

Syllabi of
Departmental Courses (DC) Courses
B. Tech I Semester
For batch admitted 2022-23
(Computer Science and Engineering)
Under Flexible Curriculum



DIGITAL ELECTRONICS (150121)

COURSE OBJECTIVES

- To perform the analysis and design of various digital electronic circuits.
 - To learn various number systems, boolean algebra, and logic gates.
 - To understand the concept of counters, latches, and flip-flops.
-

Unit-I

Introduction to Digital Electronics, Needs and Significance, Different Number Systems: Binary Numbers, Octal and Hexadecimal Numbers, Conversions, Complement's, Signed Binary Numbers, Binary Arithmetic, Binary Codes: BCD, ASCII Codes.

Unit-II

Basic Theorems and Properties of Boolean Algebra, Boolean Functions, Boolean Relations, Digital Logic Gates, De Morgan's Theorem, Karnaugh Maps and simplifications, Prime Implicants and Essential Prime Implicants definition.

Unit-III

Combinational Circuits, Half Adder, Half Subtractor, Full Adder and Full Subtractor, Binary Adder-Subtractor, Binary Multiplier, Comparator, Decoders, Encoders, Multiplexers, Demultiplexer.

Unit-IV

Sequential Circuits, Latches, Flip-Flops: RS Latches, Level Clocking, D Latches, Edge-triggered D Flip-flop, Edge-triggered JK Flip-flop, JK Master-slave Flip-flop; Registers, Shift Registers, Counters, Ripple Counters, Synchronous Counters.

Unit-V

Introduction to Memory, Memory Decoding, Error Detection and Correction,



MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR - 474005

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

Programmable Logic Array, Programmable Array Logic, Sequential Programmable Devices, RTL and DTL Circuits, TTL, ECL, MOS, CMOS, Application Specific Integrated Circuits.

RECOMMENDED BOOKS

- Digital Design, Morris Mano M. and Michael D. Ciletti, IV Edition, Pearson Education.
 - Digital Electronics: Principles, Devices and Applications, Anil K. Maini, Wiley.
-

COURSE OUTCOMES

After completion of the course students would be able to:

- CO1. explain the computer architecture for defining basic component and functional unit.
 - CO2. recall different number system and solve the basic arithmetic operations.
 - CO3. develop the understanding of combinational circuits.
 - CO4. analyze the basic concept of sequential circuits.
 - CO5. compare various memories.
 - CO6. solve the boolean functions using logic gates.
-



MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR - 474005

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

Department of Computer Science and Engineering

Computer Programming

(150122/160122/230122/240122/270122/280122)

COURSE OBJECTIVES:

- To develop the understanding of algorithms, programming approaches and program documentation techniques.
- To study the concepts of procedural and object oriented programming.
- To design and implement basic programming solutions using programming constructs.

Unit I

Introduction to Programming, types of computer programming languages, Program Execution and Translation Process, Problem solving using Algorithms and Flowcharts. Introduction to C++ Programming: Data Types, Constants, Keywords, variables, input/output, Operators & Expressions, Precedence of operators.

Unit II

Control Statements and Decision Making: goto statement, if statement, if-else statement, nesting of if statements, The switch statement, while loop, do...while loop, for loop, nesting of for loops, break and continue statement. Function Basics, Function Prototypes, Passing Parameter by value and by reference, Default Arguments, Recursion. Arrays: One dimensional Arrays, Multidimensional Arrays, Passing Arrays to Functions.

Unit III

Strings, Pointers, Structures and File handling:, operations on Strings, Basics of Pointers & Addresses, reference variable, Pointer to Pointer, Pointer to Array, Array of Pointers, Pointer to Strings. Dynamic memory allocation using new and delete operators. Structures & Union, Pointer to Structure, Self-Referential Structures. File Concepts, Study of Various Files and Streams, operations on files.



MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR - 474005

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

Unit IV

Object Oriented Paradigm, Features of OOPS, Comparison of Procedural Oriented Programming with Object Oriented Programming, Abstract Data Types, Specification of Class, Visibility Modes, Defining Member Functions, Scope Resolution Operator, Constructors, its types, and Destructors, Creating of Objects, Static Data Member, Static Member Function, Array of Objects, Object as Arguments, Inline Function, Friend Function.

Unit V

Polymorphism: Introduction, Type of Polymorphism: Compile Time Polymorphism & Run Time Polymorphism, Function Overloading, Operator Overloading. Inheritance: Introduction, Visibility Modes, Types of Inheritance: Single Level, Multilevel, Multiple, Hybrid, Multipath.

RECOMMENDED BOOKS:

- C++ How to Program, H M Deitel and P J Deitel, Prentice Hall.
- Programming with C++, D Ravichandran, T.M.H.
- Computing Concepts with C++ Essentials, Horstmann, John Wiley.
- The Complete Reference in C++, Herbert Schildt, TMH.
- Object-Oriented Programming in C++, E Balagurusamy.
- Fundamentals of Programming C++, Richard L. Halterman.

COURSE OUTCOMES:

After completing this, the students will be able to:

CO1: identify situations where computational methods and computers would be useful.

CO2: develop algorithms and flowchart for a given problem.

CO3: understand the concepts of procedural programming.

CO4: explain the concepts of object oriented programming and its significance in the real world.

CO5: analyze the problems and choose suitable programming techniques to develop solutions.

CO6: develop computer programs to solve real world problems.



MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR - 474005

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

List of Experiment

Computer Programming(150122)

1. Write a Program to Check Whether a Number is Even or Odd
2. Write a Program to Check Leap Year
3. Write a Program to find the sum of the first n natural numbers
4. Write a Program to convert string from lower case to upper case
5. Write a program to find the sum of array elements
6. Write a program to print String using Pointer
7. Write a program to swap two numbers using pointers
8. Write a Program to read the first line from a file
9. Write a Program to write a sentence on a file
10. Write a Program Binary to decimal conversion



MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR - 474005

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

List of Skill-Based Mini-projects

Computer Programming(150122)

1. Design a program to implement the Tic tac toe game
2. Design a program to implement the basic operation of the Leave Management System
3. Generate a Student report card system using a C/C++ program.
4. Design a program that can generate a Calendar for any year.
5. Design a program that demonstrates the operations performed by an ATM Machine.
6. Design a program to create a Number System Conversion system.
7. Design a program to implement the basic operation of the Department Store Management System
8. Design a program to implement the basic operation of the Library Management System
9. Design a program to implement the basic operation of the Bus Reservation System
10. Design a program to implement a Periodic Table.
11. Design a program to implement a Digital clock

Please Note: Each project has to be submitted by a group of 3 to 4 students, and each group will be assigned only one project.



MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR - 474005

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

Emerging Technologies in Computer Science (150123)

Course Objectives:

1. To acquire knowledge of trending and emerging technologies along with their principles, issues, challenges, and mechanisms.
2. To provide a conceptual understanding of modern tools and techniques for Big data Analytics, Artificial intelligence, Cyber Security, and IoT.

Unit I – Artificial Intelligence:

Introduction: Need and Scope of AI, History, Definition of AI, Techniques of AI, Characteristics of AI applications, Basic Search Techniques, General problem solving, Speech Recognition, Natural Language Processing, Computer Vision, Introduction of expert systems

Unit II – Cloud Computing:

Introduction to cloud computing, Software as a service, platform as a service, and infrastructure as a service. Cloud deployment model: Public cloud, Private clouds, Community clouds and Hybrid clouds. Virtualization: Compute virtualization, Storage virtualization, Full and paravirtualization.

Unit III – Cyber Security:

Overview of Cyber Security, Cyber-crime, Cyberwarfare, cyber Terrorism, Cyber espionage, Cyber Vandalism (Hacking), Cyber Stalking, Internet Frauds and Software piracy, Cyber Security Threats and Vulnerabilities: Hacker, Types of Hacker- white, Gray and black, Malicious Software: Virus, Worm, Trojan Horse, Backdoors and Spywares, Sniffers, Denial of Service attack and Phishing.

Unit IV – Internet of Things:

IoT definition, Characteristics, IoT conceptual and architectural framework, Components of IoT ecosystems, Review of Basic Microcontrollers and interfacing, Basic components and challenges of a sensor, Sensor features, RFID: Features & working principle.

Unit V - Big Data Analytics:



MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR - 474005

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

Introduction to Big data, Big data characteristics, Traditional data versus Big data, Evolution of Big data, challenges with Big Data, Technologies available for Big Data, Use of Data Analytics, Hadoop Ecosystem, Core Hadoop components, ETL Processing

COURSE OUTCOMES:

After successful completion of the course, the learners would be able to:

1. Illustrate concepts & applications of Artificial Intelligence.
2. Describe the fundamental ideas behind Cloud Computing, the evolution of the paradigm, its applicability benefits, as well as current and future challenges;
3. Understand the basics of Cyber Security and working knowledge
4. Analyze various Cyber Security Threats and Vulnerabilities
5. Understand the Internet of Things and its hardware and software components.
6. Define the concept and challenges of Big Data, along with the basic understanding of Big Data Solutions using the Hadoop Eco System

Reference Books:-

- RadhaShankarmani, M. Vijaylakshmi, " Big Data Analytics", Wiley, Second edition
- Rich & Knight - Artificial Intelligence
- Kai Hawang, Geofrey C Fox, "Distributed and Cloud Computing"
- Cryptography and Network Security Principles and Practice Fourth Edition, William Stallings, Pearson Education
- Cuno Pfister, "Getting Started with the Internet of Things", O Reilly Media



Engineering Mathematics –I (100011)

Objective of Course

- To understand the techniques of differential and integral calculus in engineering problems
- To expose the concept of ordinary and partial differentiation
- To explore with matrix and its applications
- To understand Boolean algebra and graph theory

Unit 1:

Maclaurin's and Taylor's theorem, Partial differentiation, Euler's theorem, Jacobian, Maxima and Minima of one and two variables, Convergence of Sequence, and Series Test.

Unit 2:

Definite integral as a limit of a sum, application in summation of series, Beta and Gamma function and its properties, the transformation of Beta function, Gamma functions, the transformation of Gamma function, the relation between Beta and Gamma function, Legendre's duplication formula, double & triple integral, Change of the order of integration, Length of the curves, Volumes and surfaces.

Unit 3:

Ordinary differential equations of first and higher order, Linear higher order differential equations with constant coefficients, Homogeneous linear differential equations, and Simultaneous differential equations.

Unit 4:

Matrix, Rank of Matrix, Echelon form, Normal form of matrix, Solution of simultaneous equation by elementary transformation, Consistency of equation, Eigen values and Eigenvectors, Normalized eigenvector, Cayley Hamilton theorem and its application to finding inverse of matrix.

Unit 5:

Introduction to Algebra of Logic, statement, Logical connector, Types of Conditional statement, Logical equivalence, CNF and DNF, Algebraic laws, De Morgan's laws, Boolean algebra, Principle of duality basic theorems, Boolean expressions and function, DNF and CNF form and Switching circuit.

Graph Theory, graph, Types of graphs, walk, path, circuit, Hamiltonian graph, Euler graph and its applications, Tree, Spanning tree and its properties.



MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR - 474005

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

Course Outcomes

After completing this course, students will be able to:

CO's	Description of COs
CO1	Apply differential Calculus to basic engineering problems
CO2	Use integration techniques to determine the solution to various complex problems
CO3	Solve the differential equations by various methods
CO4	Solve the problem of the matrix.
CO5	Concept of Boolean algebra and graph theory.

Recommended Books:

1. E. Kreyszig: Advance Engineering Mathematics, John Wiley & Sons, 10th Edition (2011).
2. C.L Liu: Discrete Mathematics, 4th Edition 2012.
3. R. K. Jain, S. R. K. Iyengar: Advance Engineering Mathematics, Narosa Publishing House Pvt.Ltd, 5th Edition (2016).
4. F. B . Hildebrand: Advanced Calculus for application, Englewood Cliffs, N. J. Prentice- Hall, 2nd Edition (1980).
5. B. S. Grewal: Higher Engineering Mathematics, Khanna Publishers, 43rd Edition (2015)..
6. B.V. Ramanna: Higher Engineering Mathematics, McGraw Hill Education, 1st Edition (2017).



MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR - 474005

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

Basic Electrical & Electronics Engineering: 100022

Course Objectives:

- To impart the basic knowledge of the DC and AC circuits and their applications.
- To familiarize the students with the basic knowledge of magnetic circuits, transformer and its terminology.
- To make familiarize the students about the working of rotating electrical machine, various electronic circuits and its importance.

Unit I - D.C. Circuits Analysis:

Voltage and Current Sources: Dependent and independent source, Source conversion, Kirchhoff's Law, Mesh and Nodal analysis. Network theorems: Superposition theorem, Thevenin's theorem & Norton's theorem and their applications.

Unit II –Single-phase AC Circuits:

Generation of sinusoidal AC voltage, definitions: Average value, R.M.S. value, Form factor and Peak factor of AC quantity, Concept of Phasor, analysis of R-L, R-C, R-L-C Series and Parallel circuit, Power and importance of Power factor.

Unit III- Magnetic Circuits:

Basic definitions, AC excitation in magnetic circuits, self-inductance and mutual inductance, Induced voltage, laws of electromagnetic Induction, direction of induced E.M.F. Flux,MMF and their relation, analysis of magnetic circuits.

Unit IV- Single-phase Transformer &Rotating Electrical Machines:

Single phase transformer, Basic concepts, construction and working principal, Ideal Transformer and its phasor diagram at No Load, Voltage, current and impedance transformation, Equivalent circuits and its Phasor diagram, voltage regulation, losses and efficiency, testing of transformers, Construction & working principle of DC and AC machine.



Unit V - Digital Electronics, Devices & Circuits:

Number systems used in digital electronics, decimal, binary, octal, hexadecimal, their complements, operation and conversion, Demorgan's theorem, Logic gates- symbolic representation and their truth table, Introduction to semiconductors, Diodes, V-I characteristic, Bipolar junction transistors and their working, Introduction to CB, CE & CC transistor configurations

Recommended Books:

1. Basic Electrical and Electronics Engineering, D.P. Kothari & I.J. Nagrath-Tata McGraw Hill
2. Basic Electrical and Electronics Engineering, V N Mittle & Arvind Mittal -Tata McGraw Hill
3. Basic Electrical and Electronics Engineering, S. K Bhattacharya -Pearson
4. Electrical Machinery- A.E. Fitzgerald, C. Kingsley and Umans - TMH
5. Principles of Electrical Engineering- Vincent Del Toro- Prentice Hall.
6. Basic Electrical Engineering -A,E. Fitzgerald, Higginbotham and Grabel -TMH
7. Integrated Electronics- Millmann & Halkias
8. Electronics Devices & circuits- Sanjeev Gupta, Dhanpat Rai Publication
9. Basic Electrical and Electronics Engineering, D.C Kulshreshtha-Tata McGraw Hill

Course Outcomes

After the completion of the course, the student will be able to –

- CO 1. Solve** dc & ac circuits by applying fundamental laws & theorems
- CO 2. Compare** the behavior of electrical and magnetic circuits for given input
- CO 3. Explain** the working principle, construction, applications of rotating electrical machines
- CO 4. Explain** the working principle, constructional details, losses & applications of single phase transformer.
- CO 5. Select** the logic gates for various applications in digital electronic circuits.
- CO 6. Explain** characteristics of Diode and Transistor.



MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR - 474005

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

Basic Electrical & Electronics Engineering Lab (100022)

LIST OF EXPERIMENT

1. To verify Kirchhoff's Current Law & Kirchhoff's Voltage Law.
2. To verify Superposition Theorem
3. To determine resistance & inductance of a choke coil.
4. To determine active & reactive power in a single phase A.C circuit.
5. To determine voltage ratio & current ratio of a single phase transformer.
6. To determine the polarity of a single phase transformer.
7. To perform open circuit & short circuit test on a single phase transformer.
8. To study multimeter & measure various electrical quantities
9. To study of constructional details of DC machine.
10. To determine the V-I characteristics of diode in forward bias & reverse bias condition.

Course Outcomes:

After the completion of the lab, the student will be able to -

- CO 1. Verify** circuit theorems.
- CO 2. Perform** tests on transformer for determination of losses, efficiency & polarity.
- CO 3. Acquire** teamwork skills for working effectively in groups
- CO 4. Prepare** an organized technical report on experiments conducted in the laboratory.

Skill-Based Mini Project

Basic Electrical & Electronics Engineering

1. Enlist the different electrical loads available in your home and prepare their rating chart.
2. Design the residential house wiring using fuse, switch, and indicator, lamp and energy meter. Also apply the Thevenin's theorem for finding the current in a particular branch of the circuit.
3. If one FTL (Fluorescent Tube Light) is replaced by LED bulb.
 - A. Calculate the Monthly electrical energy saving?
 - B. Calculate the monthly savings in electricity bill?

Note: LUX level of FTL and LED bulbs must be the same (follow BEE Guide lines). Consider electricity bill charges from MP Vidyut Vitran company website.



MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR - 474005

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

4. What is the use of condenser in a ceiling fan? Draw a wiring diagram for the testing of motor winding.
5. Find the different ways/ Methodologies/ Guidelines, by which energy can be conserved in domestic applications?
6. Design a working model for controlling one lamp by two 2-way switch.
7. Visit the electrical machine lab and enlist different types of AC and DC motors along with their ratings. Also mention their industrial applications.
8. Visit the panel room and identify the different safety practices followed by electrical engineer.
9. Enlist different measuring instruments available in electrical workshop lab. Also prepare a comparison chart for Analog and digital measuring instruments.



MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR - 474005

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

Department of Computer Science and Engineering

IT WORKSHOP (150124)

COURSE OBJECTIVES:

- To Understand the basics principles of computer, internet and computer security
 - To Understand the basic productive IT tools
 - To Learn the language of the web: HTML & CSS
 - To learn and understand Python programming basics and paradigm
-

UNIT I

Introduction & evolution of the internet, Study of various internet-based services like Email, social network, chat, web browsers, google services, etc. Introduction to cyber security and cyber laws, awareness of cyber hygiene, i.e., protecting the personal computer from getting infected with viruses, worms, and other cyber-attacks.

UNIT II

Professional word documents excel spreadsheets and power point presentations using the Microsoft suite of office tools, Operating System and Software Installations: Introduction to the operating system. Operating system types & evolution of operating system, Introduction to software, Types of software i.e., MS office, Media players, Winrar etc.

UNIT III

Introduction to html, html text editors, html building blocks, html tags, html attributes, html elements, html formatting, html heading, html paragraphs, html phrase tags, html anchors, html images, html tables, html list, html form, html with CSS, html classes, html frames, html Java scripts

UNIT IV

Introduction to python, Unique features of Python, Python-2 and Python-3 differences, Install Python and Environment Setup, First Python Program, Python Identifiers, Keywords and Indentation, Comments and document interlude in Python, Command line arguments.

UNIT V

Getting User Input, Python Data Types, What are variables?, Python Core objects and Functions, Number and Math's, Control Statements, List, Python Dictionaries and Sets, Input and Output in Python, Python built in function, Case study using HTML, Case study using Python.



MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR - 474005

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

RECOMMENDED BOOKS:

[1]. VamsiKurama, "Python Programming: A Modern Approach", Pearson India, 2017. [2]. Charles Severance, " Python for Informatics- Exploring Information", 1st edition Shroff Publishers, 2017.

[2] Thomas A. Powell “ Thecomplete references HTML and CSS”, Fifth edition, Mc Graw Hill Publication.

COURSE OUTCOMES:

After completion of this course, the students would be able to:

CO1: Understand the basic concept and structure of application software.

CO2: Identify the existing configuration of the computers and peripherals.

CO3: Integrate the PCs into local area network and re-install operating system and various application programs.

CO4: Design and develop basic web pages using HTML and CSS.

CO5: Design & create and implement a static and dynamic webpage

CO6: Design and implement a program to solve a real world problem.



MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR - 474005

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

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

IT WORKSHOP

List of Experiments

- 1) Apply the following operation on Excel Spreadsheet

Deleting a Column or a Row

Inserting a Row

Sorting

Displaying Formulas in the Worksheet

Copying Cells, Columns or Rows

Justification of Cell Contents

- 2) Perform the following Function on Excel Spreadsheet

AutoSum

Max

Min

Average

- 3) Write a program to describe various text formatting commands.
- 4) Create an HTML Login form.
- 5) Create a google form for the registration of students using google services.
- 6) Write a Program to create a simple layout of the Webpage.
- 7) Write a Program to divide a page into Frames.
- 8) Write a python program to swap two variables without using a temporary variable.
- 9) Write a program two find largest number among three numbers.
- 10) Write a Python programs that makes use of conditional and control flow structures



MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR - 474005

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

SKILL BASED PROJECTS

1. Design & implement a login form in HTML.
2. Design & implement a registration form for a college event.
3. Design & implement your dynamic portfolio page.
4. Create an animation with the help of HTML & CSS.
5. Create a Google classroom for your subject.
6. Design & implement a calculator in python.
7. Create your blog by using Google blogger.
8. Create YouTube channel or monetization it.
9. Create an alarm by python.
10. Create a Quiz game in python.



Engineering Chemistry (3000002) (Natural Sciences & Skills)

COURSE OBJECTIVES:

- Enable the students to become familiar with the concepts of Modern Engineering Chemistry. Develop an understanding of complex topics in correlation to Chemical analysis and applications. So that they could be applied to engineering and applications. Help students develop an understanding of the reactions and analysis-related problems in day-to-day life/industry/engineering field.
-

Unit I - Chemistry of Water Analysis

Source and impurities, alkalinity, pH, hardness of water, the interrelationship between alkalinity and hardness, degree of hardness, Standards of water for drinking purposes, Methods of water softening: lime- soda process, zeolite, and ion exchange resin process. Scale formation: causes, effects, and prevention. Caustic embitterment, priming, foaming, boiler corrosion, and deaeration. Simple numerical problems on water softening based on the lime soda process and water analysis

Unit II - Chemistry of Engineering Material

Lubricants-Introduction, functions of lubricants, types, and classification of lubricants, solid lubricants, semi-solid lubricants, liquid lubricants, synthetic lubricants, lubricating emulsions, biodegradable lubricants, mechanism of lubrication, physical & chemical properties, testing of lubricants, types of greases, application of lubricants and silicones, selection of lubricants.

Cement: introduction & raw materials, gypsum cement, Types of cement, Methods of manufacturing cement: Wet process, Dry process, Semi-dry process. Chemistry of setting & Hardening of cement, Types of Portland cement, and its derivatives.

Refractory. Introduction, classification of refractories, and properties of refractories with reference to Refractoriness, RUL, Porosity, Thermal Spalling

Unit III - Chemicals of industrial importance

Fuels- Definition & Classification of fuels and their comparison. Calorific values, Determination of calorific value by Bomb calorimeter. Proximate and ultimate analysis of coal and their significance, Varieties of fuel oils, their properties and uses, knocking, anti-knocking compounds (octane & cetane number), simple numerical problems based on fuels.



MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR - 474005

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

Unit IV - Polymers of Engineering importance

Introduction, types and classification of polymers, Types of polymerization: addition or chain polymerization, condensation polymerization and their mechanism,

Classification of plastic, important thermoplastic resins Nylon 66, Teflon, Polystyrene & important thermosetting resins Phenolic resin, Amino resin. Moulding of plastics. Natural & synthetic rubbers, Vulcanization, styrene rubber, polyurethanes, silicon rubber, reclaimed rubber, Introduction to polymer composites, Engineering Plastics, Polymer in medicine and surgery and conducting polymers

Unit V - Standard Methods of Chemical Analysis

Introduction to Chromatography- Classification of Chromatography Methods, Principle of Chromatographic Mechanisms, Terminology Used in Chromatography, Chromatographic Performance, Isolation of Separated Components (Elution), Column, Thin layer and paper Chromatography. Principle, Instrumentation and application of Gas Chromatography.

Introduction to Spectroscopy-Ultra-Violet, and Visible Spectroscopy, Theory of ultraviolet visible spectroscopy, Types of electronic transitions, Chromophore, Auxochrome, Absorption and intensity shifts, The Absorption law. Instrumentation and Applications of ultraviolet-visible spectroscopy. Introduction of IR Spectroscopy.



MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR - 474005

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

RECOMMENDED BOOKS:

- Engineering Chemistry- P.C.Jain and Monika Jain, Dhanpat Rai *Publishing Co (P) Ltd*, 2013
- Engineering Chemistry - B.K. Sharma, Krishna Publication, 2015
- A Text Book of Engineering Chemistry - S. S. Dara & A.K. Singh, S. Chand Publication, 2015.
- Applied Chemistry - Theory and Practice, O.P. Viramani, A.K. Narula, New Age Pub, 2008.
- Polymer Science – Ghosh, Tata McGraw Hill.2010
- Chemistry for Environmental Engineering - Sawyer, McCarty and Parkin – McGraw Hill, International.2003
- Industrial Chemistry - B.K. Sharma, GOEL Publishing house 2011

COURSE OUTCOMES:

After completion of the course students would be able to:

CO1: Integrate the importance of water treatment for domestic and Industrial purposes

CO2: Acquire knowledge of the types, properties, and applications of advanced Engineering materials like lubricants, fuels.

CO3: Appreciate the knowledge of the types, properties, and application of advanced polymer materials, cement, refractories.

CO4: Perform simple and complex calculations through problem-solving methods.

CO5: Summarize the concept of chromatography and spectroscopy for various engineering applications related to day to day life.



MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR - 474005

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

List of Experiments

Subject Name: Engineering Chemistry laboratory

Subject code 3000002 (Under Flexible Scheme-2019-20)

B.Tech. (First / Second semester) with effect from 01.07.2022

NOTE: At least 10 of the following experiments must be performed during the session.

Experiment No.	Aim of experiment
1	Determination of Total hardness by Complexometric titration.
2	Determination of temporary and permanent hardness by Complexometric titration.
3	Determination of alkalinity of given water sample by neutralization Titration. (a) OH^- & CO_3^{2-} (b) CO_3^{2-} & HCO_3^-
4	Determination of percentage of Fe in Iron alloy solution by redox titration.
5	Determination of percentage of Cr in Chromium alloy solution by back titration.
6	Determination of Cu in Copper alloys solution by Iodometric Titration.
7	Determination of Viscosity of given oil sample by Redwood viscometer No.1
8	Determination of Flash & fire points of given oil sample by Pensky Martin close cup Apparatus.
9	Determination of Flash & fire point of given oil sample by Cleveland's open cup Apparatus.
10	Determination of Moisture content, volatile matter content, Ash content and fixed Carbon of a given sample of coal by proximate analysis.
11	Separation of the colour pigment of spinach leaf by paper chromatography.
12	Preparation of phenol formaldehyde resin by condensation polymerization.
13	Preparation of urea formaldehyde resin by condensation polymerization.



MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR - 474005

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

Course outcomes

Lab CO	After attending the lab in Engineering Chemistry (100101) the student will be able to:
CO1	Develop experimental skills required for the application of chemistry in engineering.
CO2	Operate different chemicals and instruments specified in the course safely and efficiently.
CO3	Analyze water samples, lubricants, fuel, alloys, and ores for different properties
CO4	Function as a member of a problem-solving team

Skill-Based Mini Project

Guidelines for delivering the Project:

Students will have to deliver a 10 Minute presentation preferably on PowerPoint.

1. The student can choose a topic of their choice but the same should be from the syllabi.
2. The students will have to communicate the same to the teacher in advance before delivering the same, and getting the topic approved. The teacher can change, modify, and suggest one instead.
3. The students will be allowed to share their screen and present the same online in laboratory sessions and in additional classes as called by the teacher.
4. Student will also have to submit a written report based on that.
5. The said activity has to be completed before the teaching ends.
6. He will be judged on basis of Presentation rubrics.