BAPATLA ENGINEERING COLLEGE :: BAPATLA
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Institutional Electives (R18 Regulations)

Institutional Elective – 1

S.NO	CODE	TITLE
1.	18CE101	AIR POLLUTION & CONTROL
2.	18CE102	RURAL WATER SUPPLY AND ENVIRONMENT SANITATION
3.	18CS101	JAVA PROGRAMMING
4.	18CS102	DATABASE MANAGEMENT SYSTEM
5.	18ECI01	DIGITAL IMAGE PROCESSING
6.	18ECI02	EMBEDDED SYSTEMS
7.	18EEI01	APPLICATIONS OF WAVELETS TO ENGINEERING PROBLEMS
8.	18EEI02	INDUSTRIAL ELECTRICAL SYSTEMS
9.	18EII01	PRINCIPLES & APPLICATIONS OF MEMS
10.	18EII02	POWER PLANT INSTRUMENTATION
11.	18ITI01	INTRODUCTION TO DATA ANALYTICS
12.	18ITI02	CYBER SECURITY
13.	18ME101	FLUID POWER & CONTROL SYSTEMS
14.	18ME102	PROJECT MANAGEMENT
15.	18MA006	GRAPH THEORY
16.	18PH101	NANO MATERIALS AND TECHNOLOGY
17.	18PH102	FIBER OPTICS COMMUNICATIONS
18.	18EL003	PROFESSIONAL COMMUNICATION

Institutional Elective – II

S.NO	CODE	TITLE
1.	18CE103	DISASTER MANAGEMENT
2.	18CE104	REMOTE SENSING &GIS
3.	18CS103	PYTHON PROGRAMMING
4.	18CS104	COMPUTER NETWORKS
5.	18ECI03	WIRELESS COMMUNICATIONS
6.	18ECI04	ARTIFICIAL NEURAL NETWORKS
7.	18EEI03	HIGH VOLTAGE ENGINEERING
8.	18EEI04	ELECTRICAL ENERGY CONSERVATION & AUDITING
9.	18EII03	ROBOTICS AND AUTOMATION
10.	18EII04	SENSORS AND SIGNAL CONDITIONING
11.	18ITI03	MOBILE APPLICATION DEVELOPMENT
12.	18ITI04	WEB TECHNOLOGIES
13.	18ME103	NON-CONVENTIONAL ENERGY SOURCES
14.	18ME104	AUTOMOBILE ENGINEERING
15.	18PH103	ADVANCED MATERIALS
16.	18PH104	OPTO ELECTRONIC DEVICES AND APPLICATIONS
17.	18EL004	ENGLISH FOR COMPETITIVE EXAMINATIONS

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Institution Elective - I

AIR POLLUTION & CONTROL

IV B.Tech – I Semester (Code: 18CE101)

Lectures	4	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment		:	50	Semester End Examination (3 Hours)			50

Course Objectives:

- To take up the basic concepts of sources and effects of Air Pollution
- The contents involved the knowledge of the effect of metrological parameters on air pollution
- The contents involved the knowledge of the control of air pollution from particulates
- To develop skills relevant to control of gaseous pollution and also introduce about Air Quality Management

Course Outcomes: On the completion of the course, one should be able to understand:

CO1:The concepts of sources of air pollution and effects of air pollutants on man, materials and plants

CO2:Be able to understand the effect of air pollution with meteorological parameters

CO3:The knowledge about particulate control by different devices

CO4:Be able to develop gaseous pollution control technologies and estimate the quality monitoringof air pollutants

UNIT –I

Air Pollution –Definitions, Air Pollutants–Classifications –Natural and Artificial– Primary and Secondary, point and Non-Point, Line and Areal Sources of air pollution-stationary and mobile sources.

Effects of Air pollutants on man, material land vegetation: Global effects of air pollution – Green House effect, Heat Islands, Acid Rains and Ozone Holes etc.

UNIT –II

Meteorology and plume Dispersion; properties of atmosphere; Heat, Pressure, Wind forces, Moisture and relative Humidity, Influence of Meteorological phenomenon Air Quality-wind rose diagrams.

UNIT – III

Lapse Rates, Pressure Systems, Winds and moisture plume behavior and plume Rise Models; Theory and problem related to Gaussian dispersion model.

Control of particulates –Control at Sources, Process Changes, Equipment modifications, Design and operation of control. Equipment's–Settling Chambers, Centrifugal separators, filters Dry and Wet scrubbers, Electrostatic precipitators.

UNIT – IV

General Methods of Control of NOx and Sox emissions–In-plant Control Measures, process changes, dry and wet methods of removal and recycling. Air Quality Management–Monitoring of SPM, SO;NO and CO Emission Standards.

TEXTBOOKS:

1. AirpollutionByM.N.RaoandH.V.N.Rao –Tata Mc.GrawHillCompany.
2. AirpollutionbyWarkand Warner. –Harper & Row, NewYork.

REFERENCE BOOK:

1. An introduction to Air pollution by R.K.Trivedy and P.K.Goel, B.S.Publications

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Institution Elective - I

RURAL WATER SUPPLY AND ENVIRONMENT SANITATION

IV B.Tech – I Semester (Code: 18CE102)

Lectures	4	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment	:	50	Semester End Examination (3 Hours)				50

Course Objectives:

- Apply knowledge of basic sciences and engineering to analyze water resources systems for socio-economic development.
- Identify the sources of water and their characteristics.
- Identify and select criteria for the selection of sanitation technology
- To learn about analytical & design methods for environmental systems.

Course Outcomes: At the end of the course the student will be able to:

CO1: Identify problems pertaining to rural water supply and sanitation.
CO2: Design water supply and sanitation system for rural community.
CO3: Design low-cost waste management systems for rural areas.
CO4: Plan and design an effluent disposal mechanism.

UNIT - I

WATER SUPPLY: Issues of rural water supply –Various techniques for rural water supply- merits- National rural drinking water program- rural water quality monitoring and surveillance- operation and maintenance of rural water supplies

UNIT - II

LOW-COST WATER TREATMENT: Introduction – Epidemiological aspects of water quality methods for low cost water treatment - Specific contaminant removal systems

UNIT - III

RURAL SANITATION: Introduction to rural sanitation- Community and sanitary latrines - Planning of wastewater collection system in rural areas- Treatment and Disposal of wastewater - Compact and simple wastewater treatment units and systems in rural areas stabilization ponds - septic tanks - Imhoff tank- soak pits- low-cost excreta disposal systems Effluent disposal.

UNIT - IV

INDUSTRIAL HYGIENE AND SANITATION: Occupational Hazards- Schools- Public Buildings- Hospitals- Eating establishments- Swimming pools – Cleanliness and maintenance and comfort- Industrial plant sanitation. SOLID WASTE MANAGEMENT: Disposal of Solid Wastes- Composting- land filling incineration- Biogas plants - Rural health - Other specific issues and problems encountered in rural sanitation.

TEXT BOOKS:

1. Eulers, V.M., and Steel, E.W., Municipal and Rural Sanitation, 6th Ed., McGraw Hill Book Company, 1965.
2. Park, J.E., and Park, K., Text Book of Preventive and Social Medicine, BanarsidasBhanot, 1972

REFERENCE BOOKS:

1. Wright, F.B., Rural Water Supply and Sanitation, E. Robert Krieger Publishing Company, Huntington, New York, 1977.
2. Juuti, P., Tapio S. K., and Vuorinen H., Environmental History of Water: Global Views

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Institution Elective - II

DISASTER MANAGEMENT

IV B.Tech – II Semester (Code: 18CE103)

Lectures	4	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment		:	50	Semester End Examination (3 Hours)			50

Course Objectives: The subject provides

- Clear knowledge of Disaster, Hazards and Vulnerabilities.
- Knowledge of Mechanism of Disaster Management.
- Clear idea of Capacity Building.
- Explains how to do the planning for disaster management.

Course Outcomes: At the end of the course student will be able to

CO1: Understands Disaster, Man-made Hazards and Vulnerabilities.
CO2: Understands Disaster Management Mechanism
CO3: Understands Capacity Building Concepts
CO4: Understands Planning of Disaster Managements

UNIT-I

Understanding Disaster: Concept of Disaster - Different approaches- Concept of Risk - Levels of Disasters - Disaster Phenomena and Events (Global, national and regional)

Hazards and Vulnerabilities: Natural and man-made hazards; response time, frequency and forewarning levels of different hazards - Characteristics and damage potential or natural hazards; hazard assessment - Dimensions of vulnerability factors; vulnerability assessment - Vulnerability and disaster risk - Vulnerabilities to flood and earthquake hazards.

UNIT-II

Disaster Management Mechanism: Concepts of risk management and crisis managements -Disaster Management Cycle - Response and Recovery - Development, Prevention, Mitigation and Preparedness - Planning for Relief.

UNIT-III

Capacity Building: Capacity Building: Concept - Structural and Nonstructural Measures Capacity Assessment; Strengthening Capacity for Reducing Risk - Counter-Disaster Resources and their utility in Disaster Management - Legislative Support at the state and national levels

UNIT-IV

Coping with Disaster: Coping Strategies; alternative adjustment processes – Changing Concepts of disaster management - Industrial Safety Plan; Safety norms and survival kits -Mass media and disaster management.

Planning for disaster management: Strategies for disaster management planning - Steps for formulating a disaster risk reduction plan - Disaster management Act and Policy in India -Organizational structure for disaster management in India - Preparation of state and district disaster management plans.

TEXT BOOKS:

1. Manual on Disaster Management, National Disaster Management, Agency Govt of India.
2. Disaster Management by MrinaliniPandey Wiley 2014.
3. Disaster Science and Management by T. Bhattacharya, McGraw Hill Education (India) Pvt Ltd Wiley 2015.

REFERENCES:

1. Earth and Atmospheric Disasters Management, N. Pandharinath, CK Rajan, BS Publications 2009.
2. National Disaster Management Plan, Ministry of Home affairs, Government of India (http://www.ndma.gov.in/images/policyplan/dmplan/draftndmp.pdf)

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Institution Elective - II

REMOTE SENSING &GIS

IV B.Tech – II Semester (Code: 18CE104)

Lectures	4	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment		:	50	Semester End Examination (3 Hours)			50

Course Objectives:

- Learn basic concepts of Aerial Photographs.
- Learn basic concepts of remote sensing and its characteristics, satellite sensors and platforms.
- Know about satellite digital image processing and classification techniques.
- Understand the basic concepts GIS, spatial data and analysis
- Applications of GPS in surveying.
- Know various remote sensing and GIS applications in civil engineering

Course Outcomes:

CO1: Interpret Information from Aerial Photographs.
CO2: Exposure on Basics of Remote Sensing, Satellite Sensors and Platforms, Practical Knowledgeon Satellite Image Classification.
CO3: Know Basics of GIS And Map Making. Exposure about Spatial Analysis Using Overlay Tools.
CO4: Geo-Tag Assets Using GPS And Add Attribute & Meta-Data.
CO5: Get the Knowledge on Various Remote Sensing and GIS Applications in Civil Engineering.

UNIT- I

PHOTOGRAMMETRY: Fundamentals of Photogrammetry and Photo interpretation – types of photographs; Vertical photographs – principal point; scale; Stereoscopy; Overlap, side lap and flight planning.

UNIT – II

REMOTE SENSING:

Introduction to Remote Sensing: Basic concepts of remote sensing, electromagnetic radiation, electromagnetic spectrum, interaction with atmosphere and target.

Sensors and platforms: Introduction, types of sensors, airborne remote sensing, Space-borne remote sensing. Visual Interpretation Techniques. Overview of Indian Remote sensing satellites and sensors, satellite definition and types, characteristics of satellite, characteristics of satellite orbit

UNIT – III

GEOGRAPHIC INFORMATION SYSTEM (GIS)

Introduction, key components, data entry &preparation – Spatial data input, Raster Data Model, Vector Data Model, Raster Vs Vector, advantages and disadvantages of Raster & Vector network analysis - concept and types, Data storage-vector data storage, attribute data storage.

UNIT - IV

GLOBAL POSITIONING SYSTEM (GPS)&RS AND GISAPPLICATIONS:

GPS definition, components of GPS, GPS receivers. Space, Control and User segments of GPS. Advantages and disadvantages of GPS, Limitations and applications of GPS Indian Systems (IRNSS, GAGAN)Development of GPS surveying techniques, Navigation with GPS, Applications of GPS.

Applications: Photogrammetry, Remote Sensing and Geographical information Systems

TEXT BOOKS:

1. Bhatta B (2008), 'Remote sensing and GIS', Oxford University Press
2. Chang, K. T. (2006). Introduction to Geographic Information Systems. The McGraw-Hill.
3. Lillesand, T.M, R.W. Kiefer and J.W. Chipman (2013) 'Remote Sensing and Image Interpretation', Wiley India Pvt. Ltd., New Delhi
4. Schowenger, R. A (2006) 'Remote Sensing' Elsevier publishers.
5. Parkinson, B. W., Spilker, J. J. (Jr.) (1996). Global Positioning System: Theory & Applications (Volume-I). AIAA, USA

REFERENCE BOOKS:

1. 'Fundamentals of Remote Sensing' by George Joseph, Universities Press, 2013.
2. 'Fundamentals of Geographic Information Systems' by Demers, M.N, Wiley India Pvt.Ltd, 2013.
3. Jensen John R. Introduction to Digital Image Processing: A Remote Sensing Perspective Prentice hall, New Jersey
4. Paul Wolf, Elements of Photogrammetry, McGraw Hill.
5. Leick Alfred, 1995: GPS Satellite Surveying, Wiley Inter science
6. Burrough, P. P. & McDonnel, R. A. (1998). Principles of GIS. Oxford University Press.

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JAVA PROGRAMMING IV B. Tech. – VII Semester (Code: 18CSI01)					
Lectures	:	4 Periods/Week	Continuous Assessment	:	50
Final Exam	:	3 hours	Final Exam Marks	:	50

Pre-Requisite: None.

Course Objectives:

➢	Understand the concepts of Data Types, Variables, Arrays, Operators, control Statements, Classes and Objects.
➢	Understand Inheritance, Interfaces, Packages and Strings.
➢	Understand and write programs on Exception Handling and I/O.
➢	Understand the concepts of Event Handling, Applets and Swings.

Course Outcomes: Students will be able to:

CO-1	Understand basic Java language syntax and semantics to write Java programs, use concepts such as variables, conditional and iterative execution methods etc. And use the Java SDK environment to create, debug and run Java programs
CO-2	Identify classes, objects, members of a class and relationships among them needed for a specific problem and Write Java application programs using OOP principles and proper program structuring
CO-3	Demonstrate the concepts of polymorphism, inheritance, packages and interfaces.
CO-4	Write Java programs to implement error handling techniques using exception handling

UNIT-1	(13 Periods)
The History and Evolution of Java, An Overview of Java, Data Types, Variables and Arrays, Operators, Control Statements, Introducing Classes A Closer Look at Methods and Classes.	

UNIT-2	(13 Periods)
Inheritance, Packages and Interfaces. **Strings:** String Constructors, Program using 10 String methods, String Buffer class, Program using 10 String Buffer methods Introducing String Builder class.	

UNIT-3	(12 Periods)
Exception Handling **I/O:** I/O Basics, Reading Console Input, Writing Console Output, The Print Writer class, Reading and Writing Files, Automatically Closing a File.	

UNIT-4	(12 Periods)

The Applet Class: Applet Architecture, An Applet Skeleton, Applet program to draw shapes, setting Color, Font using Graphicsclass **Event Handling, GUI Programming with Swing:** The Origins of Swing, Advantages of Swing over AWT, The MVC Connection, Program using Swing Components JLabel, JText Field, JText Area, JCheck box, JButton, JTabbed Pane, JTable, JTree, JCombo Box.	
Text Books :	1. Java The Complete Reference‖, 9th Edition, Herbert Schildt, TMH Publishing Company Ltd.
References :	1. Java: A Beginner's Guide, Eighth Edition, Herbert Schildt, TMH Publishing Company Ltd. 2. Head First Java, Second Edition, O'Reilly

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DATABASE MANAGEMENT SYSTEM

IV B.Tech- VII Semester (Code: **18CSI02**)

Lectures:	4 periods/week	Continuous Internal Assessment:	50 marks
Final Exam:	3 Hours	Semester End Exam:	50 marks

Course Objectives:

At the end of the course, the students will be able to:

- Familiarize with fundamental concepts of database and various database architectures and Design relations for Relational databases using conceptual data modeling. Familiarize the student with the basic taxonomy and terminology of the computer networking area.
- Implement formal relational operations in relational algebra and SQL.
- Identify the Indexing types and normalization process for relational databases
- Use mechanisms for the development of multi user database applications

Learning Outcomes:

After completing this course the student must demonstrate the knowledge and ability to:

CO1: Ability to apply knowledge of database design methodology which give a good formal foundation in relational data model and Understand and apply the principles of data modelingusing ER Model.

CO2: Familiar with relational DB theory and will able to write relational algebra expressions,Relational Calculus and SQL.

CO3: Design database schema and Identify and solve the redundancy problem in database tablesusing normalization.

CO4: Understand transaction processing and concurrency control techniques.

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3
CO 1		3	2	2		2				3			2		3
CO 2	3	3	2	2						3			3	3	3
CO 3	3	3	3	3						3			3	3	3
CO 4		3	3	3		3				3			2	3	3

UNIT-I — 16 Periods

Databases and Database Users: Introduction - An Example - Characteristics of the Database Approach– Actors on the Scene- Workers behind the Scene-Advantages of Using the DBMS Approach.

Database System Concepts and Architecture: Data Models, Schemas, and Instances- Three-Schema Architecture and Data Independence- Database Languages and Interfaces- The Database System Environment -Centralized and Client/Server Architectures for DBMSs.

Data Modeling Using the Entity-Relationship(ER)Model: Using High-Level Conceptual Data Models for Database Design-An Example Database Application-Entity Types, Entity Sets, Attributes, and Keys-Relationship Types, Relationship Sets, Roles, and Structural Constraints-Weak Entity Types-Refining the ER Design for the COMPANY Database-ER Diagrams, Naming Conventions, and Design Issues

UNIT-II	16 Periods
The Relational Algebra and Relational Calculus: Unary Relational Operations: SELECT and PROJECT - Relational Algebra Operations from Set Theory-Binary Relational Operations: JOIN and DIVISION– Additional Relational Operations-The Tuple Relational Calculus-The Domain Relational Calculus **Schema Definition, Constraints, Queries, and Views:** SQL Data Definition and Data Types –Specifying Constraints in SQL-Schema Change Statements in SQL-Basic Queries in SQL – More Complex SQL Queries-INSERT, DELETE, and UPDATE Statements in SQL- Views (Virtual Tables) in SQL	
UNIT-III	14 Periods
Introduction to Schema Refinement: Problems Caused by Redundancy, Decompositions– ProblemRelated to Decomposition, Functional Dependencies - Reasoning about FDS, Normal Forms, FIRST, SECOND, THIRD Normal Forms, BCNF, Properties of Decompositions, Loss Less- Join Decomposition, Dependency Preserving Decomposition, Schema Refinement in Database Design – Multivalued Dependencies FOURTH Normal Form, Join Dependencies, FIFTH Normal form, Inclusion Dependencies.	
UNIT-IV	14 Periods
Introduction to Transaction Processing Concepts and Theory: Introduction to Transaction Processing-Transaction and System Concepts-Desirable Properties of Transactions- Characterizing Schedules Based on Recoverability –Characterizing Schedules Based on Serializability **Concurrency Control Techniques:** Two-Phase Locking Techniques for Concurrency Control –Concurrency Control Based on Time stamp Ordering– Multi version Concurrency Control Techniques-Validation(Optimistic) Concurrency Control Techniques-Granularity of Data Items and Multiple Granularity Locking	
Text Book(s) :	Fundamentals of Database Systems, RamezElmasri and Navathe Pearson Education, 6thedition
References :	1. Introduction to Database Systems, C.J. Date Pearson Education 2. Database Management Systems, Raghu Rama krishnan, Johannes Gehrke, TATA McGraw Hill3rdEdition 3. Database System Concepts, Silberschatz, Korth, McGraw hill,5thedition

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PYTHON PROGRAMMING
IV B. Tech. – VIII Semester (Code: 18CSI03)

Lectures	:	4 Periods/Week	Continuous Assessment	:	50
Final Exam	:	3 hours	Final Exam Marks	:	50

Pre-Requisite: None.

Course Objectives:

- Understand and write code using the basics of Python, Statements, Expressions, Conditional Executions, and Functions.
- Write code for Iteration, Strings, File I/O.
- Write code in creating, usage of Lists, Dictionaries, and Tuples.
- Understand the concepts of Object Orientation, Databases and write code implementing them.

Course Outcomes: Students will be able to:

CO-1	Understanding of scripting and the contributions of python language.
CO-2	Understanding of Python especially the object-oriented concepts, using databases.
CO-3	Able to design and implement machine learning solutions to classification, regression.
CO-4	Able to design and implement machine learning solutions to clustering problems and features of various data.

UNIT-1 (12 Periods)

Introduction: Overview, History of Python, Python Features, Environment Setup. Variables, expressions, and statements: values and types, variables, names and keywords, statements, operators and operands, expressions, order of operations, modulus operator, string operations, asking the user for input, comments, choosing mnemonic variable names.

Conditional execution: Boolean expressions, logical operators, conditional execution, Alternative execution, chained conditionals, nested conditionals, catching exceptions using try and except, short-circuit evaluation of logical expressions.

Iteration: updating variables, the while statement, infinite loops and break, finishing iterations with continue, definite loops using for, loop patterns.

UNIT-2 (12 Periods)

Functions: function calls, built-in functions, type conversion functions, random numbers, math functions, adding new functions, definitions and uses, flow of execution, parameters and arguments, fruitful functions and void functions.

Strings: string is a sequence, getting the length of a string using len, traversal through a string with a loop, string slices, strings are immutable, looping and counting, the in operator, string comparison, string methods, parsing strings, format operator.

FileI/O: persistence, opening files, text files and lines, reading files, searching through a file, letting the user choose the file name, using try except and open, writing files.

UNIT-3 (12 Periods)

Lists: a list is a sequence, lists are mutable, traversing, operations, slices, methods, deleting elements, functions, strings, parsing lines, objects and values, aliasing, arguments. **Tuples**: tuples are immutable, comparing tuples, tuple assignment, dictionaries and tuples, multiple assignmentwith dictionaries, the most common words, using tuples as keys in dictionaries, sequences. **Sets:** Introduction, access set items, add set items, remove set items, loop sets, join sets, set methods. **Dictionaries:** Dictionary as a set of counters, dictionaries and files, looping and dictionaries, advanced text parsing.	
UNIT-4	(12 Periods)
Regular Expressions: Character matching in regular expressions, Extracting data using regular expressions, Combining searching and extracting, Escape character**.** **Object-Oriented Programming:** Managing Larger Programs, Using Objects, starting with Programs, Subdividing a Problem–Encapsulation, First Python Object, Classes as Types, Object Lifecycle, Many Instances. **Using Databases and SQL:** Database concepts, Database Browser for SQLite, creating a database table, Structured Query Language summary, Basic data modeling, Programming with multiple tables, three kinds of keys, Using JOIN to retrieve data.	
Text Books :	1. Python for Everybody, Charles Severance
References :	1. W3Schools - https://www.w3schools.com/python/ 2. A Python Book: Beginning Python, Advanced Python, and Python Exercises, Dave Kuhlman, Open Source MIT License.

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COMPUTER NETWORKS

IV B.Tech- VIII Semester (Code: **18CSI04**)

Lectures:	4 periods/week	Continuous Internal Assessment:	50 marks
Final Exam:	3 Hours	Semester End Exam:	50 marks

Course Objectives:

At the end of the course, the students will be able to:

- Build an understanding of the fundamental concepts of computer networking.
- Familiarize the student with the basic taxonomy and terminology of the computer networking area.
- Introduce the student to advanced networking concepts, preparing the student for entryAdvanced courses in computer networking.
- Allow the student to gain expertise in some specific areas of networking such as the design and maintenance of individual networks.

Learning Outcomes:

After completing this course the student must demonstrate the knowledge and ability to:

CO1: Understand and explain Data Communications System and its components and Identify thedifferent types of network topologies and protocols.

CO2: Enumerate the layers of the OSI model and TCP/IP. Explain the function(s) of each layer.

CO3: Understand and building the skills of subnetting and routing mechanisms.

CO4: Familiarity with the application layer protocols of computer networks, and how they can beused to assist in network implementation.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	1	2	2		2				3			2		3
CO2	2	3	2	2						3			3	3	3
CO3		3	3	3						3			3	3	3
CO4		2	3	3		3				3			2	3	3

UNIT-I	14 Periods

Data Communications & Networking Overview: A Communications Model, Data Communications, Data Communication Networking.

Protocol Architecture: The Need for Protocol Architecture, A Simple Protocol Architecture, OSI, The TCP /IP Protocol Architecture.

Digital Data Communication Techniques: Asynchronous & Synchronous Transmission, Types of Errors, Error Detection, Error Correction.

UNIT-II	16 Periods

Data Link Control: Flow Control, Error Control. **Network Layer:** **Network Layer Design Issues:** Store-and-Forward Packet Switching, Services Provided to the Transport Layer, Implementation of Connectionless Service, Implementation of Connection-Oriented Service, Comparison of Virtual-Circuit & Datagram Subnets. **Routing Algorithms:** The Optimality Principle, Shortest Path Routing, Flooding, Distance Vector Routing, Link State Routing, Hierarchical Routing.	
Congestion Control Algorithms: General Principles of Congestion Control, Congestion Prevention Policies, Congestion Control in Virtual-Circuit Subnets, Congestion Control in Datagram Subnets, Load Shedding, Jitter Control.	
UNIT-III	16 Periods
Quality of Service: Requirements, Techniques for Achieving Good Quality of Service The **Network Layer in the Internet:** The IP Protocol, IP Addresses, Internet Control Protocols. **The Transport Layer: The Transport Service:** Services Provided to the Upper Layers, Transport Service Primitives, Berkeley sockets **Elements of Transport Protocols:** Addressing, Connection Establishment, Connection Release, Flow Control and Buffering, Multiplexing, Crash Recovery.	
UNIT-IV	14 Periods
The Internet Transport Protocol (UDP): Introduction to UDP, Remote Procedure Call, The Real-Time Transport Protocol. **The Internet Transport Protocols (TCP):** Introduction to TCP, The TCP Service Model, The TCP Protocol, The TCP Segment Header, TCP Connection Establishment, TCP Connection Release, Modeling TCP Connection Management, TCP Transmission Policy, TCP Congestion Control, TCP Timer Management. **Application Layer: The Domain Name System (DNS):** The DNS Name Space, Resource Records, Name Servers.	
Text Book(s) :	1. BehrouzA.Forouzan, —Data Communications and Networking‖, 4th edition, TMH. 87 2. Tanenbaum, —Computer Networks‖, 4th Edition, (Pearson Education / PHI).
References :	1. Wayne Tomasi, —Introduction to Data Communications and Networking‖, PHI. 2. GodBole, —Data Communications & Networking‖, TMH. 3. Nader F.Mir, —Computer and Communication Networks‖, PHI

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Digital Image Processing

VII – Semester (Code: 18ECI01)

Lectures	4	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment	:	50		Semester End Examination (3 Hours)	:	50	

Prerequisites: NONE

Course Objectives: In this course, students will learn the following topics

CO1: Recall and summarize the digital image fundamentals and to be exposed to basic image processing techniques.

CO2: Be familiar with image restoration, segmentation and compression techniques.

CO3: Illustrate the representation of monochrome and color images in the form of features and descriptors

CO4: Give the students a taste of the applications of the theories taught in the subject. This willbe achieved through the project and some selected lab sessions. Develop a theoretical foundation of fundamental Digital Image Processing concepts.

Course Outcomes: Students will be able to

CLO1: Explain the digital image fundamentals and basic image processing techniques

CLO2: Apply appropriate technique for image enhancement both in spatial and frequency domains

CLO3: Analyze the need for image restoration and color image processing and illustrate various restoration and color image processing techniques.

CLO4: Evaluate various segmentation, representation and description techniques on digital images

UNIT – I

INTRODUCTION: What Is Digital Image Processing? The Origins of Digital Image Processing, Examples of Fields that Use Digital Image Processing, Fundamental Steps in Digital Image Processing, Components of an Image Processing System.

DIGITAL IMAGE FUNDAMENTALS: Elements of Visual Perception, Light and the Electromagnetic Spectrum, Image Sensing and Acquisition, Image Sampling and Quantization, Some Basic Relationships between Pixels.

UNIT – II

SPATIAL AND FREQUENCY DOMAIN FILTERING: Background. Some Basic Intensity Transformation functions, Histogram Processing, Fundamentals of Spatial Filters, Smoothing Spatial Filters, Sharpening Spatial Filter. The basics of filtering in the Frequency Domain, Image smoothing using frequency domain filters, Image sharpening using frequency domain filters.

IMAGE COMPRESSION: Fundamentals – Image Compression models – Error Free Compression, Lossy Compression

UNIT – III

IMAGE RESTORATION: A Model of the Image Degradation/Restoration Process, Noise Models, Restoration in the Presence of Noise Only-Spatial Filtering, Periodic Noise Reduction by Frequency Domain Filtering, Linear, Inverse Filtering, Minimum Mean Square Error (Wiener) Filtering.

COLOR IMAGE PROCESSING: Color Fundamentals, Color Models, Pseudo color Image Processing, Basics of Full-Color Image Processing, Color Transformations, Smoothing and Sharpening, Image Segmentation based on Color.

UNIT – IV

IMAGE SEGMENTATION: Detection of discontinuities, Thresholding, Edge based Segmentation and Region based Segmentation

IMAGE REPRESENTATION AND DESCRIPTION: Representation schemes, Boundary Descriptors,

Regional Descriptors.

TEXT BOOK:

1. R. C. Gonzalez, R. E. Woods, Digital Image Processing 4th Edition, Pearson Education Publishers, 2019.

REFERENCE BOOKS:

1. S Jayaraman, S Esakkirajan, T Veerakumar, Digital Image Processing, Mc-Grah Hill Publications, 2010.
2. Milan Sonka, Vaclav Hlavac and Roger Boyle, Image Processing Analysis and Machine Vision, Thomson learning, Second Edition, 2001.
3. S.Sridhar, Digital Image Processing, Oxford University Press, 2016.

BAPATLA ENGINEERING COLLEGE :: BAPATLA
(Autonomous)

EMBEDDED SYSTEMS
VII– Semester (Code: 18ECI02)

Lectures	4	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment			: 50	Semester End Examination (3 Hours)			: 50

Pre-requisites: NONE

Course Objectives: In this course, students will learn the following topics

- CO1: On typical embedded system design methodologies, characteristics and design metrics.
- CO2: To know different core manufacturing models, importance of synchronization among processes and need for communication interfaces in wired and wireless.
- CO3: Illustrate the kernel architecture and kernel objects, different task schedulers with their applications.
- CO4: Real time OS, synthesis and simulation tools at different obstruction levels along with hw/sw co- design.

Course Outcomes: Students will be able to

CO1: Understand different design methodologies for embedded systemdesign.
CO2: Understand different core manufacturing models, importance of synchronization among processes and need for communication interfaces in wired and wireless
CO3: Know kernel architecture and kernel objects, different task schedulers with their applications.
CO4: Know the embedded and real time OS, synthesis and simulation tools at different obstruction levels along with hw /sw co-design

SYLLABUS

UNIT – I

Introduction to embedded systems: Design challenges, processor technology, IC technology, design technology, tradeoffs, single purpose processor, RT level combinational logic, sequential logic (RT level) custom single purpose processor design, General purpose processors: basic architecture, pipelining, programmers view, development environment, ASIPS, microcontrollers and digital signal processors.

UNIT – II

STATE MACHINE AND CONCURRENT PROCESS MODELS: models vs. languages, FSMD, using state machines, PSMM, concurrent process model, concurrent processes, communication and synchronization among processes, data flow model and real-time systems. Need for communication interfaces, RS232/UART, RS422/RS485, USB, Infrared, IEEE 802.11, and Bluetooth.

UNIT - III

EMBEDDED SYSTEM AND RTOS CONCEPTS: Architecture of kernel, tasks and task scheduler, interrupt service routines, semaphores, mutex. Mail boxes, message queues, event registers, pipes and signals.

UNIT – IV

EMBEDDEDSYSTEM AND RTOS CONCEPTS: Timers, memory management, priority inversion problem, embedded OS and real-time OS, RTLinux, and Handheld OS. Design technology: Introduction, automation, synthesis, parallel evolution of compilation and synthesis, logic synthesis, RT synthesis, behavioral synthesis, system synthesis, HW/SW co-design, verification, and co-simulation.

TEXT BOOKS:

1. Frank Vahid, Tony D Givargis, Embedded system design – A unified HW/ SW Introduction, John Wiley & sons 2002.
2. KVKK Prasad, Embedded and real-time systems, DreemtechPress, 2005.

REFERENCE BOOKS:

1. Raj Kamal, Embedded system architecture, programming and design, TMH edition.
2. Mohammad Ali Mazidi, Janice G., The 8051 microcontroller and embedded systems, Pearson edition.
3. Jonathan W Valvano, Embedded Microcomputer Systems, Brooks/cole, Thompson

BAPATLA ENGINEERING COLLEGE :: BAPATLA
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Wireless Communications
VII– Semester (Code: 18ECI03)

Lectures	4	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment	:	50	Semester End Examination (3 Hours)	:	50		

Prerequisites: NONE

Course Objectives: In this course, students will learn the following topics

- Understand basic fundamentals of wireless communications.
- To know the role of equalization in Mobile communication and to study different typesof Equalizers and Diversity techniques.
- Differentiate various multiple access technique
- Demonstrate different wireless communication systems and standards (1G to 4G).

Course Outcomes: Students will be able to

CO1:Understand the fundamental concepts of Cellular & Mobile communications.
CO2:Demonstrate knowledge equalization and different diversity techniques
CO3:Compare different multiple access techniques in mobile communication.
CO4:Demonstrate different wireless communication systems and standards (1G to 4G)

UNIT – I

Cellular Mobile Communication Concepts: Evolution of mobile radio communications, Examples of wireless communication systems, Frequency re-use and channel assignment strategies, Handoff strategies, Interference and system capacity, co-channel and adjacent channel interference,Grade of service,Coverage and capacity enhancement in cellular network, cell splitting, sectoring, repeaters, microcells.

UNIT – II

Equalization: Fundamentals of equalizers, Equalizers in a communication receiver, Linear equalizers, Nonlinear equalizers: Decision feedback equalizers, Maximumlikelihood sequence Estimation (MLSE) equalizer.
Diversity Techniques: Space diversity: Selection diversity, feedback, MRC, EGC diversity, Polarization diversity, Frequency diversity, Time diversity, Rake Receiver.

UNIT – III

Multiple Access in Wireless communications: Principle and applications ofMultiple Access Techniques-FDMA, TDMA, CDMA, Spread Spectrum Multiple Access.

UNIT – IV

Wireless Generations Technologies up to 3G:1G, TDMA-based 2G, IS-95, 2.5G, 3G development, Air interface technologies , Internet speeds of 2G, 2.5G, and 3G technologies, Limitations of 3G, Quality of services (QOS) in 3G.
4GTechnology:4G evolution, Advantages of 4G over 3G, Applications of 4G, Limitations of 4G.

TEXT BOOKS:

1. Theodore S. Rappaport, Wireless Communications Principles and Practice, 2ndEdition, Pearson Education, 2003 (UNIT I, II, III).
2. G Sasibhusan Rao, Mobile Cellular Communications, Pearson Education, 2013(UNIT IV).

REFERENCE BOOKS:

1. W.C.Y. Lee, Mobile Cellular Communications, 2nd Edition, MC Graw Hill, 1995.
2. Yi-BingLin, ImrichChlamtac, Wireless and Mobile Network architectures, Wiley, 2001.
3. KamiloFeher, Wireless Digital Communications, PHI, 2003.

BAPATLA ENGINEERING COLLEGE :: BAPATLA
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Artificial Neural Networks

VIII – Semester (Code: 18ECI04)

Lectures	4	Tutorial	0		Practical	0	Credits	3			
Continuous Internal Assessment			:	50	Semester End Examination (3 Hours)			:	50		

Prerequisites: NONE

Course Objectives: In this course, students will learn the following topics

- Certain fundamental concepts of artificial neural networks.
- Basic elementary patterns classifying neural nets and the fundamental ideas of patter association.
- Basic concepts of competitive networks and brief descriptions of certain competitive Networks.
- Various applications of Neural networks in different domains.

Course Outcomes: Students will be able to

CO1: Understanding the functionality of Artificial Neural Model and implementation of different digital logics using various neural models.

CO2: Analyze the given pattern to one already stored in memory

CO3: Understanding A multilayer feed forward neural net with one or more hidden layers can learnany continuous mapping to an arbitrary accuracy.

CO4: Learn various applications of Neural networks.

SYLLABUS

UNIT – I

ARTIFICIAL NEURAL NETWORKS: **BASIC CONCEPTS**

Introduction, Computation in terms of patterns, The McCulloch-Pitts Neural Model, The Perceptron, Neural Network Architectures, Activation Functions, Learning by Neural Nets

UNIT – II

PATTERN CLASSIFIERS: Hebb Nets, Perceptrons, Adaline, Madaline.

PATERN ASSOCIATORS: Auto-associative Nets, Hetero-Associative Nets, Hopfield Networks, Bi-directional Associative Memory.

UNIT – III

COMPETITIVE NEURAL NETS: The MAXNET, Kohonen's Self Organizing Map (SOM), Learning Vector Quantization (LVQ), Adaptive Resonance Theory(ART)

BACKPROPAGATION: Multilayer Feed forward Net, The Generalized Delta Rule, The Back propagation Algorithm.

UNIT – IV

APPLICATIONS OF NEURAL NETWORKS

Applications of Neural Networks in Forecasting, Applications of Neural Networks in Healthcare, Applications of Neural Networks in Business, Applications of Neural Networks in image processing and compression, Applications of Neural Networks in control systems, Applications of Neural Networks in pattern recognition.

TEXT BOOKS

1. Introduction to SOFT COMPUTING by Samir Roy and UditChakraborty,Pearson Publishing,2013. (Unit I,II, III)

2. Introduction to Neural Networks using Matlab 6.0 by S N Sivanandam,SSumathi, S N Deepa,Tata McGraw Hill Publishing,7th Reprint, 2008(Unit IV)

REFERENCE BOOKS:

1. Jang J.S.R., Sun C.T., Mizutani E., "*Neuro-Fuzzy and Soft Computing"*, Prentice Hall, 1997.
2. Hertz J., "*Introduction to the Theory of Neural Computing"*, Addison-Wesley, 1991

BAPATLA ENGINEERING COLLEGE :: BAPATLA
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APPLICATIONS OF WAVELETS TO ENGINEERING PROBLEMS

IV B.Tech-VII Semester (18EEI01)

Lectures	4	Tutorial	1	Practical	0	Credits	4
Continuous Internal Assessment	:	50	Semester End Examination (3 Hours)	:	50		

Course Objectives: To make the students will be able to

- Illustrate different types of wavelets and digital filtering integration
- Get knowledge about the significance of Bi-orthogonal and multidimensionalwavelets
- Understand DWT and DTWT and their interpretation using orthonormal PRQMFfilter.
- Applications of wavelet transform to Engineering systems.

Course Learning outcomes: Students will be able to

CO1: Describe scaling functions, continuous wavelet transform and different wavelet functions.

CO2: Develop bi-orthogonal wavelet basis function and apply to two dimensional signals.

CO3: Apply wavelet transform for image and audio compression.

CO4: Employ wavelet transforms for different engineering applications

Course Syllabus

UNIT – I

Continuous wavelet transforms, Properties, Inverse transform, Examples of mother wavelet transform. Digital filtering interpretation, Examples of orthogonal basis –generate interpreting ortho normal MRAs for discrete time signals

UNIT – II

Bi-orthogonal Wavelets: Bi-orthogonal wavelet bases, Filtering relationship for bi-orthogonal filters, Examples of bi-orthogonal scaling functions and wavelets, two dimensional wavelets, Multidimensional wavelets and wavelet packets.

UNIT – III

Wavelet Transform And Data Compression: Introduction, Transform Coding, DTWT for Image Compression, Audio Compression, And Video Coding Using Multi-resolution Techniques: a Brief Introduction.

UNIT – IV

Applications of Wavelet Transforms: De-noising, Biomedical applications, Applications in communication system, Edge detection and object isolation, Image fusion, Electrical system protection

TEXT BOOKS:

1. Raghuveer M. Rao, Ajit S. Bopardikar, "Wavelet Transforms: Introduction to Theory & Applications", Pearson Education Asia, New Delhi, 2003
2. Agostino Abbate, Casimer M. De Cusatis and Pankaj K. Das, "Wavelets and Sub-bands Fundamentals and Applications", Pearson Education Asia, New Delhi, 2008

REFERENCE BOOKS:

1. K. P. Soman and K.L. Ramchandran, "Insight into Wavelets from theory to practice", Eastern Economy Edition, 2008
2. Stephane G. Mallat, "A Wavelet Tour of Signal Processing", Academic Press, Second Edition, 1999.

CO-PO mapping:

APPLICATIONS OF WAVELETS TO ENGINEERING PROBLEMS		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Describe scaling functions, continuous wavelet transform and different wavelet functions.	2	3	1	2	2	-	-		-	-	-	-
CO2	Develop bi-orthogonal wavelet basis function and apply to two dimensional signals.	3	3	2	1	-	-	-		-	-	-	1
CO3	Apply wavelet transform for image and audio compression.	3	2	1	1		-	-		-	-	-	1
CO4	Employ wavelet transforms for different engineering applications	2	3	2	2	2	-	-		-	-	-	2

BAPATLA ENGINEERING COLLEGE :: BAPATLA
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INDUSTRIAL ELECTRICAL SYSTEMS

IVB.Tech – VII Semester (Code: 18EEI02)

Lectures	4	Tutorial	0		Practical	0	Credits	3	
Continuous Internal Assessment			:	50	Semester End Examination (3 Hours)			:	50

Course Objectives: To make the students

- Understand the electrical wiring systems for residential, commercial and industrial consumers, representing the systems with standard symbols and drawings, SLD.
- Understand various components of industrial electrical systems.
- Analyze and select the proper size of various electrical system components.
- Solve problems involving with different AC and DC sources in electrical circuits.

Course Outcomes: Students will be able to

CO1: Demonstrate the electrical wiring systems for residential, commercial and industrial consumers, representing the systems with standard symbols and drawings, SLD.

CO2: Explain various components of industrial electrical systems.

CO3: Analyze and select the proper size of various electrical system components.

CO4: Solve problems involving with different AC and DC sources in electrical circuits.

UNIT - I

Electrical System Components: LT system wiring components, selection of cables, wires, switches, distribution box, metering system, Tariff structure, protection components- Fuse, MCB, MCCB, ELCB, inverse current characteristics, symbols, single line diagram (SLD) of a wiring system, Contactor, Isolator, Relays, MPCB, Electric shock and Electrical safety practices.

Residential and Commercial Electrical Systems: Types of residential and commercial wiring systems, general rules and guidelines for installation, load calculation and sizing of wire, rating of main switch, distribution board and protection devices, earthing system calculations, requirements of commercial installation, deciding lighting scheme and number of lamps, earthing of commercial installation, selection and sizing of components.

UNIT - II

Illumination Systems: Understanding various terms regarding light, lumen, intensity, candle power, lamp efficiency, specific consumption, glare, space to height ratio, waste light factor, depreciation factor, various illumination schemes, Incandescent lamps and modern luminaries like CFL, LED and their operation, energy saving in illumination systems, design of a lighting scheme for a residential and commercial premises, flood lighting.

UNIT - III

Industrial Electrical Systems I: HT connection, industrial substation, Transformer selection, Industrial loads, motors, starting of motors, single line diagram, Cable and Switchgear selection,

Lightning Protection, Earthing design, Power factor correction – kVAR calculations, type of compensation, Introduction to PCC, MCC panels. Specifications of LT Breakers, MCB and other LT panel components.

UNIT – IV

Industrial Electrical Systems II: DG Systems, UPS System, Electrical Systems for the elevators, Battery banks, Sizing the DG, UPS and Battery Banks, Selection of UPS and Battery Banks.

Industrial Electrical System Automation: Study of basic PLC, Role of in automation, advantages of process automation, PLC based control system design, Panel Metering and Introduction to SCADA system for distribution automation.

TEXT BOOKS:

1. H. Joshi, "Residential, "Commercial and Industrial Electrical Systems", McGraw Hill Education, 2007.
2. K. B. Raina, "Electrical Design, Estimating & Costing", New age International, 2017.
3. J. B. Gupta, "A Course in Electrical Installation Estimating and Costing", S.K. Kataria& Sons, 2013.

REFERENCE BOOKS:

1. Surjit Singh, "Electric Estimating and Costing", DhanpatRai and Co., 2016.
2. S. L. Uppal and G. C. Garg, "Electrical Wiring, Estimating &Costing", Khanna publishers, 2008.

CO-PO Mapping:

Industrial Electrical Systems 18EED52		**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**
CO1	Demonstrate the electrical wiring systems for residential, commercial and industrial consumers, representing the systems with standard symbols and drawings, SLD.	3	2	2	-	-	2	-	-	-	-	-
CO2	Explain various components of industrial electrical systems.	3	2	2	-	-	2	-	-	-	-	-
CO3	Analyze and select the proper size of various electrical system components.	3	2	2	-	2	2	-	-	-	-	-
CO4	Solve problems involving with different AC and DC sources in electrical circuits.	3	2	2	-	2	-	-	-	-	-	-

BAPATLA ENGINEERING COLLEGE :: BAPATLA
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HIGH VOLTAGE ENGINEERING

IV B.Tech – VIII Semester (Code: 18EEI03)

Lectures	4	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment			50	Semester End Examination (3 Hours)			50

Pre-requisites: Physics, Circuit Theory, Power Systems-1

Course objectives: To make the students

- Understand the breakdown phenomenon in solids, liquids and gases.
- Understand different measuring techniques in high voltages.
- Understand the testing techniques of different high voltage apparatus.
- To know the protective techniques against over voltages.

Course outcomes: At the end of the course, the student will demonstrate

CO1: Understand the basic physics related to various breakdown processes in solid, liquid and gaseous insulating materials.
CO2: Explain the generation and measurement of D. C., A.C.,& Impulse voltages.
CO3: Describe tests on H. V. equipment and on insulating materials, as per thestandards.
CO4: Illustrate the protection against over voltages.

UNIT-I

Breakdown phenomenon of Gases,Liquids and Solids: Ionization processes and de-ionization processes, Types of Discharge, Gases as insulating materials, Breakdown in Uniform gap, non-uniform gaps, Townsend's theory, Streamer mechanism, Corona discharge. Breakdown in pure and commercial liquids, Solid dielectrics and composite dielectrics, intrinsic breakdown, electromechanical breakdown and thermal breakdown, Partial discharge, applications of insulating materials.

UNIT-II

Generation of High voltages: Generation of high D. C. and A.C. voltages, generation of impulse voltages, generation of impulse currents, tripping and control of impulse generators.

UNIT-III

Measurement of high voltages and currents: Measurements of Peak voltage, impulse voltage and high direct current measurement method, cathode ray oscillographs for impulse voltage and current measurement, measurement of dielectric constant and loss factor, partial discharge measurements.Protection against over-voltages, Surge diverters, Surge modifiers.

UNIT-IV

High voltage testing techniques: Various standards for HV Testing of electrical apparatus, IS, IEC standards, Testing of insulators and bushings, testing of isolators and circuit breakers, testing of cables, power transformers and some high voltage

equipment, High voltage laboratory layout, indoor and outdoor laboratories, testing facility requirements, safety precautions in H. V. Labs.

TEXTBOOKS:

1. M.S.Naidu and V.Kamaraju , "High Voltage Engineering", McGraw Hill; 6th edition, 2020.
2. C. L. Wadhwa, "High Voltage Engineering", New Age International Publishers, 2007.

REFERENCE BOOKS:

1. Kuffel and Zungel,"High Voltage Engineering fundamentals", ELSEVIER, 2nd edition, 2008.
2. R. Arora and W. Mosch "High Voltage and Electrical Insulation Engineering", John Wiley & Sons, 2011.
3. Wolfgang Hauschild, Eberhard Lemke, "HV Laboratory Techniques and Testing", Springer; 2nd ed. 2019.

CO PO and PSO mapping:

High Voltage Engineering		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Understand the basic physics related to various breakdown processes in solid, liquid and gaseous insulating materials.	3	-	-	2	-	3	-	-	-	-	-	2
CO2	Explain the generation and measurement of D. C., A.C.,& Impulse voltages.	-	-	2	-	3	2	-	-	-	-	-	-
CO3	Describe the tests on H. V. equipment and on insulating materials, as per the standards.	3	-	-	-	-	-	-	-	-	-	-	-
CO4	Illustrate protection against over voltages.	-	-	3	-	-	-	-	2	-	-	-	-

BAPATLA ENGINEERING COLLEGE :: BAPATLA
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ELECTRICAL ENERGY CONSERVATION & AUDITING

IV-B.Tech VIII-Semester (Code: 18EEI04)

Lectures	4	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment			50	Semester End Examination (3 Hours)			50

Course objectives: To make the students

- Understand the concept of energy conservation, energy management.
- Explain the energy efficient motors and its characteristics.
- Understand the power factor improvement, lighting and different measuring instruments.
- Explain theeconomic aspects of energy management.

Course outcomes: At the end of this course, students will be able to

CO1: Examine the principles of Energy audit and its process in thermal powerstation&analyze the different aspects of energy management.

CO2: Describe the characteristics of energy efficient motors.

CO3: Illustrate the power factor improvement, good lighting system practice andthe typesof energy instruments.

CO4: Analyze the economic aspects of Energy Management.

UNIT-I

Basic Principles of Energy Audit: Energy audit - definitions, concept , types of audit, energy index, cost index , pie charts, Sankey diagrams, load profiles, Energy conservation schemes - Energy saving potential, energy audit of thermal power station, building energy audit.

Energy Management: Principles of energy management, organizing energy management program, initiating, planning, controlling, promoting, monitoring, reporting, Energy manger, Qualities and functions, language, Questionnaire - check list for top management.

UNIT-II

Energy Efficient Motors: Energy efficient motors, factors affecting efficiency, loss distribution, constructional details. Characteristics - Variable speed, variable duty cycle systems, Voltage variation -Voltage unbalance - Over motoring - Motor energy audit.

UNIT-III

Power Factor Improvement, Lighting & Energy Instruments: Power Factor Improvement, Lighting: Power factor – Methods of improvement, location of capacitors, Pf with non-linearloads, effect of harmonics on power factor. Power factor motor controllers - Good lighting system design and practice, lighting control, lighting energy audit. Energy Instruments: Watt meter, data loggers, thermocouples, pyrometers, lux meters, tong testers, application of PLC's.

UNIT-IV

Economic Aspects and Analysis: Economics Analysis - Depreciation Methods, time value of money, rate of return, present worth method , replacement analysis, life cycle costing analysis - Energy efficient motors, Calculation of simple payback method, net present worth method - Power factor correction, lighting - Applications of life cycle costing analysis, return on investment.

TEXT BOOKS:

1. Desai, Sonal, "Handbook of Energy Audit", McGraw-Hill Education, 2015.
2. W.R. Murphy and G. Mckay. EnergyManagement. Butter worth Publications.2001.
3. John. C. Andreas, Energy Efficient ElectricMotors, Marcel Dekker Inc Ltd, 2nd Edition, 1995.

REFERENCE BOOKS:

1. Bureau of Energy Efficiency India. General Aspects of Energy Management and Energy Audit. Bureau of Energy Efficiency India, 4 th edition, 2015.
2. Bureau of Energy Efficiency India. Energy Efficiency in Electrical Utilities. Bureau of Energy Efficiency India, 4 th edition, 2015.
3. Doty, Steve, and Wayne C. Turner. Energy management handbook. Crc Press, 2004.
4. Paul O' Callaghan, "Energy Management", Mc-Graw Hill Book Company, 1st Edition, 1998.
5. S. C. Tripathy, "Utilization of Electrical Energy", Tata McGraw Hill, 1993.

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CO-PO Mapping:

ELECTRICAL ENERGY CONSERVATION AND AUDITING		PO 1	PO 2	PO 3	PO 4	PO 5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	Examine the principles of Energy audit and its process in thermal power station & analyze the different aspects of energy management	3	-	-	-	-	-	-	3	2	-	1
CO2	Describe the energy efficient motors and its characteristics.	3	-	-	-	-	2	-	-	-	-	3
CO3	Illustrate the power factor improvement, lighting and different measuring instruments.	3	-	4	-	-	2	3	-	-	-	-
CO4	Analyze the economic aspects of energy management.	3	-	-	-	-	-	-	2	3	-	1

BAPATLA ENGINEERING COLLEGE :: BAPATLA
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PRINCIPLES AND APPLICATIONS OF MEMS(18EI101)

Lectures: 3	Tutorial: 1	Practical: 0	Self Study:0	Credits :3
Continuous Internal Assessment: 50			Semester End Examination (3 Hours): 50	

Course Objectives:

- Introduce the reader to the world of MEMS and their fabrication.
- Treatment of actuators and sensing from a generic standpoint and modelling strategies for selected MEMS
- Acquire the new skills of considering microtechnology based solutions to problems
- To know how MEMS are modeled

Course Outcomes:

CO1: List the advantages and applications of MEMS, list various techniques for adding materials to a substrate

CO2: List various steps in photolithography and micromachining

CO3: Define a transducer and list its characteristics, state working principles of various transducers.

CO4: To model any transducer

CO-PO-PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1:	2	2													
CO2:	1	1													
CO3:	2	2		1											
CO4:	3	3	2	2											

Syllabus :

UNIT-I

Introduction : What are MEMS? Why MEMS? How MEMS are made? Roadmap and perspective

The substrate and adding materials to it : Introduction, the silicon substrate, additive techniques: oxidation and physical vapour deposition, other additive techniques.

UNIT-II

Creating and transferring patterens-photolithography: Introduction, keeping it clean, photoresist, working with resist, masks, resolution, permanent resists.

Creating Structures-Micromachining : Introduction, bulk micromachining processes, surface micromachining, process integration.

UNIT-III

Modeling : what is modelling? The input output concept, physical variables and notation.

MEMS transducers : definition of transducer, distinguishing between sensors

and actuators, response characteristics of transducers, MEMS sensors, MEMS actuators, signal conditioning.

Piezoresistive transducers: Introduction, modeling piezoresistive transducers, Piezoresistive pressure sensor

UNIT-IV

Capacitive transducers: Introduction, capacitor fundamentals, modelling a capacitive sensor, capacitive accelerometer.

Piezoelectric transducers: Introduction, modelling piezoelectric materials, mechanical modelling of beams and plates, cantilever piezoelectric actuator.

Thermal transducers: Introduction, Basic heat transfer, hot-arm actuator.

Text Books:

1. Thomas M. Adams, Richard A Layton : Introductory MEMS : Fabrication and applications, Springer publications

Reference Books:

1. Julian W. Gardner, Vijay K Varadan, Osama O. Awadelkarim :Microsensors, MEMS, and smart devices, John Wiley and sons.

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POWER PLANT INSTRUMENTAITON (18EI102)

Lectures: 3	Tutorial: 1	Practical: 0	Self Study:0	Credits :3
Continuous Internal Assessment: 50			Semester End Examination (3 Hours): 50	

Course Objectives:

- Compare various types of power plants used to generate electricity by using Renewable and Non- Renewable energy sources.
- Understand the operation of steam generation and its components.
- Understand the operation of various types of boilers and turbines used in power plants
- Analyze the process control operation involved in power plant instrumentation.

Course Outcomes :

CO:1 Compare various types of power plants used to generate electricity by using Renewable and Non- Renewable energy sources.

CO2: Understand the operation of steam generation and its components.

CO3: Understand the operation of various types of boilers and turbines used in power plants

CO4: Analyze the process control operation involved in power plant instrumentation.

CO-PO-PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1:	3		1										2	3	3
CO2:	1		2		1	1							2	2	1
CO3:	1		2		1	1							2	2	1
CO4:	1		2		3	1							2	3	1

Syllabus :

UNIT – I

AN OVERVIEW OF POWER GENERATION: Brief survey of methods of power generation Hydro, Thermal, Nuclear, Solar wind etc. Importance of instrumentation for power generation – Thermal power plants – Building Blocks Details of the Boiler process – PI diagram of Boiler.

Non electrical parameters, flow of feed water, fuel, air and strain with correction factors for temperature, pressure, temperature level –radiation detectors – smoke density measurement, dust monitor.

UNIT – II

CONTROL LOOPS AND INTERLOCKS IN BOILER: Combustion control – control of Main header pressure, air fuel ratio control, furnace draft and excessive air control, drum level, main and reheat steam temperature control, burner tilting up, bypass damper, super heater, spray and gas recirculation controls – B.F.P. recirculation control – hot well and de-aerator level control – Pulverizer control, computers in power plants.

UNIT – III

TURBINE MONITORING AND CONTROL: Condenser Vacuum Control – gland steam exhaust pressure control – speed vibration, shell temperature monitoring and control – lubricating oil temperature control – hydrogen generator cooling system.

UNIT – IV

ANALYSERS IN POWER PLANTS: Thermal conductive type – Paramagnetic type Oxygen Analyzer, IR type and trim Analyzer – spectrum analyzer – Hydrogen purity meter – chromatography PH meter – conductivity cell – Fuel analyzer - brief survey of pollution monitoring and control equipment.

Text Books:

1. Modern Power station practice: Volume 6, Instrumentation, Controls and Testing, Pergaman Press, Oxford 1971
2. Wakil. M.M.; Power Plant Technology (McGraw Hills), 1985

Reference Books:

1. Elonka S.M. and Kohal, Standard Boiler Operations Questions and Answers, TMH, 1973

BAPATLA ENGINEERING COLLEGE :: BAPATLA
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ROBOTICS AND AUTOMATION (18EII03)

Lectures: 3	Tutorial: 1	Practical: 0	Self Study:0	Credits :3
Continuous Internal Assessment: 50			Semester End Examination (3 Hours): 50	

Course Objectives:

- To understand the basic anatomy of robots and trajectory planning
- To enable students to understand about the work envelopes of robots and its role in automation
- To give an overview of the various methods of control of robots
- To select robots based on their applications and their related issues in industrial automation

Course Outcomes :

CO1: Expertise in fundamentals of Robotics (Unit I)
CO2: Understand the issues related to end effectors and sensors (Unit II)
CO3: Acquire knowledge in Programming and control of Robots (Unit III)
CO4: Understand the issues related to implementation of Industrial Automation with Robot Applications

CO-PO-PSO MAPPING

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1:	3	2	2						2	1	2	3	2		
CO2:	2	2	3	1	2				2	2	1	1	3		
CO3:	3	3	3	1	3				2	2	2	1		2	
CO4:	2	2	2	2	2		2		3	2	2	1		3	

Syllabus :

UNIT–I

Fundamentals of Robots: Definition –Historical background- Robot Anatomy : Polar, Cylindrical, Cartesian coordinate, Joint-arm configuration–Work volume– Robot Drive System : Hydraulic, Electric, Pneumatic – Control System: Limited sequence, Play back with point to point and Continuous path control Intelligent Robots- Dynamic performance: Speed of response and Stability - Precision of movement: Spatial Resolution, Accuracy, Repeatability and Compliance – Introduction to End effectors, Robotic Sensors, Robot Programming and work cell control.

UNIT–II

Robot End Effectors, Sensors, End Effectors: Types-Mechanical grippers-Magnetic grippers, Vacuum cups, Adhesive gripper, Hooks and Scoops- Tools as end

effectors - Robot/ End-effectors, interface- Consideration in Gripper selection and Design.

Sensors: Transducers and Sensors – Sensors in Robotics: Tactile, Proximity, and Range Sensors, Miscellaneous sensors and sensor based systems- Machine Vision System.

UNIT–III

Programming and Control of Robots :Robot Programming: Methods of Programming-: Lead through Methods, Robot program as a path in space- Motion interpolation, WAIT, SIGNAL and DELAY Commands, Branching, Capabilities and limitations of Lead through Methods-

Textual Robot Programming- structure, Motion, End effectors and Sensor commands, Program control communication, Monitor mode commands Robot Control: Open and Closed loop control- control Problem- Linear control Schemes- Design of Partitioned PD, PID and Adaptive Controllers for Linear Second order SISO Model of robot and their Block schematic representation- Control of Industrial Robots Using PLCs.

UNIT–IV

Automation: Factory Automation: Fixed Automation, Flexible Automation and Programmable Automation. Intelligent Industrial Automation, Industrial Networking, Bus Standards Automatic Feeders, Automatic Storage and Retrieval Systems (AS/RS), Transfer Lines, Automatic Inspection Systems Applications of Robots, Factors influencing the selection of Robots – Robots for Welding, Painting, Assembly, Nuclear, Thermal and Chemical Plants.

Introduction to Mobile Robots, Legged Robots and Remote Controlled Robots, Automated Guided Robots, Micro Robots – Control and Safety Issues.

Text Books:

1. Groover, M.P., Weiss, M., Nagel, R.N., Odrey, N.G., Industrial Robots: Technology, Programming and Applications, McGraw-Hill Book Company, 2012.
2. Mittal R K, Nagrath I J, “Robotics and control”, Tata McGraw Hill, 2010.

Reference Books:

1. Groover, M.P., Automation, Production Systems, and Computer-Integrated Manufacturing, Prentice-Hall of India Private Limited, New Delhi, 2007
2. S.R.Deb, “Robotics Technology and Flexible Automation”, Tata McGraw Hill, 1994
3. YoranKoren, Robotics for Engineers, McGraw Hill, 1980.
4. Saeed B. Niku, An Introduction to Robotics- Analysis, Systems, Applications, Second Edition, John Wiley & Sons Inc., 2010.
5. Wesley, E. Sryda, “Industrial Robots: Computer interfacing and Control” PHI, 1985.

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SENSORS AND SIGNAL CONDITIONING (18EI104)

Lectures: 3	Tutorial: 1	Practical: 0	Self Study:0	Credits :3
Continuous Internal Assessment: 50			Semester End Examination (3 Hours): 50	

Course Objectives:

- Describe the basics of sensors, their static and dynamic characteristics, primary sensors for common quantities, working principles of resistive sensors and various methods of signal condition of resistive sensors.
- Study various reactive variation sensors and design of signal condition circuits for these sensors
- Know various self generating sensors and design of signal condition circuits for these sensors
- Understand the working principles of various digital and Intelligent sensors

Course Outcomes :

CO:1 List the characteristics of sensors and their significance

CO2: State applications of resistive sensors and design a signal conditioning circuit for a given resistive sensor.

CO3: State the working principles of self generating sensors, their applications design a signal conditioning circuit for a given self generating sensor

CO4: List various digital sensors and their applications

CO-PO-PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1:	2														
CO2:	3	3	3	2	3										
CO3:	3	3	3	2	3										
CO4:	2	2													

Syllabus :

UNIT-I

Introduction to sensor-based measurement systems: General concepts and terminology, sensor classification, general input-output configuration, static and dynamic characteristics of measurement systems, primary sensors.

Resistive sensors : potentiometers, strain gauges, resistive temperature detectors, thermistors.

Signal conditioning for resistive sensors: Measurement of resistance, voltage dividers, Wheatstone bridge-balance measurements, Wheatstone bridge-deflection measurements, differential and instrumentation amplifiers, interference.

UNIT-II

Reactance variation and electromagnetic sensors: capacitive sensors, inductive sensors-variable reluctance sensors, eddy current sensors, linear variable differential transformer, electromagnetic sensors.

Signal conditioning for reactance variation sensors: problems and alternatives, ac bridges, carrier amplifiers and coherent detection, specific signal conditioning for capacitive sensors.

UNIT-III

Self generating Sensors: thermocouples, piezoelectric sensors, photovoltaic sensors, electrochemical sensors.

Signal conditioning for self-generating sensors: Chopper and low-drift amplifiers, electrometer and transimpedance amplifiers, charge amplifiers, noise in amplifiers, noise and drift in resistors.

UNIT-IV

Digital and Intelligent sensors: Position encoders, resonant sensors, variable oscillators, conversion to frequency, period or time duration, direct sensor-microcontroller interfacing, communication systems for sensors, intelligent sensors.

Text Books:

1. Raman Pallas – Areny, John G. Webster :Sensors and signal conditioning, second edition, John Wiley and sons.

Reference Books:

1. Walt Kester : Practical design techniques for sensor signal conditioning, Analog devices and Prentice Hall.

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Introduction to Data Analytics
IVB.Tech – VIII Semester (18IT101)

Lectures	:	4 Periods/Week	Tutorial	:	0	Practical	:	0
CIA Marks	:	50	SEE Marks	:	50	Credits	:	3

Prerequisites:

Course Objectives: Students will be able to:

- Understand the use of R, Basics of R, Advanced data structures, reading/writing data into R.
- Understand the basic & advanced data management, manipulate data using SQL statements and visualization of data using different plots.
- Understand the normal, binomial distributions, correlation and covariance, T-test, ANOVA, Manipulation string, and Linear models.
- Understand the cluster analysis and classification.

Course Outcomes: After the course the students are expected to be able to:

CO 1: Import, review, manipulate and summarize data-sets in R.
CO 2: Understand advanced data structures like vectors, lists, matrices, arrays and data frame.
CO 3: Understand normal and binomial distributions and apply basic and advanced statistical tools.
CO 4: Understand the difference between Supervised and Un-supervised Machine Learning Algorithms.

Mapping of Course Outcomes with Program Outcomes:

CO/PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	2						1					
CO 2				3	2							
CO 3				3	2							
CO 4				3	2							

Mapping of Course Outcomes with Program Specific Outcomes:

CO/PSO	PSO 1	PSO 2	PSO 3
CO 1		1	2
CO 2		1	2
CO 3		1	2
CO 4		1	2

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Syllabus:

UNIT – I **(14 Periods)**

Introduction to R - Why use R?, Obtaining and installing R, The R Environment - Command line interface, RStudio, R Packages - Installing packages, loading packages, Building packages, Basics of R - basic Math, variables, Data types, vectors, calling function, function documentation, missing data. Advanced Data Structures- data.Frames, Lists, Matrices, Arrays, Reading Data into R-Reading CSVs, Excel data, reading from databases.

UNIT – II **(14 Periods)**

Basic Data Management - A working example, creating new variables, recoding variables, renaming variables, missing values, date values, type conversion, sorting data, merging data set, sub-setting datasets, Using SQL statement to manipulate data.

UNIT – III **(14 Periods)**

Normal distribution, binomial distribution, summary statistics, correlation and covariance, T-test, ANOVA, paste, sprintf, extracting text, regular expression, Simple linear regression, multiple linear regressions.

UNIT – IV **(14 Periods)**

Cluster Analysis-common steps in cluster analysis, calculating distances, Hierarchical cluster analysis, Partitioning cluster analysis, avoiding nonexistence clusters, Preparing the data, logistic regression, decision trees, random forests, support vector machines, choosing a best predictive solution.

TEXT BOOK:

1. R for Every One, Advanced analytics and graphics by Jared P Lander, Addison Wisley Data and Analytics series, 2017, 2nd edition.
2. R in Action, Data Analysis and graphics with R, Robert L Kaacoff, Manning Publisher,2015, 2nd edition.

REFERENCE BOOKS:

1. Beginning R by Dr.Mark Gardener, Wrox publisher, 2012, 1st edition.
2. Associate Analytics Facilitator Guide provided by NASSCOM.

http://183.82.43.252/~gopam/html/NASSCOM.

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CYBER SECURITY
IV B.Tech – VII Semester (18IT102)

Lectures	:	4 Periods/Week	Tutorial	:	0	Practical	:	0
CIA Marks	:	50	SEE Marks	:	50	Credits	:	3

Prerequisites:

Course Objectives: Students will be able to:

- Understand about Security basics and Cryptographic algorithms.
- Understand how to secure computer system with Cryptographic algorithms and data integrity.
- Identify hacking basics information and privacy concepts.
- Gather the matter about Security in the networks & analyze, and various types of attacks in the computer system.

Course Outcomes: After the course the students are expected to be able to:

CO 1: Use basic security information and cryptographic algorithms.
CO 2: Explain principles of operation of Asymmetric Encryption techniques and integrity algorithms.
CO 3: analyze hacking techniques and privacy concepts.
CO 4: Add security feature to computer networks and improve computer security.

Mapping of Course Outcomes with Program Outcomes:

CO/PO	PO 1	PO 2	PO 3	PO4	PO 5	PO 6	PO7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	2	2	3	2	3					2	2	2
CO 2	2	3	2	2	2					2	2	2
CO 3	2	2	2	2	2		2	2		2		2
CO 4	2	2	2	2	2					2	2	2

Syllabus:

UNIT – I **(16 Periods)**

Int. to Computer Security: Definition of Computer Security, the OSI Security Architecture, Security Attacks, Security Services, Security Mechanisms and A Model for Network Security.
Symmetric Ciphers: Classical Encryption Techniques, Block Ciphers and the DES, AES Techniques.

UNIT – II **(14 Periods)**

Public Key Cryptography: Principles of Public-Key Cryptosystems, The RSA algorithm and Diffie Hellman Key Exchange Algorithm.

Digital Signatures: Properties, Attacks and Forgeries, Digital Signature Requirements, Direct Digital Signature and Elgamal Digital Signature Scheme.

UNIT – III **(14 Periods)**

Hacking: Basic Terminology, Hacker's Motives and Objectives, Hacker Classes, Hacking Phases and Role of an Ethical Hacker.
Privacy in Cyberspace: Privacy Concepts, -Privacy Principles and Policies, Privacy on the Web, Email Security, Privacy Impacts of Emerging Technologies.

UNIT – IV **(16 Periods)**

Information gathering tools: Recon-ng, Dmitry, Net discover and Nmap.
Network Scanning: Objectives of Network Scanning, TCP/IP protocol stack, Types of Network Scanning.
Security of Computer Systems: Malware attacks, Password attacks.

TEXT BOOK:

1. Cryptography and Network Security - Principles & Practice by William Stallings, 7th *edition*, Prentice Hall

REFERENCE BOOKS:

1. Cryptography and Network Security by Behrouz A. Forouzan and DebdeepMukhopadhyay 3rd*ed*, Mcgraw-Hill Education, 2016.
2. CISSP All-in-One Exam Guide, Seventh Edition 2016 by Shon Harris and Fernando Maymi McGraw-Hill Education.
3. Gray Hat Hacking: The Ethical Hackers Handbook 4th Edition by Allen Harper, Shon Harris McGraw-Hill Education.
4.Charles P. Pfleeger Shari Lawrence Pfleeger Jonathan Margulies, Security in Computing,5th Edition , Pearson Education , 2015.

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MOBILE APPLICATION DEVELOPMENT

IV B.Tech – VIII Semester (18IT103)

Lectures	:	4 Periods/Week	Tutorial	:	0	Practical	:	0
CIA Marks	:	50	SEE Marks	:	50	Credits	:	3

Prerequisites: Object Oriented Programming using Java

Course Objectives: Students will be able to:

- Understand basic concepts of Android platform.
- Learn Android UI palette.
- Familiarize with Building blocks of Android App.
- Understand working with Mobile hardware in Apps.

Course Outcomes: After the course the students are expected to be able to

CO 1: Apply Java programming concepts to Android App development.

CO 2: Develop User interfaces for Android Apps.

CO 3: Use the mobile sensors, google maps & multimedia in Apps.

CO 4: Develop a full featured Android Apps.

Mapping of Course Outcomes with Program Outcomes:

CO/PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	3	3		3		2		2	2	2	
CO 2	3				2		1		2	2		
CO 3	3		3		3		2				2	
CO 4	1								2	1	2	

Mapping of Course Outcomes with Program Specific Outcomes:

CO/PSO	PSO 1	PSO 2	PSO 3
CO 1	1		
CO 2	1		
CO 3		1	2
CO 4		2	

Syllabus:

UNIT – I **(14 Periods)**

Introduction: Android background, Android SDK features, Android Software Stack, Android Development Tools, Types of Android applications, Hardware imposed design considerations, Practical application design considerations.

Creating Applications & Activities: Creating basic Android application using Android Studio, Exploring Android Studio IDE, Application Manifest file, Using the Manifest Editor, Using Resources.The Activity Life Cycle.

Building User Interfaces: Basic Views, Picker views, List views, View Groups, Android Layouts, Fragments - Fragment Life Cycle, working with Android fragments, using Adapters.

UNIT – II **(14 Periods)**

Advanced Views: Image View, Grid View, Image Switcher, Working with Menus, Web View, Working with Dialogs – Alert Dialog, Progress Dialog, Date Picker Dialog, Time Picker Dialog, Character Picker Dialog.
Intents and Broadcast Receivers: Using Intents to launch Activities, Returning results from Activities, Using intents to broadcast events; Pending Intents, Intent filters & Broadcast Receivers - using Intent Filters to service Implicit Intents, Listening for Native Broadcast Intents.
Files, Saving State & Preferences: Working with the File System, Saving & Restoring Activity Instance state using Life cycle Handlers, Saving & Retrieving Shared Preferences.
Using Internet Resources: Downloading files using Download Manager.

UNIT – III **(14 Periods)**

Databases: SQLite, Content Values & Cursors, Working with SQLite databases.
Content Providers: Creating Content Providers, Using Content Providers, Native Android Content Providers.
Messaging & Notifications: Sending SMS & MMS using Intents, sending SMS using SMS Manager, Receiving SMS Messages. Notifications - Creating Notifications, Using Standard Notification UI, Creating a Custom Notification UI, Triggering, Updating & Canceling Notifications.
Working in the Background: Creating and Controlling Services, Binding Services to Activities. Creating and Running Asynchronous Tasks, Manual Thread Creation.

UNIT – IV **(14 Periods)**

Hardware Sensors: Supported Android Sensors, Virtual Sensors, Monitoring Sensors, Interpreting Sensor values, using Accelerometer & Proximity sensors.
Maps & Location Based Services: Using the emulator with location based services, Finding and Tracking your location, using proximity alerts, using the Geocoder, map based activities.
Audio, Video and using the Camera: Playing Audio and Video, Recording Sound, Recording Video, using Camera.

TEXT BOOK:

1. **"Professional Android 4 Application Development",** Reto Meier, John Wiley & Sons, Inc., 2012.
2. **"Beginning Android Programming with Android Studio",** J. F. DiMarzio, 4th edition, John Wiley & Sons, Inc., 2017.

REFERENCE BOOKS:

1. **Head First Android Development -** A Brain Friendly Guide, Dawn Griffiths & David Griffiths, O' Reilly.
2. **Introduction to Android Application Development - Developer's Library,** Joseph Annuzzi, Jr.Lauren Darcey& Shane Conder, 5th ed., Addison-Wesley.

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WEB TECHNOLOGIES

IV B.Tech – VIII Semester (18IT104)

Lectures	:	4 Periods/Week	Tutorial	:	0	Practical	:	0
CIA Marks	:	50	SEE Marks	:	50	Credits	:	3

Prerequisites: C Programming (18CS001)

Course Objectives: Students will be able to:

COB 1: Analyze a web page and identify HTML elements and their attributes.
COB 2: Build dynamic web pages using JavaScript (client side programming).
COB 3: Write a well formed / valid XML documents.
COB 4: Understand Web server and its working also working with Ajax for asynchronous communication.

Course Outcomes: After the course the students are expected to be able to:
CO 1: Design web pages with different elements and attributes.
CO 2: Build websites with dynamic functionality using java script.
CO 3: Identify the functionality of XML and create an XML document and display data from XML document.
CO 4: Recognize the use of web servers and know the functionality of web servers.

Mapping of Course Outcomes with Program Outcomes:

CO/PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	0	2	2	1					1	2	3	2
CO 2			1							1		3
CO 3			1									
CO 4		2	3	2		1	2	1	2	2	3	3

Mapping of Course Outcomes with Program Specific Outcomes:

CO/PSO	PSO 1	PSO 2	PSO 3
CO 1		2	
CO 2			
CO 3		2	
CO 4			

Syllabus:

UNIT – I **(14 Periods)**

Introduction to HTML5 Part I, Introduction to HTML5 Part II, Cascading Style Sheets I, Cascading Style Sheets II, **JavaScript:** Introduction to Scripting, Control Statements I, Control Statements II, Functions,

Arrays.

UNIT – II **(14 Periods)**

JavaScript: Objects, Dynamic HTML: Document Object Model and Collections, Event Model, HTML5 Introduction to Canvas

UNIT – III **(14 Periods)**

XML: Introduction, XML Basics, Structuring data, XML Namespaces, DTD, XSD, XSL Transformations.

UNIT – IV **(14 Periods)**

Building Ajax-Enabled Web Applications, Web Servers (IIS and Apache), Working with JQuery

Programming Exercises for Unit - IV:

TEXT BOOK:

1. Harvey M. Deitel and Paul J. Deitel, "Internet & World Wide Web How to Program", 5/e, PHI.
2. Kogent Learning Solutions Inc.,HTML5 Black Book: "Covers CSS3, Javascript, XML, XHTML, Ajax, PHP and Jquery".

REFERENCE BOOKS:

1. Jason Cranford Teague, “Visual Quick Start Guide CSS, DHTML & AJAX”, 4e, Pearson Education.
2. Tom NerinoDoli smith, “JavaScript & AJAX for the web”, Pearson Education 2007.
3. Joshua Elchorn, “Understanding AJAX”, Prentice Hall 2006.

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Institutional Elective-I (in VII semester – position as 6th theory subject)

FLUID POWER& CONTROL SYSTEMS

18MEI 001

IVYearB.Tech.Seventh Semester

Lectures	4	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment	:	50		Semester End Examination (3 Hours)	:	50	

Course Objectives:

- To acquire knowledge in fluid power sources, power utilization and trouble shooting
- To understand and develop hydraulic circuits for various applications
- To understand and develop pneumatic circuits used in automation.
- To understand the importance and uses of accumulator

Course Outcomes:

At the end of the course students will be able to

CO1: Categorize fluid power systems and understand the working of hydraulic power sources andactuators

CO2: Illustrate the construction and working of control elements in hydraulic and pneumatic circuits.

CO3: Select suitable pneumatic circuit for various industrial applications.

CO4: Understand the function of an accumulator and Identify faults in hydraulic systems and maintenance of hydraulic system

UNIT-I

Introduction: Fluid Power, Basic Law, Application of Fluid Power, Advantages of Fluid Power Systems, Types of Fluid Power Systems.

Hydraulic Systems: Pumps – Gear Pumps and Vane Pumps. Selection and Specification of Pumps. Hydraulic Actuators: Linear and Rotary Actuators.

UNIT-II

Control and Regulation Elements: Pressure, Flow and Direction Control Valves Hydraulic Circuits: Reciprocation, Quick Return, Sequencing, Synchronizing Circuits, Industrial Circuits - Punching Press Circuit, Milling Machine Circuits

UNIT-III

Introduction to Pneumatic Systems: Pneumatic fundamentals, Pneumatic Valves Pneumatic Circuits: Pneumatic circuits- Basic pneumatic circuit, Quick exhaust circuit, feed control circuit and Time delay circuit.

UNIT-IV

Hydraulic Circuits: Accumulators, Accumulator Circuits – Leakage Compensation, Auxiliary Power Source, Emergency Source of Power Maintenance of Hydraulic Systems: Maintenance of Hydraulic Systems, Trouble Shooting of Hydraulic System.

TEXT BOOKS

1. Anthony Esposito 'Fluid Power with applications" Pearson Education.
2. Andrew Parr " Hydraulics and Pneumatics-A technicians and engineers guide" Jaico publishing co

REFERENCE BOOKS

1. W.Bolton,"Pneumatic and Hydraulic systems" Butterworth-Heinemann

Web page references

1. https://www.grc.nasa.gov/www/k-12/WindTunnel/Activities/Pascals_principle.html
2. http://www.vickers.sh.cn/pdfs/M-SRSR-MC001-E.pdf
3. http://file.seekpart.com/keywordpdf/2011/3/31/20113319837232.pdf
4. http://www.associatedgroups.com/EATON-CAT/pdfs/i3155s.pdf

CO-PO MAPPING

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	1											1	2	
CO2		2		1											
CO3	2	2												3	
CO4	1	3	1										2		

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INSTITUTIONAL ELECTIVE

PROJECT MANAGEMENT

18MEI 002

IV Year B.Tech. Seventh Semester

Lectures	4	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment	:	50		Semester End Examination (3 Hours)	:	50	

Course Objectives:

The course is aimed at project planning and control before implementing any project.
The objectives are,

- To acquire the knowledge of planning a project.
- To perform SWOT analysis of project
- To use PERT and CPM techniques in implementing a project
- To learn to manage a project
- To control the project and evaluate it.

Course Outcomes:

At the end of the course, the student will be able to

CO1: Discuss the project life cycle and its phases
CO2: Develop an example of Work Breakdown Structure
CO3: Express the project plan through a network
CO4: Identify different project selection methods.
CO5: Identify the critical path of a given project
CO6: Carryout risk analysis using PERT method
CO7: Schedule the resources for a given project and prepare the relevant costs
CO8: Develop an organization structure for a given project and identify the appropriate leadershipstyle
CO9: Explain the ways of performance appraisal of project team

UNIT - I

Introduction to the course and to Project Management - Definitions, scope and contents, Relevance, Classification of Projects, Defining the Project, Project Life Cycle, WBS, Project Life cycle, Developing a project Plan, Network analysis, Exercises 14

UNIT - II

Critical path method, Risk analysis, PERT; problems, Reducing Project Duration 14

UNIT - III

Estimating project Times and Costs, Scheduling Resources and Costs, problem solving, Progress and Performance Measurement 14

UNIT - IV

Organization – Structure and Culture, Designing a structure for a project, Leadership styles, Leading, Managing Project Teams. The Project Management Maturity Model (PMMM) 14

TEXT BOOKS

1. Harold Kerzner, "*Project Management*", 8th Edition, Wiley, New York, 2003. (pdf available)
2. Project Management: The Managerial Process, Erik W. Larson, and Clifford F. Gray. McGraw-Hill Higher Education

REFERENCE BOOKS

3. A Guide to the Project Management Body of Knowledge (PMBOK guide), PMI, 2017
4. Prasanna Chandra, "*Projects – Planning, analysis, selection, implementation and review*",Tata McGraw-Hill, New Delhi, 2010.

CO-PO MAPPING

Course Outcomes	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	1		2		2			2	1					2	1
CO2			2				2								
CO3		1			1				1			1		1	1
CO4	3		2		2	2				2		2			2
CO5															

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INSTITUTIONAL ELECTIVE
NON-CONVENTIONAL ENERGY SOURCES
18MEI 003
IV Year B.Tech. Seventh Semester

Lectures	4	Tutorial	0	Practical	0	Credits	3
Continuous Internal Assessment	:	50	Semester End Examination (3 Hours)	:	50		

Course Objectives:

- CO 1: To enable students to identify different sources of non-conventional energy and innovativeTechnologies in harnessing energy from these sources.
- CO 2: Understand the energy conversion from wind energy, geothermal energy, Biomass, biogas, fuel cells.
- CO 3: Understand the advantages and limitations of different non-conventional energy sources andidentify a wide variety of applications for non-conventional energy.

Course Outcomes: At the end of the course, the student will be able to
CO-1: Understand different methods of exploiting solar energy.
CO-2: Understand the principles and energy conversion from wind and geo thermal sources
CO-3: Gain knowledge in exploring the energy from ocean, tidal and bio-mass
CO-4: understand the techniques in power generation using Fuel cells, bio gas and MHD

UNIT-I

Various non-conventional energy resources- Introduction, availability, classification, relative merits and demerits

Solar Energy: Extra terrestrial solar radiation - terrestrial solar radiation –solar radiations on earth-measurement of solar radiations-solar constant-solar collectors-flat plate collectors-concentrating collectors-solar thermal conversion-solar thermal central receiver systems - photovoltaic energy conversion - solar cells- energy storage methods-applications of solar energy

UNIT-II

Wind energy: Availability of wind energy in India, site selection-Components of wind energy conversion systems-Classification of wind energy conversion systems-vertical axis and horizontal axis wind turbines-Performance characteristics-Betz criteria coefficient-applications of WECS-environmental aspects

Geo thermal Energy: Structure of earth's interior-geothermal sites-geothermal resources-Site selection for geothermal power plants-Principle of working-various types of geothermal power plants-applications

UNIT-III

Ocean thermal energy conversion (OTEC): Principle of ocean thermal energy conversion-Open cycle and closed cycle OTEC plants-Merits and demerits

Tidal Power: Tides and waves as sources of energy-fundamentals and use of tidal energy-limitations of tidal energy conversion system
Bio mass: Availability of biomass and its conversion techniques-bio mass gasification-bio mass resource development in India

UNIT-IV

Bio Gas: Bio gas production, aerobic and anaerobic bio conversion process-Properties of bio gas-classification of biogas plants-advantages and disadvantages-bio gas applications
Fuel Cells: Classification, Principle of working of various types of fuel cells, merits and demerits, future potential of fuel cells.
Magneto-Hydrodynamics (MHD): Principle of working of MHD Power plant, Classification, advantages and disadvantages.

TEXT BOOK:

1. H.P. Garg& Jai Prakash, Solar Energy: Fundamentals and Applications, Tata McGraw Hill, New Delhi
2. Non-Conventional Energy Sources by G.D.Rai, Khanna Publisher
3. B H Khan, "Non-Conventional Energy Resources", 2nd Edition, Tata McGraw Hill Education Pvt Ltd, 2011

REFERENCE BOOKS:

1. Power plant technology by EL-Wakil, McGraw-Hill.
2. Renewable Energy Sources by John Twidell& Toney Weir: E&F.N. Spon

CO-PO MAPPING

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1		2		2			2	1					2	1
CO2			2				2								
CO3		1			1				1			1		1	1
CO4	3		2		2	2				2		2			2

BAPATLA ENGINEERING COLLEGE :: BAPATLA
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INSTITUTIONAL ELECTIVE

AUTOMOBILE ENGINEERING

18MEI 004

IVYear B.Tech. Eight Semester

Lectures	4	Tutorial	0		Practical	0	Credits	3			
Continuous Internal Assessment			:	50	Semester End Examination (3 Hours)			:	50		

Course Objectives:

To make the students to

- Familiarize the fundamentals of Engine Components, Chassis and suspension system, braking and transmission system, and cooling and lubrication system.
- Develop a strong base for understanding future developments like hybrid and electric vehicles in the automobile industry.

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

CO1: List different types of Vehicles and their applications
CO2: Define working of Automobile Engine cooling and lubrication system.
CO3: Describe functioning of Ignition system and its accessories.
CO4: Describe functioning of Transmission, Steering, Braking and Suspension system.
CO5: Understand the working and layout of Hybrid and electric vehicles and their components

UNIT-I

INTRODUCTION: Classification of vehicles – applications, valves, valve arrangements and operating Mechanisms, Piston - design basis, types, piston rings, firing order; Crankshafts, Flywheel, Air and Fuel Filters, Mufflers. (8)

FUEL SUPPLY SYSTEMS: Fuel supply pumps, Mechanical and Electrical type Diaphragm pumps. (3)

COOLING SYSTEMS: Need for cooling system, Air and water cooling, Thermal syphon cooling systems (4)

UNIT-II

LUBRICATING SYSTEMS: Various lubricating systems for I.C. Engines. (3)

ELECTRICAL SYSTEM: Ignition system, Spark plugs, Distributor, Electronic Ignition, Alternator, cut out, Current and voltage regulators, charging circuit, starting motors, lighting, instruments and accessories. (9)

CHASSIS: Introduction, Construction, Requirements of Chassis. (3)

UNIT-III

TRANSMISSION: Gear Box - Theory, Four speed and Five Speed Sliding Mesh, Constant mesh & synchromesh type, selector mechanism, automatic transmission, overdrive, propeller shaft, differential - principle of working. (8)

SUSPENSION SYSTEMS: Need for suspension systems, springs, shock absorbers, axles – front and rear, different methods of floating rear axle, front axle and wheel alignment. (7)

UNIT-IV

VEHICLE CONTROL: Steering mechanisms and power steering, types of brakes and brake actuation mechanisms (air and hydraulic). (6)

ELECTRIC, HYBRID AND FUEL CELL VEHICLES: Layout of electric and hybrid vehicles – Advantages and drawbacks, System Components, Electronic control system, Different configurations of electric and hybrid vehicles hybrid vehicles, Power split device, High energy and power density batteries – Basics of fuel cell vehicles. (9)

TEXT BOOKS

1. Automobile Engineering - G.B.S.Narang.
2. Automobile Engineering -R.B.Gupta
3. Automobile Engineering - Vol I & II - Kirpal Singh

REFERENCE BOOKS

1. Automotive Mechanics - Joseph Heitner
2. Automobile Engineering -S.Srinivasan

CO-PO MAPPING

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	2	1	1		2		1			1	2	1	1	1
CO2	1	2	2	1	1	2	2	1		1	1	2	1	1	1
CO3	2	1	2	1		1		1		1	2	2	1		1
CO4	1	2	2		2	2				2	1	3	1		1
CO5	2	2	2	2		2		2			2	2	2	2	2

BAPATLA ENGINEERING COLLEGE :: BAPATLA
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GRAPH THEORY
(OPEN ELECTIVE)
18 MA006 (3Th, 3 credits)
IV B.Tech, VII Semester

Lectures	:	3 Hours/Week	Continuous Assessment	:	50
Final Exam	:	3 hours	Final Exam Marks	:	50

Course Objectives

In this course, students will learn the following :

1. Understand the basic concepts of Graph Theory.
2. Check whether two graphs are isomorphic.
3. Determine whether the given graph is Eulerian and Hamiltonian Also explain Travelling salesman problem using Graphs.
4. Define the terms Tree, rooted tree, binary tree, and Spanning tree.
5. Apply Kruskal's algorithm and Prim's algorithm to find minimum spanning tree in a weighted connected graph.
6. Discuss the planarity of a graph, Euler's formula , dual of a graph, Kuratowski's theorem on planarity
7. Find the chromatic number of a graph and Explain Four-color-problem.
8. Study the properties of graphs through their matrix representation like incidence matrix , adjacency matrix and other related sub matrices

S.No	Outcome	Knowledge Level
CO-1	Discuss the baisc concepts of graph theory and able to determine whether a graph is Eulerian and Hamiltonian	K2
CO-2	Apply Kruskal's and Prim"s algorithms in order to determine the minimum spanning tree in a connected weighted graph.	K3
CO-3	Determine the planarity of a graph usningKuratowski's algorithm and find the chromatic number of a given graph.	K3
CO-4	Analyze the properties of graphs through matrix representation and utilize these ideas in the application	K4

	of switching network

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C01	2	2		1								
C02	2	2		2								
C03	2	3		1								
C04	3	2		2								

UNIT - I

PATHS AND CIRCUITS:

Introduction: Graphs: Graph, Finite and infinite graphs, Incidence and degree, isolated vertex, pendent vertex and null graph; Isomorphism; Sub graphs; walks, paths and circuits; Connected graphs, Disconnected graphs and Components; Euler graphs(Konigsberg Bridge Problem); Hamiltonian Paths and circuits; Travelling salesman problem.

[Sections: 1.1; 1.3; 1.4; 1.5; 2.1; 2.2; 2.4; 2.5; 2.6; 2.9; 2.10] [12 Hours]

UNIT – II

TREES AND FUNDAMENTAL CIRCUITS: Trees; Some Properties of Trees; Distance and centers in a Tree; Rooted and Binary Trees; Spanning Trees; Fundamental circuits; Spanning Trees in a Weighted graphs(Kruskal's Algorithm and Prim's Algorithm).

[Sections:3.1; 3.2; 3.4; 3.5; 3.7; 3.8; 3.10] [12 Hours]

UNIT – III

PLANAR AND DUAL GRAPHS: Planar graphs; Kuratowski's two graphs; Different Representations of a Planar graph: Euler's formula, Theorem-5.6 and Corollary; Detection of planarity (Kuratowski's theorem); Geometric Dual; Coloring of a Graph, Chromatic number, the four Color problem.

[Sections: 5.2; 5.3; 5.4; 5.5; 5.6; 8.1, 8.6] [12 Hours]

UNIT – IV

MATRIX REPRESENTATION OF GRAPHS: Incidence Matrix; Sub matrices of A(G); Circuit Matrix; Fundamental Circuit Matrix and Rank of B; Application to a switching network; Cut-set Matrix; Relationship among A_f, B_f and C_f; Path Matrix; Adjacency Matrix.

[Sections:7.1; 7.2; 7.3; 7.4; 7.5; 7.6; 7.7; 7.8; 7.9] [12 Hours]

TEXT BOOK:

1. NarsinghDeo, 'Graph Theory with Applications to Engineering and Computer Science' Prentice-Hall of India Private Limited, New Delhi.

REFERENCE BOOK:

1. Douglas B. West "Introduction to graph Theory" Pearson Education Private limited, Delhi, 2002.

BAPATLA ENGINEERING COLLEGE :: BAPATLA
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18PHI01	Nano Materials and Technology	**even sem**	**3-0-0**	**3credits**

Course out comes: After completion of the course student will be able to:

CO 1	**Scale up synthesis of nanomaterials and understand quantum confinement**
CO2	**Understand properties of nanomaterials and nano tubes**
CO3	**Know the characterisation techniques of nano materials**
CO4	**Know the usage of nano particles in nano biology and nano medicine.**

CO-PO Mapping:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3											
CO2	3											
CO3	2			2								
CO4	2				2							

UNIT-1

INTRODUCTION TO NANO TECHNOLOGY: history of Nano materials nano scale, conventional and Nano materials differences, quantum confinement, quantum wells, quantum wires, quantum dots, surface to volumeratio, nanoceramics, nanocomposites and nanoclusters .

SYNTHESIS OF NANOMATERIAL: Bottom up and top down approaches, cryo rolling, high energy ball milling, chemical vapour deposition, solgel method, laser ablation, rapid solidification processing, equal channel angular extrusion, molecular beam epitaxy, sputtering ,hydrothermal method, physical vapour deposition and electro deposition.

UNIT-2

PROPERTIESOFNANOMATERIALS: Electrical, magnetic, optical, physical, chemical, mechanical, thermal and electro-chemical properties.

CARBON NANOMATERIALS: Nanotubes, graphene, bucky balls, nano horns, properties of carbon nanotubes, synthesis of carbon nano materials, application of carbon nano tubes.

UNIT-3

CHARACTERIZATION OF NANO MATERIALS: X-ray diffraction, scanning electron microscopy, uv-visible spectroscopy, scanning tunnelling microscopy, differential thermal analysis and differential scanning calorimetry , FTIR.

UNIT-4

APPLICATION OF NANOMATERIALS: Electronics, computers, biomedical, mechanical, chemical, coatings, optoelectronic, environmental, sensors, aerospace, textiles, cosmetics and medical applications.

TEXT BOOKS:

1. Kulkarni SulabhaK, Nanotechnology: Principles and Practices, capital publishing company , 2007.
2. Stuart M.Lindsay, Introduction to nano science , Oxford University Press,2009.
3. Robert Kelsall, IamHamley, Mark Geoghegan, Nanoscale, Scince and Technology, John Wiley&Sons,2005.

BAPATLA ENGINEERING COLLEGE :: BAPATLA
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18PHI02	**FIBER OPTICS COMMUNICATIONS**	**even sem**	**3-0-0**	**3credits**

Course out comes: After completion of the course student will be able to:

CO1	**identify signal degradation and losses in optical fibers.**
CO2	**understand power launching and coupling in optical fibers .**
CO3	**compute optical fiber link design parameters .**
CO4	**measure optical parameters and optical signal losses.**

CO-PO-Mapping:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2										
CO2	3	1										
CO3	2		2									
CO4	2			1	1							

UNIT-1

Fiber optical wave guides : Introduction ,total internal reflection ,types of fibers, planar dielectric wave guide, optical fiber wave guides-inter-modal dispersion ,single mode fibers, low dispersion fibers.
Signal degradation in optical fibers: Attenuation, Absorption, Scattering losses, Radioactive losses signal distortion in optical wave guides, information capacity determination, intra model dispersion (material dispersion, wave guide dispersion**)**

UNIT-2

Power launching and coupling: Source to fiber power launching, source output pattern power-coupling calculation, power launched verss wave length, equilibrium numerical. Aperture lensing schemes for coupling improvement nanimaging micro sphere. Laser diode-to-fiber-coupling, fiber-to-fiber joints, mechanical misalignment, fiber-related losses, fiber end face preparation, fiber splicing optical fiber connectors**.**

UNIT-3

Transmission link analysis :point –to-point links, system consideration, link power budget, rise time budget ,transmission distance for single model links ,wave length division multiplexing (WDM) passive components ,the 2x2 fiber coupler ,the 2x2 wave guide coupler ,star coupler ,local area network .

UNIT-4

Measurement attenuation Measurement ,the cut back technique,insertion loss method optical time domain reflectometer.dipersion measurement – inter modal diaspersion,time domainter modal diaspersion measurement ,Frequency domain inter modal diaspersion measurement,OTDR fiber application ,OTDR Trace ,attenuation measurments fiberfault location.

TEXT BOOKS:

1. WillamJ & Hawkes F.B opto electronics: An introduction.(PHI)
2.Gerd Keiser optical fiber communication (3 rd edition McGraw Hill)

Reference Books:

1. A .Selvarajan , S .Kar,and T.SRINIVAS , fiber optic communications ,Tata Mc GrawHill,2002.
2. D.C Agarwal "fiber optics in communications "Wheeler publishing,1993.

BAPATLA ENGINEERING COLLEGE :: BAPATLA
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18PHI03	ADVANCED MATERIALS	odd sem	3-0-0	3credits

Course Objectives:

CO1	**To acquire knowledge on synthesis and properties of nano and bio materials**
CO2	**To educate the student on characteristics and usage of composite and optical materials.**
CO3	**To possess the knowledge on properties and applications of superconducting materials.**
CO4	**To know the functionality of smart materials and their adoption in real time applications**

Course Outcomes: **After the completion of course the student is able to**

CLO1	**Understand the importance of nano-materials, their characteristics and applications.**
CLO2	**Identify, describe and evaluate the properties of fibre reinforcements, polymer materials and optical materials.**
CLO3	**Advance their knowledge in phenomenon of superconductivity and applications.**
CLO4	**Explain the strengths and weaknesses of a smart material and surface acoustic wave materials into the design of a product in various applications.**

CO-PO-Mapping:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3											
CO2	2	2										
CO3	2			2								
CO4	2	2										

UNIT-I

Nano Materials: Origin of nano technology, Classification of nano materials, Physical, chemical, electrical, mechanical properties of nano materials. Preparation of nano materials by plasma arcing, physical vapour deposition, chemical vapour deposition (CVD), Sol-Gel, electro deposition, ball milling, carbon nano tubes(CNT).Synthesis, preparation of nanotubes, nano sensors, Quantum dots, nanowires,nano biology, nanomedidcines.

Biomaterials: Overview of biomaterials. Biomaterials, bioceramics, biopolymers, tissue grafts, soft tissue applications, cardiovascular implants, biomaterials in ophthalmology, orthopeadiac implants, dental materials.

UNIT-II

Composites: General characteristics of composites , composites classes, PMCs, MMCs, CMCs, CCCs, IMCs, hybrid composites, fibers and matrices, different types of fibers, whiskers, different matrices materials, polymers, metal, ceramic matrices, toughening mechanism, interfaces, blending and adhesion, composite modeling, finite element analysis and design.

Optical materials: Mechanisms of optical absorption in metals, semiconductors and insulators. Non-linear optical materials, optical modulators and optical fibers. Display devices and materials photo-emissive, photovoltaic cells, charge coupled devices (CCD), laser materials.

UNIT-III

Super conducting materials: Types of super conductors, an account of mechanism of superconductors, effects of magnetic field currents, thermal energy, energy gap, acoustic attenuation, penetration depth, BCS theory, DC and AC Josephson effects, high Tc superconductors, potential applications of superconductivity, electrical switching element, superconductor power transmission and transformers, magnetic mirror, bearings, superconductor motors, generators, SQUIDS etc.

UNIT-IV

Smart materials: An introduction, principles of smart materials, input – output decision ability, devices based on conductivity changes, devices based on changes in optical response, biological systems smart materials. Devices based on magnetization, artificial structures, surfaces, hetero structures, polycrystalline, amorphous, liquid crystalline materials.

Surface Acoustic Wave (SAW) Materials and Electrets: Delay lines, frequency filters, resonators, Pressure and temperature sensors, Sonar transducers. Comparison of electrets with permanent magnets, Preparation of electrets, Application of electrets.

Textbooks & References:

1. B.S. Murthy et al., Textbook of Nano science and Nanotechnology, Universities press, Springer.
2. Krishan K Chawla, Composite Materials;Springer; 3rd ed. 2012.
3. A.C. Rose-Innes and E.H. Rhoderick, *Introduction to Superconductivity*.2nd Edition 1978
4. Brian Culshaw, Smart structures and materials, Artech House Publishers

BAPATLA ENGINEERING COLLEGE :: BAPATLA
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18PHI04	**OPTO ELECTRONIC DEVICES AND APPLICATIONS**	**Odd sem**	**3-0-0**	**3credits**

Course objectives

CO1	Understand the concepts of different lasers and mode locking systems.
CO2	Gain the knowledge about light generating devices, solar cells and display devices.
CO3	To know the operating mechanism and applications of various light detecting devices.
CO4	To familiarize electro optic modulators relating to communication

Course Outcomes

CLO1	Develop the knowledge of laser operating principles and structures to produce giant optical pulses.
CLO2	To Acquire the detailed knowledge about functionality and applications of solar cells ,light generating and display devices
CLO3	To posses the skills of design ,develop and adoption of photo detectors in real time electronic applications.
CLO4	To have the knowledge on the usage of optical modulators in communication process.

Course Outcomes and POs mapping

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3											
CO2	2											
CO3	2		2									
CO4	2			1	1							

UNIT-1

Optical process in semiconductors /optical media: Interaction of photons with matter , radiative non radiative processes , rates of absorption and emission –laser principle optical feedback-threshold condition-semiconductor laser –heterojunction lasers quantum well lasers, tunneling based lasers, mode locking: active mode locking and passive mode locking Q-switching

UNIT-2

Display devices: photo luminescence, cathode luminescence, electro luminescence, injection luminescence, LED principle of operation- LED structure –frequency response –defects and reliability, plasma display liquid crystal display, numerical display-photovoltaic effect- I-V characteristics and spectral response of solar cells –heterojunction and cascaded solar cells-Schottky barrier and thin film solar cells –design of solar cell.

UNIT-3

Detection devices: photo detection principle ,photo detector –thermal detector – photo conductor – noise in photo conductors –PIN photo diode –APD detector performance parameters –detectors for long wave length operation –wave length selective detection charge coupled device (CCD), application of infrared detector used for TV and remote controllers

UNIT-4

Communication –types of communication –examples –modulation-types of modulation –limitations of direct modulation – modulation by carrier injection in semiconductors – electro optic modulators – Kerr modulators Acousto- optic modulators (Bragg cell) , interferometric modulators semiconductor optical amplifiers .

Text Books:

1. Pallab Bhattacharya “Semiconductor opto electronic devices” , Prentice Hall of India Pvt. LTD, New Delhi 2009
2. Jasptit Singh, “Opto Electronics-An introduction to Materials and Devices” ,McGraw-Hill International Edition,2014.
3. S.C.Gupta,”Opto Electronic Devices and Systems”, Prentice Hall of India,2015
4. J.Wilson and J.F.B.Hawes,”Optoelectronics-An Introduction”, PearsonEducatiob, Taiwan Ltd,2010.

BAPATLA ENGINEERING COLLEGE :: BAPATLA
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Department of English
Institutional Elective-I
Professional Communication (18EL003)
IV B.Tech (Theory)

Lectures:3 Periods/Week — Continuous Assessment: 50M
Sem End Exam Duration: 3 hours — Sem End Exam : 50M
Course Schedule: IV B.Tech – VII Semester
Credits: 2

UNIT-I

L	P	T
10	0	0

Preparing project reports

Research methods- Abstract writing- background knowledge of the research topic-Literature review—Plagiarism- methodology- sampling- data collection and analysis- Integrate tables, figures, and other images into documents -presenting the findings- conclusion- preparing references- Appendices

UNIT-II

L	P	T
10	0	0

Oral presentation of the Projects (Viva voce)

Presentation and oral communication skills- presenting the findings of research- Maintaining audience orientation- body language- voice modulation- delivery of ideas

Unit III

L	P	T
10	0	0

Life skills for professionals

Understanding career management- Networking professionally- Mastering Cross Cultural Etiquette - Respecting social protocols- Developing a long termcareer plan- Making career choices

Unit IV

L	P	T
12	0	0

Corporate Etiquette

Power Dressing – Greeting – Introduction - Polishing Business Manners (Hand Shakes, Gifts, Humour, Office Behaviour) – The art of Small talk & Conversations - Dining Etiquette

Reference Books

- Training in Interpersonal Skills: Tips for Managing People at Work, Pearson Education, India; 6 edition, 2015.
- The Ace of Soft Skills: Attitude, Communication and Etiquette for Success, Pearson Education; 1 edition, 2013.

- Butterfield Jeff, "Soft Skills for Everyone", Cengage Learning India Pvt Ltd; 1 edition, 2011.
- Markel, Mike, Technical Communication (9th Edition) Boston: Bedford/St. Martin's, 2009.

Course Description

This course is designed to help students develop writing skills that will enable them to produce clear and effective technical documents. Focus will be on basic principles of good technical writing like proposals and projects. While the emphasis will be on writing, oral communication of technical information will form an important component of the course. This course is also designed to enhance the employability and maximize the potential of the students by introducing them to the principles of personal and professional success, and help them acquire the skills needed to apply these principles in their lives and careers.

Objectives

The course will enable students to

- improve grammar, mechanics and writing style for clarity, concision, coherence and emphasis and increase knowledge of technical communication
- identify and understand the facets and functions of the primary genres of technical writing, reports, proposals and project reports
- define and identify different life skills required in professional life
- Explain the basic mechanics of effective communication and demonstrate these through presentations.

Outcomes

The students will be able to

- use and apply writing skills in writing Technical reports, Project Proposals and make oral presentations of their findings
- Develop strategies for addressing multiple audiences, expert and lay audiences.
- apply principles of cross cultural etiquette and build professional network
- demonstrate improved competency of Soft Skills required for the workplace

CO-PO Mapping

Sr No	Outcome	KL
I	utilize writing skills in writing Technical reports, Project Proposals and make oral presentation of their findings	K4
II	develop strategies for addressing multiple audiences, expert and lay audiences	K4
III	apply principles of cross cultural etiquette and build professional network	K3
IV	demonstrate improved competency of Soft Skills required for the workplace	K3

CO/PSO	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	PSOI	PSOII

I								2		3	3	2	2	1
II								2		3	3	2	2	1
III								3	2	3	2	2	2	1
IV								3	2	3	2	2	2	1

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Department of English
Institutional Elective-II
English for Competitive Examinations (18EL004)
IV B.Tech (Theory)

Lectures:3 Periods/Week | Continuous Assessment: 50M
Sem End Exam Duration: 3 hours | Sem End Exam : 50M

Course Schedule: IV B.Tech-VIII Sem
Credits: 2

UNIT-I

L	P	T
10	0	0

Orientation on different formats of competitive exams - Vocabulary – Verbal ability – Verbal reasoning - Exploring the world of words – High Frequency Words – Meaning and their usage – Synonyms-antonyms –Word substitution –Double Unit Analogies – Idioms and phrases – Commonly confused words – Spellings –Word variables – New words in use.

UNIT-II

L	P	T
10	0	0

Grammar – Sentence improvement –Sentence completion – Rearranging phrases into sentences – Error identification –Tenses – Prepositions – Adjectives – Adverbs – Subjectverb agreement – Voice – Reported speech – Articles.

Unit III

L	P	T
10	0	0

Listening and Speaking

Contextual listening – Listening to instructions – Listening for specific information – Identifying detail, main ideas – Following signpost words – Connected Speech with Intonation Patterns - Speaking to respond and elicit ideas – Guided speaking (Visual Description) – Opening phrases (Formal & Informal) –Speaking on a topic – making an interactive presentation – Telling a story or a personal anecdote – Talking about oneself - Utterance – Speech acts- Brainstorming ideas – Group discussion.

Unit IV

L	P	T
12	0	0

Reading& Writing:

Reading: Specific information and detail – Identifying main and supporting ideas – Speed with accuracy – Improving global reading skills – Linking ideas – Summarising – Understanding argument – Identifying opinion/attitude and making inferences - Critical reading

Writing:Pre-writing techniques – Mind Mapping - Describing pictures and facts-Focus on cohesion – Using cohesive devices –organizing points – Rhetoric writing -Analytic writing-Statements of Purpose – Structure, Content and Style

Reference Books:

- Showick Thorpe, English for Competitive Examinations, Pearson Education, India:Fifth edition, 2015.
- Philip Sunil Solomon, English for Success in Competitive Exams, Oxford University Press
- Sharon Weiner Green, Barron's GRE, Galgotia Publications: Seventeenth Edition, 2008.

Course Description:

This course aims to prepare the Students for competitive examinations where the English language is a vital component. It is designed for students in the higher semesters, the course will help students to familiarise themselves with those aspects of English that are tested in these examinations.

Course Objectives:

The course aims

- To train the students in the language components essential to face competitive examinations both at national (UPSC, Banking, Railway, Defence) and international levels (GRE, TOEFL, IELTS).
- to enhance an awareness of the specific patterns in language testing and the respective skills
- Togear up with verbal reasoning and verbal ability tests.
- To inculcate effective practices in language-learning in order to improve accuracy in the usage of grammar and coherence in writing.

Course Outcomes:

Students will be able to

- develop and use vocabulary effectively and gain practical techniques
- utilize reading skills to comprehend a wide range of texts with the emphasis required
- apply principles of functional grammar to identify errors with precision and write with clarity and coherence
- develop improved competence in listening skills in order to follow and comprehend different accents and speak effectively

CO-PO Mapping

Sr No	Outcome	KL
I	develop and use vocabulary effectively and gain practical techniques	K4
II	utilize reading skills to comprehend a wide range of texts with the emphasis required	K4
III	apply principles of functional grammar to identify errors with precision and write with clarity and coherence	K3
IV	develop improved competence in listening skills in order to follow and comprehend different accents and speak effectively	K4

BAPATLA ENGINEERING COLLEGE :: BAPATLA
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CO/PSO	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	PSOI	PSOII
I										3	1	2	2	1
II										3	1	2	2	1
III										3	1	2	2	1
IV										3	1	2	2	1

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