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**VEL TECH MULTI TECH
Dr RANGARAJAN Dr.SAKUNTHALA
ENGINEERING COLLEGE**

(An ISO 9001: 2008 Certified Institution)

(Owned by Vel Trust)

(Approved by Govt. of Tamil Nadu and affiliated to Anna University)



SYLLABUS

WEEKLY SCHEDULE

VII SEMESTER

2014 - 2015

**DEPARTMENT OF BIO MEDICAL
ENGINEERING**

IV YEAR DEGREE COURSE

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WEEK DETAILS

SL.NO.	WEEK	FROM	TO
1	WEEK1	24-06-2014	27-06-2014
2	WEEK2	30-06-2014	04-07-2014
3	WEEK3	07-07-2014	11-07-2014
4	WEEK4	14-07-2014	18-07-2014
5	WEEK5	21-07-2014	25-07-2014
6	WEEK6	28-07-2014	01-08-2014
7	WEEK7	04-08-2014	08-08-2014
8	WEEK8	11-08-2014	14-08-2014
9	WEEK9	18-08-2014	22-08-2014
10	WEEK10	25-08-2014	28-08-2014
11	WEEK11	01-09-2014	05-09-2014
12	WEEK12	08-09-2014	12-09-2014
13	WEEK13	15-09-2014	19-09-2014
14	WEEK14	22-09-2014	26-09-2014
15	WEEK15	29-09-2014	01-10-2014
16	WEEK16	06-10-2014	10-10-2014
17	WEEK17	13-10-2014	17-10-2014
18	WEEK18	20-10-2014	24-10-2014
19	WEEK19	27-10-2014	31-10-2014

SUBJECT CONTENTS

SL.NO	SUBJECT CODE	SUBJECT NAME
THEORY		
1	BM2401	Pattern recognition and neural networks
2	BM2402	Medical informatics
3	BM2403	Medical optics
4	BM2404	Digital image processing
5	EC2352	Computer networks
6	BM2023	Physiological Modelling
PRACTICAL		
7	BM2405	Hospital training
8	BM2406	Digital image processing Lab

TEST / EXAM SCHEDULE

SL.NO	SUBJECT CODE	SUBJECT NAME	UNIT TEST I	UNIT TEST II	UNIT TEST III	UNIT TEST IV	UNIT TEST V
1	BM2401	Pattern recognition and neural networks	08/07/14 FN	30/07/14 FN	20/08/14 FN	09/09/14 FN	29/09/14 FN
2	BM2402	Medical informatics	08/07/14 AN	30/07/14 AN	20/08/14 AN	09/09/14 AN	29/09/14 AN
3	BM2403	Medical optics	09/07/14 FN	31/07/14 FN	21/08/14 FN	10/09/14 FN	30/09/14 FN
4	BM2404	Digital image processing	09/07/14 AN	31/07/14 AN	21/08/14 AN	10/09/14 AN	30/09/14 AN
5	EC2352	Computer networks	10/07/14 FN	01/08/14 FN	22/08/14 FN	11/09/14 FN	01/10/14 FN
6	BM2023	Physiological Modelling	10/07/14 AN	01/08/14 AN	22/08/14 AN	11/09/14 AN	01/10/14 AN

SL.NO	SUBJECT CODE	SUBJECT NAME	MODEL EXAM
1	BM2401	Pattern recognition and neural networks	13-10-2014
2	BM2402	Medical informatics	14-10-2014
3	BM2403	Medical optics	15-10-2014
4	BM2404	Digital image processing	16-10-2014
5	EC2352	Computer networks	17-10-2014
6	BM2023	Physiological Modelling	20-10-2014

BM2401 PATTERN RECOGNITION AND NEURAL NETWORKS

UNIT I INTRODUCTION AND SIMPLE NEURAL NET

WEEK 1: Elementary neurophysiology and biological neural network-
Artificial neural network

WEEK 2: Architecture, biases and thresholds,

WEEK 3: Hebb net, Perceptron, Adaline and Madaline.

UNIT II BACK PROPOGATION AND ASSOCIATIVE MEMORY

WEEK 4: UNIT TEST I

Back propagation network, generalized delta rule,

WEEK 5: Bidirectional Associative memory, Hopfield network

WEEK 6: UNIT TEST II

UNIT III NEURAL NETWORKS BASED ON COMPETITION

WEEK 8: Kohonen Self organizing maps Learning Vector
Quantization, counter propagation network.

UNIT IV UNSUPERVISED LEARNING AND CLUSTERING ANALYSIS

WEEK 9: UNIT TEST III

Patterns and features, training and learning in pattern recognition,
discriminate functions, different types of pattern recognition.

WEEK 10: Unsupervised learning- hierarchical clustering, partition
clustering. Neural pattern recognition approach – perception model

WEEK 11: UNIT TEST IV

UNIT V SUPERVISED LEARNING USING PARAMETRIC AND NON PARAMETRIC APPROACH

WEEK 12: Bayesian classifier, non parametric density estimation,
histograms, kernels, window estimators,

WEEK 13: k-nearest neighbor classifier, estimation of error rates.

WEEK 14: UNIT TEST V

WEEK 15: ICD CLASSES

WEEK 16: MODEL EXAM

TEXT BOOKS:

1. Hagan, Demuth and Beale, “Neural network design”, Vikas Publishing House Pvt. Ltd., New Delhi , 2002
2. Freeman J.A., and Skapura B.M, " Neural networks, algorithms, applications and programming techniques”, Addison – Wesley,2003
3. Duda R.O, Hart P.G, “Pattern classification and scene analysis”, Wiley Edition,2000
4. Earl Gose, Richard Johnsonbaugh, Steve Jost, “Pattern Recognition and Image Analysis”, Prentice Hall of India Pvt. Ltd., New Delhi, 1999.

REFERENCES:

1. Robert Schalkoff, “ Pattern recognition, Statistical, Structural and neural approaches”
John Wiley and Sons(Asia) Pte. Ltd., Singapore, 2005
2. Laurene Fausett ,” Fundamentals of neural networks – Architectures, algorithms and applications”, Prentice Hall, 1994

BM2402 MEDICAL INFORMATICS

UNIT I MEDICAL INFORMATICS

WEEK 1: Introduction - Structure of Medical Informatics Internet and Medicine -Security issues,

WEEK 2: Computer based medical information retrieval, Hospital management and information system,

WEEK 3: Functional capabilities of a computerized HIS, e-health services, Health Informatics – Medical Informatics, Bioinformatics

UNIT II COMPUTERISED PATIENT RECORD

WEEK 4: UNIT TEST I

Introduction - History taking by computer, Dialogue with the computer, Components and Functionality of CPR,

WEEK 5: Development tools, Intranet, CPR in Radiology- Application server provider, Clinical information system, computerized prescriptions for patients.

WEEK 6: UNIT TEST II

UNIT III COMPUTERS IN CLINICAL LABORATORY AND MEDICAL IMAGING

WEEK 7: Automated clinical laboratories-Automated methods in hematology, cytology and histology, Intelligent Laboratory Information System - Computerized ECG, EEG and EMG,

WEEK 8: Computer assisted medical imaging- nuclear medicine, ultrasound imaging ultrasonography-computed X-ray tomography, Radiation therapy and planning, Nuclear Magnetic Resonance

UNIT IV COMPUTER ASSISTED MEDICAL DECISION-MAKING

WEEK 9: UNIT TEST III

Neuro computers and Artificial Neural Networks application, Expert system - General model of CMD,

WEEK 10: Computer –assisted decision support system-production rule system cognitive model, semester networks , decisions analysis in clinical medicine-computers in the care of critically patients-computer assisted surgery-designing

WEEK 11: UNIT TEST IV

UNIT V RECENT TRENDS IN MEDICAL INFORMATICS

WEEK 12: Virtual reality applications in medicine, Computer assisted surgery, surgical simulation, Telemedicine - Tele surgery computer aids

for the handicapped, computer assisted instrumentation in Medical Informatics

WEEK 13: Computer assisted patient education and health - Medical education and health care information

WEEK 14: UNIT TEST V

WEEK 15: ICD CLASSES

WEEK 16: MODEL EXAM

TEXT BOOKS:

1.R.D.Lele Computers in medicine progress in medical informatics, Tata Mcgraw Hill Publishing computers Ltd,2005, New Delhi

2.Mohan Bansal, Medicl informatics Tata Mcgraw Hill Publishing computers Ltd, 2003 New Delhi

BM2403 MEDICAL OPTICS

UNIT I OPTICAL PROPERTIES OF THE TISSUES

WEEK 1: Refraction, Scattering, absorption, light transport inside the tissue,

WEEK 2: tissue properties, Light interaction with tissues, optothermal interaction,

WEEK 3: fluorescence speckles

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UNIT II INSTRUMENTATION IN PHOTONICS

WEEK 4: UNIT TEST I

Instrumentation for absorption, scattering and emission measurements, excitation light sources – high pressure arc lamp, solid state LEDs,

WEEK 5: Lasers, optical filters, polarizer, solid state detectors, time resolved and phase resolved detectors.

WEEK 6: UNIT TEST II

UNIT III APPLICATIONS OF LASERS

WEEK 7: Laser in tissue welding, lasers in dermatology,

WEEK 8: lasers in ophthalmology, otolaryngology, urology.

UNIT IV OPTICAL TOMOGRAPHY

WEEK 9: UNIT TEST III

Optical coherence tomography, Elastography,

WEEK 10: Doppler optical coherence tomography, Application towards clinical imaging.

WEEK 11: UNIT TEST IV

UNIT V SPECIAL OPTICAL TECHNIQUES

WEEK 12: Near field imaging of biological structures, in vitro clinical diagnostic,

WEEK 13: fluorescent spectroscopy, photodynamic therapy.

WEEK 14: UNIT TEST V

WEEK 15: ICD CLASSES

WEEK 16: MODEL EXAM

TEXT BOOKS:

1. Tuan Vo Dirh, “Biomedical photonics – Handbook”, CRC Press, BocaRaton, 2003.
2. Mark E. Brezinski., Optical Coherence Tomography: Principles and Applications, Academic Press, 2006.

REFERENCES:

1. Leon Goldman, M.D., & R. James Rockwell, Jr., “Lasers in Medicine”, Gordon and Breach, Science Publishers Inc., New York, 1971.
2. R. Splinter and B.A Hooper, An Introduction to BioMedical Optics, Taylor and Francis, 2007.

BM2404 DIGITAL IMAGE PROCESSING

UNIT I DIGITAL IMAGE FUNDAMENTAL

WEEK 1: Elements of digital image processing systems - Elements of visual perception

WEEK 2: image Sampling and quantization – basic relationships between pixels

WEEK 3: matrix and singular value representation of discrete images.

UNIT II IMAGE TRANSFORMS

WEEK 4: UNIT TEST I

1-D DFT - 2-D DFT – DCT – DST – Walsh Hadamard –

WEEK 5: Haar – Slant – KL – SVD and their properties.

WEEK 6: UNIT TEST II

UNIT III IMAGE ENHANCEMENT

WEEK 7: Gray level transformation – Histogram processing – enhancement using arithmetic/logic operation –

WEEK 8: spatial filtering – smoothing and sharpening spatial filter – smoothing infrequency domain filter – homomorphic filtering

UNIT IV IMAGE RESTORATION AND RECOGNITION

WEEK 9: UNIT TEST III

Image degradation models – unconstrained and constrained restoration – inverse filtering

WEEK 10: LMS filter – geometric mean filter – geometric transformation – pattern classes– optimal statistical classifier – neural networks and its uses in image processing

WEEK 11: UNIT TEST IV.

UNIT V IMAGE COMPRESSION

WEEK 12: Image compression models – elements of information theory – error free compression –lossy compression – run-length – Huffman coding – shift codes – arithmetic coding – bit plane coding – transform coding – JPEG standards – MPEG standards - wavelet transform predictive techniques – block truncation coding schemes – facet modeling. Image

WEEK 13: segmentation – detection of discontinuities – edge linking and boundary detection thresholding – region based segmentation – segmentation by morphological watersheds – use of motion in segmentation.

WEEK 14: UNIT TEST V

WEEK 15: ICD CLASSES

WEEK 16: MODEL EXAM

TEXT BOOK:

1. Rafael C. Gonzalez and Richard E. Woods, “Digital Image Processing” Pearson education, 2007.
2. Anil K. Jain, “Fundamentals of Digital Image Processing”, PHI, 1997

REFERENCES:

1. Willian K. Pratt, “Digital Image Processing”, John Wiley, NJ, 1987.
2. Sid Ahmed M. A., “Image Processing Theory, Algorithm and Architectures”, McGraw Hill, 1995
3. Scott E. C. Umbaugh, “Computer Vision and Image Processing”, Prentice Hall, Eaglewood Cliffs, NJ, 1998.

EC2352 COMPUTER NETWORKS

UNIT I PHYSICAL LAYER

WEEK 1: Data Communications – Networks - Networks models – OSI model – Layers in OSI model –

WEEK 2: TCP / IP protocol suite – Addressing – Guided and Unguided Transmission media switching:

WEEK 3: Circuit switched networks – Data gram Networks – Virtual circuit networks Cable networks for Data transmission: Dialup modems – DSL – Cable TV – Cable TV for Data transfer.

UNIT II DATA LINK LAYER

WEEK 4: UNIT TEST I

Data link control: Framing – Flow and error control – Protocols for Noiseless and Noisy Channels – HDLC

Multiple access: Random access – Controlled access

WEEK 5: Wired LANS: Ethernet – IEEE standards – standard Ethernet changes in the standard – Fast Ethernet – Gigabit Ethernet. Wireless LANS: IEEE 802.11 – Bluetooth. Connecting LANS: Connecting devices - Backbone networks - Virtual LAN Virtual circuit networks: Architecture and Layers of Frame Relay and ATM

WEEK 6: UNIT TEST II

UNIT III NETWORK LAYER

WEEK 7: Logical addressing: IPv4, IPv6 addresses Internet Protocol: Internetworking –

WEEK 8: IPv4, IPv6 - Address mapping – ARP, RARP, BOOTP, DHCP, ICMP, IGMP, Delivery - Forwarding - Routing – Unicast, Multicast routing protocols.

UNIT IV TRANSPORT LAYER

WEEK 9: UNIT TEST III

Process-to-Process delivery - User Datagram Protocol (UDP) – Transmission Control

WEEK 10: Protocol (TCP) – Congestion Control – Quality of services (QoS) – Techniques to improve QoS

WEEK 12: UNIT TEST IV

UNIT V APPLICATION LAYER

WEEK 13: Domain Name System (DNS) – E-mail – FTP – WWW – HTTP – Multimedia Network Security: Cryptography – Symmetric key and Public Key algorithms - Digital signature – Management of Public keys – Communication Security – Authentication Protocols.

WEEK 14: UNIT TEST V

WEEK 15: ICD CLASSES

WEEK 16: MODEL EXAM

TEXT BOOKS:

1. Behrouz A. Foruzan, “Data communication and Networking”, Tata McGraw-Hill,: Unit I – IV, 2006.
2. Andrew S. Tannenbaum, “Computer Networks”, Pearson Education, Fourth Edition, : Unit V, 2003.

REFERENCES:

1. Wayne Tomasi, “Introduction to Data Communication and Networking”, 1/e, Pearson Education.
2. James .F. Kurose & W. Rouse, “Computer Networking: A Topdown Approach Featuring”,3/e, Pearson Education.
3. C.Sivaram Murthy, B.S.Manoj, “Ad hoc Wireless Networks – Architecture and Protocols”, Second Edition, Pearson Education.
- 4.Greg Tomshon, Ed Tittel, David Johnson. “Guide to Networking Essentials”, fifth edition, Thomson India Learning, 2007.
5. William Stallings, “Data and Computer Communication”, Eighth Edition, Pearson Education, 2000.

BM2023 PHYSIOLOGICAL MODELLING

UNIT I PROPERTIES OF SYSTEMS AND ELECTRICAL ANALOG

WEEK 1: System concept, system properties – Resistance, storage, resistance – compliance, piecewise linear approximation,

WEEK 2: electrical analog for compliance, thermal storage, step response of first order systems

WEEK 3: resistance- compliance systems, and pulse response of first order systems

UNIT II TRANSFER FUNCTIONS

WEEK 4: UNIT TEST I

Transfer functions and its use, Study of transfer function of first order

WEEK 5: second order systems, engineering concept in coupled system, example of Transformed signals

WEEK 6: UNIT TEST II

UNIT III IMPEDANCE CONCEPT

WEEK 7: Transfer functions with impedance concept, prediction of performance, identification of the system from impedance function.

WEEK 8: periodic signals, relationship between transfer function and sinusoidal response, evaluation of transfer function from frequency response

UNIT IV FEEDBACK SYSTEMS

WEEK 9: UNIT TEST III

Characteristics of physiological feedback systems

WEEK 10: stability analysis of systems

WEEK 11: UNIT TEST IV

UNIT V SIMULATION OF BIOLOGICAL SYSTEMS

WEEK 12: Simulation of thermal regulation, pressure and flow control in circulation, ocular motor

WEEK 13: fabrication; Future applications: MEMS – robots – random system, endocrinal system, functioning of receptors.

WEEK 14: UNIT TEST V

WEEK 15: ICD CLASSES

WEEK 16: CYCLE TEST III

REFERENCES

1. William B. Blesser, "System approach to Bio-medicine", McGraw-Hill book co., New York, 1969.
2. Manfred Clynes and John H. Milsum, "Bio-medical engineering system", McGraw-Hill book co., New York, 1970.
3. Michael C.K. Khoo, "Physiological Control Systems -Analysis, Simulation and Estimation" Prentice Hall of India Pvt. Ltd., New Delhi, 2001
4. Douglas S. Regs, "Control theory and physiological feedback mechanism", The William & Williams co., Baltimore, 1970

BM2406 DIGITAL IMAGE PROCESSING

1. Display of Grayscale Images.
2. Histogram Equalization.
3. Non-linear Filtering.
4. Edge detection using Operators.
5. 2-D DFT and DCT.
6. Filtering in frequency domain.
7. Display of color images.
8. Conversion between color spaces.
9. DWT of images
10. segmentation using watershed transform.