SARDAR PATEL UNIVERSITY, BALAGHAT

Four Year B.Tech in Electrical Engineering (EE)

BEE 401

Application of IOT in Electrical Engineering

Unit 1:

Introduction: Definition, Characteristics of IOT, IOT Conceptual framework, IOT Architectural view, Physical design of IOT, Logical design of IOT, Machine-to-machine (M2M), SDN (software defined networking) and NFV(network functi virtualization) for IOT, data storage in IOT.

Unit 2:

Design Principles for Web Connectivity: Web Communication Protocols for connected devices, Message Communication Protocols for connected devices, SOAP, REST, HTTP Restful and Web Sockets. Internet Connectivity Principles: Internet Connectivity, Internet based communication, IP addressing in IOT, Media Access control.

Unit 3:

Sensor Technology , Participatory Sensing, Industrial IOT and Automotive IOT , Actuator, Sensor data Communication Protocols ,Radio Frequency Identification Technology, WirelessSensor Network Technology.

Unit 4:

IOT Design methodology: Specification -Requirement, process, model, service, functional & operational view.IOT Privacy and security solutions, Raspberry Pi & arduino devices. IOTCase studies: smart city streetlights control & monitoring.

Unit 5:

IoT applications to Industries, IoT applications to Power System , IoT applications to Renewable energy, IoT applications to Power Electronics, Benefits to IoT in electrical field.

Reference Book:
1. Rajkamal,"Internet of Th ings", Tata McGraw Hill publication
2. Vijay Madisetti and Arshdeep Bahga, "Internet of things(A-Hand-on-Approach)"1st Edition ,Universal Press
3. Hakima Chaouchi "The Internet of Things: Connecting Objects", Wileypublication.
4. Charless Bell "MySQL for the Internet of things", Apress publications.
5. Francis dacosta "Rethinking the Internet of things:A scalable Approach toconnecting everything", 1st edition, Apress publications 2013.

6. Donald Norris"The Internet of Things: Do-It-Yourself at Home Projects forArduino, Raspberry Pi and BeagleBone Black", McGraw Hill publication

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BEE 402

Electrical Machine-I

Unit –I

Magnetic circuits: Laws governing magnetic circuits,flux linkage, inductance and energy-statically & dynamically induced EMF, Torque production, Hysteresis & Eddy current loss, AC Excitation, introduction of permanent magnets transformer as a magnetically coupled circuit.

Unit –II

Transformer-I: Single phase transformer Working principle, e.mf. equation, construction, phasor diagrams, equivalent circuit, voltage regulation, losses, separation of hysteresis and eddy current losses, efficiency, tests: open circuit and short circuit, load, , Condition for maximum efficiency and regulation.

Unit –III

Transformer-II: Three phase transformer: its construction, groups and connections, their working and applications; Scottconnection; Parallel operation of Transformers: application, advantages, requirement and load sharing; Tap changers, cooling, conservator and breather**. .**

Unit –IV

D. C. Generator : Law of conservation of energy, electromechanical energy conversion. Principle of operation ,construction and main components, armature winding, Types of winding(lap and wave winding), EMF equation, circuit model, Armature reaction, commutation, compensating windings, Types of DC generators, characteristics and applications, losses and efficiency.Simple numericals.

Unit –V

D. C. Motor : Principle of operation, production of back & its significance, torque equation. Classification D. C. motors, characteristics of D. C. motors, starters for DC motors, speed control, losses and efficiency, applications of motors. Retardation Test, HopkinsonTest, Swimburne's test, PMDC motor, Simple numericals**.**

List of Experiments

1. Perform turn ratio and polarity test on 1-phase transformer

2. Perform load test on a 1-phase transformer and plot its load characteristic

3. Perform OC and SC tests on a 1-phase transformer and determine its equivalent circuit. Also find its efficiency and regulation at different load and power factor.

4. Perform OC and SC tests on a 3-phase transformer and determine its equivalent circuit. Also find its efficiency and regulation at different load and power factor.

5. Perform Sumpner's test on two 1-phase transformer and determine its efficiency at various load.

6. Study of D. C. Machines (Parts)

7. Speed control of D. C. Motor (armature and field control method)

8. To perform Swinburn test of DC Motor.

9. To perform Hopkinsons test of DC Motor

10. To perform Open circuit characterstics test & External circuit characterstics test on DC generator.

Refrence books:-

1. V.Del Toro, "Electrical Machines & Power Systems", 1985, Prentice-Hall, Inc., EnglewoodCliffs

2. S K Bhattacharya, Electrical Machines, McGraw-Hill

3. Ashfaq Hussain, Electrical Machines, Dhanpat Rai & Co 4. Langsdorf, A.C. Machines, McGraw-Hill

5. Samarajit Ghosh, Electrical Machines, Pearson

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BEE 403

Digital Electronics Logic Design

Unit –I

Number Systems and Codes: Digital number systems, base conversion, Binary, Decimal, octal, Hexadecimal, number system with radix r, Gray codes.Alphanumeric codes – ASCII code and BCD codes, concept of parity, complementr's & (r-1)'s, subtraction with complements, signed Binary numbers, Error Detecting & Correcting codes.

Unit –II

Basic Theorems & Properties of Boolean algebra: AND, OR, NOT operators, laws of Boolean algebra, Demorgon's theorem, Boolean expression & logic diagram. Negative logic, Alternate logic gate representation (concept of bubbled gates) canonical and standard Forms (Minterms & Maxterms), sum of minterms& product of maxterms, conversion between canonical forms. Truth table & maps, 2,3,4,5 and 6 variable maps, solving digital problems using Maps, Don't care conditions, Tabular minimization. Sum of product & product of sum reduction, Exclusive OR & Exclusive NOR circuits, Parity generator & checkers.

Unit –III

Combinational Circuits: Design procedure, Adders (half and Full), subtractor (half and full) code convertors, Analysis of design, Universal building blocks, Implementation of any logic circuit with only NAND gates or with only NOR gates, Binary serial adder, parallel adder, serial/parallel adder, look ahead carry generator, BCD adder, Binary multiplier, Magnitude comparator, Decoder, Demultiplexer, Encoders, priority encoder, Multiplexers & implementation of combinational logic diagram.

Unit –IV

Sequential Logic Circuit : Latches, SR latch with NAND & NOR gates, D latch, edge triggered flip flop, J-K flip flop, T flip flop, Master slave flip flop, Analysis of clocked sequential circuit, state table, state diagram, state reduction state equations, state assignments, flip flop excitation table & characteristic equations, Design procedure for sequential circuits, Design with state reduction, Applications of flipflop.

Unit –V

Registers and Counters : Asynchronous and Synchronous counter, counters with MOD

numbers, Down counter, UP/DOWN counter, propagation delay in ripple counter, programmable counter, Pre- settable counter, BCD counter, cascading, counter applications, Decoding in counter, Decoding glitches, Ring Counter, Johnson counter, Rotate left & Rotate right counter, Registers – Buffer, Shift left, shift right, shift left/Right registers, parallel in parallel out, serial in serial out, parallel in serial out, serial in parallel out registers.

List of Experiments

1. Verification of all the logic gates.

2. Design of BCD to Excess-3 code converter.

3. Implementation of NAND & NOR as Universal gate.

4. Design of RS, JK, T& D Flipflop.

5. Multiplexer /Demultipexer based boolean function

6. Design of combinational circuit for the

(i) Halfadder (ii) Fulladder (iii) Half subtractor (iv) Fullsubtractor

7. Design various A-D & D-Aconvertors.

8. Verify the truth table of SR flip flop

9. Verify BCD to seven segment decoder.

References Books:-

1. A. Anand Kumar, Fundamentals of digital circuits, PHI 2. A K Maini, Digital Electronics, Wiley India

3. Thomas Blakeslee; Digital Design with standard MSI and LSI; Wiley Interscience 4. Jain RP; Modern digital electronics; TMH

5. M Mano; Digital Logic & Computer design; PHI

6. Tocci ; Digital Systems Principle & applications; Pearson EducationAsia 7. Gothmann; Digital Electronics;PHI

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BEE 404

Power System-I

Unit – I

Transmission Line Components & Under Ground Cabling: Inductance resistance and capacitance of transmission line, Calculation of inductance for 1-Φ and 3- Φ, Single and double circuit line.

Unit – II

Concept of GMR and GMD, Symmetrical & asymmetrical conduction configuration, Calculation of capacitance for 2 wire and 3 wire systems, Effect of ground or capacitance, Capacitance calculation for symmetrical and asymmetrical 1-phase and three phase.

Unit – III

Single and double circuit line, Charging current, Transposition of line, Composite conductor, Skin and proximity effect, bundle conductor.

Unit – IV

Underground Cable Comparison of cables and overhead transmission lines, Classification of cables, requirement of cable construction, capacitance of single and multi-core cable, economic core diameter, dielectric stress in cable.

Unit – V

Grading of cables, ionization of Heating of cables, Phenomena of dielectric losses and sheath loss in cables, Thermal resistance of cables.

REFERENCES

1. John Grainger and William Stevenson, Power system Analysis, McGraw Hill.

2. C.L. Wadhwa, Electrical Power System Analysis, New Age International.

3. D.P. Kothari, I.J. Nagrath, Power System Engineering TMH II Ed. Reprint 2009.

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BEE 405

ELECTROMAGNETICS FIELD & MATERIALS

UNIT:- I

COULOMB'S LAW AND ELECTRIC FIELD INTENSITY

The Experimental law of Coulomb; Electric Field Intensity; Field Due to a Continuous Volume Charge Distribution; Field of a Line Charge; Field of a Sheet of Charge.

ELECTRIC FLUX DENSITY, GAUSS'S LAW AND DIVERGENCE

Electric Flux Density; Gauss's Law; Divergence; Maxwell's First Equation (Electrostatics); The Vector Operator and the Divergence Theorem.

UNIT:- II

ENERGY AND POTENTIAL

Energy Expended in Moving a Point Charge in an Electric Field; The Line Integral; Definition of Potential Difference and Potential; The Potential Field of a Point Charge; The Potential Field of a System of Charges: Conservative Property; Potential Gradient; Energy Density in the Electrostatic Field

CURRENT AND CONDUCTORS, DIELECTRICS AND CAPACITANCE

Current and Current Density; Continuity of Current; Metallic Conductors; Conductor Properties and Boundary Conditions. Boundary Conditions for Perfect Dielectric Materials; Capacitance; Examples.

UNIT:- III

POISSON'S AND LAPLACE'S EQUATIONS

Derivation of Poisson's and Laplace's Equations; Uniqueness Theorem; Examples of the Solution of Laplace's Equation; Example of Solution of Poisson's Equation;

UNIT:- IV

THE STEADY MAGNETIC FIELD

Biot-Savart Law; Ampere's Circuital Law; Curl; Stoke's Theorem; Magnetic Flux and Magnetic Flux Density; The Scalar and Vector Magnetic Potentials.

MAGNETIC FORCES, MATERIALS AND INDUCTANCE

Force on a Moving Charge; Force on a Differential Current Element; Force Between Differential Current Elements; Force and Torque on a Closed Circuit; Magnetization and Permeability; Magnetic Boundary Conditions; The Magnetic Circuit; Potential Energy and Forces on Magnetic Materials; Inductance and Mutual Inductance.

UNIT:- V

TIME-VARYING FIELDS AND MAXWELL'S EQUATIONS

Faraday's Law; Displacement Current; Maxwell's Equations in Point Form; Maxwell's Equations in Integral Form; The Retarded Potentials.

Text Books:

I.   Engineering Electromagnetics, W. H. Hayt and J. A. Buck, Seventh Edition, Tata McGraw Hill, 7 th Edition, 2012.
II.   II. Electronic Communication Systems, George Kennedy and Bernard Davis, Fourth Edition, Thirty-fifth Reprint (2008), Tata McGraw Hill Publishing Company Ltd.
III.   Elements of Engineering Electromagnetics, Nannapaneni Narayana Rao, 6th Edition, Pearson Education Low Price Edition.

SARDAR PATEL UNIVERSITY, BALAGHAT

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BEE 406(P)

Computer Programming-II (JAVA)

C language alphabet set, identifiers, Variables and constants Data types, Builtin and user Defined Data types Arrays operators and expressions Simple assignment and Input-output statements, preprocessor directives writing simple 'C' programs, compiling and executing 'C' Programs.

Conditional statements and loops: IF statement IF–ELSE statement, SWITCH statement, FOR statement, WHILE and Do WHILE statement.

Function: Function declaration or prototype. Function definition, function calling: call by value, call by reference, Recursion.

Introduction to pointers, File processing: concept of files, file opening, editing, reading and writing.

Lab assignments :

1. Design and execute a 'C' program for multiplying two nXn matrics.

2. Design a 'C' program to calculate Average of 'n' numbers.

3. Design a 'C' program to add two numbers using call by value parameter passing mechanism.

4. Design a 'C' program to swap the contents of two variables using call by reference parameter passing mechanism.

5. Design a 'C' program to open a file and add contents to modify the file.

Reference Books :

1. Programming in ANSI C, by Balagurusamy, Tata McGraw Hill 2. The C programming Language. By Brian W. Kernighan and Dennis M. Ritchie. Published by Prentice-Hall

3. Let us C by Y.Kanetkar, BPB Publication