

Semester 8

Theory

S.no	Subject name	L	P	M
01	Computer Networks	4	0	100
02	Elective II	4	0	100
03	Medical Electronics	4	0	100
04	Total Quality Management	4	0	100

Practical

S.no	Subject name	L	P	M
05	Project work	4	0	100

Semester VIII

Medical Electronics

4 0 100

ELECTRO-PHYSIOLOGY AND BIOPOTENTIAL RECORDING

(9)

The origin of Biopotentials; biopotential electrodes; biological amplifiers; ECG, EEG, EMG, PCG, EOG, lead systems and recording methods, typical waveforms and signal characteristics.

BIO-CHEMICAL AND NON ELECTRICAL PARAMETER MEASUREMENTS

(9)

pH, PO₂, PCO₂, PHCO₃, Electrophoresis, colorimeter, photometer, Auto analyzer, Blood flow meter, cardiac output, respiratory measurement, Blood pressure, temperature, pulse, Blood cell counters.

ASSIST DEVICES

(9)

Cardiac pacemakers, DC Debrillators, Dialyser, HeartLung machine, Hearing aids.

PHYSICAL MEDICINE AND BIO-TELEMETRY

(9)

Diathermies- Short-wave, ultrasonic and microwave type and their applications, Medical stimulator, Telemetry principles, frequency selection, Bio-telemetry, radio-pill and tele-stimulation.

RECENT TRENDS IN MEDICAL INSTRUMENTATION

(9)

Thermography, endoscopy unit, Laser in medicine, Surgical diathermy, cryogenic application, Electrical safety.

TOTAL HOURS:45

Text Books:

1. John G. Webster, " Medical Instrumentation Application and Design ", John Wiley and Sons, New York, 1998.
1. Leslie Cromwell, " Biomedical instrumentation and measurement ", Prentice Hall of India New Delhi, 1997.

References:

1. Khandpur.R.S., " Handbook of Biomedical Instrumentation ", Tata McGraw-Hill, New Delhi, 1997.
2. Joseph J.Carr and John M.Brown, " Introduction to Biomedical equipment technology ", John Wiley and Sons, New York, 1997.

Semester VIII

Computer Networks

4 0 100

PROTOCOLS AND ARCHITECTURE (9)

Protocols, Layered approach - OSI model - Hierarchical Approach - DOD model -SNA architecture – Local network Technology - Bus/Tree topology - Ring topology - Medium access control protocols - Details of IEEE 802 standards - LAN protocol performance.

NETWORKS ACCESS PROTOCOLS AND INTERNET WORKING (9)

Network interface - Circuit switched network access - packet Switched network access - broadcast network access - principles of internetworking - bridges, gateways - X.75 - Internet protocol - ISO internet protocol standard - DOD internet protocol standard.

TRANSPORT AND SESSION SERVICE PROTOCOLS (9)

Transport services protocol mechanisms - Networks Services - ISO Transport standards - DOD transport protocols - session characteristics - ISO session service definition - ISO session protocol definition - other session approaches.

PRESENTATION APPLICATION PROTOCOLS (9)

Virtual Terminal protocols - File Transfer protocols - Electronic Mail - Overview of ISDN - ISDN protocols.

NETWORK MANAGEMENT

Architecture of network management protocols - Information extraction - Configuration Management – Fault Management - Performance management - Security Management - Accounting Management – Capacity planning - Standards.

TOTAL HOURS:45

Text Books:

1. Starlings. " Data and Computer Communication ", Maxwell and Macmillan 1988.

References:

1. Starlings, " Computer Communications: Architectures, Protocols and Standards ", IEEE Computer Society, 1987.
2. Andrew Tannenbaum, S. " Computer Networks ", 2nd Edition, Prentice Hall of India, 1988.
3. Kernel Explain A.S., " Communication Network Management ", Prentice Hall of India, 1992.

4. " Network Management Standards ", Uylers Black, McGraw Hill, 1995.
5. Corner and Stevens, " Internetworking with TCP/IP ", val
6. " Client Server Programming and Application ", Prentice Hall, USA 1994.

Semester VIII

TOTAL QUALITY MANAGEMENT	4 0 100
1. INTRODUCTION	9
Definition of Quality, Dimensions of Quality, Quality Planning, Quality costs - Analysis Techniques for Quality Costs, Basic concepts of Total Quality Management, Historical review, Principles of TQM, Leadership – Concepts, Role of Senior Management, Quality Council, Quality Statements, Strategic Planning, Deming Philosophy, Barriers to TQM Implementation.	
2. TQM PRINCIPLES	9
Customer satisfaction – Customer Perception of Quality, Customer Complaints, Service Quality, Customer Retention, Employee Involvement – Motivation, Empowerment, Teams, Recognition and Reward, Performance Appraisal, Benefits, Continuous Process Improvement – Juran Trilogy, PDSA Cycle, 5S, Kaizen, Supplier Partnership – Partnering, sourcing, Supplier Selection, Supplier Rating, Relationship Development, Performance Measures – Basic Concepts, Strategy, Performance Measure.	
3. STATISTICAL PROCESS CONTROL (SPC)	9
The seven tools of quality, Statistical Fundamentals – Measures of central Tendency and Dispersion, Population and Sample, Normal Curve, Control Charts for variables and attributes, Process capability, Concept of six sigma, New seven Management tools.	
4. TQM TOOLS	9
Benchmarking – Reasons to Benchmark, Benchmarking Process, Quality Function Deployment (QFD) – House of Quality, QFD Process, Benefits, Taguchi Quality Loss Function, Total Productive Maintenance (TPM) – Concept, Improvement Needs, FMEA – Stages of FMEA.	
5. QUALITY SYSTEMS	9
Need for ISO 9000 and Other Quality Systems, ISO 9000:2000 Quality System – Elements, Implementation of Quality System, Documentation, Quality Auditing, QS 9000, ISO 14000 – Concept, Requirements and Benefits.	

TEXT BOOK:

1. Dale H.Besterfiled, et at., Total Quality Management, Pearson Education Asia, 1999. (Indian reprint 2002).

REFERENCES:

1. James R.Evans & William M.Lidsay, The Management and Control of Quality, (5th Edition), South-Western (Thomson Learning), 2002 (ISBN 0-324-06680-5).
2. Feigenbaum.A.V. "Total Quality Management, McGraw-Hill, 1991.
3. Oakland.J.S. "Total Quality Management Butterworth – Heinemann Ltd., Oxford. 1989.
4. Narayana V. and Sreenivasan, N.S. Quality Management – Concepts and Tasks, New Age International 1996.
5. Zeiri. "Total Quality Management for Engineers Wood Head Publishers, 1991.

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 modeling.

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 organization and parameterization.

TOTAL HOURS:45

Text Books:

1. Douglas A. Pucknell and Kamran Eshrafhian, " Basic VLSI Design systems and circuits ", Prentice Hall of India Pvt. Ltd., 1993.
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, 1993.
4. Mohammed Ismail and Terri Fiez, " Analog VLSI, Signal and Information Processing ", McGraw -Hill, 1994.
5. Neil H.E.Weste, Kamran Eshraghian, "Principles of CMOS VLSI Design ", Addison Wesley

1. DIGITAL IMAGE FUNDAMENTALS

9

Elements of digital image processing systems, Elements of Visual perception, Image sampling and quantization, Matrix and Singular Value representation of discrete images.

2. IMAGE TRANSFORMS

9

1D DFT, 2D DFT, Cosine, Sine, Hadamard, Haar, Slant, KL, SVD transforms and their properties.

3. IMAGE ENHANCEMENT

9

Histogram Modification and specification techniques, Image smoothing, Image sharpening, generation of spatial masks from frequency domain specification, nonlinear filters, Homomorphic filtering, false color, Pseudo color and color image processing.

4. IMAGE RESTORATION AND RECOGNITION

9

Image degradation models, Unconstrained and Constrained restoration, inverse filtering, least mean square filter, Pattern Classes, optimal statistical classifiers, neural networks and associated training methods and use of neural networks in image processing.

5. IMAGE COMPRESSION

9

Run length, Huffman coding, Shift codes, arithmetic coding, bit plane coding, transform coding, JPEG Standard, wavelet transform, predictive techniques, Block truncation coding schemes, Facet modeling.

TOTAL

HOURS:45

Text Books:

1. Anil K. Jain, "FUNDAMENTALS OF DIGITAL IMAGE PROCESSING ", Prentice Hall of India, 1997.
2. Rafael C.Gonzalez and Richard E.Woods, "DIGITAL IMAGE PROCESSING ", Addison Wesley, 1993.

References:

1. William K. Pratt, "DIGITAL IMAGE PROCESSING ", John Wiley, NY, 1987.
2. Sid Ahmed M.A., "IMAGE PROCESSING THEORY, ALOGORITHMS AND ARCHITECTURES ", McGraw-Hill, 1995.
3. Umbaugh, " COMPUTER VISION ".

1. MEDICAL INFORMATICS**9**

Medical data acquisition and database systems; PC based multichannel data acquisition system; Storage, analysis and retrieval techniques. PC based video card; Modems and Computer networking.

2. VISUAL BASIC**9**

Visual programming concepts; Visual Basic environment, tools and controls; Dynamic data exchange; VB based Medical information system.

3. 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.

4. 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.

5. COMPUTERS IN MEDICAL RESEARCH**9**

Physiological system modeling and simulation; 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 HOURS:45**Text:**

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", Techmedia, New Delhi, 1998
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.

1. ADAPTIVE LINEAR COMBINER:

9

Elementary neurophysiology and biological neural network - Artificial neural network, Adeline and Madeline.

2. BACK PROPAGATION AND ASSOCIATE MEMORY

9

Back propagation network, generalized delta rule, Bi-directional associate memory, and Hopfield memory architecture.

3. BOLTZMANN'S MACHINES AND COUNTER PROPAGATION NETWORK:

9

Simulated Annealing, Boltzman completion network, Boltzman input output network, counter propagation network

4. SELF-ORGANISING MAPS AND ADAPTIVE RESONANCE THEORY:

9

Self organizing map, feature map classifier, adaptive resonance theory network, ART1, ART2.

5. SPATIOTEMPORAL NETWORKS AND NEOCOGNITRON

9

Architecture of spatiotemporal networks, Sequential competitive avalanche field, Neocognition architecture and data processing.

TOTAL HOURS:45

Text Book:

1. J.A.Freeman & David.M.Skapura, Neural networks, Algorithms applications and programming techniques, Addison Wesley, 1991.ISE Reprint 1999.

Reference:

1. David M.Skapura, 'Building Neural Networks', Addison Wesley, 1996.
2. Bose, 'Neural Network Fundamentals with graphs, algorithms and applications', Tata McGraw Hill, 1995.

1. INTRODUCTION**9**

Definition - architecture - difference between conventional and expert system.

2. KNOWLEDGE ACQUISITION**9**

Knowledge representation and formal logic-knowledge engineer - Knowledge acquisition techniques - concept formalization - Knowledge representation development - knowledge acquisition for core problem knowledge acquisition without knowledge engineers.

3. EXPERT SYSTEM TOOLS**9**

Problem solving start engines - languages for expert system development - expert system shells - LISP machines - PC - based expert system tools.

4. FUZZY MODELING AND CONTROL**9**

Fuzzy sets - Fuzzy set operators - Fuzzy Reasoning - Fuzzy propositions - Linguistic variable - Decomposition and Defuzzification - Fuzzy systems: case studies.

5. NEURAL CONTROLLERS**9**

Introduction: Neural networks - supervised and unsupervised learning - neural network models -single and multi layers - back propagation - learning and training. Neural controllers case studies.

TOTAL HOURS:45**References:**

1. Rolston, D.W., "Principles of Artificial and Expert Systems Development ", McGraw Hill Book Company, International Edition.
2. Kosko, B, "Neural Networks and Fuzzy Systems ", Prentice Hall of India Pvt. Ltd, 1994.
3. Klir, G.J and Folger, T.A. " Fuzzy Sets, and information ", Prentice Hall.
4. James A. Freeman, David M. Skapura, "Neural Networks Algorithms ", Applications and Programming Techniques', Addison Wesley Publishing Company 1992.

1. INTRODUCTION

9

Cell structure - electrode - electrolyte interface, electrode potential, resting and action potential - electrodes for their measurement, ECG , EEG , EMG - machine description - methods of measurement - three equipment failures and trouble shooting.

2. TRANSDUCERS FOR BIO-MEDICAL INSTRUMENTATION

9

Basic transducer principles - source of bioelectric potentials - resistive, inductive, capacitive, fiber-optic, photoelectric, piezo-electric and chemical transducers - their description and feature applicable for biomedical instrumentation.

3. SIGNAL CONDITIONING, RECORDING AND DISPLAY

9

Input isolation, DC amplifier, power amplifier, differential amplifier - feedback, op Amp-electrometer amplifier, carrier Amplifier - instrument power supply. Oscillagrophic - galvanometric - X-Y, magnetic recorder, storage oscilloscopes- electron microscope - PMMC writing systems.

4. CARDIAC MEASUREMENTS

9

Electrocardiograph measurements - blood pressure measurement: by ultrasonic method - plethysonography - blood flow measurement by electromagnetic flow meter-cardiac output measurement by dilution method - phonocardiography - vector cardiography. Respirator of measurement:spiro meters - pulmonary measurement system, medical gases and safety systems - heart lung machine - artificial ventilator - Anesthetic machine - Clinical equipment - CT scanner - NMRJ - ultrasonic scanner - thermographic measurement - bio-telemetry - laser equipment and application - therapeutic equipment - cardiac pacemaker - dc-defibrillator patient safety -Electrical shock hazards - safety - pasometers.

5. COMPUTERS IN BIO-MEDICAL INSTRUMENTATION

9

Introduction - Computers in medicine - basics of signal conversion and digital filtering - data reduction technique - time and frequency domain technique - ECG Analysis systems VLSI in Digital Signal Processing.

TOTAL HOURS:45

Text Books:

1. Khandpur, R.S., " Handbook of Biomedical Instrumentation ", TMH, 1989.

References:

1. Geddes L.A., and Baker, L.E., " Principles of Applied Bio-medical Instrumentation ", 3rd Edition, John Wiley and Sons, 1995.
2. Cromwell, Weibell and Pfeiffer, " Biomedical Instrumentation and Measurements ", 2nd Edition, Prentice Hall of India, 1999.
3. Tompkins W.J., " Biomedical Digital Signal Processing ", Prentice Hall of India, 1998.

Intellectual Property Rights (IPR)

4 0 100

UNIT I

9

Introduction - Invention and Creativity - Intellectual Property (IP) - Importance - Protection of IPR - Basic types of property (i. Movable Property ii. Immovable Property and iii. Intellectual Property).

UNIT II

9

IP - Patents - Copyrights and related rights - Trade Marks and rights arising from Trademark registration - Definitions - Industrial Designs and Integrated circuits - Protection of Geographical Indications at national and International levels - Application Procedures.

UNIT III

9

International convention relating to Intellectual Property - Establishment of WIPO - Mission and Activities - History - General Agreement on Trade and Tariff (GATT).

UNIT IV

9

Indian Position Vs WTO and Strategies - Indian IPR legislations - commitments to WTO- Patent Ordinance and the Bill - Draft of a national Intellectual Property Policy - Present against unfair competition.

UNIT V

9

Case Studies on - Patents (Basmati rice, turmeric, Neem, etc.) - Copyright and related rights - Trade Marks - Industrial design and Integrated circuits - Geographic indications - Protection against unfair competition.

TOTAL HOURS:45

TEXT BOOK

1. Subbaram N.R. "Handbook of Indian Patent Law and Practice ", S. Viswanathan (Printers and Publishers) Pvt. Ltd., 1998.

REFERENCES

1. Eli Whitney, United States Patent Number: 72X, Cotton Gin, March 14, 1794.
2. Intellectual Property Today: Volume 8, No. 5, May 2001, [www.iptoday.com].
3. Using the Internet for non-patent prior art searches, Derwent IP Matters, July 2000.
4. [www.ipmatters.net/features/000707_gibbs.html.

Indian Constitution and Society

4 0 100

UNIT I

9

Historical Background - Constituent Assembly of India - Philosophical foundations of the Indian Constitution - Preamble - Fundamental Rights - Directive Principles of State Policy - Fundamental Duties - Citizenship - Constitutional Remedies for citizens.

UNIT II

9

Union Government - Structures of the Union Government and Functions - President - Vice President - Prime Minister - Cabinet - Parliament - Supreme Court of India - Judicial Review.

UNIT III

9

State Government - Structure and Functions - Governor - Chief Minister - Cabinet - State Legislature - Judicial System in States - High Courts and other Subordinate Courts

UNIT IV

9

Indian Federal System - Center - State Relations - President's Rule - Constitutional Amendments - Constitutional Functionaries - Assessment of working of the Parliamentary System in India.

UNIT V

9

Society : Nature, Meaning and definition; Indian Social Structure; Caste, Religion, Language in India; Constitutional Remedies for citizens - Political Parties and Pressure Groups; Right of Women, Children and Scheduled Castes and Scheduled Tribes and other Weaker Sections.

TOTAL HOURS:45

TEXT BOOKS

1. Durga Das Basu, " Introduction to the Constitution of India ", Prentice Hall of India, New Delhi.
2. R.C.Agarwal, " (1997) Indian Political System ", S.Chand and Company, New Delhi.
3. Maciver and Page, " Society: An Introduction Analysis ", Mac Milan India Ltd., New Delhi.
4. K.L.Sharma, " (1997) Social Stratification in India: Issues and Themes ", Jawaharlal Nehru University, New Delhi.

REFERENCES

1. Sharma, Brij Kishore, " Introduction to the Constitution of India:, Prentice Hall of India, New Delhi.
2. U.R.Gahai, " (1998) Indian Political System ", New Academic Publishing House, Jalaendhar.
3. R.N. Sharma, " Indian Social Problems ", Media Promoters and Publishers Pvt. Ltd.
4. Yogendra Singh, " (1997) Social Stratification and Change in India ", Manohar, New Delhi.

