Reg No.:_____   Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
Sixth Semester B.Tech Degree Regular and Supplementary Examination July 2021

Course Code: CS352
Course name: COMPREHENSIVE EXAM (CS)

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.
(5) Calculators are not permitted

PART A- COMMON COURSES

1. The work done by the force $e^x\hat{i} + 2y\hat{j} - \hat{k}$ along the circle $x^2 + y^2 = 4, z = 2$ in the positive direction is ....

   a) 0   b) 1   c) 4π d) 8π

2. General solution of the Differential Equation $y'' + y' - 6y = 0$ is ....

   a) $ae^{2x} + be^{3x}$ b) $ae^{-2x} + be^{-3x}$ c) $ae^{-2x} + be^{3x}$ d) $ae^{2x} + be^{-3x}$

3. A cutting plane cut the cone such a way that true shape of cutting portion is seen as triangle when cutting plane is cutting the base and passed through_

   a) midpoint of axis   (b) apex of cone   c) generator of cone   (d) any point on axis

4. The perspective projection of any solid will be formed on _____ plane

   a) Horizon   (b) Picture   c) Ground   (d) Central

5. A force "P" acts at point A horizontally to the right side. What is the value moment due to this force at a point B which is at a distance "x" to the right of A and a distance "y" below A? Assume point A, B and the force applied as coplanar.

   a) Px   (b) Py   c) $P\sqrt{x^2 + y^2}$ (d) Pxy

6. Reaction of a roller support is always

   a) parellel to rolling direction   (b) Perpendicular to rolling direction   c) depends on the direction of loading   (d) Inclined to rolling direction

7. Carbon belongs to which family of engineering materials

   a) Metals   (b) Polymers   c) Ceramics   (d) Composites

8. In design process which process is followed after construct and test prototype

a) Evaluate and implement the solution	(b) Define the problem	c) Present the solution	(d) Develop the solutions

9. ....is a biological hazard

a) COVID 19	(b) Lead poisoning	c) Flurosis	(d) Trachoma

10. Which protocol helps to phase out Hydro-fluorocarbons?

a) Kyoto Protocol	(b) Montreal Protocol	c) The Cartagena Protocol	(d) The Nagoya Protocol

PART B- CORE COURSES

11. "The product of two negative real numbers is not negative." Is given by?

a) $\exists x \, \forall y \, ((x < 0) \wedge (y < 0) \rightarrow (xy > 0))$	b) $\exists x \, \exists y \, ((x < 0) \wedge (y<0) \wedge (xy > 0))$	c) $\forall x \, \forall y \, ((x < 0) \wedge (y<0) \rightarrow (xy>0))$	d) $\forall x \, \exists y \, ((x<0) \wedge (y<0) \wedge (xy>0))$

12. Which of the following statement is NOT true about Lattice?

a) Every chain is a distributed lattice	b) Boolean Algebra is a complemented distributed lattice	c) Lattice is a POSET	d) Idempotent property does not hold for a Lattice

13. The inclusion of _____ sets into R = {{1, 2}, {1, 2, 3}, {1, 3, 5}, {1, 2, 4}, {1, 2, 3, 4, 5}} is necessary and sufficient to make R a complete lattice under the partial order defined by set containment.

a) {1}, {2, 4}	b) {1}, {1, 2, 3}	c) {1}	d) {1}, {1, 3}, {1, 2, 3, 4}, {1, 2, 3, 5}

14. Let G be a finite group with two sub groups M & N such that |M|=56 and |N|=123. Determine the value of |M∩N|.

a) 1	b) 56	c) 14	d) 78

15. How many permutations of the letters ABCDEFGH contain the string ABC?

a) 540	b) 720	c) 500	d) 650

16. How many number of onto functions are there from a 5 element set to 2 element set?

a) 2^{5-2}	b) 2^5-2	c) 2^5	d) $2^{10}-2$

17. The operands in zero-address instruction are stored in

a) Cache	b) Registers	c) Accumulators	d) Push down stack

18. The collection of registers in multiple bus organization is referred as

a) Register set	b) Register block	c) Register file	d) Map registers

19. To extend the connectivity of the processor bus we use_____

    a)   PCI bus   b)   SCSI bus   c)   controllers   d)   Multiple bus

20. How many 128×8 RAM chips are needed to provide a memory capacity of 2048 bytes?

    a)   2   b)   16   c)   64   d)   128

21. The multiplicand and the control signals are passed through to the n-bit adder via

    a)   Encoder   b)   Decoder   c)   MUX   d)   DEMUX

22. The hardwired control generator consist of

    a)   Decoder/encoder   b)   Condition codes   c)   Control step counter   d)   All the above

23. Consider a disk queue with requests for I/O to blocks on cylinders are 176, 79, 34, 60, 92, 11, 41, 114. Considering SSTF (shortest seek time first) , find the total number of head movements if the disk head is initially at 50 is?

    a)   204   b)   236   c)   240   d)   245

24. Which is not the necessary condition for deadlock

    a)   Mutual exclusion   b)   Hold and wait   c)   Circular wait   d)   Pre-emption

25. A race condition refers to

    a)   A situation where single process access and manipulate same data concurrently   b)   A situation where several processes access and manipulate same data concurrently   c)   A situation where process access and manipulate different data concurrently   d)   None of the above

26. The code which are not self modifying and never changes during execution are called _____

    a)   Subroutine code   b)   Re-entrant code   c)   Main program code   d)   None of these

27. Effective access time is directly proportional to _____

    a)   page-fault rate   b)   hit ratio   c)   memory access time   d)   none of the mentioned

28. _____ selects among processes that are ready for execution and allocate CPU to one of them

    a)   Medium term scheduler   b)   Long term scheduler   c)   Short term scheduler   d)   None of these

29. How many stacks are needed to implement a queue. Assume that no other data structure is available to you.

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

30. What is the worst case time complexity for search, insert and delete operations in a general Binary Search Tree?

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

31. 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

32. Which of the following statement(s) is TRUE?
   1. A hash function takes a message of arbitrary length and generates a fixed length code.
   2. A hash function takes a message of fixed length and generates a code of variable length.

   3. A hash function may give the same hash value for distinct messages.

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

33. What is the time complexity of searching for an element in a circular linked list?

   a) O(n)   b) O(nlogn)   c) O(1)   d) $O(n^2)$

34. What does the following function do for a given Linked List with first node as head?

```
void fun1(struct node* head)
{
 if(head == NULL)
   return;

 fun1(head->next);
 printf("%d  ", head->data);
}
```

| a) Prints all nodes of linked lists | b) Prints all nodes of linked list in reverse order | c) Prints alternate nodes of Linked List | d) Prints alternate nodes in reverse order |

35. In a max-heap, element with the greatest key is always in the which node?

| a) Leaf node | b) Leftmost node of the right subtree of the root. | c) root node | d) Rightmost node of the left subtree of the root. |

36. What is a hash table?

| a) A structure that maps values to keys | b) A structure that maps keys to values | c) A structure used for storage | d) A structure used to implement stack and queue |

37. In a Recoverable schedule: If T1 has read something T2 has written, then
   Statement 1: T1 must commit before T2   Statement 2: T2 must commit before T1

| a) Only Statement 2 is true | b) Only Statement 1 is true | c) Statement 1 and statement 2 are true | d) Statement 1and Statement 2 are false |

38. Which of the following clauses is used for checking the result of a correlated nested query is empty or not

   a) UNIQUE   b) ANY   c) EXISTS   d) ALL

39. Suppose that we have an ordered file with 30000 records stored on a disk with block size 1024 bytes. File records are of fixed size and are unspanned, with record length 100 bytes. The number of blocks needed for the file is

   a) 1000   b) 30000   c) 300   d) 3000

40. Based on the functional dependencies B -> A; B -> C; C -> D and D -> XY, which of the following is not true

   a) A -> C   b) B -> AC   c) B -> D   d) None of the Above

41. A functional dependency of the form A -> B is trivial if

   a) $A \subseteq B$ b) $A \subset B$ and $B \subset A$ c) $B \subset A$ d) $B \subseteq A$

42. No primary key value can be null. This is specified by

   a) Domain constraint   b) Referential integrity   c) Foreign key   d) Entity integrity

43. The feature that cannot be captured by context free grammar is

   a) Recursive procedure Syntax   b) Syntax of if-then-else statement   c) Variable declared before its use   d) Arbitrary length of variable names

44. Consider the language L={ww|w ε {0,1}*}. L is

   a) Regular   b) Accepted by turing machine   c) CSL   d) CFL

45. Let r1=(0+1)*, r2=0*1+10*+0*+1*. What is the length of the smallest string that is present in language corresponds to regular expression r1 and not present in language corresponds to regular expression r2.

   a) 2   b) 3   c) 4   d) 5

46. The method used ot check whether a given string w is a member of a Context Free Grammar or not is

   a) Thomson's construction   b) CYK algorithm   c) Table filling algorithm   d) Church hypothesis

47. If s is the number of states of a Nondeterministic FA, then the equivalent DFA can have maximum of

   a) s states   b) s-1 states   c) 2^s states   d) 2^{s-1} states

48. The family of recursive languages is not closed under

   a) Union   b) Intersection   c) Complementation   d) None

49. For every pair of transactions T_i and T_j, it appears to T_i that either T_j, finished execution before T_i started, or T_j started execution after T_i finished; this requirement is known as

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

50. In ACID properties letter 'D' stands for

   a) Dimension   b) Definition   c) Durability   d) Dependency

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