



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

Accredited by NBA, New Delhi

An ISO 9001:2008 Certified Institution

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Approved by AICTE, New Delhi & Govt. of
Tamilnadu & Affiliated to Anna University



**SYLLABUS
WEEKLY SCHEDULE**

SEMESTER V

2013- 2014

DEPARTMENT OF BME

IV YEAR COURSE

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VEL TECH MULTI TECH Dr. RANGARAJAN

**Dr.SAKUNTHALA ENGINEERING COLLEGE
DEPARTMENT OF BIOMEDICAL ENGINEERING
WEEKLY SCHEDULE**

**SEM : V YEAR : III
ACADEMIC YEAR: 2013 – 2014**

S.No	WEEKS	DATE	
		FROM	TO
1	WEEK1	24.06.2013	28.06.2013
2	WEEK2	01.07.2013	05.07.2013
3	WEEK3	08.07.2013	12.07.2013
4	WEEK4	15.07.2013	19.07.2013
5	WEEK5	22.07.2013	26.07.2013
6	WEEK6	30.07.2013	02.08.2013
7	WEEK7	05.08.2013	08.08.2013
8	WEEK8	12.08.2013	16.08.2013
9	WEEK9	12.08.2013	16.08.2013
10	WEEK10	19.08.2013	23.08.2013
11	WEEK11	26.08.2013	30.08.2013
12	WEEK12	02.09.2013	06.09.2013
13	WEEK13	09.09.2013	13.09.2013
14	WEEK14	16.09.2013	21.09.2013
15	WEEK15	23.09.2013	28.09.2013
16	WEEK16	30.09.2013	06.10.2013
17	WEEK17	07.10.2013	12.10.2013
18	WEEK18	15.10.2013	19.10.2013

BM2304 BIO MEDICAL INSTRUMENTATION LAB

- WEEK 1:** Design of low noise pre-amplifier for ECG
WEEK 2. Study of characteristics of temperature sensors
WEEK 3. Measurement of pulse rate using photo transducer
WEEK 4. Measurement of respiration rate
WEEK 5: CYCLE TEST I
WEEK 6 Measurement of blood flow velocity using ultrasound
WEEK 7: Study of ESU – cutting and coagulation modes
WEEK 8. pH Measurement and conductivity test
WEEK 9. Measurement of heart rate using F-V converter
WEEK 10: CYCLE TEST II
WEEK 11: Galvanic skin resistance (GSR) measurement
WEEK 12: Recording of Audiogram
WEEK 13: REVISION
WEEK 14: REVISION
WEEK 15: ICD CLASSES
WEEK 16: CYCLE TEST III

GE2321 COMMUNICATION SKILLS LABORATORY

- WEEK 1. LISTENING COMPREHENSION:**
 Listening and typing – Listening and sequencing of sentences –Filling in the blanks -Listening and answering
WEEK 2. READING COMPREHENSION:
 Filling in the blanks - Close exercises – Vocabulary building - Reading and answering questions.
WEEK 3. SPEAKING: Phonetics: Intonation – Ear training - Correct Pronunciation – Sound recognition exercises – Common Errors in English. Conversations: Face to Face Conversation – Telephone conversation Role play
B. DISCUSSION OF AUDIO-VISUAL MATERIALS
WEEK 4. RESUME / REPORT PREPARATION / LETTER Structuring the resume / report - Letter writing / Email Communication - Samples.

CONTENTS

S.NO	SUB. CODE	SUBJECT
1	BM2305	Digital signal processing
2	BM2301	Bio control systems
3	BM2302	Diagnostic and therapeutic equipment
4	BM2303	Biomaterials and artificial organs
5	EC2363	Microprocessor, microcontroller and system design
6	BM2305	Hospital management
PRACTICAL		
7	EC2364	Microprocessor & microcontroller lab
8	BM2304	Biomedical instrumentation lab
9	GE2321	Communication skills lab

TEST SCHEDULE

CYCLE TEST - I

Sl. NO	DATE	SUB. CODE	SUBJECT
1	30.07.2013	BM2305	Digital signal processing
2	31.07.2013	BM2301	Bio control systems
3	01.08.2013	BM2302	Diagnostic and therapeutic equipment
4	02.08.2013	BM2303	Biomaterials and artificial organs
5	05.08.2013	EC2363	Microprocessor, microcontroller and system design
6	06.08.2013	BM2305	Hospital management

BM2306 MICROPROCESSOR AND MICROCONTROLLER LAB

8085 based experiments

1. Assembly Language Programming of 8085

8086 based experiments

WEEK 1: 1. Programs for 16 bit Arithmetic, Sorting, Searching and String operations,

WEEK 2: 2. Programs for Digital clock, Interfacing ADC and DAC

WEEK 3: Interfacing Programming 8279, 8259, and 8253.

WEEK 4: Serial Communication between two Microprocessor Kits using 8251.

WEEK 5: CYCLE TEST I

WEEK 6: Interfacing and Programming of Stepper Motor and DC Motor Speed control and Parallel Communication between two Microprocessor Kits

WEEK 7: Macroassembler Programming for 8086

8051 based experiments

WEEK 8: Programming using Arithmetic, Logical and Bit Manipulation instructions of 8051 microcontroller.

WEEK 9: Programming and verifying Timer, Interrupts and UART operations in 8051 microcontroller.

WEEK 10: CYCLE TEST II

WEEK 11: Interfacing – DAC and ADC and 8051 based temperature measurement

WEEK 12: Interfacing – LED and LCD

5. Interfacing – stepper motor traffic light control

WEEK 13: Communication between 8051 Microcontroller kit and PC.

WEEK 14 : REVISION

WEEK 15: ICD CLASSES

WEEK 16: CYCLE TEST III

CYCL BM2304 HOSPITAL MANAGEMENT

UNIT I OVERVIEW OF HOSPITAL ADMINISTRATION

WEEK 1: Distinction between Hospital and Industry

WEEK 2: Challenges in Hospital Administration -Hospital Planning

WEEK 3: Equipment Planning – Functional Planning.

UNIT II HUMAN RESOURCE MANAGEMENT ON HOSPITAL

WEEK 4: Principles of HRM – Functions of HRM – Profile of HRD Manager

WEEK 5: CYCLE TEST I

WEEK 6: Tools of HRD –Human Resource Inventory – Manpower Planning.

UNIT III RECRUITMENT AND TRAINING

WEEK 7: Different Departments of Hospital, Recruitment, Selection, Training Guidelines –

WEEK 8: Methods of Training – Evaluation of Training – Leadership grooming and Training, Promotion – Transfer.

UNIT IV PLANNING SUPPORTIVE SERVICES

WEEK 9: Medical Records Department – Central Sterilization and Supply Department

WEEK 10: CYCLE TEST II

WEEK 11: Pharmacy Food Services - Laundry Services.

UNIT V COMMUNICATION AND SAFETY ASPECTS IN HOSPITAL

WEEK 12: Purposes – Planning of Communication, Modes of Communication – Telephone, ISDN, Public Address and Piped Music – CCTV.

WEEK 13: Security – Loss Prevention – Fire Safety – Alarm System – Safety Rules.

WEEK 14: REVISION FOR FIVE UNITS

WEEK 15: ICD CLASSES

TEST SCHEDULE

CYCLE TEST-II

Sl. NO	DATE	SUB. CODE	SUBJECT
1	16.09.2013	BM2305	Digital signal processing
2	17.09.2013	BM2301	Bio control systems
3	18.09.2013	BM2302	Diagnostic and therapeutic equipment
4	19.09.2013	BM2303	Biomaterials and artificial organs
5	20.09.2013	EC2363	Microprocessor, microcontroller and system design
6	21.09.2013	BM2304	Hospital management

TEST SCHEDULE

MODEL EXAM

Sl. NO	DATE	SUB. CODE	SUBJECT
1	21.10.2013	BM2305	Digital signal processing
2	22.10.2013	BM2301	Bio control systems
3	23.10.2013	BM2302	Diagnostic and therapeutic equipment
4	24.10.2013	BM2303	Biomaterials and artificial organs
5	25.10.2013	EC2363	Microprocessor, microcontroller and system design
6	26.10.2013	BM2304	Hospital management

WEEK 13: Washing machine, RTC

Interfacing using I2C Standard, Motor Control, Relay, PWM, DC, Stepper Motor Multichannel biomedical data acquisition system.

WEEK 14: REVISION FOR FIVE UNITS

WEEK 15: ICD CLASSES

WEEK 16: CYCLE TEST III

TEXTBOOKS:

1. Ramesh S. Gaonkar, Microprocessor Architecture Programming and Applications with 8085. Fourth edition, Penram International Publishing
2. Douglas V.Hall, Microprocessor and Interfacing, Programming and Hardware. Revised second Edition, Indian edition, Tata McGraw Hill,
3. Muhammad Ali Mazidi, Janice Gillispie Mazidi, Rolin D.MCKinlay The 8051 Microcontroller and Embedded Systems, Second Edition, Pearson Education 2008.

REFERENCES:

1. Kenneth J.Ayala., "The 8051 Microcontroller, 3rd Edition, Thompson Delmar Learning, New Delhi, 2007.
2. A.K. Ray , K.M .Bhurchandi "Advanced Microprocessor and Peripherals" ,Second edition, Tata McGraw-Hill, 2007.
3. Barry B.Brey, "The Intel Microprocessors Architecture, Programming and Interfacing" Pearson Education, New Delhi, 2007, and system design using 8085, 8086, 8051 and 8096, PHI, 2007

C2363 MICROPROCESSOR, MICROCONTROLLER AND SYSTEM DESIGN L T P C

UNIT I ARCHITECTURE OF 8085 /8086 9

WEEK 1: 8085- Functional Block Diagram- Description - Addressing Modes, Timing diagrams.

WEEK 2: 8086- Architecture, Instruction set, Addressing Modes.

WEEK 3: Introduction to 8087 -Architecture.

UNIT II 8086 ASSEMBLY LANGUAGE PROGRAMMING

WEEK 4: Simple Assembly Language Programming, Strings, Procedures, Macros,

WEEK 5: CYCLE TEST I

WEEK 6: Assembler Directives- Interrupts and Interrupt Applications.

UNIT III PERIPHERAL INTERFACING & APPLICATION

WEEK 7: Programmable Peripheral Interface (8255), keyboard display controller (8279), ADC, DAC Interface,

WEEK 8: Programmable Timer Controller (8254), Programmable interrupt controller (8259), Serial Communication Interface (8251).

UNIT IV MICROCONTROLLER

WEEK 9: Architecture of 8051 Microcontroller- Instruction Set – Assembly Language Programming Branching, I/O and ALU Instructions.

WEEK 10: CYCLE TEST II

WEEK 11: Programming 8051 - Timers, Serial Port, Interrupts. C programming for 8051.

UNIT V 8086 AND 8051 BASED SYSTEM DESIGN 9

WEEK 12: Design and interfacing - LED, LCD & Keyboard Interfacing, ADC, DAC, Sensor Interfacing, External Memory Interfac,e Traffic light controller,

BM2305 DIGITAL SIGNAL PROCESSING

UNIT I FINITE IMPULSE RESPONSE (FIR) FILTER

WEEK 1: Introduction to FIR filter - phase delay and group delay – linear phase transfer function. Design of FIR filter using Fourier method, Rectangular window,

WEEK 2: Hamming window, Hamming window, Kaiser Window. Design using frequency sampling technique.

WEEK 3: Structure realization of FIR system – direct form, cascade form, linear phase FIR system.

UNIT II INFINITE IMPULSE RESPONSE (IIR) FILTER

WEEK 4: Introduction to IIR filter - Impulse-invariant transformation technique-Bilinear-Transformation technique – frequency transformation in digital domain

WEEK 5: CYCLE TEST I

WEEK 6: Design of Butterworth filter and Chebyshev filter (type-1) (restricted to 3rd order). Structure Realization of IIR system – lattice structure and lattice-ladder structure.

UNIT III FINITE WORD LENGTH EFFECT IN FIR AND IIR FILTER

WEEK 7: Quantization of fixed-point and floating-point numbers – product quantization – variance Estimation of quantization error – finite word length effect on IIR filter –

WEEK 8: Product Quantization error in IIR filter – mathematical analysis of steady state output noise – Dynamic scaling to prevent overflow – limit-cycle oscillation in recursive system –Rounding-off error in DFT and FFT computation.

UNIT IV BASICS OF RANDOM SIGNAL PROCESSING (ONLY QUALITATIVE ANALYSIS)

WEEK 9: Introduction to probability function, joint probability, conditional probability – estimation

Parameters – joint distribution function, probability density function, ensemble average – mean squared value, variance, standard deviation, moments,

WEEK 10: CYCLE TEST II

WEEK 11: correlation, covariance, orthogonally, auto-covariance, auto-correlation, cross-covariance and cross-correlation stationarity – ergodic – white noise – energy density spectrum – power density spectrum estimation – periodogram – direct method, indirect method, Barlett method Welch method. Decimator (down sampling) – frequency-domain analysis of decimator – interpolation (up sampling) – frequency-domain analysis of interpolator

UNIT V INTRODUCTION TO DIGITAL SIGNAL PROCESSORS

WEEK 12: Programmable DSP – multiplier accumulator – overflow and under-flow in MAC unit – Van-Neumann architecture, Harvard architecture – cache memory – pipelining

WEEK 13: Computer configuration – RISC – CISC – addressing modes – replication – TMS320 processor – first to fifth generation (only block diagram approach) – architecture and features.

WEEK 14: REVISION FOR FIVE UNITS

WEEK 15: ICD CLASSES

WEEK 16: CYCLE TEST III

TEXT BOOKS:

1. E. C. Ifeachor and B.W. Jervis, “Digital Signal processing – A Practical Approach”, Pearson education, New Delhi, 4th Edition, 2004. 2. John G. Proakis and Dimitris G. Manolakis, “Digital Signal Processing, Algorithms Edition, 2007.

REFERENCES:

1. Sanjit K. Mitra, “Digital Signal Processing – A computer Based Approach”, TMH, New Delhi, 1998

WEEK 15: ICD CLASSES

WEEK 16: CYCLE TEST III

TEXT BOOKS:

1. Sujata V. Bhatt, Biomaterials Second Edition, Narosa Publishing House, 2005.
2. Joon B. Park Joseph D. Bronzino, Biomaterials - Principles and Applications – CRC Press, 2003

REFERENCES:

1. Park J.B., “Biomaterials Science and Engineering”, Plenum Press, 1984.
2. Standard Handbook of Biomedical Engineering & Design – Myer Kutz, McGraw-Hill, 2003
3. Introduction to Biomedical Engineering – John Enderle, Joseph D. Bronzino, Susan M. Blanchard, Elsevier, 2005.

**BM2303 BIOMATERIALS AND ARTIFICIAL ORGANS
UNIT I STRUCTURE OF BIO-MATERIALS AND BIO-COMPATIBILITY**

WEEK 1: Definition and classification of bio-materials, mechanical properties,

WEEK 2: visco elasticity, wound-healing process,

WEEK 3: body response to implants, blood compatibility.

UNIT II IMPLANT MATERIALS

WEEK 4: Metallic implant materials, stainless steels, co-based alloys, Ti-based alloys,

WEEK 5: CYCLE TEST I

WEEK 6: ceramic implant materials, aluminum oxides, hydroxyapatite glass ceramics carbons, medical applications.

UNIT III POLYMERIC IMPLANT MATERIALS

WEEK 7: Polymerization, polyamides, Acrylic polymers, rubbers, high strength thermoplastics, medical applications.

WEEK 8: Bio polymers: Collagen and Elastin.

UNIT IV TISSUE REPLACEMENT IMPLANTS

WEEK 9: Soft-tissue replacements, sutures, surgical tapes, adhesive, Percutaneous and skin implants, maxillofacial augmentation,

WEEK 10: CYCLE TEST II

WEEK 11: blood interfacing implants, hard tissue replacementimplants, internal fracture fixation devices, joint replacements.

UNIT V ARTIFICIAL ORGANS

WEEK 12: Artificial Heart, Prosthetic Cardiac Valves, Artificial lung (oxygenateor),

WEEK 13: Artificial Kidney (Dialyser membrane) , Dental Implants.

WEEK 14: REVISION FOR FIVE UNITS

BM2301 BIOCONTROL SYSTEMS

UNIT I CONTROL SYSTEM MODELLING

WEEK 1:Terminology and basic structure of control system, example of a closed loop system, transfer functions, modeling of electrical systems,

WEEK 2: translational and rotational mechanical systems, electromechanical systems, block diagram and **WEEK 3:** signal flow graph representation of systems, conversion of block diagram to signal flow graph, reduction of block diagram and signal flow graph.

UNIT II TIME RESPONSE ANALYSIS

WEEK 4: Step and Impulse responses of first order and second order systems, determination of time domain specifications of first and second order systems from its output responses. Definition of steady state error constants and its computation,

WEEK 5: definition of stability, Routh-Hurwitz criteria of stability, root locus technique, construction of root locus and study of stability, definition of dominant poles and relative stability .

UNIT III FREQUENCY RESPONSE ANALYSIS

WEEK 7: Frequency response, Nyquist stability criterion, Nyquist plot and determination of closed loop stability, definition of gain margin and phase margin, Bode plot, determination of gain margin and phase margin

WEEK 8: Bode plot, use of Nichol's chart to compute resonance frequency and band width.

UNIT IV PHYSIOLOGICAL CONTROL SYSTEMS 9

WEEK 9: Block diagram representation of the muscle stretch reflex, difference between engineering and physiological control systems,

WEEK 10: CYCLE TEST II

WEEK 11: generalized system properties , models with combination of system elements, introduction to simulation.

UNIT V PHYSIOLOGICAL SYSTEM MODELING

WEEK 12: Linear model of respiratory mechanics, model of chemical regulation of ventilation,

WEEK 13: linear model of muscle mechanics, model of regulation of cardiac output, model of Neuromuscular reflex motion.

WEEK 14: REVISION FOR FIVE UNITS

WEEK 15: ICD CLASSES

WEEK 16: CYCLE TEST III

TEXT BOOKS:

1. M. Gopal "Control Systems Principles and design", Tata McGraw Hill ,2002
2. Benjamin C. Kuo, "Automatic control systems", Prentice Hall of India, 1995
3. Michael C K Khoo, "Physiological control systems", IEEE press, Prentice –Hall of India, 2001.

REFERENCES:

1. John Enderle, Susan Blanchard, Joseph Bronzino "Introduction to Biomedical Engineering" second edition, Academic Press, 2005.
2. Richard C. Dorf, Robert H. Bishop," Modern control systems",Pearson, 2004

controlled. Flow, Patient Cycle Ventilators, Humidifiers, Nebulizers, Inhalators.

UNIT V SENSORY MEASUREMENT 9

WEEK 12: Psycho Physiological Measurements-for testing and sensory Responses, Electrooculograph, Electro retinograph,

WEEK 13: Audiometer-Pure tone, Speech. EGG (Electrogastrograph), galvanic skin resistance(GSR).

WEEK 14: REVISION FOR FIVE UNITS

WEEK 15: ICD CLASSES

WEEK 16: CYCLE TEST III

TEXT BOOKS:

1. Joseph J. Carr and John M. Brown, "Introduction to Biomedical equipment technology", Pearson education, 2003.
2. John G.Webster, Medical Instrumentation Application and Design, third edition, Wiley India Edition, 2007.

REFERENCES:

1. Myer Kutz, "Standard Handbook of Biomedical Engineering & Design", McGraw Hill, 2003.
2. Khandpur R.S, "Handbook of Biomedical Instrumentation", Tata McGraw Hill, New Delhi, 2003.
- 3 L.A Geddes and L.E.Baker, "Principles of Applied Biomedical Instrumentation",
- 4 Leslie Cromwell, "Biomedical Instrumentation and Measurement", Pearson Education, New Delhi, 2007.

BM2302 DIAGNOSTIC AND THERAPEUTIC EQUIPMENT-I

UNIT I CARDIAC EQUIPMENTS

WEEK 1: Electrocardiograph, Normal and Abnormal Waves, Heart rate monitor, Arrhythmia Simulator

WEEK 2: Holter Monitor, Phonocardiography, Plethysmography. Cardiac Pacemaker-Internal and External Pacemaker–Batteries

WEEK 3: AC and DC Defibrillator- Internal and External.

UNIT II NEUROLOGICAL EQUIPMENTS

WEEK 4: Clinical significance of EEG, Multi channel EEG recording system, Epilepsy,

WEEK 5: CYCLE TEST I

WEEK 6: Evoked Potential –Visual, Auditory and Somatosensory, MEG (Magneto Encephalon Graph). EEG Bio Feedback Instrumentation.

UNIT III SKELETAL MUSCULAR SYSTEM

WEEK 7: Sliding theory of contraction, recording and analysis of EMG waveforms, fatigue characteristics

WEEK 8: Muscle stimulators, nerve stimulators, Nerve conduction velocity measurement, EMG Bio Feedback Instrumentation.

UNIT IV RESPIRATORY MEASUREMENT SYSTEM

WEEK 9: Instrumentation for measuring the mechanics of breathing – Spiro meter-Lung Volume and vital capacity, measurements of residual volume, pneumotachometer -Airway resistance measurement,

WEEK 10: CYCLE TEST II

WEEK 11: Whole body plethysmography, Intra-Alveolar and Thoracic pressure measurements, Apnea Monitor. Types of Ventilators – Pressure, Volume, Time

WEEK 10: CYCLE TEST II

WEEK 11: generalized system properties , models with combination of system elements, introduction to simulation.

UNIT V PHYSIOLOGICAL SYSTEM MODELING

WEEK 12: Linear model of respiratory mechanics, model of chemical regulation of ventilation,

WEEK 13: linear model of muscle mechanics, model of regulation of cardiac output, model of Neuromuscular reflex motion.

WEEK 14: REVISION FOR FIVE UNITS

WEEK 15: ICD CLASSES

WEEK 16: CYCLE TEST III

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3. Michael C K Khoo, “Physiological control systems”, IEEE press, Prentice –Hall of India, 2001.

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1. John Enderle, Susan Blanchard, Joseph Bronzino “Introduction to Biomedical Engineering” second edition, Academic Press, 2005.
2. Richard C. Dorf, Robert H. Bishop,” Modern control systems”, Pearson, 2004