MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR
(A Govt. Aided UGC Autonomous Institute Affiliated to RGPV, Bhopal, MP)
Electrical Engineering Department

Flexible Scheme & Syllabus
2020-2021
B.Tech.
in
Electrical Engineering
(IV Semester)

Madhav Institute of Technology & Science
Gwalior-474005

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR
(A Govt. Aided UGC Autonomous Institute Affiliated to RGPV, Bhopal, MP)
Electrical Engineering Department

Digital Electronics & Microprocessor: 130411

Course Objectives:

- To introduce the fundamental concepts and techniques associated with the digital logic, circuit design and microprocessor.To minimize the logical expressions using Boolean postulates, Karnaugh method, and   Quine-McCluskey method.
- To Familiarize with the digital integrated circuits and 8085 microprocessors.
- To design various combinational and sequential circuits.

Unit- I Number System, Binary Codes and Boolean Algebra: Basics of number system. Excess-3, Gray, Cyclic and ASCII codes,Binary Arithmetic, Signed and unsigned representation, 1's and 2's compliment representation. Logic gates, Laws of Boolean algebra, Logic diagrams, Universal gates,

Unit- II Boolean minimization and Combinational Logic Circuits: Minterms and Maxterms, sum-of -product (SOP) form, product of sum (POS) form and Karnaugh mapping, Quine-McCluskey method of minimization, Simplification by Boolean theorems, Encoders, Decoders, Multiplexers, Demultiplexer, Code Convectors, Parity Checker Generator, Arithmetic Circuit like Adder etc.

Unit- III Sequential circuits: SR, JK, T, D and Master-Slave Flip-Flops - operation, transition and excitation tables, timing diagrams, Design of counters - Ripple counters, Ring counters, Modulo N counters, Shift registers, Universal registers, Semi-conductor memories, Programmable Logic Devices, Programmable Logic Array (PLA), Programmable Array Logic (PAL).

Unit- IV Digital Integrated Circuits: Diode as switch, Bipolar transistor as switch, FET as switch, Digital integrated circuits: Logic levels, propagation delay, power dissipation, fan-out and fan-in, noise margin, logic families and their characteristics-RTL, TTL, ECL, CMOS.

Unit- V Intel 8085 Microprocessor: Introduction to 8-bit 8085 microprocessor, Architecture of 8085 microprocessors, Pin Configuration, instruction set and Addressing modes, General application program.

Recommended Books:

1. Digital Computer and Electronics by Malvino, brown, TMH Publishing company
2. Digital Design by Morris Mano, Pearson Education
3. An Introduction to Digital Computer Design by V. Rajaraman, and Radhakrishnan, 3rdEdn.. PH1.
4. Digital Principles and Applications by A.P. Malvino and B.P. Leach 4thEdn McGraw Hill.
5. Microprocessor & Interfacing by D.V. Hall, McGraw Hill International Edition.
6. Microprocessor Architecture, Programming and Applications by Gaonkar, Wiley Eastern Ltd.
7. Introduction to Microprocessors by A.P. Mathur, McGraw Hill International Edition.

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR
(A Govt. Aided UGC Autonomous Institute Affiliated to RGPV, Bhopal, MP)
Electrical Engineering Department

Course outcomes focused on employability/entrepreneurship and skill development

Course Outcomes:

S No.	Course Outcome (CO)	Mapping
1	**Explain** the concept of different Number systems, logic family and Microprocessor.	Skill Development
2	**Design** the logic expressions using logic gates after simplifying the expression using Boolean laws, K-map and Quine-McCluskey method.	Employability
3	**Design** different types of combinational logic circuits using basic and universal gates.	Employability
4	**Explain** the concepts of sequential circuits and basic memory devices.	Skill Development
5	**Describe** the working of logic families such (RTL, TTL, ECL, and C-MOS).	Employability
6	**Describe** an 8-bit microprocessor architecture & explain the concepts of memory and I/O interfacing with microprocessor.	Skill Development

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

(A Govt. Aided UGC Autonomous Institute Affiliated to RGPV, Bhopal, MP)

Electrical Engineering Department

Digital Electronics & Microprocessor Lab: 130411

Course outcomes focused on employability/entrepreneurship and skill development

S No.	Course Outcome (CO)	Mapping
1	**Develop** skill to build, and troubleshoot digital circuits.	Skill Development
2	**Demonstrate** the troubleshooting techniques to test digital circuits.	Skill Development
3	**Prepare** and present an organized written engineering report on electronic testing of digital circuits.	Skill Development
4	**Develop** the ability to work is team and learns professional ethics.	Skill Development

List of Experiments

1. Verification of truth tables of

    (a) OR, AND, NOT gates (By using 7400-series)
    (b) NAND & NOR gates.
    (c) EX-NOR & EX-OR gates.

2. Verification of De-Morgan's Theorem using ICs.

3. Implementations of Multiplexer &Demultiplexer using logic gates (ICs) and verify truth table.

4. Implementations of Encoder & Decoder using logic gates (ICs) and verify truth table.

5. Implementations of Half Adder & Full Adder using logic gates (ICs) and verify truth table.

6. Implementations of Half Subtractor& Full Subtractor using logic gates (ICs) and verify truth table.

7. Implementation of Binary to Gray Code & Excess- 3 to BCD Converter using logic gates.

8. Operation and verifying truth tables of flip- flops- RS, D, and JK using ICs.

9. To perform addition & subtraction of two 8 bit numbers using 8085.

10. To perform the multiplication & division of two 8 bit numbers using 8085.

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR
(A Govt. Aided UGC Autonomous Institute Affiliated to RGPV, Bhopal, MP)
Electrical Engineering Department

Electrical Machines-I: 130412

Course Objectives:
- To develop basic concepts of AC and DC machines, their constructional details and working principles and
- To familiarize the students with the practical applications and operational issues of transformer, induction motor and DC machines.

Unit- I Basic Concepts of Rotating Electrical Machines: Physical concepts of torque production. Electromagnetic and reluctance torque, Constructional features of rotating machines i.e. DC machine. Induction machine and synchronous machine.EMF generation in dc and ac machines, MMF production on a distributed winding, Production of rotating magnetic field. AC & DC windings short pitching and distribution of winding. Fractional slot winding. Winding factors & harmonic elimination, Ratings and loss dissipation.

Unit- II D.C. Machines I: Construction of DC Machines, Armature winding, EMF and torque equations, Armature reaction, Commutation, Interpoles and compensating windings, Performance characteristics of DC generators.

Unit- III D.C. Machines II: Performance characteristics of DC motors, Starting of DC motors; 3point and 4 point starters, Speed control of DC motors; Field control, Armature control and Voltage control (Ward Lenonard method); Efficiency and Testing of D.C. machines (Hopkinson's and Swinburn's Test).

Unit- IV Single Phase Transformer: Phasor diagram, Efficiency and voltage regulation, All day efficiency. Testing of Transformers-O.C. and S.C. tests, Sumpner's test, and Polarity test. Auto Transformer- Single phase and three phase auto transformers, Volt-amp relation, Efficiency, Merits &demerits and applications.

Unit- V Three Phase Induction Motor I: Review of constructional details. Principle of operation, Slip. Production of torque, Steady state analysis. Phasor diagram, equivalent circuit. Power flow diagram and Torque speed characteristics. Starting methods

Recommended Books:
1. Electric Machines by D.P. Kothari & I.J. Nagrath, Tata McGraw Hill
2. Electric Machines by Ashfaq Hussain, Dhanpat Rai & Company
3. Electric Machinery by A.E Fitzerald, Kingsley and S.D. Umans, McGraw Hill.
4. Electrical Machinery by P.S. Bimbhra, Khanna Publisher
5. Generalized Theory of Electrical Machines by P.S. Bimbhra, Khanna Publishers
6. Alternating Current Machines by M.G.Say, Pitman & Sons

Course outcomes focused on employability/entrepreneurship and skill development

S No.	Course Outcome (CO)	Mapping
1	**Explain** the principles and construction of different AC and DC machines.	Skill Development
2	**Discuss** the fundamental control practices such as starting, reversing, braking, plugging etc. associated with AC and DC machines.	Employability
3	**Analyze**the performance of AC and DC machines.	Employability
4	**Develop** the equivalent circuits and compute the induced emf, torque, efficiency, losses etc.	Skill Development
5	**Describe**various tests conducted for evaluating the performance of AC and DC machines.	Skill Development
6	**Evaluate** the performance of machines under different operating conditions.	Skill Development

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

(A Govt. Aided UGC Autonomous Institute Affiliated to RGPV, Bhopal, MP)

Electrical Engineering Department

Electrical Machines-I Lab: 130412

Course outcomes focused on employability/entrepreneurship and skill development

S No.	Course Outcome (CO)	Mapping
1	**Draw** characteristics of electric machine for a specific purpose, requirement.	Skill Development
2	**Determine** the efficiency of any transformer, regulation of any transformer.	Skill Development
3	**Conduct** Load sharing by two or more machines	Skill Development
4	**Develop** the ability to work in team and learns professional ethics	Skill Development

LIST OF EXPERIMENTS

1. To Perform direct load test on single phase transformer

2. To perform parallel operation on two single phase transformers

3. To obtain magnetization characteristics of DC shunt generator

4. To obtain internal and external characteristics of DC shunt generator

5. To control the speed of DC shunt motor

6. To perform load test on DC shunt motor (Mechanically loaded)

7. To perform load test on DC series motor (Mechanically loaded)

8. To perform load test on DC compound motor (Electrically loaded)

9. To perform Hopkinson's test on two identical dc machines

10. To perform load test on induction motor

11. To obtain speed torque characteristics of 3 phase induction motor.

12. A virtual lab simulation of conventional electrical machines.

Power System -I: 130413

Course objectives:
- To familiarize the students with conventional and Non-Conventional energy sources and their use in electrical power generation.
- To expose the students with Transmission and distribution system, line parameters, performance of transmission lines, power plant economics and different types of tariffs.

Unit 1: Energy Resources and Electrical Power Generation: Introduction to Conventional and non-conventional energy resources; National and International energy trends; Global warming and greenhouse effects. Generation of electrical power, overview of conventional power generation: Hydro, Thermal, Nuclear and Gas Power; Renewable energy generation.

Unit 2: Transmission and Distribution Systems: Introduction, electrical supply system, comparison of AC and DC systems : conductor volume etc., overhead versus underground systems, choice of working voltages for transmission and distribution, transmission and distribution systems, Overhead line insulators, types of insulators pin, suspension and strain insulators, insulator materials, insulator string; Calculation of voltage distribution and string efficiency, methods of equalizing voltages, use of guard rings. Corona.

Unit 3: Line Parameters: Types of conductor, Inductance of a conductor due to internal flux, Inductance of a single phase & three phase transmission line, Self & mutual G.M.D., Inductance of three phase symmetrical and unsymmetrical spaced lines, transposed lines. Bundle conductors, skin effect, capacitance of single & three phase transmission line, effect of earth and charging current, transmission line communication and line interference.

Unit 4: Performance of Overhead Transmission Line: Single line diagram of power system, ABCD constant and equivalent circuits of short, medium and long transmission line, regulation and efficiency of short, medium, transmission line, Ferranti effect, surge impedance loading. Long transmission line, Generalized circuit equation relation between generalized circuit constant for simple network

Unit-5 Power plants Economics and Tariff: Size and number of generating units. Effect of load factor on cost of generation, Load curves, Maximum demand, Load factor, diversity factor, Plant capacity and plant use factor, type of tariffs and economics of power factor improvements.

Recommended Books:
1. Electric Power Generation, Transmission and Distribution by S.N. Singh, Prentice Hall of India, 2nd Edition.
2. Power system Analysis by A. Husain A, CBS Pub & Distributor.
3. Power System Analysis by B.R. Gupta B.R, S Chand & Co.
4. Electrical Power by S.L. Uppal, Khanna Publishers Limited, New Delhi.
5. Electrical Power Systems by C.L.Wadhwa, New Age International Publishers Ltd., New Delhi

Course outcomes focused on employability/entrepreneurship and skill development
Course Outcomes:

S No.	Course Outcome (CO)	Mapping
1	**Describe** the general structure and supply systems used in power systems	Skill Development
2	**Develop** the knowledge of generation of electricity based on conventional and nonconventional energy sources	Employability
3	**Evaluate** the string efficiency, corona losses etc.	Employability
4	**Determine** the transmission line parameters	Skill Development
5	**Determine** the transmission line parameters	Skill Development
6	**Describe** the concept of power plant economics, types of tariffs and power factor economics	Skill Development

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR
(A Govt. Aided UGC Autonomous Institute Affiliated to RGPV, Bhopal, MP)
Electrical Engineering Department

Programming with Python (Lab):130414

Course outcomes focused on employability/entrepreneurship and skill development

S No.	Course Outcome (CO)	Mapping
1	**Demonstrate** the use of loops & conditional statements in Python	Skill Development
2	**Design** Python programs to solve real world problem	Skill Development
3	**Prepare** technical report	Skill Development

List of Experiments

1. Introduction to Python programming

2. Write a program to create, concatenate and print a string and accessing substring from a given string

3. Write a program in Python for demonstration of list creation and its appending & removal

4. Write a program to demonstrate working with Tuples in python

5. Write a program to demonstrate working with Tuples in python

6. Write a code to create Functions in Python

7. Write a code to demonstrate the use of loops & conditions in Python

8. Write a code to take input from user & then to sort the numbers using Python

9. Write a python program to convert temperature units to and from degree Celsius to degree Fahrenheit

10. Write a program that inputs a text file. The program should print all of the unique words in the file in alphabetical order

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR
(A Govt. Aided UGC Autonomous Institute Affiliated to RGPV, Bhopal, MP)
Electrical Engineering Department

Renewable Energy Lab: 130415

Course outcomes focused on employability/entrepreneurship and skill development

S No.	Course Outcome (CO)	Mapping
1	**Develop** the understanding of renewable energy sources.	Skill Development
2	**Investigate** the solar PV & wind energy operation and find their performance curves.	Skill Development
3	**Examine** smart house & load analysis kit.	Skill Development
4	**Develop** teamwork skills for working effectively in groups.	Skill Development
5	**Prepare a technical** report on experiments conducted in the lab.	Skill Development

List of Experiments

1. To setup a Solar PV standalone system and calculate power in different branches of the system.

2. To set up a Solar PV Grid Connected system and calculate power in different branches of the system.

3. To set up a Solar PV Power plant with the help of a Hybrid inverter.

4. To set up a Wind Energy standalone system and calculate power in different branches of the system.

5. To set up a Solar PV- Wind Energy Hybrid standalone system and calculate power in different branches of the system.

6. Utilizing smart house as a load and analyzing load waveforms.

7. Utilizing Load analysis kit and understanding about loads connected in series.

8. Observing different weather parameters using weather station.

9. Comparing the different types of grid connected systems and analyzing their waveforms with the help of linear loads.

10. Comparing the different types of grid connected systems and analyzing their waveforms with the help of nonlinear loads.