Basic Electrical Engineering & Digital Electronics (22ESFY1050T/22ESFY2050T)

Semester-I/II

Teaching Scheme
Lectures : 03 Hrs./week
Practical : 02 Hrs./week
Tutorial : - - - -
Credit : 03

Examination Scheme
Term Test : 15 Marks
Teacher Assessment : 20 Marks
End Sem Exam : 65 Marks
Total Marks : 100 Marks

Pre-requisite

1. Knowledge of basic physics.
2. Knowledge of basic mathematics.

Course Objectives

1. To develop basic understanding of concepts of DC and AC circuits, and analyse their operations using various methods and techniques.
2. To get an insight of various digital electronics.

Course Outcomes

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Apply the knowledge of theorems/laws to analyse the DC circuits.	L3	Apply
CO2	Analyse single phase AC circuits.	L4	Analyse
CO3	Demonstrate knowledge of basic number system, logic gates and sequential circuits.	L3	Apply
CO4	Illustrate the working principle behind the electronic components used to build a drone.	L2	Understand

Course Contents

Unit-I DC Circuits 05 Hrs.

Prerequisite: *Basic terminologies of Electrical and Electronic circuit . Crammer's rule for matrix*

- Introduction to ideal and practical voltage and current sources
- Kirchhoff's current and voltage laws
- Mesh and nodal analysis
- Supernode and supermesh analysis

Unit-II DC Network Theorems 06 Hrs.

Prerequisite: *Series / parallel combination of resistances and power sources*

- Source transformation and star – delta connections
- Superposition Theorem
- Thevenin's Theorem and Norton's Theorem
- Maximum Power Transfer Theorem

Unit-III AC Circuits 11 Hrs

Prerequisite: *Basic terminologies of Electrical engineering, Electromagnetic Induction*

- Generation and representation of alternating voltage and currents
- RMS and Average value
- Phasor representation
- AC through resistance, inductance and capacitance
- R-L-C series, parallel circuits
- Series resonance
- Calculation of power and power factor

Unit-IV Number Systems and Logic Gates 06 Hrs

Prerequisite: *Base and Base value of number system*

- Review of number system
- Binary code, Binary coded decimal, Octal code, Hexadecimal code and conversions
- Basic gates

- Universal gates
- Boolean algebra
- De Morgan's theorem

Unit-V Latches and Flip flops 06 Hrs.

Prerequisite: *Truth Table*

- Introduction to latches and flip-flops: RS, JK, T. D flip-flops
- Introduction to counters: design of 2-bit asynchronous counter
- Introduction to registers

Unit-VI Introduction to drones 05 Hrs.

Prerequisite: *Basic terminologies of Drones*

- Introductions to drones
- Sensors
- Controllers
- Actuators
- Electronic assembly
- Applications of drones

Reference Books

1. D. P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill, 2010.
2. D. C. Kulshreshtha, "Basic Electrical Engineering", McGraw Hill, 2009.
3. R.R. Singh, "Basic Electrical Engineering", Tata McGraw Hill, 2019.
4. E. Hughes, "and Electronics Technology", Pearson, 2010.
5. V. D. Toro, "Electrical Engineering Fundamentals", Prentice Hall India, 1989.
6. M. Morris Mano, "Digital design", Prentice Hall India.
7. Garg, P. K, "Unmanned Aerial Vehicles: An Introduction". Stylus Publishing, LLC, 2021.
8. Kimon P. Valavanis, "Handbook of Unmanned Aerial Vehicles", Volume 4, Springer Netherlands, 2014.

Text Books

1. B. R. Patil, "Basic Electrical Engineering", Oxford Higher Education, 2016.

2. R. S. Sedha, "A textbook of Electronic Devices and Circuits", S. Chand, 2002.

3. R. P. Jain, "Modern Digital Electronics", McGraw Hill, 2011.

4. Noam Nisan and Shimon Schocken, "Elements of Computing Systems", MIT Press, 2012.

5. Syed Omar Faruk Towaha, "Building Smart Drones with ESP8266 and Arduino", Packt Publishing, 2018.

6. Barnhart, R. Kurt, Douglas M. Marshall, and Eric Shappee, eds, "Introduction to unmanned aircraft systems", CRC Press, 2021.

Basic Electrical Engineering & Digital Electronics Laboratory (22ESFY1050L/22ESFY2050L)

Semester-I/II

Practical Scheme
Lectures : - - - - -
Practical : 02 Hrs./week
Credit : 01

Examination Scheme
Teacher Assessment : 25 Marks

Total : 25 Marks

Course Objectives

1. To analyzing the given DC network and verify different DC network theorems.
2. To understand the concepts of logic gates, universal gates and design the combinational circuits.

Course Outcomes

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Apply the knowledge of DC theorems/laws to analyse the DC circuits.	L3	Apply
CO2	Verify the different DC theorem	L3	Apply
CO3	Verify and analyze the truth table of different logic gate and circuits.	L3	Apply
CO4	Design and implement combinational logic circuits.	L6	Create

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List of Practical /Experiments/Assignments:

Laboratory: Suggested experiments

1. Study of basic laboratory instruments. (compulsory)
2. Mesh and Nodal analysis.
3. Verification of Superposition Theorem.
4. Verification of Thevenin / Norton / Maximum Power Transfer Theorem.
5. Study of R-L and R-C series circuits.
6. R-L-C series resonance circuit.
7. Verification of truth table for gates.
8. Implementing a given logic function using basic gates/SSI ICs.
9. Implementing a given half adder / full adder using basic gates/SSI ICs.
10. Implementing 'X' bit asynchronous counter using JK / T flip-flops.

NOTE: Minimum eight experiments from the above suggested list or any other experiment based on syllabus will be included, which would help the learner to apply the concept learnt.

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