

SAURASHTRA UNIVERSITY

COURSE: B.E. (BIO-MEDICAL & INSTRUMENTATION ENGINEERING)

SEMESTER: III

Sub. Code	Subject	Teaching Scheme		Examination Scheme				
		Theory Hours	Practical Hours	Theory Paper Hours	Theory Marks	Term Work Marks	Practical /Oral Marks	Total Marks
BM-301	Applied Mathematics	4	-	3	100	-	-	100
BM-302	Analog Electronic Circuits	4	2	3	100	25	25	150
BM-303	Human Biology – I	3	2	3	100	25	25	150
BM-304	Computer Programming – II	4	2	3	100	25	25	150
BM-305	Digital Circuits	4	2	3	100	25	25	150
BM-306	Computer Application Practice	1	2	-	-	25	25	50
TOTAL		20	10	-	500	125	125	750

SAURASHTRA UNIVERSITY, RAJKOT
B.E. SEM III (BIOMEDICAL & INSTRUMENTATION ENGINEERING)

BM - 301: APPLIED MATHEMATICS

TEACHING SCHEME		EXAMINATION SCHEME				
THEORY HOURS	PRACTICAL HOURS	THEORY MARKS	PAPER HOURS	PRACTICAL/ORAL MARKS	TERMWORK MARKS	TOTAL MARKS
04	-	100	03	-	-	100

1 FOURIER SERIES:

Definitions, Euler's formulae, Condition for a Fourier Expansion, Functions having points of discontinuity, Change of interval, Odd and even function, Half range series, Harmonic analysis.

2. VECTOR CALCULUS:

Differentiation:

Introduction, vector function of a scalar Quantity, Decomposition of a vector function, vector differentiation, Geometrical interpretation, velocity and acceleration, standard results, point function, vector operator Del ∇ , Gradient, Geometrical Meaning of $\text{grad } \phi$, standard Results, divergence and curl, physical interpretation of divergence, physical interpretation of curl, $\text{div grad } \phi$ or $\phi \nabla^2$.

3. ORDINARY DIFFERENTIAL EQUATIONS:

Linear differential equations of higher order with constant coefficients, Methods of variations of parameters, Cauchy's and Legendre's Linear equations, Simultaneous linear equations with constant coefficients, Applications of linear differential equations, Solution of Bessel's and Legendre's equations by series Properties like recurrence relations, Orthogonality.

4. PARTIAL DIFFERENTIAL EQUATIONS:

Formation of differential equations, Directly integrable equations, Linear and nonlinear equations of first order, Homogeneous linear equations with constant coefficient, Applications of partial differential equations.

5. NUMERICAL METHODS:

Solution of algebraic and transcendental equations by Bisection method, Newton-Raphson, False position, Iteration and extended iteration methods, Convergence of these methods.

BOOKS RECOMMENDED:

Higher Engineering Mathematics
 Engineering Mathematics Vol. I, II, III, IV
 Engineering Mathematics Vol. I
 A Text of On Engineering mathematics II
 Engineering Mathematics
 Mathematics for Engineering Students

-Dr. B. S. Grewal.
 -Kumbhojkar G. V.
 -Prof. Wartikar & Wartikar
 -N. P. Bali, Ashok Sexena & Iyenger
 -Dhavan & Srivastav
 -P. D. S. Verma

SAURASHTRA UNIVERSITY, RAJKOT
B.E. SEM III (BIOMEDICAL & INSTRUMENTATION ENGINEERING)

BM - 302: ANALOG ELECTRONIC CIRCUITS

TEACHING SCHEME		EXAMINATION SCHEME				
THEORY HOURS	PRACTICAL HOURS	THEORY MARKS	PAPER HOURS	PRACTICAL/ORAL MARKS	TERMWORK MARKS	TOTAL MARKS
04	02	100	03	25	25	150

1. AMPLIFIERS:

Review of Transistor FET biasing, Low frequency parameters and equivalent circuits, Analysis of single stage transistor & FET amplifier configuration using Hybrid models, input & output impedance, voltage & current gain calculations, bootstrapping analysis of paired configurations (e.g. Darlington, difference amplifier etc.)

High frequency model of Transistor and FET, Hybrid π C.E. Model CE short circuit gain, concept of f_B , f_T , interstage coupling, gain and bandwidth of a cascade amplifier, frequency response, effect of bypass and coupling capacitors on low frequency response, classification and distortion of amplifiers, fundamentals of tuned amplifier.

Power Transistor rating, transformer coupling, harmonic distortion, power calculation of class A & B type, class AB operation, push pull & complementary configurations, Heat sinks design & calculation.

Concept of feedback, voltage current transresistance and transconductance types, general characteristics of negative feedback amplifiers, topologies, Analysis and calculation of voltage and current gains, input and output impedance of feedback amplifiers.

2. OSCILLATORS :

Criterion of Oscillation, General condition of Oscillation analysis & working of sinusoidal oscillators such as R. C. phase shift, weinbridge, Hartley, Colpitts, Crystal etc. and Non-sinusoidal oscillators such as multivibrators, UJT saw tooth generators, Blocking Oscillators.

3. POWER SUPPLIES:

Review of diode rectifier circuits and filters, need for regulation, series regulators, Short circuit protection, three pin I.C. regulators, switch mode power supply.

4. OPERATIONAL AMPLIFIER BASICS:

Ideal characteristics, I.C. version, specification, offset error voltages, and Currents, measurement of parameters, Analysis of basic inverting and non-inverting amplifiers, universal balancing technique Frequency Compensation.

BOOKS RECOMMENDED:

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|-------------------------------|----------------------|
| Integrated Electronics | - Millman & Halkias. |
| Electronics Device & Circuits | - David A. Bell |
| Microelectronic Circuits | - Sedra / Smith |
| Electronic Circuits | - Schilling & Belove |
| Electronic Devices & Circuits | - Mottershead |

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B.E. SEM III (BIOMEDICAL & INSTRUMENTATION ENGINEERING)

BM - 303: HUMAN BIOLOGY - I

TEACHING SCHEME		EXAMINATION SCHEME				
THEORY HOURS	PRACTICAL HOURS	THEORY MARKS	PAPER HOURS	PRACTICAL/ORAL MARKS	TERMWORK MARKS	TOTAL MARKS
03	02	100	03	25	25	150

ANATOMY

1. ELEMENTS OF HUMAN ANATOMY:

Outline of different types of cells and tissues

2. RESPIRATORY SYSTEM:

Thoracic Cavity Diaphragm
Structure of Respiratory tract
Structure of Lungs

3. CARDIOVASCULAR SYSTEM:

Structure of Heart
Heart Valves
Brief knowledge of Arteries & Veins of the Body
Blood Supply of the Heart (Coronary Circulation)

4. NERVOUS SYSTEM:

Vertical column & cranial cavity (Brief outline)
Structure of Spinal Cord & Different Parts of Brain
Brief Outline of Cranial & Spinal Nerves

PHYSIOLOGY

1. GENERAL PHYSIOLOGY

Functional Organization of the Human Body and Control of the internal environment

“Hemostasis” Mechanisms of the Major Functional Systems

1. Hemostasis, Extracellular Fluid Transport System - The Circulatory, Removal of Metabolic End Products.
2. Regulation of Body Functions, Reproduction.
Control System of the Body.

Characteristics of Control Systems.

Automaticity of the Body.

The Cell and Its Function

Physical Structure of the cell

Membranous Structures of the cell, Cytoplasm and Its Organelles, Nucleus.

Functional System of the Cell

Ingestion by the cell-Endocytosis & Exocytosis, Function of the Lysosomes, Function of the Endoplasmic Reticulum and the Golgi apparatus, Function of the Mitochondria, Ameboid, Locomotion of cells, Cilia and Ciliary Movements.

2. MEMBRANE PHYSIOLOGY, NERVE AND MUSCLE:

Transport of Ions and Molecules through the Cell Membrane.

Diffusion, Active Transport.

Membrane Potentials and Action Potentials.

Basic Physics of membrane Potentials, Resting Membrane Potential of Nerves, Nerve Action Potential, Propagation of the Action Potential, Special Aspects of Signal Transmission in Nerve Trunks, Excitation - The Process of Exciting the Action Potential, inhibition of Excitability - “ Stabilizers ” and Local Anesthetics, Recording Membrane Potentials and Action Potentials.

Contraction of Skeletal Muscle

Physiology & Anatomy of skeletal Muscle, General Mechanism of Muscle Contraction, Mechanism of Muscle Contraction, Energies of Muscle Contraction, Characteristics of Whole muscle Contraction, E.M.G. (Electromyography).

Excitation of Skeletal Muscle

Neuromuscular Transmission, Excitation - Contraction Coupling.
Contraction of Smooth Muscle.

3. THE HEART:

Heart Muscle: The heart as pump.

Physiology of Cardiac Muscle, Cardiac Cycle.

Rhythmic Excitation of the Heart

Specialized Excitatory and Conductive system of the Heart, Control of Excitation and Conduction in the Heart.

The normal Electrocardiogram (ECG)

4. THE CIRCULATION:

Overview of the circulation ; Medical Physics of Pressure, Flow and Resistance, Vascular Distensibility and Function of the Arterial and Venous Systems, Control of Output by Venous Return - Role of the Frank - Starling Mechanism of the Heart. Methods of Measuring Cardiac Output, Normal Heart sounds and Blood pressure, Urine Formation by the Kidneys, Micturition, Treatment of Renal Failure by Dialysis with an Artificial Kidney.

5. BLOOD:

Composition & function of blood, Various cells & their structure, Numbers cell count, Hemoglobin & its Estimation, Anemia.

BOOKS RECOMMENDED:

Human Anatomy (Vol. 1, 2, 3)	- B. D. Chaurasiya
General Anatomy	- B. D. Chaurasiya
Gray's Anatomy (Reference)	
Principles of Anatomy & Physiology	- Tortora
Grant's Atlas of Anatomy	- Agar
Essentials of Human Anatomy Vol. 1, 2, 3	- Datta A. K.
Principles of General Anatomy	- Datta A. K.

SAURASHTRA UNIVERSITY, RAJKOT
B.E. SEM III (BIOMEDICAL & INSTRUMENTATION ENGINEERING)

BM - 304: COMPUTER PROGRAMMING-II

TEACHING SCHEME		EXAMINATION SCHEME				
THEORY HOURS	PRACTICAL HOURS	THEORY MARKS	PAPER HOURS	PRACTICAL/ORAL MARKS	TERMWORK MARKS	TOTAL MARKS
04	02	100	03	25	25	150

1. INTRODUCTION OF C & FLOW - CHARTING:

Introduction. Why C ..?, Features of C, Basic structure programming style, Basics & importance of flow charting, Symbols used in flow charting, sample examples of flow charting.

2. DATATYPES, VARIABLES, OPERATORS AND EXPRESSIONS:

Introduction to Data types, different data types, declaration and initialization of different variables, defining symbolic constants, Arithmetic, Relational, Logical, Assignment, increment and decrement Operators, its importance and varieties of operators. Expressions & its evaluation, precedence of arithmetic operators, its associativity, input & output operators.

3. DECISION MAKING, BRANCHING & LOOPING:

Introduction, IF statement, IF ELSE & nesting of IF, switch statement, GOTO statement, WHILE statement, DO Statement, FOR Statement.

4. ARRAYS:

Introduction, one-dimensional arrays, two & multi dimensional arrays, Initialization of arrays.

5. CHARACTER STRINGS HANDLING:

Declaration & initialization of string variables, reading & writing the string variables, concatenation, comparison of string and arithmetic operators on character, string handling function.

6. FUNCTIONS IN C:

Introduction, built in functions & needs for user defined functions, form of C functions, return values & their types, calling functions, category of functions, arguments & return values, nesting of functions, Recursion, function with arrays, scope of variables in functions.

7. STRUCTURES & UNIONS:

Need of structures, definition, giving values to a member, initialization of structure, array of structure, structure within structure, structure & functions, unions.

8. POINTERS:

The concept, understanding pointers, declaring & initialization of pointers, pointer expressions, increment & scale factor, pointers & arrays, pointer & characters, String Pointer & Functions, pointers & structures and pointers to pointers.

Dynamic Memory, Allocation, linked lists & preprocessor, introduction & importance of Dynamic memory, function of DMA, concept & link lists, advantages & types of LL applications & LL use of preprocessor, Marco substitution, File Inclusion, Compiler control directives.

9. FILE MANAGEMENT:

Defining, opening and closing file, input/output operations on files, error handling during I/O, random access, file command line argument.

BOOK RECOMMENDED:

Balaguru Swamy
Gottfried

- "ANSI C"
- Prog. With "C"

SAURASHTRA UNIVERSITY, RAJKOT
B.E. SEM III (BIOMEDICAL & INSTRUMENTATION ENGINEERING)
BM - 305: DIGITAL CIRCUITS

TEACHING SCHEME		EXAMINATION SCHEME				
THEORY HOURS	PRACTICAL HOURS	THEORY MARKS	PAPER HOURS	PRACTICAL/ORAL MARKS	TERMWORK MARKS	TOTAL MARKS
04	02	100	03	25	25	150

1. LINEAR AND NON LINEAR WAVESHAPING:

Pulse specifications, duty cycle, characteristics of switching devices, switching times, typical junction voltages, relation of sag and rise time to sinusoidal frequency response pulse transformer design consideration, electromagnetic delay line.

Response of high pass low pass RC, RL circuits to step, pulse, square wave, ramp and exponential waveforms. High pass circuits as differentiator, Low pass circuit as integrator, Diode and Transistor clipper and clamper circuits.

2. NUMBER SYSTEMS, CODES & BINARY ARITHMETIC:

Binary, Octal, Hex number system and inter conversion, signed and unsigned binary numbers r's and (r-1)' compliment, representation of negative numbers, Binary arithmetic.

3. BOOLEAN ALGEBRA AND LOGIC GATES:

Boolean algebra, Boolean functions, Canonical & standard forms, Digital logic gates, Simplification of Boolean function, Karnaugh map & tabulation methods.

4. COMBINATIONAL CIRCUIT DESIGN:

Adders, Subtractors, Parallel adder, decimal adder, magnitude comparator, decoders, Multiplexers , Code conversion.

5. SEQUENTIAL CIRCUIT LOGIC DESIGN:

Flip flop, analysis of clocked sequential ckt., State reduction and assignment, Excitation tables, Shift registers, Ripple and Synchronous counters.

BOOK RECOMMENDED:

Digital Logic and Computer Design	- Morris Mano
Solid state pulse circuits	- David A. Bell
Pulse Digital & Switching Waveforms	- Milliman & Taub
Wave shaping digital circuits	- Agrawal & S. Rai
Principles of Digital Electronics	- Malvino & Leach
Modern Digital Electronics	- R. P. Jain

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BM - 306: COMPUTER APPLICATION PRACTICE

TEACHING SCHEME		EXAMINATION SCHEME				
THEORY HOURS	PRACTICAL HOURS	THEORY MARKS	PAPER HOURS	PRACTICAL/ORAL MARKS	TERMWORK MARKS	TOTAL MARKS
01	02	-	-	25	25	50

1. OVERVIEW OF COMPUTER SYSTEM:

Functional organization of PC, different types, system specifications like CPU, memory, Hard disk, floppy disk drive, CD drives, keyboard, mouse, multimedia cards, monitors, printers.

2. OVERVIEW OF COMPUTER SOFTWARE:

Type of operating systems, languages and commonly used application software packages.

3. SOFTWARE PRACTICES:

Familiarity with DOS & Windows Operating System, Introduction to Word processing, spreadsheets, database management, presentation etc. software packages (MS - Office), practice with PCB design software packages (e.g. ORCAD), Circuit simulation packages (e.g. PSPICE).

BOOKS RECOMMENDED:

IBM PC and Clones	- Govind Rajalu
Introduction to Computers information for Business	- Mark G. Simkin
Working in Microsoft Office	- Ron Mansfield