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SHIVAJI UNIVERSITY KOLHAPUR

Revised Syllabus of

B.E. (Electronics Engineering Semester VII & VIII)

To be introduced from the academic year 2016-17

(i. e. from June 2016) onwards

Syllabus Structure

Class: B.E. (Electronics-I) **Sem: VII**

Sr. No.	Subject	Teaching Scheme (Hrs)				Examination Scheme (Hrs)				
		L	T	P	Total	Theory	Term Work	POE	OE	Total
1	Information Theory & Coding Techniques	3	1	0	4	100	25	-	-	125
2	Embedded System Design	4	0	2	6	100	25	50	-	175
3	Computer Network	4	0	2	6	100	25	-	50	175
4	Image Processing	4	0	2	6	100	25	-	-	125
5	Elective-I	3	1	0	4	100	25	-	-	125
6	Project-I	0	0	4	4	-	50	-	25	75
		18	**2**	**10**	**30**	**500**	**175**	**50**	**75**	**800**

Class: B.E. (Electronics-I) **Sem: VIII**

Sr. No.	Subject	Teaching Scheme (Hrs)				Examination Scheme (Hrs)				
		L	T	P	Total	Theory	Term Work	POE	OE	Total
1	Microwave Engineering	4	0	2	6	100	25	-	50	175
2	Wireless Communication Network	4	0	2	6	100	25	-	-	125
3	Power Electronics & Drives	4	0	2	6	100	25	50	-	175
4	Elective-II	3	1	0	4	100	25	-	-	125
5	Project-II	0	0	8	8	-	50	-	150	200
		15	**1**	**14**	**30**	**400**	**150**	**50**	**200**	**800**

Note: Practicals based on Sr. No.1 & 2

Elective-I	Elective-II
Optimization Techniques	System On Chip
Robotics & Artificial Intelligence	Advanced Image Processing
Satellite Communication	Computer Vision
Information Technology	Fuzzy & Neural Systems
Advanced Control System	Adaptive Signal Processing
Modern Power Electronics Drives	Automotive Electronics
Bio-Medical Instrumentation	High Performance Computer Network
Real Time Systems	Remote Sensing & GIS

<u>Important Note</u>: Before joining the B.E. (Electronics) Part –I i.e. Sem-VII students are expected to have completed Industrial training / Industrial visits / Industrial tours during T.E. Part-II.

A) Term Work Assessment Scheme

The term work of concerned subjects shall be assessed on the basis of Tutorials (if applicable), assignments, class tests and practical performance, attendance of the student.

B) Guidelines for Nature of Question Paper for B.E. (Electronics) Part-I & II.

1. There shall be total six questions in each paper, all being compulsory with internal options.
2. Each question paper shall consist of two sections (Section I & Section II).
3. Duration of each paper shall be of Three Hours Carrying Maximum of 100 Marks.

Shivaji University, Kolhapur.

B.E. (Electronics Engineering) Part- I
Semester –VII

INFORMATION THEORY AND CODING TECHNIQUES

Teaching Scheme	**Examination Scheme**
Lectures: 3 Hrs./week	Theory: 100 marks
Tutorial: 1 Hr./week	Term work: 25 marks

Course Objective:

1. To introduce information theory, the fundamentals of error control coding techniques and their applications.
2. To calculate the information content of a random variable from its probability distribution, Related to the joint, conditional, and marginal entropies of variables in terms of their probabilities.
3. To understand the types of channels, Channel and their Capacities to construct efficient codes for data on imperfect communication channels.
4. To understand the need & Objective of error control coding with encoding & decoding procedure to analyze error detecting & correcting capability of different codes.

Course Outcomes:

After successful completion of the course, students will be able to:

1. Students will be able to demonstrate the knowledge of analysis of basic blocks/ components of digital Communication system.
2. Students will be able to introduce to the basic notions of information and channel capacity.
3. Students can analyze the channel models mathematically.
4. Students will be able to design encoder and decoder for various coding techniques as per the need and Specification and able to analyze the error detecting and correcting capability of coding scheme.

SECTION-I

UNIT I: INFORMATION THEORY (5Hrs.)

Introduction, Concept of information: Unit, Properties, Entropy (Average Information) : Definition, Mathematical expression of Entropy, Entropy of Binary Source, Properties and Information Rate, Joint Entropy, Conditional entropy, relation between Joint & Conditional Entropies, Mutual Information: Average Mutual Information, Expression for Mutual information and properties, Relation between Mutual Information & Entropy

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UNIT II: CHANNAL CAPACITY AND CODING (5 Hrs.)

Channel Capacity, Redundancy and Efficiency of channel, Discrete memory less channel – Channel Matrix, Classification of channels: lossless Channel, Deterministic Channel, Noise free channel, Binary Symmetric Channel (BSC), Cascaded Channels and Binary Erasure

Channel (BEC), Calculation of channel capacity of all channels, Shannon's fundamental theorem, Capacity of a band limited Gaussian channel, Shannon-Hartley Theorem, Trade of between Bandwidth and Signal to Noise ratio. Entropy Coding: Shannon Fano Coding, Huffman's Coding, Coding Efficiency Calculations.

UNIT III: LINEAR BLOCK CODES (5 Hrs.)

Introduction: Error Control Coding: Need, Objectives & Approaches of Error Control Coding Classification, Error Detection and Error Correction Techniques, Linear Block Code: Structure, Terms Related to Block Code, Matrix Description of Linear Block Code, Generator and Parity Check Matrices, Hamming Codes, Encoder and Syndrome decoder for (n, k) block Code.

SECTION-II

UNIT IV: CYCLIC CODES (5 Hrs.)

Algebraic structure, Properties, Polynomial representation of Codeword, Generator Polynomial, Generation of Code Vector in Nonsystematic and Systematic form, Generator and Parity check matrices in Systematic form, Encoding of Cyclic Code, Syndrome decoding for Cyclic code, Hardware Representation of (n, k) cyclic code. Cyclic Redundancy Check Code

UNIT V: BCH & RS CODE (5 Hrs.)

Binary Field Arithmetic, BCH Code: Properties, Primitive element and primitive polynomial, Primitive BCH Code, Construction of Galois Field GF (2^m), Addition & Multiplication of GF (2^m), Properties of Galois Field GF (2^m), Minimal & Generator Polynomial for BCH Code, Decoding of BCH Code, Reed-Solomon code**:** Introduction, Error correction capability of RS code, RS code in Nonsystematic & Systematic form, Decoding of RS & Nonbinary BCH code.

UNIT VI: CONVOLUTIONAL CODE (5 Hrs.)

Introduction, Encoding of Convolutional Codes, Generation of Output code sequence : Time Domain Approach, Transform Domain Approach, Graphical Approach – Code Tree, State diagram and Trellis Diagram, Decoding of Codes : Maximum Likelihood Decoding -Viterbi Algorithm, Sequential Decoding . Structural & Distance properties of Convolutional codes,

TEXT BOOKS:

1. R.P Singh & S.D.Sapre , **"Communication Systems Analog & Digital"**, Mc-Graw Hill, IInd Edition, 2001.
2. Muralidhar Kulkarni, K.S. Shivprakasha **, "Information Theory & Coding"**, Wiley (India) Publication 2014
3. Arijit Saha,Surajit Mandal**, "Information Theory,Coding & Cryptography",** Pearson Education, Ist Edition, 2013.

4. Salvatore Gravano**, "Introduction to Error Control Codes",** Oxford University Press, Ist Edition, 2001

REFERENCE BOOKS:

1. Simon Haykin, **"Communication Systems ",** John Wiley & Sons, Inc, IVth Edition
2. Sam Shanmugam, "**Digital and Analog Communication Systems",** John Wiley Publication , 2005.
3. Martin Roden, **" Analog & Digital Communication Systems",** Prentice Hall India, IIIrd Edition.
4. Ranjan Bose, "**Information Theory Coding & Cryptography"**, Tata McGraw-Hill Publishing Company Ltd, IInd Edition 2008

TERM WORK: (Minimum 8 tutorials/ Assignments)

Minimum 8 tutorials / assignments based on above syllabus covering all units.

Note for Paper Setter:

Theory Examination Question Paper may contain 60% Numerical & 40 % subjective questions approximately.

Shivaji University, Kolhapur.
B.E. (Electronics Engineering) Part- I
Semester –VII

EMBEDDED SYSTEM DESIGN

Teaching Scheme		**Examination Scheme**	
Lectures	: 4 Hrs./week	Theory	:100 marks
Practical	: 2 Hr./week	Term work	: 25 marks
		POE	: 50 marks

Course Objectives:-

1. To learn and understand the characteristics of Embedded systems and its Architectures
2. To develop skill of ARM programming.
3. To introduce devices and buses used for embedded networking
4. To study key features of Microcontroller LPC214X
5. To develop skill of programming on chip resources of LPC214X
6. To understand the concept of real time operating systems.

Course Outcomes:-

After successful completion of the course, students will be able to:

1. Differentiate and apply important attributes of Embedded system
2. Use ARM programmers model to encode instructions so as to write meaningful assembly language program, compile, execute and debug it
3. Student should be able to design small applications of UART, I2C, SPI
4. Demonstrate scaling of execution speed using MAM and PLL, Saving device power
5. Student should be able to design small applications of GPIO, Timers, PWM, Real time clock, Watchdog using embedded C
6. Design Embedded system applications using RTOS

SECTION-I

UNIT I: INTRODUCTION (4 Hrs.)

Introduction to Embedded Systems, Classification of Embedded System, processor selection in Embedded System, Components of Embedded systems, Hardware and Software Systems Development tools: Assembler, cross compiler, Simulator, ICE, IDE.

UNIT II: INTRODUCTION TO ARM PROCESSOR (10 Hrs.)

ARM Core data flow model, registers, operating modes, pipeline, exceptions, interrupts & the vector table, ARM processor families ARM instruction set: conditional execution. Branch and Load/Store, software interrupt instruction, program status register instruction, Thumb instruction set introduction. Exception handling schemes

UNIT III: EMBEDDED NETWORKING (6 Hrs.)

Concept of data communication Bus: parallel and serial, Serial Bus communication protocols: RS232 standard, RS485, Serial Peripheral Interface (SPI), Inter Integrated Circuits (I2C). CAN Bus

SECTION-II

UNIT IV: ARM7TDMI-S MICROCONTROLLER LPC 2148 (4 Hrs.)

Features, LPC 214X Device Information, Block Diagram, Memory Maps, Memory Acceleration Module-Block Diagram & Operation, System Control Block(SCB)-Register Description, Fosc. Selection Algorithm, external interrupt logic, phase locked loop, power control, Reset- Block Diagram& RSI register.

UNIT V: LPC 2148ON CHIP RESOURCES (10 Hrs.)

Features, Block diagram and SFR planning: Pin connect block, GPIO, UART & Architecture, I2C, SPI, Timer, PWM, ADC & DAC, Real time clock, Watchdog timer, Vectored interrupt controller, features of on chip USB

UNIT VI: INTRODUCTION TO RTOS (6 Hrs.)

Architecture of kernel, task and task scheduler, ISR, Semaphores, Mutex, , Mailboxes and Pipes, Message Queues, Timers, Memory Management

TEXT BOOK:

1. Rajkamal, **"Embedded Systems :Architecture, Programming and Design",**TMH
2. Sloss, Symes, Wright, "**ARM system developers guide**", Morgan Kaufman (Elsevier) publication.
3. Dr. K.V.K.K.Prasad, **"Embedded/ Real time systems: Concepts, Design and Programming",** Dreamtech press

REFERENCE BOOKS:

1. William Hohel , "**ARM assembly language: fundamentals and Technique**"
2. ARM Architecture Reference Manual By: ARM
3. ARM7TDMI Technical Reference Manual Revision: r4p1 By: ARM
4. LPC214x USER MANUAL By Philips/ NXP semiconductor
5. An Embedded Software Primer. David E. Simon. Pearson Education
6. James k. Peckol, **"Embedded systems A contemporary Design tool",** Wiley

TERM WORK: (Minimum 8 Experiments)

Minimum Eight experiments on microcontroller (LPC2148) using assembly language & embedded C programming, the experiments on embedded C programming should demonstrate usage of on chip resources like GPIO, timers, counters, ADC/DAC, RTC, serial communication and off chip resources like LED, LCD, stepper motor etc.

Shivaji University, Kolhapur.
B.E. (Electronics Engineering) Part- I
Semester –VIII

COMPUTER NETWORK

Teaching Scheme	**Examination Scheme**
Lectures: 4 Hrs./week	Theory: 100 marks
Practical: 2 Hr./week	Term work: 25 marks
	OE: 50 marks

Course Objectives:

1. To provide students with an overview of the concepts and fundamentals of data communication and computer networks
2. Review the state of art in open research area such as LAN, MAN, WLAN & applications Computer Networking
3. Acquire the required skill to design simple computer networks.

Course Outcomes:

After completion of this Students will be able to:

1. State the evolution of Computer network, classifies different types of Computer Networks.
2. Design, implements, and analyzes simple computer networks.
3. Identify, formulate, and solve network engineering problems.
4. Understand basics of network security.

SECTION – I

UNIT I: INTRODUCTION TO COMPUTER NETWORK (6 Hrs.)

History and development of computer network, network application, network software and hardware components, reference models: layer details of OSI,TCP/IP models., Network topology, Transmission media and types, Network Devices: Network Connectors, Hubs, Switches, Routers, Bridges.

UNIT II: DATA LINK LAYER (6 Hrs.)

Design issues, sliding window protocols.HDLC – types of stations, modes of operation & frame formats, Random access Protocols, IEEE 802.3 and 802.11 frame formats.

UNIT III: NETWORK LAYER (8 Hrs.)

Design issues, Routing algorithms – shortest path, distance vector routing, link state routing. Routing protocols - RIP, OSPF, IP Addressing, Subnetting/supernetting, IPv4, IPv6 header format and basic address mode, DHCP, Congestion control, traffic shaping algorithms.

SECTION-II

UNIT IV: TRANSPORT LAYER (7Hrs.)

Transport layer-Process to process delivery, UDP, TCP, TCP services, TCP Segment, TCP Timers, Flow control, congestion control and Quality of Service.

UNIT V: APPLICATION LAYER (6Hrs)

DNS, HTTP, E-mail, SMTP, Telnet, FTP

UNIT VI: BASICS OF NETWORK SECURITY AND NETWORK ADMINISTRATION (7Hrs)

Network security: Introduction to Cryptography, Basics of Security attacks, secret key algorithm, public key algorithm, Message integrity and authentication, Digital signature.

TEXT / REFERENCE BOOKS:

1. Forouzan, , **"Data Communication and Networking"** IInd edition,Tata Mc-Graw Hill, Publication.
2. Tanenbaum, **"Computer Neworks",** IVth Edition, pearson Education.
3. Wayne Tomasi, **"Introduction to Data communications and Networking"** Pearson Education.
4. Forouzan, **"TCP/IP Protocol Suite",** IIIrd Edition Tata Mc-Graw Hill publication.

Term Work:
(Minimum ten experiments based on syllabus)

Shivaji University, Kolhapur.
B.E.(Electronics Engineering) Part- I
Semester- VII

IMAGE PROCESSING

Teaching Scheme:	**Examination Scheme:**
Lecture - 4 Hrs. / week	Theory - 100 marks
Practical-2 Hr. /week	Term work - 25 marks

Course Objectives:

1. To learn the fundamental concepts of Digital Image Processing and study basic image processing operations.
2. To cover the basic analytical methods which are widely used in image processing; linear and nonlinear filtering; and image transformations for coding and restoration.
3. To design and implement algorithms for advanced image analysis.
4. To expose students to current applications in the field of digital image processing.

Course Outcomes:

After successful completion of the course, students will be able to:

1. Apply principles and techniques of digital image processing in applications related to digital imaging system design and analysis.
2. Analyze and implement image processing algorithms.
3. Hands-on experience in using software tools for processing digital images.

SECTION-I

UNIT-I: **INTRODUCTION** **(5 Hrs.)**

Concept of digital image processing, steps in image processing, components of image processing system, Applications areas.

UNIT-II: DIGITAL IMAGE FUNDAMENTALS **(7 Hrs.)**

Image sensing and acquisition, Basic concept of sampling and quantization, representations of digital image, spatial and gray level resolution, zooming and shrinking of image, Basic relationship between pixels.

UNIT-III: **IMAGE ENHANCEMENT IN SPATIAL DOMAIN** **(8 Hrs.)**

Basic gray level transformations, image negation, log transformations, power law transformations, piece wise linear transformations, histogram processing, histogram equalization, histogram matching, Image enhancement using arithmetic and logical operations.

SECTION-II

UNIT-IV: SPATIAL FILTERS (7 Hrs.)

Smoothing spatial filters: smoothing linear, order statistic filters, sharpening spatial filters: Use of second derivatives for enhancement, Use of first derivatives for enhancement.

UNIT-V: EDGE DETECTION AND SEGMENTATION (6 Hrs.)

Detection of discontinuities: point, line and edge detection, Thresholding, Region based segmentation.

UNIT-VI: COLOR IMAGE PROCESSING (7 Hrs.)

Color fundamentals, color models, RGB color model, CMY color model, HSI color model, pseudocolor image processing: intensity slicing, gray level to color transformation.

TEXT BOOK:

1. Rafael C. Gonzalez and Richard E. Woods, **"Digital image processing**", (Pearson Education publication)

REFERENCE BOOKS:

1) S. Sridhar, **"Digital Image Processing",** (Oxford)
2) Malay K. Pakhira, **"Digital Image Processing and Pattern Recognition",** (PHI)

List of Experiments: (Minimum 10 Experiments based on following topics)

1) Gray level Transformation
2) Histogram processing and equalization
3) Arithmetic and Logical operation
4) Smoothing filters
5) Sharpening filter
6) Edge Detection
7) Image segmentation

Shivaji University, Kolhapur.
B.E.(Electronics Engineering) Part- I
Elective – I

OPTIMIZATION TECHNIQUES

Teaching Scheme:	**Examination Scheme:**
Lecture - 3 Hrs. / week	Paper - 100 marks
Tutorial-1 Hr. /week	Term work - 25 marks

Course Objectives:

1. Students should understand the concept of Optimization Techniques.
2. Students should understand the concept of linear programming, Nonlinear programming, Geometric programming, Dynamic programming.
3. Students should understand the concept of Genetic Algorithms
4. Students should understand single-dimensional and Multi-dimensional Search Methods.

Course Outcomes:

After successful completion of the course, students will be able to:

1. Students should be able to apply Optimization Techniques to Engineering Problems.
2. Students should be able to implement Linear/Nonlinear, Dynamic, Geometric programming.
3. Students should be able to implement the concept of Genetic Algorithms
4. Students should be able to apply single-dimensional and Multi-dimensional Search Methods in constrained and Unconstrained problem environments

SECTION-I

UNIT I: INTRODUCTION (5 Hrs.)

Historical development, Application to Engineering Problems, Statement of Optimization problems, Classification of Optimization, Multivariable optimization with and without constraints, Multivariable optimization with and without constraints.

UNIT II: LINEAR PROGRAMMING (6 Hrs.)

Formulation, Geometry, Graphical solution, standard and matrix form of linear programming problems, Simplex programming and its flowchart, revised simplex algorithm, Two-phase Simplex method ,Degeneracy Duality in linear programming: Definition of Dual Problem, General Rules for converting any Primal into its Dual Simplex method and its flow chart. Decomposition principle, Transportation problem

UNIT III: NONLINEAR PROGRAMMING (5 Hrs.)

Unimodal functions, single dimensional minimization methods, Exhaustive search, Fibonnaci method, Quadrature interpolation, Cubic interpolation , Direct root method, Random search method , Steepest decent method.

SECTION- II

UNIT IV: NONLINEAR PROGRAMMING (4 Hrs.)

Convex sets and convex functions, Kuhn-Tucker conditions.convex optimization, Lagrange multipliers Convex quadratic programming: Wolfe'sand Pivot complementary algorithms. Constrained Multidimensional Search Methods**:** Rosen's Gradient projection method.

UNIT V: GEOMETRIC PROGRAMMING (7 Hrs.)

Problems with positive coefficients up to one degree ofdifficulty, Generalized method for the positive and negative coefficients.Dynamic programming: Discrete and continuous dynamic programming (simple illustrations). Multistage decision problems, computation procedure and case Studies

UNIT VI: GENETIC ALGORITHMS (5 Hrs.)

Introduction, Representation of design variables, Representation of objective function and constraints, Genetic operators, Application procedure and case studies.

TEXT BOOKS

1. S.S Rao , **"Optimization: Theory and Practices"**, New Age Int. (P) Ltd. Publishers, New Delhi
2. A. D. Belegundu, Tirupati R. Chandrupatla , **"Optimization concepts & application in Engg."**, Pearson Education

Shivaji University, Kolhapur.
B.E.(Electronics Engineering) Part- I
Elective – I

ROBOTICS AND ARTIFICIAL INTELLIGENCE

Teaching Scheme	**Examination Scheme**
Lecture – 3 Hrs. / week	Theory - 100 marks
Tutorial-1 Hr. /week	Term work - 25 marks

SECTION-I

UNIT I: FUNDAMENTALS OF ROBOT (4 Hrs.)

Robot – Definition – Robot Anatomy – Co-ordinate Systems, Work Envelope, types and classification –Specifications – Pitch, Yaw, Roll, Joint Notations, Speed of Motion, Pay Load – Robot Parts and Functions – Need for Robots – Different Applications

UNIT II: SENSORS (7 Hrs.)

Requirements of a sensor, Principles and Applications of the following types of sensors – Position of sensors (Piezo Electric Sensor, LVDT, Resolvers, Optical Encoders, Pneumatic Position Sensors), Range Sensors (Triangulation Principle, Structured, Lighting Approach, Time of Flight Range Finders, Laser Range Meters), Proximity Sensors (Inductive, Hall Effect, Capacitive, Ultrasonic and Optical Proximity Sensors), Touch Sensors, (Binary Sensors, Analog Sensors), Wrist Sensors, Compliance Sensors, Slip Sensors. Vision sensors

UNIT III: ELECTRIC DRIVES FOR ROBOT CONTROL (4 Hrs.)

Introduction, General aspects of robot control , Types, DC electric motor, AC electric motor, stepper motors, half step mode operation, micro step mode. Types of stepper motors, Direct drive actuator, Computer controlled servo system for robot applications

SECTION-II

UNIT IV: INTRODUCTION TO AI AND PROBLEM SOLVING (5 Hrs.)

History, state of the art, Need for AI in Robotics. Thinking and acting humanly, intelligent agents, structure of agents. PROBLEM SOLVING: Solving problems by searching – Informed search and exploration–Constraint satisfaction problems–Adversarial search, knowledge and reasoning–knowledge representation – first order logic.

UNIT V: KNOWLEDGE AND REASONING: (5 Hrs.)

A knowledge Based Agent, WUMPUS WORLD Environment, Propositional Logic, First Order Predicate Logic Syntax and Semantics, PROLOG, Unification, Forward and backward chaining, Resolution., General Ontology.

UNIT VI: PLANNING (5 Hrs.)

A Simple Planning Agent, Planning in Situation calculus, Basic representation for planning, A Partial Order Planning example, A partial order planning algorithm, Knowledge engineering for planning, Blocks world Shakyís world, Metric Path Planning

TEXT BOOKS :

1. M.P.Groover, **"Industrial Robotics – Technology, Programming and Applications",** McGraw-Hill, 2001
2. Klafter R.D., Chmielewski T.A and Negin M., **"Robotic Engineering - An Integrated Approach"**, Prentice Hall, 2003.
3. Robert J. Schilling, **"Fundamentals of Robotics: Analysis and Control",** PHI Publication
4. Stuart Russell, Peter Norvig, **"Artificial Intelligence: A modern Approach",** Pearson Education, India 2003.
5. Saeed B Niku, **"Introduction to Robotics Analysis Control and Applications",** Wiley

REFERENCE BOOKS:

1. Robin R Murphy, "**Introduction to AI Robotics",** PHI Publication.
2. Negnevitsky, M, **"Artificial Intelligence: A guide to Intelligent Systems",** Harlow: Addison Wesley, 2002
3. David Jefferis, **"Artificial Intelligence: Robotics and Machine Evolution",** Crabtree Publishing Company, 1992.
4. Dan W. Paterson, **"Introduction to Artificial Intelligence and Expert System",** PHI.
5. Elaine Rich, Kevin Knight, **"Artificial Intelligence"**, 2nd Edition, Tata MeGraw-Hill.
6. Craig J.J., **"Introduction to Robotics Mechanics and Control"**, Pearson Education, 2008.
7. Deb S.R., **"Robotics Technology and Flexible Automation",** Tata Mc Graw Hill Book Co., 1994.
8. Francis N-Nagy Andras Siegler, **"Engineering foundation of Robotics"**, Prentice Hall Inc., 1987.

Shivaji University, Kolhapur.
B.E.(Electronics Engineering) Part- I
Elective – I

SATELLITE COMMUNICATION

Teaching Scheme	**Examination Scheme**
Lectures: 3 Hrs. /week	Theory: 100 marks
Tutorial: 1 Hr. /week	Term work: 25 marks

Course Objectives:
The course aims to:

1. To learn the basic concepts of satellite communication.
2. To explain the orbital mechanics, launch vehicles and satellite subsystems.
3. To learn the satellite link design.
4. To understand V-SAT system.
5. To understand satellite navigation and GPS.

Course Outcomes:
After successful completion of this course, the student will be able to:

1. Students will able to understand basic concepts of satellite communication.
2. Students will able to understand the orbital mechanics, launch vehicles and satellite subsystems.
3. Ability to calculate satellite link budget.
4. Students will able to describe multiple access system.
5. Student will able to understand satellite navigation and GPS.

SECTION-I

UNIT I: INTRODUCTION (5 Hrs.)

Origin of Satellite Communications, Historical Back-ground, Basic Concepts of Satellite Communications, Orbit & Its types, Applications, Future Trends of Satellite Communications.

UNIT II: ORBITAL MECHANICS AND LAUNCHERS (5 Hrs.)

Orbital Mechanics, Look Angle determination, Orbital perturbations, Orbit determination, launches and launch vehicles(PSLV,GSLV), Orbital effects in communication systems performance.

UNIT III: SATELLITE SYSTEMS (5 Hrs.)

Attitude and orbit control system, telemetry, tracking, Command and monitoring, power systems, communication subsystems, Satellite antenna Equipment reliability and Space qualification.

SECTION-II

UNIT IV: SATELLITE LINK DESIGN (5 Hrs.)

Basic transmission theory, system noise temperature and G/T ratio, Design of down links, up link design, Design of satellite links for specified C/N, System design example.

UNIT V: VSAT SYSTEMS (5 Hrs)

Overview of VSAT Systems, Network Architectures, Access Control Protocols, Basic Techniques, Multiple Access Selection, Signal Formats, Modulation, Coding, and Interference Issues, Calculation of Link Margins for a VSAT Star Network, System Design Procedure: Description of System, System Parameters, Preliminary Calculations, Link C/N Ratios, Inbound Links, Outbound Links, System Analysis

UNIT VI: SATELLITE NAVIAGATION AND THE GLOBAL POSITIONING SYSTEM (5 Hrs.)

Radio and Satellite Navigation, GPS Position Location principles, GPS Receivers and codes, Satellite signal acquisition, GPS Navigation Message, GPS signal levels, GPS receiver operation, GPS C/A code accuracy, Differential GPS.

TEXT BOOKS:

1. Timothy Pratt, Charles Bostian and Jeremy Allnutt, **" Satellite Communications",** Wiley publications, IIndEdition, 2003.
2. Wilbur L. Pritchard, Robert A Nelson and Henri G.Suyderhoud, **"Satellite Communications Engineering"**, Pearson Publications, IIndEdition, 2003.
3. A.K.Maini, "**Satellite Communications",** Wiley India

REFERENCES BOOKS:

1. M. Richharia, **"Satellite Communications : Design Principles"**, BS Publications, IIndEdition, 2003
2. D.C Agarwal, **"Satellite Communication", Khanna Publications**, Vth Edition.
3. K.N. Raja Rao, **"Fundamentals of Satellite Communications"**, PHI, 2004
4. Dennis Roddy, **"Satellite Communications"**, McGraw Hill, IInd Edition, 1996

TERM WORK: (Minimum 8 tutorials)

Minimum 8 tutorials / assignments based on above syllabus covering all units.

Shivaji University, Kolhapur.
B.E.(Electronics Engineering) Part-I
Elective – I

INFORMATION TECHNOLOGY

Teaching Scheme	**Examination Scheme**
Lecture: 3 Hrs. / week	Paper: 100 marks
Tutorial: 1 Hr. /week	Term work: 25 marks

Course Objectives:

1. Student will be able to understand basic Information Technology concepts and its strategies
2. Student will be able to understand and use E-commerce system.
3. Student will be able to develop an application using Multimedia techniques.
4. Student will be able to apply the Basic knowledge of Database systems in Real Scenario.

Course outcomes:
After successful completion of this course, the student will be able to:

1. Student will be able to Analyze & Processes Data**.**
2. Analyze the global E-business environment
3. Student will differentiate text, image, video &audio in multimedia applications
4. Student will Analyze traditional file system and DBMS and able to handle different database languages

SECTION-I

UNIT I. INTRODUCTION (5 Hrs.)

Concepts and management, Definition, Classification, Transactional and functional Processing, Information infrastructure and Architecture, Managing Information Resources.

UNIT II. STRATEGIC INFORMATION SYSTEM (5 Hrs.)

Strategic Advantage, Porter's Competitive Forces Model and strategies, Porter's value chain Model, Inter organizational Strategic Information System, Framework for global Competition, Strategic Information System-Examples and Analysis

UNIT III. E-COMMERCE (5 Hrs.)

Overview of E-Business and E-Commerce, E-Commerce Mechanism, Business to Consumer Applications, B2B Applications, Market Research and Online Advertising, E-Commerce support services.

SECTION-II

UNIT IV: SYSTEM DEVELOPMENT (5 Hrs.)

Life Cycle, System development outside the IS Department, Building E-Business applications Important System Development issues, Protecting Information Resources-From national to organizational efforts, The CIO in Managing the IS Department.

UNIT V: MULTIMEDIA (4 Hrs.)

Introduction to multimedia, Software tools-, Text, Sound, Image, Animation, Video

UNIT VI: DATABASE MANAGEMENT SYSTEMS (6 Hrs.)

Database System Applications, Data Definition Language(DDL),Data Manipulation Language(DML), Database users and administrators, Entity relationship model-Basic concept, keys, Design Issues, E-R Diagrams, Structure of relational databases, Structured Query Language(SQL)- Background, Basic Structure

TEXT BOOKS:

1. Turban, Mclean,Wetherbe , **"Information Technology for management",** (Wiley publications) (for Unit 1,2,3,4)
2. **"Multimedia :Making It Work",** (8^{th} Edition),Tata Mc Hill Publications (for 5^{th} unit)
3. Henry F. Korth, Abraham Silberschatz, Sudarshan , **"Database System Concept"** (McGraw Hill Inc.) Fourth Edition onwards,(7^{th} Edition), (For 6^{th}Unit)

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B.E.(Electronics Engineering) Part-I
Elective – I

ADVANCE CONTROL SYSTEMS

Teaching Scheme	**Examination Scheme**
Lectures: 3 Hrs. /week	Theory: 100 marks
Tutorial: 1 Hr./week	Term work : 25 marks

Course Objectives:

1. To study analog and digital control systems
2. To Understand the basics of signal processing in digital control
3. To study the stability analysis of linear and non linear systems

Course Outcomes:
After successful completion of this course, the student will be able to:

1. At the end of course students will be able to apply signal processing in digital control system
2. At the end of course students will be able to apply the modeling concepts
3. Students will be equipped with stability analysis of linear and non linear systems.

SECTION – I

UNIT I: INTRODUCTION (5 Hrs.)

Control system analysis and design by conventional methods: overview Root locus analysis of control system, system with transport lag, Root contour plots, Bode diagram, Polar plots, Nyquist stability criterion, Stability analysis, experimental determination of transfer functions.

UNIT II : SIGNAL PROCESSING IN DIGITAL CONTROL (5 Hrs.)

Why Use Digital Control, Configuration of the Basic Digital Control Scheme, Principles of Signal Conversion, Basic Discrete – Time signals, Time – Domain models for discrete – time systems, Transfer function models, Stability on the Z-plane and the Jury stability criterion, Sampling as Impulse Modulation, Sampled Spectra and Aliasing, Filtering Practical Aspects of the choice of sampling rate, Principle of discretization, The Routh stability criterion on their- plane.

UNIT III: DIGITAL CONTROL DEVICES AND SYSTEMS (5 Hrs.)

Introduction, z-Domain description of sampled continuous – time plants, z-Domain description of systems with Dead – Time, Implementation of Digital Controllers, Digital temperature control system, Digital position control system, Stepping motors and their control.

SECTION – II

UNIT IV: CONTROL SYSTEM ANALYSIS USING STATE VARIABLE METHODS (6 Hrs.)

Introduction, Vectors and Matrices, State variable representation, Conversion of state variable models, to Transfer functions, Conversion of Transfer functions to canonical state Variable models, Eigen values and Eigenvectors, Concepts of controllability and observability, Equivalence between transfer function and state variable representations, multivariable systems.

UNIT V: STATE VARIABLE ANALYSIS OF DIGITAL CONTROL SYSTEMS (5 Hrs.)

Introduction, State descriptions of Digital Processors, State Description of sampled continuous time plants, State Description of systems with Dead- Time, Solution of State difference equations, Controllability and observability, Multivariable systems.

UNIT VI: POLE-PLACEMENT DESIGN AND STATE OBSERVERS (4 Hrs.)

Introduction, Stability improvement by state feedback, Necessary and sufficient conditions of arbitrary pole-placement, State regulator design, Design of State Observers, Compensator Design by the separation principle.

TEXT / REFERENCE BOOK:

1. Katsuhiko Ogata, **"Modern Control Engineering",** PHI Publication.
2. Frohr, OrHenburger, **"Introduction to Electronics Control Engineering",** Wiley Eastern publication
3. M. Gopal, **"Digital Control Engineering",** PHI Publication.
4. M. Gopal, **"Digital Control And State Variable Methods",** Tata McGraw Hill Publication
5. Kuo B.C., **"Digital Control system"**, Wiley Eastern publication, II nd Edition
6. Ogata K, **"Discrete Time Control Systems",** PHI Publication.

TERM WORK: (Minimum 8 tutorials)

Minimum 8 tutorials / assignments based on above syllabus covering all units

Shivaji University, Kolhapur.
B.E.(Electronics Engineering) Part-I
Elective – I

MODERN POWER ELECTRONICS DEVICES

Teaching Scheme	**Examination Scheme**
Lecture: 3 Hrs./per week	Theory: 100 Marks
Tutorial: 1 Hr./per week	Term work: 25 Marks

SECTION-I

UNIT I: INTRODUCTION (5 Hrs.)

Power Switching device overview-Attributes of an ideal switch, application requirements, circuit symbols; handling capacity-(SOA); Device selection strategy- On state & switches losses-EMI due to switching-Power diodes-Types forward & reverse characteristics , switching characteristics-rating

UNIT II: CURRENT CONTROLLED DEVICES (5 Hrs.)

BJT's – Construction, statics characteristics, switching characteristics; Negative temperature coefficient & secondary breakdown; Power Darlington

UNIT III: GATE TURNOFF THYRISTOR (GTO) (5 Hrs.)

Basic structure and operation, GTO switching characteristics, GTO turn-on transient, GTO turn -off transient, minimum on and off state times, gate drive requirement**s,** maximum controllable anode current, overcurrent protection of GTO'S, modeling and simulation of GTO'S.

SECTION-II

UNIT IV: POWER MOSFET'S (5 Hrs.)

Basic structure, V-I characteristics, turn-on process, on state operation, turn-off process, switching characteristics, resistive switching specifications, clamped inductive switching specifications - turn-on transient and di/dt limitations, turn-off transient, turn off time, switching losses.

UNIT V: INSULATED GATE BIPOLAR TRANSISTORS (IGBT'S) (5 Hrs.)

Basic structure and operation, latch up IGBT, switching characteristics, resistive switching specifications, clamped inductive switching specifications - IGBT turn-on transient, IGBT turn off transient

UNIT VI: NEW DEVICES (5 Hrs.)

MOS gated thyristors, MOS controlled thyristors or MOS GTO'S, base resistance controlled thyristors, emitter switched thyristor, GaN and SiC devices.

TEXT/ REFERENCE BOOKS:

1. Ned Mohan, Tore M. Undeland, William P. Robbins, **"Power Electronics Converters, Applications, and Design",** 3rd Edition. Wiley India Pvt. Ltd, 2011.
2. Khanchandani, **"Power electronics"**
3. G. Massobrio, P. Antognetti, **"Semiconductor Device Modeling with Spice",** McGraw-Hill, 2nd Edition, 2010.
4. B. JayantBaliga, **"Power Semiconductor Devices",** 1st Edition, International Thompson Computer Press, 1995.
5. V. Benda, J. Gowar, and D. A. Grant, **"Discrete and Integrated Power Semiconductor Devices: Theory and Applications",** John Wiley & Sons, 1999.

Shivaji University, Kolhapur.
B.E.(Electronics Engineering) Part-I
Elective – I

BIOMEDICAL INSTRUMENTATION

Teaching Scheme	**Examination Scheme**
Lectures: 3 Hrs. /week	Theory: 100 marks
Tutorial: 1 Hr. /week	Term work: 25 marks

Course Objectives:-

1. To give knowledge of the principle of operation and design of biomedical Instruments.
2. To render a broad and modern account of biomedical instruments.
3. To give the introductory idea about human physiology system
4. To apply the principles of electronic circuits and devices to the use and design of instrumentation in the biomedical area.
5. To find out different faults in Biomedical Instruments and solution to correct them and able to use the appropriate engineering references and resources, including industry manuals, needed to find the best solutions.
6. To develop awareness about Multimedia applications in the field of Biomedical Engg.

Course Outcomes:
After successful completion of this course, the student will be able to:

1. Students will have a clear knowledge about human physiology system.
2. They will have knowledge of the principle operation and design and the background knowledge of biomedical instruments and specific applications of biomedical engineering
3. They will get the information handle Clinical instruments for their respective use in social life

SECTION-I

UNIT I: ANATOMY AND PHYSIOLOGY (4 Hrs.)

Elementary ideas of cell structure, heart and circulatory system, control nervous system, Musclo-skeletal system, Respiratory system Body temperature and reproduction system.

UNIT II: CLASSIFICATION OF BIOMEDICALEQUIPMENT (4 Hrs.)

Diagnostic, therapeutic and clinical laboratory equipment

UNIT III: BIOELECTRIC SIGNALS AND THEIR RECORDING (7 Hrs.)

Bioelectric signals (ECG, EMG, EEG, EOG & ERG) and their characteristics, Bio-electrodes, electrodes tissue interface, contact impedance, effects of high contact impedance, types of electrodes, electrodes for ECG, EEG and EMG.

SECTION-II

UNIT IV: TRANSDUCERS FOR BIOMEDICAL APPLICATION (5 Hrs.)

Resistive transducers - Muscle force and Stress (Strain gauge), spirometry (Potentiont) , humidity, (Gamstrers), Respiration (Thermistor) Inductive Transducers - Flow measurements, muscle movement (LVDT) Capacitive Transducers - Heart sound measurement, Pulse pick up Photoelectric Transducers - Pulse transducers, Blood pressure, oxygen Analyses ,Piezoelectric Transducers - Pulse pickup, ultrasonic blood flowmeter ,Chemical Transducer - Ag-Agfallas (Electrodes, PH electrode

UNIT V: BIO-ELECTRIC SIGNAL RECORDING MACHINES (8Hrs.)

Physiological pre-amplifier and specialized amplifiers, ECG lead systems details of ECG, EMG, and EEG machines ,Heart rate measurement pulse rate measurement, respiration, rate measurement, blood pressure measurement, microprocessor applications in patient monitoring, Defibrillator , Basic X-Ray components and circuits, types of X-ray machines e.g. general purpose, dental image intensifier system, table shooting and maintenance of X-Ray machine

UNIT VI: SAFETY ASPECTS OF MEDICAL (2 Hrs.)

Gross current, Micro Current shock, safety standards rays and considerations, safety testing instruments, biological effects of X-rays and precautions

TEXT/ REFERENCE BOOKS:

1. John. G. Webster, **"Medical Instrumentation",** John Wiley publication.
2. Goddes & Baker, **"Principles of Applied Biomedical Instrumentation",** John Wiley publication.
3. Carr & Brown, **"Biomedical Instrumentation & Measurement"**, Pearson Education
4. Cromwell, **"Biomedical Instrument"**, Prentice Hall of India, New Delhi
5. R.S. Khandpur, **" Hand book of Medical Instruments",** TMH, New Delhi
6. Sanjay Guha, **"Medical Electronics and Instrumentation"**, University press Publication
7. Edwand J. Bukstein, **"Introduction to Biomedical Electronics",** sane and Co. Inc. USA

TERM WORK: (Minimum 8 tutorials)

Minimum 8 tutorials / assignments based on above syllabus covering all units.

Shivaji University, Kolhapur.
B.E. (Electronics Engineering) Part-I
(Elective- I)

REAL TIME SYSTEMS

Teaching Scheme	**Examination Scheme**
Lectures: 3 Hrs./week	Theory: 100 marks
Tutorial: 1 Hr./week	Term work: 25 marks

Course Objectives:-

1. To study multi tasking techniques in real time systems.
2. To get knowledge of characteristics of real and non real time systems.
3. To get knowledge of different approaches to scheduling real time systems.
4. To analyze the resource requirement and the affects of resource contention.

Course Outcomes:
After successful completion of this course, the student will be able to:

1. Identify multi-tasking techniques in real time systems
2. Evaluate the performance of soft and hard real time systems
3. Analyze multi task scheduling algorithms for periodic, a periodic and sporadic tasks.
4. Analyze resource control and resource access for real time systems.

SECTION-I

UNIT I: INTRODUCTION TO REAL TIME APPLICATIONS (5 Hrs.)

Digital control systems, High level control systems, Signal processing, Real time databases, Multimedia applications ,Jobs and Processors, Release Times, Deadlines and Timing constraints, Hard and soft timing constraints, hard real time systems and soft real time systems.

UNIT II: REFERENCE MODEL FOR REAL TIME SYSTEMS (5 Hrs.)

Processors and recourses, temporal parameters of real-time workload, Periodic task model, Precedence constraints and data dependency, Temporal dependency, AND/OR Precedence constraints, conditional branches, pipeline relationship, Functional parameters, Resource parameters of jobs and parameters of resources, Scheduling hierarchy.

UNIT III: REAL TIME SCHEDULING APPROACHES (5 Hrs.)

Clock-driven approach, weighted round robin approach, Priority driven approach, dynamic versus static systems, Effective release and times and deadlines, Optimality of EDF and LST algorithms, Challenges in validating timing constraints in priority driven systems, Offline versus online scheduling.

SECTION-II

UNIT IV: CLOCK DRIVEN SCHEDULING (5Hrs.)

static, timer-driven scheduler, general structure of cyclic schedules, cyclic executives, improving the average response time of aperiodic jobs, scheduling sporadic jobs, practical considerations and generalizations, pros and cons of clock-driven scheduling,

UNIT V: PRIORITY DRIVEN SCHEDULING (5 Hrs.)

fixed-priority versus dynamic-priority algorithms, maximum schedulable utilization, optimality of the rm and dm algorithms, sufficient schedulability conditions for the rm and dm algorithms, scheduling aperiodic and sporadic jobs in priority driven systems, deferrable servers, sporadic servers, constant utilization, total bandwidth, and weighted fair-queueing servers, scheduling of sporadic jobs, a two-level scheme for integrated scheduling,

UNIT VI: RESOURCES AND RESOURCE ACCESS CONTROL (5 Hrs.)

Assumptions on resources and their usage, effects of resource contention and resource access control, non-preemptive critical sections, basic priority-inheritance protocol, basic priority-ceiling protocol, stack-based, priority-ceiling (ceiling-priority) protocol, use of priority-ceiling protocol in dynamic-priority systems, preemption-ceiling protocol, controlling accesses to multiple-unit resources, controlling concurrent accesses to data objects.

TEXT BOOKS:

1. Jane Liu, **"Real-Time Systems",** Prentice Hall
2. Philip A. Laplante, **"Real Time System Design and Analysis",** PHI

REFERENCE BOOKS:

1. Krishna. C. M., Kang. G, Shin, **"Real Time Systems",** McGraw Hill
2. Herma K, **"Real Time Systems – Design for Distributed Embedded Applications"**, Kluwer Academic,

TERM WORK: (Minimum 8 tutorials)

Minimum 8 tutorials / assignments based on above syllabus covering all units.

Shivaji University, Kolhapur.
B.E. (Electronics Engineering) Part-I
PROJECT-I

Teaching Scheme	**Examination Scheme**
Practical: 4 hours/week	Oral Examination: 25 marks
	Term work: 50 marks

1. The project work is to be carried out in two semesters of B.E. (Electronics) Part – I & Part– II.
2. The practical batch for project shall be of maximum 16 students. The batch will be preferably divided into groups, each consisting of not more than 4 students.
3. In semester – I, the group will select an innovative project with the approval of the guide and submit the synopsis of project compulsory in the month of July.
4. The group is expected to complete literature survey, detail system design, layout etc. in semester – I, as a part of term work.
5. In addition all students of project group will deliver a seminar on latest topics related to proposed project and submit the joint seminar report consisting Literature survey, basic proposed project work and the size of the report should be at least 30 pages.

Note: The group should compulsorily maintain a logbook of progress of the project activities. The logbook should have entries related to the work done, problems faced, solution evolved etc. duly signed by internal guide.

Shivaji University, Kolhapur.
B.E. (Electronics Engineering) Part-II
Semester- VIII

MICROWAVE ENGINEERING

Teaching Scheme	**Examination Scheme**
Lectures: 4 Hrs./week	Theory: 100 marks
Practical: 2 Hr./week	Term work: 25 marks
	OE: 50 marks

Course Objectives:

1. Understand the basic concept of microwave engineering, and apply EM wave theory to understand the nature of microwave signal
2. Understand the theoretical and experimental design and analysis of microwave tube devices and circuits
3. Learn the basics of Monolithic Microwave Integrated Circuits (MMIC).
4. Study Microwave semiconductor devices & applications
5. To understand various microwave measurement techniques
6. Expose students to different microwave antennas.

Course Outcomes:
After successful completion of this course, the student will be able to:

1. Analyse the microwave waveguides and passive circuit components.
2. Identify and differentiate the state of art in microwave tubes and their uses in real life
3. Indentify materials used in MMIC and microwave hazards
4. Differentiate solid state devices used in microwave based on their characteristics and operations
5. Measure the output power, VSWR, impedance, frequency and wavelength of microwave signal
6. Apply the microwave antenna knowledge for industrial and scientific purposes

SECTION I

UNIT I: WAVE GUIDES AND MICROWAVE COMPONENTS (7 Hrs.)

Rectangular wave guides: TE and TM mode wave, power transmission in wave guide, power losses in wave guide, excitation of modes in wave guide.
Microwave cavities, microwave hybrid circuits, directional coupler, Circulators and Isolators, microwave attenuators. (Numerical Expected)

UNIT II: MICROWAVE TUBES (7 Hrs.)

Microwave linear beam Tubes: Klystrons, Reentrant Cavities, Velocity-Modulation Process, Bunching Process in Klystrons, reflex klystron, slow wave structures, principle of operation of Helix Traveling-Wave Tubes (TWTs).

Microwave CROSSED-FIELD TUBES: Magnetron Oscillators, Cylindrical Magnetron, Linear Magnetron Coaxial Magnetron, Forward and backward wave crossed field amplifier (CFA),

UNIT III: MONOLITHIC MICROWAVE INTEGRATED CIRCUITS AND HAZARDS (6 Hrs.)

Materials: substrate, conductor dielectric & resistive MMIC growth, thin film formation, hybrid microwave I.C. fabrication, Electromagnetic compatibility, plane wave propagation in shielded rooms, anechoic chambers, microwave clean rooms, microwave hazards.

SECTION II

UNIT IV: MICROWAVE SOLID STATE DEVICES (7 Hrs.)

Microwave bipolar transistor, microwave FETs, Microwave tunnel diodes, Gunn Effect diodes, RWH Theory, LSA diodes, InP diodes, CdTe diodes, IMPATT diodes, PIN diodes, MESFETs and HEMT.

UNIT V: MICROWAVE MEASUREMENTS (7 Hrs.)

Detection and measurement of microwave power, bridge circuit using thermistor and barraters, direct and indirect methods of power measurement, transmission cavity wave meter, measurement of VSWR, measurements of attenuation, measurement of impedance measurement of scattering parameters, free space attenuation.

UNIT VI: MICROWAVE ANTENNAS (6 Hrs.)

Antenna parameters: antenna gain, directivity and beam width, Horn antenna, parabolic reflector with all types of feeding methods, slotted antenna, Lens antenna, Microstrip antennas, Corner reflector. Equations for antenna gain, directivity and beam width of all above antenna types (Numerical Expected)

TEXT / REFERENCE BOOKS:

1. Samuel Liao , **"Microwave Devices and Circuit",** Prentice Hall of India
2. Annapurna Das &Sisir K Das, **"Microwave Engineering**", Tata Mc-Graw Hill.
3. G.S.N. Raju , **"Antennas and wave propagation",** Pearson Education
4. K. T. Matthew, **"Microwave Engineering"**, Wiley India, 2011
5. Shrushut Das, **"Microwave Engineering",** Oxford Press.
6. M. Kulkarni, **"Microwave and Radar Engineering",** Umesh Publications.

TERM WORK: (Minimum 8 Experiments)

Minimum 8 experiments based on above syllabus covering all units.

LIST OF EXPERIMENTS:

1. Reflex Klystron Characteristics
2. GUNN Diode Characteristics
3. VSWR Measurement (Using V_{max} / V_{min} Method)
4. Frequency and wavelength measurement
5. Input impedance measurement
3. Study of E plane /H plane and magic Tee
4. Study of Directional coupler, coupling factor
7. Horn Antenna (Gain, Radiation Pattern and beam width)
8. Parabolic Antenna (Gain, Radiation Pattern and beam width)
9. Measurement of attenuation (Fixed and variable)

Shivaji University, Kolhapur.
B.E. (Electronics Engineering) Part-II
Semester- VIII

WIRELESS COMMUNICATION NETWORK

Teaching Scheme	**Examination Scheme**
Lectures: 4 Hrs./week	Theory: 100 marks
Practical: 2 Hr./week	Term work: 25 marks

Course objectives:

1. To elaborate and show how wireless networks are penetrating our daily lives for data, multimedia and voice services.
2. To explain them about the techniques in accessing, analyzing and transferring of remote end data with high reliability and security.
3. To understand different Hand off concepts, channel assignment and frequency reuse concept.
4. To understand concept of GSM architecture and framing structure.
5. To understand different Wireless LAN protocols and communication protocol such as IEE802.11
6. To understand wireless access protocols and WAP security.

Course outcomes:
After successful completion of this course, the student will be able to:

1. Explain wireless networking protocols (Bluetooth, Security etc.), architectures, and standards used for wireless communication systems.
2. Apply communication engineering concepts in preparing a link budget and design of cell geometry.
3. Discuss call establishment procedure.
4. Explain the importance of Multiple Access techniques, voice coding techniques and mobility management in GSM network.

SECTION-I

UNIT I: INTRODUCTION OF WIRELESS COMMUNICATION. (7 Hrs.)

Challenges in wireless networking, Wireless communications standards Overview, evolution of cellular system, Cellular system architecture & operation, Performance criteria. Multiple access schemes for wireless communication -TDMA, FDMA, CDMA, SDMA

UNIT II: WIRELESS NETWORK PLANNING AND OPERATION (7 Hrs.)

Frequencies management, channel assignments, frequency reuse, System capacity & its improvement, Handoffs & its types, roaming, co channel & adjacent channel interference.

UNIT III: DIGITAL CELLULAR NETWORKS (6 Hrs.)

GSM (Global System for Mobile Communications,) architecture& interfaces, signal processing in GSM, frame structure of GSM, Channels used in GSM.

SECTION – II

UNIT IV: WIRELESS LAN AND BLUETOOTH TECHNOLOGY (7 Hrs.)

Introduction, Requirements of Wireless LAN, Advantages and Disadvantages of IR LAN and Radio Transmissions, IEEE802.11 Architecture and Services, Bluetooth Architecture , Bluetooth Security, Bluetooth Protocols.

UNIT V: MOBILE DATA NETWORKS (7 Hrs.)

Introduction, Data oriented CDPD (Cellular Digital Packet Data) networks, GPRS (General Packet Radio Service) GSM Physical layer: Speech Coding and decoding, Data transmission in GSM: Data Services, SMS, HSCSD, and EDGE (Enhanced Data rates for GSM Evolution).

UNIT VI: WIRELESS ACCESS PROTOCOL (6 Hrs.)

WAP (Wireless Application Protocol) architecture, Wireless Datagram, Wireless Transport layer security, wireless transaction, Wireless Session, Wireless Application Environment, WML

TEXT BOOKS:

1. William C.Y.Lee, "**Mobile communication Engg**", Tata McGraw Hill Publications
2. T.S. Rappaport, "**Wireless Communication, principles & practice**", Pearson Education
3. Yi Bang Lin, "**Wireless and mobile network architecture**", Wiley India publication

REFERENCE BOOKS:

1. William Stalling, "**Wireless Communication & Networking**"
2. Dr Sunilkumar Manvi, "**Wireless and Mobile Network",** (2^{nd} edition) Wiley India publication
3. Upen Dalal, "**Wireless communication and Network**", Oxford Publication

Practicals:
Minimum Eight experiments based on above topics.

Shivaji University, Kolhapur.
B.E. (Electronics Engineering) Part-II
Semester- VIII

POWER ELECTRONICS & DRIVES

Teaching Scheme	**Examination Scheme**
Lectures: 4 Hrs. /week	Theory: 100 marks
Practical: 2 Hr./week	Term work: 25 marks
	POE: 50 marks

Course Objectives:

1. To motive the students to develop the knowledge about various configurations of three phase controlled Rectifiers.
2. To motive the students to develop the knowledge about various configurations of cycloconverter.
3. To enable students to gain knowledge and understanding aspects of three phase inverter.
4. To enable students to gain knowledge and understanding of ac & dc drives.
5. Applying matlab tools and methodologies for a design of power converter circuits.

Course Outcomes:
After successful completion of this course, the student will be able to:

1. Ability to analyze and evaluate the three phase controlled converter.
2. Ability to build power electronic circuits using matlab tools.
3. Understand the fundamental principles and applications ac drives & dc drives.
4. Ability to design, analyze and understand the operation of inverter & cycloconverter.

SECTION- I

UNIT I: 3-PHASE CONTROLLED RECTIFIERS. (10 Hrs.)

Concepts of 3-phase, half wave controlled rectifier with R load, half controlled and full controlled converter with RL load (continuous and discontinuous current mode of operation). Effect of source inductance on performance of 3-phase converters, mathematical analysis all above converter topologies are expected. Numerical are expected only on full controlled converter for various modes.

UNIT II: 3 PHASE INVERTERS (5 Hrs.)

IGBT based inverters: 3-phase bridge inverter (120 and 180 mode of conduction) Voltage control of 3-phase inverter, harmonic reduction techniques, comparison of VSI and CSI inverter. Numerical are expected voltage controlled techniques of inverters.

UNIT III: CYCLO-CONVERTERS (5 Hrs.)

Introduction to cyclo-converters, 1-phase to 1-phase, 3-phase to 1-phase, 3-phase to 3- phase: bridge configuration and circulating and non-circulating mode of operation for 1 phase midpoint configuration. Harmonic reduction techniques

SECTION II

UNIT IV: FUNDAMENTALS OF ELECTRIC DRIVES (9 Hrs.)

Block diagram of an electric drive, parts of electric drive, and selection criteria of electric drives, comparison of D.C. and A.C. drive, adjustable speed drive. D.C. Motor: D.C. Shunt and separately excited.

D.C. motor, D.C. Series motor, basic characteristics, starting and breaking, conventional speed control methods.

A.C. Motor: Single phase Induction Motors, three phase induction motor ,squirrel cage ,slip ring induction motor ,performance characteristics , starting and breaking, starters for 3 phase induction motor –D.O.L., star-delta starter, autotransformer starter, rotor resistance starter, speed control methods.

UNIT V: D.C. MOTOR CONTROL (6 Hrs.)

Equivalent circuit, speed torque characteristics of D.C. Motor, operating modes, regenerative braking, dynamic braking, plugging, constant torque and constant power control, single phase controlled rectifier fed drives, single quadrant chopper fed D.C. drives (chopper -A&B), four quadrant chopper drive .Numerical are expected on above mentioned chopper fed drive.

UNIT VI: A.C. MOTOR CONTROL (5 Hrs.)

Starting ,braking, speed control, Equivalent circuit ,speed torque characteristics of induction motor, speed control methods: stator voltage control ,rotor voltage control, frequency control(V/F); slip power recovery scheme-Scherbius drive, VSI Fed induction motor drive,

TEXT/ REFERENCE BOOKS:

1. G.K.Dubey , **"Fundamentals of Electrical Drives".**
2. M.H. Rashid, **"Power Electronics",** 3rd Edition, Pearson.
3. M.D. Singh, K.B. Khanchandani, **"Power Electronics",** 2nd Edition, Tata- McGraw Hill
4. **"Power Electronics",** 3rd Edition, Wiley.
5. P.C.Sen, "**Power Electronics"**, Tata McGraw-Hill Education.
6. **"Power Electronics"** Oxford University Press, 2005 - Technology & Engineering.

6. V.R.Moorthi, Shephard, **"Power Electonics & motor Control",** 2nd Edition, Cambridge Publication.
7. Ned Mohan, **"Electric Machine Drive",** Wiely Publication.
8. Mandell , **"Power Electronics".**

PRACTICAL LIST:

Part-I: Hardware

1. Study of 3 phase full controlled converter with R load.
2. Study of 3 phase half controlled converter with R load.
3. Study of speed control of DC motor.
4. Study of speed control of AC motor.
5. Study of single phase to single phase cyclo-conveter.
6. Study of 3 phase inverter.
7. Study of four quadrant chopper fed DC drive.
8. Study of single phase mid-point cyclo-conveter.

Part-I: Software

Minimum 3 simulation based experiments by using software tools like matlab/labview/scilab etc.

Note: Minimum 8 experiments are to be conducted from Hardware and Software.

Shivaji University, Kolhapur.
B.E. (Electronics Engineering) Part-II
Elective-II

SYSTEM ON CHIP

Teaching Scheme:	**Examination Scheme**
Lecture: 3 Hrs./Week	Theory: 100 Marks
Tutorial: 1 Hr./ Week	TW: 25 Marks

Course Objectives:

1. Gain a sound knowledge of system design techniques
2. Understand various development tools used for system design on single chip
3. Learn basic concepts of SOC processors
4. Designing of SOC components & Systems

Course Outcomes :
After successful completion of this course, the student will be able to:

1. Differentiate between SOC and Embedded System designing
2. Specify the processor needed for particular application
3. Design basic SOC components.
4. Design Microprocessor and Microcontroller based systems like AES & Image compression.

SECTION-I

UNIT I: INTRODUCTION TO THE SYSTEMS APPROACH (5 Hrs)

System Architecture: An Overview, Components of the System: Processors, Memories and Interconnects, Hardware and Software: Programmability'Versus Performance, Processor Architectures, Memory and Addressing, System-Level Interconnection, An Approach for SOC Design, System Architecture and Complexity, Product Economics and Implications for SOC.

UNIT II: CHIP BASICS: TIME, AREA, POWER, RELIABILITY AND CONFIGURABILITY (5 Hrs)

Introduction, Cycle Time, Die Area and Cost, Ideal and Practical Scaling, Power, Area–Time–Power Trade-Offs in Processor Design, Reliability, Configurability

UNIT III: PROCESSORS (5 Hrs)

Introduction, Processor Selection for SOC, Basic Concepts in Processor Architecture, Study of IBM's power PC, Picoblaze processor, Microblaze processor

SECTION-II

UNIT IV INTERCONNECT (4 Hrs)

Introduction, Overview: Interconnect Architectures, Bus: Basic Architecture, SOC Standard Buses: AMBA, Core Connect, Bus Interface Units: Bus Sockets and Bus Wrappers, Analytic Bus Models.

UNIT V: SOC PERIPHERAL COMPONENTS & TOOLS (6 Hrs)

XPS 16550 UART, XPS Serial Peripheral Interface (SPI), XPS Timer/Counter, XPS IIC Bus Interface. Tools: Xilinx ISE and Xilinx EDK Latest versions SOC system design tutorial.

UNIT VI: APPLICATION STUDIES (5 Hrs)

Introduction, SOC Design Approach, Application Study AES: AES Algorithm and Requirements, AES: Design and Evaluation, Application Study Image Compression: JPEG Compression, Example JPEG System for Digital Still Camera

TEXT/ REFERENCES BOOK:

1. Michael J. Flynn, Wayne Luk, **"Computer System Design: System on Chip"**, A John Wiley & Sons, Inc., Publication
2. Wyne Wolf, **"FPGA based system design",** Prentice Hall of India.
3. **"Computers as components : principles of embedded computing system Design",** Morgan Kaufman publishers
4. Ahmed Jerrya, Wayne Wolf, **"Multiprocessors systems-on-chips"** Morgan Kaufman Publishers
5. Core connect architecture at http://www.chips.ibm.com/products/coreconnect
6. EDK power PC tutorial at http://www.xilinx.com/EDK
7. Power PC info http://www.chips.ibm.com/productspowerPC/cores/405sde_pb.html
8. White papers form xilinx.com and http://www.chips.ibm.com
9. Xilinx XPS Documents.

Shivaji University, Kolhapur.
B.E. (Electronics Engineering) Part-II
Elective-II

ADVANCED IMAGE PROCESSING

Teaching Scheme:	**Examination Scheme:**
Lectures: 3 Hrs. /week	Theory: 100 Marks
Tutorials: 1 Hr. /week	Term Work: 25 Marks

SECTION-I

UNIT I: FREQUENCY DOMAIN FILTERS (5 Hrs.)

Smoothing: Ideal low pass filter, Butterworth, Gaussian low pass filters, Sharpening in frequency domain: Ideal high pass filter, Butterworth high pass filters, Gaussian high pass filters. Laplacian in frequency domain.

UNIT II: COLOR IMAGE PROCESSING (5 Hrs.)

Color fundamentals, basics of full color processing, color transformations: formulation, color complements, color slicing, tone and color correction, color image smoothing and sharpening.

UNIT III: IMAGE COMPRESSION (5 Hrs.)

Fundamentals, coding redundancy, inter pixel redundancy, psycho visual redundancy, fidelity criteria, image compression models, elements of information theory, error free compression, lossy compression.

SECTION-II

UNIT IV: MORPHOLOGICAL IMAGE PROCESSING (5 Hrs.)

Basic concepts from set theory, logical operations involving binary images, dilation, erosion, opening and closing, hit or miss transformations, basic morphological algorithms

UNIT V: IMAGE RESTORATION (5 Hrs.)

Model of the Image degradation/ Restoration process, Estimation of Noise parameter, restoration in Presence of noise-Spatial filtering, Periodic noise reduction by Frequency domain filtering

UNIT VI: WAVELETS AND MULTIRESOLUTION PROCESSING (5 Hrs.)

Image pyramids, Sub-band coding, the Haar transform, Series expansions, scaling functions, wavelet functions, the discrete wavelet transform.

TEXT/ REFERENCE BOOK:

1. Rafael C. Gonzalez and Richard E. Woods, **"Digital image processing",** Pearson Education publication
2. S. Sridhar , **"Digital Image Processing",** Oxford

3. B.Chanda , D. Dutta Majumder , **"Digital Image Processing and Analysis",** PHI

Shivaji University, Kolhapur.
B.E. (Electronics Engineering) Part-II
Elective-II

COMPUTER VISION

Teaching Scheme:	**Examination Scheme**:
Lectures: 3 Hrs./week	Theory: 100 Marks
Tutorials: 1 Hr./week	Term Work: 25 Marks

SECTION-I

UNIT I: IMAGE REPRESENTATION (5 Hrs.)

Introduction to Boundary, Chain Code, Polygonal Approximation, signature, boundary Segments, skeletons

UNIT II: IMAGE DESCRIPTION (5 Hrs.)

Boundary Descriptors: Simple Descriptor, shape numbers, Fourier descriptors, statistical moments, Regional Descriptors: Simple Descriptors, Topological Descriptors and Relational Descriptors.

UNIT III: TEXTURE (5 Hrs.)

Introduction to texture, Statistical texture description, Syntactic texture description

SECTION-II

UNIT IV: OBJECT RECOGNITION (5 Hrs.)

Patterns and Pattern classes, Decision Function, Matching by minimum Distance classifier, matching by correlation

UNIT V: CLASSIFIER (5 Hrs.)

Bayes Classifier, Cluster Analysis, nearest neighbour classifier

UNIT VI: ARTIFICIAL NEURAL NETWORK (5 Hrs.)

Human Recognition system, Basic neuron, activation function, feed forward network, perceptron learning, AND, OR, XOR model

TEXT BOOKS:

1. R.C. Gonzalez and R.E. Woods , **"Digital Image Processing"** , Pearson
2. M. K. Pakhira , **"Digital Image Processing and Pattern Recognition",**PHI
3. Milan Sonk, **"Digital Image Processing and Computer vision",** Cengage learning

REFERENCE BOOKS:

1. S. Sridhar , **"Digital Image Processing",** Oxford
2. B.Chanda , D. Dutta Majumder , **"Digital Image Processing and Analysis",** PHI

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FUZZY AND NEURAL SYSTEM

Teaching Scheme	**Examination Scheme**
Lectures: 3 Hrs./ week	Theory: 100 Marks
Tutorial: 1Hrs./ week	Term Work: 25 Marks

SECTION-I

UNIT I: INTRODUCTION TO FUZZY LOGIC (3 Hrs)

Uncertainty in information, Basic concepts of Fuzzy sets, Operations on fuzzy sets, Properties. Fuzzy relations

UNIT II: FUZZY REASONING AND FUZZY IMPLICATION (5 Hrs.)

Fuzzy Proposition, Formation of Fuzzy Rules, Compound rules, Aggregation of Fuzzy rules, Fuzzy (Approximate) Reasoning, Types of Fuzzy Reasoning, Mamadani and TSK methods of Fuzzy Reasoning, Fuzzy Inference System (FIS), Types of FIS: Mamadani and Sugeno type, Comparison, Conversion of Fuzzy Rules into Fuzzy Relation

UNIT III: FUZZY LOGIC CONTROL (7Hrs.)

General structure of Fuzzy Logic Control, Steps involved in designing Fuzzy Logic Control: Fuzzification, Inference Logic, Methods of Fuzzification and Defuzzification, Design of Fuzzy Logic Control for: Furnace Temperature, DC Motor Speed

SECTION II

UNIT IV: FUNDAMENTAL CONCEPTS AND MODELS OF ARTIFICIAL NEURAL SYSTEMS (4 Hrs)

Biological Neurons and their Artificial Models, McCulloch-Pitts Neuron Model, Models of Artificial Neural Networks, Supervised and Unsupervised Learning, Neural Network Learning Rules, Hebbian Learning Rule Perceptron Learning Rule, Delta Learning Rule, Widrow-Hoff Learning Rule, Correlation Learning Rule, Winner-Take-All Learning Rule, Outstar Learning Rule.

UNIT V: SUPERVISED LEARNING NETWORK (6 Hrs)

Single layer network: Training and classification using the discrete perception, Single layer continuous perception networks for linearly separable classification,
Multilayer Network: Linearly nonseparable pattern classification, Architecture of feed forward network, generalized delta rule, learning function, Back propagation algorithm. Application of supervised learning.

UNIT VI: UNSUPERVISED LEARNING NETWORKS (5 Hrs.)

Fixed weight competitive network: Maxnet, Mexican Hat net, hamming network, Kohonen self-organizing feature mapping network, architecture, training algorithm, Adaptive Resonance Theory (ART) Network, operating principles and training algorithm, Application of unsupervised learning.

TEXT BOOKS:

1. J. M. Zurada, **"Introduction to Artificial Neural systems"**, Jaico Publishing House Delhi, VIth Edition, 2003.
2. Lotfi A. Zadeh, **"Fuzzy logic Systems: Origin, Concepts, and Trends".**

REFERENCE BOOKS:

1. KishanMeherotra, Chilukuri K. Mohan, Sanjay Ranka, **"Element of Artificial Neural Networks"**, 2nd edition, 2010.
2. S. N. Sivanandam , S N Deepa, **"Principles of Soft Computing",** WILEY
3. B. Yegnanarayana, **"Artificial Neural Networks**", PHI, New Delhi, VI Edition, 2001
4. Simon Haykin, **"Neural Networks: A comprehensive Foundation",** Pearson Education, New Delhi 2009.
5. S. V. Kartalopoulos, **"Understanding Neural Networks and Fuzzy Logic: Basic Concepts and Applications"**, PHI, New Delhi 2000.
6. G. J. Klir, B. Yuon, **"Fuzzy Sets and Fuzzy Logic: Theory and applications"**, PHI, New Delhi.
7. J. Yen, R. Langari , **"Fuzzy Logic"**, Pearson Education, New Delhi
8. D. Driankov, H. Hellendroon, M. Reinfrank, **"An Introduction to Fuzzy Logic Control"**, (1996), Narosa Publishing House, New Delhi
9. Timothy Koss, **"Fuzzy Logic with Engineering Applications"**, Prentice Hall of India Pvt. Ltd., New Delhi.

Shivaji University, Kolhapur.
B.E. (Electronics Engineering) Part-II
Elective-II

ADAPTIVE SIGNAL PROCESSING

Teaching Scheme	**Examination Scheme**
Lectures: 3 Hrs. /week	Theory: 100 marks
Tutorial: 1 Hr. /week	Term work: 25 marks

Course Objective:

1. To introduce adaptive systems
2. To understand the filter design related to adaptive signal processing
3. To introduce different algorithms to implement adaptive signal processing
4. Application of adaptive signal processing

Course Outcomes:

After successful completion of this course, the student will be able to:

1. Explain the concept of adaptive systems and adaptive filter.
2. Compare the different adaptive algorithms.
3. Apply the concept of adaptive filtering for various applications

SECTION-I

UNIT-I: INTRODUCTION OF ADAPTIVE SYSTEMS (6 Hrs)

Definitions and characteristics, Open and closed loop adaptation, Adaptive filter structures, Adaptive Linear Combiner - Description, Weight Vectors, Desired Response & Error, Performance function , Gradient & Mean Square Error.

UNIT II: WIENER FILTERS (4 Hrs)

Linear optimum filtering , Principle of Orthogonality , Minimum Mean Square Error, Wiener – Hopf Equation, Error Performance Surface, Linear Regression Model.

UNIT III: STEEPEST DESCENT ALGORITHM (5 Hrs)

Basic idea of Gradient search method, stability and rate of convergence, Learning curve, Gradient Search by Newton's Method, Gradient Search by Method of Steepest Descent, Comparison of Learning Curves.

SECTION-II

UNIT IV: LMS ALGORITHM (6 Hrs)

Derivation of LMS algorithm, Convergence of weight vector, Learning curve, Noise in weight vector solution, Misadjustment, Performance. Overview - LMS Adaptation algorithms, The sign-LMS and the normalized LMS algorithm, Properties of LMS adaptive

filter , Stability & Performance analysis of LMS Algorithms,- Convergence of LMS algorithm. FFT based implementation of the block LMS Algorithm.

UNIT V: OTHER ADAPTIVE ALGORITHMS (5 Hrs)

Other adaptive algorithms- LMS Newton, Sequential regression, Recursive least squares, adaptive recursive filters, random search algorithms, Adaptive Lattice predictor, Adaptive filters with orthogonal signals.

UNIT IV: APPLICATIONS OF ADAPTIVE SIGNAL PROCESSING (4 Hrs)

Noise cancellation – Cancellation of Echoes in long distance telephone circuits, Adaptive equalization of Telephone Channels, Adaptive Beam forming, Adaptive Model Control, Adaptive Inverse Control, Adaptive modeling of a multi-path communication channel, Adaptive interference canceling: applications in Bio-signal processing

TEXT / REFERENCE BOOKS:

1. Bernard Widrow and Samuel D. Stearns, **"Adaptive Signal Processing"**, Person Education, 2005.
2. Simon Haykin, **"Adaptive Filter Theory",** Prentice Hall International, 2002
3. B. Farhang – Boroujeny , **"Adaptive Filter Theory & Applications",** John Wiley & Sons publication.
4. A Poularikas, Z M Ramadan, **"Adaptive filtering primer with MATLAB",** Taylor and Francis Publications

Shivaji University, Kolhapur.
B.E. (Electronics Engineering) Part-II
Elective-II

AUTOMOTIVE ELECTRONICS

Teaching Scheme	**Examination Scheme**
Lectures: 3 Hrs. /week	Theory: 100 marks
Tutorial: 1 Hr. /week	Term work: 25 marks

UNIT I: POWER TRAIN ENGINEERING AND FUNDAMENTALS OF AUTOMOTIVE (4 Hrs)

Fundamentals of Petrol, diesel and gas engines, electric motors and control systems. Basic Automotive System, System Components. Evolution of Electronics in Automotive. Alternators and charging, battery technology, Ignition systems. Working principles of various electronic components and accessories used in Automotive. Emission control. Developments in existing engine forms and alternatives, Hybrid designs (solar power, electric/gasoline, LPG, fuel cells). Basic Transmission systems, Different forms and developments.

UNIT II: SENSOR TECHNOLOGIES IN AUTOMOTIVE (6 Hrs)

In-vehicle sensors: Working principles, limitations and use within the automotive context of the following: Temperature sensing e.g. coolant, air intake, Position sensing e.g. crankshaft, throttle plate. Pressure sensing e.g. manifold, exhaust differential type, Distance sensing e.g. anti-collision, Velocity sensing e.g. speedometer, anti-skid, Torque sensing e.g. automatic transmission, Vibration sensing e.g. Airbags, Flow sensing and measurement e.g. Fuel injection. Interfacing principles: Operation, topologies and limitations of all sensors covered in the above to in-vehicle processing or communications nodes. Interfacing electronics, Operational amplifier circuits, Instrumentation amplifiers, Comparators. Level shifting, Wave-shaping, Filters. Noise mechanisms and reduction. Use of Actuators: Types, Working principle, limitations and use within the automotive context of each type

UNIT III: AUTOMOTIVE CONTROL SYSTEMS (8 Hrs)

Control system approach in Automotive: Analog and Digital control methods, stability augmentation, control augmentation, Transmission control, System components and functions. Cruise control, traction control, actuator limiting, wind-up, gain scheduling, adaptive control. Special Control Schemes: Vehicle braking fundamentals, Antilock systems, Variable assist steering and steering control, Controls for Lighting, Wipers, Air-conditions/Heating, Remote keyless Entry and Anti-theft System, Emission sub-system control, Control techniques used in hybrid system. Electronic Engine control: Motion equations, modeling of linear and non-linear systems, numerical methods, Spark Ignition and Compression Ignition Engines and their electronic controls.

SECTION-II

UNIT IV: ELECTRONIC CONTROL UNIT DESIGN. (5 Hrs)

Architecture of 8 /16 bit microcontrollers with emphasis on Ports, Timer/Counters, Interrupts, Watch-dog timers, PWM, Memory requirement and Usage. High-level language programming: Effective use of C programming with particular reference to: Operators-including bit wise, Control constructs, Pointers. Real-Time Program Design: Pointers to physical addresses and linking, Input and Output device programming, Timers and interrupts, latency. Program Development: Software development strategies, Compiling and linking, Software testing and debugging

UNIT V: AUTOMOTIVE COMMUNICATION SYSTEMS (7 Hrs)

Communication interface with ECUs: Interfacing techniques and interfacing with infotainment gadgets. TCP/IP for automotive applications. Wireless LANs standards, such as Bluetooth, IEEE802.11x. Communication protocols for automotive applications. Automotive Buses: Use of various buses such as CAN, LIN, FlexRay, Recent trends in Automotive buses (Such as OBDII, MOST, IE, IELLI, D2B, and DSI). Application of Telematics in Automotive: Global Positioning Systems (GPS) and General Packet Radio Service (GPRS), for use in an automotive environment. Higher End Technology: Comparative study and applications of ARM Cortex:-A series/M-series, ARM 9 and ARM11.

UNIT VI: DIAGNOSTICS AND SAFETY IN AUTOMOTIVE (6 Hrs)

Fundamentals of Diagnostics: Basic wiring system and Multiplex wiring system. Preliminary checks and adjustments. Self Diagnostic system. Fault finding and corrective measures. Electronic transmission checks and Diagnosis. Diagnostic procedures and sequence. On board and off board diagnostics in Automotive. Safety in Automotive: Safety norms and standards. Passenger comfort and security systems. Electromagnetic environment and Automotive EMC Standards. SAE and IEEE Standards, Future trends in Automotive Electronics.

TEXT BOOKS:

1. Williams. B.Ribbens, **"Understanding Automotive Electronics",** 6th Edition, 2003, Elsevier Science, Newness Publication
2. Robert Bosch, **"Automotive Electronics Handbook",** John Wiley and Sons, 2004
3. Nitaigour Mahalik, **"Mechatronics: Principles, Concepts and Applications",** TMH, 2003.
4. K.P.Ramchandran, G.K.Vijayraghavan, M.S. Balsundaram, **"Mechatronics: Integrated Mechanical and Electronic System",** Wiley India, 2010.

REFERENCE BOOKS:

1. Ronald K Jurgen, **"Automotive Electronics Handbook"**, 2nd Edition, McGraw-Hill, 1999.
2. James D Halderman, **"Automotive Electricity and Electronics"**, PHI Publication 2005.
3. Terence Rybak, Mark Steffka, **"Automotive Electromagnetic Compatibility (EMC)",** Springer, 2004.

4. Uwe Kiencke and Lars Nielsen, **"Automotive Control Systems: Engine, Driveline and Vehicle"**, 2nd Edition, Springer Verlag, 2005.
6. David Alciatore, Michael Histand, **"Introduction to Mechatronics and Measurement Systems (SIE)"**, TMH, 2007.
7. Iqbal Husain, **"Electric and Hybrid Vehicles: Design Fundamentals",** CRC Press, 2003.
8. Tom Denton, **"Advanced Automotive Diagnosis"**, 2nd Edition, Elsevier, 2006.
9. Tracy Martin, **"How to Diagnose And Repair Automotive Electrical Systems"**, Motor Books/MBI Publishing Company, 2005.
11. Mehrdad Ehsani, Ali Emadi, Yimin Gao, **"Modern Electronic, Hybrid Electric, and Fuel Cell Vehicles: Fundamentals, Theory, and Design"**, 2nd Edition, CRC Press, 2009.

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B.E. (Electronics Engineering) Part-II
Elective-II

HIGH PERFOMANCE COMMUNICATION NETWORKS

Teaching Scheme	**Examination Scheme**
Lectures: 3 Hrs. /week	Theory: 100 marks
Tutorial: 1 Hr. /week	Term work: 25 marks

SECTION I

UNIT I: PACKET SWITCHED NETWORKS (5 Hrs)

OSI & IP models – Ethernet (IEEE 802.3) – Token Ring (IEEE 802.5) Wireless LAN (IEEE 802.11), FDDI-DQDB-SMDS: Internetworking with SMDS

UNIT II: SDN & BROADBAND ISDN (5 Hrs)

ISDN – overview –interfaces and functions- Layers and Services – Signaling System 7- Broadband ISDN architecture and protocols

UNIT III: ATM (5 Hrs)

ATM: Main features – addressing- signaling & routing – ATM header structure – adaptation layer –management & control – ATM switching & transmission.

SECTION II

UNIT IV: FRAME RELAY (5 Hrs)

Frames relay Protocols & services – congestion control – internetworking with ATM – Internet and ATM– Frame relay via ATM

UNIT V: OPTICAL NETWORKS (5 Hrs)

Optical Links, WDM system, Optical cross-connects, Optical LANs, Optical paths and networks

UNIT VI: ADVANCED NETWORK ARCHITECTURE (5 Hrs)

IP forwarding architectures overlay model –Multi protocol Label switching (MPLS) – integrated services in the Internet – Resource Reservation Protocol (RSVP) – Differentiated services

TEXT BOOKS:

1. Jean Walrand, Pravin Varaiya, "**High performance communication networks",** 2nd edition Morgan Kaufmann Publication. (CH-1, 5)
2. William Stallings, **"ISDN and Broadband ISDN with Frame Relay and ATM"**, 4th Edition Pearson.(CH- 2, 3,4)

3. Leon Gracia, Indra Widjaja, **"Communication Networks-Fundamental concepts and Key architectures"**, McGraw Hill Companies.(CH- 6)
4. Behrouz Forouzan, **"Data Communications and Networking"**, 4th Edition, McFraw Hill Companies

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B.E. (Electronics Engineering) Part-II
Elective-II

REMOTE SENSING AND GIS

Teaching Scheme	**Examination Scheme**
Lectures: 3 Hrs./week	Theory: 100 marks
Tutorial: 1 Hr./week	Term work: 25 marks

SECTION – I

UNIT I: INTRODUCTION (6 Hrs)

Definition of GIS, The origins of GIS, CADD, AM/FM, GIS Applications, GIS industry and GIS software: GIS software vendors, GIS products, GIS users, services, benefits of GIS, Map data security, Elimination of redundancy, Map revisions, search and analysis of map data, productivity of employees, and integration of map data.

UNIT II: GIS TECHNOLOGY TRENDS (4 Hrs)

Data networks, Data communications, computer hardware, operating system, software Engineering

UNIT III: GIS DATA (7 Hrs)

Sources, collection and Entry, Digitizing, GPS surveying, Digital orthophotography, satellite imagery, GIS Data formats and standards, vector data, Raster data, Raster images, DOD spatial Data standards (SDS), spatial data transfer standard (SDTS), Open Geo-data interoperability specification (OGIS).

SECTION-II

UNIT IV: GIS ANALYSIS, PLANNING AND IMPLEMENTATION (6 Hrs)

Network analysis, Digital terrain modeling and analysis, Grid cell GIS modeling and analysis, GIS plan, Components of GIS plan, phases – planning, analysis, implementation Successful implementation of GIS, management support leadership and vision, Data conversion and maintenance, Hardware and software, User training, Data communication, Software customization, User support, Funding.

UNIT V: PITFALLS OF GIS (5 Hrs)

Failures, outstanding benefits, experimentation, undefined goals, Lack of long term planning and management support, computerizing existing problems, user involvement, Lack of user training and R and D support, Budget overrun/ underestimation etc. Maintenance and Management of GIS Data base :Centralized GIS database, Distributed GIS database, Master and transaction GIS database, maintenance issues, Financial and legal aspects of GIS: GIS costs, savings, Additional benefits, GIS model for financial justification, Laws for access, pricing, privacy, liability, copyright practice etc.

UNIT VI: REMOTE SENSING: (6 Hrs)

Data collection, data types, EM spectrum, radiation and earth, simulated – and earth, simulated –and false-color images, LUT s and band correlation, processing remotely sensed data, rectification, Band stretching, haze corrections, ratios, principal component analysis, image enhancement, edge detection, change detection, GPS data acquisition, classification of remotely sensed data, supervised and unsupervised. Putting it together, types of data and their uses, conflict resolution, visualization, topical issues, Case Study: Land record, utility management, oil and gas, global change.

TEXT/REFERENCE BOOKS:

1. G.B.Korte, **"The GIS Handbook",** 5th Education, Oxford press.
2. Ian wood, Sarah Cornelius, Steve Carver, **"Geological Information System".**
3. Muralikrishna I.V., **"Remote Sensing Application and Geographic Information Systems Recent Trends",** TMH

Shivaji University, Kolhapur.
B.E. (Electronics Engineering) Part-II
Semester- VIII

PROJECT –II

Teaching Scheme:
Practical: 8 Hrs. / Week

Examination Scheme:
Term work: 50 marks
OE: 150 Marks

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1. The Project group in semester-I will continue in semester II as well and complete the project work in all respects (Assembly, Testing, Fabrication, tabulation, test result etc.)
2. The project work along with project report consisting of approximately 80 pages should be submitted as part of term work in Semester- II on or before the last day of the semester -II.
3. The project report must be submitted in the prescribed format decided by the concerned department to maintain the uniformity.
4. The project report must be duly signed by
    a. Students
    b. Guide
    c. Head of Department
    d. Head of institution
    e. External Examiner

EQUIVALENCE FOR B.E. (Electronics Engg.)

Part –I (Semester-VII)

Sr. No	B.E. Part-I (Pre- Revised)	B.E. Part-I (Revised)
1	Embedded System Design	Embedded System Design
2	Information Theory and coding	Information Theory and coding techniques
3	Digital Signal Processing	Digital Signal Processing (Revised syllabus at T.E. Part-II)
4	Power Electronics and Drives	Power Electronics and Drives (Revised syllabus at B.E. Part-II)
Elective –I		
5	Advanced Control Engineering	Advanced Control System
6	Bio-medical Instrumentation	Bio-medical Instrumentation
7	Real Time Systems	Real Time Systems
8	Fuzzy Logic and Application	Robotics and Artificial intelligence
9	Remote Sensing & GIS	Remote Sensing & GIS (Revised syllabus at B.E. Part-II)
10	Satellite Communication	Satellite Communication

Part –II (Semester-VIII)

Sr. No	B.E. Part-II (Pre- Revised)	B.E. Part-II (Revised)
1	Video Engineering	Video Engineering (Revised syllabus at T.E. Part-II)
2	Microwave Engineering	Microwave Engineering
3	Computer network	Computer network (Revised syllabus at B.E. Part-I)
4	Operating System	Computer Architecture & Operating System (Revised syllabus at T.E. Part-II)
Elective –II		
5	Neural Network and Application	Fuzzy and Neural Systems
6	Digital Image Processing	Advanced Image Processing
7	Mechatronics	Automotive Electronics
8	Information Technology	Information Technology (Revised syllabus at B.E.

		Part-I)
9	Broadband Communication	High Performance Computer Networks
10	System On chip	System On Chip
11	Wireless Communication Network	Wireless Communication Network