE05200) ELECTRICAL TECHNOLOGY

UNIT I

DC MACHINES

Principle of operation of DC Machines- EMF equation – Types of generators – Magnetization and load characteristics of DC generators

UNIT II

D.C. MOTORS

DC Motors – Types of DC Motors – Characteristics of DC motors – 3-point starters for DC shunt motor – Losses and efficiency – Swinburne's test – Speed control of DC shunt motor – Flux and Armature voltage control methods.

UNIT III

TRANSFORMERS

Principle of operation of single phase transformer – types – Constructional features – Phasor diagram on No Load and Load – Equivalent circuit

UNIT IV

PERFORMANCE OF TRANSFORMERS

Losses and Efficiency of transformer and Regulation – OC and SC tests – Predetermination of efficiency and regulation (Simple Problems).

UNIT V

THREE PHASE INDUCTION MOTOR

Principle of operation of three-phase induction motors – Slip ring and Squirrel cage motors – Slip-Torque characteristics – Efficiency calculation – Starting methods.

UNIT VI

ALTERNATORS

Alternators – Constructional features – Principle of operation – Types - EMF Equation – Distribution and Coil span factors – Predetermination of regulation by Synchronous Impedance Method – OC and SC tests.

UNIT VII

SINGLE PHASE INDUCTION MOTORS

Principle of operation - Shaded pole motors – Capacitor motors, AC servomotor, AC tachometers, Synchros, Stepper Motors – Characteristics.

UNIT VIII

ELECTRICAL INSTRUMENTS

Basic Principles of indicating instruments – Moving Coil and Moving Iron Instruments (Ammeters and Voltmeters).

TEXT BOOKS

1. Introduction to Electrical Engineering – M.S Naidu and S. Kamakshiah, TMH Publ.
2. Basic Electrical Engineering - T.K. Nagasarkar and M.S.Sukhija, Oxford University Press, 2005

REFERENCES

1. Principles of Electrical Engineering - V.K Mehta, S.Chand Publications.
2. Theory and Problems of basic electrical engineering - I.J. Nagarath and D.P Kothari, PHI Publications
3. Essentials of Electrical and Computer Engineering - David V. Kerns, JR. J. David Irwin

(EE05539) SWITCHING THEORY AND LOGIC DESIGN**UNIT I****NUMBER SYSTEMS & CODES**

Philosophy of number systems – complement representation of negative numbers- binary arithmetic – binary codes – error detecting and error correcting codes – hamming codes.

UNIT II**BOOLEAN ALGEBRA AND SWITCHING FUNCTIONS**

Fundamental postulates of Boolean Algebra-Basic theorems and properties - switching functions–Canonical and Standard forms—Algebraic simplification—digital logic gates, properties of XOR gates–universal gates-Multilevel NAND/NOR realizations.

UNIT III**MINIMIZATION OF SWITCHING FUNCTIONS**

Map method, Prime implicants, Don't care combinations, Minimal SOP and POS forms, Tabular Method, Prime–Implicant chart, simplification rules

UNIT IV**COMBINATIONAL LOGIC DESIGN**

Design using conventional logic gates, Encoder, Decoder, Multiplexer, De-Multiplexer, Modular design using IC chips, MUX Realization of switching functions Parity bit generator, Code-converters, Hazards and hazard free realizations.

UNIT V**PROGRAMMABLE LOGIC DEVICES, THRESHOLD LOGIC**

Basic PLD's-ROM, PROM, PLA, PLD Realization of Switching functions using PLD's. Capabilities and limitations of Threshold gate, Synthesis of Threshold functions, Multigate Synthesis.

UNIT VI**SEQUENTIAL CIRCUITS - I**

Classification of sequential circuits (Synchronous, Asynchronous, Pulse mode, Level mode with examples) Basic flip-flops-Triggering and excitation tables. Steps in synchronous sequential circuit design. Design of modulo-N Ring and Shift counters, Serial binary adder, sequence detector.

UNIT VII**SEQUENTIAL CIRCUITS - II**

Finite state machine-capabilities and limitations, Mealy and Moore models- minimization of completely specified and incompletely specified sequential machines, Partition techniques and Merger chart methods-concept of minimal cover table.

UNIT VIII**ALGORITHMIC STATE MACHINES**

Salient features of the ASM chart-Simple examples-System design using data path and control subsystems-control implementations-examples of Weighting machine and Binary multiplier.

TEXTBOOKS

1. Switching and Logic design – CVS Rao, Pearson, 2005.
2. Switching & Finite Automata theory – Zvi Kohavi, TMH, 2nd Edition.

REFERENCES

1. Introduction to Switching Theory and Logic Design - F.J.Hill, G.R.Peterson, John Wiley, 2nd edition.
2. Switching Theory and Logic Design – R.P.Jain, TMH Edition, 2003.
3. Digital Design - Morris Mano, PHI, 2nd edition.
4. An Engineering Approach To Digital Design – Fletcher, PHI.
5. Digital Logic – Application and Design – John M. Yarbrough, Thomson Publications, 1997.
6. Fundamentals of Logic Design – Charles H. Roth, Thomson Publications, 5th Edition, 2004.

(EC05517) SIGNALS AND SYSTEMS**UNIT I****SIGNAL ANALYSIS**

Analogy between vectors and signals, Orthogonal signal space, Signal approximation using orthogonal functions, Mean square error, Closed or complete set of orthogonal functions, Orthogonality in complex functions, Exponential and sinusoidal signals, Concepts of Impulse function, Unit step function, Signum function.

UNIT II**FOURIER SERIES REPRESENTATION OF PERIODIC SIGNALS**

Representation of Fourier series, Continuous time periodic signals, properties of Fourier series, Dirichlet's conditions, Trigonometric Fourier series and Exponential Fourier series, Complex Fourier spectrum

UNIT III**FOURIER TRANSFORMS**

Deriving Fourier transform from Fourier series, Fourier transform of arbitrary signal, Fourier transform of standard signals, Fourier transform of periodic signals, properties of Fourier transforms, Fourier transforms involving impulse function and Signum function. Introduction to Hilbert Transform.

UNIT IV**SIGNAL TRANSMISSION THROUGH LINEAR SYSTEMS**

Linear system, Impulse response, Response of a linear system, Linear time invariant (LTI) system, Linear time variant (LTV) system, Transfer function of a LTI system. Filter characteristics of linear systems. Distortion less transmission through a system, Signal bandwidth, system bandwidth, Ideal LPF, HPF and BPF characteristics, Causality and Poly-Wiener criterion for physical realization, relationship between bandwidth and rise time.

UNIT V**CONVOLUTION AND CORRELATION OF SIGNALS**

Concept of convolution in time domain and frequency domain, Graphical representation of convolution, Convolution property of Fourier transforms. Cross correlation and auto correlation of functions, properties of correlation function, Energy density spectrum, Parseval's theorem, Power density spectrum, Relation between auto correlation function and energy/power spectral density function, Relation between convolution and correlation, Detection of periodic signals in the presence of noise by correlation, Extraction of signal from noise by filtering.

UNIT VI**SAMPLING**

Sampling theorem – Graphical and analytical proof for Band Limited Signals, impulse sampling, Natural and Flat top Sampling, Reconstruction of signal from its samples, effect of under sampling – Aliasing, Introduction to Band Pass sampling.

UNIT VIII**LAPLACE TRANSFORMS**

Review of Laplace transforms, Partial fraction expansion, Inverse Laplace transform, Concept of region of convergence (ROC) for Laplace transforms, constraints on ROC for various classes of signals, Properties of L.T's relation between L.T's, and F.T. of a signal. Laplace transform of certain signals using waveform synthesis.

UNIT VIII**Z-TRANSFORMS**

Fundamental difference between continuous and discrete time signals, discrete time signal representation using complex exponential and sinusoidal components, Periodicity of discrete time using complex exponential signal, Concept of Z- Transform of a discrete sequence. Distinction between Laplace, Fourier and Z transforms. Region of convergence in Z-Transform, constraints on ROC for various classes of signals, Inverse Z-transform, properties of Z-transforms.

TEXT BOOKS

1. Signals, Systems & Communications - B.P. Lathi, BS Publications, 2003.
2. Signals and Systems - A.V. Oppenheim, A.S. Willsky and S.H. Nawab, PHI, 2nd Edn.

REFERENCES

1. Signals & Systems - Simon Haykin and Van Veen, Wiley, 2nd Edition.
2. Network Analysis - M.E. Van Valkenburg, PHI Publications, 3rd Edn., 2000.
3. Signals & Systems Analysis Using Transformation Methods & MATLAB - Robert, TMH, 2003.
4. Signals, Systems and Transforms - C. L. Phillips, J.M.Parr and Eve A.Riskin, Pearson education., 3rd Edition, 2004.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY

HYDERABAD

II Year B.Tech. BME – I Semester

T P C
4+1 0 4**(CM05045) APPLIED CHEMISTRY AND BIOCHEMISTRY****UNIT-I**

Electro Chemistry and polymers: Conductance, Specific Equivalent and Molecular Conductance -Cell constant -Measurement of Equivalent Conductance -Galvanic Cell

UNIT-II

Standard Electrode Potentials -Calculation of E. M. F of a cell –Determination of pH by E. M. F methods. Engineering use of the following a) Polyethylene, b) Teflon, C) PVC, d) Bakelite, e) Rubber -Natural Rubber-.

UNIT-III

Lubricants and water Technology: Definition -Theory of Lubrication, properties of Lubrication. Nature of Impurities present in water, Hardness of water and its Determination, Different methods of Treatment of water- Lime soda, Zeolite, Ion exchange process- Analysis of water.

UNIT-IV

Biochemistry of Living Cell, Sub-cellular. Fractionation using the Differential Centrifugation Method. Functions of each Organelle, Transport of Substances across Biological Membrane Function. Redox potential, Oxidative phosphorylation.

UNIT-V

Chemical nature of Enzymes - study of the Properties of Enzymes and kinetics by Spectrophotometer. Diagnostic and therapeutic uses of Enzymes.

UNIT-VI

Carbohydrate, Protein & Lipid metabolism (Briefly), Nucleic Acid chemistry, Protein synthesis. Transcription and Translation, Replication, Polymerase Chain Reaction(PCR) Immunological Techniques or Immunoassay – Radio Immuno Assay

(RIA), Enzyme- Linked Immunosorbent Assay (ELISA), Chemiluminescence.

UNIT-VII

Blood Chemistry: Chemical Composition of Blood, Separation of Serum Proteins and lipoproteins by Electrophoresis and Ultracentrifugation Acid Base Balance and Biochemical Measurements of Acid-Base and Electrolyte status of the patients, Urine Analysis.

UNIT-VIII

General methods of biochemical analysis carried out in the estimation of blood constituents, such as glucose etc. Principles and different methods of chromatography – fluorometry, flame photometry, Automation and Biochemical Analysis. Applications of isotopes in biochemistry.

TEXT BOOKS

1. Robert Murray, Peter A. Mayes, Victor W. Rodwell, Daryl K. Granner, Harper's Biochemistry, 26th Edition, McGraw-Hill Companies, February 2003.
2. Jain & Jain, "Engineering Chemistry" Dhanpat Rai Publishing company, New Delhi.

REFERENCE

1. Rao, N. Mallikarjuna, Medical Biochemistry, New Age International Pvt Ltd, 2002.
2. Lalit M. Srivastava, Nibhriti Das & Subrata sinha, Essentials of practical Biochemistry, CBS Publishers, 1st edition, 2002.

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY
HYDERABAD**

II Year B.Tech. BME – I Semester

T P C
4+1 0 4

(BM05039) ANATOMY AND PHYSIOLOGY

UNIT-I

Skeletal system: classification of Bones, Joints and Muscles- Structure and function. Major Muscles of Limbs and their Actions. Functional Concept of the Human body, Bone and Muscle Physiology,

UNIT-II

Nervous system and special senses: Brain and spinal cord, Peripheral and Autonomic Nervous System, nerve physiology, Electroencephalogram and Electro-corticogram.
Anatomy and physiology of Eye and Ear.

UNIT-III

Cardiovascular system: heart, arterial and venous system, Performance Characteristics of Heart and Major Blood Vessels, Electrocardiography

UNIT-IV

Respiratory system: Trachea and Lungs. Respiratory Physiology.

UNIT-V

Endocrine System: Endocrine Glands, Physiology of Endocrine Regulatory System.

UNIT-VI

Digestive System: Oesophagus, Stomach, Intestines, Liver, Gall Bladder and Pancreas

UNIT-VII

Lymphatic system: Spleen, glands and Lymph nodes

UNIT-VIII

Reproductive and Urinary Systems: Male and Female. Counter Current Concept and its Application of Concentration Of Urine

REFERENCE:

1. Charles E. Tobin, Basic Human Anatomy, McGraw Hill, 1980.
2. J Gibson, Modern Physiology & Anatomy for Nurses; Black-well Scientific Publishers, 1981.
3. Best and Taylor, The Living Body; B. I Publication, 1980. .
4. C. Tandam & Dr. Chandramoli; Textbook of physiology for Dental studies. Dorpan Publications.
5. Gordon Sears, W. S & Winwood W. S; Anatomy & Physiology for Nurses, Revised edition

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY
HYDERABAD**

II Year B.Tech. BME – I Semester

T P C
4+1 0 4

(BM05082) BIOELECTRICITY AND ELECTRODES

UNIT-I

Bioelectricity generation at the cellular & sub cellular level. Different biopotentials and their characteristics.

UNIT-II

Nernst Equation: Derivations and its significance. Refractory Period Characteristics of Stimulus. Strength-Duration relationship. Electrical equivalent circuit of Axon. Membrane time and space constants.

UNIT-III

Hodgkin- huxley formulation, Membrane conductance, Nerve conduction, membrane properties from current voltage relations, Models of squid axon. Propagation of impulses in unmyelinated and myelinated nerve fiber. Electrical properties of receptors. Intensity-frequency relationship. Electrical properties of synaptic junctions - EPSP and IPSP.

UNIT-IV

Characteristics of Action potentials at SA Node, Atria, A V Node, Purkinje fibers and Ventricles. ECG Complexes. 12 lead ECG. Standard leads of Einthoven. Pericardial leads and Augmented limb leads. Relationship between unipolar extremity leads and standard Bipolar leads.

UNIT-V

Biopotential electrodes: classification & characteristics. Electrode-Electrolyte Interface. Equivalent Circuit Properties of Needle & Micro Electrodes. Electrodes for Surgery, Physiotherapy & Analytical Instruments.

UNIT-VI

Electrodes for ECG EEG EMG, EOG. Electrodes for surgery, physiotherapy and Analytical Instruments, Ion-sensitive electrodes used in Biochemistry analysers.

UNIT-VII

Electrical activity of skeletal muscles, Motor unit potentials, neuromuscular transmission, EMG wave form. Surface and needle electrodes for EMG. Velocity and their changes in normal and abnormal states. Fatigue and conduction, chemical significance. Gradation of muscular activity.

UNIT-VIII

Application of Bioelectric phenomena Forward, Inverse problems. Electro Encephalogram. Impedance Plethysmography, Measurement of Tissue Resistance.

TEXT BOOKS

1. Robert Plonsey and Roger Barr, Bioelectricity, McGraw Hill, 1986.
2. John Webster. Medical Instrumentation. - Application and Design. John Wiley and Sons. Inc., New York. Third edition 2003.

REFERENCE

1. Principles of Applied Biomedical Instrumentation by L. A Geddes, John Wiley & Sons, 1989.
2. Plonsey Robert and Flemming David G. Bioelectrical phenomena, McGraw Hill, 1969.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY
HYDERABAD
II Year B.Tech. BME – I Semester
(BM05043) APPLIED BIOCHEMISTRY LAB

T P C
0 3 2

1. Study of Plasma protein electrophoresis.
2. Study of Chromatography to separate amino acids in protein mixtures.
3. Study of Colorimetry.
4. Study of Spectrophotometry.
5. Study of pH meter
6. Study of Flame photometry-Analysis of Na and K in an unknown sample
7. Quantitative estimation of glucose.
8. Quantitative estimation of urea.
9. Quantitative estimation of creatinine
10. Quantitative estimation of Serum proteins, A/G Ratio
11. CSF Analysis
12. Clearance Tests – Demonstration.
13. Test for presence of (a) Reducing Sugars (b) Proteins. (c) Ketone Bodies. (d) Blood. (e) Bile Salts. (f) Bile Pigments.

(BM05040)ANATOMY AND PHYSIOLOGY LAB

1. Histology Practicals. Showing the slides of Primary tissues.
2. Demonstration of Brain Dissection.
3. Dissected Upper limbs & Lower limbs -Its demonstration.
4. Dissection of Pelvis and Pelvic Organs Abdomen and Abdominal Organs.
5. Dissection of thorax – showing heart & major blood vessels, lungs and respiratory system.
6. Recording of B. P. and Effects of Physical Exertion and Posture on this Parameter.
7. Recording Mechanical Response of the Muscle on Application of Induced Electric Signal,
8. Study of Rate of Conduction of Nerve Impulse.
9. Isolated frog's Heart Perfusion and Effect of Ions (Mg, Ca, K) using Slow Micro Injector (Demonstration).
10. Analysis of Na,K in an unknown sample using flame photometer (Demonstration).
11. Test of Hearing using Tuning Fork.
12. Recording of EMG, ECG, and EEG by Polygraph (Demonstration),

(HS05353)MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS**UNIT I****INTRODUCTION TO MANAGERIAL ECONOMICS**

Definition, Nature and Scope Managerial Economics–Demand Analysis: Demand Determinants, Law of Demand and its exceptions.

UNIT II**ELASTICITY OF DEMAND**

Definition, Types, Measurement and Significance of Elasticity of Demand. Demand Forecasting, Factors governing demand forecasting, methods of demand forecasting (survey methods, statistical methods, expert opinion method, test marketing, controlled experiments, judgmental approach to demand forecasting)

UNIT III**THEORY OF PRODUCTION AND COST ANALYSIS**

Production Function – Isoquants and Isocosts, MRTS, Least Cost Combination of Inputs, Production function, Laws of Returns, Internal and External Economies of Scale.

Cost Analysis: Cost concepts, Opportunity cost, Fixed Vs. Variable costs, Explicit costs Vs. Implicit costs, Out of pocket costs vs. Imputed costs. Break-even Analysis (BEA)-termination of Break-Even Point (simple problems)-Managerial Significance and limitations of BEA.

UNIT IV**INTRODUCTION TO MARKETS & PRICING STRATEGIES**

Market structures: Types of competition, Features of Perfect competition, Monopoly and Monopolistic Competition. Price-Output Determination in case of Perfect Competition and Monopoly. Pricing Strategies

UNIT V**BUSINESS & NEW ECONOMIC ENVIRONMENT**

Characteristic features of Business, Features and evaluation of Sole Proprietorship, Partnership, Joint Stock Company, Public Enterprises and their types, Changing Business Environment in Post-liberalization scenario.

UNIT VI

CAPITAL AND CAPITAL BUDGETING

Capital and its significance, Types of Capital, Estimation of Fixed and Working capital requirements, Methods and sources of raising finance. Nature and scope of capital budgeting, features of capital budgeting proposals, Methods of Capital Budgeting: Payback Method, Accounting Rate of Return (ARR) and Net Present Value Method (simple problems)

UNIT VII

INTRODUCTION TO FINANCIAL ACCOUNTING

Double-Entry Book Keeping, Journal, Ledger, Trial Balance- Final Accounts (Trading Account, Profit and Loss Account and Balance Sheet with simple adjustments).

UNIT VIII

FINANCIAL ANALYSIS THROUGH RATIOS

Computation, Analysis and Interpretation of Liquidity Ratios (Current Ratio and quick ratio), Activity Ratios (Inventory turnover ratio and Debtor Turnover ratio), Capital structure Ratios (Debt-Equity ratio, Interest Coverage ratio), and Profitability ratios (Gross Profit Ratio, Net Profit ratio, Operating Ratio, P/E Ratio and EPS).

TEXTBOOKS

1. Managerial Economics and Financial Analysis – Aryasri, TMH, 2/E, 2005.
2. Managerial Economics - Varshney & Maheswari, Sultan Chand, 2003.

REFERENCES

1. Financial Accounting for Management - Ambrish Gupta, Pearson Education, New Delhi, 2004.
2. Financial Accounting - Schaum's Outlines, Shim & Siegel, TMH, 2/E, 2004
3. Production and Operations Management – Chary, TMH, 3/e, 2004.
4. Managerial Economics In a Global Economy - Dominick Salvatore, Thomson, 4th Edition 2003.
5. Financial Accounting—A Managerial Perspective – Narayanaswamy, PHI, 2005
6. Managerial Economics - Peterson & Lewis, Pearson Education, 4th Edition, 2004
7. Managerial Economics & Financial Analysis - Raghunatha Reddy & Narasimhachary, Scitech, 2005.
8. Financial Accounting - S.N.Maheswari & S.K. Maheswari, Vikas, 2005.
9. Managerial Economics: Analysis, Problems and Cases - Truet and Truet, Wiley, 2004.
10. Managerial Economics – Dwived, Vikas, 6th Ed., 2002
11. Managerial Economics - Yogesh Maheswari, PHI, 2nd Ed., 2nd Ed. 2005.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY

HYDERABAD.

II Year B.Tech. BME - II Semester

T P C
4+1 0 4**(CE 05239) ENVIRONMENTAL STUDIES**

UNIT - I

Multidisciplinary nature of Environmental Studies: Definition, Scope and Importance – Need for Public Awareness.

UNIT - II

Natural Resources : Renewable and non-renewable resources – Natural resources and associated problems – Forest resources – Use and over – exploitation, deforestation, case studies – Timber extraction – Mining, dams and other effects on forest and tribal people – Water resources – Use and over utilization of surface and ground water – Floods, drought, conflicts over water, dams – benefits and problems - Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies. - Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies. - Energy resources: Growing energy needs, renewable and non-renewable energy sources use of alternate energy sources. Case studies. Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification. Role of an individual in conservation of natural resources. Equitable use of resources for sustainable lifestyles.

UNIT - III

Ecosystems : Concept of an ecosystem. - Structure and function of an ecosystem. - Producers, consumers and decomposers. - Energy flow in the ecosystem - Ecological succession. - Food chains, food webs and ecological pyramids. - Introduction, types, characteristic features, structure and function of the following ecosystem:

- a. Forest ecosystem
- b. Grassland ecosystem
- c. Desert ecosystem
- d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

UNIT - IV

Biodiversity and its conservation : Introduction - Definition: genetic, species and ecosystem diversity. - Bio-geographical classification of India - Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values - Biodiversity at global, National and local levels. - India as a mega-diversity nation - Hot-spots of biodiversity - Threats to biodiversity: habitat loss, poaching of wildlife,

man-wildlife conflicts. - Endangered and endemic species of India - Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

UNIT - V

Environmental Pollution : Definition, Cause, effects and control measures of :

- Air pollution
- Water pollution
- Soil pollution
- Marine pollution
- Noise pollution
- Thermal pollution
- Nuclear hazards

Solid waste Management : Causes, effects and control measures of urban and industrial wastes. - Role of an individual in prevention of pollution. - Pollution case studies. - Disaster management: floods, earthquake, cyclone and landslides.

UNIT - VI

Social Issues and the Environment : From Unsustainable to Sustainable development -Urban problems related to energy -Water conservation, rain water harvesting, watershed management -Resettlement and rehabilitation of people: its problems and concerns. Case Studies -Environmental ethics: Issues and possible solutions. -Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case Studies. -Wasteland reclamation. -Consumerism and waste products. -Environment Protection Act. -Air (Prevention and Control of Pollution) Act. -Water (Prevention and control of Pollution) Act -Wildlife Protection Act -Forest Conservation Act -Issues involved in enforcement of environmental legislation. -Public awareness.

UNIT - VII

Human Population and the Environment : Population growth, variation among nations. Population explosion - Family Welfare Programme. -Environment and human health. -Human Rights. -Value Education. -HIV/AIDS. -Women and Child Welfare. - Role of Information Technology in Environment and human health. -Case Studies.

UNIT - VIII

Field work : Visit to a local area to document environmental assets River /forest grassland/hill/mountain -Visit to a local polluted site-Urban/Rural/Industrial/ Agricultural Study of common plants, insects, birds. -Study of simple ecosystems-pond, river, hill slopes, etc.

TEXTBOOK :

Textbook of Environmental Studies for Undergraduate Courses by Erach Bharucha for University Grants Commission.

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY
HYDERABAD.**

II Year B.Tech. BME - II Semester

T P C
4+1 0 4

(EC05497) PULSE AND DIGITAL CIRCUITS

UNIT I**LINEAR WAVESHAPING**

High pass, low pass RC circuits, their response for sinusoidal, step, pulse, square and ramp inputs. RC network as differentiator and integrator, attenuators, its applications in CRO probe, RL and RLC circuits and their response for step input, Ringing circuit.

UNIT II**NON-LINEAR WAVE SHAPING**

Diode clippers, Transistor clippers, clipping at two independent levels, Transfer characteristics of clippers, Emitter coupled clipper, Comparators, applications of voltage comparators, clamping operation, clamping circuits using diode with different inputs, Clamping circuit theorem, practical clamping circuits, effect of diode characteristics on clamping voltage, Transfer characteristics of clampers.

UNIT III**SWITCHING CHARACTERISTICS OF DEVICES**

Diode as a switch, piecewise linear diode characteristics, Transistor as a switch, Break down voltage consideration of transistor, saturation parameters of Transistor and their variation with temperature, Design of transistor switch, transistor-switching times.

UNIT IV**MULTIVIBRATORS**

Analysis and Design of Bistable, Monostable, Astable Multivibrators and Schmitt trigger using transistors.

UNIT V**TIME BASE GENERATORS**

General features of a time base signal, methods of generating time base waveform, Miller and Bootstrap time base generators – basic principles, Transistor miller time base generator, Transistor Bootstrap time base generator, Current time base generators.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY

HYDERABAD.

II Year B.Tech. BME - II Semester

T P C
4+1 0 4

(EC05471) PRINCIPLES OF COMMUNICATIONS

UNIT VI
SYNCHRONIZATION AND FREQUENCY DIVISION

Principles of Synchronization, Frequency division in sweep circuit, Astable relaxation circuits, Monostable relaxation circuits, Synchronization of a sweep circuit with symmetrical signals, Sine wave frequency division with a sweep circuit.

UNIT VII

SAMPLING GATES

Basic operating principles of sampling gates, Unidirectional and Bi-directional sampling gates, Reduction of pedestal in gate circuits, Applications of sampling gates.

UNIT VIII

REALIZATION OF LOGIC GATES USING DIODES & TRANSISTORS

AND, OR gates using Diodes, Resistor, Transistor Logic, Diode Transistor Logic.

TEXT BOOKS

1. Pulse, Digital and Switching Waveforms - J. Millman and H. Taub, McGraw-Hill, 1991.
2. Solid State Pulse circuits - David A. Bell, PHI, 4th Edn., 2002.

REFERENCES

1. Pulse and Digital Circuits – A. Anand Kumar, PHI.
2. Wave Generation and Shaping - L. Strauss.
3. Pulse, Digital Circuits and Computer Fundamentals - R. Venkataraman.

UNIT I

Introduction : Block diagram of Electrical communication system, Radio communication : Types of communications, Analog, pulse and digital Types of signals, Fourier Transform for various signals, Fourier Spectrum, Power spectral density, Autocorrelation, correlation, convolution.

UNIT II

Amplitude Modulation : Need for modulation, Types of Amplitude modulation, AM, DSB SC, SSB SC, Power and BW requirements, generation of AM, DSB SC, SSB SC, Demodulation of AM : Diode detector, Product demodulation for DSB SC & SSB SC.

UNIT III

Angle Modulation : Frequency & Phase modulations, advantages of FM over AM, Bandwidth consideration, Narrow band and Wide band FM, Comparison of FM & PM.

UNIT IV

Pulse Modulations : Sampling, Nyquist rate of sampling; Sampling theorem for Band limited signals, PAM, regeneration of base band signal, PWM and PPM, Time Division Multiplexing; Frequency Division Multiplexing, Asynchronous Multiplexing.

UNIT V

Digital Communication : Advantages, Block diagram of PCM, Quantization, effect of quantization, quantization error, Base band digital signal, DM, ADM, ADPCM and comparison.

UNIT VI

Digital Modulation : ASK, FSK, PSK, DPSK, QPSK demodulation, coherent and incoherent reception, Modems.

UNIT VII

Information Theory : Concept of information, rate of information and entropy, Source coding for optimum rate of information, Coding efficiency, Shannon-Fano and Huffman coding.

UNIT VIII

Error control coding : Introduction, Error detection and correction codes, block codes, convolution codes.

TEXTBOOKS

1. Communication Systems Analog and Digital – R.P. Singh and SD Sapre, TMH, 20th reprint, 2004.
2. Principles of Communications – H. Taub and D. Schilling, TMH, 2003.

REFERENCES

1. Electronic Communication Systems – Kennedy and Davis, TMH, 4th edition, 2004.
2. Communication Systems Engineering – John. G. Proakis and Masoud Salehi, PHI, 2nd Ed. 2004.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY

HYDERABAD.

II Year B.Tech. BME - II Semester

T P C
4+1 0 4**(BM05064) BASIC CLINICAL SCIENCES-I****UNIT-I**

NEPHROLOGY: Principles of dialysis; Haemodialysis, Acetate dialysis, Bicarbonate dialysis, Peritoneal dialysis, Chronic ambulatory peritoneal dialysis, Haemoperfusion, Sequential ultra filtration. Haemofiltration, Adequacy of dialysis, Clearance, dialysance,

UNIT-II

Components of dialysing system, Dialysate, composition of dialysate, Types of dialysers; controls and monitoring devices for dialysers. Clinical significance. Renal transplantation: Basic principles.

UNIT-III

NEUROLOGY: Diseases of nervous system, spinal cord lesions, motor nervous disease, Prolapsed intravertebral disc, Neuropathies, Myasthenia gravis, Diseases of muscle.

UNIT-IV

DIAGNOSTIC INVESTIGATIONS IN NEUROLOGY. Electroencephalography, Computerized axial tomography, Angiography, Pneumoencephalography, neuromuscular stimulation, Electromyography. Clinical applications. Clinical significance, Diseases of muscle, Motor neuron disorders. The electrical study of reflexes. The silent period. The F response, The H reflex, The axon reflexes. Disorders of neuromuscular transmission

UNIT-V

CARDIOLOGY: Heart structure and function, Cardiac cycle, various valves and their function, Cardio vascular measurements. Prosthetic devices: Monitors. Heart lung machine applications and clinical significance. CVP and SWAN catheters. Electrocardiography: Source of ECG potentials: Dipole theory, conduction system, Normal and abnormal ECG's. Diagnostic applications, interpretation of ECG. Cardiopacing. Diagnostic indications. Criteria for selection. Therapeutic indications. Complications. Temporary pacing. Permanent pacing.

UNIT-VI

CARDIAC ASSIST DEVICES: Arterial and Ventricular fibrillation, application of cardiac assist devices. Cardiac catheterisation. Echocardiography. Cine angiography, Treadmill and Ergometer Applications and Clinical significance. Diagnostic usage of ultrasound scanners. Doppler ultrasound measurement. Clinical significance. Open heart surgery grafts, bypass surgery. Instrumentation used for open-heart surgery, Organization of I.C.C.U Clinical aspects.

UNIT-VII

GENERAL SURGERY: Surgical patient: Clinically significant investigations, Pre operative preparation. Study and operation of surgical equipment. Laparoscopy and its use in various surgeries

UNIT-VIII

GASTROENTROLOGY: Anatomy and physiology of G.I.T. clinically significant symptoms, signs and diseases. Nutritional support and parenteral therapy. Height and weight estimations according to age. Intravenous cannulae, I. V Sets, Infusion pumps, stomach wash tubes. Various endoscopic procedures, liver biopsy etc.

REFERENCE:

1. Diseases of kidney, vol. 1&2 Little Brown.
2. Physiological Approach to Clinical Neurology by Lance Mcleod
3. Cardio vascular assist devices
4. Rushmer , Cardio vascular Dynamics.
5. Dent. Stodel, tureoffe Surgical Endoscopy
6. Tean W. Salesh, Laproscopy

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY

HYDERABAD.

II Year B.Tech. BME - II Semester

T P C
4+1 0 4**(BM05101)BIOTRANSDUCERS AND APPLICATIONS****UNIT-I**

INTRODUCTION: Classification, Basic requirements of bio transducers, Quasi state effects (linearity, Hysteresis), Amplitude distortion, Phase distortion, Sampling errors, Input and Output impedance effects, Factors influencing the choice and design of the transducer in Measuring the Physiological Parameters.

UNIT-II

TEMPERATURE TRANSDUCERS (Measurement Principle, Design and Applications): Thermo resistive, Thermo electric, PN junction diode- Thermometers, frequency change temperature Transducers, Chemical Thermometry, Radiation Thermometry.

UNIT-III

DISPLACEMENT, TRANSDUCERS: Potentiometric Transducers: Resistive, Resistive strain gauges. L V. D. T, Inductive displacement transducer, Capacitive displacement transducers, Ultrasonic methods.

UNIT-IV

FORCE & VELOCITY TRANSDUCERS: Differentiation and Integration methods, Doppler system, Methods based on the mass bauer effect, Electro magnetic methods. Acceleration transducers: Piezo electric transducers

UNIT-V

PRESSURE TRANSDUCERS: Occlusive cuff methods. Force balance methods. Direct hydraulically coupled Catheter transducer system, Diaphragm displacement pressure transducers. Electrical transduction methods for Catheter tip transducer. Optical transducers. Implantable pressure transducer, Micro pressure transducer.

UNIT-VI

FLOW TRANSDUCERS: Flow probe design and application: Catheter tip electromagnetic Intra vascular probe & electronic system. Doppler shift flow meters,

Pressure gradient technique, Intra vascular Thermistor probe, Water filled plethysmography, Air filled plethysmography, Fick & Rapid Injection indicator dilution methods.

UNIT-VII

BIOTELEMETRY: Radio Telemetry principles, FM, AM, PCM. Transmission of biological data through radio telemetry. Single channel, multi channel systems. Block diagrams and functions of bio signal transmitters and receivers.

UNIT - VIII

Bioelectric Amplifiers - Different types of Bioelectric amplifiers, Principle of Operational Amplifier, Instrumentation Amplifier characteristics, Integrator, Differentiator, Log Amplifier and Antilog Amplifier. Signal Conditioning

TEXT BOOKS:

1. John Webster. Medical Instrumentation. - Application and Design. John Wiley and Sons. Inc., New York. Third edition 2003.
2. Tatsuo Togawa, Toshiyo Tamura & P, Ake Oberg, Biomedical Transducers and Instruments, CRC Press, Boca Raton, 1997.

REFERENCE:

1. Richard. S. C.Cobbold; Transducers for Biomedical Measurements- principles and application; Krieger pub Co, 1992
2. L. A.Geddes, L,E Baker, Principles of Applied Biomedical Instrumentation, John Wiley & Sons. 1989.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD.

II Year B. Tech. BME - II Semester

T P C
0 3 2

(EC05498) PULSE AND DIGITAL CIRCUITS LAB.

MINIMUM TWELVE EXPERIMENTS TO BE CONDUCTED :

1. Linear wave shaping.
2. Non Linear wave shaping – Clippers.
3. Non Linear wave shaping – Clampers.
4. Transistor as a switch.
5. Study of Logic Gates & Some applications.
6. Study of Flip-Flops & some applications.
7. Sampling Gates.
8. Astable Multivibrator.
9. Monostable Multivibrator.
10. Bistable Multivibrator.
11. Schmitt Trigger.
12. UJT Relaxation Oscillator.
13. Bootstrap sweep circuit.

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY
HYDERABAD.**

II Year B.Tech. BME - II Semester

T P C
0 3 2

(BM05557) TRANSDUCERS LAB

1. L.V.D.T & STRAIN GAUGE
Designing of Oscillator & proportional amplifier
2. Resistance Thermometry (R. T. D)
3. Thermister & Thermocouple
Designing of Bridge Circuit & Reference Junction Compensation Circuit
4. Photo Sensors: Photo Diode, Solar Cell, and Photo Transistor
5. pH Measurement
6. Pressure Measurement
Designing of Instrumentation Amp With Different Gains
7. Level Measurement
8. P. I. D
P.I, P.D, P. I. D
Designing Of Integrator & Differentiator Using Components
9. Op-Amp As Adder Subtractor
Designing of Adder & Subtractor Using Components
10. Speed Measurement
11. L. D. R & Piezo Electric Transducers
12. Inductive & Capacitive Pickup

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY
HYDERABAD.**

III Year B.Tech. BME - I Semester

T P C
4+1 0 4

(EC 05176) DIGITAL SIGNAL PROCESSING

UNIT I

INTRODUCTION

Introduction to Digital Signal Processing: Discrete time signals & sequences, linear shift invariant systems, stability, and causality. Linear constant coefficient difference equations. Frequency domain representation of discrete time signals and systems.

UNIT II

DISCRETE FOURIER SERIES

Properties of discrete Fourier series, DFS representation of periodic sequences, Discrete Fourier transforms: Properties of DFT, linear convolution of sequences using DFT, Computation of DFT.

UNIT III

FAST FOURIER TRANSFORMS

Fast Fourier transforms (FFT) - Radix-2 decimation in time and decimation in frequency, FFT Algorithms, Inverse FFT, FFT with General Radix.

UNIT IV

REALIZATION OF DIGITAL FILTERS

Applications of z-transforms, solution of difference equations of digital filters. System function, stability criterion, frequency response of stable systems. Realization of digital filters – direct, canonic, cascade and parallel forms, Lattice structures.

UNIT V

IIR DIGITAL FILTERS

Analog filter approximations – Butter worth and Chebyshev, Design of IIR Digital filters from analog filters, Bilinear transformation method, step and impulse invariance techniques, Spectral transformations.

UNIT VI**FIR DIGITAL FILTERS**

Characteristics of FIR Digital Filters, frequency response. Design of FIR Digital Filters using Window Techniques, Frequency Sampling technique, Comparison of IIR & FIR filters.

UNIT VII**MULTIRATE DIGITAL SIGNAL PROCESSING**

Decimation, interpolation, sampling rate conversion, filter design and implementation for sampling rate conversion.

UNIT VIII**INTRODUCTION TO DSP PROCESSORS**

Introduction to programmable DSPs: Multiplier and Multiplier Accumulator (MAC), Modified Bus Structures and Memory Access schemes in DSPs Multiple access memory, Multiport memory, VLSI Architecture, Pipelining, Special addressing modes, On-Chip Peripherals.

Examples: Features of TMS 320CXX Processors, Internal Architecture. External memory accesses, Pipeline operations, Peripherals.

TEXT BOOKS

1. Digital Signal Processing : Principals, Algorithms and Applications - Proakis, J.Gard and D.G.Manolakis, 3rd Edn.,PHI, 1996.
2. Fundamentals of Digital Signal Processing – Robert J. Schilling and Sandra L. Harris, Thomson, 2005.

REFERENCES

1. Discrete Time Signal Processing – A.V. Oppenheim and R.W. Schaffer, PHI, 1989.
2. Fundamentals of Digital Signal Processing – Loney Luderman.
3. Digital Signal Processing – S. Salivahanan et al., TMH, 2000.
4. Digital Signal Processing – Thomas J. Cavicchi, WSE, John Wiley, 2004.
5. Digital Signal Processors, Architecture, Programming & Applications, - B. Venkata Ramani, M. Bhaskar, TMH, 4th reprint, 2004.

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III Year B.Tech. BME - I Semester

T P C

4+1 0 4

(EC05342) LINEAR AND DIGITAL IC APPLICATIONS**UNIT I****INTEGRATED CIRCUITS**

Classification, chip size and circuit complexity, basic information of Op-amp, ideal and practical Op-amp, internal circuits, Op-amp characteristics, DC and AC characteristics, 741 op-amp and its features, modes of operation-inverting, non-inverting, differential.

UNIT II**OP-AMP APPLICATIONS**

Basic application of Op-amp, instrumentation amplifier, ac amplifier, V to I and I to V converters, sample & hold circuits, multipliers and dividers, Differentiators and Integrators. Comparators, Schmitt trigger, Multivibrators, introduction to voltage regulators, features of 723.

UNIT III**ACTIVE FILTERS & OSCILLATORS**

Introduction, 1st order LPF, HPF filters. Band pass, Band reject and all pass filters. Oscillator types and principle of operation – RC, Wien and quadrature type, waveform generators – triangular, sawtooth, square wave and VCO.

UNIT IV**TIMERS & PHASE LOCKED LOOPS**

Introduction to 555 timer, functional diagram, monostable and astable operations and applications, Schmitt Trigger. PLL - introduction, block schematic, principles and description of individual blocks of 565.

UNIT V**D-A AND A- D CONVERTERS**

Introduction, basic DAC techniques, weighted resistor DAC, R-2R ladder DAC, inverted R-2R DAC, and IC 1408 DAC, Different types of ADCs - parallel comparator type ADC, counter type ADC, successive approximation ADC and dual slope ADC. DAC and ADC specifications.

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III Year B.Tech. BME - I Semester T P C
4+1 0 4

(BM 05292) HOSPITAL SYSTEM MANAGEMENT

UNIT VI
Classification of Integrated circuits, comparison of various logic families, standard TTL NAND Gate- Analysis& characteristics, TTL open collector O/Ps, Tristate TTL, MOS & CMOS open drain and tristate outputs, CMOS transmission gate, IC interfacing- TTL driving CMOS & CMOS driving TTL .

UNIT VII

Design using TTL-74XX & CMOS 40XX series, code converters, decoders, Demultiplexers, decoders & drives for LED & LCD display. Encoder, priority Encoder, multiplexers & their applications, priority generators/checker circuits. Digital arithmetic circuits-parallel binary adder/subtractor circuits using 2's, Complement system. Digital comparator circuits.

UNIT VIII

SEQUENTIAL CIRCUITS

Flip-flops & their conversions. Design of synchronous counters. Decade counter, shift registers & applications, familiarities with commonly available 74XX & CMOS 40XX series of IC counters.
Memories: ROM architecture, types & applications, RAM architecture, Static & Dynamic RAMs, synchronous DRAMs.

TEXT BOOKS

1. Linear Integrated Circuits –D. Roy Chowdhury, New Age International (p) Ltd, 2nd Ed., 2003.
2. Op-Amps & Linear ICs – Ramakanth A. Gayakwad, PHI, 1987.

REFERENCES:

1. Operational Amplifiers and Linear Integrated Circuits – R.F. Coughlin and Fredrick F. Driscoll, PHI, 1977.
2. Operational Amplifiers and Linear Integrated Circuits: Theory and Applications –Denton J. Daibey, TMH.
3. Design with Operational Amplifiers and Analog Integrated Circuits - Sergio Franco, McGraw Hill, 3rd Ed., 2002.
4. Digital Fundamentals – Floyd and Jain, Pearson Education, 8th Edition, 2005.

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III Year B.Tech. BME - I Semester

T P C
4+1 0 4

(BM 05292) HOSPITAL SYSTEM MANAGEMENT

UNIT-I

Classification of Hospital Systems: General Hospital -Specialist Hospital -Teaching - Research, Primary Health Centre -Their role, Functions. Role of Biomedical Engineers

UNIT-II

Aspects of Hospital Services- Outpatient- Inpatient supportive emergency drug and medical supply Nursing Services Dietary services Transport services

UNIT-III

Hospital Planning -Location –Orientation, budgeting, communication with in the hospital outside the hospitals, electric power supply for various theatres and rooms, diesel generator, stand by power supply.

UNIT-IV

Air conditioning of important theatres and equipment housings, water supply requirements and management, lifts, fire fighting and equipments. Sanitation with in the hospitals, laundry services.

UNIT-V

Computer and Information Management in Hospitals: Computer aided hospital management: Application Administration/Discharge records of patient's -patients billing -maintenance of patients records, Their history, Maintenance of inventory of medicines and drugs - purchase.

UNIT-VI

Electrical Factors in Hospital Design, voltage stabilizer, uninterrupted power supply for intensive care units and computerised monitoring units-safety precautions.

UNIT-VII

Electrical factors in Hospital Design: Interference of systems, protection, grounding of ECG, EEG, ENG and other therapeutic equipments.

UNIT-VIII

Biomedical equipment services their purchase, servicing and maintenance -keeping intact and throwing the condemned equipment, Training of men for medical equipments, preventive and periodical maintenance procedures.

TEXT BOOKS

1. Hospital Administration and Management by S. I, GOEL & R KUMAR, deep and deep Publications, New Delhi.

REFERENCE:

1. Source book of Modern Technology for Hospitals and Health care by ASHOK SAHNI, ISHA, BANGALORE, 1992.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY

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III Year B.Tech. BME - I Semester

T P C
4+1 0 4**(BIM050065) BASIC CLINICAL SCIENCES -II****UNIT-I**

Orthopaedics: classification of joints, reduction replacements

UNIT-II

Pathology: general pathology, investigations.

Blood bank: blood groups, blood transfusion, exchange transfusion.

UNIT-III

Anaesthesia: general Anaesthesia, uptake of Anaesthetic gases and vapours, Pre-anaesthetic care and preparation. Postoperative care Laws of gases. Recommendations and preventions. Patient monitoring during surgery. Monitoring of respiration and temperature. Invasive and non-invasive monitoring, recent trends. Organization of theatres, CSSD..

UNIT-IV

Measurement of Intra vascular pressures. Blood flows. Plethysmography. Humidity and Temperature measurements, Clinical significance. Mechanism of Respiration, Gas exchange. Artificial respiration, Diagnostic and Therapeutic indications.

UNIT-V

Radio therapy: Principles of radiation oncology and cancer radio therapy. Perspective, Radio sensitivity and radio resistance of tumours and Tissues. Classification of Tumours according to cell Radio sensitivity. Cell survival theory. Oxygen effect. Cell repair, Radio curability of tumours. Therapeutic ratio. normal Tissue tolerance dose. Modification of radiation response Physical, chemical and Biomedical modifiers.

UNIT-VI

Management on radiation:.. Radioactive protection. Somatic effects, LD 50. Cause of radiation death skin blood and blood forming organs. Reproductive organs. Em-

byo late effects of radiation, Radiation carcinogenesis, leukaemogenesis. Categorical, Genetic effects. Hazards and permissible exposures. Maximum permissible occupational doses. Hazards in various branches of radiation. Protective lines of defence. Protective measures. Physical measurements and medical tests.

UNIT-VII

Nuclear medicine: determination of distribution of radioactive material with in the body. Organ imaging procedures central nervous system, cardio vascular system, respiratory system thyroid, liver, spleen, pancreas, skeletal system, kidney.

UNIT-VIII

Thyroid function studies, Tests for renal function, Body spaces, Haematological procedures, Blood flow. Gastro intestinal function. Radio immunoassay, Therapeutic uses of Radio isotopes, Thyroid diseases, Thyroid cancer, Polycythemia, meta static bone diseases. Malignancy, plural effusion and ascites.

TEXT BOOKS :

1. John Crawford adams Churchill, Outline of Orthopaedics and outline of Fractures.
2. Miller R. D., text book of anaesthesia

REFERENCE :

1. Meredith and Massey, Fundamental Physics of Radiology. Johns and Cunningham
2. Ramesh chandra The Physics of Radiology-An Introduction to Nuclear Medicine.

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III Year B.Tech. BME - I Semester

T P C
4+1 0 4**(BM 05083) BIOFLUIDS AND MECHANICS****UNIT-I**

BIO-FLUID MECHANICS: Newton's laws, Stress, Strain, Elasticity, Hooks-law, viscosity, Newtonian fluid, Non-Newtonian fluid, Viscoelastic fluids, vascular tree, Relationship between diameter, velocity and Pressure of blood flow, Resistance against flow.

UNIT-II

FLOW PROPERTIES OF BLOOD: Physical chemical and Rheological properties of blood. Apparent and relative viscosity,
Blood viscosity variation: Effect of shear rate, hematocrit, temperature, protein contents of blood. Casson's equation, Problems associated with extracorporeal blood flow.

UNIT-III

RHEOLOGY OF BLOOD IN MICROVESSELS: Fahraeus -Lindquist effect and inverse effect; distribution of suspended particles in a narrow rigid tube. Nature of red cells in tightly fitting tubes, hematocrit in very narrow tube

UNIT-IV

BIOVISCOELASTIC FLUID: Viscoelasticity, Viscoelastic models Maxwell, Voigt and Kelvin Models, Response to Harmonic variation, Use of viscoelastic models Bio-Viscoelastic fluids: Protoplasm, Mucus, Saliva, Synovial fluids.

UNIT-V

CARDIAC MECHANICS: Cardiovascular system. Mechanical properties of blood vessels: arteries, arterioles, capillaries and veins.
Blood flow: Laminar and Turbulent, Physics of cardiovascular diseases, Prosthetic heart valves and replacements.

UNIT-VI

RESPIRATORY MECHANICS: Alveoli mechanics, Interaction of Blood and Lung P. V curve of Lung. Breathing mechanism, Airway resistance, Physics of Lung diseases.

UNIT-VII

SOFT TISSUE MECHANICS: Pseudo elasticity, non-linear stress-strain relationship, Viscoelasticity, Structure, function and mechanical properties of skin, ligaments and tendons.

UNIT-VIII

ORTHOPEDIC MECHANICS: Mechanical properties of cartilage, diffusion properties of Articular cartilage, mechanical properties of bone, kinetics and kinematics of joints, Lubrication of joints.

TEXT BOOKS:

1. Y.C Fung, Biomechanics- Mechanical properties of living tissues, 2nd ed, Springer-Verlag, 1993.
2. D.O Cooney, Biomedical engineering Principles. Marcel Dekker, INC New York. 1976.

REFERENCE:

1. Silver Frederick H. Biomaterials, Medical Devices & Tissue Engineering: Chapman & Hall, London, 1994
2. Biomechanics by Nihanth ozkai
3. D.A Mc Donald, Blood flow in arteries, Edward Arnold ltd, 1998.

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III Year B.Tech. BME - I Semester

T P C
4+1 0 4

(BM 05088) BIOMEDICAL EQUIPMENT

UNIT-I

Bio Amplifiers and signal conditioning circuits.

RECORDERS & DISPLAY DEVICES: General features of Thermal, Ink Jet, Photographic, Dot Recorders. General features of Display Devices for Bio-Signals.

UNIT-II

Diagnostic Equipment:- E.C.G, T.M.T, E.E.G, E.M.G, P.F.T, Phono cardiography.

(Working principle, Types of Electrodes used, Calibration, Basic Trouble Shooting).
Ophthalmoscope, Retinoscope.

UNIT-III

Analytical equipment: pH Meter, Conductivity Meter, Electrophoresis, Chromatography, Flame Photo Meter, Spectro Photometer, Biochemistry Analysers, Electrolyte Analysers, Cell Counter, Blood Gas Analyser. (Working principle, Types of Electrodes. Calibration. Basic Trouble Shooting.)

UNIT-IV

MONITORING EQUIPMENT: Arrhythmia monitors, Holter monitor. Blood Pressure Monitors. Central monitoring stations in critical care units, Ambulatory monitors, foetal monitors. Incubator", Apnea monitors.

UNIT-V

THERAPEUTIC EQUIPMENT:-

Infusion pumps, Suction Apparatus.

Pacemaker: Synchronous -Asynchronous, External -Internal, Demand & Fixed type Pacemaker, Programmable Pacemakers.

Defibrillators: AC & DC Defibrillators. Synchronous & Asynchronous. Electrical Safety.

Nerve stimulators. Bladder stimulators. Implant able Stimulators, Short wave Diathermy, Micro wave Diathermy, Ultra Sound Diathermy

UNIT-VI

Heamo dialyser, Qualitative requirements, General scheme of operation, Types of exchangers. Block diagram, Electronic control and monitoring systems
Heart Lung machine: Governing principle, Qualitative Requirements, Functional details of thin film membrane type blood oxygenators.

I. A. B. P.- principle & application.

UNIT-VII

SURGICAL EQUIPMENT: electro surgical generators:- Unipolar, Bipolar. Hazards of electro surgical units & Safety measures. Anaesthesia delivery systems, Different types of Ventilators, Humidifiers, Nebulisers, Surgical microscope & O.T table

UNIT-VIII

Patient Electrical Safety, Types of Hazards. Natural protective Mechanism, Leakage current, Patient Isolation, Hazards in operation rooms. Grounding conditions in Hospital Environment.

TEXT BOOKS

1. Handbook of Bio Medical Instrumentation -R. S. Kandpur. 2003
2. Joseph .J. Carr, John M. Brown; introduction to biomedical equipment technology, Pearson.

REFERENCE:

1. John Webster. Medical Instrumentation.- Application and Design. John Wiley and Sons. Inc., New York. Third edition 2003.
2. Bio-Medical Instruments Theory & design. Welkowitz, Walter & Others. 2nd Edition, Academic Press, 1991

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III Year B.Tech. BME - I Semester

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(EC05301) IC APPLICATIONS LAB

1. 741 OPAMP Characteristics
2. Adder, Integrator and differentiator using 741 OPAMP
3. Function Generator using 741 OP AMP
4. IC 555 Timer –Astable Operation
5. IC 555 Timer – Monostable Operation
6. Study of Logic Gates
7. Study of Flip-Flops using ICs
8. Half Adder, Full Adder and Subtractor
9. Counters and Shift Registers & 7490 Counter
10. BCD to 7 Segment decoder using IC 7447
11. Voltage Regulator using IC 723
12. D/A Converter
13. A/D Converter
14. Multiplexer and Demultiplexer

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III Year B.Tech. BME - I Semester

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(BM05089) BIOMEDICAL EQUIPMENT LAB

STUDY, OPERATION AND TROUBLE SHOOTING OF:

1. ECG Monitor
2. EEG,EMG
3. Pace Maker
4. DC Defibrillator
5. Short Wave Diathermy Unit
6. Ultrasound Diathermy Unit
7. Safety Evaluation Circuits
8. Audiometer
9. Hearing Aids
10. Pneumo tachograph and signal conditioners (PFT)
11. Ultra Sound Scanner
12. Electro surgical generators.

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III Year B.Tech. BME - II Semester

T P C
4+1 0 4**(EC05574) VLSI DESIGN****UNIT I****INTRODUCTION**

Introduction to IC Technology – MOS, PMOS, NMOS, CMOS & BiCMOS technologies- Oxidation, Lithography, Diffusion, Ion implantation, Metallisation, Encapsulation, Probe testing, Integrated Resistors and Capacitors.

UNIT II**BASIC ELECTRICAL PROPERTIES**

Basic Electrical Properties of MOS and BiCMOS Circuits: I_{ds} - V_{ds} relationships, MOS transistor threshold Voltage, μ_m , μ_p , figure of merit Co : Pass transistor, NMOS Inverter, Various pull ups, CMOS Inverter analysis and design, Bi-CMOS Inverters.

UNIT III**VLSI CIRCUIT DESIGN PROCESSES**

VLSI Design Flow, MOS Layers, Stick Diagrams, Design Rules and Layout, $2 \mu_m$ CMOS Design rules for wires, Contacts and Transistors Layout Diagrams for NMOS and CMOS Inverters and Gates, Scaling of MOS circuits, Limitations of Scaling.

UNIT IV**GATE LEVEL DESIGN**

Logic Gates and Other complex gates, Switch logic, Alternate gate circuits, Basic circuit concepts, Sheet Resistance R_s and its concept to MOS, Area Capacitance Units, Calculations - t - Delays, Driving large Capacitive Loads, Wiring Capacitances, Fan-in and fan-out, Choice of layers

UNIT V**SUBSYSTEM DESIGN**

Subsystem Design, Shifters, Adders, ALUs, Multipliers, Parity generators, Comparators, Zero/One Detectors, Counters, High Density Memory Elements.

UNIT VI**SEMICONDUCTOR INTEGRATED CIRCUIT DESIGN**

PLAs, FPGAs, CPLDs, Standard Cells, Programmable Array Logic, Design Approach.

UNIT VII**VHDL SYNTHESIS**

VHDL Synthesis, Circuit Design Flow, Circuit Synthesis, Simulation, Layout, Design capture tools, Design Verification Tools, Test Principles.

UNIT VIII**CMOS TESTING**

CMOS Testing, Need for testing, Test Principles, Design Strategies for test, Chip-level Test Techniques, System-level Test Techniques, Layout Design for improved Testability.

TEXTBOOKS

- Essentials of VLSI circuits and systems – Kamran Eshraghian, Eshraghian Douglas and A. Pucknell, PHI, 2005 Edition.
- Principles of CMOS VLSI Design - Weste and Eshraghian, Pearson Education, 1999.

REFERENCES

- Chip Design for Submicron VLSI: CMOS Layout & Simulation, - John P. Uyemura, Thomson Learning.
- Introduction to VLSI Circuits and Systems - John .P. Uyemura, JohnWiley, 2003.
- Digital Integrated Circuits - John M. Rabaey, PHI, EEE, 1997.
- Modern VLSI Design - Wayne Wolf, Pearson Education, 3rd Edition, 1997.

HYDERABAD

III Year B.Tech. BME - II Semester **T P C**
4+1 0 4

(EC05400) MICROPROCESSORS AND INTERFACING**UNIT I**

An over view of 8085, Architecture of 8086 Microprocessor: Special functions of General purpose registers. 8086 flag register and function of 8086 Flags.

UNIT II

Addressing modes of 8086. Instruction set of 8086. Assembler directives, simple programs, procedures, and macros.

UNIT III

Assembly language programs involving logical, Branch & Call instructions, sorting, evaluation of arithmetic expressions, string manipulation.

UNIT IV

Pin diagram of 8086-Minimum mode and maximum mode of operation. Timing diagram. Memory interfacing to 8086 (Static RAM and EPROM). Need for DMA. DMA data transfer Method: Interfacing with 8237/8257.

UNIT V

8255 PPI – various modes of operation and interfacing to 8086. Interfacing Keyboard, Displays, Stepper Motor and actuators. D/A and A/D converter interfacing.

UNIT VI

Interrupt structure of 8086. Vector interrupt table. Interrupt service routines. Introduction to DOS and BIOS interrupts. 8259 PIC Architecture and interfacing cascading of interrupt controller and its importance.

UNIT VIII

Serial data transfer schemes. Asynchronous and Synchronous data transfer schemes. 8251 USART architecture and interfacing. TTL to RS 232C and RS232C to TTL conversion. Sample program of serial data transfer. Introduction to High-speed serial communications standards, USB.

UNIT VIII

8051 Microcontroller Architecture. Register set of 8051, Modes of timer operation, Serial port operation, Interrupt structure of 8051, Memory and I/O interfacing of 8051.

TEXT BOOKS

- Advanced microprocessor and Peripherals - A.K.Ray and K.M.Bhurchandi, TMH, 2000.
- Microprocessors and interfacing - Douglas V. Hall, TMH, 2nd Edition, 1999.

REFERENCES

- Micro computer systems, The 8086/8088 Family Architecture, Programming and Design - Y.Liu and G.A. Gibson, PHI, 2nd edition.
- Microprocessors 8086/ 8088 - Avatar singh and Triebel, PHI.
- Assembly Language Techniques for the IBM PC - Alan R. Miller, BPB. (for DOS and BIOS interrupts only)
- Micro Controllers - Rajkamal, Pearson Education, 2005.
- Design with PIC Micro Controllers – John B. Peatman, 2005.
- 8051 Micro Controllers – Dr. Rajiv Kapadia.
- 8086 Micro Processor - Kenneth J. Ayala, Penram International/ Thomson, 1995.
- 8051 Microcontroller - Kenneth J. Ayala, Penram International/ Thomson, 3rd Edition, 2005.

(BM05086) BIOLOGICAL CONTROL SYSTEMS**UNIT-I**

Dynamic Systems and their Control. Modelling and Block Diagrams. Open and Closed loop Systems.

UNIT-II

Principles and General Engineering Techniques of Feedback Control. Basic Closed Loop Relation. Closed Loop Dynamics of First Order and Second Order.

UNIT-III

System Stability and Compensation. Frequency Response and Techniques. Root Locus Method. Introduction to Non-linear Control.

UNIT-IV

Examples of Biological Control Systems. Pupil Control System. Visual Fixation System. Oculo-motor System.

UNIT-V

Skeletal Muscle Servomechanism. The Semicircular Canal. Free Swinging Limbs. Thermo Regulation.

UNIT-VI

Respiration Models and Controls. Cardiovascular Control Systems.

UNIT-VII

Sugar Level Control Mechanism. Endocrine Control System. Excretion Control.

UNIT-VIII

Human Operator Tracking Characteristics. Biological Receptors-Receptor Characteristics. Transfer Function Models of Receptors.

TEXT BOOKS

1. Ogata Katsuhika, Modern Control Engineering, Second Edition, Prentice Hall of India, 1992.
2. Michel C Khoo, Physiological Control Systems -Analysis, simulation and estimation, Prentice Hall of India, 2001.

REFERENCE:

1. Milsom John H. , Biological Control Systems Analysis, McGraw-Hill, 1996

(BM05340)LASERS AND FIBRE OPTICS IN MEDICINE**UNIT-I**

Laser – Properties, Laser interaction with tissues, Photo medicine & Photo biology lasers used for medical applications-CO₂, Ruby, Nd-YAG, Ar, Kr, He-Ne.

UNIT-II

Optical fibers – Coherent and incoherent bundles, Light transmission and image transmission systems in rigid and flexible endoscopes.

UNIT-III

Application of Lasers in Ophthalmology-laser refractor, laser accuracy testing, Laser treatment of Corneal ulcers, Laser Photo coagulators.

UNIT-IV

Laser & Fiber optics in Dermatology.

UNIT-V

Endoscopy: Bronchoscope, Gastroscope.

UNIT-VI

Laser and Fiber optics applications in surgery.

UNIT-VII

Laser and Fiber optics applications in Dentistry – Laser Induced carrier inhibition, Laser effects on Dental soft tissues.

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UNIT-VIII

Standards, Potential Hazards of lasers, safety regulations and precautions. Medical surveillance.

III Year B.Tech. BME - II Semester

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(BM05091) BIOMEDICAL SIGNAL PROCESSING**TEXT BOOK**

1. Biomedical Aspects of the Laser, by Leon Goldman, Springer verlaac, 1967

UNIT-I

Discrete and continuous Random variables, Probability distribution and density functions. Gaussian and Rayleigh density functions, Correlation between random variables.

REFERENCE:

1. Laser Applications in Medicine and Biology vol I, II, III Plenum Press, (1971 & 1974) by M. L. Wel Basht.
2. Laser Hand Book, Vol 11, Academic Press London (1972) by F. T. Arrechi
3. Introduction to Lasers and Their Applications by Osha callen and Rhodes, Addison . Wesley- 1977.
4. Lasers in Photo medicine and Photo Biology by E. D. R. Pratesi & C. A Sacchi, Springer verlaac 1980.
5. Lasers in Medicine by H. K. Koebmer, john Willy & sons, 1980.

UNIT-II

Stationary random process, Ergodicity, Power spectral density and autocorrelation function of random processes. Noise power spectral density analysis, Noise bandwidth, noise figure of systems.

UNIT-III

Data Compression Techniques: Lossy and Lossless data reduction Algorithms. ECG data compression using Turning point, AZTEC, CORTES, Hoffman coding, vector quantisation, DCT and the K L transform.

UNIT-IV

Cardiological Signal Processing: Pre-processing, QRS Detection Methods. Rhythm analysis: Arrhythmia Detection Algorithms. Automated ECG Analysis. ECG Pattern Recognition. Heart rate variability analysis.

UNIT-V

Adaptive Noise Canceling: Principles of Adaptive Noise Canceling. Adaptive Noise Canceling with the LMS Adaptation Algorithm. Noise Canceling Method to Enhance ECG Monitoring: Fetal ECG Monitoring.

UNIT-VI

Signal Averaging, polishing – mean and trend removal, Prony's method. Linear prediction. Yule – walker ($Y-W$) equations.

UNIT-VII

Neurological Signal Processing: Modeling of EEG Signals. Detection of spikes and spindles Detection of Alpha, Beta and Gamma Waves. Auto Regressive(A.R.) modeling of seizure EEG. Sleep Stage analysis. Inverse Filtering. Least squares and polynomial modeling.

UNIT-VIII

Original Prony's Method. Prony's Method based on the Least Squares Estimate. Analysis of Evoked Potentials.

TEXT BOOKS

1. Rangaraj M. Rangayyan – Biomedical Signal Analysis. IEEE Press, 2001.
2. D.C.Reddy, Biomedical Signal Processing- principles and techniques, Tata McGraw-Hill, 2005.

REFERENCE:

1. Weikunat R, Digital Bio signal Processing, Elsevier, 1991.
2. Akay M, Biomedical Signal Processing, Academic: Press 1994
3. Biomedical digital Signal Processing, willis J.Tompkins, PHI,
4. Cohen,A, Biomedical Signal Processing -Vol. I Time & Frequency Analysis, CRC Press, 1986.

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III Year B.Tech. BME - II Semester

T P C
4+1 0 4**(BM05380)MEDICAL IMAGING TECHNIQUES****UNIT-I**

Fundamentals of X-ray: Electromagnetic Radiation, Interactions between X-rays and Matter, Intensity of an X-ray Beam, Attenuation. Generation and Detection of X-rays: X-ray Generation, Filters, Beam Restrictors and Grids, Intensifying Screens Fluorescent Screens, X-ray detectors.

UNIT-II

X-Ray Image Characteristics: Spatial Resolution, Image Noise, Image Contrast, Receiver Operating Curve (ROC), Image Subtraction, Digital Radiography. X-ray diagnostic methods, Biological effects of ionising radiation.

UNIT-III

Conventional Tomography, Longitudinal Section Tomography, Computed Tomography, Reconstruction Techniques: Algebraic, Iterative reconstruction Techniques, Radon Transform and its applications. Back Projection, Filter Back Projection Algorithms.

UNIT-IV

Radio Nuclide Imaging: Fundamentals of Radioactivity, Generation and Detection of Nuclear Emission, Diagnostic Methods using Radiation Detector. Radio Nuclide Imaging Systems: SPECT, PET, Attenuation compensation. Characteristics of Radio nuclide Images, Internal Radiation, Dosimetry and Biological effects.

UNIT-V

Fundamentals of Acoustic Propagation: Reflection and Refraction, Attenuation, Absorption, Scattering, Non linearity Parameter and Doppler effect. Image Characteristics: Ultrasonic Texture, Speckle reduction, Compensation of Phase Aberration, Tissue Characterization. Transducer Beam Characteristics, Axial and Lateral Resolution, Focusing arrays.

UNIT-VI

Ultrasonic Diagnostic Methods: Pulse-Echo Systems, Transmission Methods, Doppler Methods, Duplex Methods, Duplex Imaging. Biological effects due to Ultrasound.

UNIT-VII

Magnetic Resonance Imaging: Fundamentals of Nuclear Magnetic Resonance, Fourier Spectrum of the NMR Signal, Spin Density, Relaxation Times, Pulse Sequences.

Generation and Detection of NMR signal: Magnetic field Gradients, The NMR Coil/Probe, The Transmitter, and The Receiver.

UNIT-VIII

Characteristics of Magnetic Resonance Imaging: Spatial Resolution, Image contrast.

Imaging Methods: Data Acquisition, Spin Echo Imaging, Gradient Echo Imaging, Blood Flow Imaging, NMR Spectroscopy, Sensitivity and Resolution, Imaging Safety, Biological Effects of Magnetic Fields.

TEXT BOOK

1. K.Kirk Shung, Michael B. Smith, Benjamin Tsui. Principles of Medical Imaging., Pub : Academic Press, 1992

REFERENCE:

1. Avinash C. Kak, Principles of Computerised Tomographic Imaging, IEEE PRESS
2. Rangaraj M. Rangayyan, Biomedical Image Analysis", CRC Press, Boca Raton, FL, 2005.

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III Year B.Tech. BME - II Semester

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(EC05401) MICROPROCESSORS LAB**I. Microprocessor 8086**

1. Introduction to MASM/TASM.
2. Arithmetic operation – Multi byte Addition and Subtraction, Multiplication and Division – Signed and unsigned Arithmetic operation, ASCII – arithmetic operation.
3. Logic operations – Shift and rotate – Converting packed BCD to unpacked BCD, BCD to ASCII conversion.
4. By using string operation and Instruction prefix: Move Block, Reverse string, Sorting, Inserting, Deleting, Length of the string, String comparison.
5. DOS/BIOS programming: Reading keyboard (Buffered with and without echo) – Display characters, Strings.

II. Interfacing

1. 8259 – Interrupt Controller :- Generate an interrupt using 8259 timer.
2. 8279 – Keyboard Display :- Write a small program to display a string of characters.
3. 8255 – PPI :- Write ALP to generate sinusoidal wave using PPI.
4. 8251 – USART :- Write a program in ALP to establish Communication between two processors.

III. Microcontroller 8051

1. Reading and Writing on a parallel port.
2. Timer in different modes.
3. Serial communication implementation.

(BM05092) BIOMEDICAL SIGNAL PROCESSING LAB

1. Computation of Convolution and Correlation Sequences.
2. Analog and Digital Signal Conditioning.
3. Signal Averaging Improvement in the SNR Using Coherent Averaging.
4. Signal Averaging Improvement in the SNR Using Incoherent Averaging.
5. Exponential Averaging.
6. Data Polishing: Mean and Trend Removal.
7. Design of IIR Filter.
8. Design of FIR Filter.
9. PSD Estimation.
10. Data Compression Techniques: AZTEC, TP.
11. Data Compression Technique: CORTES.
12. Data Compression Technique: K. L. Transform.

Using Matlab and other tool boxes

(CS05138) COMPUTER NETWORKS**UNIT I**

Introduction: OSI, TCP/IP and other networks models, Examples of Networks: Novell Networks, Arpanet, Internet, Network Topologies WAN, LAN, MAN.

UNIT II

Physical Layer: Transmission media copper, twisted pair wireless, switching and encoding asynchronous communications; Narrow band, broad band ISDN and ATM.

UNIT III

Data link layer: Design issues, framing, error detection and correction, CRC, Elementary Protocol-stop and wait, Sliding Window, Slip, Data link layer in HDLC, Internet, ATM.

UNIT IV

Medium Access sub layer: ALOHA, MAC addresses, Carrier sense multiple access. IEEE 802.X Standard Ethernet, wireless LANs. Bridges.

UNIT V

Network Layer: Virtual circuit and Datagram subnets-Routing algorithm shortest path routing, Flooding, Hierarchical routing, Broad cast, Multi cast, distance vector routing.

UNIT VI

Dynamic routing – Broadcast routing. Rotary for mobility. Congestion, Control Algorithms – General Principles – of Congestion prevention policies. Internet Working: The Network layer in the internet and in the ATM Networks.

UNIT VII

Transport Layer: Transport Services, Connection management, TCP and UDP protocols; ATM AAL Layer Protocol.

UNIT VIII

Application Layer – Network Security, Domain Name System, SNMP, Electronic Mail; the World WEB, Multi Media.

TEXT BOOKS

1. Computer Networks — Andrew S Tanenbaum, 4th Edition. PHI/Pearson Education.
2. Data Communications and Networking – Behrouz A. Forouzan.. third Edition TMH.

REFERENCES

1. An Engineering approach to Computer Networks – S. Keshav, 2nd Edition, Pearson Education.
2. Understanding Communications and Networks, W.A.Shay, Thomson

(CS05049) ARTIFICIAL NEURAL NETWORKS**UNIT I****INTRODUCTION TO ARTIFICIAL NEURAL NETWORKS**

Introduction, Artificial Neural Networks, Historical Development of Neural Networks, Biological Neural Networks, Comparison Between Brain and the Computer, Comparison Between Artificial and Biological Neural Networks, Network Architecture, Setting the Weights, Activation Functions, Learning Methods.

UNIT II**FUNDAMENTAL MODELS OF ARTIFICIAL NEURAL NETWORKS**

Introduction, McCulloch – Pitts Neuron Model, Architecture, Learning Rules, Hebbian Learning Rule, Perceptron Learning Rule, Delta Learning Rule (Widrow-Hoff Rule or Leastmean Square (LMS) rule, Competitive Learning Rule, Out Star Learning Rule, Boltzmann Learning, Memory Based Learning.

UNIT III**FEED FORWARD NETWORKS**

Introduction, Single Layer Perceptron Architecture, Algorithm, Application Procedure, Perceptron Algorithm for Several Output Classes, Perceptron Convergence Theorem, Brief Introduction to Multilayer Perceptron networks, Back Propagation Network (BPN), Generalized Delta Learning Rule, Back Propagation rule, Architecture, Training Algorithm, Selection of Parameters, Learning in Back Propagation, Application Algorithm, Local Minima and Global Minima, Merits and Demerits of Back Propagation Network, Applications, Radial Basis Function Network (RBFN), Architecture, Training Algorithm for an RBFN with Fixed Centers.

UNIT IV**ADALINE AND MADALINE NETWORKS**

Introduction, Adaline Architecture, Algorithm, Applications, Madaline, Architecture, MRI Algorithm, MRII Algorithm.

UNIT V**COUNTER PROPAGATION NETWORKS**

Winner Take – all learning, out star learning, Kohonen Self organizing network, Grossberg layer Network, Full Counter Propagation Network (Full CPN), Architecture, Training Phases of Full CPN, Training Algorithm, Application Procedure, Forward Only counter Propagation Network, Architecture, Training Algorithm, Applications, Learning Vector Quantizer (LVQ).

UNIT VI**ASSOCIATIVE MEMORY NETWORKS - I**

Types, Architecture, Continuous and Discrete Hopfield Networks, Energy Analysis, Storage and Retrieval Algorithms, Problems with Hopfield Networks.

UNIT VII**ASSOCIATIVE MEMORY NETWORKS – II**

Boltzman Machine, Bidirectional Associative Memory, Adaptive Resonance Theory Networks Introduction, Architecture, Algorithm.

UNIT VIII**APPLICATIONS OF NEURAL NETWORKS**

Implementation of A/D Converter using Hopfield Network, Solving Optimization Problems, Solving Simultaneous Linear Equation, Solving Traveling Salesman Problems using Hopfield Networks, Application in Pattern Recognition, Image Processing,

TEXT BOOKS

1. Introduction to Artificial Neural Systems - J.M.Zurada, Jaico Publishers, 3rd Edition.
2. Introduction to Neural Networks Using MATLAB 6.0 - S.N. Shivanandam, S. Sumati, S. N. Deepa, TMH.

REFERENCES

1. Elements of Artificial Neural Networks - Kishan Mehrotra, Chelkuri K. Mohan, and Sanjay Ranka, Penram International.
2. Artificial Neural Network – Simon Haykin, Pearson Education, 2nd Ed.
3. Fundamental of Neural Networks – Laurene Fausett, Pearson, 1st Ed.
4. Artificial Neural Networks - B. Yegnanarayana, PHI.

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(CS05303)IMAGE PROCESSING AND PATTERN RECOGNITION**UNIT-I**

Basic Concepts, Pattern Recognition Systems, Fundamental Problems in pattern recognition system design, Design concepts and Methodologies – Character recognition – Speech recognition – Finger print Recognition – Pattern Recognition Model.

UNIT – II:

Decision Functions – Linear Decision functions – Distance functions, Minimum distance classification, clustering concepts, Cluster seeking algorithms, Maximum distance, K- means Algorithms.

UNIT – III:

Bayes classified decision function – For Baye's classifier Baye's Classifier for normal patterns. Trainable pattern classifiers – deterministic approach, perception approach reward – punishment concept.

UNIT – IV:

Gradient approach – Gradient Descent algorithms – LMSE Algorithms – Multi category classification.

UNIT – V:

Trainable pattern classifiers, statistical approach – stochastic approximation methods, Robbin Minro algorithms – Increment correction algorithms, LMSE algorithms, Syntactic patter recognition – formulation – syntax directed recognition – picture describe.

UNIT – VI:

Digital Image fundamentals: Representation, elements – image transforms - Fast Fourier transform, DCT and DWT.

UNIT – VII:

Image enhancement: Spatial domain - frequency domain methods – Histogram, Modification techniques – Image Smoothing, image sharpening.

UNIT – VIII:

Image encoding - Fidelity criteria, Encoding process, Mapping – Quantizer coder – Image Segmentation – Masks – Point detection – Line Detection – Edge Detection.

TEXT BOOKS:

1. Digital Image Processing – by R.C. Gonzalez & R.E. Woods, Addison Wesley.
2. Pattern Recognition Principles – J.T.TOU.R.C. Gonzalez, Addison Wesley.

REFERENCE:

1. Fundamentals of Digital Image Processing – by A.K. Jain, PHI Pearson Education

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(BM05503) REHABILITATION ENGINEERING**UNIT-I**

Engineering concepts in rehabilitation Engineering.

Anthropometry: Methods for Static and dynamic Measurements: Area Measurements, Measurement of characteristics and movement, Measurement of Muscular Strength and Capabilities.

Measurement tools and processes in Rehabilitation engineering: fundamental principles, structure, function; performance and behaviour. Subjective and objective measurement methods.

UNIT-II

Ergonomic aspects in designating devices: Introduction to Models in Process Control, Design of Information Devices, Traditional Devices, V,D,U' s, Using colour, Design of Controls

UNIT-III

Engineering concepts in sensory rehabilitation Engineering.

Sensory augmentation and substitution:

Visual system: Visual augmentation, Tactual vision substitution, and Auditory vision substitution.

Auditory system: Auditory augmentation, Audiometer, *Hearing aids*, cochlear implantation, visual auditory substitution, tactual auditory substitution, Tactual system: Tactual augmentation, Tactual substitution,

UNIT-IV

ARTIFICIAL LARYNX (pneumatic & electronic): Analyzing artificial electronic larynx speech.

Augmentative communication, control and computer access (AAC): user interface; outputs; acceleration techniques; Intervention and other issues;

UNIT-V

Orthopedic Prosthetics and Orthotics in rehabilitation:

Engineering concepts in motor rehabilitation, applications. Computer Aided Engineering in Customized Component Design. Intelligent prosthetic knee. A hierarchically controlled prosthetic hand. A self-aligning orthotic knee joint. Externally powered and controlled Orthotics and Prosthetics.

FES systems-Restoration of hand function, restoration of standing and walking, Hybrid Assistive Systems (HAS).

UNIT-VI

Active Prostheses: Active above knee prostheses. Myoelectric hand and arm prostheses-different types, block diagram, signal flow diagram and functions. The MARCUS intelligent Hand prostheses

UNIT-VII

Robotic manipulation aids: modes of operation and control.

Environmental control systems: Environmental control and Access to computers.

UNIT-VIII

Computer applications in Rehabilitation engineering: Interfaces in compensation for visual perception. Improvement of orientation and mobility, Computer assisted lip reading, Brain computer interface.

TEXTBOOK

1. Bronzino, Joseph; Handbook of biomedical engineering, 2nd edition, CRC Press, 2000.

REFERENCE:

1. Horita- Nochohrai Teodorecu, L.C.Jain , intelligent systems and technologies in rehabilitation engineering; CRC; December 2000.
2. Robnson C.J Rehabilitation engineering. CRC press 1995
3. Etienne Grandjean, Harold Oldroyd, Fitting the task to the man, Taylor & Francis, 1988.

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(CS05435) OPERATING SYSTEMS
(ELECTIVE - I)

UNIT I

Computer System and Operating System Overview; Overview of Computer System hardware – Instruction execution – I/O function – Interrupts – Memory hierarchy – I.O Communication techniques. Operating System Objectives and functions – Evaluation of operating System – Example Systems.

UNIT II

Process Description – Process Control-process states – Process and Threads - Examples of Process description and Control.

UNIT III

Concurrency: Principles of Concurrency – Mutual Exclusion – Software and hardware approaches – semaphores – Monitors – Message Passing – Readers Writers Problem.

UNIT IV

Principles of deadlock – deadlock prevention, detection and avoidance dining philosophers problem – example Systems.

UNIT V

Memory Management: Memory Management requirements – loading programmes in to main memory – virtual memory – hardware and Control structures – OS Software – Examples of Memory Management.

UNIT VI

Uniprocessor Scheduling: Types of Scheduling – Scheduling algorithms – I/O management and Disc Scheduling – I/o devices – organization – of I/O function – OS design issues – I/O buffering – Disk I/O – disk scheduling Policies – examples System.

UNIT VII

File Management and Security: Overview of file management – file organization and access – File Directories – File sharing – record blocking – secondary Storage Management – example system.

UNIT VIII

Security: Security threats – Protection – intruders – Viruses – trusted System.

TEXT BOOKS

1. Operating Systems' – Internal and Design Principles, Fifth Edition–2005, Pearson education./PHI
2. Operating System Principles- Abraham Silberchatz, Peter B. Galvin, Greg Gagne, 7th Edition John Wiley

REFERENCES

1. Operating Systems A design approach - Crowley, TMH.
2. Modern Operating Systems, Andrew S Tanenbaum. 2nd Edition, PHI/PEARSON

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(EC05399) MICROCONTROLLERS AND APPLICATIONS

(ELECTIVE – I)

UNIT I**OVERVIEW OF ARCHITECTURE AND MICROCONTROLLER RESOURCES**

Architecture of a microcontroller – Microcontroller resources – Resources in advanced and next generation microcontrollers – 8051 microcontroller – Internal and External memories – Counters and Timers – Synchronous serial-cum-asynchronous serial communication - Interrupts.

UNIT II**8051 FAMILY MICROCONTROLLERS INSTRUCTION SET**

Basic assembly language programming – Data transfer instructions – Data and Bit-manipulation instructions – Arithmetic instructions – Instructions for Logical operations on the set among the Registers, Internal RAM, and SFRs – Program flow control instructions – Interrupt control flow.

UNIT III**REAL TIME CONTROL : INTERRUPTS**

Interrupt handling structure of an MCU – Interrupt Latency and Interrupt deadline – Multiple sources of the interrupts – Non-maskable interrupt sources – Enabling or disabling of the sources – Polling to determine the interrupt source and assignment of the priorities among them – Interrupt structure in Intel 8051.

UNIT IV**REAL TIME CONTROL : TIMERS**

Programmable Timers in the MCU's – Free running counter and real time control – Interrupt interval and density constraints.

UNIT V**SYSTEMS DESIGN : DIGITAL AND ANALOG INTERFACING METHODS**

Switch, Keypad and Keyboard interfacing – LED and Array of LEDs – Keyboard-

cum-Display controller (8279) – Alphanumeric Devices – Display Systems and its interfaces – Printer interfaces – Programmable Instruments interface using IEEE 488 Bus – Interfacing with the Flash Memory – Interfaces – Interfacing to High Power Devices – Analog input interfacing – Analog output interfacing – Optical motor shaft encoders – Industrial control – Industrial process control system – Prototype MCU based Measuring instruments – Robotics and Embedded control – Digital Signal Processing and Digital Filters.

UNIT VI

REAL TIME OPERATING SYSTEM FOR MICROCONTROLLERS

Real Time operating system – RTOS of Keil (RTX51) – Use of RTOS in Design – Software development tools for Microcontrollers.

UNIT VII

16-BIT MICROCONTROLLERS

Hardware – Memory map in Intel 80196 family MCU system – IO ports – Programmable Timers and High-speed outputs and input captures – Interrupts – instructions.

UNIT VIII

ARM 32 Bit MCUs

Introduction to 16/32 Bit processors – ARM architecture and organization – ARM / Thumb programming model – ARM / Thumb instruction set – Development tools.

TEXT BOOKS

1. Microcontrollers Architecture, Programming, Interfacing and System Design – Raj Kamal, Pearson Education, 2005.
2. The 8051 Microcontroller and Embedded Systems – Mazidi and Mazidi, PHI, 2000.

REFERENCES

1. Microcontrollers (Theory & Applications) – A. V. Deshmuk, WTMH, 2005.
2. Design with PIC Microcontrollers – John B. Peatman, Pearson Education, 2005.

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(BM05202) ELECTRO MAGNETIC INTERFERENCE AND COMPATIBILITY TECHNIQUES

(Elective-I)

UNIT-I

Sources of EMI -Intersystem and Intrasystem: EMI Prediction and Modeling; Cross talk, Cable wire and Coupling; Shielding Materials; Grounding Materials; Grounding and Bounding.

UNIT-II

Receiver Models of EMI Prediction: Types of Emissions; Amplitude Culling; Frequency Culling; Detail Prediction and Performance Prediction of Various Emissions.

UNIT-III

Receiver EMI Functions, Receiver Models for Amplitude culling, Frequency Culling, Detail Prediction and Performance Prediction.

UNIT-IV

Antenna Models for EMI Prediction: Antenna EMI Prediction Considerations. Antenna Models for Amplitude Culling, Frequency Culling and Detail Prediction, Propagation Models for EMI Prediction.

UNIT-V

Propagation Considerations, Propagation Models for Amplitude Culling. Propagation Models and Detail Predictions.

UNIT-VI

EMI Measurements -Open area test site Measurements, Measurement Precautions: Radiated and Conducted Interference Measurements: Control Requirements and test methods.

UNIT-VII

EMI filter Characteristics of LPF, HPF, BPF, BEF. EMI standards-Military and Industrial Standards, FCC Regulations.

UNIT-VIII

EMI/EMC Standards.

REFERENCES :

1. Duff William G. and White Donald .R.J Series on ELECTROMAGNETIC INTERFERENCE AND COMPATIBILITY Vol 5, EMI Prediction and Analysis Technique, 1972.
2. Kodali Prasad V. ENGINEERING ELECTROMAGNETIC COMPATIBILITY, IEEE Press, 1996.
3. Weston David A. ELECTROMAGNETIC COMPATIBILITY. Principles and Applications, 1991.
4. PRINCIPLES OF ELECTROMAGNETIC COMPATIBILITY. Artech House, 1987

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(EC05215) EMBEDDED AND REAL TIME SYSTEMS

(Elective-II)

UNIT-I

INTRODUCTION

Embedded systems overview, design challenge, processor technology, IC technology, Design Technology, Trade-offs. Single purpose processors RT-level combinatorial logic, sequential logic (RT-level), custom single purpose processor design (RT-level), optimizing custom single purpose processors.

UNIT II

GENERAL PURPOSE PROCESSORS

Basic architecture, operation, Pipelining, Programmer's view, development environment, Application Specific Instruction-Set Processors (ASIPs) – Micro Controllers and Digital Signal Processors.

UNIT III

STATE MACHINE AND CONCURRENT PROCESS MODELS

Introduction, models Vs. languages, finite state machines with data path model (FSMD), using state machines, program state machine model (PSM), concurrent process model, concurrent processes, communication among processes, synchronization among processes, implementation, data flow model, real-time systems.

UNIT IV

COMMUNICATION INTERFACE

Need for communication interfaces, RS232 / UART, RS422 / RS485, USB, Infrared, IEEE 1394 Firewire, Ethernet, IEEE 802.11, Blue tooth.

UNIT V

EMBEDDED / RTOS CONCEPTS – I

Architecture of the Kernel, Tasks and Task scheduler, Interrupt service routines, Semaphores, Mutex.

UNIT VI

EMBEDDED / RTOS CONCEPTS – II

Mailboxes, Message Queues, Event Registers, Pipes, Signals

UNIT VII

EMBEDDED / RTOS CONCEPTS – III

Timers, Memory Management, Priority inversion problem, Embedded operating systems Embedded Linux, Real-time operating systems, RT Linux, Handheld operating systems, Windows CE.

UNIT VIII

DESIGN TECHNOLOGY

Introduction, Automation, Synthesis, Parallel evolution of compilation and synthesis, Logic Synthesis, RT synthesis, Behavioral Synthesis, Systems Synthesis and Hardware/ Software Co-Design, Verification, Hardware/Software co-simulation, Reuse of intellectual property codes.

TEXT BOOKS

1. Embedded System Design – A Unified Hardware/Software Introduction - Frank Vahid, Tony D. Givargis, John Wiley, 2002.
2. Embedded / Real Time Systems – KVKK Prasad, Dreamtech Press, 2005.

REFERENCES

1. Embedded Microcomputer Systems – Jonathan W. Valvano, Brooks / Cole, Thompson Learning.
2. An Embedded Software Primer – David E. Simon, Pearson Ed., 2005.
3. Introduction to Embedded Systems – Raj Kamal, TMS, 2002.

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(BM05382) MEDICAL INFORMATICS

(Elective-II)

UNIT-I

Introduction and Overview of hospital information system. Patient history taking mechanisms.

UNIT-II

Patient Data Processing, Database Management, Communication of Medical data across different hospital units. Networking and Integration of patient data.

UNIT-III

Data from Patients, Coding and Classification , The Patient Record, Biosignal Analysis, Medical Imaging, Image Processing and Analysis.

UNIT-IV

Patient-Centered Information Systems, Primary Care, Clinical Departmental Systems, Clinical Support Systems, Nursing Information Systems.

UNIT-V

Medical Knowledge and Decision Support, Methods for Decision Support, Clinical Decision-Support Systems, Strategies for Medical Knowledge Acquisition, Predictive Tools for Clinical Decision Support.

UNIT-VI

Institutional Information Systems, Modeling of Health Care for Information Systems Development, Hospital Information Systems: Clinical Use, Technical Choices, Health Information Resources.

UNIT-VII

Methodology for Information Processing, Logical Operations, Biostatistical Methods, Biosignal Processing Methods, Pattern Recognition, Modeling for Decision Support, Structuring the Computer-based Patient Record, Evaluation of Clinical Information Systems.

UNIT-VIII

Methodology for Information Systems: Human-Computer Interaction in Health Care , Costs and Benefits of Information Systems, Security in Medical Information Systems, Standards in Health-care Informatics and Telematics, Project Management,

TEXT BOOK

1. Bemmel, J van; Musen, M.A. Handbook of Medical Informatics 1st ed. 1997.

REFERENCES:

1. COMPUTERS IN MEDICINE Tata McGraw Hill, 2005.
2. Davidson, P., Best Practice Series: Healthcare Information Systems, Auerbach Publications, 2000

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(BM 05452) PHYSIOLOGICAL SYSTEMS MODELLING

(Elective-II)

UNIT-I

The problem of system modelling in Physiology. Types of Nonlinear models of physiological systems. Deductive and Inductive modeling.

UNIT-II

Nonparametric modeling: Volterra models. Wiener models. Efficient volterra kernel estimation Analysis of estimation errors.

UNIT-III

Parametric modeling: Basic parametric model forms and Estimation procedures. Volterra kernels of nonlinear differential equations. Discrete-time volterra kernels of NARMAX models. From Volterra kernel measurements to Parametric models. Equivalence between continuous and Discrete -parametric models.

UNIT-IV

Preliminary tests and Data preparation. Model specification and Estimation. Model validation and Interpretation. Outline of step-by-step procedure.

UNIT-V

Applications: Neurosensory systems: Cardiovascular system, Renal system, Metabolic-Endocrine system.

UNIT-VI

Modeling of multiinput/multioutput systems: The Two-input case. Applications of Two-input modeling to physiological systems. The Multipin case spatiotemporal and spectrottemporal modeling.

UNIT-VII

Modeling of neuronal systems: A General model of membrane and Synaptic dynamics, Functional integration in the Single neuron, Neuronal systems with Point-process inputs Modeling of neuronal ensembles.

UNIT-VIII

Modeling of Closed-loop systems: Autoregressive form of Closed-loop model, Network model form of Closed-loop systems.

TEXT BOOK

1. Vasilis Z. Marmarelis, Nonlinear dynamic modeling of physiological systems, Wiley-IEEE Press, 2004.

REFERENCE:

1. David T. Westwick, Robert E. Keamney, Identification of Nonlinear Physiological Systems, Wiley-IEEE Press, 2003.
2. Michel C Khoo, Physiological Control Systems -Analysis, simulation and estimation, Prentice Hall of India, 2001.

(BM 05381) MEDICAL IMAGING TECHNIQUES LAB

Implementation of the below Algorithms.

1. Algorithms for Low Pas filter, High Pass Filter, Median Filter
2. Prewitt Edge, Quick Edge Detector
3. Miller's Algorithm
4. Cooley -Turkey Algorithm
5. Numerical Implementation of the Two Dimensional F. F. T.
6. Reconstruction Algorithm for Parallel Projections.
7. Reconstruction Algorithm for Fan Beam Projections
8. Re-Sorting Algorithm
9. Back Projection Algorithm.
10. A.R.T. (Algebraic Reconstruction Techniques).
11. S. A. R. T.
12. S. I. R T (Simultaneous Iterative Reconstruction Technique)

Using Mat lab or C language

(EC05174) DIGITAL IMAGE PROCESSING LAB

1. Image data Compression
2. Maximum distance algorithm.
3. K- mean algorithm.
4. Gradient descent algorithm.
5. LMSE algorithm.
6. Image Enhancement –Histogram.
7. Image Smoothing.
8. Image Sharpening.
9. Masks.
10. Point Detection.
11. Line Detection.
12. Edge Detection.

Using Mat lab and tool boxes

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(BM05093) BIOMEMS

UNIT-I

Introduction: history of MEMS, market for MEMS, overview of MEMS processes, properties of silicon, a sample MEMS process.
Basics of Microtechnology: definitions and terminology, a sample process, lithography and etching.
MEMS Biosensors: Bio Flow Sensors, MEMS Images.
Introduction to MEMS Pro design software.

UNIT-II

Micromachining: subtractive processes (wet and dry etching), additive processes (evaporation, sputtering; epitaxial growth).
Fundamental Devices and Processes: basic mechanics and electrostatics for MEMS, parallel plate actuators, pull-in point, comb drives.

UNIT-III

Fundamental Devices and Processes: more electrostatic actuators; MEMS foundries, Cronos MUMPs (multi user MEMS process).
MUMPs Multi User MEMS Process: JDS Uniphase MUMPs processing sequence and design rules.
MUMPs and SUMMIT: design rules; applications; micro hinges and deployment actuators.

UNIT-IV

CMOS MEMS: CMOS foundry processes, integrated IC/MEMS, MEMS postprocessing, applications.
Cleanroom lab techniques: clean rooms, gowning procedures; safety, fire, toxicity; acids and bases; photolithography.

UNIT-V

MicroOptoElectroMechanical Systems (MOEMS): micro scanners, digital mirror display, retinal scanning display. Grating light valve, corner cube retroreflector, optical switches, other micro-optical devices.

UNIT-VI

Thermal Transducers: bimorphs, "heatulators", cilia arrays.
Piezoresistivity; Scanning Probe Microscopy: scanning tunneling microscope (STM), atomic force microscope (AFM).

UNIT-VII

Scaling Laws.
Wireless MEMS: mechanical and electrical resonators, Q-factor, switches, filters.
Power for MEMS: thin film batteries, micro fuel cells, energy fields.

UNIT-VIII

MEMS Packaging and Assembly: microassembly: serial and parallel, deterministic and stochastic; microgrippers: HexSil process; packaging techniques.
The Future of MEMS: bioMEMS - neural implants, gene chips, diagnostic chips; MEMS in space; mechanical computers; invisible and ubiquitous computing.

TEXT BOOKS:

1. HSU, TAI RAN, **MEMS AND MICROSYSTEMS Design And Manufacture**, Tata McGraw-Hill,2002.
2. Rai-Choudhury, Prosenjit, MemS and Moems Technology and Applications SPIE 2000.

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(EC05171) DIGITAL DESIGN THROUGH VERILOG

(Elective-III)

UNIT I

INTRODUCTION TO VERILOG

Verilog as HDL, Levels of Design Description, Concurrency, Simulation and Synthesis, Functional Verification, System Tasks, Programming Language Interface (PLI), Module, Simulation and Synthesis Tools, Test Benches.

LANGUAGE CONSTRUCTS AND CONVENTIONS

Introduction, Keywords, Identifiers, White Space Characters, Comments, Numbers, Strings, Logic Values, Strengths, Data Types, Scalars and Vectors, Parameters, Memory, Operators, System Tasks, Exercises.

UNIT II

GATE LEVEL MODELING

Introduction, AND Gate Primitive, Module Structure, Other Gate Primitives, Illustrative Examples, Tri-State Gates, Array of Instances of Primitives, Additional Examples, Design of Flip-flops with Gate Primitives, Delays, Strengths and Contention Resolution, Net Types, Design of Basic Circuits, Exercises.

UNIT III

BEHAVIORAL MODELING

Introduction, Operations and Assignments, Functional Bifurcation, *Initial* Construct, *Always* Construct, Examples, Assignments with Delays, *Wait* construct, Multiple *Always* Blocks, Designs at Behavioral Level, Blocking and Non blocking Assignments, The case statement, Simulation Flow. *if* and *if-else* constructs, *assign-deassign* construct, *repeat* construct, *for* loop, the *disable* construct, *while* loop, *forever* loop, parallel blocks, *force-release* construct, Event.

UNIT IV

MODELING AT DATA FLOW LEVEL

Introduction, Continuous Assignment Structures, Delays and Continuous Assignments, Assignment to Vectors, Operators.

SWITCH LEVEL MODELING

Introduction, Basic Transistor Switches, CMOS Switch, Bi-directional Gates, Time Delays with Switch Primitives, Instantiations with Strengths and Delays, Strength Contention with Trireg Nets, Exercises.

UNIT V

SYSTEM TASKS, FUNCTIONS, AND COMPILER DIRECTIVES

Introduction, Parameters, Path Delays, Module Parameters, System Tasks and Functions, File-Based Tasks and Functions, Compiler Directives, Hierarchical Access, General Observations, Exercises,

FUNCTIONS, TASKS, AND USER-DEFINED PRIMITIVES

Introduction, Function, Tasks, User-Defined Primitives (UDP), FSM Design (Moore and Mealy Machines)

UNIT VI

DIGITAL DESIGN WITH SM CHARTS

State Machine Charts, Derivation of SM Charts, Realization of SM Charts, Implementation of the Dice Game, Alternative realizations for SM Charts using Microprogramming, Linked State Machines.

UNIT VII

DESIGNING WITH PROGRAMMABLE GATE ARRAYS AND COMPLEX PROGRAMMABLE LOGIC DEVICES

Xilinx 3000 Series FPGAs, Designing with FPGAs, Using a One-Hot State Assignment, Altera Complex Programmable Logic Devices (CPLDs), Altera FLEX 10K Series CPLDs

UNIT VIII

VERILOG MODELS

Static RAM Memory, A simplified 486 Bus Model, Interfacing Memory to a Microprocessor Bus, UART Design, Design of Microcontroller CPU.

TEST BOOKS

1. Design through Verilog HDL – T.R. Padmanabhan and B. Bala Tripura Sundari, WSE, 2004 IEEE Press.
2. A Verilog Primer – J. Bhaskar, BSP, 2003.

REFERENCES

1. Fundamentals of Logic Design with Verilog – Stephen. Brown and Zvonko Vranesic, TMH, 2005.
2. Digital Systems Design using VHDL – Charles H Roth, Jr. Thomson Publications, 2004.
3. Advanced Digital Design with Verilog HDL – Michael D. Ciletti, PHI, 2005.
4. Digital systems Design using VHDL – Charles H Roth, Jr. Thomson Publications, 2004.

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(BM 05087) BIOMATERIALS

(ELECTIVE – III)

UNIT I

Properties of Materials, Classes of materials used in medicine: Metals, Polymers, Hydrogels Bioresorbable and Biodegradable Materials, Ceramics, Natural materials composites thin films, grafts, Coatings medical fibers and Biological functional materials, Smart materials, Pyrolytic Carbon for long-term medical Implants textured and Porous materials non-fouling surfaces

UNIT-II

Host reactions to : Inflammation, Wound healing and the Foreign body response. Systemic toxicity and Hypersensitivity. Blood coagulation and Blood-materials Interactions. Tumorigenesis.

UNIT-III

Testing biomaterials: In Vitro assessment of tissue compatibility In vivo assessment of tissue compatibility. Testing of blood-materials interactions.

Degradation of materials in the biological environment: Effects of the Biological environment on metals, polymers and ceramics.

UNIT-IV

Applications of materials in medicine, Dentistry and Biology: Cardiovascular medical devices. Nonthrombogenic treatments and Strategies. Dental implantation adhesive and Sealants. Ophthalmologic applications-intraocular lens implants.

UNIT-V

Orthopedic biomaterials, Performance of drug delivery systems, Sutures.

UNIT-VI

Burn dressings and Skin substitutes.

Artificial organs and tissues: Implantable cardiac assist devices. Materials for extracorporeal devices. Cochlear implants. Artificial red blood cell substitutes.

UNIT-VII

Sterilization of implants and Devices implants and Device failure. Surface properties with Biological responses. Implant retrieval and Evaluation.

UNIT-VIII

Standards development and regulation of medical products using biomaterials. Nano bio materials.

TEXT BOOKS:

1. Biomaterials Science: An Introduction to Materials in Medicine Buddy D. Ratner, Frederick J. Schoen, Allan S. Hoffman, Jack E. Lemons
2. Hench L L Ethiridgc E. C. Biomaterials, an interfacial approach, Academic press 1982

REFERENCE:

1. Bronzino J D, the biomedical engineering handbook CRC Press.

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(BM05562) TRANSPORTATION PHENOMENA IN LIVING SYSTEMS

(ELECTIVE – III)

UNIT-I

Heat Transport: Body temperature regulation modes of heat transfer.

UNIT-II

Heat transportation in Tissues, Muscles, Skin and other Organs in different environmental temperatures.

UNIT-III

Models of heat transfer in the body.

UNIT-IV

Fundamentals and applications of mass transport. Introduction to Mass Transport. Diffusion with Convection or Electrical Potentials. Transport in Porous Media. Transvascular Transport. Solvent and Solute Transport across the Kidney Glomerulus.

UNIT-V

Processes of mass transfer Diffusion, Osmosis, ElectroOsmosis. Ultra filtration. Reverse Osmosis through natural Membrane systems, Reverse Osmosis through artificial synthetic Membranes.

UNIT-VI

Mass Transport and Biochemical Interactions, Oxygen Transport from the Lungs to the Tissues.

UNIT-VII

Mass transfer: Mass transfer in Kidney, Skeletal, Nervous, G. I. system, Cardio Pulmonary system.

UNIT-VIII

Mass transfer in dialysers and oxygenators.

TEXT BOOKS

1. Fournier, Ronald L., Basic transport phenomena in biomedical engineering. Taylor & Francis. 1998

REFERENCE:

1. David O. Cooney, Biomedical engg. Principles: An introduction to fluid, Heat & Mass transport process Vol & 2 ; Marcel Dekker inc.,
2. Medical physiology by Ganong
3. Physiology by Best and Taylor

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY

HYDERABAD

IV YEAR B.Tech. BME – II Semester

T P C
4+1 0 4**(ME05508)ROBOTICS AND AUTOMATION**

(ELECTIVE IV)

UNIT – I BASIC CONCEPTS

Automation and Robotics – An over view of Robotics – present and future applications – classification by coordinate system and control system, Dynamic stabilization of Robotics.

UNIT – II POWER SOURCES AND SENSORS

Hydraulic, Pneumatic and electric drivers – Determination HP of motor and gearing ratio, variable speed arrangements, Path Determination - Machinery Vision – Ranging – Laser – Acoustic, Magnetic Fiber Optic and Tactile Sensor

UNIT – III MANIPULATORS

Construction of Manipulators, Manipulator Dynamic and Force Control, Electronic and Pneumatic manipulators.

UNIT – IV ACTUATORS AND GRIPPERS

Pneumatic, Hydraulic Actuators, Stepper Motor Control Circuits, End Effector, Various types of Grippers, Design consideration.

UNIT – V

Differential transformation and manipulators, Jacobians – problems. Dynamics: Lagrange – Euler and Newton – Euler formations – Problems.

UNIT VI KINEMATICS

Forward and Inverse Kinematic Problems; Solutions of Inverse Kinematic problems, Multiple Solution, Jacobian Work Envelop – Hill Climbing Techniques.

UNIT VII PATH PLANNING

Trajectory planning and avoidance of obstacles, path planning, Skew motion, joint integrated motion – straight line motion – Robot programming, languages and software packages.

UNIT VIII CASE STUDY

Multiple Robots – Machine Interface – Robots in Manufacturing and Non-Manufacturing applications – Robot Cell Design Selection of a Robot.

TEXT BOOKS:

1. Industrial Robotics / Groover M P / Pearson Edu.
2. Robotics / Fu K S/ McGraw Hill.

REFERENCES:

1. Robotics, CSP Rao and V.V. Reddy, Pearson Publications (In press)
2. Robotics and Control / Mittal R K & Nagrath I J / TMH.
3. An Introduction to Robot Technology, / P. Coiffet and M. Chaitronze / Kogam Page Ltd. 1983 London.
4. Robotic Engineering / Richard D. Klaffer, Prentice Hall
5. Robot Analysis and Intelligence / Asada and Slow time / Wiley Inter-Science
6. Introduction to Robotics / John J Craig / Pearson Edu.
7. Robot Dynamics and Control by Mark W. Spong and M. Vidyasagar, John Wiley & Sons.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY

HYDERABAD

IV Year B.Tech. BME - II Semester

T P C

4+1 0 4

(EC05183) DSP PROCESSORS AND ARCHITECTURES
(ELECTIVE – IV)

UNIT I

INTRODUCTION TO DIGITAL SIGNAL PROCESSING

Introduction, A Digital signal-processing system, The sampling process, Discrete time sequences, Discrete Fourier Transform (DFT) and Fast Fourier Transform (FFT), Linear time-invariant systems, Digital filters, Decimation and Interpolation, Analysis and Design tool for DSP Systems MATLAB, DSP using MATLAB.

UNIT II

COMPUTATIONAL ACCURACY IN DSP IMPLEMENTATIONS

Number formats for signals and coefficients in DSP systems, Dynamic Range and Precision, Sources of error in DSP implementations, A/D Conversion errors, DSP Computational errors, D/A Conversion Errors, Compensating filter.

UNIT III

ARCHITECTURES FOR PROGRAMMABLE DSP DEVICES

Basic Architectural features, DSP Computational Building Blocks, Bus Architecture and Memory, Data Addressing Capabilities, Address Generation Unit, Programmability and Program Execution, Speed Issues, Features for External interfacing.

UNIT IV

EXECUTION CONTROL AND PIPELINING

Hardware looping, Interrupts, Stacks, Relative Branch support, Pipelining and Performance, Pipeline Depth, Interlocking, Branching effects, Interrupt effects, Pipeline Programming models.

UNIT V

PROGRAMMABLE DIGITAL SIGNAL PROCESSORS

Commercial Digital signal-processing Devices, Data Addressing modes of TMS320C54XX DSPs, Data Addressing modes of TMS320C54XX Processors,

Memory space of TMS320C54XX Processors, Program Control, TMS320C54XX instructions and Programming, On-Chip Peripherals, Interrupts of TMS320C54XX processors, Pipeline Operation of TMS320C54XX Processors.

UNIT VI

IMPLEMENTATIONS OF BASIC DSP ALGORITHMS

The Q-notation, FIR Filters, IIR Filters, Interpolation Filters, Decimation Filters, PID Controller, Adaptive Filters, 2-D Signal Processing.

UNIT VII

IMPLEMENTATION OF FFT ALGORITHMS

An FFT Algorithm for DFT Computation, A Butterfly Computation, Overflow and scaling, Bit-Reversed index generation, An 8-Point FFT implementation on the TMS320C54XX, Computation of the signal spectrum.

UNIT VIII

INTERFACING MEMORY AND I/O PERIPHERALS TO PROGRAMMABLE DSP DEVICES

Memory space organization, External bus interfacing signals, Memory interface, Parallel I/O interface, Programmed I/O, Interrupts and I/O, Direct memory access (DMA).

A Multichannel buffered serial port (McBSP), McBSP Programming, a CODEC interface circuit, CODEC programming, A CODEC-DSP interface example.

TEXT BOOKS

1. Digital Signal Processing – Avtar Singh and S. Srinivasan, Thomson Publications, 2004.
2. DSP Processor Fundamentals, Architectures & Features – Lapsley et al. S. Chand & Co, 2000.

REFERENCES

1. Digital Signal Processors, Architecture, Programming and Applications – B. Venkata Ramani and M. Bhaskar, TMH, 2004.
2. Digital Signal Processing – Jonatham Stein, John Wiley, 2005.

(BM05499) QUANTITATIVE ENGINEERING PHYSIOLOGY

(Elective-IV)

UNIT-I - Cellular Physiology

Introduction to Physiology, Introduction to Modeling and Review of Electric Circuits.

UNIT-II

Review of Cellular Physiology, Cellular Metabolism and Kinetics, Membrane Dynamics.

UNIT-III

Ion Transport types of transport and Cellular Homeostasis, The Resting Potential.

UNIT-IV

Regulation of Cell Function and Cell Cycle Detailed aspects of Neoplasia, Uses of DNA Micro-Arrays,

UNIT-V - Neuromuscular Physiology

Review of Nervous System, The Action Potential, Propagation of Action Potentials, measurement by Patch Clamp.

UNIT-VI

Skeletal Muscle, Neuromuscular Junction and Synaptic Transmission, Smooth Muscle, study of Demyelinating Diseases.

UNIT-VII - Cardiovascular Physiology

Review of Cardiovascular Physiology, The ECG, causes and classification of Arrhythmias, characteristics of Defibrillation phenomena.

UNIT-VIII

Pressure Volume Relationships, Models of Circulation, Cardiac Output, Cardiac Regulation, Physiological aspects of Myocardial Infarction.

Text Books:

1. Text Book of Physiology by Guyton.
2. Text Book of Physiology by West & Todd

REFERENCE:

1. Text Book of Physiology by Choudary.

(CA05315) INDUSTRY ORIENTED MINI PROJECT

(HOSPITAL TRAINING)

1. **NEPHROLOGY:** Operation of dialysers and Estimation of renal function

2. **NEUROLOGY:** study and operation of EEG, EMG equipment, recording of EEG signals normal and abnormal recordings

3. Special techniques and features of equipment, YAG laser, stent tubes, cerebral angiography.

4. **CARDIOLOGY:** study and operation of various pacemakers, DC Defibrillators, monitors.

5. **GASTROENTEROLOGY:** study and operation of infusion pumps, endoscopic instruments and other lab equipments.

6. **GENERAL SURGERY:** Study and Operation of Surgical equipment for both Adult and Paediatric. Suction apparatus, Cautery, Light Sources.

7. Study and operation of Laproscopic instruments, micro surgical equipments

8. **ORTHOPAEDICS:** study and operation of physiotherapy equipment. Prosthetic devices.

9. **PATHOLOGY & BLOOD BANK:** Study and operation of Various Instruments used for pathological tests, Plasmaphoresis Instruments

10. **ANAESTHESIA:** study and operation of various equipments used in theatres like electro surgical generators, cold light sources, servo ventilators, Anaesthesia equipment, ventilators, CSSD equipment, oxygen plant/oxygen concentrators.

11. **IMAGING SCIENCE:** operation of X-Ray plants, X-Ray film developing technique, ultrasound scanning, CAT, MRI.

12. **RADIO THERAPY:** study and operation of radiotherapy equipment.