Jalpaiguri Government Engineering College
Unit Test-II, Even Semester 2024
Design and Analysis of Algorithms (PCC-CS402)

FM: 15 Time Allotted: 45 Minutes

Answer all questions: 5×3=15

1. How you will solve the 4-queens problem using backtracking method? Show the 4x4 board position for every step and also write down the algorithm. 1+2+2
2. Why LC search is used? Try to solve the 15-puzzle problem using the branch and bound technique. 1+4
3. Is "P=NP"- Justify your answer? Prove that SAT is a NP-complete problem. 1+4

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Unit Test-I, Even Semester 2025
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Full Marks: 15 **Time Allotted: 45 Minutes**

Answer any three questions: 5×3=15

1. Find an optimal solution to the knapsack instance n=7, m=15, (p1, p2,..., p7) = (10, 5, 15, 7, 6, 18, 3), and (w1, w2, ..., w7) = (2, 3, 5, 7, 1, 4, 1). 5
2. Find the minimum number of operations required for the following matrix chain multiplication using dynamic programming: A(5X4)*B(4X7)*C(7X3)*D(3X9). 5
3. Explain the Bellman-Ford algorithm with an example? How is it different from Dijkstra's algorithm? 4+1
4. "Quick sort is quick"- Justify the statement. Can we multiply any two matrices in lesser time than $O(n^3)$? If yes, then how is it possible? 2+1+2

JALPAIGURI GOVERNMENT ENGINEERING COLLEGE

Subject: Object Oriented Programming **Subject code: PCC-CS403**

Full Marks: 15 **Time: 45 minutes**

Answer any three questions:

1. What do you mean by polymorphism? Explain different types of polymorphisms in Object Oriented Programming with proper code snippet. [1+4]

2. What is the order in which constructor and the destructor are executed in inheritance? Explain the execution of constructor and destructor in multi-level and multiple-inheritance with suitable examples. [1+4]

3. Explain different types of access -modifiers available in object oriented programming with suitable code snippet. [5]

4. What is an exception? When and how finally block is used in exception handling? Define checked and unchecked exception with examples [1+2+2]

5. What is the main disadvantage of multiple-inheritance? Write a program where interface can be used to support multiple-inheritance. [2+3]

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Subject: Object Oriented Programming **Subject code: PCC-CS403**

Full Marks: 15 **Time: 45 minutes**

Answer any three questions:

1. What is Object Oriented Programming? How is it different from the procedure oriented programming? Explain the terms: i) Class and Object. ii) Data abstraction and data encapsulation. [1+2+2]

2. What is operator overloading? Overload '+' and '*' operator using member functions to carry out addition and multiplication of two matrices respectively. [1+4]

3. What is polymorphism? Define different types of polymorphisms. Explain method overloading and constructor overloading with suitable code snippet. [1+1+3]

4. What do you mean by **this** keyword? How are static block, and static methods defined in a class executed? Explain with suitable code snippet. Explain differences between constructor and method. [1+2+2]

COMPUTER ARCHITECTURE (PCC-CS401)

F.M – 15

Total time – 45 min

Answer any 3(three) of the following questions. 5x3=15

1. Discuss the difference between Von Neumann architecture and Harward architecture. State two factors that will improve the performance of a computer system. (3+2)

2. In the context of amdahl's Law, let us assume Factor $_{enhanced}$ = 0.5, Speedup $_{enhanced}$ = 3, then compute the speedup $_{overall}$ using amdahl's Law. What is cache memory? (3+2)

3. What is pipelining? State the main difference between RISC and CISC architecture.(3+2)

4. Assume that each stage of a pipeline is executed in time cycle tc=20 ns with total number of stages k=4 and the total number of tasks n=100, now calculate the speedup ratio for the non pipelined and pipelined processor. Mention the name of two pipeline hazards (3+2)

JALPAIGURI GOVERNMENT ENGINEERING COLLEGE

Class test 2025 Sub: Mathematics BS-M401

Full Marks: 15 Time 45 minutes

1. Solve $dy/dx + y = y^3(\cos x - \sin x)$.

2. Solve $y = px + \sqrt{(a^2p^2+b^2)}$.

3. Solve by Method of variation of parameters, $d^2y/dx^2 + 4y = 4\sec^2 x$.

2nd Internal Assessment Examination (2025)

Dept: CSE Semester: 4th Sub: Formal Language & Automata Theory (PCC CS404) (Answer any three)

1.Define Context Free Grammar. Construct a grammar for the set of all palindromes over {a,b}. 2+3

2.Construct a regular expression corresponding to the state diagram described in Fig. 1. 5

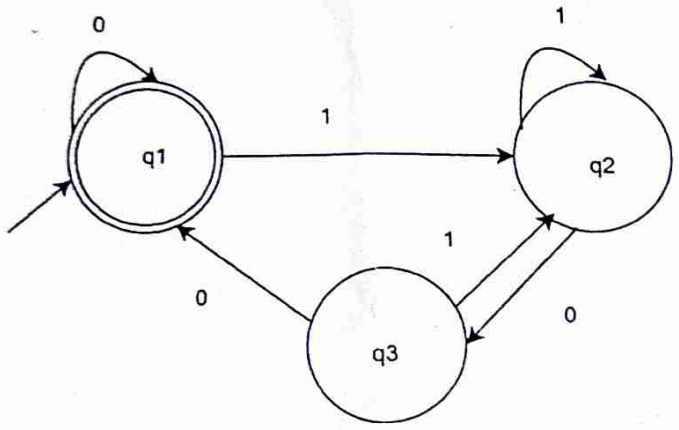


Fig. 1

3.Write down the Closure properties of Regular expression. Using the Pumping Lemma show that $L=\{a^{i^2} : i>=1\}$ in not regular. 2+3

4.Let G=({S,A},{0,1,2},P,S), where P consists of S->0SA2, S->012, 2A->A2, 1A->11. Find the Language showing the derivations. Find Regular Expression for the following: (a) a^{2n}:n>=1 (b) Set of all strings having exactly 3b's. 3+1+1

1st Internal Assessment Examination (2025)

Dept: CSE Semester: 4th Sub: Formal Language & Automata Theory (PCC CS404) (Answer any three) 3X5 = 15

1. Define Finite Automata. Draw a DFA that accepts an even number of 1's and an even number of 0's.
2. Differentiate between NFA and DFA. Construct a DFA equivalent to the machine given by State Transition Table1:

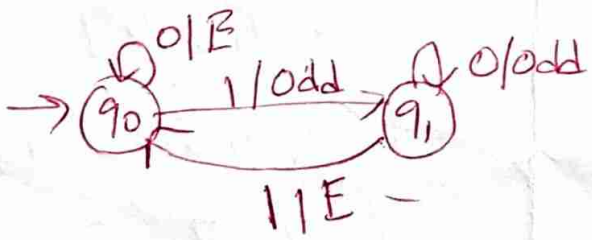
Present State\Inputs	Next State a	b
↖q0	q0,q3	q0,q1
q1	ϕ	q2
(q2)	q2	q2
q3	q4	ϕ
(q4)	q4	q4

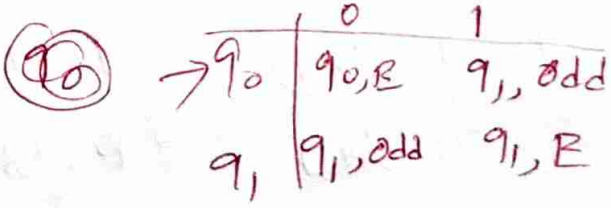
Table 1

Present State\Inputs	Next State a	b
↖q0	q1	q2
q1	q4	q3
q2	q4	q3
(q3)	q5	q6
(q4)	q7	q6
q5	q3	q6
q6	q6	q6
q7	q4	q6

Table 2

3. Define Mealy Machine. Construct a Mealy machine which can output EVEN, ODD according as the total number of 1's encountered is even or odd. The input symbols are 0 and 1. 2+3
4. Construct a minimum state automaton equivalent to a DFA whose state transition is defined by Table 2.





(4) $q_0 = \{\{q_3, q_4\}, \{q_0, q_1, q_2, q_5, q_6, q_7\}\}$

$\pi_1 = \{\{q_3, q_4\}, \{q_0, q_6\}, \{q_1, q_2\}, \{q_5, q_7\}\}$

$\pi_2 = \{\{q_3, q_4\}, \{q_0\}, \{q_6\}, \{q_1, q_2\}, \{q_5, q_7\}\}$