



MALLA REDDY ENGINEERING COLLEGE FOR WOMEN

(Autonomous Institution – UGC, Govt. of India)

(Affiliated to JNTU, Hyderabad, Approved by AICTE - - ISO 9001:2015 Certified)

Accredited by NBA & NAAC – 'A' Grade

NIRF India Ranking, Accepted by MHRD, Govt. of India

B.TECH II YEAR II SEMESTER REGULAR END EXAMINATIONS, JULY -2024

ANALOG AND DIGITAL ELECTRONICS CIRCUITS

(COMMON TO CSE, CSE-CS, IT)

[Time: 3 Hours]

[Max. Marks: 60]

PART – A

(10x 1 = 10M)

- Note:** 1. This Part consists of 10 QUESTIONS
2. Answer **All Questions**. Each question carries 1Mark.

1	A	What is transition capacitance in a P-N junction diode?	1M	BTL 1
	B	Mention the advantages of Full Wave Rectifier.	1M	BTL 2
	C	What is early effect of a BJT?	1M	BTL 1
	D	Which configuration of a BJT provides the highest current gain?	1M	BTL 2
	E	In a JFET, what happens to the drain current (I_D) as the gate-source voltage (V_{GS}) becomes more negative?	1M	BTL 2
	F	What is the binary representation of the decimal number 10?	1M	BTL 1
	G	What are "don't care" conditions in a K-map?	1M	BTL 2
	H	State advantages of K-map?	1M	BTL 1
	I	What is the main difference between sequential and combinational logic circuits?	1M	BTL 1
	J	What does "edge-triggered" mean in the context of flip-flops?	1M	BTL 1

PART – B

(5 x 10 = 50M)

- Note:** 1. This Part consists of 10 QUESTIONS
2. Answer any 1 question from each Section. Each question carries 10 Marks.
3. Illustrate your answers with NEAT sketches wherever necessary.

SECTION - I

2.	Describe the forward and reverse bias characteristics of a P-N junction diode, including a sketch of the V-I curve. Explain the significance of the knee voltage.	10M	BTL 4
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(OR)

3.A	Explain the operation of a half wave rectifier circuit. Include a diagram and discuss its efficiency and ripple factor.	5M	BTL 2
3.B	Explain the working of capacitor filter with circuit diagram.	5M	BTL 2

SECTION - II

4.A	Discuss the Input and Output characteristics of a BJT in CE Configuration.	5M	BTL 3
4.B	Compare the common base (CB), common emitter (CE), and common collector (CC) amplifier configurations in terms of voltage gain, current gain, input impedance, and output impedance.	5M	BTL 4

(OR)

5.A	Discuss the need for biasing in a transistor amplifier circuit. Explain the consequences of improper biasing.	5M	BTL 4
5.B	What is thermal runaway in a BJT? Explain the mechanisms that cause thermal runaway.	5M	BTL 2

SECTION - III

6.A	Explain the structure and working principle of a Junction Field Effect Transistor (JFET).	5M	BTL 2
6.B	Compare the enhancement and depletion modes of a MOSFET.	5M	BTL 3

(OR)

7.A	Express the following numbers in decimal. i) $(10110.0101)_2$ ii) $(16.5)_{16}$ iii) $(26.24)_8$	6M	BTL 3
7.B	Verify the expression $x'y' + x'y + xy = x' + y$	4M	BTL 5

SECTION – IV

8.A	Simplify $F(A,B,C,D) = \sum (4,5,6,7,12,13,14) + d(1,9,11,15)$ using K-map.	6M	BTL 6
8.B	Implement EX-OR gate using only NOR gates	4M	BTL 5

(OR)

9.A	Explain The Half adder? Implement the full adder using two half adders	5M	BTL 2
9.B	Describe the working of a 4-to-1 multiplexer. How can multiple 4-to-1 multiplexers be combined to create an 8-to-1 multiplexer?	5M	BTL 4

SECTION – V

10.A	Explain the Logic diagram of JK flip-flop?	5M	BTL 2
10.B	Design and draw the 3 bit up-down synchronous counter?	5M	BTL 5

(OR)

11.A	Describe the structure and functioning of a RAM cell. Explain the difference between static RAM (SRAM) and dynamic RAM (DRAM), including their advantages.	5M	BTL 4
11.B	Explain the differences between a Programmable Logic Array (PLA) and a Programmable Array Logic (PAL). Discuss their structures and provide examples of applications for each.	5M	BTL 2

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B.TECH II YEAR II SEMESTER REGULAR END EXAMINATIONS, JULY-2024
DATABASE MANAGEMENT SYSTEMS
 (COMMON TO CSE, CSE- AI&ML, DS, CS, IOT, IT)

[Time: 3 Hours]

[Max. Marks: 60]

PART – A**(10x 1 = 10M)**

- Note:** 1. This Part consists of 10 QUESTIONS
 2. Answer **All Questions**. Each question carries 1 Mark.

1	A	Define atomicity and consistency	1M	BTL2
	B	Define ER Model	1M	BTL1
	C	Analyse about relational algebra	1M	BTL4
	D	List out the operations of the relational algebra.	1M	BTL1
	E	What are the three classes of SQL expression?	1M	BTL1
	F	Define Sub query and give its types	1M	BTL2
	G	Evaluate the situation to roll back a transaction	1M	BTL4
	H	Generalize the type of locking needed for insert and delete operations.	1M	BTL6
	I	Point out the ordered indices with example.	1M	BTL4
	J	Illustrate hash indexing.	1M	BTL3

PART – B**(5 x 10 = 50M)**

- Note:** 1. This Part consists of 10 QUESTIONS
 2. Answer any 1 question from each Section. Each question carries 10 Marks.
 3. Illustrate your answers with NEAT sketches wherever necessary.

SECTION - I

2.A	With the help of the block diagram, describe the basic architecture of a database management system	5M	BTL3
2.B	List the disadvantages of File system over database.	5M	BTL2

(OR)

3.A	Describe about views of data.	5M	BTL2
3.B	List the components of Storage Manager and Query processor and explain.	5M	BTL2

SECTION - II

4.A	Define trigger and explain its three parts. Differentiate row level and statement Knowledge 10 level triggers	5M	BTL3
4.B	Describe different set operations in Relational algebra with an example	5M	BTL4

(OR)

5.A	Examine about Data Models.	5M	BTL3
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5.B	Describe about Mapping cardinalities.	5M	BTL3
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SECTION - III

6.A	Differentiate Static SQL and Dynamic SQL	5M	BTL2
6.B	Describe the aggregate functions in SQL with an example	5M	BTL2

(OR)

7.A	Explain the select, project, Cartesian product and join operation in relational algebra with an example	5M	BTL4
7.B	Illustrate with an example what is meant by partial functional dependency and describe how this type of dependency relates to 2NF.	5M	BTL6

SECTION – IV

8.A	Illustrate the conflict serializability and view serializability with an example	5M	BTL3
8.B	Explain about the two-phase locking with suitable example.	5M	BTL5

(OR)

9.A	Differentiate strict two-phase locking protocol and rigorous two-phase locking protocol.	5M	BTL2
9.B	How the time stamps are implemented? Explain.	5M	BTL2

SECTION – V

10.A	Examine the algorithms for SELECT and JOIN operations .	5M	BTL4
10.B	Create B tree and B+ tree to insert the following key values (the order of the tree is three) 32, 11, 15, 13, 7, 22, 15, 44, 67, 4. (15)	5M	BTL6

(OR)

11.A	Analyse about the index schemas used in databases.	5M	BTL4
11.B	Explain about static and dynamic hashing with an example .	5M	BTL2

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B.TECH II YEAR II SEMESTER REGULAR END EXAMINATIONS, JULY-2024

DESIGN AND ANALYSIS OF ALGORITHMS

(COMMON TO CSE, CSE- AI&ML, DS, CS, IOT, IT)

[Time: 3 Hours]

[Max. Marks: 60]

PART – A

(10x 1 = 10M)

- Note:** 1. This Part consists of 10 QUESTIONS
2. Answer **All Questions**. Each question carries 1 Mark.

1	A	What is the Space Complexity of Merge Sort and Binary Search Algorithms?	1M	BTL1
	B	Are Algorithm and Operating System both same? Give a simple answer?	1M	BTL2
	C	Compare Spanning Tree vs Game Tree.	1M	BTL1
	D	What are Efficient Non-Recursive Binary Tree Traversal Algorithms?	1M	BTL1
	E	Where Greedy and Dynamic methods differ each other?	1M	BTL2
	F	Mention any two applications of Dynamic Programming Method.	1M	BTL1
	G	Highlight the concept of Branch and Bound Method.	1M	BTL1
	H	Brief the concept of Backtracking Method.	1M	BTL1
	I	Pen down any two properties of NP-Complete problem.	1M	BTL2
	J	Is NP-Hard a subset of NP-Complete and vice versa?	1M	BTL1

PART – B

(5 x 10 = 50M)

- Note:** 1. This Part consists of 10 QUESTIONS
2. Answer any 1 question from each Section. Each question carries 10 Marks.
3. Illustrate your answers with NEAT sketches wherever necessary.

SECTION - I

2.A	Illustrate the mechanism of calculating the Time Complexity of Multiplication of two 3x3 matrices by Divide and Conquer Method.	5M	BTL4
2.B	Keep the following List of elements in a Descending order by Merge Sort: 7, 33, 88, 22, 55, 66, 99, 111, 345, 231, 876. Write complexity of all cases.	5M	BTL3

(OR)

3.A	Analyze the Probabilistic Randomized Algorithms with a detailed example.	5M	BTL3
3.B	Arrange the following list of elements in a Descending order by Quick Sort method: 2, 9, 5, 1, 99, 3, 8, 22, 11, 77, 44, 66. Write its time complexity of All cases.	5M	BTL4

SECTION - II

4.A	How Bi-Connected components are different from Connected Components? Explain Articulation Points of a Bi-Connected Components of a Graph with your example.	5M	BTL4
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4.B	Explain Union & Find Algorithms, in detail.	5M	BTL2
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(OR)

5.A	Draw AND/OR Graphs with your own examples.	5M	BTL5
5.B	Differentiate BFS & DFS Graphs with detailed analysis.	5M	BTL3

SECTION - III

6.A	Discuss and Analyze the solutions of the Knapsack Problem between Greedy Method and Dynamic Programming Method, in detail.	5M	BTL3
6.B	Provide a feasible solution to Dijkstra's Single source shortest path problem (draw a graph of 6 nodes on your own with required weights)	5M	BTL5

(OR)

7.A	Why do we need Optimal Binary Search Trees in Algorithms? Calculate how many optimal binary search trees can be formed from a list of the following elements: 33, 11, 22, 44, 77, 66.	5M	BTL4
7.B	Examine all pairs shortest path problem in Dynamic programming.	5M	BTL3

SECTION – IV

8.A	Present a solution to a Graph coloring problem, (draw a Complete graph with 5 nodes) by Backtracking Method.	5M	BTL5
8.B	Draw a Travelling Salesman Problem with 6 vertices and distances among the vertices, and evaluate it by Branch and Bound Method.	5M	BTL4

(OR)

9.A	Search for a feasible solution to 0/1 Knapsack Problem by Branch and Bound Method for the following data: Weight of Knapsack: 10 kilos Item No. : 1 2 3 4 5 Weights (in kilos) : 3 4 3 4 2 Costs (in Lakhs) : 4 2 5 3 6	5M	BTL4
9.B	Give Possible Solutions to 8-Queen's Problem.	5M	BTL3

SECTION – V

10.A	Elucidate Cook's theorem in detail and give any two applications of it.	5M	BTL5
10.B	Demonstrate any two problems of non-deterministic algorithms.	5M	BTL4

(OR)

11.A	Look into NP-Hard and NP-Complete problems with detailed examples.	5M	BTL3
11.B	Evaluate the degree of complexity of Knapsack, Job Assignment and Travelling Salesman Problems with respect to NP, NP-Hard and NP-Complete problems.	5M	BTL4

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B.TECH II YEAR II SEMESTER REGULAR END EXAMINATIONS, JULY-2024

FORMAL LANGUAGES AND AUTOMATA THEORY

(COMMON TO CSE, IT)

[Time: 3 Hours]

[Max. Marks: 60]

PART – A

(10x 1 = 10M)

- Note:** 1. This Part consists of 10 QUESTIONS
2. Answer **All Questions**. Each question carries 1 Mark.

1	A	What are the fundamental concepts of strings and alphabet?	1M	BTL2
	B	Define NFA with ϵ moves. Give example.	1M	BTL1
	C	Discuss the key components and operations involved in regular expressions	1M	BTL3
	D	Describe Closure Properties of Regular sets	1M	BTL4
	E	Define Ambiguity in CFG with example.	1M	BTL2
	F	What is the definition of a Pushdown Automaton (PDA)?	1M	BTL3
	G	What is the significance of normal forms in the analysis of context-free grammars?	1M	BTL2
	H	What is the significance of the Universal Turing Machine (UTM)?	1M	BTL2
	I	Define Undecidable Problem	1M	BTL1
	J	Define Recursively Enumerable Language	1M	BTL1

PART – B

(5 x 10 = 50M)

- Note:** 1. This Part consists of 10 QUESTIONS
2. Answer any 1 question from each Section. Each question carries 10 Marks.
3. Illustrate your answers with NEAT sketches wherever necessary.

SECTION - I

2.A	<p>a) Describe the below DFA and check the Strings are valid or not using Transition Table of DFA i) vvivt ii) viiit iii) vitit</p>	6M	BTL4
2.B	Explain Moore and Mealy machines with examples	4 M	BTL2

(OR)

3.A	Construct deterministic finite automata to recognize odd number of 1's and even number of 0's?	3 M	BTL4
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3.B	Construct DFA for Equivalent Below NFA and check the strings. i) "aabc"	7 M	BTL4																
<table border="1"> <tr> <td>δ</td><td>a</td><td>b</td><td>c</td></tr> <tr> <td>$\rightarrow x$</td><td>{X, Y}</td><td>{Y}</td><td>{X, Y, Z}</td></tr> <tr> <td>Y</td><td>{}</td><td>{X, Y}</td><td>{X, Z}</td></tr> <tr> <td>$\odot z$</td><td>{X, Y}</td><td>{Z}</td><td>{X, Y, Z}</td></tr> </table>				δ	a	b	c	$\rightarrow x$	{X, Y}	{Y}	{X, Y, Z}	Y	{}	{X, Y}	{X, Z}	$\odot z$	{X, Y}	{Z}	{X, Y, Z}
δ	a	b	c																
$\rightarrow x$	{X, Y}	{Y}	{X, Y, Z}																
Y	{}	{X, Y}	{X, Z}																
$\odot z$	{X, Y}	{Z}	{X, Y, Z}																

SECTION - II

4.A	Convert the following regular expression to an equivalent NFA with ϵ -moves: where $\Sigma = \{a, b, c\}$ i) $(a b)^*ab+c^*$ ii) $((a+b^*c)^*) + (ab^*c)^*$	6M	BTL4
4.B	Discuss the implications of the Pumping Lemma for the design of regular languages with example.	4M	BTL5

(OR)

5.A	Construct a regular expression from the given DFA: DFA with states $\{A, B, C\}$, alphabet $\{0, 1\}$, transitions $\delta(A, 0) = B$, $\delta(A, 1) = A$, $\delta(B, 0) = C$, $\delta(B, 1) = A$, $\delta(C, 0) = C$, $\delta(C, 1) = C$, start state A, accepting state C.	5M	BTL4
5.B	Use the Pumping Lemma to prove that the language $L = \{a^n b^n \mid n \geq 0\}$ is not regular.	5M	BTL4

SECTION - III

6.A	List the steps involved in constructing a Pushdown Automaton (PDA).	3 M	BTL2
6.B	Given a CFG, construct an equivalent PDA. Grammar: $S \rightarrow aSb \mid \epsilon$ Detail the steps and transitions in the PDA.	7M	BTL4

(OR)

7.A	Define the following terms: i) Context-Free Grammar (CFG) ii) Sentential Forms iii) Parse Trees	4M	BTL1
7.B	Design a DPDA for the language $L = \{a^n b^n c^m \mid n, m \geq 0\}$. Explain why this language can or cannot be recognized by a DPDA.	6M	BTL4

SECTION - IV

8.A	What is the process of Chomsky Normal Form (CNF)? Convert the following context-free grammar to Greibach Normal Form: $S \rightarrow AB \mid a$ $A \rightarrow BB \mid b$ $B \rightarrow AA \mid a$	10M	BTL4
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(OR)

9.A	Define Turing Machine and its movements (Move $\{L, R\}$). Design a Turing machine to recognize the language $L = \{0^n 1^n \mid n \geq 1\}$	10M	BTL4
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SECTION - V

10.A	Explain Rice's Theorem.	4 M	BTL2
10.B	Explain why some languages are not recursively enumerable. Provide an example.	6 M	BTL3

(OR)

11.A	Given the following Post's Correspondence Problem instance, determine if there is a solution: List 1: (ab, a) List 2: (b, ba) Show your work and reasoning.	5 M	BTL4
11.B	Analyze the relationship between P and NP classes. Discuss why it is believed that $P \neq NP$.	5 M	BTL4



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B.TECH II YEAR II SEMESTER REGULAR END EXAMINATIONS, JULY-2024

OBJECT ORIENTED PROGRAMMING THROUGH JAVA

(CSE, CSE-IOT, CSE-CS. IT)

[Time: 3 Hours]

[Max. Marks: 60]

PART – A

(10x 1 = 10M)

- Note:**
1. This Part consists of 10 QUESTIONS
 2. Answer **All Questions**. Each question carries 1 Mark.

1	A	What is the fundamental difference between OOPs and Procedure Oriented Programming languages?	1M	BTL1
	B	Why is garbage collection important?	1M	BTL2
	C	Define the final class.	1M	BTL1
	D	Why is the class path so important in packages?	1M	BTL2
	E	Give the significance of finally in exception handling.	1M	BTL2
	F	What are thread priorities?	1M	BTL1
	G	Define HashTable.	1M	BTL1
	H	Differentiate between text files and binary files.	1M	BTL2
	I	What is the use of the JLabel component?	1M	BTL2
	J	Where do you use Event Listeners?	1M	BTL4

PART – B

(5 x 10 = 50M)

- Note:**
1. This Part consists of 10 QUESTIONS
 2. Answer any 1 question from each Section. Each question carries 10 Marks.
 3. Illustrate your answers with NEAT sketches wherever necessary.

SECTION - I

2. A	What is a data type? Explain different data types.	5M	BTL2
2.B	Elaborate on different OOP concepts in Java.	5M	BTL1

(OR)

3.A	What are classes and instances? Give examples.	5M	BTL2
3.B	Discuss the concept of constructors in Java. Give the importance of this keyword.	5M	BTL3

SECTION - II

4.A	How do you prevent inheritance further? Explain with an example.	5M	BTL2
4.B	Can you inherit an interface by a class? Justify your answer.	5M	BTL4

(OR)

5.A	How do you implement method overriding in Java? Give an example.	5M	BTL2
5.B	Explain the process of creating and importing packages in Java.	5M	BTL4

SECTION - III

6.A	Discuss different keywords in exception handling.	5M	BTL2
6.B	Elaborate on the thread life cycle in detail with a neat sketch.	5M	BTL2

(OR)

7.A	What is an exception? Write a Java program to handle user-defined exceptions.	5M	BTL4
7.B	How do you synchronize the threads? Explain with an example code.	5M	BTL2

SECTION – IV

8.A	Illustrate the differences between Array List and LinkedList?	5M	BTL2
8.B	Write a Java program to demonstrate accessing a collection using an iterator.	5M	BTL4

(OR)

9.A	Explain the benefits of the Java Collection Framework. Give example collections.	5M	BTL2
9.B	Describe the Byte and Character Stream with an example.	5M	BTL3

SECTION – V

10.A	Discuss the life cycle of an applet with a neat sketch.	5M	BTL2
10.B	Write a program to implement the basic operations of a calculator using AWT.	5M	BTL4

(OR)

11.A	Compare the following terms: i)JFrame ii)JApplet iii)JPanel	5M	BTL2
11.B	What is the role of event listeners in event handling? Explain.	5M	BTL2

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