



VEL TECH MULTI TECH Dr RANGARAJAN Dr.SAKUNTHALA ENGINEERING COLLEGE

(An ISO 9001: 2008 Certified Institution)
(Owned by 'VEL Shree R. Rangarajan
Dr. Sakunthala Rangarajan Educational Academy)
(Approved by AICTE, New Delhi &
Govt. of Tamil Nadu and affiliated to Anna University)



SYLLABUS

WEEKLY SCHEDULE

IV SEMESTER

2014 - 2015

DEPARTMENT OF BIO MEDICAL

IV DEGREE COURSE

42, Avadi – Alamathi Road,
Chennai – 600062
Telefax – 044-26841061
E-mail: veltech@md3.vsnl.net.in
Website : www.vel-tech.org



WEEKLY SCHEDULE

SEM : IV YEAR : II

ACADEMIC YEAR: 2015

Sl.No	WEEKS	DATE	
		FROM	TO
1	WEEK1	02.01.15	09.01.15
2	WEEK2	12.01.15	16.01.15
3	WEEK3	19.01.15	23.01.15
4	WEEK4	27.01.15	30.01.15
5	WEEK5	02.02.15	06.02.15
6	WEEK6	09.02.15	13.02.15
7	WEEK7	16.02.15	20.02.15
8	WEEK8	23.02.15	27.02.15
9	WEEK9	02.03.15	06.03.15
10	WEEK10	09.03.15	13.03.15
11	WEEK11	16.03.15	20.03.15
12	WEEK12	23.03.15	27.03.15
13	WEEK13	30.03.15	01.04.15
14	WEEK14	06.04.15	10.04.15
15	WEEK 15	13.04.15	17.04.15
16	WEEK16	20.04.15	24.04.15
17	WEEK17	27.04.15	30.04.15

CONTENTS

THEORY		
Sl.NO	SUB.CODE	SUBJECT
1	MA6451	Probability and Random Processes
2	BM6401	Medical physics
3	BM6402	Basics of Electrical Engineering
4	BM6403	Analog and Digital ICs
5	BM6404	Pathology and Microbiology
6	CS6304	Analog and Digital Communication
PRACTICAL		
8	BM641 1	Circuits and ICs Laboratory
9	BM6412	Pathology and Microbiology Laboratory

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	MA6451	Probability and Random Processes	22.01.15 FN	11.02.15 FN	03.03.15 FN	23.03.15 FN	13.04.15 FN
2	BM6401	Medical physics	22.01.15 AN	11.02.15 AN	03.03.15 AN	23.03.15 AN	13.04.15 AN
3	BM6402	Basics of Electrical Engineering	23.01.15 FN	12.02.15 FN	04.03.15 FN	24.03.15 FN	15.04.15 FN
4	BM6403	Analog and Digital ICs	23.01.15 AN	12.02.15 AN	04.03.15 AN	24.03.15 AN	15.04.15 AN
5	BM6404	Pathology and Microbiology	24.01.15 FN	13.02.15 FN	05.03.15 FN	25.03.15 FN	16.04.15 FN
6	CS6304	Analog and Digital Communication	24.01.15 AN	13.02.15 AN	05.03.15 AN	25.03.15 AN	16.04.15 AN

MODEL THEORY

Sl.NO	DATE	SUB. CODE	SUBJECT
1	20.04.2015	MA6451	Probability and Random Processes
2	21.04.2015	BM6401	Medical physics
3	22.04.2015	BM6402	Basics of Electrical Engineering
4	23.04.2015	BM6403	Analog and Digital ICs
5	24.04.2015	BM6404	Pathology and Microbiology
6	27.04.2015	CS6304	Analog and Digital Communication

MA6451 PROBABILITY AND RANDOM PROCESSES

UNIT I RANDOM VARIABLES

WEEK1: Discrete and continuous random variables

WEEK2: Moment generating functions – Binomial, Poisson

WEEK3: Geometric, Uniform, Exponential, Gamma and Normal distributions

UNITII TWO - DIMENSIONAL RANDOM VARIABLES

WEEK4: conditional distributions – Covariance

WEEK 5: Correlation and Linear regression – Transformation of random variables

UNIT III RANDOM PROCESSES

WEEK6: Definition and examples - first order, second order, strictly stationary, wide-sense stationary and ergodic processes - Markov process

WEEK7: CYCLE TEST I

WEEK8: Binomial, Poisson and Normal processes - Sine wave process – Random telegraph process.

UNIT IV CORRELATION AND SPECTRAL DENSITIES

WEEK9: Auto correlation - Cross correlation - Properties – Power spectral density – Cross spectral density - Properties

WEEK 10: Wiener-Khintchine relation – Relationship between cross power spectrum and cross correlation function

UNIT V LINEAR SYSTEMS WITH RANDOM INPUTS

WEEK11: Linear time invariant system - System transfer function – Linear systems with random inputs

WEEK12: CYCLE TEST II

WEEK13: – Auto correlation and cross correlation functions of input and output – white noise.

WEEK 14: REVISION FOR FIVE UNITS

WEEK 15: MODEL THEORY EXAM

WEEK 16: MODEL PRACTICAL EXAM

TEXT BOOKS

1. Oliver C. Ibe, “Fundamentals of Applied probability and Random processes”, Elsevier, First Indian Reprint (2007) (For units 1 and 2)”, Pearson Education Asia, Second Edition, 2007.
2. Yates and D.J. Goodman, “Probability and Stochastic Processes”, John Wiley and Sons, Second edition, 2005.
3. Peebles Jr. P.Z., “Probability Random Variables and Random Signal Principles”, Tata McGraw-Hill Publishers, Fourth Edition, New Delhi, 2002. (For units 3, 4 and 5).

REFERENCES

1. Miller, S.L and Childers, S.L, “Probability and Random Processes with applications to Signal Processing and Communications”, Elsevier Inc., First Indian Reprint 2007.
2. H. Stark and J.W. Woods, “Probability and Random Processes with Applications to Signal Processing”, Pearson Education (Asia), 3rd Edition, 2002.
3. Hwei Hsu, “Schaum’s Outline of Theory and Problems of Probability, Random Variables and Random Processes”, Tata McGraw-Hill edition, New Delhi, 2004. Leon-Garcia,A, “Probability and Random Processes for Electrical Engineering

BM 6401

MEDICAL PHYSICS

UNIT I NON IONIZING RADIATION AND ITS MEDICAL APPLICATION

WEEK1: Non-ionizing Electromagnetic Radiation: Overview of non-ionizing radiation effects-Low Frequency Effects

WEEK2: Higher frequency effects. Physics of light, Measurement of light and its unit

WEEK3: limits of vision and color vision an overview, Thermography– Application

UNITII SOUND IN MEDICINE

WEEK4: Physics of sound, Normal sound levels –ultrasound fundamentals – Generation of ultrasound (Ultrasound Transducer)

WEEK 5: Interaction of Ultrasound with matter; Cavitations, Reflection, Transmission- Scanning systems – Artefacts- Ultrasound-Doppler-Double Doppler shift-Clinical Applications

UNIT III PRINCIPLES OF RADIOACTIVE NUCLIDES

WEEK6: Radioactive Decay – Spontaneous Emission – Isometric Transition – Gamma ray emission, alpha,beta, Positron decay, electron capture, Sources of Radioisotopes Natural and Artificial radioactivity, Radionuclide used in Medicine and Technology

WEEK7: CYCLE TEST I

WEEK8: Decay series, Production of radionuclides –Cyclotron produced Radionuclide- Reactor produced Radio- nuclide-fission and

electron Capture reaction, radionuclide Generator-Technetium generator.

UNIT IV INTERACTION OF RADIATION WITH MATTER

WEEK 9: interaction of charged particles with matter –Specific ionization, Linear energy transfer range, Bremsstrahlung, Annihilation, Interaction of X and Gamma radiation with matter

WEEK 10: Photoelectric effect, Compton Scattering , Pair production, Attenuation of Gamma Radiation ,Interaction of neutron with matter and their clinical significance.

UNIT V BASIC RADIATION QUANTITIES

WEEK11: Introduction -exposure- Inverse square law-KERMA- Kerma and absorbed dose –stopping power -relationship between the dosimetric quantities

WEEK12: CYCLE TEST II

WEEK 13: Bremsstrahlung radiation, Bragg’s curve- concept of LD 50- Stochastic and Non-stochastic effects, Different radiation Unit, Roentgen, gray, Sievert.

WEEK 14: REVISION FOR FIVE UNITS

WEEK 15: MODEL THEORY EXAM

WEEK 16: MODEL PRACTICAL EXAM

TEXT BOOKS

1. Joseph J. Carr and John M. Brown, “Introduction to Biomedical Equipment Technology”, Pearson Education, 2004.
2. John G. Webster, “Medical Instrumentation Application and Design”, John Wiley and sons, New York, 2004

REFERENCE

1. Leslie Cromwell, “Biomedical Instrumentation and measurement”, Prentice hall of India, New Delhi, 2007.
2. Khandpur R.S, “Handbook of Biomedical Instrumentation”, Tata McGraw-Hill, New Delhi, 2003.
3. Standard Handbook of Biomedical Engineering & Design – Myer Kutz, McGraw-Hill Publisher, 2003.

BM6402 BASICS OF ELECTRICAL ENGINEERING

UNIT I MAGNETIC CIRCUIT

WEEK1: Magnetic effects of electric current, Magnetic circuits,

WEEK2: Magnetic materials and B-H relationship, Electromagnetic induction and force,

WEEK3: Hysteresis and eddy current losses.

UNITII DC MOTORS

WEEK4: Parts of DC motors, types of motors, principle of operation of DC motors, Back EMF, circuit model, power balance, calculation of torque and speed,

WEEK 5: armature and field control, DC motor starting, calculation of efficiency.

UNIT III TRANSFORMERS

WEEK6: Methods of generation of AC voltages, role of transformers in the distribution of electricity, Construction and principle of operation of single phase transformers, Ideal transformer, voltage and current relationships, impedance transformation, definition of voltage regulation,

WEEK7: CYCLE TEST I

WEEK 8: Losses in the transformer, calculation of efficiency of transformer, construction and voltage ratio aspects of single phase autotransformer, construction and voltage ratio aspects three phase transformer.

UNIT IV AC MACHINES

WEEK9: Synchronous machines, construction, principle of operation, phasor diagram, voltage equation, Open circuit and short circuit characteristics, voltage regulation

WEEK 10: Induction motor, construction, circuit model, torque slip characteristics, starting, speed control-slip control, frequency control.

UNIT V FRACTIONAL -KW MOTORS

WEEK11: Single phase induction motor, principle of operation, torque-speed characteristics, two-phase motors, split phase motor, universal motor, two value capacitance motor, stepper motors.

WEEK12: CYCLE TEST II

WEEK13 variable reluctance stepper motor-single stack and multistack-permanent magnet stepper motor- drive concepts-unipolar drive circuit, bipolar drive circuit-calculation

WEEK 14: REVISION FOR FIVE UNITS

WEEK 15: MODEL THEORY EXAM

WEEK 16: MODEL PRACTICAL EXAM

TEXT BOOKS:

1. D P Kothari and I J Nagrath, "Basic Electrical Engineering", TMH, 2ed, 2007.
2. P. C Sen, "Principles of Electric machines and power electronics", John-Wiley & Sons, 2ed, 2007.

REFERENCE

1. Muhammad Rashid, "Power electronics circuit, devices and applications", Prentice–Hall of India, 3rd ed, 2004.

BM6403 ANALOG AND DIGITAL ICs

UNIT I NUMBER SYSTEMS AND LOGIC GATES

WEEK1: Decimal, Binary, Octal and Hexadecimal Numbers.- Conversion between these number systems.- Complements r's and (r-1)'s complements.- subtraction using complements –

WEEK2: – Encoding numbers and characters using Binary digits. – Binary coded Decimal –Gray code - Binary to Gray code conversion –ASCII Code.

WEEK3: Boolean expressions, Truth Tables and Logic circuits – The Karnaugh Map – half adder, full adder, Multiplexers and Demultiplexers - Decoders and encoders. Coding of Combination Circuits in verilog.

UNIT II

WEEK4: Flip Flops – RS, D, T, JK Flip Flops – Characteristic equations, exciting tables – JK Master – Slave flip-flop – Universal shift register.

WEEK 5: Design of modulo-N counters – counter design using state diagram. Sequential circuit design with verilog.

UNIT III OPERATIONAL AMPLIFIERS

WEEK6: The characteristics of Ideal Operation – slew rate, offset voltage, bias current, CMRR, bandwidth - equivalent circuit of an op-Amp – virtual ground concept –555 Timer (internal diagram) and its applications – monostable multivibrator, astable multivibrator. Phase

locked Loop (565 - block diagram approach) and its applications - Frequency multiplication, Frequency translation,

WEEK7: CYCLE TEST I

WEEK8: Linear applications of op-amp – inverting and noninverting amplifier, summing, subtracting, averaging amplifier - voltage to current converter – current to voltage converter –voltage to frequency and frequency to voltage converters. DAC – Binary weighted DAC and R-2R DAC. ADC – single slope and dual slope ADCs, successive approximation ADC

WEEK 9: Differential amplifiers – differentiator and integrator. Nonlinear applications – comparator - Schmitt Triggers – Precision Diode Half wave and full wave rectifiers – Average detectors – peak detector

UNIT IV ACTIVE FILTERS AND SIGNAL GENERATOR

WEEK9: Active filters (first and second order) – Low pass, high pass, band pass filters, band reject filters (notch filters). Oscillators -

WEEK 10: RC Phase shift and Wein-bridge. Waveform generators - Square, triangular and saw tooth.

UNIT V

WEEK11: 555 Timer (internal diagram) and its applications – monostable multivibrator, astable multivibrator. Phase locked Loop (565 - block diagram approach) and its applications -Frequency multiplication, Frequency translation

WEEK12: CYCLE TEST II

WEEK13 Voltage to frequency and frequency to voltage converters. DAC – Binary weighted DAC and R-2R DAC. ADC – single slope and dual slope ADCs, successive approximation ADC

WEEK 14: REVISION FOR FIVE UNITS

WEEK 15: MODEL THEORY EXAM

WEEK 16: MODEL PRACTICAL EXAM

TEXT BOOKS

1. Ramakant A. Gayakwad , “Op-AMP and Linear Ics, Prince Hall, 1994
2. M. Morris Mano , “Digital Logic and Computer design “ Prentice Hall 1994.

REFERENCE

1. Robert B.Northrop, “Analysis and Application of Analog Electronic Circuits to Biomedical Instrumentation, CRC Press, 2004.
2. Sergio Franco, DESIGN with Operational Amplifiers and analog Integrated circuits, McGraw-Hills
3. Millman , J. Halkis.C.C “Integrated Electronics”.McGraw Hill , 1972.
4. John. F. Wakerly, “Digital design principles and practices”, Pearson Education,Fourth Edition, 2007 .
5. Charles H. Roth, Jr, “Fundamentals of Logic Design”, Fourth edition, Jaico Books, 2002

BM 6404 PATHOLOGY AND MICROBIOLOGY

UNIT I: CELL DEGENERATION, REPAIR AND NEOPLASIA

WEEK1 Cell injury and Necrosis, Apoptosis, Intracellular accumulations, Pathological calcification

WEEK2: Cellular adaptations of growth and differentiation, Inflammation and Repair including fracture healing,

WEEK3: Neoplasia, Classification, Benign and Malignant tumours, carcinogenesis, spread of tumours.

UNIT II FLUID AND HEMODYNAMIC DERANGEMENTS

WEEK4: Fluid and hemodynamic derangements edema, normal hemostasis, thrombosis, disseminated intravascular coagulation, embolism, infarction, shock.

WEEK5: Hematological disorders-Bleeding disorders, Leukaemias, Lymphomas

UNIT III MICROSCOPES

WEEK6: General Structural Organisation of bacterial and viral cell-growth and identification of bacteria, observation of culture.

WEEK7: CYCLE TEST I

WEEK8: Microscopy: Light microscopy, dark field microscopy, phase contrast microscopy, fluorescence and electron microscopy

UNIT IV MICROBIAL CULTURES

WEEK9: Genetic disorders, Infection and Immunity-Mutations, Autosomal and X linked disorders, Mendelian disorders, types of immune response, hypersensitivity disorders,

WEEK 10: Genetic disorders, Infection and Immunity-Mutations, Autosomal and X linked disorders, Mendelian disorders, types of immune response, hypersensitivity disorders,

UNIT V IMMUNOLOGY

WEEK11: Identification of disease producing organisms, simple stain, Gram stain,

WEEK12: CYCLE TEST II

WEEK13: AFB stain, Fluorescent techniques, antigen-antibody techniques

WEEK 14: REVISION FOR FIVE UNITS

WEEK 15: MODEL THEORY EXAM

WEEK 16: MODEL PRACTICAL EXAM

TEXT BOOKS:

1. Ramzi S Cotran, Vinay Kumar & Stanley L Robbins: Pathologic Basis of diseases. WB Saunders Co. 7th edn-2005.
2. Harsh Mohan: Text book of Pathology. Jaypee publishers. 4th edn. 2000.

REFERENCE:

1. **Underwood JCE:** General and Systematic Pathology Churchill Livingstone 3edn.2000.

CS6304 ANALOG AND DIGITAL COMMUNICATION

UNIT I ANALOG COMMUNICATION

WEEK1Noise: Source of Noise - External Noise- Internal Noise - Noise Calculation. Introduction to Communication Systems: Modulation – Types - Need for Modulation.

WEEK2: – Theory of Amplitude Modulation - Evolution and Description of SSB Techniques

WEEK3: Theory of Frequency and Phase Modulation –Comparison of various Analog Communication System (AM – FM – PM)

UNIT II DIGITAL COMMUNICATION

WEEK 4: Amplitude Shift Keying (ASK) – Frequency Shift Keying (FSK) Minimum Shift Keying (MSK) –Phase Shift Keying (PSK) – BPSK – QPSK – 8 PSK – 16 PSK - Quadrature Amplitude Modulation (QAM)

WEEK 5 8 QAM – 16 QAM – Bandwidth Efficiency– Comparison of various Digital Communication System (ASK– FSK – PSK – QAM).

UNIT III DATA AND PULSE COMMUNICATION

WEEK 6: Data Communication: History of Data Communication - Standards Organizations for Data Communication- Data Communication Circuits - Data Communication Codes - Error Detection and Correction Techniques

WEEK 7: CYCLE TEST II

WEEK 8: Data communication Hardware - serial and parallel interfaces. Pulse Communication: Pulse Amplitude Modulation (PAM) – Pulse Time Modulation (PTM) – Pulse code Modulation (PCM) - Comparison of various Pulse Communication System (PAM – PTM – PCM)

UNIT IV SOURCE AND ERROR CONTROL CODING

WEEK 9: Entropy, Source encoding theorem, Shannon fano coding, Huffman coding, mutual information, channel capacity, channel coding theorem,

WEEK 10: Error Control Coding, linear block codes, cyclic codes, convolution codes, viterbi decoding algorithm

UNIT V MULTI-USER RADIO COMMUNICATION

WEEK11: Advanced Mobile Phone System (AMPS) - Global System for Mobile Communications (GSM) – Code division multiple access (CDMA) – Cellular Concept and Frequency Reuse

WEEK12: CYCLE TEST II

WEEK13: Channel Assignment and Hand off - Overview of Multiple Access Schemes - Satellite Communication - Bluetooth.

WEEK 14: REVISION FOR FIVE UNITS

WEEK 15: MODEL THEORY EXAM

WEEK 16: MODEL PRACTICAL EXAM

TEXT BOOK:

1. H Taub, D L Schilling, G Saha, “Principles of Communication Systems” 3/e, TMH, 2007
2. S. Haykin “Digital Communications” John Wiley, 2005

REFERENCES:

1. B.P.Lathi, “Modern Digital and Analog Communication Systems”, 3/e, Oxford University Press, 2007
2. H P Hsu, Schaum Outline Series - “Analog and Digital Communications” TMH 2006
3. B.Sklar, “Digital Communications Fundamentals and Applications” 2/e Pearson Education 2007

BM6411 CIRCUIT & IC’S LAB

WEEK1: Study of logic gates, Half adder and Full adder

WEEK2: Encoder and BCD to 7 segment decoder

WEEK3: Multiplexer and demultiplexer using digital ICs

WEEK4: Universal shift register using flip flops

WEK 5: Design of mod-N counter

WEEK6: Inverting, non-inverting amplifier and comparator

WEEK7: CYCLE TEST I

WEEK8: . Integrator and Differentiator

WEEK9: Active filter – first order and second order LPF and HPF

WEEK 10: . Current to Voltage convertor and Voltage to Current Convertor

WEEK11: Comparator, Peak detector and Average detector

WEEK12: CYCLE TEST II

WEEK13: Instrumentation amplifier using IC741

WEEK 14: REVISION

WEEK 15: MODEL THEORY EXAM

WEEK 16: MODEL PRACTICAL EXAM

BM 2258 PATHOLOGY AND MICROBIOLOGY LAB

WEEK1: Urine physical and chemical examination (protein, reducing substances, ketones, bilirubin and blood)

WEEK2: Study of parts of compound microscope
Hematoxylin and eosin staining

WEEK3: Histopathological slides of benign and malignant tumours.

WEEK4: Manual tissue processing and section cutting
(demonstration)

WEEK5: Cryo processing of tissue and cryosectioning
(demonstration)

WEEK6: Basic staining – Hematoxylin and eosin staining.

WEEK7: CYCLE TEST I

WEEK8: Special stains – cresyl fast Blue (CFV)- Trichrome – oil red
O – PAS

WEEK9: Simple stain. Gram stain

WEEK12 CYCLE TEST II

WEEK13: AFB stain.

WEEK 14: REVISION

WEEK 15: MODEL THEORY EXAM

WEEK 16: MODEL PRACTICAL EXAM