MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

(A Govt. Aided UGC Autonomous & NAAC Accredited Institute affiliated to RGPV, Bhopal)

Department of Information Technology

Scheme of Evaluation

B. Tech. I Semester *(Artificial Intelligence (AI) and Machine Learning)*

(for batch admitted in academic session 2022-23)

S. No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted							Total Marks	Contact Hours per week			Total Credits	Mode of Teaching	Mode of Exam.	Duration of Exam.
				Theory Slot				Practical Slot										
				End Term Evaluation		Continuous Evaluation		End Sem. Exam.	Continuous Evaluation			L	T	P				
				End Sem. Exam	$Proficiency in subject /course	Mid Sem. Exam.	Quiz/ Assignment		Lab Work & Sessional	Skill Based Mini Project								
1.	2280121	DC	Introduction to Artificial Intelligence & Machine Learning	50	10	20	20	-	-	-	100	4	-	-	4	Blended	MCQ	1.5 Hrs
2.	2280122	DC	Computer Programming	50	10	20	20	60	20	20	200	2	1	2	4	Blended	AO	2 Hrs
3.	2280123	DC	Digital Logic Design	50	10	20	20	-	-	-	100	2	1	-	3	Blended	PP	2 Hrs
4.	2250100	BSC	Linear Algebra	50	10	20	20	-	-	-	100	3	1	-	4	Offline	PP	2 Hrs
5.	2100022	ESC	Basic Electrical & Electronics Engineering	50	10	20	20	60	20	20	200	2	1	2	4	Blended	MCQ	1.5 Hrs
Total				**250**	**50**	**100**	**100**	**120**	**40**	**40**	**700**	**13**	**04**	**04**	**19**	-	-	-
6.	3000001	Natural Sciences & Skills	Engineering Physics	50	10	20	20	30	10	10	150	1	-	2	GRADE	Blended	MCQ	1.5 Hrs

Induction programme of three weeks (MC): Physical activity, Creative Arts, Universal Human Values, Literary, Proficiency Modules, Lectures by Eminent People, Visits to local Areas, Familiarization to Dept./Branch & Innovations.

$Proficiency in course/subject – includes the weightage towards ability/ skill/ competency /knowledge level /expertise attained etc. in that particular course/subject

Natural Sciences & Skills: Engineering Physics / Engineering Chemistry / Environmental Engineering / Language

Credits of Natural Sciences & Skills will be added in the VI Semester

MCQ: Multiple Choice Question **AO:** Assignment + Oral **OB:** Open Book **PP:** Pen Paper **SO:** Submission + Oral

Mode of Teaching				Mode of Examination				
Theory			Lab	Theory			Lab	Total Credits
Offline	Online	Blended	Offline	PP	AO	MCQ	SO	
04	-	13	02	07	03	07	02	19
21.05%	-	68.42%	10.53%	36.84%	15.79%	36.84%	10.53%	Credits %

02-03-2023
DEAN (ACADEMICS)
M.I.T.S
GWALIOR

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Department of Information Technology

Scheme of Evaluation

B. Tech. II Semester *(Artificial Intelligence (AI) and Machine Learning)*

(for batch admitted in academic session 2022-23)

S. No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted							Total Marks	Contact Hours per week			Total Credits	Mode of Teaching	Mode of Exam.	Duration of Exam.
				Theory Slot				Practical Slot										
				End Term Evaluation		Continuous Evaluation		End Sem. Exam.	Continuous Evaluation			L	T	P				
				End Sem. Exam	$Proficiency in subject /course	Mid Sem. Exam.	Quiz/ Assignment		Lab Work & Sessional	Skill Based Mini Project								
1.	2280221	DC	Data Structures	50	10	20	20	60	20	20	200	3	-	2	4	Offline	PP	2 Hrs
2.	2280222	DC	Python Programming	50	10	20	20	60	20	20	200	2	1	2	4	Blended	~~PP~~ AO	2 Hrs
3.	2280223	DC	Database Management System	50	10	20	20	60	20	20	200	2	1	2	4	Blended	~~AO~~ PP	2 Hrs
4.	2280224	DC	Operating System	50	10	20	20	-	-	-	100	2	1	-	3	Blended	PP	2 Hrs
5.	2250106	BSC	Probability and Random Process	50	10	20	20	-	-	-	100	3	1	-	4	Blended	PP	2 Hrs
Total				**250**	**50**	**100**	**100**	**180**	**60**	**60**	**800**	**12**	**04**	**06**	**19**	-	-	-
6.	3000002	Natural Sciences & Skills	Engineering Chemistry	50	10	20	20	30	10	10	150	1	-	2	GRADE	Blended	MCQ	1.5 Hrs

Induction programme of three weeks (MC): Physical activity, Creative Arts, Universal Human Values, Literary, Proficiency Modules, Lectures by Eminent People, Visits to local Areas, Familiarization to Dept./Branch & Innovations. SIP-I (Institutional) : Minimum two week duration.

$Proficiency in course/subject – includes the weightage towards ability/ skill/ competency /knowledge level /expertise attained etc. in that particular course/subject

Natural Sciences & Skills: Engineering Physics / Engineering Chemistry / Environmental Engineering / Language

Credits of Natural Sciences & Skills will be added in the VI Semester

MCQ: Multiple Choice Question **AO:** Assignment + Oral **OB:** Open Book **PP:** Pen Paper **SO:** Submission + Oral

07.03.2023

DEAN (ACADEMICS)
M.I.T.S
GWALIOR

Mode of Teaching				Mode of Examination				Total Credits
Theory			Lab	Theory			Lab	
Offline	Online	Blended	Offline	PP	AO	MCQ	SO	
04	-	12	03	13	03	-	03	19
21.05%	-	63.16%	15.79%	68.42%	15.79%	-	15.79%	Credits %

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Department of Information Technology

Scheme of Evaluation

B. Tech. III Semester *(Artificial Intelligence (AI) and Machine Learning)*

(for batch admitted in academic session 2022-23)

S. No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted							Total Marks	Contact Hours per week			Total Credits	Mode of Teaching	Mode of Exam.	Duration of Exam.
				Theory Slot				Practical Slot										
				End Term Evaluation		Continuous Evaluation		End Sem. Exam.	Continuous Evaluation			L	T	P				
				End Sem. Exam	$Proficiency in subject /course	Mid Sem. Exam.	Quiz/ Assignment		Lab Work & Sessional	Skill Based Mini Project								
1.	2280321	BSC	Discrete Structures	50	10	20	20	-	-	-	100	2	1	-	3	Offline	PP	2 Hrs
2.	2280322	DC	Computer Networks & Protocols	50	10	20	20	-	-	-	100	2	1	-	3	Blended	PP	2 Hrs
3.	2280323	DC	Design & Analysis of Algorithms	50	10	20	20	60	20	20	200	2	1	2	4	Blended	PP	2 Hrs
4.	2280324	DC	Computer Graphics & Multimedia	50	10	20	20	60	20	20	200	2	1	2	4	Blended	PP	2 Hrs
5.	2280325	DC	Internet of Things	50	10	20	20	-	-	-	100	2	1	-	3	Blended	MCQ	1.5 Hrs
6.	2280326	DLC	Design and Thinking Lab	-	-	-	-	60	20	20	100	-	-	2	1	Offline	SO	-
7.	2280327	DLC	Self-learning/Presentation (SWAYAM/NPTEL/MOOC)	-	-	-	-	-	40	-	40	-	-	2	1	Online and Mentoring	SO	-
8.	200XXX	CLC	**Novel Engaging Course (Informal Learning)**	-	-	-	-	50	-	-	50	-	-	2	1	Interactive	SO	-
9.	2280328	DLC	Summer Internship Project–I (Institute Level) (Evaluation)	-	-	-	-	60	-	-	60	-	-	4	2	Offline	SO	-
Total				**250**	**50**	**100**	**100**	**290**	**100**	**60**	**950**	**10**	**05**	**14**	**22**	-	-	-
10.	3000003	Natural Sciences & Skills	Environmental Engineering	50	10	20	20	-	-	-	100	2	-	-	GRADE	Blended	MCQ	1.5 Hrs

$Proficiency in course/subject – includes the weightage towards ability/ skill/ competency /knowledge level /expertise attained etc. in that particular course/subject

Natural Sciences & Skills: Engineering Physics / Engineering Chemistry / Environmental Engineering / Language

Credits of Natural Sciences & Skills will be added in the VI Semester

MCQ: Multiple Choice Question **AO:** Assignment + Oral **PP:** Pen Paper **SO:** Submission + Oral

Mode of Teaching					Mode of Examination					Total Credits
Theory			Lab	NEC	Theory			Lab	NEC	
Offline	Online	Blended	Offline	Interactive	PP	AO	MCQ	SO	SO	
03	-	12	06	01	15	-	-	06	01	22
13.64%	-	54.55%	27.27%	4.54%	68.19%	-	-	27.27%	4.54%	Credits %

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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DEPARTMENT OF INFORMATION TECHNOLOGY

INTRODUCTION TO ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING
2280121

L	T	P	Total Credits
4	-	-	4

COURSE OBJECTIVES

- To provide the most fundamental knowledge to the students so that they can understand what the AI is.
- To present the basics of Artificial Intelligence (AI) and machine learning (ML).
- To investigate applications of AI and ML techniques in social media analysis, mobile and IoT analysis, time series analysis, artificial neural networks and other machine learning models.

Unit I

Artificial Intelligence: Introduction, History of AI, AI Problem, Approaches, Goals, Purpose, Scope, Terminology, and Application Areas, Industrialization and its Impact, Cyber-Physical System, Evolution of Industry, Data Availability, Relation between Artificial Intelligence, Machine Learning, Deep Learning and other Related Fields.

Unit II

Conventional vs Machine Learning Programming, Data/Information/Knowledge, Type of Data: Structure, Non Structure, Semi Structure, Images, Video, Temporal, Real Time. Data Types: Categorical/Nominal/Ordinal, Data Types Conversion, Model, Algorithm, Model Development Life Cycle, Learning, Training, Testing, Validation, Importance of Data, AI Tools for Implementation.

Unit III

Introduction to Machine Learning: Basic Concepts of Machine Learning, Types of Learning: Supervised, Unsupervised and Reinforcement Learning, Categorical and Continuous Data, Skewness and Correlation, Regression Analysis Vs Classification. Supervised Learning: Linear and Logistic Regression: Linear models for classification, Sigmoid, Logistic regressions with single and multiple variables, Polynomial regression.

Unit IV

Unsupervised Learning: Clustering, Common distance measures, Hierarchical algorithms – agglomerative and divisive, partitioning algorithms – k-means and derivatives; Design and Analysis of Machine Learning Experiments: Guidelines for machine learning experiments, Factors, Response, and Strategy of experimentation, Cross-Validation and Resampling methods, measuring classifier performance.

Unit V

Artificial Intelligence and Machine Learning in Real World: Speech Processing, Natural Language Processing, Planning, manufacturing industry, logistic industry, retail industry. AI and DS in Healthcare, Defense and Agriculture, Cyber Security, Agriculture, E-Commerce, Finance, Smart Devices.

RECOMMENDED BOOKS

- Artificial Intelligence A Modern Approach by Stuart J. Russell and Peter Norvig, Prentice Hall.
- Fundamentals of Artificial Intelligence by K. R. Chowdhary, Springer.
- E. Alpaydin, Introduction to Machine Learning (3rd ed.), PHI, 2015. ISBN 978-8120350786.

COURSE OUTCOMES

After completion of the course students would be able to:

CO1. define basic concepts of Artificial Intelligence.

CO2. relate various computer components used in Artificial Intelligence.

CO3. learn about and practice a variety of Supervised and Unsupervised Learning approaches.

CO4. familiarize and learn about the latest trends and research in the field.

CO5. understand the real world problems and applications of AI and ML for solving the problems.

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DEPARTMENT OF INFORMATION TECHNOLOGY

COMPUTER PROGRAMMING
2160122/2230122/2240122/2270122/2280122

L	T	P	Total Credits
2	1	2	4

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, 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.

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 Balagurusam.
- 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.

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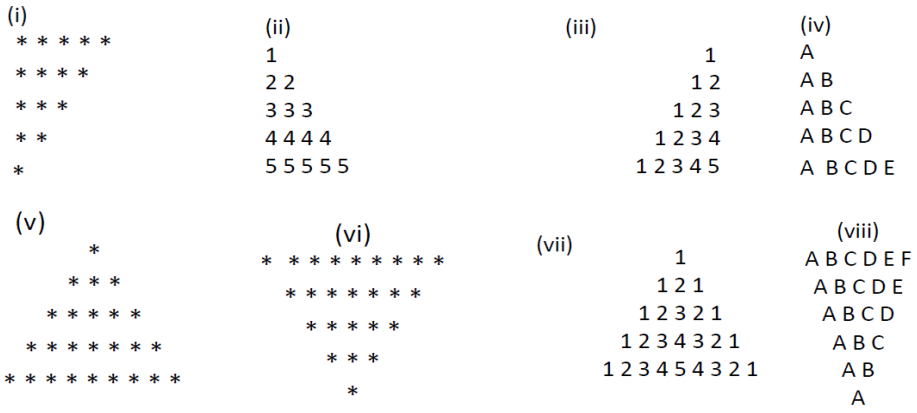
DEPARTMENT OF INFORMATION TECHNOLOGY

COMPUTER PROGRAMMING
2160122/2230122/2240122/2270122/2280122

LIST OF PROGRAMS

1. Write a program to add two numbers and display its sum.
2. Write a Program to calculate and display the volume of a cylinder for height and radius parameters to be input from the user.
3. Write a program to realize the following expressions:
   a. V = u + at
   b. S = ut+1/2a
   c. T=2*a+√b+9c
4. Write a program to take input of name, rollno and marks obtained by a student in 5 subjects of 100 marks each and display the name, rollno with percentage score secured.
5. Write a program to swap values of two variables with and without using the third variable.
6. Write a program to illustrate the use of unary prefix and postfix increment and decrement operators.
7. Write a program to find the largest of three numbers using ternary operators.
8. Write a program to find the roots of quadratic equation.
9. Write a Program to Check Whether a Number is Prime or not.
10. Write a program to compute the grade of students using if else ladder as per MITS norms.
11. Write a program to check whether the entered year is leap year or not (a year is leap if it is divisible by 4 and divisible by 100 or 400.)
12. Write a program to print the sum of digits of a number using for loop.
13. Write a program to display the following pattern using for loops.



14. Write a program to calculate factorial of a number using recursion.

15. Write a program to add two matrices of the same order.

16. Write a program to add two complex numbers, use structure data-type to represent complex numbers.

17. Write a program to create 10 objects of a student class containing the student's name, ID, Semester and CGPA as data members, and getDetails(), setDetails() as member functions. The class should also contain static variables which keep track of the student with maximum CGPA in each semester. The class should also contain a constructor to initialize the data members.

COURSE OUTCOMES

After completing this, the students will be able to:

CO1. apply basic programming concepts .

CO2. develop algorithms and flowchart for a given problem.

CO3. illustrate the concepts of procedural programming.

CO4. implement the concepts of object oriented programming.

CO5. design suitable programming solutions using procedural/object oriented programming paradigms.

CO6. develop computer programs to solve real world problems.

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DEPARTMENT OF INFORMATION TECHNOLOGY

COMPUTER PROGRAMMING
2160122/2230122/2240122/2270122/2280122
LIST OF SKILL BASED MINI PROJECT

List of Micro Projects:

1. Two strings A and B are given, each consisting of lower case alphabets. Write a program to find whether it is possible to choose some non-empty strings s1 and s2 where s1 is a substring of A, s2 is a substring of B such that s1 + s2 is a palindromic string. Here '+' denotes the concatenation between the strings, and if there are such strings S1 and S2 then print S1+S2.

2. Following conditions are given based on three subjects marks:
    a. Physics marks must be greater than 80
    b. Chemistry marks must be greater than 80
    c. English marks must be greater than 70

    Students are awarded grade 10 if all three conditions are met. Grade 9 is given if conditions a and b are met. Grade 8 is given if conditions b and c are met. Grade 7 is given if a and c are met. Grade is 6 if only one condition is met . Grade is 5 if none of the three conditions are met. Write a program to display the grade of students, based on the values of physics, chemistry and English, given by the user. Also, display the calculated grade only if the overall marks (out of 300) are greater than 32%, otherwise display ‘the student is Fail’.

List of Macro Projects:

1. Design a flowchart to implement the Tic-Tac-Toe game and hence implement the same using C++.
2. Write a program in C++ that implements the operations performed by an ATM. The operations include: Balance check, Withdraw Cash, Deposit cash etc.
3. Create a login module using C++ with below mentioned features:
    a. Verify username and password correctly.
    b. Register new user and set its password.
    c. Change password of any registered user.

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List of Mini Projects:

1. Library Systems is aimed to computerize the library management operations, e.g. Registering a Student, Issuing a book, Handling Book Return, etc. Write a program in C++ which implements these operations.
2. A Question Bank System computerized the MCQ based exams. It takes input from a file having questions, presents them randomly before the examinee, counts time to complete the exam and finally presents the marks obtained. Use OOPS concepts to implement the question bank system.
3. Design a Student Record Management System in C++ which maintains the personnel as well as academic record of students and provides various options for searching a student in the system.
4. Ram and Shyam are playing a game. Ram initially has the number **A** and Shyam has the number **B**. There are a total of **N** turns in the game, and Ram and Shyam alternatively take turns. In each turn the player whose turn it is, multiplies his or her number by 2. Ram has the first turn. Suppose after all the **N** turns, Ram's number has become **C** and Shyam's number has become **D**. Write a program to calculate the integer division of the maximum number among **C** and **D** by the minimum number among **C** and **D**.
5. There's an array A consisting of N non-zero integers $A_{1..N}$. A subarray of A is called alternating if we take any two adjacent elements in it , then one of them should be even and the other should be odd. For each x from 1 to N, write a program to compute the length of the longest alternating subarray that starts at x - that is, a subarray $A_{x..y}$ for the maximum possible $y \geq x$. The length of such a subarray is $y-x+1$.
6. Given an array $A_1, A_2, ..., A_N$, count the number of subarrays of array A which are non-decreasing. A subarray A[i,j], where $1 \leq i \leq j \leq N$ is a sequence of integers $A_i, A_{i+1}, ..., A_j$. A subarray A[i,j] is non-decreasing if $A_i \leq A_{i+1} \leq A_{i+2} \leq ... \leq A_j$. Write a program to count the total number of such subarrays.
7. Two strings A and B are given, each consisting of lower case alphabets. Write a program to find whether it is possible to choose some non empty strings s1 and s2 where s1 is a substring of A, s2 is a substring of B such that s1 + s2 is a palindromic string. Here '+' denotes the concatenation between the strings. And if there are such strings S1 and S2 then print S1+S2.
8. There are N students standing in a row and numbered 1 through N from left to right. You are given a string S with length N, where for each valid i, the i-th character of S is 'x' if the i-th student is a girl or 'y' if this student is a boy. Students standing next to each other in the row are friends .The students are asked to form pairs for a project. Each pair must consist of a boy and a girl. Two students can only form a pair if they are friends. Each student can only be part of at most one pair. Write a program to find the maximum number of pairs that can be formed.
9. Following conditions are given based on three subjects marks
    a. Physics marks must be greater than 50

b. Chemistry marks must be greater than 80
c. English marks must be greater than 70

Students are awarded grade 10 if all three conditions are met. Grade 9 is given if conditions a and b are met. Grade 8 is given if conditions b and c are met. Grade 7 is given if a and c are met. Grade is 6 if only one condition is met . Grade is 5 if none of the three conditions are met. Write a program to display the grade of students , based on the values of physics, chemistry and English, given by the user. Use object oriented programming to implement the system.

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DEPARTMENT OF INFORMATION TECHNOLOGY

DIGITAL LOGIC DESIGN
2160123/2230123/2240123/2270123/2280123

L	T	P	Total Credits
2	1	-	3

COURSE OBJECTIVES

- To understand the fundamental operating components of Digital Computers.
- To learn various number systems, boolean algebra employed in digital computers.
- To understand the concepts of counters, latches and flip-flops.

Unit I

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

Unit III

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

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, Programmable Devices: Programmable Logic Array (PLA), Programmable Array Logic (PAL), Sequential Programmable Logic Device (SPLD), Complex Programmable Logic Device (CPLD), Field-Programmable Gate Array (FPGA), Digital Logic Design: RTL and DTL Circuits, TTL.

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 basic components and functional units to define computer architecture

CO2. explain different number systems and basic operations employed at machine level.

CO3. develop the understanding of combinational circuits.

CO4. analyse the basic concept of sequential circuits.

CO5. compare and differentiate various memories used in Computers.

CO6. reduce the boolean functions to mitigate hardware complexity issues.

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DEPARTMENT OF INFORMATION TECHNOLOGY

BASIC ELECTRICAL & ELECTRONICS ENGINEERING
2100022

L	T	P	Total Credits
2	1	2	4

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

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

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COURSE OUTCOMES

After completion of the course students would 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.

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DEPARTMENT OF INFORMATION TECHNOLOGY

BASIC ELECTRICAL & ELECTRONICS ENGINEERING (100022)

LIST OF PROGRAMS

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.

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DEPARTMENT OF INFORMATION TECHNOLOGY

BASIC ELECTRICAL & ELECTRONICS ENGINEERING (100022)
LIST OF SKILL BASED MINI PROJECT

List of Micro Projects:

1. Study of voltage and current source.
2. Study of various loads in electrical circuits.
3. Study of resistance and inductance.
4. Study of capacitance and inductance.
5. Study of energy and power in an arbitrary circuit.
6. Study of electrical switch.
7. Study of EM induction theory.
8. Study of hazard while electrical circuit dealing.
9. Study of energy and power meters.

List of Macro Projects:

1. Study of current and voltage mathematical representation.
2. Identify the various electrical loads in household applications.
3. Identify and draw the circuit diagram of FTL.
4. Study of circuit response of RC network.
5. Differentiate energy and power of a RL circuit.
6. Construction of different types of electrical switches.
7. Study of EM induction in DC and AC motors.
8. Study of electrical safety norms.
9. Identification and differentiate the digital and analog energy/ power meters.

List of Mini Projects:

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. Calculate the Monthly electrical energy saving? Calculate the monthly savings in electricity bill?
   Note: LUX level of FTL and LED bulbs must be the same (follow BEE Guidelines). Consider electricity bill charges from MP Vidyut Vitran company website.

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DEPARTMENT OF INFORMATION TECHNOLOGY

DATA STRUCTURES
2160221/2230222/2240222/2270221/2280221

L	T	P	Total Credits
3	-	2	4

COURSE OBJECTIVES

- To be familiar with the use of data structures as the foundational base for computer solutions to problems.
- To understand various techniques of searching and sorting.
- To understand basic concepts about stacks, queues, lists, trees and graphs.

Unit-I

Introduction to Data Structures: Algorithms & their characteristics, asymptotic notations. arrays and its representations, index to address translation. **Link list:** Introduction, implementation of linked list, operations, circular link list, doubly linked list, polynomial manipulation using linked list.

Unit-II

Stacks: Concepts and implementation of stacks, operations on stack, conversion of infix to postfix notation, evaluation of postfix expression, recursion.

Queues: Concepts and implementation, operations on queues, dequeue, priority queues, circular queues and application.

Unit-III

Trees: Types, terminology, binary tree -representations, traversal, conversion of general tree to binary tree, binary search tree, threaded binary tree and height balanced tree.

Unit-IV

Graphs: Background, graph theory terminologies, representation of graphs- sequential & linked representation, path matrix, graph traversals- BFS, DFS, spanning trees, applications of graph.

Unit-V

Searching & Sorting: Linear search, binary search, bubble sort, selection sort, insertion sort, quick sort, merge sort, radix sort and heap sort, comparison between sorting techniques, hashing and collision resolution techniques.

RECOMMENDED BOOKS

- Data Structures, Algorithms and Applications in C++, Sartaj Sahni, 2nd Edition.
- An Introduction to Data Structures with Applications, Jean-Paul Tremblay, Mcgraw hill.
- Data Structures & Algorithms, Aho, Hopcroft & Ullman, original edition, Pearson Publication.

COURSE OUTCOMES

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

CO1. outline the basics of Algorithms and their performance criteria.

CO2. explain the working of linear/Non Linear data structures.

CO3. identify the appropriate data structure to solve specific problems.

CO4. analyze the performance of various Data Structures & their applications.

CO5. evaluate the time/space complexities of various data structures & their applications.

CO6. design the optimal algorithmic solutions for various problems.

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DEPARTMENT OF INFORMATION TECHNOLOGY

DATA STRUCTURES
2160221/2230222/2240222/2270221/2280221
LIST OF PROGRAMS

1. Write a program to implement doubly linked list with all possible deletion operations.
2. Write a program to insert an element in the beginning of the circular linked list.
3. Write a program to implement stack using linked list.
4. Write a program to count the number of nodes in the binary search tree.
5. Write a program to implement AVL Tree.
6. Write a program to traverse the BST in pre-order and post-order.
7. Write a program to implement Graph using an array.
8. Write a program to implement Breadth First Search.
9. Write a program to implement Depth First Search.
10. Write a program to implement Spanning Tree.
11. Write a program to implement binary search algorithm.
12. Write a program to implement Heap Sort.
13. Write a program for implementing the Radix Sort methods to arrange a list of integers in ascending order.
14. Write a program for implementing the Quick Sort methods to arrange a list of integers in ascending order.

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DEPARTMENT OF INFORMATION TECHNOLOGY

DATA STRUCTURES
2160221/2230222/2240222/2270221/2280221
LIST OF SKILL BASED MINI PROJECT

List of Micro Projects:

1. Write a program to create an array of N Integer Elements.
2. Write a program to implement linear search in an array.
3. Write a program to create Singly Linked List (SLL) of Integer Data.
4. Write a program for implementing the Selection sort methods to arrange a list of integers in ascending order.

List of Macro Projects:

1. Design, Develop and Implement a menu driven Program for the following Array operations
    a. Inserting an element at a given valid Position
    b. Deleting an element at a given valid Position
    c. Display of array elements
2. Design, Develop and Implement a menu driven Program for the following operations on STACK of Integers (Array Implementation of Stack with maximum size MAX)
    a. Push an Element on to Stack
    b. Pop an Element from Stack
    c. Demonstrate Overflow and Underflow situations on Stack
    d. Exit
3. Design, Develop and Implement a menu driven Program for the following operations on doubly linked list:
    a. Insert at the beginning.
    b. Insert at specific position.
    c. Insert at the end.
    d. Exit.
4. Given an array of elements, construct a complete binary tree from this array in level order fashion. That is, elements from left in the array will be filled in the tree level wise starting from level 0.
5. Design, Develop and Implement a menu driven Program for the following operations on Binary Search Tree (BST) of Integers
    a. Create a BST of N Integers.
    b. Traverse the BST in In-order.

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List of Mini Projects:

1. Write a program to evaluate any arithmetic expressions using STACK.
2. Write a program to implement priority queue for airport check in process.
3. Write a program to implement Music Player using Linked List.
4. Write a program to implement Online Voting System using a graph and linked list.
5. Write a program to design a Snakes game.
6. Design, Develop and Implement a menu driven Program for the following operations on Doubly Linked List (DLL) of Professor Data with the fields: ID, Name, Branch, Area of specialization
    a. Create a DLL stack of N Professor's Data.
    b. Create a DLL queue of N Professor's Data Display the status of DLL and count the number of nodes in it.

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DEPARTMENT OF INFORMATION TECHNOLOGY

PYTHON PROGRAMMING
2160222/2230223/2240223/2270222/2280222

L	T	P	Total Credits
2	1	2	4

COURSE OBJECTIVES

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

Unit I

Introduction to Python: Formal and natural languages, Downloading and installing Python. Problem-solving methods and algorithm development. The first program, Variables, expressions, keywords, Operators, Expressions and statements, Interactive mode and script mode, Order of operations. Datatypes: Numeric, string, list tuple, dictionary, set.

Unit II

Function, ways of passing arguments to functions, user defined and inbuilt functions, lambda function. Control Statements: Conditional and unconditional branching, while loop, for loop, loop control statements, range function. Numeric, String, list, tuple, dictionary and set manipulation operations using loops and inbuilt manipulation functions. Packages and modules in python.

Unit III

Exception and File Handling: Errors vs exceptions, Exceptions handling with try block, handling multiple exceptions, writing your own exceptions, file handling modes, reading, writing and appending a file, Handling file exceptions.

Unit IV

Object oriented programming: Characteristics and features of OOPS, Classes and objects, constructors and destructors, defining member variables and functions, visibility modes, static members.

Unit V

Polymorphism: Introduction, Type of Polymorphism: Compile Time Polymorphism & Run Time Polymorphism, polymorphism in python. Inheritance: Introduction, Visibility Modes, Types of Inheritance: Single Level, Multilevel, Multiple, Hybrid, Multipath. Association, Aggregation and composition. Array manipulation and visualization using numpy and matplotlib libraries.

RECOMMENDED BOOKS

- Python Crash Course: A Hands-On, Project-Based Introduction to Programming, By Eric Matthes.
- Learn Python the Hard Way: third Edition T.R. Padmanabhan, Programming with Python, Springer, first Ed., 2016.
- Kenneth Lambert, Fundamentals of Python: First Programs, Cengage Learning, first Ed., 2012.

COURSE OUTCOMES

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

CO1. define basics syntax and features of python programming language

CO2. solve computational problem using python language.

CO3. take part in online coding platforms.

CO4. inspect the python program for errors.

CO5. design a program using the features of object oriented concept.

CO6. construct the python code for real world problem using the libraries.

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DEPARTMENT OF INFORMATION TECHNOLOGY

OPERATING SYSTEM
2270224/2280224

L	T	P	Total Credits
2	1	-	3

COURSE OBJECTIVES

- To provide basic knowledge of computer operating system structures and functioning.
- To compare several different approaches to memory management, file management and process management.
- To understand various problems related to concurrent operations and their solutions.

Unit I

Basics of Operating System: Generations, Types, Structure, Services, System Calls, System Boot, System Programs, Protection and Security.

Unit II

Process Management: Process Concepts, Process States, Process Control Block, Scheduling-Criteria, Scheduling Algorithms and their Evaluation, Threads, Threading Issues.

Unit III

Process Synchronization: Background, Critical-Section Problem, Peterson's Solution, Synchronization Hardware, Semaphores, Classic Problems of Synchronization, Monitors.

Deadlock: System Model, Deadlock Characterization, Deadlock Prevention, Detection and Avoidance, Recovery from Deadlock.

Unit IV

Memory Management: Main Memory, Swapping, Contiguous Memory Allocation, Paging, Structure of Page Table, Segmentation, Virtual Memory, Demand Paging, Page Replacement Algorithms, Allocation of Frames, Thrashing.

Unit V

Storage Management: Mass-Storage Structure, Overview, Disk Structure, Disk Attachment, Disk Scheduling.

File System Interface: The Concept of a File, Access Methods, Directory Structure, File System Structure, Allocation Methods, Free-Space Management.

RECOMMENDED BOOKS

- Operating System Concepts, Silberschatz, Ninth Edition, Willey Publication.
- Operating Systems, internals and Design Principles, Stallings, Seventh Edition, Pearson Publication.
- Modern Operating Systems, Tanenbaum, Fourth Edition. Pearson Publication.

COURSE OUTCOMES

After the successful completion of this course, the student will be able to:

CO7. define the basic concept of operating systems.

CO8. explain the working procedure of the operating system.

CO9. analyze the various operating system problems and issues.

CO10. determine the solutions for various operating system problems and issues.

CO11. evaluate the performance of various scheduling and allocation techniques.

CO12. elaborate the working of various scheduling and allocation techniques.

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DEPARTMENT OF INFORMATION TECHNOLOGY

DISCRETE STRUCTURES
2230221/2240221

L	T	P	Total Credits
2	1	-	3

COURSE OBJECTIVES

- To perceive the knowledge of basic algebra
- To describe function and its relation
- To familiarize propositional logic
- To know about the graph theory and its application in computer engineering
- To familiarize the discrete numeric function and generating function

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Unit-I

Finite and Infinite Sets, Mathematical Induction, Principles of Inclusion and Exclusion, Multisets, Functions and Relations, Binary Relations, Equivalence Relations and Partitions, Partial Ordering Relations and Lattices, Chains, Pigeonhole Principle.

Unit-II

Prepositional Logic, Syntax, Semantics of ATF (Atomic Formula), WFF (Well Formed Formula's),Validity and Satisfiability of WFF by Quine's Method, Normal and Closure Form of Prepositional Calculus.

Unit-III

Introduction and Basic Terminology of Graphs, Planner Graphs, Multi-Graphs and Weighted Graph, Shortest Path in Weighted Graph, Introduction to Eularian Paths and Circuits, Hamiltonian Paths and Circuits.

Unit-IV

Introduction to Discrete Numeric Functions and Generating Functions, Introduction to Recurrence Relations and Recursive Algorithms, Linear Recurrence Relations With Constant Coefficients, Homogeneous Solutions, Particular Solutions and Total Solutions.

Unit-V

Introduction to Group, Subgroups, Generations and Evaluation of Power, Cosets and Lagrange's Theorem, Group Codes, Isomorphism and Automorphism, Homomorphism and Normal Sub Groups, Ring.

RECOMMENDED BOOKS

- J. Tremblay and Manohar: Discrete Mathematical Structures with Application to Computer science Narsingh Deo: Graph Theory.
- Kenneth Rosen: Discrete mathematics and its applications (6th edition) 2006 McGraw-Hill
- C. Liu, D. Mohapatra: Elements of Discrete Mathematics 2008, Tata McGraw-Hill.
- T. Koshy: Discrete mathematics with applications 2003, Academic Press.
- J. Hein: Discrete structures, logic and computability 2009, Jones & Bartlett Publishers.

COURSE OUTCOMES

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

CO13. explain the basic concept of set theory, prepositional logic, graph theory, discrete numeric function and algebraic structure.

CO14. illustrate the knowledge of course content and distinguish between them in terms of their applications.

CO15. identify the concepts of graph for solving problems in the computer science.

CO16. apply the concepts of studied topics with suitable technique faced in engineering problems

CO17. analyze the set theory, prepositional logic, graph theory, discrete numeric function and algebraic structure to examine the real world problem.

CO18. build analytical skill and interpret applications of engineering beneficial in real time trouble-shooting.

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DEPARTMENT OF INFORMATION TECHNOLOGY

COMPUTER NETWORKS AND PROTOCOLS
2230321/2240321/2270322/2280322

L	T	P	Total Credits
2	1	-	3

COURSE OBJECTIVES

- Familiarize the student with the basic taxonomy and terminology of the computer networking & Protocols.
- Provide detail knowledge about various layers, protocols and devices that facilitate networking.
- Enable students to deal with various networking problems such as flow control, error control and congestion control.

Unit-I

Introduction: Computer Network Types, OSI Reference Model & TCP/IP Reference Mode, Circuit Switching, Message Switching & Packet Switching, Frequency Division Multiplexing, Wavelength Division Multiplexing & Time Division Multiplexing, ISDN, SONET.

Physical Layer : Data Transmission Modes, Network topologies, Line Coding, Synchronous & Asynchronous Transmission, Transmission Medium- Guided & Unguided, Networking Devices, Performance Criteria.

Unit-II

Data Link Layer: Introduction, Design Issues, Services, Framing, Error Control, Flow Control, ARQ Strategies, Error Detection and Correction, Parity Bits, Cyclic Redundant Code (CRC), Hamming Codes, MAC Sub Layer- Channel Allocation Problem, Pure ALOHA ,Slotted ALOHA, CSMA ,CSMA/CD, IEEE 802.3, IEEE 802.4 and IEEE 802.5, HDLC.

Unit-III

Network Layer Protocols: Introduction, Design Issues, Services, Routing- Distance Vector Routing, Hierarchical Routing & Link State Routing, Shortest Path Algorithm-Dijkstra's Algorithm & Floyd–Warshall's Algorithm, Routing Protocols, Flooding, Connection Oriented & Connectionless Service, IP Addressing, IPV4, IPV6, Internet Protocol Datagram, Fragmentation, ICMP, IGMP.

Unit-IV

Transport Layer Protocols: Datagram Protocol (UDP) - Process To Process Communication, Port Number, Socket Address, User Datagram, UDP Operation. TCP Services, Process To Process Communication, Stream Delivery Service, Full Duplex Communication, Connection Oriented Service, Reliable Service, TCP Features- Numbering System, Flow Control, Error Control, Congestion Control , TCP Segment, Flow Control-Sliding Window Protocol, Silly Window Syndrome Error Control-Checksum, Acknowledgement, Retransmission, Congestion Control.

Unit-V

Application Layer Protocols: Introduction, Design Issues, Presentation Layer- Translation, Encryption- Substitutions and Transposition Ciphers, Compression- Lossy and Lossless. Session Layer – Dialog Control, Synchronization. Application Layer- Remote Login, File Transfer & Electronic Mail. Domain Name System (DNS), Telnet, FTP, TFTP, Email Protocol: SMTP, POP, IMAP.

RECOMMENDED BOOKS

- Data Communication and Networking, Behrouz A. Forouzan, McGraw Hill.
- Computer Networks, Andrew S. Tanenbaum, Pearson Education India.
- Computer Networks and Internets, Douglas E. Comer, Pearson India.
- TCP/IP Protocol Suite, B. A. Fourozan, Tata McGraw Hill
- Internetworking with TCP/IP, Douglas E. Comer, Publisher- PHI, New Delhi
- TCP/IP Illustrated by Richard Stevens, Publisher- Addison – Wesley.

COURSE OUTCOMES

After the successful completion of this course, the student will be able to:

CO1. explain the fundamental concepts of computer network.

CO2. illustrate the basic taxonomy & terminologies of computer network protocols.

CO3. develop a concept for understanding advance computer network.

CO4. build the skill of IP addressing and routing mechanism.

CO5. predict the performance of computer network in congestion and internet.

CO6. construct the network environment for implementation of computer networking concept.

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DEPARTMENT OF INFORMATION TECHNOLOGY

DESIGN & ANALYSIS OF ALGORITHMS
2160322/2230322/2240322/2270323/2280323

L	T	P	Total Credits
2	1	2	4

COURSE OBJECTIVES

- To introduce the topic of algorithms as a precise mathematical concept.
- To study the techniques like recursion, divide and conquer, dynamic programming, greedy approach, backtracking and branch and bound.
- To practice their skills on many well-known algorithms and data structures designed to solve real-life problems.

Unit-I

Introduction to Computational Model: Algorithms and its Importance, Recurrences and Asymptotic Notations, Mathematical Analysis of Non-Recursive and Recursive Algorithm, Review of Sorting & Searching Algorithms, **Basic Tree and Graph Concepts:** B-Trees and Traversal Techniques, Topological sort.

Unit-II

Divide and Conquer Method: Introduction and its Examples such as Finding the Maximum and Minimum, Binary Search, Merge Sort, Quick Sort and Strassen's Matrix Multiplication and Additional Real World Problems on Divide and Conquer.

Unit-III

Greedy Method: Introduction, Characteristics, Examples of Greedy Methods such as Single-Source Shortest Paths, **Minimum Cost Spanning Trees :** Prims's and Kruskal's Algorithm, Knapsack Problem, Dijkstra's Single Source Shortest Path Algorithm, Optimal Storage on Tapes.

Unit-IV

Dynamic Programming: Introduction, The Principle of Optimality, Examples of Dynamic Programming Methods such as – 0/1 Knapsack, Traveling Salesman Problem, Floyd's All Pairs Shortest Path, Longest Common Subsequence and Reliability Design, Matrix Chain Multiplication.

Unit-V

Backtracking: Concept and its Examples like 4-Queen's Problem, Knapsack problem Hamiltonian Circuit Problem, Graph Coloring Problem etc. **Branch & Bound:** Introduction and its Examples like - Traveling Salesperson Problem etc. **NP-Completeness:** Introduction, Class P and NP, Polynomial Reduction, NP-Hard and NP- Complete Problems.

RECOMMENDED BOOKS

- Fundamentals of Computer Algorithms, Horowitz & Sahani, Universities press.
- Introduction to Algorithms, Coremen Thomas, Leiserson CE, Rivest RL, PHI.
- Design & Analysis of Computer Algorithms, Ullmann, Pearson.
- Algorithm Design, Michael T Goodrich, Robarto Tamassia, Wiley India.

COURSE OUTCOMES

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

CO1. demonstrate a familiarity with major algorithms and data structures.
CO2. idenify important algorithmic design paradigms and methods of analysis.
CO3. analyze the performance of algorithms.
CO4. compare various algorithm design techniques.
CO5. select the design technique to solve any real world problem.
CO6. design efficient algorithm using various design techniques.

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DEPARTMENT OF INFORMATION TECHNOLOGY

DESIGN & ANALYSIS OF ALGORITHMS
2160322/2230322/2240322/2270323/2280323

LIST OF PROGRAMS

1. WAP to implement the following using array as data structure and analyze its time complexity.
   a. Insertion sort b. Selection sort c. Bubble sort d. Quick sort
   e. Merge sort f. Heap sort
2. WAP to implement Linear and Binary Search and analyze its time complexity.
3. WAP to implement Strassen's Matrix Multiplication.
4. WAP to implement Binomial coefficient computation and analyze its time complexity.
5. WAP to implement minimum spanning tree using Prim's algorithm and analyze its time complexity.
6. WAP to implement Dijkstra's Algorithm and analyze its time complexity.
7. WAP to implement Bellman Ford Algorithm and analyze its time complexity.
8. WAP to implement DFS and BFS and analyze their time complexities.
9. WAP to implement Bucket Sort Algorithm for integer elements.
10. WAP to implement Topological sort algorithm and analyze their time complexities.

COURSE OUTCOMES

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

CO1. relate the principles of algorithm design in solving problems.

CO2. demonstrate basic algorithms and different problem solving strategies.

CO3. build creativeness and confidence to solve non-conventional problems.

CO4. analyze running times of algorithms using asymptotic analysis.

CO5. compare various algorithm design approaches for solving real world problems.

CO6. design and implement optimization algorithms in specific applications.

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DEPARTMENT OF INFORMATION TECHNOLOGY

DESIGN & ANALYSIS OF ALGORITHMS
2160322/2230322/2240322/2270323/2280323
LIST OF SKILL BASED MINI PROJECT

List of Micro Projects:

1. Implement the greedy approach for single source shortest path.
2. Design a program for finding minimum cost tree for traversing all nodes of a graph.
3. Implement tree traversal techniques like pre-order, post-order and in-order.
4. Implement the Task Scheduling problem.
5. Implement the Longest Common Subsequence problem.
6. Find the shortest cycle in a graph.

List of Macro Projects:

1. Implement the movement of knight in chess game.
2. Implementation of a guessing game of the terminal on screen.
3. Print all the nodes reachable from a given starting node in a digraph using BFS method.
4. Check whether a given graph is connected or not using DFS method.
5. Find a subset of a given set S = {s1,s2,.....,sn} of n positive integers whose sum is equal to a given positive integer d. For example, if S= {1, 2, 5, 6, 8} and d = 9 there are two solutions {1,2,6} and {1,8}.A suitable message is to be displayed if the given problem instance doesn't have a solution.
6. Write a program to solve the job scheduling problem using the greedy algorithm.
7. Calculate the maximum weighted vertex pair in the weighted graph.

List of Mini Projects:

1. Implement a program for matrix layer rotation.
2. Implementation of vertex cover algorithm.
3. Implementation of the knapsack problem.
4. Implement N Queen's problem using Back Tracking.
5. Write a program to calculate the shortest path using travelling salesman problem.
6. Implement a phone directory application using doubly-linked lists.
7. Find the maximum clique in a graph.
8. WAP to implement the spanning tree using kruskal algorithms.

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DEPARTMENT OF INFORMATION TECHNOLOGY

COMPUTER GRAPHICS & MULTIMEDIA
2160323/2230323/2240323/2270324/2280324

L	T	P	Total Credits
2	1	2	4

COURSE OBJECTIVES

- To become familiar with computer graphics techniques and display devices.
- To enhance the proficiency in image representations, 2D and 3D graphics transformations.
- To develop awareness with various illumination, color models and multimedia system.

Unit-I

Introduction to Computer Graphics: Interactive Computer Graphics, Application of Computer Graphics, Random and Raster Scan Displays, Storage Tube Graphics Display, Calligraphic Refresh Graphics Display, Flat Panel Display, Refreshing, Flickering, Interlacing, Resolution, Bit Depth, Aspect Ratio etc.

Unit-II

Scan Conversion Technique: Image representation, Line drawing: DDA, Bresenham's Algorithm. Circle Drawing: Mid-Point, DDA, Bresenham's Circle Generation Algorithm, Ellipse Generation Algorithm, Curves: Parametric Function, Bezier Method, B-Spline Method.

Unit-III

2D & 3D Transformations: Translation, Rotation, Scaling, Reflection, Shearing, Inverse Transformation, Composite Transformation, World Coordinate System, Viewing Transformation, Representation of 3D object on Screen, Parallel and Perspective Projections.

Unit-IV

Clipping: Point clipping, Line Clipping, Simple Visibility Line Clipping Algorithm, Polygon Clipping, Hidden Surface Elimination: Z- Buffer algorithm and Painter's Algorithm, Area Filling, **Basic Illumination Models:** Diffuse Reflection, Specular Reflection, Phong Shading, Gouraud Shading, Color Models: RGB, YIQ, CMY, HSV.

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Unit-V

Multimedia System: An Introduction, Multimedia hardware and software, Multimedia System Architecture, Multimedia Applications and evolving technologies, Multimedia Authoring. Data & File Format standards, Sampling, Compression standards, Compression through spatial and temporal redundancy.

RECOMMENDED BOOKS

- Donald Hearn and M.P. Becker : Computer Graphics, PHI Publication
- FoleyVandam, Feiner, Hughes : Computer Graphics principle and Practice
- Rogers : Principles of Computers Graphics, TMH
- Sinha and Udai : Computer Graphics, TMH
- Prabhat K. Andleigh, Kiran Thakrar : Multimedia Systems Design, Prentice Hall PTR

COURSE OUTCOMES

After completion of the course students will be able to:

CO1. explore various display devices and applications of computer graphics.

CO2. illustrate various scan conversion techniques like line, circle, curve and shape drawing algorithms.

CO3. apply 2-dimensional, 3-dimensional transformations and projections on images.

CO4. classify methods of image clipping and various algorithms for line and polygon clipping.

CO5. apply appropriate filling algorithms, hidden surface elimination algorithm on images.

CO6. summarize various color models, shading methods and multimedia system.

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DEPARTMENT OF INFORMATION TECHNOLOGY

INTERNET OF THINGS
2270325/2280325

L	T	P	Total Credits
2	1	-	3

COURSE OBJECTIVES

- To understand basic terminology, concepts, structure and flow of IoT.
- To understand protocols of IoT.
- To understand Sensors, Devices & Components.
- To be able to understand the security issues in IoT.

UNIT I

Introduction to IoT and network architecture: Evolution of Internet of Things (IoT), IoT Components, Impact of IoT. IoT World Forum (IoTWF) standardized architecture, Simplified IoT Architecture: Core IoT Functional Stack, IoT data management and compute stack (Cloud, edge, fog).

UNIT II

IoT Protocols: Communication Protocols: IEEE 802.15.4, Zigbee, 6LoWPAN, Z-Wave, Bluetooth, RFID. Networking Protocols: CoAP and MQTT.

UNIT III

Things in IoT: Sensor: light sensor, moisture sensor, temperature sensor, etc. Actuator: DC motor, different types of actuators. Controllers: microcontrollers and their role as a gateway to interfacing sensors and actuators.

IoT Platform overview: Raspberry pi, Arduino Board details, Introduction to Arduino IDE, Embedded 'C' Language basics, Interfacing sensors, LEDs.

UNIT IV

Cloud computing in IoT: Introduction to Cloud Computing-Definition, Characteristics, Components, Cloud provider: Microsoft Azure, AWS, Google Cloud.

UNIT V

Security and Future of IoT ecosystem: Need of security in IoT, Privacy for IoT enabled devices, IoT security for consumer devices, Security levels, protecting IoT devices

Future IoT eco system, Need of power full core for building secure algorithms, Examples for new trends – AI, ML penetration to IoT

RECOMMENDED BOOKS

- IoT Fundamentals: Networking Technologies, Protocols and Use Cases for Internet of Things, David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Rob Barton and Jerome Henry, Cisco Press, 2017
- Internet of Things – A hands-on approach, Arshdeep Bahga, Vijay Madisetti, Universities Press, 2015
- Internet of Things: Architecture, Design Principles And Applications, Rajkamal, McGraw Hill HigherEducation.

COURSE OUTCOMES

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

CO1. develop basic understanding of IoT and its architecture.

CO2. compare the communication models and protocols for IoT.

CO3. analyze different devices, hardware and software platforms for application in IoT.

CO4. discuss the security issues involved in IoT.

CO5. develop IoT Applications in real world.

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

(A Govt. Aided UGC Autonomous & NAAC Accredited Institute Affiliated to RGPV, Bhopal)

DEPARTMENT OF INFORMATION TECHNOLOGY

DESIGN AND THINKING LAB
2230325/2240325/2270326/2280326

L	T	P	Total Credits
-	-	2	1

PREREQUISITES

We assume that you are already familiar with the basics of C and C++. Knowledge in other programming language especially the OOP is an added advantage. A basic understanding of microcontrollers and electronics is also expected.

COURSE OBJECTIVE:

The students will:

- Learn the basics of electronics, including reading schematics (electronics diagrams)
- Learn how to prototype circuits with a breadboard
- Learn the Arduino programming language and IDE
- Program basic Arduino examples
- Prototype circuits and connect them to the Arduino
- Program the Arduino microcontroller to make the circuits work
- Connect the Arduino microcontroller to a serial terminal to understand communication and stand-alone use
- Explore the provided example code and online resources for extending knowledge about the capabilities of the Arduino microcontroller

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Unit-I

Introduction: embedded system, Understanding Embedded System, Overview of basic electronics and Digital electronics, Microprocessor vs Microcontroller, Common features of Microcontroller, Comparison between different types of microcontrollers.

Unit-II

Arduino: introduction, Pin Configuration and Architecture, Device and Platform Features, Concept of Digital and Analog ports, Arduino Interfacing Board, Introduction to Embedded C and Arduino Platform.

Unit-III

Basic Concepts and Functions: Arduino data types, Variables and constants, Operators, Control Statements, Arrays, Functions, Pins Configured as INPUT, Pull-up Resistors, Pins Configured as OUTPUT, pinMode() Function, digitalWrite() Function, analogRead() function, Arduino Interrupts.

Unit-IV

Arduino Time and Displays: Incorporating Arduino time, delay() function, delay Microseconds() function, millis() function, micros() function. Working with Serial Monitor, Line graph via serial monitor, interfacing 8 bit LCD to Arduino, Fixed one line static message display, Running message display using the LCD Library of Arduino.

Unit-V

Arduino Sensors and Secondary Integrations: Humidity Sensor, Temperature Sensor, Water Detector/ Sensor, PIR Sensor, Ultrasonic Sensor, Connecting Switch (Relay switches). Types of Relay, Controlling Electrical appliances with electromagnetic relays.

RECOMMENDED BOOKS:

- Arduino for Dummies, by John Nussey (2013)

References:

1. Arduino Projects for Dummies, by Brock Craft (2013)
2. Programming Arduino – Getting Started with Sketches, Simon Monk (2016)
3. Programming Arduino - Next Steps, by Simon Monk (2016)

COURSE OUTCOMES

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

CO1. define the basic concept of Embedded System.

CO2. describe the basic principles of Arduino programming and IDE.

CO3. familiarize with different types of sensors and related systems.

CO4. design, implement, debug and test programs/ system.

CO5. design and develop Smart systems applications.

CO6. build Arduino board using different sensors.
