

## SIXTH SEMESTER

### THEORY

S.No	Subject Code	Subject Name	L	T	P	IA	EE	Total
1		Digital Image Processing	4	0	0	20	80	100
2		Engineering Economics and Financial Accounting	4	0	0	20	80	100
3		Radiological Equipments	4	0	0	20	80	100
4		Diagnostic and Therapeutic Equipments	4	0	0	20	80	100
5		Visual Programming	4	0	0	20	80	100
6		Elective I	4	0	0	20	80	100

### PRACTICAL

S.No	Subject Code	Subject Name	L	T	P	IA	EE	Total
7		Digital Signal Processing Lab	0	0	3	20	80	100
8		Visual Programming Lab	0	0	3	20	80	100

## SEMESTER VI

### 1 DIGITAL IMAGE PROCESSING

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|---|---|
| 1. DIGITAL IMAGE FUNDAMENTAL  | 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 transform 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, Pseudocolor 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 |
| Runlength, 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, NJ, 1987.
2. Sid Ahmed M.A., "Image Processing Theory, Algorithm and Architectures", McGraw-Hill, 1995.
3. Umbaugh, "Computer Vision".

## SEMESTER VI

### 2. ENGINEERING ECONOMICS AND FINANCIAL ACCOUNTING

1.

9

Introduction – economic theories and scope – demand and supply analysis – determinants of demand – law of demand – elasticity of demand – demand forecasting – demand sensitivity – price, income, gross, advertisement – law of supply – elasticity of supply – cost concepts – types – cost curves – short run and long run – breakeven analysis – pricing concepts – types, price determinations.

2.

9

Concepts – firm, industry, market, market power, market conduct, market performance. Market structure – types – perfect, monopoly, monopolistic and oligopoly competition. Manufacturing practices – diversification, vertical and horizontal integration, merger.

9

3. National income: concepts and measurement – GNP, NNP, - methods of measuring National income – inflation and deflation, unemployment. Money and Banking: Value of money – banking – commercial bank and its functions, central bank and its function. New Economic Environment: economic systems, economic liberalization, privatization and globalization.

9

4. Introduction, Scope, Objectives, Basic financial concepts – time value of money and method of appraising project profitability – rate of return – pay back period – present value, NPV comparison – cost – benefit analysis. Source of finance – internal and external - long term and short term – securities, equities/bonds, shares, financial institutions.

9

5. Accounting system – financial statements – types – ledger, cash flow statement, profit and loss account, balance sheet. Ratios/Financial analysis – liquidity, leverage activity, profitability, trends analysis.

Total Hours: 45

TEXT BOOKS:

1. Maheswari. S.N "Management Accounting and Financial Accounting", S.Chand & Co, 1993.
2. D.N.Dwivedi, "Managerial Economics", Vikas Publishing House

SEMESTER VI  
3. RADIOLOGICAL EQUIPMENTS

1. X-RAYS

9

Principles and production of soft and hard X-rays, selection of anodes, Heel Pattern. Scattered radiation, Porter Bucky system, Cooling system.

2. RADIO DIAGNOSIS:

9

Radiography, Angiography, Fluoroscopy, Image Intensifier, Multi section radiography.

3. SPECIAL RADIOLOGICAL EQUIPMENTS

9

Principle, Plane of Movement, Multi section Radiography, CAT. Principle of NMR, MRI

4. APPLICATION OF RADIOISOTOPES

9

Alpha, Beta and Gamma emission, Principle of radiation detectors, dot scanners, nuclear angiogram, Principles of Radiation therapy.

5. RADIATION SAFETY 9

Hazardous effect of Radiation, Radiation protection Techniques, Safety Limits, Radiation Monitoring.

Total Hours: 45

REFERENCES:

1. R.S.Khandpur, "Handbook of Biomedical Instrumentation", Tata McGraw-Hill Publishing Company Ltd., New Delhi, 1997.
2. Steve Webb, "The Physics of Medical Imaging", Adam Hilger Philadelphia, 1988.
3. William R.Hendee, E.Russel Ritenour, "Medical Imaging Physics", Third Edition, Mosby Year Book, St. Louis, 1992.

## SEMESTER VI

### 1. DIAGNOSTIC AND THERAPEUTIC EQUIPMENT-I

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|--|---|
| 1. CARDIAC SYSTEM  | 9 |
| ECG, sources of ECG, normal and abnormal waveform, diagnosis interpretation, cardiac pacemaker-external pacemaker, implantable pacemaker, different types of pacemakers, fibrillation, defibrillator, AC defibrillator, DC defibrillator, electrodes, synchronised and unsynchronised types. |   |
| 2. NEUROLOGICAL SYSTEM   | 9 |
| EEG, genesis, lead system, wave characteristics, frequency bands, spontaneous and evoked response, diagnostic interpretation, epileptic discharges.  |   |
| 3. SKELETAL MUSCULAR SYSTEM  | 9 |
| Structure of muscles, sliding theory of contraction, stimulation of muscles, muscle potential generation, recording and analysis of EMG waveforms, muscle and nerve stimulation, fatigue characteristics.  |   |
| 4. HEART-LUNG MACHINE  | 9 |
| Need for the unit, functioning of bubble, disc type and membrane type oxygenators, finger pump, roller pump, electronic monitoring of functional parameter.  |   |
| 5. RESPIRATORY MEASUREMENT AND VENTILATOR  | 9 |
| Spirometer, Respiratory volume measurement, pneumograph, artificial respirator – IPR type, functioning.  |   |

Total Hours: 45

#### REFERENCES:

1. John G. Webster, "Medical Instrumentation Application and Design", John Wiley and sons, New York, 1998.
2. Khandpur R.S, "Handbook of Biomedical Instrumentation", Tata McGraw-Hill, New Delhi, 1997.
3. Joseph J. Carr and John M. Brown, "Introduction to Biomedical equipment technology", John Wiley and sons, New York, 1997.

## SEMESTER VI

### 5. VISUAL PROGRAMMING

1. INTRODUCTION TO WINDOWS PROGRAMMING 9  
GUI Concepts – Overview of Windows programming – Creating the window -Displaying the window - message Loop – windows procedure-WM\_PAINT message - WM\_DESTROY message – An Introduction to GDI – Scroll Bars – Keyboard – Mouse – Menus.
2. VISUAL BASIC PROGRAMMING 9  
IDE – First Visual Basic Program - Introduction to Forms –intrinsic Controls –working with Files - Accessing databases with data control - Classes and Objects – ADO Object Model.
3. VISUAL C++ PROGRAMMING 9  
Windows Programming Model - Visual C++ components – Microsoft foundation classes Library Application Framework – Getting Started with AppWizard – Basic Event handling, Mapping modes, and a Scrolling View - Graphics Device Interface, Colors and fonts – Modal Dialog and Windows Common Dialogs – Modeless Dialog and windows Common dialogs – Using ActiveX controls – Windows Message Processing and Multithreading.
4. ADVANCED CONCEPTS 9  
Menus – Keyboard Accelerators – Rich Edit Control – Tool bars – Status bars – A reusable Frame Window Base Class - Reading and writing documents - SDI and MDI environments – splitter windows and multiple views.
5. APPLICATIONS OF WINDOWS PROGRAMMING 9  
Dynamic link library – Component Object Model - Object linking and embedding – Data Base Management With Microsoft ODBC.

Total Hours: 45

#### TEXT BOOKS

1. Charles Petzold, “Windows Programming”, Microsoft press, 1996. Chapters: 2, 5, 6, 9, 10.
2. Francesco Balena, “Programming Microsoft Visual Basic6.0”, Microsoft press, Indian Reprint, 2001. Chapters: 1, 2, 3, 5, 6, 13.
3. David Kruglirski.J, “Programming Microsoft Visual C++”, Fifth Edition, Microsoft press, 1998.  
Chapters: 1,2,3,4,5,6,7,8,12,13,14,15,17,18,20,22,24,31.

#### REFERENCES

1. G.Cornell, “Visual Basic 6”, Tata McGraw-Hill, 1998.

## SEMESTER VI - ELECTIVE

### 1. VERY LARGE SCALE INTEGRATED CIRCUIT DESIGN

#### 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

9

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

Total Hours: 45

### TEXT BOOKS

1. Douglas A. Pucknell and Kamran Eshraffian, "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.

## SEMESTER VI - ELECTIVE

### 2. NEURAL NETWORKS

#### 1 ADAPTIVE LINEAR COMBINER

9

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

#### 2. BACK PROPOGATION AND ASSOCIATE MEMORY

9

Back propogation network, generalized delta rule, Bidirectional associate memory, Hopfield memory architecture.

#### 3. BOLTZMANN'S MACHINES AND COUNTER PROPOGATION NETWORK

9

Simulated Annealing, Boltzman completion network, Boltzman input output network, counter propogation 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, Neocognitron architecture and dataprocessing.

Total Hours: 45

#### TEXT BOOK:

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

#### REFERENCES:

1. avid M. Skapura, 'Building Neural Networks', Addison Wesley, 1996.

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2. Bose, 'Neural Network Fundamentals with graphs, algorithms and applications', Tata McGraw-Hill, 1995.

## SEMESTER VI - ELECTIVE

### 3. COMPUTER NETWORKS

#### 1. DATA COMMUNICATION CONCEPTS

9

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

9

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 Hours: 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. Wayne Tomasi, “Electronic communication systems”, fundamentals through

## SEMESTER VI

### 7. DIGITAL SIGNAL PROCESSING LAB

1. Representation of time-series; computation of convolution.
2. Response of a difference equation to initial conditions; stability.
3. DFT computation.
4. Computational experiments with digital filtering.
5. Sampling and waveform generation.
6. FIR and IIR filters implementation.
7. Fast Fourier Transform.
8. Quantization noise.
9. Adaptive filters.
10. Multirate signal processing.

Total Hours: 45

### 8. VISUAL PROGRAMMING LAB

1. VISUAL BASIC 15
  - i. Simple programs with control structures
  - ii. Adding menus to forms
  - iii. Creating dialog boxes with various options
  - iv. MDI applications
  - v. Writing code for various keyboard and mouse events
  - vi. OLE container control
  - vii. Simple programs with classes and objects
  - viii. Data access through Data control and DAO.

Total Hours : 45

2. VISUAL C++ 30
  - i. Creating applications with App wizard
  - ii. Drawing in documents
  - iii. Working with MFC
  - iv. Creating simple SDI and MDI applications
  - v. Exception handling
  - vi. Loading - Editing and - Adding resources - Linking resources To applications

vii. Drawing bitmaps

viii. Threads

ix. OLE

x. Active X

xi. DLL's

Total Hours: 45