

Roll No.

Total No. of Pages : 03

Total No. of Questions : 09

Master of Computer Application (Sem.-3)

THEORY OF COMPUTATION

Subject Code : PGCA1927

M.Code : 90800

Date of Examination: 13-12-2023

Time : 3 Hrs.

Max. Marks : 70

INSTRUCTIONS TO CANDIDATES :

- SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
- SECTION - B & C. have FOUR questions each.
- Attempt any FIVE questions from SECTION B & C carrying TEN marks each.
- Select atleast TWO questions from SECTION - B & C.

SECTION-A

1. Attempt the following :

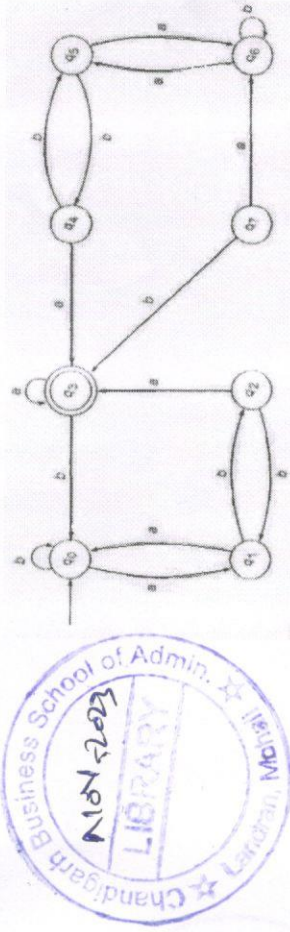
- Briefly Discuss Russell's Paradox in the context of theory of computation.
- Draw a FA accepting the language L over $\{a, b\}$ where $L = \{\text{"The language of all strings in which the number of a's is even."}\}$
- Give the mathematical definition of Mealy Machine.
- What are the closure properties of regular languages?
- How can we determine that a given grammar is ambiguous?
- Are Deterministic PDA (DPDA) and Non-deterministic PDA (NDPA) equivalent? Give an examples.
- Give an example of language which is accepted by Turing machine but not by linear bounded automata.
- Show that if L_1 and L_2 are recursive languages, then $L_1 \cap L_2$ is also recursive.
- Does the PCP with two lists $x = (b, bab^3, ba)$ and $y = (b^3, ba, a)$ have a solution?
- What are P and NP class of problems? Give examples of each type.

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SECTION-B

- Prove that Deterministic Finite Automata (DFA) and Non-deterministic Finite Automata (NFA) are equivalent.
- Minimize the following Automata:



- Using Pumping Lemma, show that $L = \{a^p | p \text{ is a prime}\}$ is not regular.
- Find a regular expression corresponding to each of the following subsets of $\{a, b\}$.
 - The set of all strings containing exactly 2a's.
 - The set of all strings containing at least 2a's.
 - The set of all strings containing at most 2a's.
 - The set of all strings containing the substring aa.
- Convert the grammar $S \rightarrow AB, A \rightarrow BS | b, B \rightarrow SA | a$ into GNF.

SECTION-B

- Construct a Pushdown automata which accepts all palindromes over $\{a, b\}$.
- Design a Turing Machine that accepts $L = \{1^n 2^m 3^n | n \geq 1\}$
- Show that the Halting Problem of Turing Machine is undecidable.

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9. a) State the Church Turing Thesis. What is the importance of this Thesis in the context of Theory of Computation?
- b) Give at least five examples of problems which are intractable.



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Total No. of Questions : 09

MCA (Sem.-3)

ADVANCED COMPUTER NETWORKING

Subject Code : PGCA1925

M. Code : 90798

Date of Examination : 14-12-2023

Time : 3 Hrs.

Max. Marks : 70

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION - B & C. have FOUR questions each.
3. Attempt any FIVE questions from SECTION B & C carrying TEN marks each.
4. Select atleast TWO questions from SECTION - B & C.

SECTION-A

1. Answer the following :
 - a) What is World Wide Web?
 - b) Name the different layers of TCP/IP model.
 - c) Discuss briefly about Fiber optics communication.
 - d) Why is logical link layer required?
 - e) Comment on "channel allocation".
 - f) Describe the services offered by MAC layer.
 - g) Enlist any two issues of Flooding algorithm.
 - h) How is troubleshoot provided by netstat?
 - i) Discuss two features of TCP.
 - j) Name any two protocols at Application layer of TCP/IP model.

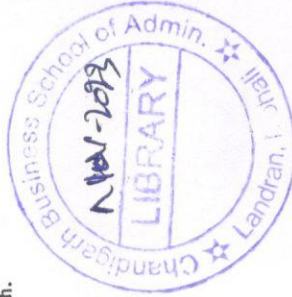
SECTION-B

2. Suppose two Hosts, A and B, are separated by 20,000 kilometers and are connected by a direct link of $R = 2$ Mbps. Suppose the propagation speed over the link is 2.5×10^8 meters/sec.
 - a) Calculate the bandwidth-delay product, $R \times d_{prop}$.
 - b) Consider sending a file of 800,000 bits from Host A to Host B. Suppose the file is sent continuously as one big message. What is the maximum number of bits that will be in the link at any given time?
 - c) Provide an interpretation of the bandwidth-delay product.
 - d) What is the width (in meters) of a bit in the link? Is it longer than a football field?
 - e) Derive a general expression for the width of a bit in terms of the propagation speed s , the transmission rate R , and the length of the link m .
3. What is the various transmission media used in computer networks? Discuss the wireless transmission media in detail.
4. What are the steps in the error control mechanism at the Data Link Layer? Discuss the three techniques for error control in the Data Link Layer.
5. What do you mean by Domain Name System (DNS)? Explain how DNS works? Discuss in detail about DNS records and DNS messages.

SECTION-C

6. Write a short note on the following :
 - a) MAC Protocols
 - b) IEEE 802.11 standards
7. a) Describe the evolution of 2.5 G TDMA standards.
b) Write a note on Bluetooth technology.
8. What is the difference between proactive and reactive routing protocols? Explain in detail any two routing protocols used in Adhoc networks.
9. a) Provide a simple overview of IPv6 and compare it with IPv4.
b) Write down a note on the evolution of wireless communication systems.

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MCA (Sem.-3)
ARTIFICIAL INTELLIGENCE & SOFT COMPUTING
Subject Code : PGCA1926

M.Code : 90799
Date of Examination : 21-12-2023

Time : 3 Hrs. Max. Marks : 70

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION - B & C have FOUR questions each.
3. Attempt any FIVE questions from SECTION B & C carrying TEN marks each.
4. Select atleast TWO questions from SECTION - B & C.

SECTION-A

1. Write short notes on :

- a) What is Soft Computing?
- b) Define AI techniques.
- c) What is Artificial Intelligence?
- d) Differentiate between syntax and semantics of languages.
- e) Define Fuzzy logic.
- f) Briefly explain the Water Jug problem.
- g) Explain the purpose of A* algorithm.
- h) Describe various Knowledge Representation Issues.
- i) What is memory Bounded Heuristic Search?
- j) Differentiate between Supervised Learning and Unsupervised Learning networks.

SECTION-B

2. What do you mean by Natural Language Processing? What are the features of natural languages that create challenges for processing of natural language by computers?

3. You have three jugs measuring 12 litres, 8 litres & 3 litres and a water faucet. You need to measure out exactly one litre. Use state space approach to solve this problem.
4. Discuss the salient features of propositional logic. Consider the following axioms and prove by resolution that "Scrooge is not a child."
 - a) Every child loves Santa.
 - b) Everyone who loves Santa loves any reindeer.
 - c) Rudolph is a reindeer and Rudolph has a red nose.
 - d) Anything which has a red nose is weird or is a clown.
 - e) No reindeer is a clown.
 - f) Scrooge does not love anything which is weird.Differentiate tree based breadth-first and depth-first search strategies based on completeness, time and space complexities.

SECTION-C

Write a short note on the applications of the following :

- a) Neuro-fuzzy modelling
 - b) Neural networks to pattern recognition system such as character recognition
 - c) Genetic algorithm.
7. Explain the working principle of genetic algorithm. Discuss the significance of fitness function. Also, write about multi-level optimization.
 8. a) Draw the architecture of backpropagation algorithm.
b) Explain with Fuzzy logics the help of examples, how is it different from the crisp logic?
9. Write a detailed note on neural networks. What is the role of activation functions? Draw and explain a single layer perceptron in detail.

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**MCA (Sem.-3)
SOFTWARE PROJECT MANAGEMENT**

Subject Code : PGCA1930

M.Code : 90801

Date of Examination : 30-12-2023

Time : 3 Hrs.

Max. Marks : 70

INSTRUCTIONS TO CANDIDATES :

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SECTION-A

- Write short notes on :
 - Discuss the use of COCOMO model.
 - Define Software Estimation.
 - Define Risk Management.
 - What is role of feasibility study in software engineering?
 - What is Software Configuration Management (SCM)?
 - What are the merits and demerits of PERT?
 - What is Organizational Behaviour?
 - What is Project Termination Review?
 - What is Staffing Pattern?
 - Define Monte Carlo Stimulation.

SECTION-B

- Explain the following terms : Risk assessment, Hazard identification and Risk analysis. Also suggest one method for prioritizing different risks that may affect the software development process.

The following details are available regarding a project :

Activity	Predecessor Activity	Duration (weeks)
A	-	3
B	A	5
C	A	7
D	B	10
E	C	5
F	D,E	4

Determine the critical path, the critical activities and the project completion time by using critical path methods.

- Elaborate all seven stages followed in procurement management to reduce the cost and to improve the relationship with suppliers.
- What is the Work Breakdown Structure? Explain its types.

SECTION-C

- How an efficient leader can strongly improves the software development process? Explain any two modern approaches to leadership with their respective characteristics and application domain.
- What do you understand by EVA? Explain in detail.
 - Explain Quality assurance and Quality control.
- What are Managing Contracts? What are the different types of Contracts and different stages in Contract Placement? Also define typical terms of Contract.
- What is process of selecting the right person for the job? How to motivate the workers in an organization?
 - What is the Oldman-Hackman Job Characteristics Model?

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