

ANNA UNIVERSITY :: CHENNAI – 600 025

DEGREE OF BACHELOR OF ENGINEERING

(8 SEMESTER PROGRAMME)

B.E. BIOMEDICAL ENGINEERING

CURRICULUM 2001

LIST OF ELECTIVES FOR 6TH SEMESTER

Code No.	Course Title	L	T	P	M
EC046	Very Large Scale Integrated Circuit Design	3	0	0	100
EC063	Neural Network	3	0	0	100
IF352	Computer Networks	3	0	0	100

LIST OF ELECTIVES FOR 7TH SEMESTER

Code No.	Course Title	L	T	P	M
BM032	Artificial Intelligence and Pattern Recognition	3	0	0	100
BM034	Physiological Modeling	3	0	0	100
ME034	Refrigeration and Air-Conditioning	3	0	0	100
BM038	Medical Informatics	3	0	0	100

LIST OF ELECTIVES FOR 8TH SEMESTER

Code No.	Course Title	L	T	P	M
BM031	Analog and Digital Communication	3	0	0	100
BM033	Bio Fluid Dynamics	3	0	0	100
BM035	Assist Devices	3	0	0	100
BM036	Bio Mechanics	3	0	0	100
BM037	Medical Imaging Techniques	3	0	0	100

1. MOS TECHNOLOGY AND CIRCUITS**9**

MOS Technology and VLSI, Process parameters and considerations for BJT, MOS and CMOS, Electrical properties of MOS circuits and Device modelling.

2. MOS CIRCUIT DESIGN PROCESS**9**

MOS layers, Stick diagram, Layout diagram, Propagation delays, Examples of combinational logic design, Scaling MOS circuits.

3. DIGITAL CIRCUITS AND SYSTEMS**9**

Programmable Logic Array (PLA) and finite state machines, Design of ALU's Memories and Registers.

4. ANALOG VLSI AND HIGH SPEED VLSI**9**

Introduction to analog VLSI, Models for analog switches, active resistors, current sources / sinks, current references, BJT and CMOS operational amplifiers for simulation. Layout of typical circuits like common source amplifier, current source and differential amplifier, Sub-micron technology and GaAs VLSI technology.

5. HARDWARE DESCRIPTION LANGUAGES**9**

VHDL Background and basic concepts, Structural specification of hardware and Design organisation and parameterization.

TOTAL : 45**TEXT BOOKS**

1. Douglas A. Pucknell and Kamran Eshrafhian, "Basic VLSI Design systems and circuits", Prentice Hall of India Pvt., Ltd.
2. Randall L. Geiger and P.E. Allen, "VLSI design techniques for analog and digital circuits", McGraw-Hill Int., Co., 1990.
3. Peter J. Ashenden, "The Designer's guide to VDNL", Harcourt Asia Pvt., Ltd., 1995.

REFERENCES

1. Amar Murkherjee, "Introduction to NMOS and CMOS VLSI system design", Prentice Hall, 1986.
2. Fabious.E., "Introduction to VLSI design", McGraw-Hill, 1990.
3. Navabi.Z., "VHDL analysis and modeling of digital systems", McGraw-Hill, 1983.
4. Mohammed Ismail and Terri Fiez, "Analog VLSI, Signal and Information Processing", McGraw-Hill, 1994.
5. Neil H.E. Weste, Kamaran Eshraghian, "Principles of CMOS VLSI Design", Addison Wesley, 1998.

1. DATA COMMUNICATION CONCEPTS**8**

Transmission media – Data encoding – Interface and Modems – Multiplexing – Error detection and correction – Digital subscriber line – Circuit switching – Packet switching – Message switching.

2. WIDE AREA NETWORKS**10**

ISO – OSI layered architecture – Function of the layers – Data link protocols – HDLC, LAPB, LAPD, Inter networking devices – Repeaters, Bridges, Routers, Routing algorithms – Distance vector routing, link state routing, X.25 protocol, congestion control.

3. FRAME RELAY AND ATM NETWORKS**9**

Frame relay operation – layers and traffic control; ATM networks – Architecture switching, layers service classes.

4. LOCAL AREA NETWORK**10**

LAN topology – Ethernet – Token bus – Token ring – FDDI – Wireless LAN, ATM LAN – IEEE 802 Medium access control layer standard – Random access protocols – ALOHA – Slotted ALOHA.

5. OSI LAYERS**8**

Transport layer issues – Session layer – Synchronization – Presentation layer – Encryption, decryption, Application layer – Message handling system, file transfer, virtual terminal – E-mail.

TOTAL : 45**TEXT BOOK**

1. William Stallings, “Data and Computer Communication”, sixth edition, Pearson education Asia, 2000.

REFERENCES

1. Behrouz A, Forouzan, “Data Communication and Networking”, second edition, Tata McGraw-Hill, 2000.
2. Fred Halsall, “Data Communication, Computer networks and Open Systems”, Fourth edition, Addison Wesley, 1995.
3. Andrew S.Tanenbaum, “Computer networks”, Third edition, PHI, 1996, Chapter 4.

BM031 ANALOG AND DIGITAL COMMUNICATION 3 0 0 100

UNIT I MODULATION SYSTEMS 9

AM – Frequency Translation – single sideband and double sideband modulation, vestigial sideband modulation. FM phase and frequency modulation, FM spectral analysis, FM bandwidth, AM Modulators and FM modulators, AM Transmitters and FM Transmitters.

UNIT II RECEIVERS 9

Sensitivity, Selectivity, AM receivers, FM receivers, Noise in AM & FM systems, SNR in AM Receivers, signal to noise power in FM, Pre-emphasis and deemphasis.

UNIT III ANALOG TO DIGITAL CONVERSION 9

Sampling theorem, pulse amplitude modulation(PAM), pulse width modulation(PWM), pulse position modulation(PPM), pulse code modulation(PCM). Digital modulation and demodulation system. ASK, FSK, PSK.

UNIT IV INFORMATION THEORY 9

Average information, Information rate, Shannon’s theorem, channel capacity, bandwidth, S/N trade off.

UNIT V SATELLITE ACCESS 9

Modulation and multiplexing voice, data, video; Analog-Digital transmission system, Digital video broadcast, multiple access: FDMA, TDMA, CDMA, assignment methods, spread spectrum communication, compression, encryption.

TOTAL : 45

TEXT BOOK

1. Taub & Schilling, “Principles of Communication systems”, McGraw-Hill, 1986.

REFERENCES

1. Wayne Tomasi, “Electronic communication systems”, fundamentals through advanced, LPE, Pearson Education, Fourth Reprint, 2001.

BM035 ASSIST DEVICES 3 0 0 100

UNIT I CARDIAC ASSIST DEVICES 9

Principle of External counter pulsation techniques, intra aortic balloon pump, Auxiliary ventricle and schematic for temporary bypass of left ventricle, prosthetic heart valves.

UNIT II HEMODIALYSERS 9

Artificial kidney, Dialysis action, hemodialyser unit, membrane dialysis, portable dialyser monitoring and functional parameters.

UNIT III HEARING AIDS 9

Common tests – audiograms, airconduction, boneconduction, masking techniques, SISI, Hearing aids – principles, drawbacks in the conventional unit, DSP based hearing aids.

UNIT IV PROSTHETIC AND ORTHODIC DEVICES 9

Hand and arm replacement – different types of models, externally powered limb prosthesis, feedback in orthodic system, functional electrical stimulation, sensory assist devices.

UNIT V RECENT TRENDS 9

Transcutaneous electrical nerve stimulator, bio-feedback.

TOTAL : 45

TEXT BOOKS

1. Levine S.N. (ed), “Advances in Bio-medical engineering and Medical physics”, Vol. I, II, IV, inter university publications, New York, 1968 (Unit I, IV, V).
2. Kolff W.J, “Artificial Organs”, Johnwiley and sons, New York, 1976. (Unit II).
3. Albert M.Cook and Webster J.G, “Therapeutic Medical Devices”, Prentice Hall Inc., New Jersey, 1982 (Unit III).

ME034 REFRIGERATION AND AIR CONDITIONING 3 0 0 100

UNIT I REFRIGERATION CYCLES & REFRIGERANTS 9

Vapour Compression Refrigeration Cycle-Simple saturated vapour compression Refrigeration cycle. Thermodynamic analysis of the above. Refrigerant Classification, Designation, Alternate Refrigerants, Global Warming Potential & Ozone Depleting Potential aspects.

UNIT II SYSTEM COMPONENTS 9

Refrigerant Compressors - Reciprocating Open & Hermetic type, Screw Compressors and Scroll Compressors -Construction and Operation characteristics. Evaporators - DX coil, Flooded type Chillers Expansion devices -Automatic Expansion Valves, Capillary Tuber & Thermostatic Expansion Valves. Condensing Units and Cooling Towers.

UNIT III CYCLING CONTROLS AND SYSTEM BALANCING 9

Pressure and Temperature controls. Range and Differential settings. Selection and balancing of system components - Graphical method.

UNIT IV PSYCHROMETRY 9

Moist air behaviour, Psychrometric chart, Different Psychrometric process analysis.

UNIT V AIR CONDITIONING 9

Summer and Winter Airconditioning, Cooling Load Calculations, Air Distribution Patterns, Dynamic and Frictional Losses in Air Ducts, Equal Friction Method, Fan Characteristics in Duct Systems.

TOTAL : 45

TEXT BOOK

1. W.F.Stocker and J.W.Jones, "Refrigeration & Air Conditioning", McGraw-Hill Book Company, 1985.

REFERENCES

1. R.J.Dossat, "Principles of Refrigeration", John Wiley and Sons Inc., 1989.
2. Manohar Prasad, "Refrigeration and Air Conditioning", Wiley Eastern Ltd., 1995.

BM038	MEDICAL INFORMATICS	3 0 0 100
UNIT I	MEDICAL DATABASE IMPLEMENTATION	9
Medical data acquisition and database systems; PC based multichannel data acquisition system; storage, analysis and retrieval techniques.		
UNIT II	VISUAL BASIC	9
Visual programming concepts; Visual Basic environment, tools and controls; Dynamic data exchange; VB based Medical information System.		
UNIT III	COMPUTERS IN SYSTEM DESIGN	9
Hospital information System its design and functional characteristics; Principles and applications of Artificial Intelligence, Pattern Recognition, Neural Network and Fuzzy Logic in Medicine.		
UNIT IV	MULTIMEDIA AND VIRTUAL REALITY APPLIED TO MEDICINE	9
Basic concepts of Multimedia; Design of Multimedia information systems; Components of virtual reality; Virtual reality applications in medicine.		
UNIT V	COMPUTERS IN MEDICAL RESEARCH	9
Medical Informatics and its levels; Design and development of educational packages on medical sciences; Integrated design concepts; Interactive multimedia, Virtual and digital libraries; Internet and its applications.		

TOTAL : 45

TEXT BOOK

1. R.D.Lele, "Computers in Medicine", Tata McGraw-Hill, New Delhi, 1997.

REFERENCES

1. Tay Vaughan, "Multimedia making it work", Tata McGraw-Hill, New Delhi, 1997.
2. Davis Chapman, "Teach Yourself Visual Basic 6 in 21 days", New Delhi, 1997.
3. Harold Sackman, "Biomedical Information Technology", Academic press, New York, 1997.
4. Mary Brth Fecko, "Electronics resources: Access and Issues", Bowker and saur, London, 1997.