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Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

SIXTH SEMESTER B.TECH DEGREE COMREHENSIVE EXAMINATION(S),DECEMBER 2019

Course Code: CS352

Course name: COMPREHENSIVE EXAM

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.
(5) Calculators are not permitted

PART A- COMMON COURSES

1. The sum of the series $\sum_{k=0}^{\infty}\left(\frac{1}{3}\right)^k$ is

a) $\frac{1}{3}$ b) $\frac{2}{3}$ c) $\frac{1}{2}$ d) 1

2. The solution of the differential equation $y'' - 4y' + 4y = 0$ is

a) $y = (A + Bx)e^{2x}$ b) $y = (A + Bx)e^{-2x}$ c) $y = (A + Bx)e^{x}$ d) $y = (A + Bx)e^{-x}$

3. The resultant of two equal forces has the same magnitude as either of the forces, then the angle between the two forces is

a) 120^0 b) 30^0 c) 90^0 d) 60^0

4. Two bodies of masses m_1 and m_2 are dropped from the top of a tower of same height. When these bodies reach the ground, their kinetic energies will be in the ratio

a) 1 : 2 b) 1: √2 c) 1: 4 d) 1 : 1

5. The top view of a pentagonal prism with axis perpendicular to the vertical plane and parallel to horizontal plane will be a

a) Pentagon b) Rectangle c) Trapezoid d) Straight line

6. In perspective projection the object is assumed to be kept on which of these planes.

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

7. Which is the most abundant element available in the atmosphere?

a) Oxygen b) Nitrogen c) Argon d) Carbon di oxide

8. The total amount of greenhouse gases produced to directly and indirectly support human activities, usually expressed in equivalent tons of carbon dioxide

a) Carbon Dating b) Carbon Trading c) Carbon Footprint d) Carbon Factor

9. One of the pins in a 3 pin plug top is bigger than the rest. This is most closely related to design for 'X', where 'X' is

a) Assembly b) Manufacturing c) Life cycle Cost d) Environment

10. Which of the following can be most appropriately associated with the design space of a ball?

a) Speed b) Velocity c) Diameter d) Height

PART B- CORE COURSES

11. A six side die is rolled twice. What is the probability that the sum is 9.

a) 1/6 b) 1/9 c) 2/9 d) 1/8

12. Which of the propositions are equivalent to p ⇒ q

(1) ~q ⇒ ~p (2) ~p ∨ q (3) ~(p∧ ~q)

a) All b) Only (1), and (2) c) Only (2), and (3) d) Only (1), and (3)

13. Let X={1,2...7}and R={<x, y>|x-y is divisible by 3}.Then R is an

a) Equivalence relation b) Reflexive relation c) Symmetric relation d) Transitive relation

14. If 25 teams play in a round robin league, totally how many matches are to be played?

a) 250 b) 150 c) 350 d) 300

15. The symbolic form of the statement: "If either Santhosh takes calculus or Poonam takes physics then Meenakshi will take English "is

a) (S ∧ P) → M b) (S ∨ P) → M c) (S ∨ P) ∧ M d) (S ∧ P) ∨ M

16. Contrapositive of P→ Q is

a) ⌉P → ⌉Q b) Q→ P c) ⌉Q → ⌉P d) P → Q

17. Out of 7 consonants and 4 vowels, how many words of 3 consonants and 2 vowels can be formed?

a) 24400 b) 21300 c) 210 d) 25200

18. A text editor generally allows searching in both directions, with wrap around if necessary. If the sequence of lines of code is stored as a linked list, which type is most suitable?

a) Singly linked list b) Doubly linked list c) Singly linked circular list d) Doubly linked circular list

19. A circular queue of characters is implemented using a linear array whose first index is 1. The array currently contains the elements d,-,-,a,b,c starting from index 1. Here '-' denotes empty slot. If two elements are deleted and three are added, what are the new positions of rear and front?

a) 6, 1 b) 4, 6 c) 5, 3 d) 3, 5

20. Consider the following loop

```
for i = 1 to n
    for j = 1 to i
        print "HELLO"
```


The asymptotic time complexity of above loop is

a) $O(n^2)$ b) O(nlogn) c) $O(n^3)$ d) O(n)

21. The postfix expression for the infix expression **x ^ y / (5 * z) + 10** is

a) x y ^ 5 z * / 10 + b) x y 5 * z ^ / 10+ c) x y ^ 5 z * 10 / + d) x y 5 z ^ * / 10 +

22. Which of the following traversal gives nodes in non-decreasing order in a Binary Search Tree

a) Inorder b) Preorder c) Postorder (d) None of the above

23. The maximum degree of any vertex in a simple graph with *n* vertices is

a) n+1 b) n-1 c) 2n-1 d) n

24. Given, the hash function *h(k)= k* mod 3, what is the number of collisions to store the following sequence of keys? 15, 11, 34, 10, 98, 51, 37, 14, 16, 47

a) 2 (b) 3 c) 9 (d) 7

25. Regular expression for all strings starts with 'ab' and ends with 'aa' is

a) ab(a+b)*aa* (b) ab(a+b)*aa c) ab*aa (d) a*b*aa

26. What is the language accepted by the following regular expression, 0*(1(01*0)*1)0*0* ?

a) Binary representation of multiples of 6 (b) Binary representation of multiples of 4 c) Binary representation of multiples of 3 (d) Binary representation of multiples of 2

27. What is the minimum number of states in a DFA that recognizes the set of all binary strings that contains four consecutive 1's?

a) 6 (b) 5 c) 4 (d) 3

28. The language accepted by Push down Automaton:

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

29. For a give Moore Machine, Given Input='101010', thus the output would be of length:

a) |Input|+1 (b) |Input| c) |Input|-1 (d) Cannot be predicted

30. How many states will be there for the minimum state DFA accepting the language a*bba.

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

31. Pigeonhole principle is the underlying principle of

a) Pumping lemma (b) Turing machine c) Context free grammar (d) Push down automata

32. Which one of the following can not be scheduled by the kernel?

a) kernel level thread (b) user level thread c) process (d) none of the mentioned

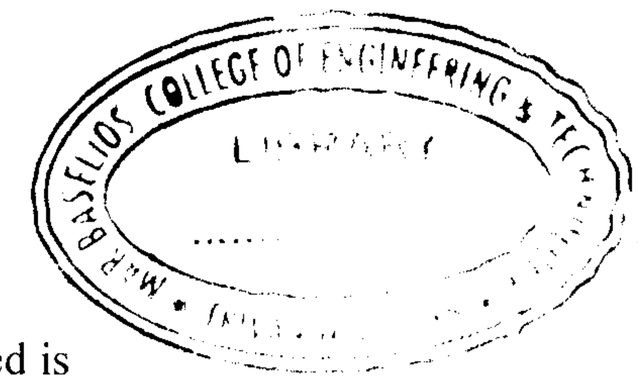
33. A process executes the code

fork ();

fork ();

fork ();

The total number of child processes created is



a) 3 (b) 4 c) 7 (d) 8

34. In a paged memory management algorithm, the hit ratio is 70%. If it takes 30 nanoseconds to search Translation Look-aside Buffer (TLB) and 100 nanoseconds (ns) to access memory, the effective memory access time is

a) 69 ns (b) 91 ns c) 160 ns (d) 190 ns

35. 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

36. Which of the following scheduler selects the process that are ready to execute and allocates CPU

a) Long-term scheduler (b) Job scheduler c) Short term scheduler (d) Medium term scheduler

37. In the non-blocking send :

a) The sending process keeps sending until the message is received (b) the sending process sends the message and resumes operation c) the sending process keeps sending until it receives a message (d) none of the mentioned

38. Which disk scheduling algorithm is known as 'elevator' algorithm

a) LOOK (b) SCAN c) CSCAN (d) CLOOK

39. The basic principle underlying behind the concept of cache memory is

a) Stored program concept (b) Locality of reference c) Divide and conquer (d) None of the above

40. The Booth recoded form of -6 is

a) -1 +1 0 -1 0 (b) +1 -1 +1 -1 0 c) 0 -1 +1 -1 0 (d) 0 +1 -1 +1 0

41. The interrupt servicing mechanism in which the requesting device identifies itself to the processor to be serviced is

a) Polling (b) Vectored interrupts c) Interrupt nesting (d) Simultaneous requesting

42. The cache memory of 1K words uses direct mapping with a block size of 4 words. How many blocks can the cache accommodate?

a) 256 words (b) 512 words c) 1024 words (d) 128 words

43. Which among the following methods *does not* have 2 representations for 0?

a) 1's complement method (b) 2's complement method c) Sign and magnitude method (d) None of the above

44. Consider a computer system with a cache with access time is C, hit rate h, miss penalty M. The average access time experienced by the processor is

a) hMC (b) h(C-1)+MC c) hC+(1-h)M (d) None of the above

45. Consider the relations r1(P, Q, R) and r2(R, S, T) with primary keys P and R respectively. The relation r1 contains 2000 tuples and r2 contains 2500 tuples. The maximum size of the join

r1 ⋈ r2 is :

a) 2000 (b) 2500 c) 4500 (d) 5000

46. Which of the following is NOT a superkey in a relational schema with attributes V, W, X, Y,Z and primary key VY?

a) VXYZ (b) VWXZ c) VWXY (d) VWXYZ

47. Dependency preservation is not guaranteed in

a) 3NF (b) BCNF c) 1NF (d) 2NF

48. Suppose that we have an ordered file with r = 30,000 records stored on a disk with block size B = 1024 bytes. The ordering key field of the file is V = 9 bytes long, a block pointer is P = 6 bytes long, and we have constructed a primary index for the file. The blocking factor for the index is

a) 68 (b) 64 c) 10 (d) 3000

49. What is the result of the following query?

DELETE FROM student

WHERE marks < (SELECT avg(marks)

FROM student);

a) The query deletes all the tuples whose marks are greater than the average marks

(b) The query deletes all the tuples whose marks are less than the average marks

c) The query deletes all the values under the marks attribute which are less than the average

(d) The query is syntactically wrong and does not execute

50. Ensuring isolation property is the responsibility of the

a) Recovery-management component of the DBMS

(b) Concurrency-control component of the DBMS

c) Transaction-management component of the DBMS

(d) Buffer management component in DBMS