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Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

SIXTH SEMESTER B.TECH DEGREE EXAMINATION, APRIL 2018

Course Code: CS352

Course Name: COMPREHENSIVE EXAM (CS)

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

1 Let $f(x,y) = x^2 - y^2$. Which of the following is true?

(A) f has a maximum at (0,0)

(B) f has a minimum at (0,0)

(C) (0.0) is neither a maximum point nor a minimum point

(D) None of these

2 The differential equation $\left(\frac{d^2y}{dx^2}\right)^3 + \frac{dy}{dx} = \sin x$ is of

(A) Order 2, degree 3 (B)Order 3, degree 2

(C) Order 3, degree 3 (D)Order 2, degree 2

3 For the equilibrium in three dimensional system of axis, which of the following is true?

(A) $F_x = 0$ (B) $F_y = 0$ (C) $F_z = 0$ D)All of the above

4 The theorem of Pappus and Guldinus is used to find

(A) Surface area of the body of revolution

(B) Surface area of the body of linear motion

(C) Surface area of the body of rectangular motion

(D) None of these

5 In isometric projection the angles between the projection of the axes is (in degrees)

(A) 150 (B) 120 (C) 90 (D) 180

6 If a point P is below HP and behind VP then in which quadrant does P lie?

(A) First (B) Second (C) Third (D) Fourth

7 In which year, Water Act (Prevention and Control of pollution) was introduced in India?

(A) 1975 (B) 1974 (C) 1998 (D) 1988

8 Which among the following is a conventional source of energy?

(A) Tidal (B) Solar (C) Coal energy (D)Wind

9 The process of building a model of the system to be built is known as

(A)Planning (B)Design (C)Prototyping (D)Estimation

10 The technique wherein an object is inspected in detail to identify its components and their interrelationships with the aim of rebuilding or enhancing the object is known as

(A) Reverse Engineering (B)Software Engineering

(C)Inspection (D)Object Analysis

11 If f(x) = 4x + 9 and g(x) = x^3, then determine (f o g)x. Here ' o ' represents composition of functions.

(A) $(4x+9)^3$ (B) 4x + 9 (C) $4x^3 + 9$ (D) 64x + 9

12 Consider the two statements below:

S1 : Every group of prime order is cyclic

S2 : Every cyclic group is Abelian

Pick the correct option

(A) Both S1 and S2 are false (B) Both S1 and S2 are true

(C) S1 is true but not S2 (D) S2 is true but not S1

13 Let 'f' be a function defined from set A to set B. If the cardinalities of domain and range of 'f' are

'm' and 'n' respectively, then which of the following is true?

(A) m = n (B) m > n (C) m < n (D)m <= n

14 A relation R is defined on integers by

aRb if and only if |a - b| = 3.

What can you say about R?

(A) R is irreflexive and antisymmetric

(B) R is symmetric and transitive

(C) R is antisymmetric and transitive

(D) R is irreflexive and symmetric

15 Which of the following is valid?

(A) p can be derived from the set of premises {(p → q), (q→r), (~q^r)}

(B) ~q can be derived from the set of premises {(p → q), ~p}

(C) (p → (q^r) can be derived from the set of premises {(p → q), (p→r) }

(D) q can be derived from the set of premises {(p v q), p}

16 The solution to the recurrence $a_n = a_{n-1} + (n - 1)$ with $a_1 = 0$ is

(A) $\frac{n(n+1)}{2}$

(B) $\frac{n(n-1)}{2}$

(C) $\frac{(n+2)(n+1)}{2}$

(D) $\frac{n(n+3)}{2}$

17 Let f(n) and g(n) be two functions such that $f(n) \leq g(n)$ for all values of n. Then

(A) $f(n) = \Theta(n)$ (B) f(n) = w(n)

(C) f(n) = O(n) (D) $f(n) = \Omega(n)$

18 Which of the following suffers from the problem of infinite traversal?

(A)Singly linked list (B)Doubly linked list

(C)Circular linked list (D)Linked list with header node

19 Assume you have a stack implemented with an array of size SIZE. If the array positions are numbered from 0, the stack underflow can be identified using what condition?

(A)TOP = SIZE (B)TOP = – 1

(C)TOP = SIZE – 1 (D)TOP = 0

20 A complete binary tree is represented using an array. For a node whose position is k, its

right child can be found at which position? (The array index starts from 1)

(A) k+1 (B) 2k (C) 2k-1 (D) 2k+1

21 A binary search tree is constructed out of the keys 5, -1, 12, 30, 15, 2, -87. The inorder traversal of this tree is

(A) 5, -1, 2, 30, 15, 12, -87
(B) 5, 2, -1, 15, 30, 12, -87
(C) -87, -1, 2, 5, 12, 15, 30
(D) -1, 2, 5, 30, 12, 15, -87

22 Depth first algorithm can be implemented using

(A) Heap (B)Stack (C)Queue (D)Deque

23 The sorting technique in which the smallest element from the unsorted sublist is swapped with the element at the beginning of the unsorted sublist is

(A)Selection sort (B)Insertion sort
(C)Quick sort (D)Bubble sort

24 The instruction MOV A,#20 uses which addressing mode?

(A)Register mode (B)Absolute mode
(C)Immediate mode (D)Relative mode

25 Which of the following is not an assembler directive?

(A) EQU (B)ORIGIN (C)DATAWORD (D)ADD

26 SCSI stands for

(A)Simple computer serial interface (B)Small computer system interface
(C)Serial controller for system interface (D)Simple computer serial interface

27 A static RAM cell contains

(A) Transistor (B) Capacitor (C)Inverter (D) Register

28 A block-set associative cache memory consists of 128 blocks divided into four block sets. The main memory consists of 16,384 blocks and each block contains 256 eight bit words. How many bits are required for addressing the main memory?

(A) 22 (B)20 (C) 32 (D)36

29 PLA means

(A) Programmed Large Array (B)Programmable Logic Array
(C)Programmed Long Array (D)Programmable List Array

30 Microprogram sequencer is used in

(A) Memory organization (B)Accumulator design
(C) Control unit design (D)None of these

31 Consider a system with 'n' processes and 'm' CPUs (n > m). What is the maximum number of processes that can be in running state?

(A) 0 (B) 1 (C)n (D)m

32 Belady's anomaly occurs in which algorithm?

(A)Optimal algorithm (B)FIFO algorithm
(C)SSTF algorithm (D)Elevator algorithm

33 Banker's algorithm is used in

(A) Deadlock prevention (B) Deadlock avoidance
(C) Deadlock detection (D) Deadlock recovery

34 A counting semaphore is initialized to 4. Then 8 P(wait) and 3 V (signal) operations are performed on the semaphore. The final value of the semaphore is

(A)-1 (B)1 (C)2 (D)-2

35 A system supports a virtual address space of 4096 pages each with 512 bytes. If the main memory has 1024 frames, the number of bits in physical address is
(A)20 (B)23 (C)21 (D)19

36 A computer with 32bit logical addresses uses two level paging. The logical address is divided into a 9 bit top level page table field and an 11 bit second level page table field and an offset field. What is the page size?
(A)4KB (B)2KB (C) 16MB (D)16KB

37 Which of the following is also known as elevator algorithm?
(A) SSTF (B) CSCAN (C) SCAN (D)LOOK

38 B-tree supports
(A)Direct access of data (B) Sequential access of data
(C) Both (A) and (B) (D)None of these

39 Durability property of transactions is enforced by
(A) User (B)Concurrency control subsystem
(C) Recovery subsystem (D) DB administrator

40 'n' transactions can be scheduled in how many ways?
(A) N (B) n! (C)n-1 (D)n+1

41 Consider the two statements below:
S1 : Every view serializable schedule is also conflict serializable
S2 : Every conflict serializable schedule is also view serializable
Pick the correct option
(A) Both S1 and S2 are false (B) Both S1 and S2 are true
(C) S1 is true but not S2 (D) S2 is true but not S1

42 The collection of tuples stored in a database at a particular moment is called
(A) Schema (B) View (C) Instance (D)Relation

43 Which of the following is free from deadlocks?
(A) Strict 2PL (2 phase locking) (B) Conservative 2PL
(C) Basic 2PL (D)None of these

44 Consider a schedule
$R_1(A), R_2(B), W_2(B), R_3(A), W_3(A), R_1(B), R_3(B), R_2(A), W_2(A)$
The schedule is
(A)Conflict serializable (B)View serializable
(C)Both (A) and (B) (D)Not serializable

45 Which of the following is **not** an application of CFGs?
(A) Well formed parentheses (B)Type checking

(C) If-else matching (D)String matching

46 Pick the true statement

(A) The language $L = \{a^n \mid n <= 1000\}$ is regular
(B) DFA is more powerful than NFA
(C) Deterministic PDA is more powerful than non deterministic PDA
(D) Non deterministic TM is powerful than deterministic TM

47 The number of states in the DFA to accept binary strings whose length is divisible by 5

(A) 4 (B)5 (C)6 (D)3

48 Context free languages are not closed under

(A) Intersection (B) Union
(C)Reversal (D)Kleene closure

49 Which of the strings cannot be generated using the expression $(a^*b)^*a^*$?

(A) aaaaaa (B) abaaa
(C) abab (D)aaaaaba

50 A grammar whose productions are of the form $A \rightarrow BC$ is in what normal form?

(A) Chomsky normal form (B) Greibach normal form
(C) Both (A) and (B) (D) Neither (A) nor (B)

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