B. Tech (Honours) (Artificial Intelligence/Data Science)

Class Test - I, May, 2023

(AICTE Scheme)

(Computer Science and Engineering Branch)

Subject- Computer Network

(B127471(022))

Time Allowed: 2 hours

Maximum Marks: 40

Minimum Pass Marks: 14

Roll No - 30001282104 2

Note: *(i)* Each question contains four parts. Part (1) of each question is compulsory. Attempt any two parts from (2), (3), and (4) of each question.
(ii) The figure in the right-hand margin indicates marks.

I.	**(1)** What is the difference between transmission mode and transmission media please make a list to all?	[2+2]
	(2) Discuss difference between OSI and TCP/IP model.	[8]
	(3) Short Notes: (a) Network hardware (b) X.25 and Frame relay	[4+4]
	(4) Please explain types of network topology in detail? **Or** Please explain types of computer networks in detail?	[8]
II.	**(1)** What is Aloha (Pure/Slotted) and CSMA (CD/CA) method?	[2+2]
	(2) What is Flow control in data link layer please write all the methods with detail explanation?	[8]
	(3) What is Error control method please decode the received message 111101001 using the (7,4) Hamming code. What is the corrected message?	[8]
	(4) What is meant by Ethernet please discuss all the types of Ethernet in a tabular form?	[8]

B. Tech (Honours) (AI/DS)

Class Test - I, May, 2023

(AICTE Scheme)

(Computer Science and Engineering Branch)

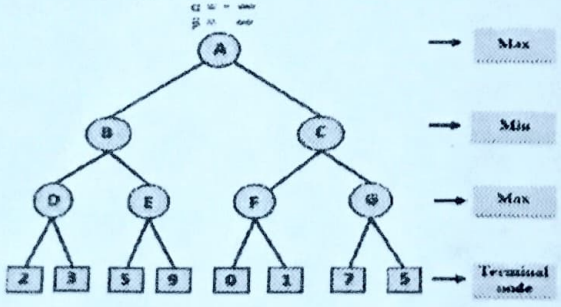
Subject- Artificial Intelligence: Principles and Applications

Subject Code: B127472(022)

Time Allowed: 2 hours | *Maximum Marks:* 40 | *Minimum Pass Marks:* 14

Roll No - 30001282104 2

Note: *(iii)* Each question contains four parts. Part (a) of each question is compulsory. Attempt any two parts from (b), (c), and (d) of each question.
(iv) The figure in the right-hand margin indicates marks.

I.	**(a) What is Heuristic Searching Technique? Explain its advantages.**	[4]
	(b) Explain Missionaries cannibal problem with proper state space technique.	[8]
	(c) How we can define that the machine is intelligent or not? Give proper justification with suitable model.	[8]
	(d) What do you mean by constrain satisfaction problem? Solve the below problem using crypt arithmetic technique. C R O S S + R O A D S D A N G E R	[8]
II.	**(a) What is propositional logic? Explain it with proper syntax and semantic.**	[4]
	(b) Explain AO* Algorithm with using suitable graph.	[8]
	(c) Explain Min-Max Search Algorithm with using following search tree. 	[8]
	(d) Convet the following statement in FOPL:(Any 4) **VI. No one is loyal to someone.** **VII. No purple mushrooms are poisonous.** **VIII. Every Child should respect his parents.** **IX. All birds can fly.** **X. All software programmers are engineers.**	[8]

B.Tech (Honours) (Data Science/Artificial Intelligence)

4th Semester, Class Test - I, May, 2023

(AICTE Scheme)

(Computer Science and Engineering Branch)

Operating System

B127473 (022)

Time Allowed: 2 hours

Maximum Marks: 40

Minimum Pass Marks: 14

Roll No - 30001282 1042

Note: *(iii)* Each question contains four parts. Part (a) of each question is compulsory. Attempt any two parts from (b), (c), and (d) of each question.

(iv) The figure in the right-hand margin indicates marks.

I. (a) Define time sharing and real time operating system [2]

(b) Write the different types of operating system structure and elaborate any one with neat and clean diagram. [4]

(c) Write about various types of services of operating system. [4]

(d) Write the differences between distributed and parallel processing concept. [4]

II.(a)

Process No.	Arrival Time	Burst Time
P0	0	20
P1	15	25
P2	30	10
P3	45	15

[5]

Calculate TAT, WT of each process. Also calculate AWT of process P2.

(b) Each process Pi, i= 1....9 is coded as follows - [5]

Mutex =1 (initially)
Repeat
P(mutex)
{ critical section }
V(mutex)
Forever

The code for P10 is identical except it uses V(mutex) in place of P(mutex). The initial value of binary semaphore is 1. What is the maximum no. of processes that can be inside the critical section at any moment of time?

(c) Define process with their various states. [5]

(d) Write about any three classical problems of IPC and elaborate any one of them and solve with semaphore. [5]

III.

(a) How we can prevent our system from deadlock? Explain in brief. [5]

(b) Why we use Banker's algorithm? Explain it with one example. [5]

(c) How we detect a deadlock within a system? Write the recovery methods. [5]

(d) Write about PCB and context switching in brief details. [5]

Chhattisgarh Swami Vivekanand Technical University
University Teaching Department
B. Tech (Honours) (Data Science/ Artificial Intelligence)
Class Test - I, May, 2023

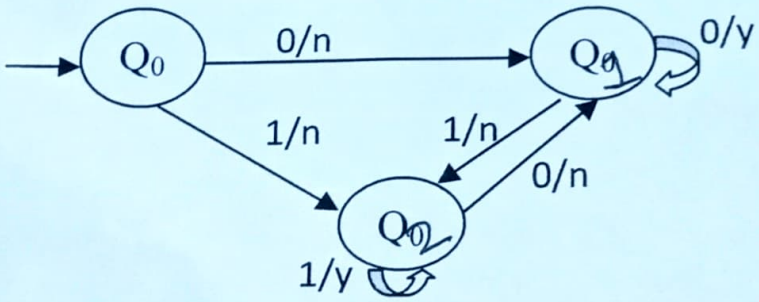
Subject: Theory of Computation **B127474 (022)**

Time Allowed: 2 hours *Maximum Marks:* 40
Minimum Pass Marks: 14

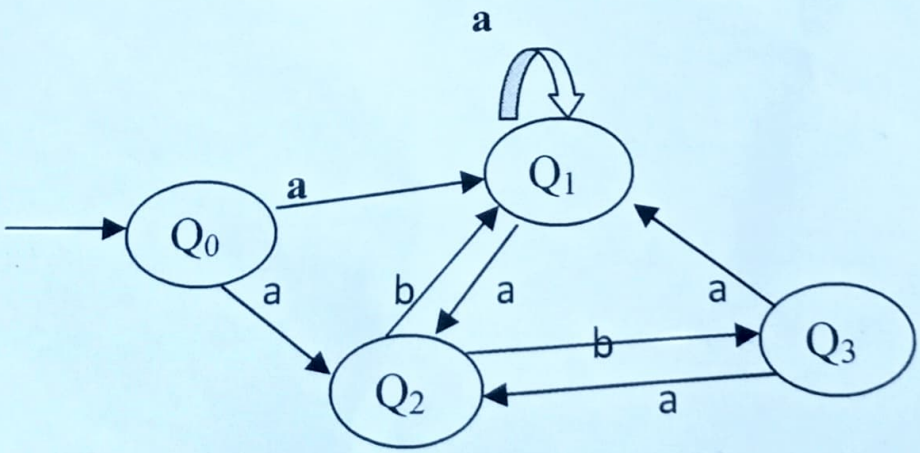
Roll No - 300012821042

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

Q.1. (a) Construct an equivalent Moore machine:- [4]

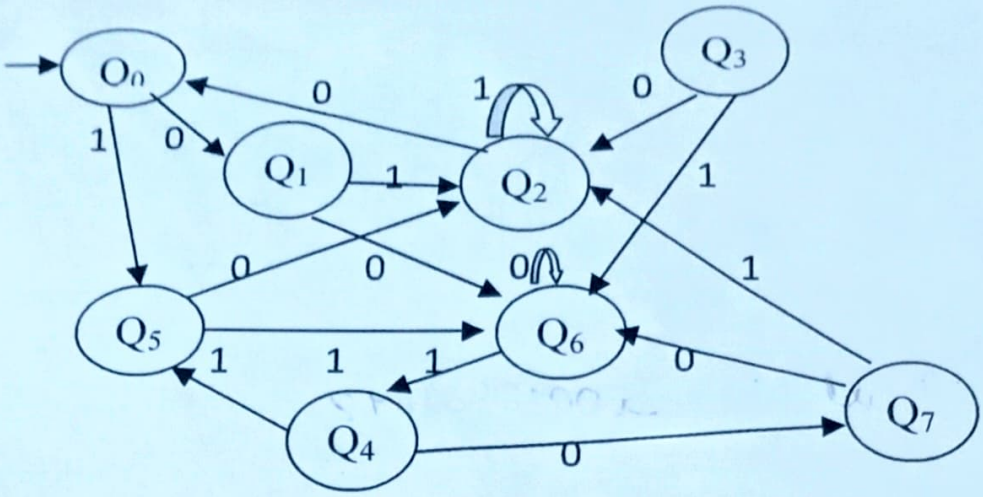


(b) Difference between NFA & DFA & design DFA for given NFA:- where Q_0 & Q_1 are final state. [8]



(c) Construct minimum state automaton equivalent to the finite. [8]

automaton given as :- where Q_2 is final state.



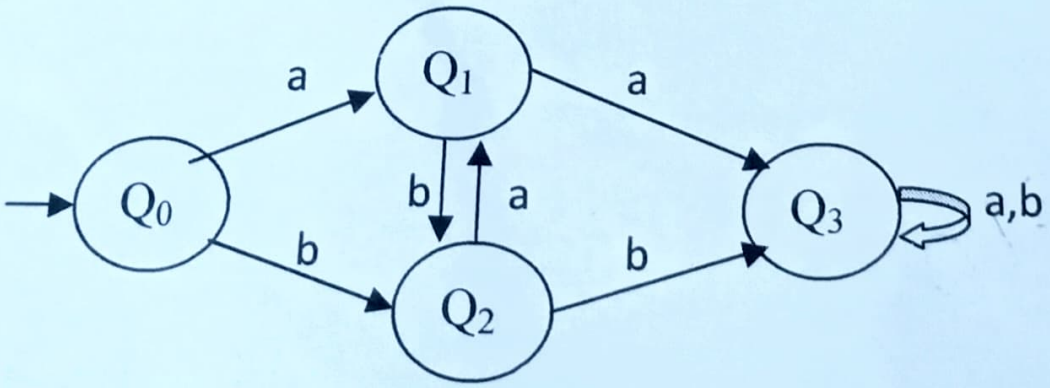
(d) Consider a grammar G whose production rules are: [8]
S->0B/1A, A->0/0S/1AA, B->1/1S/0BB
Find LMD & RMD for string 00110101 & construct a derivation tree.

Q. 2. (a) Define regular Expression with given example? [4]

I. Write the regular expression for the language starting with a but not having consecutive b's.

II. Write the regular expression for the language accepting all the string in which any number of a's is followed by any number of b's is followed by any number of c's.

(b) Find the regular expression for given diagram:- [8]
where Q_2 & Q_3 are final state.



(c)Construct a DFA with reduced states equivalent to the regular Expression R = (a+b)* (aa+bb)(a+b)* ? [8]

(d) Explain pumping lemma & prove that L= { a^p p is prime} is not Regular? [8]

Chhattisgarh Swami Vivekanand Technical University

University Teaching Department

B.Tech (Honours) (Data Science/ Artificial Intelligence)

Class Test - I, May, 2023

R for Data Science(B127475(022))

Time Allowed: 2 hours

Maximum Marks: 40
Minimum Pass Marks: 14

Roll NO - 30001282104 2

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) The figure in the right-hand margin indicates marks.

I. (a)Fill in the blanks:
R uses a _____model, with the client typically being the R console or an IDE and the server being the_____. The R interpreter is written in _____and provides core functionality for data manipulation, statistical analysis, and graphics. R uses a _____system to automatically free memory that is no longer needed by the program. [4]

(b)Discuss the history and overview of the R programming language, highlighting its key milestones and characteristics. [8]

(c)A fitness club has recently recorded the weights (in kilograms) of six randomly chosen members. The weights are as follows: 68, 73, 82, 60, 88, and 77 kg. The club wants to analyse the data to understand the weight distribution of their members better. They are particularly interested in the average weight, minimum and maximum weights, and the weight range (difference between the highest and lowest weights). They also want to extract the weights of the first three members for a separate analysis.

Using R, perform the following tasks:

1. Create a vector containing the weights of the six members.
2. Calculate the average weight of the six members.
3. Determine the minimum and maximum weights.
4. Calculate the weight range.
5. Assign the weights of the first three members to a new vector.
6. Extract the length of the new vector.

[8]

(d) A marketing agency is creating a promotional campaign for a client. They have collected a list of taglines for different products and want to analyse them. The taglines are:

"Be the change."

"The perfect fit."

"Taste the difference."

Using R, perform the following tasks:

1. Create strings for each of the taglines.
2. Concatenate the three taglines into one string, separating each tagline with a newline character.
3. Extract a substring from the first tagline (characters 4 to 6).
4. Check if the word "perfect" is present in each of the taglines.

[8]

II. (a)Define a matrix in R and explain how you can fill it with values using row and column bindings. Also, provide an example of a matrix filled with random values using these techniques. [4]

(b)Fill in the Blanks:

1. mat <- matrix(c(1, 2, 3, 4, 5, 6), nrow = 2, ncol =_____)
print(mat)

2.&3. mat1 <- matrix(c(1, 2, 3, 4), nrow = 2)
mat2 <- matrix(c(5, 6, 7, 8), nrow = 2)

row_bind<- _____(mat1, mat2)
col_bind<- _____(mat1, mat2)

4.transpose <- _____(mat)

5. identity_mat<- ____(3)

6. addition <- mat1 ___ mat2

7. subtraction <- mat1 ___mat2

8. multiplication <- mat1____ t(mat2)

[8]

(c)Given two 3x3 matrices A and B:

A = [1, 2, 3]	B = [9, 8, 7]
[4, 5, 6]	[6, 5, 4]
[7, 8, 9]	[3, 2, 1]

1. Create a new matrix C by horizontally concatenating A and B.
2. Extract the first row and third column of C and calculate their sum.
3. Replace the diagonal elements of A with the diagonal elements of the 3x3 identity matrix.
4. Calculate the transpose of the modified A.
5. Perform element-wise addition and subtraction of A and B, and then multiply the resulting matrices.
6. Invert the resulting matrix from the previous step, if possible.
7. Create a 3x3x2 multidimensional array using A and B as the first and second slices, respectively.
8. Extract the element in the first row, second column, and second slice of the multidimensional array.

[8]

(d)Explain the following terms with examples in the context ofR language:

a) Matching

b) Factors

c) Identifying Categories

d) Defining and Ordering Levels

e) Combining and Cutting

Provide a brief explanation for each term and illustrate its usage with an example in the field of R language.

[8]

Chhattisgarh Swami Vivekanand Technical University, University Teaching Department

B. Tech (Honours) (Data Science/ Artificial Intelligence)

Class Test - I, May, 2023

Subject Name-Data Visualization **Subject Code-B127476(022)**

Roll No - 300012821042

Time Allowed: 2 hours	*Maximum Marks:* 40
	Minimum Pass Marks: 14

Part – 1 (a is compulsory and b and c are optional, attempt any one)

a) Explain the Data visualization aesthetics **[4 marks]**

b) Write detailed notes on coordinate systems along with suitable examples. **[16marks]**

c) Please describe what are distributions and different types of distributions withexamples. **[16 marks]**

Part – 2 (a is compulsory and b, c and d are optional attempt any two)

a) Describe the different characteristics of use of colours in data visualization **[4 marks]**

b) What is quantile-quantile plots explain the steps with suitable examples. **[8 marks]**

c) Please explain the method for visualizing different distributions in the same plot. Also, explain the method for representing data that have differences in the order of magnitude. **[8 marks]**

d) Write short note on any two from following sections

i. Stacked bar plots

ii. Histograms

iii. Density plots

iv. Heatmaps