

B. TECH SECOND YEAR (4 YDC) ELECTRICAL ENGINEERING**LESSON PLAN****SUBJECT NAME :EE29011 NETWORK ANALYSIS****CLASS :B.TECH II YEAR ELECTRICAL**

LECT	TOPIC	CO
1	Classification of circuit elements and sources	CO1
2	Kirchhoff's law, Concept of super node and supermesh, Power, Energy, Passivity Loop and Nodal equations	
3	Magnetically coupled circuit	
4	Problems on Magnetic circuit	
5	Network topology	
6	Numericals on thevenin's theorem norton's theorem	
7	Numericals based on maximum power transfer theorem reciprocity	
8	Numericals based on compensation theorem and tellegen's	
9	First order circuits, Source free RL circuit, Source free RC circuit	
10	RL & RC circuit with source	
11	Numericals based on first order circuits	
12	Introduction to second order circuits	
13	Different solutions of characteristic equations	
14	AC transients	
15	Responses based on step ramp impulse and arbitrary inputs	
16	Circuit elements models and transform of signal waveforms	
17	Laplace transformation, Numericals based on laplace	
18	Initial and final value theorem, Circuit element model, Transform of	
19	Numericals	CO3
20	Network functions poles and zeros	
21	Discussion on two port parameters with applications	
22	Two part parameters (Z, Y, ABCD, A'B'C'D', h, g)	
23	Interconnection of two port networks (Series, Parallel)	
24	Interconnection of two port networks (Cascade)	
25	Numericals based on two port network models	
26	Numericals based on two port network models	CO4
27	Polyphase circuit introduction	
28	Balanced to three phase connections	
29	Unbalanced three phase connections	
30	Concept of Neutral shift	
31	Complex power and Power factor improvement	
32	Numericals on three phase circuit	
33	Numericals on three phase circuit and Power factor improvement	

34	Fourier analysis of periodic waveforms	CO5
35	Frequency spectrum	
36	Power and energy of complex waveforms	
37	Frequency response plot	
38	Series and parallel resonance	
39	Numericals on Series and parallel resonance	
40	Numericals	

Shri G. S. Institute of Technology and Science
 Department of Applied Mathematics and Computational Science
 B.E. II YEAR (4YDC) BIO-MEDICAL ENGINEERING
 MA 29024 MATHEMATICS – III

Total No. of Units: 5

Total No. of Lectures:40

LECTURE PLAN

<u>S.No.</u>	<u>Topic</u>	<u>No. of Lectures</u>
<u>UNIT-I</u>		
1	Vector Spaces and Subspaces	02
2	Linear Independence, Basis and Dimension, Four Fundamental Subspaces	02
3	Orthogonal Vector and Subspaces	02
4	Orthogonal Bases and Gram-Schmidt	02
<u>UNIT-II</u>		
5	Difference operator, Shift operator	02
6	Newton's forward & backward interpolation, Lagrange's Interpolation	02
7	Numerical Differentiation and Integration	02
8	Difference equations	02
<u>UNIT-III</u>		
9	Formation of partial differential equations	02
10	Partial differential equation of first order and first degree, i.e., $Pp+Qq = R$	02
11	Linear homogeneous partial differential equation of nth order with constant coefficient	02
12	Separation of variables, Applications to simple problem	02
<u>UNIT-IV</u>		
13	Euler's formula, Dirichlet's condition, Function having point of discontinuity, change of intervals	02
14	Odd and Even functions, Half-Range series	01
15	Fourier integrals, Fourier sine and Cosine integrals, Complex form of Fourier integral	03
16	Fourier transform and its application	02
<u>UNIT-V</u>		
17	Laplace Transform (LT), Laplace Transform of elementary and periodic functions	02
18	Properties of Laplace Transform	02
19	Inverse Laplace transform, Convolution Theorem	02
20	Application of Laplace Transform to the solution of Ordinary Differential equations	02

Shri G.S. Institute of Technology & Science, Indore
Department of Biomedical Engineering

Semester A July - Dec 2023

Analog Electronics

Day	Topic
1.	Physical structure of semiconductor devices and Review of basic electronics
2.	Basic of Transistors, different modes of configuration their importance & applications
3.	Dc analysis of transistors, Basic single stage BJT amp Configurations and review of different circuits
4.	Introduction to FET
5.	Its basic operation ,advantages and applications
6.	Review of the hybrid transistor model and its purpose
7.	Introduction to hybrid $-\pi$ model and why it is necessary for AC analysis of transistor
8.	Frequency Analysis of different transistor circuits
9.	Mid band frequency analysis with numerical examples
10.	Low frequency Analysis with numerical examples
11.	High Frequency Analysis with numerical examples
12.	Introduction to Multistage Amplifiers
13.	RC Coupled , Current Mirrors, Darlington Amplifier
14.	Introduction And Classification of Power Amplifiers
15.	Class A Power amplifier ,circuit details & efficiency Calculations
16.	Class B Power amplifier ,circuit details & efficiency Calculations
17.	Introduction to Regulated power supplies, advantages & applications
18.	Series Voltage Regulator basic circuits, Shunt Voltage Regulators and some circuits
19.	Regulator IC, and Switching regulators
20.	Different protection Circuits for Regulated power supplies
21.	Introduction to tuned Amplifiers their comparison with normal power amplifiers
22.	Basic principal of tuned circuits , BW, Quality Factor and Resonance frequency calculations
23.	Single tuned Amplifier, Double tuned Amplifier circuit explanation
24.	Introduction to the concept of feedback and its different examples in various domains, Different feedback topologies basic structure
25.	Voltage Series Feedback circuit analysis
26.	Voltage Shunt Feedback circuit analysis, Current Shunt Feedback circuit analysis
27.	Current Series Feedback circuit analysis, Introduction to OPAMP its ideal characteristics,
28.	Explanation of different constituents circuits of OPAMP, Emitter Coupled Amplifier circuit explanation
29.	Different circuits of OPAMP ex. Summer, Differentiator, Integrator, Filters ,buffers
30.	Explanation of Instrumentation Amplifier, their applications, Some examples of use of Instrumentation Amplifiers

Department of Biomedical Engineering

B.Tech. Third Year (Semester-A)

Lecture Plan

Session: July-Dec 2023

Subject Code: BM 39251

Subject Nomenclature: Embedded Systems

Lecture No.	Date	Topic Covered	Unit
1.		Introduction of subject, its syllabus, related books and prerequisite's	1
2.		8085 Microprocessor: introduction, hardware model & programming model	1
3.		8085 Microprocessor: bus structure & instruction set classification	1
4.		8085 Microprocessor: architecture	1
5.		8085 Microprocessor: Pin diagram & Direct memory access	1
6.		8085 Microprocessor: Interrupts & Addressing modes	1
7.		Comparison of 8085 and 8086 microprocessors	1
8.		8051 Microcontroller: introduction & Microcontroller verses General-purpose microprocessor	2
9.		8051 Microcontroller: Architecture & Block diagram	2
10.		8051 Microcontroller: memory organization	2
11.		8051 Microcontroller: special function registers	2
12.		8051 Microcontroller: I/O Ports & Timers/Counters	2
13.		8051 Microcontroller: interrupts	2
14.		Programming in Embedded C	2
15.		Introduction to Embedded system architecture & Embedded system verses General computing system	3
16.		Embedded system: Classification & Major application areas	3
17.		Purpose of embedded system & CISC processor architecture	3
18.		RISC processor architecture	3
19.		Introduction of General purpose processor	3
20.		Introduction of Application specific processor	3
21.		Introduction of Single purpose processor & Basic embedded processor	3
22.		Memory management schemes in embedded system: Memory hierarchy	4
23.		Cache	4
24.		Virtual memory	4
25.		Memory write ability and Storage permanence	4
26.		Common memory types	4
27.		Composing memory	4
28.		Advanced RAM	4
29.		Introduction to communication protocols	5
30.		Serial bus communication protocols	5
31.		Serial bus communication protocols (Cont.)	5

32.		Parallel bus communication protocols	5
33.		Parallel bus communication protocols (Cont.)	5
34.		Wireless and mobile system protocols	5
35.		Wireless and mobile system protocols (Cont.)	5
36.		Doubt clearing session (Unit-One)	
37.		Doubt clearing session (Unit-Two)	
38.		Doubt clearing session (Unit-Three)	
39.		Doubt clearing session (Unit-Four)	
40.		Doubt clearing session (Unit-Five)	

PREPARED BY: Mr. Sunny Ganavdiya (Assistant Professor, BMED)

IP39021 INDUSTRIAL ENGINEERING & MANAGEMENT

Lecture Plan

UNIT 1- Methods Engineering

Lecture no.	Unit	Content
1	1	Introduction to Methods engineering
2	1	Introduction to Productivity
3	1	Productivity Numerical
4	1	Methods Study Introduction to Recording Techniques
5	1	Work Measurement Tools & Techniques
6	1	Work Place Design & Fundamental
7	1	Introduction to job Evaluation
8	1	Wage incentive schemes

UNIT-2

Operation Management

Lecture no.	Unit	Content
1	2	Introduction to PPC Functions
2	2	Tools and Techniques of PPC
3	2	Production System
4	2	Facilities Planning , Introduction Plant Layout
5	2	Material Handling Tools and techniques

UNIT-3

Organization and Management

Lecture no.	Unit	Content
1	3	Introduction to Management Functions, Principle of Management
2	3	Introduction to Organization & Types , principle
3	3	Span of control Delegation , centralization & Decentralization
4	3	Communication, Motivation & Theories
5	3	Leadership & Theories

UNIT-4

Quantitative Techniques for Decision Making

Lecture no.	Unit	Content
1	4	Introduction to Q T & Decision Making ,Operation Research
2	4	Linear Programming G.M
3	4	L.P. Simplex Method
4	4	Practice
5	4	Transportation Problem
6	4	Assignment Problem
7	4	Network Techniques CPM & PERT

UNIT-5

Quality -Control

Lecture no.	Unit	Content
1	5	Introduction to Quality Control
2	5	Quality Planning and Quality control operation
3	5	Control Charts
4	5	Process Capabilities & TQM
5	5	Acceptance Sampling O C curve ,Plans

Shri G.S. Institute of Technology and Science

BM-49261: Hospital Management and Information Systems

Lecture Plan (July 2023-Dec 2023)

Day	Topic
1	Introduction to subject and syllabus overview and its requirement B.M.
2	Introduction to Data structures
3	Basics of array data structures
4	Multidimensional array and implementation
5	Introduction to linked list
6	Link list operations and implementation
7	Stack type data structures
8	Operation in stack data structures and implementation
9	Queue and its types
10	Various operation in queue type data structures
11	Non linear data structures and its use
12	Tree, various definition in tree type
13	Different types of tree
14	Binary search tree and its implementation
15	Graphs and its types
16	Use of graph type DS
17	Introduction to DBMS and its use and application in Hospitals
18	Basic concepts of DBMS
19	DBMS architecture
20	Characteristics of DBMS
21	Components of DBMS
22	Relational DBMS and terminologies
23	Keys in DBMS and its types
24	DBMS Methodologies
25	DDL & DML and various operations
26	Relational Schema
27	ER-Diagram and various terminologies
28	ER diagram-examples practice
29	Normalization and its types
30	Basics of SQL
31	Various SQL queries
32	Various SQL queries (constraints)
33	Various SQL queries (joins)
34	Indexing and hashing in DBMS
35	HIS and its role in DBMS
36	Networking and its types
37	Application of various topologies in hospitals
38	Introduction to PACS
39	Different block of PACS
40	DICOM & ISO and requirement in medical domain.

SUBJECT TEACHER
BMED

Lesson Plan of Bioelectricity and Transducers

L1	UNIT I:-Introduction of subject
L2-3	Bioelectric signals & Biopotential Electrodes : Cell membrane– Nernst equation, Resting and action potential,
L4	Electrical activity of muscles.
L5-6	Electrical activity of the heart, and brain.
L7	Electrode theory and recording issues: Electrode-tissue interface,
L8	Metal-Electrolyte Interface, Electrode-Skin Interface .
L9	Motion Artifact, Electrode impedance,
L10	Electrical conductivity of Electrodes: jellies and creams, Body Surface Electrodes.
L11	Internal Electrodes: Needle and Wire Electrodes
L12	Micro-electrodes: Metal, Supported Metal Micropipette.
L13	UNIT II:-Transducer and Transduction Principles, Type of transducers.
L14 15	Displacement and Pressure Measurement : (with applications) Resistive: Potentiometers,
L16, 17	Strain Gauges and Bridge Circuits..
L18	Inductive: Variable Inductance and LVDT.
L19	Capacitive type.
L20	Piezoelectric Transducers
L21	Doubt solving session
L22	UNIT III:- different types of temperature transducers:Thermistor,
L23	Thermocouple,
L24	Resistive Temperature Detector, IC based Temperature.
L25 ,26	Measurement. different types of pressure transducers: Types of Diaphragms, Bellows, Bourdon Tubes
L27	QUIZ
L28,29	UNIT IV:-Blood gas and Acid–Base Physiology Potentiometric Sensors,.
L30	Ion Selective Electrodes,
L31	Amperometric Sensors,
L32,33	Clark Electrode with examples – pH, pO ₂ , pCO ₂ Electrodes
L34	Reference electrodes
L35	UNIT V:-Biosensors and optical sensor
L36	Two examples of each biosensors and Immunosensors.
L37	Optical Sensors,
L38	Photo detectors,
L39	Pyrometers, Optical Sources.
L40	DOUBT CLEARING

Department of Biomedical Engineering

B.E.III Year (Biomedical Engineering)

Lecture Plan

Subject Code: BM-39011/BM -39001 **Subject Name: Signals & Systems**

Lecture No.	Topic Covered (Unit No.)
1.	Introduction to signals
2.	Classification of Signals, discrete & continuous time
3.	Some basic Continuous time signals eg. Impulse, step exponential etc
4.	Basic Discrete time signals
5.	Explanation of Energy & Power Signals with some examples
6.	Defining a system ,different types of systems
7.	Properties of Systems
8.	Properties of system continued
9.	Numericals based on manipulating a signal, eg shifting reversal etc and some from system properties
10.	Problem solving
11.	LTI system introduction
12.	Continuous time LTI system its properties
13.	Convolution of LTI systems
14.	Describing LTI systems using Difference & differential

	equations
15.	Numerical session based on above 4 lectures
16.	Response of LTI system to complex exponential
17.	continued
18.	Different transforms applicable on signals
19.	Reason for different transformations their usefulness
20.	Introduction to Fourier Series
21.	Concept for Fourier Series
22.	Explanation of importance, condition of convergence of Fourier series
23.	Different forms of representation of Fourier Series
24.	How to calculate coefficients of Fourier Series
25.	Numerical on Fourier series
26.	Numerical on Fourier series
27.	Introduction to Fourier Transforms
28.	Condition of convergence
29.	Discrete Fourier transform
30.	Fourier Transform for periodic and aperiodic signals
31.	Numerical examples of Fourier transform
32.	Numerical examples of Fourier transform
33.	Laplace transform its origin and usefulness
34.	Properties of Laplace transforms

35.	Numerical Problems related to laplace transform
36.	Solving Differential equations using Laplace transform
37.	Basic concepts of Z transform
38.	Properties of Z Transform ., ROC conditions
39.	Numerical Problems based on z transform
40.	Problem solving session

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Semester A July - Dec 2023

Biological Control Systems

BM-49005

Day	Topic
1.	Unit I: Introduction to physiological control systems and its examples ;difference between physiological and engineering control systems
2.	Art of modelling physiological systems ,Distributed parameters versus lumped parameter models, Simple models of muscle stretch reflex action
3.	Across variable and through variables, Generalized system properties(viz ,Impedance, compliance and inertance)
4.	Generalized system properties (viz,Impedance, compliance and inertance) continued....
5.	Unit II: Respiratory Mechanism, Linear model of respiratory mechanics
6.	gas exchange and ventilation-perfusion relationship in the lung
7.	Chemical regulation of ventilation
8.	Unit III: cardiac cycle and pressure-volume loops
9.	cardiac pressure versus time graph
10.	The cardiac output curve
11.	The venous return curve
12.	Close loop analysis: Heart and systemic circulation combined
13.	Unit:IV : The Hodgkin-Huxley model
14.	Structure of Eye & Functioning
15.	Westheimer's saccadic eye model
16.	Westheimer's saccadic eye model continued
17.	Compartmental models
18.	Compartmental models continued
19.	Integrated cardiopulmonary model
20.	Integrated cardiopulmonary model continued
21.	UnitV: Basic problems in physiological system analysis
22.	Basic problems in physiological system analysis continued...
23.	Nonparametric and parametric identification:
24.	Numerical deconvolution
25.	Least square estimation
26.	Estimation using correlation functions
27.	Estimation in the frequency domain
28.	Optimization techniques
29.	Problems in parameter estimation
30.	TEST

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Department of Biomedical Engineering

Semester July to Dec 2023

Biomechanics

BM-49004

Day	Topic
1.	Introduction to subject and syllabus overview. Discussion on its need in Biomedical Engineering
2.	forces and stresses, free body Diagram
3.	Analysis of rigid bodies in equilibrium
4.	Types of joint. Biomechanical joint analogues
5.	Biomechanical analysis of elbow,.
6.	Biomechanical analysis of shoulder
7.	Biomechanical analysis of spinal column
8.	Biomechanical analysis of hip
9.	Biomechanical analysis of knee,
10.	Biomechanical analysis of ankle
11.	Bone structure & composition, Cortical and cancellous bones, Mechanical properties of bone
12.	Linear behavior of fibres, Linear behavior of fibres in 3 dimension
13.	Viscous behavior
14.	Viscoelastic properties, and Maxwell&Voight models .
15.	Cartilage, Tendon, Ligament
16.	Muscle; Material Properties: Cartilage, Tendon, Ligament, and Muscle
17.	Modelling of soft tissues: Cartilage, Tendon and Ligament
18.	Hills's muscle model.
19.	Introduction to fluid Mechanics
20.	Viscosity and capillary viscometer
21.	Rheological properties of blood
22.	laminar flow, Couette flow
23.	Hagen Poiseuille equation
24.	Turbulent flow
25.	Introduction about Gait. Gait in Spatial Domain
26.	Gait in temporal domanin
27.	Measurement of gait parameters
28.	Force platforms and motion analysis system,
29.	Applications of force platform
30.	Centre of gravity

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SemesterA July - Dec 2023

Biomedical Instrumentation 1

BM -39013

Day	Topic
1.	Introduction to Biomedical Instrumentation, Bio-potentials, Origin of Bio-potentials: Cellular Level Signals, Resting Membrane Potential
2.	Action Potential, General Block Diagram of Medical Instrumentation, General constraints in design of Medical Instruments, General consideration for signal conditioners.
3.	Basics of Potentiometer, Standard Electrode potential, Nernst Equation
4.	Junction Potential, Electrode-Electrolyte Interface, Polarization,
5.	Electrode-Electrolyte Interface, Electric Double Layer
6.	Polarization,
7.	Polarized and Non- Polarized Electrode, Ag/ Ag cl Electrode,
8.	Electrode Skin interface, Motion Artifacts
9.	Interesting facts about heart structure.
10.	Interesting facts about heart structure.
11.	Cardiac AP, ECG Basics, Abnormal ECG, 12 LEAD
12.	Cardiac dipole,GCT,WCT
13.	ECG Amplifier and Differential Amplifier
14.	Instrumentation Amplifier
15.	Block diagram of ECG, RL DRIVEN circuit
16.	Problems and interference in recording ECG, Filtering in ECG AND EMG
17.	Detailed Study of EMG
18.	EMG based Medical devices and EEG
19.	Temperature ,Heart rate and Respiratory rate measurements
20.	Pulse rate and Oximeter. Blood flow meter
21.	Cardiac Output Measurement
22.	BP Measurement ,Plethysmography
23.	Introduction to cardiac arrhythmia and related components
24.	Introduction to Analytical Instruments, Spectrophotometry and sources of error
25.	Flame photometer and Mas spectroscopy
26.	Bio cell counter and PH meter
27.	Chromatography
28.	Biosensors
29.	Blood gas Analysers and Glucose Sensors
30.	Overview of Pacemakers and Defibrillators. Electrical Safety

Shri G.S. Institute of Technology & Science, Indore
Department of Biomedical Engineering

Semester A July - Dec 2023

Human Anatomy and physiology

BM:29003

Day	Topic
1.	Unit I: Introduction of subject ,cell structure and its organelles
2.	Different types of cell, functions of each component in the cell membrane
3.	Transport across membrane
4.	Origin of cell membrane Potential, action potential and propagation
5.	Blood composition:-RBC, WBC, and platelets
6.	Unit II: Structure of heart, types of circulation
7.	Cardiac cycle, volume and pressure changes
8.	ECG ,Heart sounds
9.	Blood pressure ,Regulation of BP
10.	Respiratory system, Mechanics of respiration
11.	Regulation of respiration
12.	Volumes and capacities of lung
13.	Types of Hypoxia
14.	Unit III: Nerve cell anatomy, Human nervous system
15.	Human nervous system continued.... Functions of nervous system
16.	Skeletal system
17.	Structural and functional classification of joints
18.	Functions of Muscular System ,types of muscles
19.	Sliding filament model
20.	Neuromuscular junction
21.	Unit IV: Digestive system
22.	Description of GI tract and Accessory organs
23.	Excretory system, Function of urinary system, Structure of Nephron
24.	Physiology of urine formation, Micturition
25.	UNIT V: Human reproductive system Male and female
26.	Physiology and function of eyes
27.	Physiology and function of ear
28.	Endocrine glands and their hormones
29.	Maintenance of calcium homeostasis, Maintenance of glucose homeostasis
30.	TEST