B127471(022)

B. Tech. (Hon's) (Fourth Semester) Examination, April-May 2024

(AICTE Scheme)

(CS Engg. Branch)

COMPUTER NETWORK

Time Allowed : Three hours

Maximum Marks : 100

Minimum Pass Marks : 35

Note : *Part (a) of each question is compulsory & carries 4 marks. Attempt any two parts from (b), (c) and (d) of each question and each part carries 8 marks.*

Unit-I

1. (a) What do you mean by Network application? Give examples of Network applications: 4

   (b) Discuss the OSI model. Explain the functions of physical layer and data Link layer.   8

(c) Explain guided and unguided media?   8

(d) What are the components of X 25?   8

Unit-II

2. (a) What are the major categoris of fast Ethernet?   4

(b) Explain sliding window Protocol in detail   8

(c) Define HDLC Explain it with frame format   8

(d) Discuss the functionalitis of Switch What are the Switching techniques?   8

Unit-III

3. (a) What is quality of service? Write its importance.   4

(b) Differentiate between IPv4 and IPv6.   8

(c) Explain any Routing protocol in detail.   8

(d) Discuss various congestion control algorithms.   8

Unit-IV

4. (a) What do you mean by Connection Oriented Protocol?   8

(b) Describe the features of UDP protocol   8

(c) What is transport protocol Explain elements of transport protocol   8

(d) Write the differences between UDP and TCP   8

Unit-V

5. (a) Write port numbers of HTTP, FTP, POP3 and SMTP.   4

(b) What are the functions and components of DNS?   8

(c) Explain file transfer protocol and its features   8

(d) Write short notes on   8

    (i)   SMTP

    (ii)   Telnet

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B. Tech. hon's (Fourth Semester) Examination, April-May 2024

(Computer Science Engineering (Data Science)

OPERATING SYSTEM

Time Allowed : Three hours

Maximum Marks : 100

Minimum Pass Marks : 35

Note : Attempt all questions. Part (a) of each question is compulsory carrying 4 marks. Attempt any two parts from parts (b), (c) and (d) carrying 8 marks each.

Unit-I

1. (a) Explain the statement "Operating system is a resource manager".

   (b) Define multiprogramming and real time operating system.

(c) Illustrate the layered approach of operating system.

(d) Describe the distributed and parallel computing with suitable example.

Unit-II

2. (a) Explain the process control block.

(b) Describe the process life cycle in detail.

(c) Consider the following 4 process with the length of CPU burst and arrival time in milliseconds.

Process	Arrival	Burst
P1	3	3
P2	6	3
P3	0	4
P4	2	5

(1) Using Shortest Remaining Time (SRT) preemptive scheduling obtain a gantt chart and calculate the average waiting time.

(2) Using Shortest Job First (SJF) preemptive scheduling obtain a gantt chart and calculate the

average waiting time.

(d) Explain Semaphore. How can semaphore is used to enforce mutual exclusion? Explain with suitable example.

Unit-III

3. (a) Explain the necessary conditions for the occurrence of deadlock.

(b) Explain how deadlock can be prevented?

(c) Prove that for deadlock all the processes will be in an unsfe state.

(d) Considering a system with five processes P0 through P4 and three resources of type A, B, C. Resource type A has 10 instances, B has 5 instances and type C has 7 instances.

Suppose at time to following snapshot of the system has been taken :

Process	Allocation			Max			Available		
	A	B	C	A	B	C	A	B	C
P0	0	1	0	7	5	3	3	3	2

P_1 2 0 0   3 2 2

P_2 3 0 2   9 0 2

P_3 2 1 1   2 2 2

P_4 0 0 2   4 3 3

Using banker algorithm, answer the following-

1) What will be the content of the Need matrix?

2) Is the system in a safe state? If Yes, then what is the safe sequence?

3) What will happen if process P1 requests one additional instance of resource type A and two instances of resource type C?

Unit-IV

4. (a) Define the resident monitor.

(b) Explain the address translation from logical to physical address.

(c) Explain the segmentation with its type and solution.

(d) Consider the following page referencing string

1,1,2,2,1,4,2,3,3,5,5,4

Assume 3 page frame, calculate the page faults using following algorithm.

1) FIFO

2) OPR

Unit-V

(a) Define the address binding.

(b) Write the file access mechanism in detail.

(c) Consider the following disk request sequence for a disk with 100 tracks.

45,21,67,90,4,89,52,61,87,25

Head pointer starting at 50. Find the number of head movements in cylinders using-

1) SSTF scheduling.

2) FCFS scheduling

(d) Write short notes on :

1) File sharing

2) Virtual OS

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B. Tech. hon's (Fourth Semester) Examination, April-May 2024

(AICTE Scheme)

(Computer Science Engineering)

THEORY OF COMPUTATION

Time Allowed : Three hours

Maximum Marks : 100

Minimum Pass Marks : 35

Note : Each questions comprises four parts. Part (a) of each question is mandatory, carrying a weight of 4 makrs. Attempt any two parts from (b), (c) and (d) of each question, with each part carrying a weight of 8 marks.
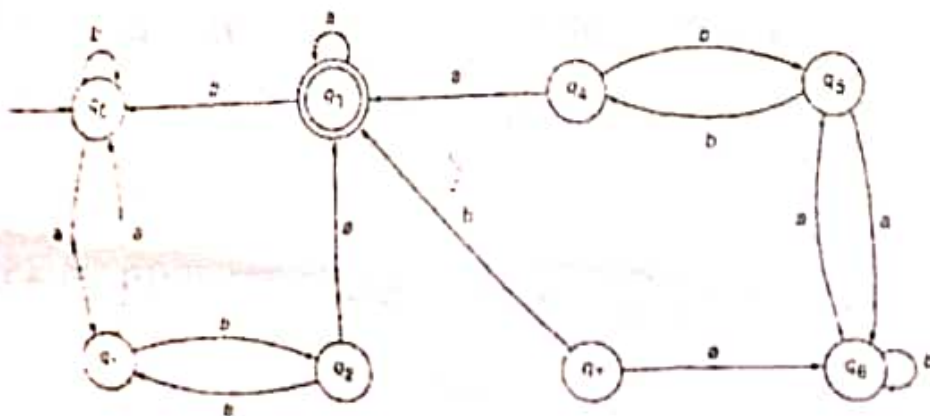
1. (a) Differentiate DFA, NDFA, and NFA with epsilon-moves in terms of the transition function.   4

   (b) Briefly define Mealy and Moore Machine.

Construct a Moore machine equivalent to the following Mealy machine. 8
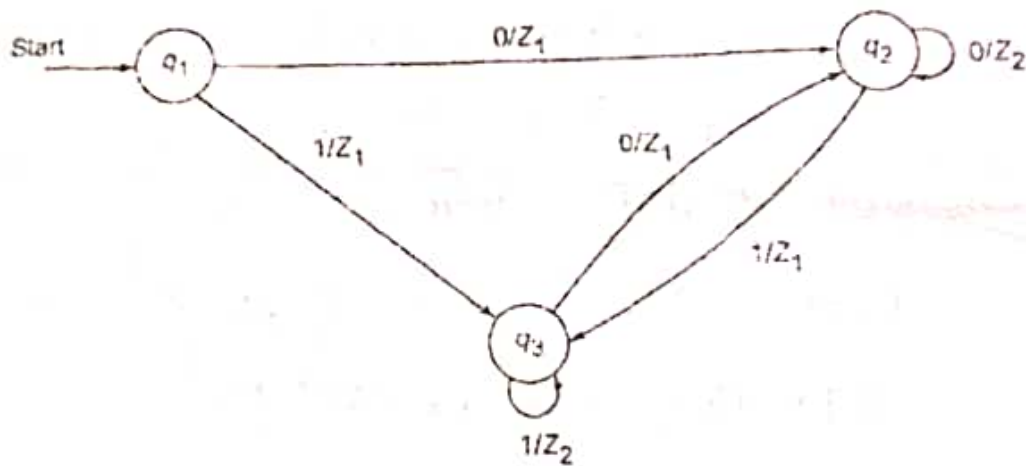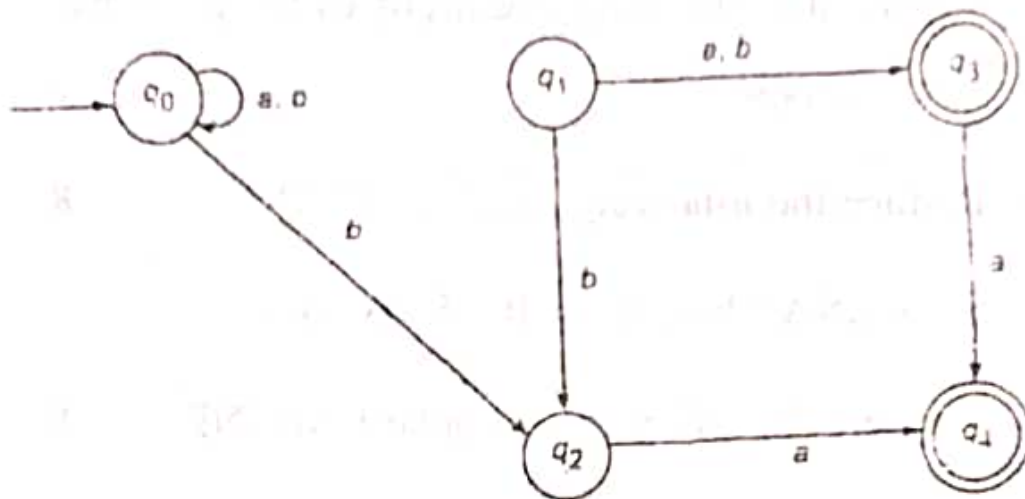

(c) Construct the minimum state automation equivalent to the following transition diagram. 8

(d) Construct a DFA equivalent to the following NDFA.

8

Unit-II

2. (a) Prove the Arden's Theorem. 4

(b) Explain the closure properties of regular sets. 8

(c) Construct a minimum state DFA for the following regular expression. 8

10 + (0 + 11) 0 *1

(d) Explain the pumping lemma. Show that L = {a^p|p

is a prime number} is not regular.   8

Unit-III

3. (a) Give the formal definition of a grammar.   4

    (b) Explain the Chomsky Hierarchy of the grammars with example.   8

    (c) Reduce the following grammar to CNF.   8

$$S \rightarrow ASA \mid bA, A \rightarrow B \mid S, B \rightarrow c$$

    (d) Convert the following grammar into GNF.   8

$$S \rightarrow AB, A \rightarrow BS \mid b, B \rightarrow SA \mid a$$

Unit-IV

4. (a) Define the acceptance by PDA using Final state and null store.   4

    (b) Write the closure properties of CFLs.   8

    (c) Construct a PDA accepting the language $\{L = a^m b^n c^n \mid m, n \geq 1\}$ 8

    (d) Construct a context free grammar for the following PDA A where

$$A = (\{q_0, q_1\}, \{a, b\}, \{Z_0, Z\}, \delta, q_0, Z_0, \phi) \text{ and}$$

δ is given by   8

$\delta(q_0, b, Z_0) = \{(q_0, ZZ_0)\}$

$\delta(q_0, A, Z_0) = \{(q_0, A)\}$

$\delta(q_0, b, Z) = \{(q_0, ZZ)\}$

$\delta(q_0, a, Z) = \{(q_1, Z)\}$

$\delta(q_1, b, Z) = \{(q_1, A)\}$

$\delta(q_1, a, Z_0) = \{(q_0, Z_0)\}$

Unit-V

(a) Differentiate Deterministic and Non-Deterministic Turing Machine.   4

(b) Explain Recursive and Recursive Enumerable languages with examples.   8

(c) Design a Turing Machine that recognize the language $\{L = 0^n 1^n\}$ n $\geq$ 1}   8

(d) Explain different types (variants) of the Turing Machine with proper diagrams.   8

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B. Tech. (Hon's) (Fourth Semester) Examination, April-May 2024

(AICTE Scheme)

(Inf. & Tech. Engg. Branch)

ARTIFICIAL INTELLIGENCE : PRINCIPLES and APPLICATION

(Data Science)

Time Allowed : Three hours

Maximum Marks : 100

Minimum Pass Marks : 35

Note : Part (a) of each question is compulsory & carries 4 marks. Attempt any *two* parts from (b), (c) and (d) of each question and each part carries 8 marks.

Unit-I

1. (a) What is AI, and why is it significant in modern computing? (2)   4

   (b) Explain the Turing test and its imoportance in artificial intelligence, including its strengths and limitations.   8

[2]

(c) What is an intelligent agent? Describe the different types of intelligent agents   8

(d) Compare and contrast optimal reasoning/behavior with human-like reasoning/behavior, providing examples to illustrate your points   8

Unit-II

2. (a) What is problem formulaion? Formulate the problem for the 8 queen puzzle   4

(b) Compare and contrast uninformed search algorithms (e g , depth-first search, breadth-first search) with informed search algrithms (e g A* search) in terms of effectiveness, completeness, and time/space complexity   8

(c) Discuss game tree search techniques, including the minimax algorithm and alpha-beta pruning   8

(d) Explain Gentic Algorithms (GAs) as a search pardigms with an example   8

Unit-III

[3]

3. (a) Convert the following English sentences in the First Order Predicate calculus   4

(i)   All humans are mortal

(ii) If it is raining, then the ground is wet

(iii) Every student in the class passed the exam

(iv) There exists a number that is greater than 5

(b) Explain the inference rules for First-Order Predicate Calculus (FOPC), focusing on resolution, resolution-refutation, and answer-extraction Provide examples for each to demonstrate their workings   8

(c) Discuss the components involved in fuzzy Reasoning/ Fuzzy Inference Systems, including fuzzification, rule base, inference engine, and defuzzification   8

(d) Discuss the methods and techniques used for the visual exploration and analysis of spatial, temporal, and multidimensional relational data   8

Unit-IV

4. (a) What is probabilistic reasoning? Provide an example of its application.   4

(b) Explain Bayes theorem with an example   8

(c) Describe Bayesian Networks and their components with example. 8

(d) Explain the concept of Hidden Markov Models (HMMs). Discuss their structure and how they are used for temporal probability modeling, providing a real-world example. 8

Unit-V

5. (a) Explain the differences between supervised, unsupervised, and reinforcement learning. 4

(b) Explain the steps involved in a classification task in supervised learning, using an example. 8

(c) Discuss the Naïve Bayes classifier. How does it work, and what are its strengths and weaknesses? 8

(d) Describe the performance evaluation of a classifier. What metrics are commonly used, and how do they indicate the effectiveness of a classifier? Provide examples to illustrate. 8

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B. Tech. hon's (Fourth Semester) Examination, April-May 2024

(AICTE Scheme)

(Data Science/Artificial Intelligence)

R FOR DATA SCIENCE

Time Allowed : Three hours

Maximum Marks : 100

Minimum Pass Marks : 35

Note : (i) Each questions contains four parts. Part (a) of each question is compulsory. Attempt any two parts from (b), (c) and (d) of each question. (ii) Include suitable header file in all your program. (iii) The figure in the right-hand margin indicates marks.

Unit-I

1. (a) Define R Programming.   4

[2]

(b) Discuss about :   8

  (i) Sequences

  (ii) Repetitions

(c) Explain basic features of R Programming.   8

(d) Discuss about R for basic Maths.   8

Unit-II

2. (a) Define Arrays.   4

(b) List out the Properties of the following :   8

  a) Matrix subtraction

  b) Matrix division

  c) Matrix addition

  d) Matrix multiplication

(c) Explain the filling Direction of Matrix.   8

(d) Explain Subsets, Extraction, and Replacement of Multidimensional Arrays.   8

Unit-III

3. (a) Define Characters.   4

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[3]

(b) Explain logical outcomes of Relational Operators?   8

(c) Explain multiple comparison of Logical Operators.   8

(d) Discuss about :

  a) Creating a Strings

  b) String Concatenation   8

Unit-IV

4. (a) Define Data Frames.   4

(b) Describe how to create objects in R Programming.   8

(c) Explain Adding Data Columns and Combining Data Frames.   8

(d) Explain Lists and Objects.   8

Unit-V

5. (a) Define Axis labels.   4

(b) Explain all graphical parameters.   8

(c) Explain line and point Appearances.   8

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(d) Explain Setting Appearance Constants with Geoms.

8

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(AICTE Scheme)

(Data Science/Artificial Intelligence)

DATA VISUALIZATION

Time Allowed : Three hours

Maximum Marks : 100

Minimum Pass Marks : 35

Note : *(i) Each question contains four parts. Part (a) of each question is compulsory. Attempt any two parts from (b), (c) and (d) of each question. (ii) Include suitable header file in all your program. (iii) The Figure in the right-hand margin indicates marks.*

1. (a) What do you understand by Coordinate system?

4

(b) Discuss different distribution that are commonly used in data visualization   8

(c) Explain color scales system?   8

(d) Explain Coordinate System and with curved axes   8

2. (a) What do you mean by Heat map?   4

  (b) Write notes on

     a) Heat Map

     b) Box plot   8

  (c) Explain Visualizing a Multiple distribution   8

  (d) Explain Empirical Cumulative Distribution function?   8

3. (a) What do you understand by graph?   4

  (b) Explain Mosaic Plots and Tree maps?   8

  (c) Write detailed notes on Scatter plot?   8

  (d) Explain bar graph and its types?   8

4. (a) What are choropleth mapping?   4

(b) Define trends How you can you visualize trends?   8

(c) What is uncertainty in data set?   8

(d) Write detailed notes on Projection   8

5. (a) Explain use of data labels in Data Visualization 4

  (b) Write notes on common problems associated with use of colors in data visualization techniques   8

  (c) Explain Direct area visualization   8

  (d) Write notes on

     (i) use of different line types in Data Visualization

     (ii) use of different markers in Data Visualization

     8