ACADEMIC REGULATIONS
COURSE STRUCTURE
AND
DETAILED SYLLABUS

BIO MEDICAL ENGINEERING

For

B.TECH FOUR YEAR DEGREE COURSE

(Applicable for the batches admitted from 2002-2003)

JAWAHARLAL NEHRU
TECHNOLOGICAL UNIVERSITY
KUKATPALLY, HYDERABAD - 500 072.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY,
HYDERABAD

B. Tech. (Regular) Four Year Degree Course (Revised) Academic Regulations

(Effective for the students studying I year
from the Academic Year 2002-2003 and onwards)

1. Award of B.Tech. Degree:

A student will be declared eligible for the award of the B. Tech. Degree if he fulfills the following academic regulations:

i. He has pursued a course of study for not less than four academic years and not more than eight academic years.

ii. He has registered for and studied all the subjects for a total of 212 credits and secured all the 212 credits.

2. Students, who fail to fulfill all the academic requirements for the award of the degree within eight academic years from the year of their admission, shall forfeit their seat in the course and their seat shall stand cancelled.

3. Courses of study:

The following courses of study are offered at present for specialization for the B. Tech. Degree:

1. Aeronautical Engineering
2. Bio-Medical Engineering
3. Bio-Technology
4. Chemical Engineering
5. Civil Engineering
6. Computer Science and Engineering
7. Computer Science and Systems Engineering

8. Electrical and Electronics Engineering
9. Electronics and Communication Engineering
10. Electronics and Computer Engineering
11. Electronics and Control Engineering
12. Electronics and Instrumentation Engineering
13. Electronics and Telematics Engineering
14. Information Technology
15. Instrumentation and Control Engineering
16. Mechanical (Mechatronics) Engineering
17. Mechanical (Production) Engineering
18. Mechanical Engineering
19. Metallurgical Engineering
20. Metallurgy and Material Technology

and any other course as approved by the authorities of the University from time to time.

4. Credits:

	Semester Pattern		Yearly Pattern	
	Periods / Week	Credits	Periods / Week	Credits
Theory	04	04	03	06
Practicals	03	02	03	04
Practicals	06	04	06	08
Project	08	08	—	—

5. Distribution and Weightage of Marks:

i. The performance of a student in each semester / I year shall be evaluated subject –wise with a maximum of 100 marks for theory and 75 marks for practical subject. In addition, project shall be evaluated for 200 marks.

ii. For theory subjects the distribution shall be 20 marks for Internal Evaluation and 80 marks for the End-Examination.

iii. For theory subjects, there shall be 5 objective type tests for a duration of 20 minutes each during the semester. Each test shall contain 20 objective type questions for 20 marks. The best 4 tests will be considered for awarding 20 sessionals marks. For the I year class which shall be on yearly basis, there shall be 6 tests of the same duration and weightage as mentioned above. However, the performance in the best 4 tests will be considered for awarding 20 sessional marks.

iv. For practical subjects there shall be a continuous evaluation during the semester for 25 sessional marks and 50 End Examination marks. Of the 25 marks for internal, 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 and another member of the staff of the same department of the same institution.

v. For the subject having design and / or drawing, and estimation, the distribution shall be 20 marks for internal evaluation (10 marks for day-to-day work and 10 marks for internal tests). There shall be two internal tests in a Semester and the better of the two will be taken into consideration. However in the I year class, there shall be three tests and the best two will be taken into consideration for a maximum of 20 marks. The End Examination shall be for a total of 80 marks.

vi. The Engineering Drawing Practice Course wherever offered is to be treated as a practical course. Evaluation method adopted for practicals shall be followed here also.

vii. Out of a total of 200 marks for the project work, 40 marks shall be for Internal Evaluation and 160 marks for the End Semester Examination. The End Semester Examination (viva-voce) shall be conducted by a board of examiners consisting of Guide, Head of the Department and an external examiner. The evaluation of project work shall be conducted at the end of the IV year. The Internal Evaluation shall be on the basis of two seminars given by each student on the topic of his project.

viii. Laboratory marks and the sessional marks awarded by the College are not final. They are subject to scrutiny and scaling by the University wherever felt desirable. The uniform distribution of awarding of Sessional marks and Laboratory marks will be referred to a Committee. The Committee will arrive at a scaling factor and

the marks will be scaled as per the scaling factor. The recommendations of the Committee are final and binding. The laboratory records and internal test papers shall be preserved in the respective departments as per the University norms and shall be produced to the Committees of the University as and when they visit the College.

6. **Attendance:**

i. A student has to put in a minimum of 75% of attendance in aggregate of all the subjects for acquiring credits in the I year and / or each semester thereafter.

ii. Condonation of shortage of attendance in aggregate upto 10% (65% and above and below 75%) in each semester or I year may be granted by the College Academic Committee.

iii. A student will not be promoted to the next semester unless he satisfies the attendance requirement of the present semester / I year.

iv. Shortage of Attendance below 65% in aggregate shall in no case be condoned.

v. Students whose shortage of attendance is not condoned in any semester / I year are not eligible to take their end examination of that class and their registration shall stand cancelled. They may seek re-admission for that semester / I year when offered next.

vi. Condonation of shortage of attendance as stipulated in 6 (ii) above shall be granted on genuine and valid grounds with supporting evidence.

vii. A stipulated fee shall be payable towards condonation of shortage of attendance.

7. **Minimum Academic Requirements:**

The following academic requirements have to be satisfied in addition to the attendance requirements mentioned in item no. 6.

i. A student shall be deemed to have satisfied the minimum academic requirements and earned the credits allotted to each theory or practical design or drawing subject or project if he secures not less than 35% of marks in the end examination and a minimum of 40% of marks in the sum total of the internal evaluation and end examination taken together.

ii. A student shall successfully complete all the I year subjects from 3 regular consecutive examinations and 3 supplementary consecutive examinations of I year from the date of admission. If he has failed to do so he shall forfeit the seat in course and his seat shall stand cancelled.

iii. A student shall be promoted from II to III year only if he fulfils the academic requirement of 56 credits from the consecutive regular and supplementary examinations of I year and from the regular examination of II year I semester irrespective of whether the candidate takes the examination or not.

iv. A student shall be promoted from third year to fourth year only if he passes all the subjects of I year and fulfils the academic requirements of total 100 credits (including 56 credits of I year) from the examinations,

a. Two regular and Two supplementary examinations of I year.

b. Two regular and one supplementary examinations of II Year I Semester

c. One regular and one supplementary examinations of II Year II Semester

d. One regular III year I Semester examination.

v. A student shall earn all the 212 credits offered as indicated in the course structure.

vi. Students who fail to earn all the 212 credits offered as indicated in the course structure within eight academic years from the year of their admission shall forfeit their seat in the course and their seat shall stand cancelled.

8. **Withholding of Results:**

The result of a student shall be withheld if:

i. He has not cleared any dues to the Institution / Hostel;

ii. A case of disciplinary action against him is pending disposal;

9. **Course pattern:**

i. The entire course of study is of four academic years. The first year shall be on yearly pattern and the second, third and fourth years on semester pattern.

ii. A student eligible to appear for the end examination in a subject, but absent at it or has failed in the end examination may appear for that subject at the supplementary examination.

10. Award of Class:

After a student has satisfied the requirements prescribed for the completion of the programme and is eligible for the award of B. Tech. Degree he shall be placed in one of the following four classes:

First Class with Distinction	70% and above	From the aggregate marks secured for 212 Credits.
First Class	Below 70% but not less than 60%	
Second Class	Below 60% but not less than 50%	
Pass Class	Below 50% but not less than 40%	

(The marks in internal evaluation and end examination shall be shown separately in the marks memorandum)

11. Minimum Instruction Days:

The minimum instruction for each semester / I year shall be 90/180 working days excluding examination days.

12. There shall be no branch transfers after the completion of admission process.

13. There shall be no place transfer within the Constituent Colleges of Jawaharlal Nehru Technological University for B.Tech. Regular / FDH / CCC and P. G. Programmes.

General:

14. Where the words "he", "him", "his", occur in the regulations, they include "she", "her", "hers".

15. The academic regulation should be read as a whole for the purpose of any interpretation.

16. In the case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Vice-Chancellor is final.

17. The University may change or amend the academic regulations or syllabi at any time and the changes or amendments made shall be applicable to all the students with effect from the dates notified by the University.

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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY,
HYDERABAD

Academic Regulations for B. Tech. (Lateral Entry Scheme)

(Effective for the students getting admitted into II year from the Academic Year 2003-2004 and onwards)

1. The Students have to acquire 156 credits from II to IV year of B.Tech. Programme (Regular) for the award of the degree.

2. Students, who fail to fulfill the requirement for the award of the degree in 6 consecutive academic years from the year of admission, shall forfeit their seat.

3. The same attendance regulations are to be adopted as that of B. Tech. (Regular).

4. Promotion Rule:

A student shall be promoted from third year to fourth year only if he fulfils the academic requirements of 44 credits from the examinations following

a. Two regular and one supplementary examinations of II Year I Semester

b. One regular and one supplementary examinations of II Year II Semester

c. One regular III year I Semester examination

5. Award of Class:

After a student has satisfied the requirements prescribed for the completion of the programme and is eligible for the award of B. Tech Degree he shall be placed in one of the following four classes:

First Class with Distinction	70% and above	From the aggregate marks secured for 156 Credits. (i.e II year to IV year)
First Class	Below 70% but not less than 60%	
Second Class	Below 60% but not less than 50%	
Pass Class	Below 50% but not less than 40%	

(The marks in internal evaluation and end examination shall be shown separately in the marks memorandum)

6. All other regulations as applicable for B. Tech. Four-year degree course (Regular) will hold good for B. Tech. (LES)

2002 – 2003

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY, HYDERABAD

I B.TECH.

BIOMEDICAL ENGINEERING
COURSE STRUCTURE

SUBJECT CODE	SUBJECT	T	P	C
BM1021	English	3	-	6
BM1022	Mathematics – I	3+1*	-	6
BM1023	Solid State Physics	2+1*	-	4
BM1024	Information Technology & Numerical Methods	3	-	6
BM1025	C & Data Structures	3	-	6
BM1026	Network Theory	3	-	6
BM1027	Electronic Devices & Circuits	3	-	6
BM1028	Engineering Drawing Practice	-	3	4
BM1029	Computer Programming Lab.	-	6	8
BM1030	Electronic Devices & Circuits Lab.-	-	3	4
	TOTAL:	**20+2***	**12**	**56**

(* Tutorial)

Note : All University examinations (theory and practical) are of 3 hours duration.

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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY, HYDERABAD

II B.Tech. - I Semester

BIOMEDICAL ENGINEERING
COURSE STRUCTURE

SUBJECT CODE	SUBJECT	T	P	C
BM2121	Mathematics – II	4	-	4
BM2122	Electrical Technology	4	-	4
BM2123	Switching Theory & Logic Design	4	-	4
BM2124	Applied Chemistry and BioChemistry	4	-	4
BM2125	Anatomy and Physiology	4	-	4
BM2126	BioElectricity and Electrodes	4	-	4
BM2127	Biochemistry Lab.	-	3	2
BM2128	Anatomy and Physiology Lab.-	-	3	2
	TOTAL:	**24**	**6**	**28**

Note :All University examinations (theory and practical) are of 3 hours duration.

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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY, HYDERABAD

II B.Tech. - II Semester

BIOMEDICAL ENGINEERING
COURSE STRUCTURE

SUBJECT CODE	SUBJECT	T	P	C
BM2221	Probability Theory & Stochastic Processes	4	-	4
BM2222	Managerial Economics & Financial Analysis	4	-	4
BM2223	Pulse & Digital Circuits	4	-	4
BM2224	Communication Engineering	4	-	4
BM2225	Basic Clinical Sciences – I	4	-	4
BM2226	Bio-Transducers and Applications	4	-	4
BM2227	Pulse and Digital Circuits Lab.	-	3	2
BM2228	Transducers Lab.	-	3	2
	TOTAL:	**24**	**6**	**28**

Note :All University examinations (theory and practical) are of 3 hours duration.

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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY, HYDERABAD

III B. Tech. – I Semester – BME

BIOMEDICAL ENGINEERING
COURSE STRUCTURE

SUBJECT CODE	SUBJECT	T	P	C
BM3121	Management Science	4	-	4
BM3122	Digital Signal Processing	4	-	4
BM3123	Linear & Digital IC Applications	4	-	4
BM3124	Basic Clinical Sciences – II	4	-	4
BM3125	BioFluids and Mechanics	4	-	4
BM3126	BioMedical Equipment	4	-	4
BM3127	IC Applications Lab	-	3	2
BM3128	Bio-Medical Equipment Lab	-	3	2
	TOTAL:	**24**	**6**	**28**

Note : All University examinations (theory and practical) are of 3 hours duration.

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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY, HYDERABAD

III B. Tech. – II Semester

BIOMEDICAL ENGINEERING
COURSE STRUCTURE

SUBJECT CODE	SUBJECT	T	P	C
BM3221	Biological Control Systems	4	-	4
BM3222	Advanced BioMedical Equipment	4	-	4
BM3223	Ergonomics	4	-	4
BM3224	Biomedical Signal Processing	4	-	4
BM3225	Medical Imaging Techniques	4	-	4
BM3226	Microprocessors & Interfacing	4	-	4
BM3227	Microprocessors Lab.	-	3	2
BM3228	Bio-Medical Signal Processing Lab	-	3	2
	TOTAL:	**24**	**6**	**28**

Note : All University examinations (theory and practical) are of 3 hours duration.

Note : All University examinations (theory and practical) are of 3 hours duration.

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IV B. Tech. – I Semester

BIOMEDICAL ENGINEERING
COURSE STRUCTURE

SUBJECT CODE	SUBJECT	T	P	C
BM4121	Image Processing and Pattern Recognition	4	-	4
BM4122	Computer Networks	4	-	4
BM4123	Rehabilitation Engineering	4	-	4
BM4124	Lasers and Fiber Optics in Medicine	4	-	4
	ELECTIVE – I	4	-	4
BM4125	Artificial Neural Networks			
BM4126	Electro Magnetic Interference & Compatibility **Techniques**			
	ELECTIVE – II	4	-	4
BM4127	Physiological Systems Modeling			
BM4128	V.L.S.I. Design			
BM4129	Digital Image Processing Lab	-	3	2
BM4130	Medical Imaging Techniques Lab	-	3	2
	TOTAL:	**24**	**6**	**28**

Note : All University examinations (theory and practical) are of 3 hours duration.

Note : All University examinations (theory and practical) are of 3 hours duration.

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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY, HYDERABAD

IV B. Tech. – II Semester - BME

BIOMEDICAL ENGINEERING
COURSE STRUCTURE

SUBJECT CODE	SUBJECT	T	P	C
	ELECTIVE – III	4	-	4
BM4221	Biomaterials			
BM4222	Transportation Phenomena in Living Systems			
	ELECTIVE – IV	4	-	4
BM4223	Robotics and Automation			
BM4224	Hospital Systems Management			
BM4225	Project & Seminar	-	-	8
	TOTAL:	**8**	**-**	**16**

Note : All University examinations (theory and practical) are of 3 hours duration.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY

I B.TECH. **3-0-6 BME 1021**

ENGLISH

(Common for all Branches)

The following textbooks of English are prescribed for I B.Tech. Class of all Branches in the Colleges of Engineering and Technology affiliated to Jawaharlal Nehru Technological University, Hyderabad. The exercises given are expected to be covered by the teacher in the classroom, the objective of the course being the development of linguistic skills of the learners.

1. A Textbook of English for Engineers and Technologists, OL.
2. Masterminds, OL.

UNIT – I:

1. Energy, Unit 3: Alternative Sources (from A Textbook of English for Engineers and Technologists, OL).
2. Jagadish Chandra Bose, (a profile from The Trailblazers in Masterminds, OL).

UNIT – II:

1. Computers, Unit 2: New Frontiers (from A Textbook of English for Engineers and Technologists, OL).
2. Chandrasekhara Venkata Raman (a profile from The World of Figures and Physics in Masterminds, OL).

UNIT – III:

1. Technology, Unit 3: Evaluating Technology (from A Textbook of English for Engineers and Technologists, OL).
2. S.S. Bhatnagar (a profile from The Institution Builders in Masterminds, OL).

UNIT – IV:

1. Environment, Unit 1: Pollution (from A Textbook of English for engineers and Technologists, OL).
2. Homi Jehangir Bhabha (a profile from The New Age in Masterminds, OL).

UNIT – V:

1. Industry, Unit 2: Safety and Training (from A Textbook of English for Engineers and Technologists, OL).
2. Salim Ali (a profile from The Living World in Masterminds, OL).

UNIT – VI:

Common Errors, Sentence Completion, Synonyms and Antonyms, Analogy, Report Writing, Comprehension, General Essay, Situational Dialogues

NOTE:

The establishment of an English Language Laboratory in each Affiliated College of Engineering and Technology is recommended with effect from the academic year 2002-03 for the following reasons:

1. to expose the students to TOEFL and GRE model of training and practice.
2. to help the students learn correct pronunciation, accent and intonation.
3. to enable the students to improve and strengthen their communicative skills.
4. to expose the students to different variations in English expression.

It is also recommended that the English Language Laboratory training and practice be treated as a non-examination item of the curriculum.

BOOKS RECOMMENDED:

1. Strengthen Your Writing, by V.R.Narayana Swami (OL).
2. Success with Grammar and Composition, by K.R.Narayanaswamy (OL).
3. Examine Your English, by Margaret Maison (OL).
4. English for Professional Students, by S.S.Prabhakara Rao.
5. TOEFL (ARCO & BARRONS, USA) and Cliff's TOEFL.
6. GRE (ARCO & BARRONS, USA) and Cliff's GRE.
7. Communication Skills for Technical Students, by T.M.Farhathulla (OL).
8. Strategies for Engineering Communication – by Susan Stevenson and Steve Whitemore, John Wiley and Sons.
9. Basic Communication Skills for Technology – by Andrea J. Rutherford, 2/e, Pearson Education Asia.

JAWAHARLAL NEHRU TECHNOLOGICALUNIVERSITY HYDERABAD

I B.Tech. **3 – 0 – 6** **BME1022**

MATHEMATICS – I

(Common to all Branches)

UNIT – I:

Sequences – Series – Convergence 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 – limit and continuity – partial differentiation – Chain rule – Total derivative – Euler's theorem, Jacobian – Functional dependence. Maxima and Minima of functions of two variabies with and 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 – formation. 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, polynomial in x, e^{ax} V(x),xV(x), method of variation of parameters.

UNIT – V :

Laplace transform of standard functions – Inverse transform – Linearity – first shifting Theorem. Transforms of derivatives and integrals – Unit step function – second shifting theorem – Dirac's delta function – Differentiation and integration of transforms –

Multiple integrals : Double and triple integrals – change of variables – Change of order of integration.

UNIT – VI :

Vector Differential Calculus :

Gradient, Divergence, Curl and their related properties of sums, Products, Laplacian and second order operators. Vector integral Calculus : Vector integration – Line integral – work done – Potential function – area, surface and volume integrals. Green's theorem, Stoke's and Gauss' Divergence Theorem. Verification of Green's, Stoke's and Gauss' Theorems. Curvilinear Coordinates – Cylindrical, Spherical Coordinates – Expressions of Grad, div, curl in Spherical, Cylindrical and Curvilinear Coordinates.

TEXT BOOKS :

1. A Text Book of Engineering Mathematics Volume – I, 2002 T.K.V. Iyengar, B. Krishna Gandhi, and others, S. Chand and Company
2. Engineering Mathematics B.V. Ramana, Tata McGraw_Hill 2002
3. Engineering Mathematics – I, C. Sanakraiah, Vijaya Publications-2002
4. Engineering Mathematics – I – 2002, P. Nageswara Rao, Y. Narsimhulu, Prabhakara Rao

REFERENCES :

1. Engineering Mathematics, S.K.V.S. Sri Rama Chary, M. Bhujanga Rao, Shankar, B.S. Publications 2000
2. Advanced Engineering Mathematics (Eighth edition) Erwin Kreyszig , John Wiley & Sons (ASIA) Pvt . Ltd. 2001
3. Advanced Engineering Mathematics (Second edition)Michael D. Green Berg, Prentice Hall, Upper saddle River, New Jersey-1998
4. Sarveswara Rao Koneru, Engineering Mathematics Orient Longman Pvt. Ltd. 2002
5. Engineering Mathematics – I, N.P. Bali, Laxmi Publications (P) Ltd., New Delhi.

JAWAHARLAL NEHRU TECHNOLOGICALUNIVERSITY HYDERABAD

I B.Tech. **2 – 0 – 4** **BME1023**

SOLID STATE PHYSICS

(Common for EEE, ECE, EIE, EContE, ICE, CSE, CSIT, CSSE, ETM, ECM, BME)

UNIT – I (A):

Bonding in solids – Cohesive energy – calculation of cohesive energy of ionic solids –application to Sodium Chloride crystal.

UNIT – I (B):

Space lattice – crystal structure – unit cell – lattice parameter – crystal systems – Bravais lattices – stacking sequences, metallic crystals – simple cubic, F.C.C. and B.C.C structures-Structures of Diamond, ZnS, NaCl and CsCl systems.

UNIT – II (A):

Directions and planes in crystals – Miller Indices- distances of separation between successive hkl planes. Imperfections in crystals – point defects – Frenkel and Schottky defects – Energy of formation of a vacancy – Number of vacancies at any given temperature.

UNIT – II (B):

Line defects – Edge and Screw dislocations – Burger's vector. Diffraction of X-rays by crystal planes – Bragg's law – Laue photograph – Powder method.

UNIT – III (A): PRINCIPLES OF QUANTUM MECHANICS

Waves and Particles – de Broglie hypothesis - G.P Thompson's experiment – Davisson and Germer's experiment – Schroedinger's wave equation (Time independent) – Physical significance of the wave function. Particle in potential box.

UNIT – III (B): ELECTRON THEORY OF METALS

Classical free electron theory – Mean free path, relaxation time and drift velocity – Fermi-Dirac distribution (non-mathematical treatment) – Quantum free electron theory of conduction scattering – Sources of electrical resistance – Kronig-Penny model (non- mathematical treatment) – Origin of energy band structure in solids–Concept of effective mass.

UNIT – IV (A): DIELECTRIC PROPERTIES

Introduction – Electronic, Ionic and Orientation polarization – Internal field – Clausius Mosotti equation – Ferro and Piezo electricity (non-mathematical treatment) – Frequency dependence of Dielectric Constant (non-mathematical treatment) – Important requirements of Insulators.

UNIT – IV (B): MAGNETIC PROPERTIES

Permeability – Magnetization – Origin of magnetic moment – Bohr magneton - Electron spin – Classification of magnetic materials – Domain theory of Ferro Magnetism – Hysteresis curve – Ferri and Anti-ferro magnetic substances – Ferrites and their applications – Requirements of magnetic materials for different purposes.

UNIT – V (A): SEMICONDUCTORS

Electrical conductivity of semiconductors – Intrinsic semiconductors – carrier concentration – Extrinsic semiconductors - carrier concentration – Minority carrier lifetime – drift and diffusion – Einstein's Equation – Equation of continuity – Hall effect.

UNIT – V (B): SUPERCONDUCTIVITY

General features – Meissner effect – Penetration depth – Type I and Type II superconductors – Flux quantization – Josephson Effect – BCS theory - Applications of superconductors.

UNIT – VI (A): LASERS

Spontaneous and Stimulated Emission – Einstein's Coefficients – Condition for Population inversion – Ruby Laser – He-Ne Laser – Semiconductor Laser – Applications of Lasers.

UNIT – VI (B): FIBRE OPTICS

Principle of Optical fibre – Step-index fibre – graded-index fibre – numerical aperture – Acceptance angle – Transmission signal in Step-index and graded-index fibre – Optical fibres in communication and sensing applications.

TEXT BOOK:

1. Solid State Physics – by S.O. Pillai (New Age International).

JAWAHARLAL NEHRU TECHNOLOGICALUNIVERSITY HYDERABAD

I B.Tech. **3 – 0 – 6** **BME1024**

INFORMATION TECHNOLOGY & NUMERICAL METHODS

(Common for EEE, ECE, EIE, EContE, ICE, CSE, CSIT, CSSE, ETM, ECM, BME)

UNIT – I:

Parts of a computer: Processor, memory, I/O devices, storage devices, operating system, application software

Types of computer systems: Supercomputer, Mainframe computer, Minicomputer, workstations, Microcomputers, Personal computers, desktop handheld computers.

Input devices: Keyboard, mouse, hand devices optical devices, audio visual devices.

Output devices: monitor, projectors, sound devices, printers, storage devices, files (Lessons 1,2,3,4,5,6,9 and 10 of text book1).

UNIT – II:

Data Processing: Data representation, data processing method, data processing speed, processor power, Intel, AMD, Cyrix, Motorola, RISC processors Operating system; User interface, program running, file management, hardware management , PC Operating Systems, Dos, Unix Windows, Windows NT

Program development: hardware/software interaction, problem to a program, structured and object oriented approaches, Programming languages, machine and high-level languages(Lessons 7,8,11,12,15, 27 and 28 of text book1)

UNIT – III:

Database management: Databases, the DBMS, working with a database and enterprise software.

Data communication and Networking: Use of networks, network structures, network topologies, network media, telephone lines, modems, digital telephones, Internet, working of Internet, Internet features, Internet applications, Accessing the Internet, connecting PC to Internet, connecting to WWW.(Lessons 16,17,18,19 and 20 of text book1)

UNIT – IV: (to be taught online through PC)

Microsoft windows ME and tools: Office 2000, Word 2000, Excel 2000, Powerpoint 2000, Access 2000, Outlook 2000, Frontpage 2000.(Chapters 4 to 25 of text book 2).

UNIT – V:

Numerical Methods - I

Iterative methods, bisection method, Newton Raphson method, successive approximation method, Gauss Jordan and Gauss Siedel methods; Interpolation, Lagrange interpolation forward difference, backward difference and central difference interpolation methods.

UNIT – VI:

Numerical Methods - II

Numerical Integration by Trapezoidal and Simpson's rules, algorithms, numerical solution to differential equations, Euler method, Runga kutta method, Milne predictor corrector method, Runga kutta method and predictor corrector method; Regression techniques

TEXT BOOKS:

1. Introduction to Computers – by Peter Norton, Tata McGraw-Hill, 4th Edition, 2001, ISBN: 0-07-044743-8.

2. Introduction to Computers with MS-Office 2000 – by Alexis Leon and Mathews Leon, Tata McGraw-Hill, 2001, 0-07-043445-X.

3. Computer oriented Numerical Methods – by V. Rajaraman

4. Numerical Methods for Scientific and Engineering Computation – by M. K. Jain, S. R. K. Iyengar, R. K. Jain, New Age International (P) Ltd.

REFERENCES:

1. Using information technology – a practical introduction to computers and communication – by Williams, Sawyer and Hutchins, Tata McGraw Hill, 2000

2. Computers and common sense – by Shelly and Hunt; Prentice Hall of India

3. Fundamentals of Information Technology – by Alexis Leon, Mathews Leon, Leon Press and Vikas Publishing House.

4. Using Information Technology: A Practical Introduction to Computers & Communications – by Brian Williams, Stacey Sawyer, and Sarah Hutchinson, Tata McGraw-Hill, 3rd Edition, 2001, ISBN: 0-07-043562-6.

5. Upgrading and Repairing PCs – by Scott Mueller, Pearson Education Asia, 13th Edition, 2002, ISBN: 81-7808-552-6.

6. Trouble Shooting, Maintaining & Repairing PCs – by Stephen J. Bigelow, Tata McGraw-Hill Publishing Company, 5th Edition, 2001, ISBN: 0-07-047367-6.

7. Introduction to Information Technology – by Efraim Turban, R. Kelly Rainer, Jr, Richard Potter, John Wiley & Sons, 2000, ISBN: 9971-51-321-8.

JAWAHARLAL NEHRU TECHNOLOGICALUNIVERSITY HYDERABAD

I B.Tech. **3 – 0 – 6** **BME1025**

C & DATA STRUCTURES

(Common for EEE, ECE, EIE, EContE, ICE, CSE, CSIT, CSSE, ETM, ECM, BME)

UNIT – I:

Algorithm, flowchart, program development steps, basic structures of C language, C tokens, data types, declaration of variables, assigning values, arithmetic, relational and logical operator, increment and decrement operators, control operator, bit-wise operator, expressions, evaluation, input-output operators, IF and SWITCH statement, WHILE, DO-WHILE and FOR statements, C programs covering all the above aspects.

UNIT – II:

One dimensional & Two dimensional arrays, initialisation, string variables, declaration, reading, writing, string handle function, user-defined functions variables & storage classes, example C Programs.

UNIT – III:

Structure definition, initialising, assigning values, passing of structures as arguments, unions, declaring & initialising of pointers, pointer based expressions, arrays, strings, functions and structures, C Program examples, file management in C, opening & Closing, I-O operations on files.

UNIT – IV:

Stacks, represnting stacks in C, Infix, Postfix & Prefix programs, recursion in C, Queue & its sequential representation, circular queue, sequence.

UNIT – V:

Single Linked List, Double linked list, Header, Circular List, applications, binary trees, representation, tree traversals, graph representaltion, graph traversals, spanning trees.

UNIT – VI:

Search techniques: linear and binary search methods, sorting methods, Exchange sort, selection sort, quick sort, tree sort.

TEXT BOOKS:

1. C & Data Structures – by E. Balagurusamy, TMH 2002.
2. Data structures using C – by A. S. Tanenbaum, PHI
3. Fundamentals of Data Structures – by Horowitz & Sahani

JAWAHARLAL NEHRU TECHNOLOGICALUNIVERSITY HYDERABAD

I B.Tech. **3 – 0 – 6** **BME1026**

NETWORK THEORY

(Common for EEE, ECE, EIE, EContE, ICE, CSE, CSIT, CSSE, ETM, ECM, BME)

UNIT – I:

Circuit concept – RLC parameters – Voltage and Current sources – Source transformation – Voltage–Current relationship for Passive elements – Kirchhoff's laws – Network Reduction Techniques – Series, Parallel, Series-Parallel, Star-to-delta or delta-to-star transformations.

Magnetic Circuits – Faraday's Laws of electromagnetic induction – Concept of self and mutual inductances – dot convention – coefficient of coupling – Composite Magnetic Circuits – Analysis of Series and Parallel Magnetic Circuits.

UNIT – II:

RMS and Average values and Form factor of different periodic waveforms, Steady state analysis of R, L and C (in series, parallel and series-parallel combinations) with sinusoidal excitation – Concept of Reactance, Impedance, Susceptance and Admittance – Phase and phase difference – Concept of Power factor, Real and Reactive powers – j–notation, Complex and polar forms of representation, Complex power – Locus diagrams. Series R-L, R-C, R-L-C and parallel combinations with variation of various parameters – Resonance – Series, Parallel Circuits, Concept of Bandwidth and Q-factor.

UNIT – III:

Three phase circuits: Phase sequence – Star and Delta connection – Relation between line and phase voltages and currents in Balanced systems – Analysis of balanced and Unbalanced 3 phase circuits – Measurement of 3 phase power, active power and reactive power.

Network topology : Definitions – Graph – Tree, Basic Cutset and Basic Tieset matrices for planar network – Loop and

nodal methods of analysis of networks with dependent and independent voltage and current sources. Duality and Dual networks.

UNIT – IV:

Network theorems (without proof): Tellegen's, Superposition, Reciprocity, Thevenin's, Norton's, Maximum Power Transfer, Millman's and Compensation theorems for dc and ac excitations.

UNIT – V:

Transient response of RL, RC and RLC circuits (series and parallel combinations) for dc and Sinusoidal excitations – Initial conditions – Classical method and Laplace transform Methods of solutions – Response of RL, RC, RLC for step, ramp, pulse and impulse excitations using Laplace Transform Methods.

UNIT – VI:

Two port network parameters – Z, Y, (ABCD) Transmission and Hybrid Parameters for Resistive Networks – concept of Transformed Network – 2-port network parameters using transformed variables.

Filters – Low pass, High pass and Band pass filters – Constant-k and m-derived filters and composite filter design.

TEXT BOOKS:

1. Engineering Circuit Analysis – by William Hayt and Jack E. Kemmerly, McGraw Hill, 5/e.
2. Electric Circuits – by J. Edminister and M. Nahvi, - Schaum's outlines, TMH, 1999.
3. Network Theory – by N. Srinivasulu, Hi-Tech Pub.

REFERENCES:

1. Network Analysis – by G.K. Mithal, Khanna Pub.
2. Network Theory – by N.C. Jagan and C. Lakshminarayana, BS Published.

JAWAHARLAL NEHRU TECHNOLOGICALUNIVERSITY
HYDERABAD

I B. Tech. **3 – 0 – 6** **BME1027**

ELECTRONIC DEVICES & CIRCUITS

(Common for EEE, ECE, EIE, EContE, ICE, CSE, CSIT, CSSE, ETM, ECM, BME)

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: SEMICONDUCTOR DIODES AND RECTIFIERS

Construction, Principle of operation, V-I characteristics, symbol, equivalent circuit, parameter calculation, limitations and specifications of – pn junction diode, Zener diode, Varactor diode, Tunnel diode and photo diode. Diffusion and transition capacitances of pn junction diode. Hall Effect. Diode applications : Rectifiers – Half wave, Full wave and Bridge Rectifiers, Filters – L, C, L-Section and π -section filters.

UNIT – III: TRANSISTOR CHARACTERISTICS

Construction, principle of operation, V-I characteristics, symbol, equivalent circuit, parameter calculations, applications, limitations and specifications of – BJT, FET, UJT and MOSFETs (different configurations of transistors are to be considered).
SCR, DIAC, TRIACs. Optoelectronic devices.

UNIT – IV: AMPLIFIERS

Biasing, DC equivalent model, criteria for fixing operating point and methods of Bias stabilization, Thermal run away and thermal stability. 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. Comparison of BJT and FET. RC coupled

amplifier – frequency response. Biasing of FET, MOSFET. FET amplifier – frequency response, FET Small signal model.

UNIT – V: FEEDBACK AMPLIFIERS

Concepts of feedback. Classification of feedback amplifiers, General characteristics of negative feedback amplifiers, Effect of Feedback on Amplifier characteristics, Simple problems.

UNIT – VI: OSCILLATORS

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

TEXT BOOKS:

1. Electronic Devices and Circuits – by Millman and Halkias, Tata McGraw Hill.
2. Electronic Devices and Circuits – by R.L. Boylestad and Louis Nashelsky Pearson Ed. Asia, PHI.
3. Electronic Devices and Circuits – by K. Lal Kishore, B.S. Publ.

REFERENCES:

1. Microelectronics – by Millman and Grabel, Tata McGraw Hill.
2. Electronic Devices and Circuits – by Bogart, Universal Bookstall, New Delhi.

JAWAHARLAL NEHRU TECHNOLOGICALUNIVERSITY HYDERABAD

I B. Tech. **0 – 3 – 4** **BME1028**

ENGINEERING DRAWING PRACTICE

(Common for EEE, ECE, EIE, EContE, ICE, CSE, CSIT, CSSE, ETM, ECM, BME)

UNIT – I:
Introduction to Engineering Graphics – Construction of Ellipse, Parabola and Hyperbola. Cycloidal Curves.

UNIT – II:
Orthographic Projections of Points, Lines and Planes – Axis inclined to one plane and inclined to both the planes.

UNIT – III:
Orthographic Projections of Solids: Cylinder, Cone, Prism, Pyramid and Sphere in simple positions and Axis inclined to both the Planes.

UNIT – IV:
Development of Surfaces: Prisms, Cylinder, Pyramid and Cone.

UNIT – V:
Isometric Projections of Lines, Planes and Simple Solids.

UNIT – VI:
Conversion of Orthographic Views into Isometric Views and Vice-Versa.

TEXT BOOKS:

1. Engineering Graphics – by K.L. Narayana & P. Kannayya, SciTech Publishers.
2. Engineering Drawing – by N.D. Bhatt, Charotar Publishers.
3. Engineering Drawing and Graphics – by Venugopal, New Age International Limited.

JAWAHARLAL NEHRU TECHNOLOGICALUNIVERSITY HYDERABAD

I B.Tech. **0 – 6 – 8** **BME1029**

COMPUTER PROGRAMMING LAB

(Common for EEE, ECE, EIE, EContE, ICE, CSE, CSIT, CSSE, ETM, ECM, BME)

1. Write a C program the evaluates the following algebraic expressions after reading necessary values from the user:
   a) ax+b/ax-b
   b) 2.5 log x + cos 32^0 + | $x^2 - y^2$ | + $\sqrt{}$ 2xy
   c) $1/\sigma\sqrt{2\pi}\, e^{-(x-m/\sqrt{2}\sigma)^2}$
2. Write a C program for the following
   a) Printing three given integers in ascending order
   b) Sum of 1 + 2+ 3 + _ _ _ _ _ n
   c) $1 + x^2/2! + x^2/4!$+ _ _ _ _ _ upto ten terms
   d) $x + x^3/3! + x^5/5!$+ _ _ _ _ _ upto 7^{th} 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/sec^2). 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 Amount	Discount (Percentage)	
	Mill Cloth	Handloom items
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 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 C program using d0-while to calculate and print the first m fibonacci numbers.

11. Write C programs to print the following outputs using for loop.

```
1                    1
2 2                  2 2
3 3 3                3 3 3
4 4 4 4              4 4 4 4
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 covert 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 (iv) Dequeue.

16. Implement polynomial addition and multiplication with linked list sparse matrix.

17. 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.

18. Singly linked list and doubly linked lists (i) Insertion (ii) Deletion (iii) Lookup

19. (i) Implement stack using singly linked list. (ii) Implement queue using singly linked list.

20. Implement the following sorting techniques (i) Bubble sort (ii) Insertion Sort (iii) Quick Sort (iv) Heap Sort.

21. Implement the following searching method. (i) Sequential Search (ii) Binary Search (iii) Fibonacci

22. (i) Conversion of Infix expression to Postfix notation. (ii) Simple expression evaluator, that can handle +,-,/ and *.

23. Implement the algorithms for the following iterative methods using C to find one root of the equation f(x)=x sinx + Cosx=0.

    a) Bisection (b) False Position (c) Newton-Raphson

    d) Successive approximation.

24. Write programs for implementing Gauss-Jordan and Gauss-Seidal methods for solving simultaneous algebraic equations given below.

    $9x_1+2x_2+4x_3 = 20$

    $x_1+10x_2+4x_3 = 6$

    $2x_1-4x_2+10x_3 = -15.$

25. Write Computer programs to implement the Lagrange interpolation and Newton-Gregory forward interpolation.

26. Implement in 'C' the linear regression and polynomial regression algorithms.

27. Implement Traezoidal and Simpson methods.

28. Practice of exercises (in text book 2 of theory) related to:

    a) Word 2000 Chapter 7, 8, 9. (b) Excel 2000 Chapter 12, 13. (c) Power point- 2000 Chapter 15, 16. (d) Access 2000 Chapter 18,19. (e) Outlook 2000 Chapter 21,22,23. (g) FrontPage 2000 Chapter 25

JAWAHARLAL NEHRU TECHNOLOGICALUNIVERSITY HYDERABAD

I B. Tech. **0 – 3 – 4** **BME1030**

ELECTRONIC DEVICES & CIRCUITS LAB

(Common for EEE, ECE, EIE, EContE, ICE, CSE, CSIT, CSSE, ETM, ECM, BME)

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. Transistor CC characteristics (Input and Output)
6. Rectifier without filters (Full wave & Half wave)
7. Rectifier with filters (Full wave & Half wave)
8. FET characteristics
9. UJT characteristics
10. Study of CRO
11. Measurement of h parameters of transistor in CB, CE, CC configurations
12. CE amplifier
13. CC amplifier (emitter follower)
14. Single stage R-C coupled Amplifier.
15. FET amplifier (Common Source)
16. FET amplifier (Common Drain)
17. Wien Bridge Oscillator
18. RC Phase Shift Oscillator
19. Feed back amplifier (Current Series).
20. Feed back amplifier (Voltage Series).
21. Colpitts Oscillator
22. Hartley Oscillator
23. SCR characteristics.

JAWAHARLAL NEHRU TECHNOLOGICALUNIVERSITY HYDERABAD

II B. Tech. - I Semester **4 – 0 – 4** **BME2121**

MATHEMATICS – II

(Common for all Branches)

UNIT – I

Matrices – brief review – Inverse of a matrix by adjoint , elementary row transformations – Rank - Normal form – eachelon form. Augmented matrix – Consistency – Solution of system of simultaneous linear homogeneous and non-homogeneous equations.

UNIT – II

Eigen values, eigen vectors – properties – Cayley-Hamilton Theorem (Inverse and powers of a matrix by Cayley-Hamilton theorem). Quadratic forms – positive, negative definite – Diagnolization of matrix. Calculation of powers of matrix – Modal and sprectral matrices. Real matrices – Symmetric, skew-symmetric, orthogonal. Linear Transformation – Orthogonal Transformation. Quadratic forms – Reduction of quadratic form to canonical form – index – signature.
Complex matrices : Hermitian, Skew-Herimitian and Unitary – Eigen values and eigen vectors of complex matrices and their properties.

UNIT – III : 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.

UNIT – IV :

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 – Classification of second order linear Partial Differential Equations, solutions of one dimensional heat equation, wave equation and two-dimensional Laplace's equation under initial and boundary conditions.

UNIT – V

Fourier integral theorem – Fourier sine and cosine integrals. Fourier transform – Fourier sine and cosine transforms – properties – Inverse transforms – Finite Fourier transforms. Solution of one dimensional wave, heat equations and two dimensional Laplace's equation by Fourier transforms.
z-transform – Inverse z-transform – properties – Damping rule – shifting rule – Initial and final value theorems.
Convolution theorem – Solution of difference equations by z-transforms.

TEXT BOOKS :

1. A Text Book of Engineering Mathematics Volume – II - 2002
   T.K.V. Iyengar, B. Krishna Gandhi and others, S. Chand and Company
2. Engineering Mathematics
   B.V. Ramana, Tata McGraw-Hill -2002
3. Engineering Mathematics – II - 2002
   C. Sankaraiah, Vijaya Publications
4. Engineering Mathematics – II - 2002
   P. Nageswara Rao, Y. Narsimhulu, Prabhakar Rao

REFERENCES :

1. Engineering Mathematics
   S.K.V.S. Sri Rama Chary, N. Bhujanga Rao, P. Bhaskara Rao, B.S. Publications 2000
2. Advanced Engineering Mathematics (Eighth edition)
   Erwin Kreyszig, John Wiley & Sons (ASIA) Pvt. Ltd. - 2001
3. Advanced Engineering Mathematics (Second edition)
   Michael D. Green Berg, Prentice Hall, Upper saddal River, New Jersey-1998
4. Sarveswara Rao Koneru
   Engineering Mathematics Orient Longman (Pvt.) Ltd. 2002
5. Engineering Mathematics – II, N.P. Bali, Laxmi Publications (P) Ltd., New Delhi.

JAWAHARLAL NEHRU TECHNOLOGICALUNIVERSITY HYDERABAD

II B. Tech. - I Semester **4 – 0 – 4** **BME2122**

ELECRICAL TECHNOLOGY

(Common for ECE, EIE, E.Cont.E, CSE, CSIT, BME)

UNIT-I: DC MACHINES

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

Principle of operation of single phase transformer – types – Constructional features – Phasor diagram on No Load and Load – Equivalent circuit – Losses and Efficiency and Regulation – OC and SC tests – Predetermination of efficiency and regulation.

UNIT-III: THREE PHASE INDUCTION MOTOR:

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

UNIT-IV:

Synchronous generators – Constructional features – types – EMF Equation – Distribution and Coil span factors – Predetermination of regulation by Synchronous Impedance Method – OC and SC tests.

Principle of operation of synchronous motor.

UNIT-V:

Single Phase Induction Motors – Constructional features – Shaded pole motors – Capacitor motors, AC servomotor, AC tachometers, Synchros, Stepper Motors – Characteristics.

TEXT BOOKS:

1. Electrical Technology – Edward Hughes, 7th Edition – Pearson Education / PHI.
2. Introduction to Electrical Engineering – M.S Naidu and S. Kamakshaiah, TMH Publ.

REFERENCES:

1. Electrical Engineering – Del Toro, 2nd Edition, Prentice Hall of India.
2. Electrical Machines – P.S Bhimbra, Khanna Publishers.

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II B. Tech. - I Semester **4 – 0 – 4** **BME2123**

SWITCHING THEORY & LOGIC DESIGN

(Common for ECE, EEE, EIE, E.Cont.E, CSE, CSIT,BME)

UNIT – I:

NUMBER SYSTEMS & CODES:

Review of number systems – binary arithmetic – binary weighted and non-weighted codes – error detecting and error correcting codes.

BOOLEAN ALGEBRA:

Postulates and theorems; representation of switching functions – SOP & POS forms – Karnaugh Map representation – Minimisation using K-maps.

UNIT – II:

DESIGN OF COMBINATIONAL CIRCUITS:

Tabular minimization – design of single output and multi output functions – design using conventional AND, OR, NOT, NAND, NOR & EX – OR gates. Design using MSI & LSI devices – Digital multiplexer / selector decoder, demultiplexer – design of 4 bit adder, carry look-ahead adder, magnitude comparator – BCD converter, logic implementations using ROM, PAL & PLA.

UNIT – III:

INTRODUCTION TO SEQUENTIAL CIRCUITS:

Combinational versus sequential circuits, Asynchronous versus synchronous circuits - State table and state diagram – state assignment – Memory elements and their excitation functions – T flip flop, D flip flop, RS flip flop, JK flip-flops and their excitation requirements – Design of synchronous sequential circuits like Sequence Detectors and binary counters.

UNIT – IV:

CAPABILITIES & MINIMIZATION OF SEQUENTIAL MACHINES:

Melay and Moore machines – capabilities and limitations of finite state machine - state equivalence and machine minimization.

UNIT – V:

ALGORITHMIC STATE MACHINES:

ASM chart, Timing considerations, control implementation, Design with multiplexers and PLA control. Introduction to unate functions and threshold logic.

TEXT BOOKS:

1. Switching and Finite Automata Theory – by Zvi Kohavi, TMH edition.
2. Digital Logic and Computer Design – by M. Morris Mano, PHI.
3. Digital Logic Design Principles – by Norman Balbamian and Breadly, John Wiley.

REFERENCES:

1. Introduction to Switching Theory and Logic Design – by F.J. Hill and Peterson, John Wiley Publications.
2. Digital Logic-Applications & Design – by John M. Yarbrough, Vikas Publications, 1997.
3. Digital Systems Design – by R.P. Jain, TMH.
4. Digital Systems: Principles and Applications – Ronald J.Tocci , Pearson Education / PHI.

JAWAHARLAL NEHRU TECHNOLOGICALUNIVERSITY HYDERABAD

II B. Tech. - I Semester **4 – 0 –4** **BME2124**

APPLIED CHEMISTRY AND BIOCHEMISTRY

UNIT – I

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

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 – III

Biochemistry of Living Cell, Sub-cellular. Fractionation using the Differential Centrifugation Method. Functions of each Organelle, Transport of Substances across Biological Membrane Function. Chemical nature of Enzymes -Isolation and study of the Properties of Enzymes. Study of Enzyme kinetics by Spectrophotometer.

UNIT – IV

Carbohydrate, Protein & Liquid metabolism (Briefly), Transport of Substances across Biological membranes, Biochemical Mechanism of Generation and Conduction of Nerve Impulse. Transmission at Neuromuscular Junction and Synapses at Central Nervous System (briefly).

UNIT – V

Blood Chemistry: Chemical Composition of Blood, Separation of Serum Proteins by Electrophoresis. Acid Base Balance and Biochemical Measurements of Acid-Base status of the patients, Urine Chemistry, Urine Analysis, Chemical composition of urine under Normal and Abnormal Conditions. General methods of Biochemical Analysis carried out in the Estimation of blood Constituents such as Glucose etc.

Suggested Reading

1. D. W. Martin, P. A. Mayes & V. W. Rodwell, Harper's Review of Bio-chemistry, Lange Medical publications, Meruzen Asia, 1980.
2. A.V. S. S. Rama Rao, Textbook or Biochemistry, L. K & S. Publications, Tirupathi, 1992.
3. Engineering Chemistry by Jain & Jain

JAWAHARLAL NEHRU TECHNOLOGICALUNIVERSITY HYDERABAD

II B. Tech. - I Semester **4 – 0 – 4** **BME2125**

ANATOMY AND PHYSIOLOGY

ANATOMY:

UNIT I

Skeletal System: General Plan, Structure and Types of Joints, Major Muscles of Limbs and their Actions.

Nervous system: Brain and spinal cord, Peripheral and Autonomic Nervous System, Eye and Ear.

UNIT II

Heart, Major Blood Vessels, Trachea and Lungs.

Reproductive Systems: Male and Female

Endocrine Glands, Stomach, Intestines, Liver and Pancreas. Urinary System

Oesophagus. Gall Bladder and Spleen.

PHYSIOLOGY:

UNIT III

Functional Concept of the Human body, Bone and Muscle Physiology, Physiology of Muscle, Indulging Force, Tension and Length Relationship, Cable Properties of Nerve and Velocity of Conduction of Nerve Impulse and Compound Action Potential. Electroencephalogram and Electrocorticogram.

UNIT IV

Cardio-Respiratory system: Electrocardiography and Performance Characteristics of Heart, Physiology of Lung.

Renal System: Counter Current Concept and its Application of Concentration Of Urine

UNIT V

Sensory System: Electroretmogram and elcactrooculogram.

Physiology of Endocrine Regulatory System.

Physiology of the Digestive System.

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. Textbook of physiology for Dental studies by C. Tandan & Dr. Chandhramoli; Dorpan Publications.
5. Anatomy & Physiology for Nurses, Gorden Sears, W. S & Winwood W. S;Revised edition

JAWAHARLAL NEHRU TECHNOLOGICALUNIVERSITY HYDERABAD

II B. Tech. - I Semester **4 – 0 – 4** **BME2126**

BIOELECTRICITY AND ELECTRODES

UNIT – I

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

Electrical Activity of the Heart. Conduction system of the Heart. 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 – III

Volume conductor fields: Bioelectric sources. Volume-conductor formulation. Solid angle computation Infinite cylindrical axon, Core conductor model Inhomogeneous media. Integral equations (Elementary treatment only). Electrode-Electrolyte Interface, Equivalent Circuit Properties of Needle & Micro Electrodes, Electrodes for Surgery, Physiotherapy & Analytical instruments.

UNIT – IV

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 – V

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

Suggested Reading:

1. Plonsey Robert and Flemming David G. Bioelectrical phenomena, McGraw Hill, 1969.
2. Plonsey Robert and Brar R., Bioelectricity, McGraw Hill, 1986.
3. Principles of Applied Biomedical Instrumentation by L. A Geddes, John Willy & Sons.

JAWAHARLAL NEHRU TECHNOLOGICALUNIVERSITY HYDERABAD

II B. Tech. - I Semester **0 – 3 – 2** **BME2127**

BIOCHEMISTRY LAB

1. Chemical reactions and Identifications of Carbohydrates using Glucose, Fructose, and Sucrose.
2. Identification of Pathological Constituents of Urine such as Glucose, Ketone bodies, Albumin, Blood, Bile Salts and bile Pigments.
3. Chemical Reactions and Identification of Protein using Albumin, Casein and Peptone.
4. Chemical Reactions and Identification of Non-protein nitrogenous substances such as Urea, Uric Acid and Creatinine.
5. Scheme for identification of given unknown Biological substance.
6. Demonstration of Plasma Protein Electrophoresis and Chromatography of Amino acids.
7. Estimation of Reducing sugars in urine.
8. Estimation of Blood Glucose.
9. Applications of Spectrophotometer.
10. Application of chromatography.
11. Electrophoresis.
12. Test for presence of a) Reducing Sugars b) Proteins. c) Ketone Bodies. d) Blood. e) Bile Salts. f) Bile Pigments. g) Chlorides. h) Calcium. i) Sodium.

JAWAHARLAL NEHRU TECHNOLOGICALUNIVERSITY HYDERABAD

II B. Tech. - I Semester **0 – 3 – 2** **BME2128**

ANA TOMY & 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)

JAWAHARLAL NEHRU TECHNOLOGICALUNIVERSITY HYDERABAD

II B. Tech. - II Semester **4 – 0 – 4** **BME2221**

PROBABILITY THEORY & STOCHASTIC PROCESSES

UNIT – I:

Concept of probability, Random variables, Discrete and continuous. Probability distribution and density functions, Functions of random variables, joint and conditional probability density functions, Examples of probability density functions – Gaussian and Rayleigh density functions.

UNIT – II:

Statistical average – Mean, Variance. Characteristic function, Correlation between random variables, Sum of two random variables, Central limit theorem.

UNIT – III:

Random processes: Stationary random process, Ergodicity, power spectral density and auto correlation function of random processes. Transmission of random processes through networks.

UNIT – IV:

Noise sources, thermal noise, noise power spectral density, noise temperature, available noise power and available noise power density, available noise bandwidth, noise figure, effective input noise temperature, noise figure of cascaded systems, narrow band noise, Quadrature representation of narrow band noise.

UNIT – V:

Information theory: Entropy, information rate, source coding, Mutual information, Channel capacity of discrete channel, Shannon-Hartley law, Trade–off between bandwidth and SNR.

TEXT BOOKS:

1. Probability, Random Variables and Random Signal Principles – by P.Z. Peebles.
2. Signals, Systems & Communications – by B.P. Lathi, BS Publ.
3. Principles of Communications Systems – by H. Taub & Donald L. Schilling, McGraw Hill.

REFERENCES:

1. Statistica Theory of Communication – by S.P. Eugene Xavier, New Age Intl. Publ.
2. Probability, Random Variables and Stochastic Processes – by A. Papoulis, S. Unnikrishna Pillai, TMH.
3. Electronic Communication Systems – by Kennedy, McGraw Hill.

JAWAHARLAL NEHRU TECHNOLOGICALUNIVERSITY HYDERABAD

II B. Tech. - II Semester **4 – 0 – 4** **BME2222**

MANAGERIAL ECONOMICS & FINANCIAL ANALYSIS

(Common for all Branches)

UNIT – I: INTRODUCTION TO MANAGERIAL ECONOMICS:
Managerial Economics: Definition, Nature and Scope. Demand analysis: Law of demand, demand determinants. Elasticity of demand: Definition, Types, Measurement and Significance – Demand Forecasting methods.

UNIT – II: THEORY OF PRODUCTION:
Firm and Industry – Production Function – Cobb Douglas Production Function – Laws of Returns – Internal and External Economies of scale.
Cost Analysis: Cost Concepts, Fixed versus Variable Costs, Explicit versus Implicit Costs, Out-of-Pocket Costs versus imputed Costs, Opportunity Costs, Sunk Costs and Abandonment Costs.
Break-even Analysis: Concept of Break-even point (BEP) – Break-even Chart – Determination of BEP in Volume and Value – Assumptions underlying and Practical Significance of BEP. (Simple problems).

UNIT – III: INTRODUCTION TO MARKETS AND BUSINESS ORGANIZATIONS:
Market Structures – Types of Competition – Features of perfect Competition, Monopoly, Monopolistic Competition, Price – output determination.
Types of Business Organizations – Features, Merits and Demerits of Sole Proprietorship, Partnership and Joint Stock Companies – Types of Companies – Public Enterprises – Types and Features.

UNIT – IV: INTRODUCTION TO CAPITAL:
Capital and its Significance, Types of Capital, Estimation of Fixed and Working capital Requirements, Methods of raising capital.

Introduction to capital Budgeting methods : Payback method, Accounting Rate of Return (ARR) and Net Present Value (NPV) method. (Simple Problems)

UNIT – V: INTRODUCTION TO FINANCIAL ACCOUNTING AND FINANCIAL ANALYSIS:
Double Entry Book Keeping – Journal – Ledger – Trial Balance – Trading Account, Profit and Loss Account and Balance Sheet with simple adjustments.
Ratio Analysis: Computation of Liquidity Ratios (Current Ratio and Quick Ratio), Activity Ratios (Inventory Turnover Ratio and Debtor Turnover Ratio), Capital Structure Ratios (Debit-Equity Ratio and Interest Coverage Ratio) and Profitability Ratios (Gross Profit Ratio, Net Profit Ratio, Operating Ratio, P/E Ratio and EPS). Analysis and Interpretation.

TEXT BOOKS:

1. Joel Dean, Managerial Economics, PHI, 2001.
2. James C. Van Horne, Financial Management Policy, 12th edition 2002, PHI.
3. Varshney and Maheshwari, Managerial Economics, S. Chand & Co., 2000.
4. Y.K. Bhushan, Fundamentals of Business Organization and Management, S. Chand & Co.
5. Narayana Swamy, Financial Accounting, PHI, 2001.
6. A.R. Aryasri, Managerial Economics and Financial Analysis for JNTU (B.Tech), TMH, New Delhi.
7. R.K. Mishra et al, Readings in Accounting and Finance.
8. R.L. Gupta, Financial Accounting, Vol-I, S. Chand, New Delhi, 2001.

JAWAHARLAL NEHRU TECHNOLOGICALUNIVERSITY HYDERABAD

II B. Tech. - II Semester **4 – 0 – 4** **BME2223**

PULSE & DIGITAL CIRCUITS

(Common for ECE, EEE, EIE, E.Cont.E, BME)

UNIT – I: LINEAR WAVE SHAPING:

High pass and low pass RC circuits and their responses for sinusoidal, step voltage, pulse, square wave and ramp inputs. High pass RC network as a differentiator. Low pass RC network as an integrator. Attenuators and their applications in CRO probe. RL and RLC circuits and their response for step input, Ringing circuits.

UNIT – II: NON-LINEAR WAVE SHAPING:

Diode clippers, Transistor clippers, clipping at two independent levels, Emitter coupled clipper, Diode comparators, Diode differentiator.

Comparator, applications of voltage comparators, clamping operation, clamping circuits using Diodes with different inputs, clamping circuit theorem, practical clamping circuits, effect of Diode characteristics on clamping voltage.

SWITCHING CHARACTERISTICS OF DEVICES:

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

UNIT – III: MULTIVIBRATORS:

Bistable, Monostable and Astable multivibrators using Transistors, Schmitt trigger.

UNIT – IV: SWEEP CIRCUITS:

Voltage sweeps, methods of linearization, Bootstrap and Miller circuits, Linear current sweep, application in T.V. , synchronization.

SYNCHRONISATION AND FREQUENCY DIVISION:

Principles of Synchronization, Synchronization of Astable multivibrators – Phase Delay and Pulse jitters – Synchronization of sweep circuits with Symmetrical signals.

UNIT – V: GATES:

Unidirectional and Bi-directional Sampling gates.

BLOCKING OSCILLATORS:

Base timing, Emitter timing, Astable blocking Oscillator.

TEXT BOOKS:

1. Pulse, Digital and Switching Waveforms – by Millman & Taub, McGraw-Hill Publ.

REFERENCES:

1. Wave Generation and Shaping – by L. Strauss.
2. Pulse, Digital Circuits and Computer Fundamentals – by R. Venkataraman.

JAWAHARLAL NEHRU TECHNOLOGICALUNIVERSITY HYDERABAD

II B. Tech. - II Semester **4 – 0 – 4** **BME2224**

COMMUNICATION ENGINEERING
(Common for EIE, EContE, BME)

UNIT – I: MODULATION

Amplitude modulation and demodulation: AM, DSB-SC, SSB and VSB.

ANGLE MODUALTION AND DEMODULATION

FM and PM, NBFM, WBFM, Pre-emphasis, De-emphasis.

UNIT – II: RADIO TRANSMITTERS

Frequency allocation of radio communication systems, broadcast standards for AM and FM.

Transmitters: Block diagram and functions of radio transmitters, AM, FM and PM.

UNIT-III: RADIO RECEIVERS

TRF and super hetrodyne receivers, RF, mixer and IF stages, choice of IF. Image frequency, alignment and tracking of radio receivers. AGC, tone and volume controls. Receiver measurements. Communications receiver. FM receivers. Fading and diversity reception.

UNIT-IV: PULSE MODULATION SYSTEMS

Sampling theorem - statement and proof, types of sampling, TDM and FDM, principles of PAM, PWM and PPM methods. PCM, DM, ADM. Introduction to Binary, M-ary, ASK, FSK, PSK, DPSK and Q-PSK methods.

UNIT V: DATA TRANSFER TECHNIQUES

Asynchronous, synchronous, serial and parallel interface standards, communication media and adapters. Modems and their interfacing. Computer communication - Introduction to circuit switching, Message switching and Packet switching networks.

UNIT VI : NOISE

Sources and types of noise. Noise power spectral density, SNR, Noise figure.

REFERENCES:

1. Electronic and Radio Engineering: Terman
2. Electronic Communication Systems: Kennedy
3. Communication Systems: B.P. Lathi
4. Radio Engineering: G.K. Mithal
5. Communication Systems: Simon Haykin
6. Data and Computer Communication: Williams Stallings
7. Electronic Communications: Robert J. Schoenbeck

JAWAHARLAL NEHRU TECHNOLOGICALUNIVERSITY HYDERABAD

II B. Tech. - II Semester **4 – 0 – 4** **BME2225**

BASIC CLINICAL SCIENCES-I

UNIT-I

NEPHROLOGY: Principles of dialysis; Haemodialysis, Acetate dialysis, Bicarbonate dialysis. Peritonial dialysis, Chronic ambulatory peritoneal dialysis, Haemoperfusion, Sequential ultra filtration. Haemofiltration, Adequacy of dialysis, Clearance, dialysance, Components of dialysing system, Dialysate, composition of dialysate, Types of dialysers, controls and monitoring devices for dialysers. Clinical significance. Renal transplantation: Basic principles.

UNIT-II

NEUROLOGY: Diseases of nervous system, spinal cord lesions, motor nervous disease, Prolapsed intravertebral disc, Neuropathies, Myasthevia gravis, Diseases of muscle, Diagnostic investigation. Electro encephalography. 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 axion reflexes. Disorders of neuromuscular transmission

UNIT-III

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. Electro cardiography: Source of ECG potentials: Dipole theory, conduction system, Normal and abnormal ECG's. Diagnostic applications, interpretation of ECG. Cardiacpacing. Diagnostic indications. Criteria for selection. Therapeutic indications. Complications. Temporary pacing. Permanent pacing.

UNIT-IV

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-V

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

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 biapsy 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 TECHNOLOGICALUNIVERSITY HYDERABAD

II B. Tech. - II Semester **4 – 0 – 4 BME2226**

BIOTRANSDUCERS & APPLICATATIONS

UNIT-I

INTRODUCTION: Basic requirements of bio transducers, Quesi static effects (linearity, Hysterisis), 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 TRANSDUCER (Measurement Principle, Design and Applications): Thermo resistive, Thermo electric, PN junction diode Thermometers, frequency change Temperature Transducers, Chemical Thermometry, Radiation Thermometry.

UNIT-III

DISPLACEMENT, MOTION AND FORCE TRANSDUCERS: Potentiometric Transducers: Resistive, Resistive strain guages, L V. D. T, Inductive displacement transducer, Capacitive displacement transducers, Ultrasonic methods. Velocity transducers: Differentiation and Integration methods, Doppler system, Methods based on the mass bauer effect, Electro magnetic methods. Acceleration transducers: Piezo electric transducers

UNIT-IV

PRESSURE & FLOW TRANSDUCERS: Occlusive cuff methods. Force balance methods. Direct hydraulically coupled Catheter transducer system, Elastic type transducers, Diaphragm displacement pressure transducers. Catheter tip transducer, Electrical transduction methods, Optical transducers. Implantable pressure transducer, Micro pressure transducer. 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-V

BIOTELEMETRY: Transmission of biological data through radio telemetry. Bioelectric Amplifiers -Principle of Operational Amplifier, Instrumentation Amplifier characteristics, Integrator, Differentiator, Log Amplifier and Antilog Amplifier-

REFERENCES:

1. Transducers for Biomedical Measurements by RICHARD. S. C.COBBOLD JOHN WILLY AND SONS.
2. Introduction to Bio-Medical electronics by HOSEPH DUBOVY~ McGraw-HILL, 1978
3. Electronic Instrumentation in Medical practice by R.S KANDPUR -KOTHARI MEDICAL PUBLICATIONS, BOMBAY 1975.
4. Principles of Applied Biomedical Instrumentation by L. A Geddes, John Willy & Sons.

JAWAHARLAL NEHRU TECHNOLOGICALUNIVERSITY
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II B. Tech. - II Semester **0 – 3 – 2** **BME2227**

PULSE & DIGITAL CIRCUITS LAB
(Common for ECE, EIE, EContE, BME)

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.

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II B. Tech. - II Semester **0 – 3 – 2** **BME2228**

TRANSDUCERS LAB

1. Study & Characteristics of the Transducers
   Strain Gauges, L VDT
2. Resistance thermometer.
3. Thermisters and 'I'hermocouple
4. Acceleration transducers
5. Optical transducers.
6. Photo Sensors: LED, Solar cells, Photo diodes, Photo Transistors.
7. pH Measurement
8. Measurement of Blood Pressure.
9. Measurement of Humidity.
10. Measurement of velocity using Ultra Sonic Method.
11. Measurement of Level.
12. PID control set up.

JAWAHARLAL NEHRU TECHNOLOGICALUNIVERSITY HYDERABAD

III B. Tech. - I Semester **4 – 0 – 4** **BME3121**

MANGEMENT SCIENCE
(Common for all Branches)

UNIT – I: INTRODUCTION TO MANAGEMENT

Concept of Management and Organization – Functions of Management, Evolution of Management Thought – Taylor's Scientific Management, Fayol's Principles of Management, Douglas Mc-Gregor's Theory X and Theory Y, Mayo's Hawthorne Experiments, Hertzberg's Two Factor theory of Motivation, Maslow's Hierarchy of Human needs – Systematic Approach to Management. Principles of Organization – Types of Organization – Types of Organization Structure: Line Organization, Functional Organization and Line and Staff Organization, Matrix Organization - Managerial objectives – social responsibilities.

UNIT – II: INTRODUCTION TO OPERATING MANAGEMENT

Types of plant Layout- Methods of Production: Job, Batch and Mass Production.

Work-Study: Basic procedure involved in Method study and Work Measurement. Statistical quality control. Materials Management - Objectives of Inventory Control – EOQ – ABC analysis - Purchase procedure - Stores Management and Stores Records.

Marketing: Marketing Vs Selling, Marketing Mix, Stages in Product Life Cycle, Channels of Distribution.

UNIT– III: INTRODUCTION TO HUMAN RESOURCE MANAGEMENT (HRM)

The concepts of HRM, Human Resource Development (HRD) and Personnel Management & Industrial Relations (PMIR) - HRM Vs PMIR, Basic functions of HR Manager: Manpower Planning, Recruitment, Selection, training, development,

placement, wage and salary administration, promotion, transfer, separation, performance appraisal, grievance handling and welfare administration, job evaluation and Merit reading.

UNIT – IV: INTRODUCTION TO STRATEGIC MANAGEMENT

Corporate Planning Process: Mission, goals, objectives, policy, strategy, programs - Elements of Corporate Planning Process - Environmental Scanning: External Environment Analysis, Internal Environment Analysis, SWOT Analysis-Stages in Strategy Formulation and Implementation.

UNIT – V: INTRODUCTION TO PERT/CPM

Network Analysis - project management – Program Evaluation and Review Technique (PERT) Vs. Critical Path Method (CPM) – Identifying Critical Path – Probability of completing the project within given time under PERT, Project cost Analysis, Project crashing.

TEXT BOOKS:

1. Koontz and O' Donnel, Principles of Management, McGraw-Hill Publ., 2001.
2. Philip Kotler, Marketing Management, Prentice Hall of India 4th Edition – 2002.
3. Gary Dessler, Human Resource Management, PEA, 2002.
4. L.S. Srinath, PERT/CPM, Affiliated East-West Press, New Delhi, 2000.
5. W. Glueck & L.R. Jauch, Business Policy and Strategic Management, McGraw-Hill, 1998.
6. A.R. Aryasri, Management Science for JNTU (B.Tech), TMH, 2002.
7. O.P. Khanna, Industrial Engineering and Management, Dhanpat Rai, 1999.
8. Chandra Bose, Management and Administration, Prentice Hall, 2002.

JAWAHARLAL NEHRU TECHNOLOGICALUNIVERSITY HYDERABAD

III B. Tech. - I Semester **4 – 0 – 4** **BME3122**

DIGITAL SIGNAL PROCESSING

(Common for ECE, EIE, EContE, EEE, BME)

UNIT – I:

Introduction to Digital Signal Processing: Discrete time signals & sequences, linear shift invariant systems, stability, 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: Fast Fourier transforms (FFT) - Radix-2 decimation in time and decimation in frequency FFT Algorithms, Inverse FFT.

UNIT – III:

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.

UNIT – IV:

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

UNIT – V:

FIR DIGITAL FILTERS: Characteristics of FIR Digital Filters, frequency response. Design of FIR Digital Filters using Window Techniques. Comparison of IIR & FIR filters. Applications of FFT in spectral analysis and filtering. Applications of DSP to speech processing and Radar signal processing.

TEXT BOOKS:

Digital Signal Processing – by A.V. Oppenheim and R.W. Schaffer, PHI.

Digital Filter Analysis and Design – by A. Antoniou, TMH.

REFERENCES:

1. Digital Signal Processing – by W.D. Stanley et.al. Resin Publ.
2. Digital Signal Processing – by S. Salivahanan et al., TMH.
3. Digital Signal Processing – by Thomas J. Cavicchi, WSE, John Wiley.

JAWAHARLAL NEHRU TECHNOLOGICALUNIVERSITY HYDERABAD

III B. Tech. - I Semester **4 – 0 – 4** **BME3123**

LINEAR & DIGITAL IC APPLICATIONS
(Common for EIE, E Cont E, EEE, BME, Mechatronics)

UNIT – I: OPERATIONAL AMPLIFIERS

Design aspects of Monolithic Opamps, Ideal characteristics, Specifications, Offset Voltages and currents, frequency compensation techniques, measurement of op amp parameters, applications of op amps – inverting, non-inverting amplifiers, integrators, function generators, logarithmic amplifiers, instrumentation amplifiers, signal conditioning circuits, detectors.

UNIT – II:

555 Timer, 556 Function generator ICs and their applications. Three terminal regulators. IC 565 phase locked loops and their typical applications. IC 1496 (Balanced Modulator) Applications.

UNIT – III: ACTIVE FILTERS

LPF, HPF, BPF, BEF, ALL Pass filters, and Higher order filters and their design. VCSV and IGMF configurations.

UNIT – IV: LOGIC FAMILIES

DTL, TTL, ECL, IIL, MOS Logic families, Parameters and their comparison. Tristate logic, Interfacing of Logic Families, Flip-Flops.

UNIT – V:

Analog multiplexers, Sample and hold circuits, D/A converters–Resistive divider and ladder networks, A/D converters, counters–Ramp type, Dual slope, Integration

technique, Successive approximation, Parallel comparison technique.

REFERENCE BOOKS:

1. Micro Electronics – by Jacob Millman (ISE).
2. Op Amps and Linear Integrated Circuits – by Ramakanth Gayakwad (PHI).
3. Integrated Circuits – by Botkar (Khanna).
4. Applications of Linear Integrated Circuits – by Clayton.

JAWAHARLAL NEHRU TECHNOLOGICALUNIVERSITY
HYDERABAD

III B. Tech. - I Semester- **4 – 0 – 4** **BME3124**

BASIC CLINICAL SCIENCES -II

UNIT – I:
Orthopaedics: classification of joints, reduction replacements Pathology: general pathology, investigations. Blood bank: blood groups, blood transfusion, exchange transfusion.

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

UNIT – IV:
Biological effects of radiation:.Radioactive protection. Somatic effects, LD 50. Cause of radiation death skin blood and blood forming organs. Reproductive organs. Embryo late effects of radiation, Radiation carcinogenesis, leukaemogenesis. Cataract, Genetic effects or radiation. 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 – V:
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. 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, Polyeythemia, meta static bone diseases. Malignantural plpural effusion and ascites,

Suggested reading:

1. John Crawford adams Churchill, Outline of Orthopaedics and outline of Frantures.
2. Miller R. D., tcxt book of anaesthesia
3. Meredith and Massey, Fundamental Physics of Radiology. Johns and Cunningham
4. The Physics of Radiology. Ramesh chandra, Introduction to Nuclear Medicine.

JAWAHARLAL NEHRU TECHNOLOGICALUNIVERSITY HYDERABAD

III B. Tech. - I Semester **4 – 0 – 4** **BME3125**

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 extracarporeal blood flow.

RHEOLOGY OF BLOOD IN MICROVESSELS: Fahracus - 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 – III:

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 – IV:

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.

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

UNIT – V:

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

ORTHOPEDIC MECHANICS: Mechanical properties of cartilage, Diffusion properties of Articular cartilage, Mechanical properties of bone, Kinetics and kinematics of joints, Lubrication of joints.

BOOKS:

1. Biomaterials, Medical devices and tissue engg.. by Chapman & Hall.
2. Introduction to biomechanics of joints and joint replacement. Mechanical engg.. Publication limited 1987 by D. Dowson & V. Wright.
3. Biomedical engg.. Principles. Marcel Dekker, INC New York by D.O Cooney
4. Biomechanics of diarthrodial joints: volume 1&2 Springer verlag by Van C. Mow, Anthony ratetiffe & Savio L-7, Woo.
5. Biomechanics- Mechanical properties of living tissues Spriger-Verlag by y.C Fung

JAWAHARLAL NEHRU TECHNOLOGICALUNIVERSITY HYDERABAD

III B. Tech. - I Semester **4 – 0 – 4** **BME3126**

BIO MEDICAL EQUIPMENT

UNIT – I

Diagnostic Equipment:- E.C.G, T.M.T, E.E.G, E.M.G, P.F.T, 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 – II

Monitoring Equipment:- Phono cardiography & Arrhythmia monitors, Blood Pressure Monitors, Centralised monitors, Ambulatory monitors, foetal monitors. Incubator", Apnea monitors.

UNIT – III

Therapeutic Equipment:- *Pacemaker:* Synchronous - Asynchronous, External -Internal, Demand & Fixed type Pacemaker, Programmable Pacemakers. *Defibrillators:* AC & DC Defibrillators, Synchronous & Asynchronous. Electrical Safety. -Working principle, Types of Electrodes, Calibration, Basic Trouble Shooting.

Heart Lung machine: Governing principle, Qualitative Requirements, Functional details of thin film membrane type blood oxyginarators. Infusion pumps, Suction Apparatus, Nerve stimulators, Bladder stimulators, Implant able Stimulators, Short wave Diathermy, Micro wave Diathermy, Ultra Sound Diathermy

UNIT – IV

Surgical Equipment: *electro surgical generators:-* Unipolar, Bipolar. Hazards of electro surgical units & Safety measures. Anaesthetic delivery systems, Different types of Ventilators, Humidifiers, Neubilisers, Surgical microscope & O.T table

UNIT – V

Recorders & Display Devices: General features of Thermal, Ink Jet, Photo graphic, Dot Recorders. General features of Display Devices for Bio -Signals. Patient Electrical Safety, Types of Hazards, Natural protective Mechanism, Leakage current, Patient Isolation, Hazards in operation rooms.

Suggested Reading:

1. Introduction to Bio-Medical electronics. joseph Dubovy, M.C. Graw Hill, 1978
2. Bio-Medical Instruments Theory & design. Wel Kowisty & Others Handbook of Bio Medical Instrumentation -R. S. Kandpur.
3. Principles of applied Bio-Medical instrumentation Oeddl1s IJ. 1

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III B. Tech. - I Semester **0– 3– 2** **BME3127**

IC APPLICATIONS LAB

(Common for EIE, E Cont E, Mechatronics, BME)
(Minimum 10 experiments should be conducted)

1. Integrator and differentiator using 741 OPAMP.
2. (A) Astable using 555.
   (B) Monostable using 555.
3. Function generator using 741 OPAMP.
4. Voltage regulator using 723.
5. Inverter Transfer Characteristics and study of logic gates.
6. Study of flip-flops using ICs.
7. 7490 Counter.
8. Half Adder, Full Adder and subtractor.
9. BCD to 7 segment decoder using IC 7447.
10. Three Terminal regulators 7805, 7809, 7912, 565 PLL, 566 VCO.
11. D/A Converter.
12. A/D Converter.
13. Study of PLAS.

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III B. Tech. - I Semester **0– 3– 2** **BME3128**

BIOMEDICAL EQUIPMENT LAB

STUDY, OPERATION AND TROUBLE SHOOTING OF:

1. ECG Monitor
2. Pace Maker
3. DC Defibrillator
4. Short Wave Diathermy Unit
5. Ultrasound Diathermy Unit
6. Monitoring and Control Circuits for Haemodialysis Machine
7. Safety Evaluation Circuits
8. Audiometer
9. Hearing Aids
10. Pneumo tachograph and signal conditioners
11. Ultra Sound Scanner
12. Electro surgical generators.

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III B. Tech. - II Semester **4– 0– 4** **BME3221**

BIOLOGICAL CONTROL SYSTEMS

UNIT – I
Dynamic Systems and their Control. Modelling and Block Diagrams. Open and Closed loop Systems. Principles and General Engineering Techniques of Feedback Control. Basic Closed Loop Relation. Closed Loop Dynamics of First Order and Second Order.

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

UNIT – III
Examples of Biological Control Systems. Pupil Control System. Skeletal Muscle Servomechanism. The Semicircular Canal. Free Swinging Limbs. Thermo Regulation.

UNIT – IV
Respiration Models and Controls. Cardiovascular Control Systems. Visual Fixation System. Oculo-motor System. Sugar Level Control Mechanism. Endocrine Control System.

UNIT – V
Models on Human Operator. Human Operator Tracking Characteristics. Biological Receptors-Receptor Characteristics. Transfer Function Models of Receptors.

Suggested Reading: ,

1. Ogata Katsuhika, Modem Control Engineering, Second Edition, Prentice Hall of India, 1992.
2. Milsum John H. , Biological Control Systems Analysis, McGraw-Hill,
3. Milhorn T. H. , Applications of Control Theory to Physiological Systems, Saunder, 1980

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III B. Tech. - II Semester **4– 0– 4** **BME3222**

ADVANCED BIOMEDICAL EQUIPMENT

UNIT – I
COMPUTERS IN MEDICINE: hospital information systems, database approach in clinical laboratories, computerised cytology and histology, chromosome analyser, computer applications in intensive care units

UNIT – II
AUDIOMETRY: Air conduction, bone conduction, Masking, Schematic, Functional diagram of an Audiometer, *Hearing aids:-* Different types, Comparison of Micro phones, Receivers & Amplifiers, Ophthalmoscope, Retinoscope. *I. A. B. P:-* principle & application.

UNIT – III
ARTIFICIAL LIMB AND HANDS: introduction to Artificial Organs, Choice of Materials, Inflammation, Rejection, and Corrosion.

UNIT – IV
PROSTHETIC HEART VALVES: Qualitative Requirements, Different types or mechanical & tissue valves, testing of Prosthetic Heart valves using a pulse duplicator.

UNIT – V
ARTIFICIAL KIDNEY: Haemo dialyser, Qualitative requirements, General scheme of operation, Types of exchangers, Block diagram, Electronic control and monitoring systems
ARTIFICIAL LARYNX (pneumatic & electronic): Analyzing artificial electronic larynx speech

BOOKS

1. Handbook of biomedical engg.. Bronzino, Joseph
2. Handbook of biomedical instrumentation R. S. Kandpur
3. Medical Instrumentation application & design houghton mifflin 1994
4. Artificial organs by Erie.D. Blom , Howard B. Rothman

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III B. Tech. - II Semester **4– 0– 4** **BME3223**

ERGONOMICS

UNIT – I

Introduction: Models in Process Control, Design of Information Devices, Traditional Devices, V. D.U' s, Using colour, Design of Controls, Control Room Layout and Design.

UNIT – II

Environmental Factors in Control Room, System Design Overview, The Operators Abilities and Limitations (Sense Organs and Perception, Job skills)

UNIT – III

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

UNIT – IV

Case Study of Wheel Chair, Design of Dental chair and Design of O.T Table.

UNIT – V

Case Study of Control Room Layout and Design and case Study of Cook pit Design.

BOOKS:

1. Ergonomics: man in his working environment by R. F. H. Murell
2. Applied ergonomics hand book by IAR galer, Butterworths & Co., 1987.
3. Handbook of control room design and ergonomics by Toni Ivergard .
4. Human factors in engg. And design by E. J. Mccormic
5. Antropomctric measurements by A. Damon

REFERANCE:

1. Fitting the task to the man by Etiemc grand jem,
2. Human factors in engineering by R J Meconnick
3. The body at work. Biological ergonomics; by W. T. singlton.
4. Biomechanical basis of ergonomics by E. R. Tichauer
5. New horizons for Human factors design by R D. Huchingson

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III B. Tech. - II Semester 4– 0– 4 BME3224

BIOMEDICAL SIGNAL PROCESSING

UNIT – I

Neurological Signal Processing: Modeling of ERG Signals. Linear prediction. Y -W equations. Detection of spikes and spindles Detection of Alpha, Beta and Gamma Waves. A R. Modeling Of Seizure EEG. Sleep Stages. Inverse Filtering. Least squares and polynomial modeling.

UNIT – II

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

UNIT – III

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 – IV

Prony's Method: Original Prony's Method. Prony's Method based on the Least Squares Estimate. Analysis of Evoked Potential using Prony's Method

UNIT – V

Data Compression Techniques: ECG Acquisition and Transmission. Data Reduction Algorithms: Turning point. AZTEC, CORTES, and the K L transform.

Suggested reading:

1. Weitkunat R, Digital Bio signal Processing, Elsevier, 1991.
2. Akay M , Biomedical Signal Processing, Academic: Press 1994
3. Macfarlane P.W., Computer Techniques in Medicine, Butter Worth, 1985
4. Cohen.A, Biomedical Signal Processing -Vol. I Time & Frequency Analysis, CRC Press, 1986.

JAWAHARLAL NEHRU TECHNOLOGICALUNIVERSITY HYDERABAD

III B. Tech. - II Semester **4– 0– 4** **BME3225**

MEDICAL IMAGIANG 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, X-ray Generators, Fillers, Beam Restrictors and Grids, Intensifying Screens Fluorescent Screens, X-ray detectors.

X-ray diagnostic methods: Conventional X-ray Radiography, Fluoroscopy, Angiography, Mammography and Xeroradiography.

Biological effects of ionising radiation: Determinants of Biological effects, Short Term and Long Term Effects.

UNIT – II

X-Ray Image Characteristics: Spatial Resolution, Image Noise, Image Contrast, Receiver Operating Curve (ROC) Image Subtraction, Conventional Tomography, Computed Tomography, Digital Radiography, 3-D Reconstruction, Dynamic Spatial Reconstructor (DSR)

UNIT – III

Fundamentals of Acoustic Propagation: Reflection and Refraction, Attenuation, Absorption, and Scattering, Non linearity Parameter, Doppler effect.

Image Characteristics: Ultrasonic Texture, Speckle reduction, Compensation of Phase Aberration, Tissue Characterization. Transducer Beam Characteristics, Axial and Lateral Resolution, Focusing, Arrays.

Ultrasonic Diagnostic Methods: Pulse-Echo Systems, Transmission Methods, Doppler Methods, Duplex Methods, Duplex Imaging.

Biological effects of Ultra sound.

UNIT – IV

Radio Nuclide: Imaging: Fundamentals of Radioactivity, Generation and Detection of Nuclear Emission, Diagnostic Methods using Radiation Detector. Radio Nuclide Imaging Systems: Longitudinal Section Tomography, SPECT, PET, Attenuation compensation.

Characteristics of Radio nuclide Images, Internal Radiation, Dosimetry and Biological effects,

UNIT – IV

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.

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.

REFERENCE:

1. Medical Imaging Principles by K. Kirk Shung.
2. Principles of Computerised Tomographic Imaging. by Avinash C. Kak IEEE PRESS , U. S. A.

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III B. Tech. - II Semester **4- 0 - 4** **BME3226**

MICROPROCESSORS & INTERFACING

(Common for ECE, EIE, EContE, EEE, BME, Mechatronics)

UNIT – I:
Evolution of Microprocessors, Architecture of 8086, Register set of 8086, Special functions of general purpose registers, Flag register and function of each flag. Addressing modes of 8086, Instruction set of 8086, Assembler directives, Simple assembly language programming of 8086 involving looping, picking maximum and minimum, sorting, and evaluation of arithmetic expression.

UNTI – II:
Pin diagram of 8086, Minimum mode and Maximum mode of operation, Timing diagram, Parallel data transfer schemes, Programmed I/O, Interrupt driven I/O, DMA. 8255 PPI, various modes of operations and interfacing to 8086. A/D, D/A converter interfacing. Simple programs using A/D, D/A converters. Stepper motor interfacing.

UNIT – III:
Need for serial I/O 8251 USART architecture and programming features, Interfacing to 8086, TTL – to – RS232C, RS232C-to-TTL conversion. Need for DMA, 8237 DMA controller architecture and programming features, Interfacing to 8086.

UNIT – IV:
Interrupt structure of 8086, Vector Interrupt table, 8259 PICU architecture, Programming features and interfacing, Memory interfacing (static RAM only) – Types of EPROMS & SRAM, 74LS138 decoder, Interfacing EPROMS and SRAMS.

UNIT – V:
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:

1. A.K.Ray and K.M Bhurchandi - Advanced Microprocessors & Peripherals, TMH.
2. Douglas V. Hall – Microprocessors & Interfacing, 2nd Ed. (TMH).
3. John Uffenbeck - The 8086/8088 Family, PHI.
4. Kenneth J.Ayala - 8051 Microcontroller, (Penram International).

REFERENCES:

1. Microcomputer Systems: The 8086/8088 Family Architecture, Programming and Design – by Yu Cheng Liu and Glenn A. Gibson, 2/e, PHI.
2. Microprocessors, Interfacing and Applications – by Ram Singh and B.P. Singh, New Age Publ.

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III B. Tech. - II Semester **0– 3- 2** **BME3227**

MICROPROCESSORS LAB
(Common for ECE, EIE, Econt E, EEE, BME)

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. Modular Program: Procedure, Near and Far implementation, Recursion.
6. DOS/BIOS programming: Reading keyboard (Buffered with and without echo) – Display characters, Strings.

II. INTERFACING:

1. 8259 – Interrupt Controller.
2. 8279 – Keyboard Display.
3. 8255 – PPI.
4. 8251 – USART.

III. MICROCONTROLLER 8051:

1. Reading and Writing on a parallel port.
2. Timer in different modes.
3. Serial communication implementation.
4. Understanding three memory areas of 00 – FF (Programs using above areas).
5. Using external interrupts.
6. Programs using special instructions like swap, bit/byte, set/reset etc.
7. Programs based on short, page, absolute addressing.

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III B. Tech. - II Semester **0– 3-2** **BME3228**

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 or I I R Filter.
8. Design of F I R Filter.
9. PSD Estimation.
10. Data Compression Techniques: AZTEC. TP.
11. Data Compression Technique: CORTES.
12. Data Compression Technique: K. L. Transform.

JAWAHARLAL NEHRU TECHNOLOGICALUNIVERSITY HYDERABAD

III B. Tech. BME

BASIC CLINICAL SCIENCES PRACTICE (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, stunt 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.

Note: It is necessary to undergo one-month Hospital Training for the award of Degree.

JAWAHARLAL NEHRU TECHNOLOGICALUNIVERSITY HYDERABAD

IV B. Tech. - I Semester **4– 0-4** **BME4121**

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

UNIT – II:

Bayes classified decision function – For bayes classifier Bayes Classifier for normal patterns. Trainable pattern classifiers – deterministic approach perception approach reward – punishment concept. Gradient approach – Gradient Descent algorithms – LMSE Algorithms – Multi category classification.

UNTI – III:

Trainable pattern classifiers statistical approach – stochastic approximation methods Robbin Minro algorithms – increment correction algorithms LMSE algorithms. Syntactic pattern recognition – formulation – syntax directed recognition – picture descript.

UNIT – IV:

Digital Image fundamentals: Representation, elements – image transforms - Fast Fourier transform, Image

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

UNIT – V:

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.
3. Fundamentals of Digital Image Processing – by A.K. Jain, PHI.

JAWAHARLAL NEHRU TECHNOLOGICALUNIVERSITY HYDERABAD

IV B. Tech. - I Semester **4– 0-4** **BME4122**

COMPUTER NETWORKS

(Common for ECE, EIE, E.Cont.E, EEE, CSE, CSIT, BME)

UNIT-I:
Review of protocol layering, Data link layer, Design issues, Elementary data link protocols, Sliding window protocol, Example data link protocols.

UNIT-II:
The medium access sublayer, Channel allocation problem, Multiple access protocols, Review of IEEE standards for LANs, LAN bridges.

UNIT-III:
The network layer, Design issues, Routing algorithms, Congestion control algorithms, The Transport layer, Transport services, Transport protocols.

UNIT-IV:
Internetworking, Internet network layer, Internet transport protocols (TCP and UDP), ATM network layer, ATM transport protocols.

UNIT-V:
The application layer, Security, DNS, SNMP, Electronic Mail, WWW, Multimedia.

TEXT BOOK:

1. Computer Networks: A. S. Tanenbaum, 3rd Edition, PHI.

REFERENCES:

1. An Engineering Approach to Computer Networking, S. Keshav, Pearson Education.
2. Computer Networking a Top-Down Approach Featuring the Internet, J. F. Kurose, K. W. Ross, Pearson Education.
3. Data Communications and Networking, A. S. Godbole, TMH.

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IV B. Tech. - I Semester **4– 0-4** **BME4123**

REHABILITATION ENGINEERING

UNIT – I

Rehabilitation concepts: Engineering concepts in sensory rehabilitation Engineering Concepts in motor rehabilitation Engineering Concepts in communication disorders. Orthopedic Prosthetics and Orthotics in rehabilitation: fundamentals, 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); Active Prostheses: Active above knee prostheses. Myoelectric hand and arm prostheses. The MARCUS intelligent Hand prostheses

UNIT – II

Sensory augmentation and substitution: visual system: Visual augmentation, Tactual vision substitution, Auditory vision substitution. Auditory system: Auditory augmentation, cochlear implantation, visual auditory substitution, tactual auditory substitution, Tactual system: Tactual augmentation, Tactual substitution,

UNIT – III

Augmentative communication, control and computer access (AAC): user interface; outputs; acceleration techniques; cost effectiveness of high -verses- low technology approaches; Intervention and other issues; Environmental control systems and robotic manipulation aids; Environmental control and Access to computers.

UNIT – IV

Measurement tools and processes in Rehabilitation engineering: fundamental principles, structure, function; performance and behaviour. Subjective and objective measurement methods: Measurement and assessment; Measurement objectives and approaches; characterising the human systems and sub systems: Characterizing tasks, Characterizing Assistive devices. Characterizing overall systems in high -level -task situations. Decision - making processes; current limitations; quality of measurement, standards rehabilitation service, delivery and rehabilitation engineering.

UNIT – V

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

Suggested reading:

1. Robinson C.J Rehabilitation engg. CRC press 1995

2. Ballabio E.etal, Rehabilitation technology, IOS Press1993.

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IV B. Tech. - I Semester **4– 0-4** **BME4124**

LASERS AND FIBRE OPTICS IN MEDICINE

UNIT – I

Laser characteristics -Energy Diffraction and Coherence – Monochromaticity, high power density calibration -Techniques -Pulse monitoring, properties of laser radiation.

Principles of Laser Applications in Medicine and Biology: Photo Medicine and photo Biology, Lasers in Diagnostics: Study of Bio molecules through laser excited fluorescence, Laser Raman Spectroscopy, Laser Applications in Dermatology, Lasers in Optholmology- Laser refractor, laser accuracy testing- Laser Treatment of corneal ulcers -Laser photo coagulators

UNIT – II

Study of cell biological function and structure using laser, Energy levels, Effect of adjurant agents, Advance reactions to laser Treatment.

UNIT – III

Fiber optics in Gastroentrology Transmission of signals, Light, construction details of Optical Fiber, Endoscope, Bronchoscope, Gastroscope, Applications in Gastroentrology.

UNIT – IV

Lasers and Optical fibers in Surgery: Surgical Instrumentation of CO2, Ruby, ND-YAG, Argon Ion, He-Neon lasers, Surgical applications of these lasers

UNIT – V

Lasers in Dentistry -Laser Induced Carrier inhibition, Laser effects on Dental Soft Tissues, Potential applications, Protection, Standards, Laser Hazards, Safety Regulations and Precautions, Medical Surveillance.

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 Oshea callen and Rhodes Addison . Wesley- 1977.
4. Lasers in Photo medicine and Photo Biology by E. D. R. Pratesi & C. A Sacchi, Springer verlac 1980.
5. Biomedical Aspects of the Laser, by Leon Goldman, Springer verlac, 1967
6. Lasers in Medicine by H. K. Koebmer, john Willy & sons, 1980.

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IV B. Tech. - I Semester **4– 0-4** **BME4125**

ELECTIVE -I

ARTIFICIAL NEURAL NETWORKS

(Common for ECE, EIE, EContE, BME)

UNIT – I:

Introduction, Neuron models, network architectures, AI and Neural nets.

Learning processes: Error correction learning, Memory based learning, Hebbian learning, Competitive learning, Boltzmann learning, Learning with and without a teacher adaptation, statistical learning theory.

UNIT – II: PERCEPTRONS:

Single Layer Perceptrons: Adaptive filtering problem, linear least square filters, LMS algorithm, learning curves, annealing techniques, Perceptron and Bay's Classifier.

Multilayer Perceptrons: Back propagation algorithm, XOR problem, feature detection, back propagation and differentiation, Hessian Matrix, Cross validation, Network pruning techniques.

UNIT – III: RADIAL BASIS NETWORKS:

Cover's theorem on the separability of patterns, Regularization Theory and Networks, Generalised RBF Networks, Approximation properties of RBF networks, comparison with Multilayer Perceptrons.

UNIT – IV: SELF ORGANISING MAPS

Introduction, self-organizing maps, SOM algorithm, properties of the feature map, learning vector quantization, contextual maps.

UNIT – V: APPLICATIONS OF ANN

Introduction, Direct Applications - Pattern Classification, Associative Memories, Optimization, Control Applications. Applications in Speech and Image Processing.

TEXT BOOKS:

1. Neural Networks–A Comprehensive Foundation – by Simon Haykin, Pearson Education.
2. Artificial Neural Networks – by B. Yegnanarayana, PHI.

REFERENCES:

1. Introduction to Neural Systems – by Zurada, Jaico Publ.
2. Neural Networks Design – by M.T. Hagon, H.B. Demuth and Mark Beale, Thompson Learning, Vikas Publ.

JAWAHARLAL NEHRU TECHNOLOGICALUNIVERSITY HYDERABAD

IV B. Tech. - I Semester **4– 0-4** **BME4126**

ELECTIVE -I

ELECTROMAGNETIC INTERFERENCE AND COMPATABILITY TECHNIQUES

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

UNIT – III

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

UNIT – IV

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

UNIT – V

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

SUGGESTED READINGS:

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

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IV B. Tech. - I Semester **4– 0-4** **BME4127**

ELECTIVE –II
PHYSIOLOGICAL SYSTEMS MODELING

UNIT – I

INTRODUCTION: The techniques of mathematical modeling. Classification of models Characteristics of modeling

UNIT – II

METABOLIC & ENDOCRINE SYSTEMS: Overview. Chemical reactions. Transport process. Diffusion. Transport by fluid circulation. Controlled process. Levels of modeling: global, Organ and cellular & sub cellular models. ,

UNIT – III

APPROACHES TO MODELING: Mathematical representation of compartment and control system models. Perturbation schemes. Steady state (dynamic equilibrium). Convolution approach. Biological receptors. Receptor characteristics, adaptation, rate sensitivity.

UNIT – IV

GLUCOSE-INSULIN MODEL TO ESTIMATE INSULIN SENSITIVITY (CASE STUDY) Insulin sensitivity, development of models of optimal complexity. Model decomposition Models of Glucose Utilization Model comparison, Insulin sensitivity index

UNIT – V

STATISTICAL APPROACH TO MODELING: Introduction. Discrete statistical signals, Continuous statistical signals. Averaging computations.

SUGGESTED READING:

1. Kapoor J.N., Mathematical modeling, Wiley Eastern Ltd., 1988.
2. Carson E. R., Cobelli C. and Finkelstein L., The Mathematical Modeling of Metabolic and Endocrine Systems, John Wiley and Sons, 1983.
3. Milsum J.H., Biological Control Systems Analysis, McGraw Hill, 1966.
4. William Simon, Mathematical Techniques for Biology and Medicine, Dover Publications.

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IV B. Tech. - I Semester **4– 0-4** **BME4128**

ELECTIVE –II

V.L.S.I.DESIGN

UNIT – I:

Electrical properties of MOS circuits: ID – VD characteristics, Device parameters, V_T, G_M

Figure of merit W_o, pull-up to pull down ratio, Bipolar, n-MOS, p-MOS, c-MOS, BiCMOS processes - comparison.

UNIT – II:

VLSI Circuit Design process: VLSI Design flow, Layers of abstraction, Stick Diagram. Design goals and layout diagrams, sheet resistance R_S, standard unit of capacitance, Inverter delays, Propagation delays, wiring capacitance, Inverter Design aspects – specifications considering worst case parameters, Inverter in the input stage, output stage, Internal inverter.

UNIT – III:

Semiconductor Integrated Circuit Design: PLA, FPGAs, CPLDs, Standard Cells, Programmable Array Logic, Design Approach.

UNIT – IV:

VHDL synthesis, Circuit design flow, Circuit synthesis, Simulation, Layout, design capture tools, design verification tools, Test principles.

UNIT – V:

VLSI Technology : Fabrication sequence, process flow, Oxidation, Lithography Techniques, Diffusion process, Ion Implantation, Encapsulation, Testing, Super Integration

Concepts, Integrated Passive components, MOS Resistors, Capacitors, Crossovers, IC Packaging techniques.

TEXT BOOKS:

1. Basic VLSI Design Systems and Circuits – by Douglas A. Pucknell, Kamran Eshraghian, PHI.
2. Modern VLSI Design – by Wayne Wolf, Pearson Education.

REFERENCES:

1. Introduction to VLSI Circuits and Systems – by John P. Uyemura, John Wiley.
2. Application Specific Integrated Circuits – by Michel John Sebastian Smith, Addison Wesley.
3. Introduction to VLSI Design – Eugine D. Fabricus, McGraw Hill.

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IV B. Tech. - I Semester **0– 3-2** **BME4129**

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.

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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)

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ELECTIVE –III

BIOMATERIALS

UNIT – I

Surface chemistry of materials, surface energy, Contact angle Critical surface tension and electro kinetic theory. Metals as implant materials, metallic corrosion, Metallic implant fractures,

UNIT – II

Polymers and plastics: Hydrogels Polymer Degradation, Resorbable polymers, Tissue adhesives, Dialysis membranes Blood Oxygenerator.

UNIT – III

Wound Kinetics, Soft tissue, Bone healing, the Bioelectric effect, Tendon Healing, tissue Reaction, Metals, Polymers, Effects of wear particles Ceramics

UNIT – IV

Testing of implants, in vitro testing with tissue cultures, in vivo testing in soft tissues, non-thrombogenic surface, thrombosis, electro kinetic factors, material surface characterisation and biocompatibility. Vascular implants

UNIT – V

Dental implants, Alveolar Bone replacements, implants for attachment of Dentures, Reimplantation of natural teeth, Orthopedic implants, types of Orthopedic function devices. Problems with fixation devices: permanent joint replacements, Hip joints, Problems Artificial joints, Bone cements

SUGGESTED READING:

1. Hench L.L., Ethridgc E.C., Biomaterials, an Interfacial approach, Academic Press, 1982
2. Bronzino J.D, the biomedical engineering Handbook, CRC Press,1995.

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ELECTIVE –III

TRANSPORTATION PHENOMINA IN LIVING SYSTEMS

UNIT – I

Organisation of the Human Body Cells, Tissues Different Organs, Natural Membrane System.

UNIT – II

Heat Transport: Body temperature regulation based on Thermostate principle & its operation, Transportation in Tissues, Muscles, Skin and other Organs in different Environmental Temperature

UNIT – III

Transportation of fluids: Blood transport through Internal Organs, Urogenitary system, Cardio pulmonary system, Central nervous system. Gastro Intestine System. Diffusion, Osmosia, ElectroOsmasia. Ultra filtration. Reverse Osmosia through natural Membrane systems, Reverse Osmosia through artificial synthetic Membranes.

UNIT – IV

Transportation of Lymph: Transportation of Lymph through Internal Organs, Urogenitary system, Cardio pulmonary system, Central nervous system. Gastro Intestine System. Problems on lymph transfer in Human body.

UNIT – V

Mass transfer: Constituents of blood, Urine, Mass transfer in Kidney, Skeletal, Nervous, G. I. system, Cardio Pulmonary system, Comparison with Artificial Organs.

BOOKS:

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

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ELECTIVE –IV

ROBOTICS & AUTOMATION

(Common for EIE, E.Cont.E, BME)

UNIT – I: BASIC CONCEPTS

Definition and origin of robotics – Different types of robots – Various generations of robots – Degrees of freedom – Asimov's laws of robotics – Dynamics stabilization of robots.

UNIT – II: POWER SOURCES AND SENSORS

Hydraulic, pneumatic and electric drives – Determination of HP of motor and gearing ratio – Variable speed arrangements – Path determination – Machine vision – Ranging – Laser – Acoustic – Magnetic – Fiber optic and Tactile sensors.

UNIT – III: MANIPULATORS, ACTUATORS AND GRIPPERS

Construction of manipulators – Manipulator dynamics and force control – Electronic and pneumatic manipulator control circuits – and effectors – Various types of grippers – Design considerations.

UNIT – IV: KINEMATICS AND PATH PLANNING

Solution of inverse kinematics problem – Multiple solution – Jacobian work envelope – Hill climbing techniques – Robot programming languages.

UNIT – V: CASE STUDIES

Multiple robots – machine interface – Robots in manufacturing and non-manufacturing applications – Robot cell design – Selection of a robot.

REFERENCES:

1. Industrial Robotics – by Mikell P, Weiss G.M., Nagel R.N., Odrey N.G., McGraw Hill, 1986.
2. Robotics Technology and Flexible Automation – by Deb S.R, TMH, 1994.
3. Robots and Manufacturing Automation – Asfahl C.R., John Wiley, 1992.
4. Robotic Engineering: An Integrated Approach – by Klafter R.D., Chimielewski T.A., and Neign M., PHI, 1994.

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IV B. Tech. - II Semester **4– 0-4** **BME4224**

ELECTIVE –IV

HOSPITAL SYSTEM MANAGEMENT

UNIT – I

Classification of Hospital Systems: General Hospital - Specialist Hospital -Teaching - Research, Primary Health Centre -Their role, Functions. Aspects of Hospital Services- Outpatient- Inpatient supportive emergency drug and medical supply Nursing Services Dietry services Transport services

UNIT – II

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, 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 – III

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 – IV

Electrical Factors in Hospital Design, voltage stabilizer, uninterrupted power supply for intensive care units and computerised monitoring units-safety precautions, interference of systems, protection, grounding of ECG, EEG, ENG and other therapeutic equipments.

UNIT – V

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 BOOK:

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.

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