Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Sixth Semester B.Tech Degree Examination June 2022 (2019 Scheme)

Course Code: CST308

Course name: COMPREHENSIVE COURSE WORK

Max. Marks: 50 Duration: 1 Hour

Instructions:

(1) Each question carries one mark. No negative marks for wrong answers

(2) Total number of questions: 50

(3) All questions are to be answered. Each question will be followed by 4 possible answers of which only ONE is correct.

(4) If more than one option is chosen, it will not be considered for valuation.

1. The Inorder and Preorder traversal of a binary tree is **d b e a f c g** and **a b d e c f g** respectively. Which among the following is the correct Post Order Traversal Sequence for this tree?
   a) d e b f g c a b) e d b g f c a c) e d b f g c a d) d e f g b c a

2. Which of the following is not the application of stack?
   a) A parenthesis balancing program b) Tracking of local variables at run time c) Compiler Syntax Analyzer d) Data Transfer between two asynchronous processes

3. In the worst case, the number of comparisons needed to search a singly linked list of length n for a given element is?
   a) log 2 n b) n/2 c) log 2 n – 1 d) n

4. To implement a stack using queue (with only enqueue and dequeue operations), how many queues will you need?
   a) 1 b) 2 c) 3 d) 4

5. The optimal data structure used to solve Tower of Hanoi is _____
   a) Tree b) Heap c) Priority queue d) Stack

6. Assume that the operators +, -, X are left associative and ^ is right associative. The order of precedence (from highest to lowest) is ^, X, +, -. The postfix expression for the infix expression (a + b X c - d ^ e ^ f is?
   a) abc X+ def ^^– b) abc X+ de^f^ – c) ab+c Xd – e ^f^ d)) -+aXbc^ ^def

7. The time complexity of heap sort in worst case is
   a) O(logn) b) O(n) c) O(nlogn) d) $O(n^2)$

8. Suppose we are sorting an array of eight integers using heapsort, and we have just finished some heapify (either maxheapify or minheapify) operations. The array now looks like this:

16 14 15 10 12 27 28

How many heapify operations have been performed on root of heap?

a) 1 b) 2 c) 3 or 4 d) 5 or 6

9. What is the number of edges present in a complete graph having n vertices?

a) (n*(n+1))/2 b) (n*(n-1))/2 c) n d) Information given is insufficient

10. If several elements are competing for the same bucket in the hash table, what is it called?

a) Diffusion b) Replication c) Collision d) Duplication

11 A process which is copied from main memory to secondary memory on the basis of requirement is known as

a) Demand paging b) Paging c) Threads d) Segmentation

12 For which of the following purposes, Banker's algorithm is used?

a) Preventing deadlock b) Solving deadlock c) Recover from deadlock d) None

13 Identify the system calls that on termination does not return control to the calling point.

a) exec b) fork c) longjmp d) ioctl

14 A CPU generates 32-bit virtual addresses. The page size is 4 KB. The processor has a translation look-aside buffer (TLB) which can hold a total of 128-page table entries and is 4-way set associative. The minimum size of the TLB tag is

a) 11 bits b) 13 bits c) 15 bits d) 20 bits

15 Dirty bit is used to indicate which of the following?

a) A page fault has occurred b) A page has corrupted data c) A page has been modified after being loaded into cache d) An illegal access of page

16 A system uses FIFO policy for page replacement. It has 4-page frames with no pages loaded to begin with. The system first accesses 100 distinct pages in some order and then accesses the same 100 pages but now in the reverse order. How many page faults will occur?

a) 196 b) 192 c) 197 d) 195

17 If a process is executing in its critical section, then no other processes can be executing in their critical section. What is this condition called?

a) mutual exclusion b) critical exclusion c) synchronous exclusion d) asynchronous exclusion

18 What is a long-term scheduler?

a) It selects processes which have to be brought into the ready queue
b) It selects processes which have to be executed next and allocates CPU
c) It selects processes which heave to remove from memory by swapping
d) None of the mentioned

19 A systematic procedure for moving the CPU to new process is known as-

a) Synchronization
b) Deadlock
c) Starvation
d) Context Switching

20 In a virtual memory system, size of virtual address is 32-bit, size of physical address is 30-bit, page size is 4 Kbyte and size of each page table entry is 32-bit. The main memory is byte addressable. Which one of the following is the maximum number of bits that can be used for storing protection and other information in each page table entry?

a) 2
b) 10
c) 12
d) 14

21 The amount of ROM needed to implement a 4-bit multiplier is

a) 64 bits
b) 128 bits
c) 1 Kbits
d) 2 Kbits

22 Match the following

(a) Immediate address mode	(1) Local variables
(b) Direct address mode	(2) Relocatable programs
(c) Indirect address mode	(3) Pointer
(d) Index addressing mode	(4) Locality of reference
(e) Base address mode	(5) Arrays
(f) Relative address mode	(6) Constant Operands

a) a6 b1 c3 d5 e2 f4
b) a5 b4 c6 d3 e1 f2
c) a3 b5 c2 d4 e1 f2
d) a6 b5 c2 d3 e1 f4

23 Register renaming is done in pipelined processors

a) as an alternative to register allocation at compile time
b) for efficient access to function parameters and local variables
c) to handle certain kinds of hazards
d) as part of address translation

24 Memory interleaving is done to

a) Increase the amount of logical memory
b) Reduce memory access time
c) Simplify memory interfacing
d) Reduce page faults

25 In an instruction execution pipeline, the earliest that the data TLB (Translation Lookaside Buffer) can be accessed is

a) before effective address calculation has started
b) during effective address calculation
c) after effective address calculation has completed
d) after data cache lookup has completed

29 The correct matching for the following pairs is

(A) DMA I/O	(1) High speed RAM
(B) Cache	(2) Disk
(C) Interrupt I/O	(3) Printer
(D) Condition Code Register	(4) ALU

a) A4B3C2D1 b) A2B1C3D4 c) A4B3C2D1 d) A2B3C4D1

30 The technique whereby the DMA controller steals the access cycles of the processor to operate is called

a) Time Cloning b) Memory Con c) Cycle Stealing d) Memory Stealing

31 For the daisy chain scheme of connecting I/O devices, which of the following statement is true?

a) It gives non-uniform priority to various devices

b) It is only useful for connecting slow devices to a processor

c) It requires a separate interrupt pin on the processor for each device

d) It gives uniform priority to all devices

32 A machine with N different opcodes can contain how many different sequences of micro-operations

a) 2^N b) N^N c) N^2 d) N

33 A cache has a 64 KB capacity, 128 -byte lines (blocks), and is 4 -way set associative. The system containing the cache uses 32 -bit addresses. How many lines (blocks) and sets does the cache have?

a) 64 b) 128 c) 256 d) 32

34 Which of the following is the property of transaction that protects data from system failure?

a) Atomicity b) Isolation c) Durability d) Consistency

35 Which normalization form is based on the transitive dependency?

a) INF b) 2NF c) 3NF d) BCNF

36 Which of the following SQL command is used for removing (or deleting) a relation form the database?

a) Drop b) Delete c) Rollback d) Remove

37 Which of the following is known as minimal super key?

a) Primary key b) Candidate key c) Foreign key d) None

38 Given the following relation instance.

x	y	z
1	4	2
1	5	3
1	6	3
3	2	2

Which of the following functional dependencies are satisfied by the instance?

a) XY -> Z and Z -> Y b) YZ -> X and Y -> Z c) YZ -> X and X -> Z d) XZ -> Y and Y -> X

39 Consider the following relational schema:

Suppliers(sid:integer, sname:string, city:string, street:string)
Parts(pid:integer, pname:string, color:string)
Catalog(sid:integer, pid:integer, cost:real)
Consider the following relational query on the above database:

```
SELECT S.sname
  FROM Suppliers S
    WHERE S.sid NOT IN (SELECT C.sid
                        FROM Catalog C
                        WHERE C.pid NOT IN (SELECT P.pid
                                            FROM Parts P
                                            WHERE P.color<> 'blue'))
```

Assume that relations corresponding to the above schema are not empty. Which one of the following is the correct interpretation of the above query

a) Find the names of all suppliers who have supplied a non-blue part.
b) Find the names of all suppliers who have not supplied a non-blue part.
c) Find the names of all suppliers who have supplied only blue parts.
d) Find the names of all suppliers who have not supplied only blue parts.

37 An entity in A is associated with at most one entity in B. An entity in B, however, can be associated with any number (zero or more) of entities in A.

a) One-to-many b) One-to-one c) Many-to-many d) Many-to-one

38 Which commands are used to control access over objects in relational database?

a) CASCADE & MVD b) GRANT & REVOKE c) QUE & QUIST d) None of these

39 Consider the ORACLE relationships below:One (x, y) = {<2, 5>, <1, 6>, <1, 6>, <1, 6>, <4, 8>, <4, 8>} Two (x, y) = {<2, 55>, <1, 1>, <4, 4>, <1, 6>, <4, 8>, <4, 8>, <9, 9>, <1, 6>}. Consider the following SQL queries, SQ1 and SQ2, respectively:

```
SQ1 : SELECT * FROM One)
        EXCEPT
      (SELECT * FROM Two);
SQ2 : SELECT * FROM One)
       EXCEPT ALL
      (SELECT * FROM Two);
```

What is the cardinality of the result generated on the execution of each SQL query on the instances above?

a) 2 and 1, respectively b) 1 and 2, respectively c) 2 and 2, respectively d) 1 and 1, respectively

40 Which of the following is **TRUE**?

a) Every relation in 3NF is also in BCNF

b) A relation R is in 3NF if every non-prime attribute of R is fully functionally dependent on every key of R

c) Every relation in BCNF is also in 3NF

d) No relation can be in both BCNF and 3NF

41 A Language for which no DFA exist is a_____

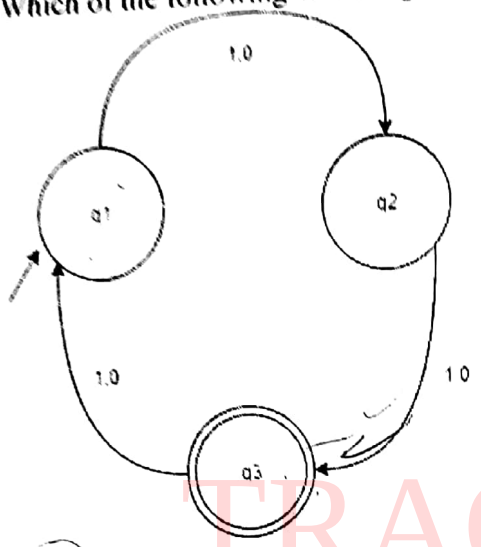
a) Regular Language

b) Non-Regular Language

c) May be Regular

d) Cannot be said

42 Which of the following will the given DFA won't accept?



a) ε

b) 11010

c) 10001010

d) String of letter count 11

43 Regular expression for all strings starts with ab and ends with bba is.

a) aba*b*bba

b) ab(ab)*bba

c) ab(a+b)*bba

d) All of the mentioned

44 Which of the following options is correct?
Statement 1: Initial State of NFA is Initial State of DFA.
Statement 2: The final state of DFA will be every combination of final state of NFA.

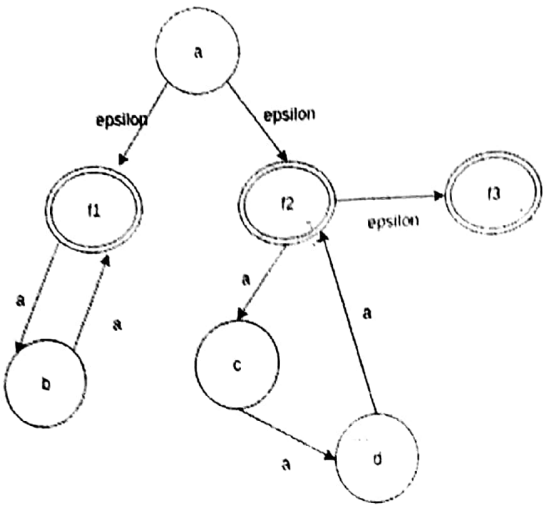
a) Statement 1 is true and Statement 2 is true

b) Statement 1 is true and Statement 2 is false

c) Statement 1 can be true and Statement 2 is true

d) Statement 1 is false and Statement 2 is also false

45 The number of elements present in the e-closure(f2) in the given diagram:



a) 0 b) 1 c) 2 d) 3

46 The language accepted by Push down Automaton:

a) Recursive Language b) Context free language c) Linearly Bounded language d) All of the mentioned

47 Given grammar G:
(1)S->AS
(2)S->AAS
(3)A->SA
(4)A->aa
Which of the following productions denies the format of Chomsky Normal Form?

a) 2,4 b) 1,3 c) 1, 2, 3, 4 d) 2, 3, 4

48 Which of the problems are unsolvable?

a) Halting problem b) Boolean Satisfiability problem c) Halting problem & Boolean Satisfiability problem d) None of the mentioned

49 Given Grammar: S->A, A->aA, A->e, B->bA
Which among the following productions are Useless productions?

a) S->A b) A->aA c) A->e d) B->bA

50 The production of the form A->B , where A and B are non-terminals is called

a) Null production b) Unit production c) Greibach Normal Form d) Chomsky Normal Form

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