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Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

B.Tech Degree S6 (S, FE) / S6 (PT) (S) Examination January 2024 (2019 Scheme)

Course Code: CST308

Course name: COMPREHENSIVE COURSE WORK

Max. Marks: 50 Duration: 1Hour

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. In a timesharing operating system, when the time slot assigned to a process is completed, the process switches from the current state to?

a) Suspended state b) Terminated state c) Ready state d) Blocked state

2. 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

3. What is a short-term scheduler?

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

4. If a process fails, most operating system write the error information to a _____ .

a) new file b) another running process c) log file d) none of the mentioned

5. 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

6. When are the register context and stack of thread deallocated?

a) when the thread terminates b) when the thread blocks c) when the thread unblocks d) when the thread spawns

7. Out of these page replacement algorithms, which one suffers from Belady's anomaly?

a) LRU b) FIFO c) Both LRU and FIFO d) Optimal Page Replacement

8. Which one of these is NOT shared by the same process's threads?

a) Address Space b) Stack c) Message Queue d) File Descriptor Table

9. Which of these disk scheduling policies results in minimum head movement?

a) Circular scan b) Elevator c) FCS d) None of the above

10. In a computer system that consists of n number of CPUs, the maximum processes that can exist in the Ready State would be:

a) Independent of n b) 2n c) n^2 d) n

11 Which of the following is preserved in execution of transaction in isolation?

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

12 Given the following relation instance.

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

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

13 Identify the statement among the following that is FALSE.

a) The relation in which all keys have only a single attribute is in its 2NF b) A relation that has two attributes is in its BCNF c) The prime attribute can depend transitively on any key in the case of a relation that is in its BCNF d) The prime attribute can depend transitively on any key in the case of a relation that is in its 3 NF

14 SQL allows tuples in relations, and correspondingly defines the multiplicity of tuples in the result of joins. Which one of the following queries always gives the same answer as the nested query shown below:

*select * from R where a in (select S.a from S)*

a) *select R.* from R, S where R.a=S.a (D)* b) *select distinct R.* from R,S where R.a=S.a* c) *select R.* from R,(select distinct a from S) as S1 where R.a=S1.a* d) *select R.* from R,S where R.a=S.a and is unique R*

15 The term for information that describes what type of data is available in a database is:

a) Data dictionary b) Data repository c) Index data d) Metadata

16 Consider the relation Cinema(theater, address, capacity)
Which of the following options will be needed at the end of the SQL query

SELECT P1.address FROM Cinema P1

such that it always finds the addresses of theaters with maximum capacity?

a) WHERE P1.capacity >= All (select P2.capacity from Cinema P2)

b) WHERE P1.capacity >= Any (select P2.capacity from Cinema P2)

c) WHERE P1.capacity > All (select max(P2.capacity) from Cinema P2)

d) WHERE P1.capacity > Any (select max(P2.capacity) from Cinema P2)

17 Consider the following two statements about database transaction schedules:

I. Strict two-phase locking protocol generates conflict serializable schedules that are also recoverable.

II. Timestamp-ordering concurrency control protocol with Thomas Write Rule can generate view serializable schedules that are not conflict serializable.

Which of the above statements is/are TRUE?

a) Both I and II b) I only c) II only d) Neither I nor II

18 B^+ Trees are considered BALANCED because

a) The lengths of the paths from the root to all leaf nodes are all equal.

b) The lengths of the paths from the root to all leaf nodes differ from each other by at most 1.

c) The number of children of any two non-leaf sibling nodes differ by at most 1.

D) The number of records in any two leaf nodes differ by at most 1.

19 Which of the following relational query languages have the same expressive power?

I) Relational algebra

II) Tuple relational calculus restricted to safe expressions

III) Domain relational calculus restricted to safe expressions.

a) II and III only b) I and II only c) I and III only d) I, II and III

20 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

21 Convert the following infix expression into its equivalent postfix expression.

(A + B ∧D)/(E – F)+G

a) (A B D ∧ + E F – / G +) b) (A B D +∧ E F – / G +) c) (A B D ∧ + E F/- G +) d) (A B D E F + ∧ / – G +)

22 The result of preorder traversal is same as:

a) Depth-first order b) Breadth-first search c) Topological order d) Linear order

23 Queues serve major role in _____.

a) Simulation of recursion b) Simulation of arbitrary linked list c) Simulation of limited resource allocation d) Simulation of heap sort

24 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 2n b) n/2 c) log 2n – 1 d) n

25 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

26 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

27 Which of the following is not an in-place sorting algorithm?

a) Selection sort b) Heap sort c) Quick sort d) Merge sort

28 The time complexity of heap sort in worst case is:

a) O(logn) b) O(n) c) O(nlogn) d) $O(n^2)$

29 Suppose we are sorting an array of eight integers using quicksort, and we have just finished the first partitioning with the array looking like this:
2 5 1 7 9 12 11 10
Which statement is correct?

a) The pivot could be either the 7 or the 9. b) The pivot could be the 7, but it is not the 9 c) The pivot is not the 7, but it could be the 9 d) Neither the 7 nor the 9 is the pivot

30 Consider a situation where swap operation is very costly. Which of the following sorting algorithms should be preferred so that the number of swap operations are minimized in general?

a) Heap Sort b) Selection Sort c) Insertion Sort d) Merge Sort

31 Match the following.

(a)	Immediate address mode	(1) Local variables
(b)	Direct address mode	(2) Relocatable programs
I	Indirect address mode	(3) Pointer
(d)	Index addressing mode	(4) Locality of reference
I	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

32 Search concept used in associative memory is:

a) Parallel search b) Sequential Search c) Binary Search d) Selection search

33 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

34 Which of the following DMA transfer modes and interrupt handling mechanisms will enable the highest I/O bandwidth?

a) Transparent DMA and Polling interrupts b) Cycle-Stealing and Vectored interrupts c) Block Transfer and vectored interrupts d) Block transfer and Polling interrupts

35 Consider the following sequence of micro-operations.
MBR ← PC
MAR ← X
PC ← Y

Memory ← MBR
Which one of the following is a possible operation performed by this sequence ?

a) Instruction fetch b) Operand fetch c) Conditional branch d) Initiation of interrupt service

36 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

37 Which of the following DMA transfer modes and interrupt handling mechanisms will enable the highest I/O bandwidth?

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38 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

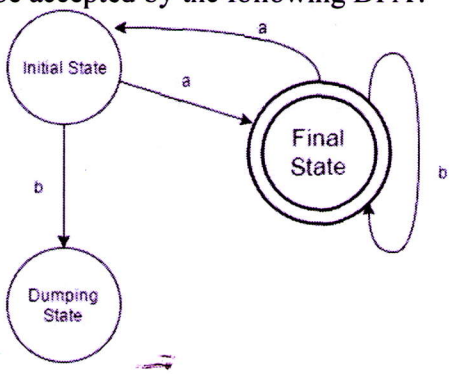
39 A machine with N different opcodes can contain how many different sequences of micro-operations.

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

40 How many 32K x 1 RAM chips are needed to provide a memory capacity of 256K-bytes?

a) 8 b) 32 c) 64 d) 128

41 Which of the following will not be accepted by the following DFA?



a) ababaabaa b) abbbaa c) abbbaabb d) abbaabbaa

42 Can a DFA recognize a palindrome number?

a) Yes b) No c) Yes, with input alphabet as $\sum^*$ d) Can't be determined

43 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

44 Which of the following statement is correct?

a) All Regular grammar are context free but not vice versa
b) All context free grammar are regular grammar but not vice versa
c) Regular grammar and context free grammar are the same entity
d) None of the mentioned

45 Suppose A→ xBz and B→y, then the simplified grammar would be:

a) A→xyz
b) A→xBz|xyz
c) A→xBz|B|y
d) none of the mentioned

46 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

47 What is the pumping length of string of length x?

a) x+1
b) x
c) x-1
d) x^2

48 The language of balanced paranthesis is:

a) regular
b) non regular
c) may be regular
d) none of the mentioned

49 Which of the problems are unsolvable?

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

50 A language L is said to be _____ if there is a turing machine M such that L(M)=L and M halts at every point.

a) Turing acceptable
b) Decidable
c) Undecidable
d) None of the mentioned

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