RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

New Scheme Based On AICTE Flexible Curricula

CSE-IOT/IOT, III-Semester

IO301 Technical Communication

1. **Technical Communication Skills:** Understanding the process and scope of Communication, Relevance, & Importance of Communication in a Globalized world, Forms of Communication, Role of Unity, Brevity and Clarity in various forms of communication.

2. **Types of Communication:** Verbal & Non-verbal Communication, Classification of NVC, Barriers to Communication, Communicating Globally, Culture and Communication. **Soft Skills:** Interpersonal Communication, Listening, Persuasion, Negotiation, Communicating bad news/messages, communicating in a global world.

3. **Writing Skills:** Traits of Technical Writing, Principles of Business Writing, Style of Writing, Writing Memos, Letters, Reports, and Types of technical reports, Characteristics, format and structure of technical reports, Writing Research Papers. **Speaking Skills:** Audience-awareness, Voice, Vocabulary and Paralanguage, Group Discussion, Combating Nervousness, Speaking to one and to one thousand, Mock Presentations.

4. **Job Interviews:** Preparing for interviews, assessing yourself, Drafting Effective Resume, Dress, decorum and Delivery techniques, Techniques of handling interviews, Use of Non-verbals during Interviews, Handling turbulence during interviews.**Group Discussion:** Objective, Method, Focus, Content, Style and Argumentation skills**. Professional Presentations:** Individual Presentations (Audience Awareness, Body Language, Delivery and Content of Presentation.

5. **Grammar & Linguistic ability:** Basics of grammar, common error in writing and speaking, Study of advanced grammar, Vocabulary, Pronunciation Etiquette, Syllables, Vowel sounds, Consonant sounds, Tone: Rising tone, Falling Tone, Flow in Speaking, Speaking with a purpose, Speech & personality, Professional Personality Attributes.

Texts and Reference Books:

1. Sharon Gerson and Steven Gerson. Technical Writing: Process and Product (8th Edition), London: Longman, 2013

2. Rentz, Kathryn, Marie E. Flatley& Paula Lentz. Lesikar's Business Communication Connecting in a Digital world, McGraw-Hill, Irwin.2012

3. Allan & Barbara Pease. The Definitive Book of Body Language,New York, Bantam,2004

4. Jones, Daniel. The Pronunciation of English, New Delhi, Universal Book Stall.2010

5. Sharma, Sangeeta& Mishra, Binod. Communication Skills for Engineers and Scientists, New Delhi: PHI Learning, 2009, rpt 2012

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IO 302 Fundamentals of IOT

OBJECTIVES: To understand the basics of Internet of Things

1. To get an idea of some of the application areas where Internet of Things can be applied
2. To understand the middleware for Internet of Things and the concepts of Web of Things
3. To understand the concepts of Cloud of Things with emphasis on Mobile cloud computing
4. To understand the IOT protocols

1. Introduction to IoT: Architectural Overview, Design principles and needed capabilities, IoT Applications, Sensing, Actuation, Basics of Networking, M2M and IoT Technology Fundamentals- Devices and gateways, Data management, Business processes in IoT, Everything as a Service(XaaS), Role of Cloud in IoT, Security aspects in IoT.

2. Elements of IoT: Hardware Components- Computing (Arduino, Raspberry Pi), Communication, Sensing, Actuation, I/O interfaces. Software Components- Programming API's (using Python/ Node.js/ Arduino) for Communication Protocols- MQTT, ZigBee, Bluetooth, CoAP, UDP, TCP,M2M and WSN Protocols – SCADA and RFID Protocols

3. IOT framework: Basic IOT Framework, Architectural view, Physical & Logical design, Applications. Machine-to-machine (M2M), Software Defined Networking (SDN) and Network FunctionVirtualization (NFV), data storage, Message Communication mechanism.

4. IoT Application Development: Solution framework for IoT applications- Implementation of Device integration, Data acquisition and integration, Device data storage- Unstructured data storage on cloud/local server, Authentication, authorization of devices.

5. IoT Case Studies: IoT case studies and mini projects based on Industrial automation, Transportation, Agriculture, Healthcare, Home Automation

TEXT BOOKS RECOMMENDED:

1. V. Madisetti and A. Bahga, "Internet of things (A-Hand-on-Approach)", Universal Press.
2. Dr. SRN Reddy, RachitThukral and Manasi Mishra, "Introduction to Internet of Things: A practical Approach", ETI Labs
3. Pethuru Raj and Anupama C. Raman, "The Internet of Things: Enabling Technologies, Platforms, and Use Cases", CRC Press

REFERENCE BOOKS RECOMMENDED:

1. Philip Levis, " TinyOS Programming"
2. F. Dacosta "Rethinking the Internet of things: A Scalable Approach to Connecting Everything", Apress publications.
3. D. Norris, "The Internet of Things: Do-It-Yourself Projects with Arduino, Raspberry Pi, and Beagle Bone Black", McGraw-Hill Education, New Delhi.
4. Raj Kamal, "Internet of Things: Architecture and Design", Tata McGraw Hill publication.
5. A. Pajankar and A. Kakkar, "Raspberry Pi by Example", Packt Publishing Ltd, Birmingham, UK.

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CSE-IOT/IOT, III-Semester

IO 303 Data Structures

1. Introduction to Data Structure: Concepts of Data and Information, Classification of Data structures, Abstract Data Types, Implementation aspects: Memory representation. Data structures operations and its cost estimation. Introduction to linear data structures- Arrays, Linked List: Representation of linked list in memory, different implementation of linked list. Circular linked list, doubly linked list, etc. Application of linked list: polynomial manipulation using linked list, etc.
2. Stacks and Queue: Stacks as ADT, Different implementation of stack, multiple stacks. Application of Stack: Conversion of infix to postfix notation using stack, evaluation of postfix expression, Recursion. Queues: Queues as ADT, Different implementation of queue, Circular queue, Concept of Dqueue and Priority Queue, Queue simulation, Application of queues.
3. Tree: Definitions - Height, depth, order, degree etc. Binary Search Tree - Operations, Traversal, Search. AVL Tree, Heap, Applications and comparison of various types of tree; Introduction to forest, multi-way Tree, B tree, B+ tree, B* tree and red-black tree.
4. Graphs: Introduction, Classification of graph: Directed and Undirected graphs, etc, Representation, Graph Traversal: Depth First Search (DFS), Breadth First Search (BFS), Graph algorithm: Minimum Spanning Tree (MST)-Kruskal, Prim's algorithms. Dijkstra's shortest path algorithm; Comparison between different graph algorithms. Application of graphs.
5. Sorting: Introduction, Sort methods like: Bubble Sort, Quick sort. Selection sort, Heap sort, Insertion sort, Shell sort, Merge sort and Radix sort; comparison of various sorting techniques. Searching: Basic Search Techniques: Sequential search, Binary search, Comparison of search methods. Hashing & Indexing. Case Study: Application of various data structures in operating system, DBMS etc.

Text Books

1. AM Tanenbaum, Y Langsam& MJ Augustein, "Data structure using C and C++", Prentice Hall India.

2. Robert Kruse, Bruse Leung, "Data structures & Program Design in C", Pearson Education.

Reference Books

1. Aho, Hopcroft, Ullman, "Data Structures and Algorithms", Pearson Education.

2. N. Wirth, "Algorithms + Data Structure = Programs", Prentice Hall.

3. Jean – Paul Trembly , Paul Sorenson, "An Introduction to Data Structure with application", TMH.

4. Richard, GilbergBehrouz, Forouzan ,"Data structure – A Pseudocode Approach with C", Thomson press.

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CSE-IOT/IOT, III-Semester

IO 304 Electronic Devices

Unit-1 Semiconductor Material Properties: Elemental & compound semiconductor materials , Bonding forces and Energy bands in intrinsic and extrinsic silicon, Charge carrier in semiconductors , carrier concentration, Junction properties, Equilibrium condition, biased junction, Steady state condition, breakdown mechanism (Rectifying Diodes, Zener Diodes), Metal Semiconductor Junction.
Special diodes: Tunnel diodes, Varactor diodes, Schottky diode, Photo diodes, Photodetector, LED, solar cell.

Unit-2 Diode circuits: Ideal and Practical diode, Clipper, Clamper.
Power Supply: Rectifiers-Half wave, Full wave, Bridge rectifier, filter circuits, Voltage regulation using shunt & series regulator circuits, Voltage regulation using IC.

Unit-3 Fundamentals of BJT: Construction, basic operation, current components and equations,CB, CE and CC configuration, input and output characteristics, Early effect, Region of operations: active, cut-off and saturation region. BJT as an amplifier. Ebers-Moll model, Power dissipation in transistor (Pd, max rating), Photo transistor. Transistor biasing circuits and analysis: Introduction, various biasing methods: Fixed bias,Self bias, Voltage Divider bias, Collector to base bias, Load-line analysis: DC and AC analysis, Operating Point and Bias Stabilization and Thermal Runaway. Transistor as a switch.

Unit-4 Small Signal analysis: Small signal Amplifier,Amplifier Bandwidth, Hybrid model, analysis of transistor amplifier using h-parameter, Multistage Amplifier: Cascading amplifier, Boot-strapping Technique, Darlington amplifier and cas-code amplifier, Coupling methods in multistage amplifier, Low and high frequency response, Hybrid πmodel, Current Mirror circuits. Large Signal analysis and Power Amplifiers: Class A,Class B,Class AB, Class C, Class D, Transformer coupled and Push-Pull amplifier.

Unit-5 FET construction- JFET: Construction, n-channel and p-channel, transfer and drain characteristics, parameters, Equivalent model and voltage gain, analysis of FET in CG, CS and CD configuration. Enhancement and Depletion MOSFET drain and transfer Characteristics. Uni-junction Transistor (UJT) and Thyristors: UJT: Principle of operation, characteristics, UJT relaxation oscillator.
Text/Reference Books:

1. Millman & Halkias, “Electronic Devices And Circuits”, TMH.
2. Salivahanan, Kumar & Vallavaraj, “Electronic Devices And Circuits”, TMH.
3. Boylestad & Neshelsky, “Electronic Devices & Circuits”, PHI.
4. Schilling & Belove, “Electronic Circuits , Discrete & Integrated”, TMH.

5. Chattopadhyay & Rakhshit, “Electronic Fundamentals & Applications”, New Age
6. Adel S. Sedra & Kenneth C. Smith, “Microelectronic Circuits”, OUP.
7. R. A. Gayakwad, “Op-Amps And Linear Integrated Circuits”, PHI
8. Theodore F. Bogart, Jeffrey S. Beasley, “Guillermo Rico Electronic Devices & Circuits”.
9. Allen Mottershead, “Electronic Devices & Circuits”.

ELECTRONIC DEVICES LAB

1. Diode Characteristic
   a) pn junction diode Characteristics and Static & Dynamic resistance measurement from graph.
   b) To plot Zener diode Characteristics curve.
2. Clipper Clamper
   a) To plot the Characteristics curve of various clamper circuits.
   b) To plot the Characteristics curve of various clamper circuits.
3. Half wave, full wave & bridge rectifier
   a) To measure Vrms, Vdc for half wave, full wave & bridge rectifier.
   b) To measure ripple factor, ratio of rectification for full wave & half wave rectifier.
4. Voltage regulation using zener diode shunt regulator and transistor series voltage regulator in the following cases
   a) Varying input
   b) Varying load
5. Characteristic of BJT
   a) To plot the input & output Characteristics curve in CB & CE configuration
   b) To find α & β and Q point from the above curve.
   c) To plot the Characteristics curve of various clipper circuits.
6. h- Parameter
   To measure h- parameter (Av, Ai, Ro & Ri) in CE Amplifier
7. Multi Stage Amplifier
   a) To plot the Characteristics curve for Direct Coupled Amplifier.
   b) To plot the Characteristics curve for RC Coupled Amplifier.
   c) To plot the Characteristics curve for transformer Coupled Amplifier.
8. FET Characteristic
   a) To plot the Characteristics curve for n channel – JFET in CS configuration.
   b) To find out pinch off voltage from the above characteristics curve

9 UJT Characteristic
   a) To plot the Characteristics curve for UJT.
   b) To determine intrinsic stand off ratio.

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CSE-IOT/IOT, III-Semester

IO 305 Network Analysis

Unit-1 Introduction to circuit theory: basic circuit element R,L,C and their characteristics in terms of linearity & time dependant nature, voltage & current sources, controlled & uncontrolled sources KCL and KVL analysis, Steady state sinusoidal analysis using phasors; Concept of phasor & vector, impedance & admittance, Nodal & mesh analysis, analysis of magnetically coupled circuits. Dot convention, coupling coefficient, tuned circuits, Series & parallel resonance

Unit-2 Network Graph theory: Concept of Network graph, Tree, Tree branch & link, Incidence matrix, cut set and tie set matrices, dual networks

Unit-3 Network Theorems: Thevenins & Norton's, Super positions, Reciprocity, Compensation, Substitution, Maximum power transfer, and Millman's theorem, Tellegen's theorem, problems with dependent & independent sources.

Unit-4 Transient analysis: Transients in RL, RC&RLC Circuits, initial& final conditions, time constants. Steady state analysis

Laplace transform: solution of Integro-differential equations, transform of waveform synthesized with step ramp, Gate and sinusoidal functions, Initial & final value theorem, Network Theorems in transform domain.

Unit-5 Two port parameters: Z, Y, ABCD, Hybrid parameters, their inverse & image parameters, relationship between parameters, Interconnection of two ports networks, Reciprocity and Symmetry in all parameter.

Text/Reference Books: 1. M.E. Van Valkenburg, Network Analysis, (Pearson)
2. S P Ghosh A K Chakraborty Network Analysis & Synth. (MGH).
3. http://www.nptelvideos.in/2012/11/networks-and-systems.html

REFERENCE:- 1. Sudhakar-Circuit Network Analysis & Synth(TMH).
2. J. David Irwin Engineering Circuit analysis tenth edition, Wiley india.
3. Kuo- Network Analysis & Synthesis, Wiley India.
4. Robert L Boylestad introductory Circuit analysis, Pearson
5. Smarajit Ghosh, NETWORK THEORY: ANALYSIS AND SYNTHESIS (PHI).
6. Roy Choudhary D; Network and systems; New Age Pub.
7. Bhattacharya and Singh- Network Analysis & Synth (Pearson)

EXPERIMENTS LIST:-

1. To Verify Thevenin Theorem and Superposition Theorem.
2. To Verify Reciprocity Theorem and Millman's Theorem.
3. To Verify Maximum Power Transfer Theorem.
4. To Determine Open Circuit and Short Circuit parameters of a Two Port Network.
5. To Determine A,B, C, D parameters of a Two Port Network.
6. To determine h parameters of a Two Port Network.
7. To Find Frequency Response of RLC Series Circuit RLC parallel Circuit and determine resonance and 3dB frequencies.
8. To determine charging and discharging times of Capacitors.

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CSE-IOT/IOT, III-Semester

IO 306 Computer Workshop (Python Programming)

Module1: Introduction to python language, Basic syntax, Literal Constants, Numbers, Variable and Basic data types,String, Escape Sequences, Operators and Expressions, Evaluation Order, Indentation, Input, Output, Functions, Comments.

Module2: Data Structure**:** List, Tuples, Dictionary, DataFrame and Sets, constructing, indexing, slicing and content manipulation.

Module3: Control Flow:Conditional Statements - If, If-else, Nested If-else. Iterative Statement - For, While, Nested Loops. Control statements - Break, Continue, Pass.

Module4: Object oriented programming:Class and Object, Attributes, Methods, Scopes and Namespaces, Inheritance, Overloading, Overriding, Data hiding**,**Exception: Exception Handling, Except clause, Try finally clause, User Defined Exceptions.

Module5: Modules and Packages**:** Standard Libraries: File I/0, Sys, logging, Regular expression, Date and Time, Network programming, multi-processing and multi-threading.

References

- **Timothy A. Budd: Exploring python, McGraw-Hill Education.**
- **R.NageshwarRao ,"Python Programming" ,Wiley India**
- **Think Python: Allen B. Downey, O'Reilly Media, Inc.**

List of Experiments:

1. To write a Python program to find GCD of two numbers.
2. To write a Python Program to find the square root of a number by Newton's Method.
3. To write a Python program to find the exponentiation of a number.
4. To write a Python Program to find the maximum from a list of numbers.
5. To write a Python Program to perform Linear Search
6. To write a Python Program to perform binary search.
7. To write a Python Program to perform selection sort.
8. To write a Python Program to perform insertion sort.
9. To write a Python Program to perform Merge sort.
10. To write a Python program to find first n prime numbers.
11. To write a Python program to multiply matrices.
12. To write a Python program for command line arguments.
13. To write a Python program to find the most frequent words in a text read from a file.
14. To write a Python program to simulate elliptical orbits in Pygame.
15. To write a Python program to bouncing ball in Pygame.