PAPER ID-311640

Roll No:

MTECH
(SEM I) THEORY EXAMINATION 2024-25
FOUNDATION OF COMPUTER SCIENCE

TIME: 3 HRS M.MARKS: 70

Note: Attempt all Sections. In case of any missing data; choose suitably.

SECTION A

1. Attempt *all* questions in brief. 2 x 07 = 14

Q no.	Question	CO	Level
a.	Write the syntax to create a node for a link list.		2
b.	Differentiate Binary search and Linear search.		3
c.	Differentiate paging and segmentation.		3
d.	Write down the difference between NPDA and DPDA with example.		3
e.	Design a FA to accept the binary number divisible by 3.		3
f.	Discuss the capabilities that should be provided by DBMS.		2
g.	Write down the difference between centralized and distributed databases.		3

SECTION B

2. Attempt any *three* of the following: 07 x 3 = 21

Q no.	Question	CO	Level
a.	Write a program in C to create a linear linked list interactively and print the list and total number of items in the list.		6
b.	Consider the processes , CPU burst time and arrival time given below: Draw the Gantt Chart and calculate the following by using SRTF CPU scheduling algorithm: (i) Average Waiting Time (ii) Average Turn Around Time		3
c.	Define Push down automata. Design a PDA for the following language: L = {wcw^r | w= {a, b}*}where w^r is the reverse of w and c is the splitter.		6
d.	Construct a Turing Machine which accepts the following language: L= {0^n1^n | n>=1}.		6
e.	Discuss about Normalization. Explain with suitable example about third, fourth and fifth Normal form.		2

Process	Arrival Time	Burst Time
P_1	0	8
P_2	1	4
P_3	2	2
P_4	3	1
P_5	4	3
P_6	5	2

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SECTION C

3. Attempt any *one* part of the following: 07 x 1 = 07

Q no.	Question	CO	Level
a.	Write an algorithm for Bubble Sort. Show step by step sorting procedure for the following list of elements: 54, 26, 93, 17, 77, 31, 44, 55, 20		4
b.	Discuss about stack. Write C functions to implement push and pop operations on stack.		6

4. Attempt any *one* part of the following: 07 x 1 = 07

Q no.	Question	CO	Level
a.	Explain the difference between Internal fragmentation and External fragmentation. Which one occurs in paging and which one occurs in pure segmentation, discuss about it.		4
b.	Discuss the performance criteria for CPU scheduling in detail.		2

5. Attempt any *one* part of the following: 07 x 1 = 07

Q no.	Question	CO	Level
a.	Discuss the applications and limitations of FA. Construct the DFA equivalent to the following regular expression: $(x+y)^*xyy$		6
b.	Write CFG for the following languages: (i) $L=\{a^nb^m \mid n\leq m+3, m,n\geq 0\}$. (ii) $L=\{a^{n+m}b^n \mid m,n\geq 1\}$		3

6. Attempt any *one* part of the following: 07 x 1 = 07

Q no.	Question	CO	Level
a.	Explain the commit protocol with reference to distributed database. How does the 2PC protocol respond to various types of failure.		2
b.	Discuss about transaction. How would you make transaction recovery from transaction failure, explain with suitable example.		2

7. Attempt any *one* part of the following: 07 x 1 = 07

Q no.	Question	CO	Level
a.	Design the PDA for the following grammar: S→aA, A→aABC|bB|a, B→b, C→c		6
b.	Explain three-tier architecture of database system.		2