PET-2017 (Computer Science & Engineering– Faculty of Engineering and Technology)

Roll No: ....   Date....**2.5..JUN 2017**

Signature of the Candidate: ....

1   Which of the following propositions is tautology?

   A. (p ∨ q)→q
   B. p ∨ (q→p)
   C. p ∨ (p→q)
   D. Both (b) & (c)

2   In propositional logic, which of the following is equivalent to p → q?

   A. ~p → q
   B. ~p ∨ q
   C. ~p ∨~ q
   D. p →q

3   What is the correct translation of the following statement into mathematical logic?
    "Some real numbers are rational"

   A. ∃x (real(x) ∨ rational(x))
   B. ∀x (real(x) → rational(x))
   C. ∃x (real(x) ∧ rational(x))
   D. ∃x (rational(x) → real(x))

4   If two fair coins are flipped and at least one of the outcomes is known to be a head, what is the probability that both outcomes are heads?

   A. 1/3
   B. 1/4
   C. 1/2
   D. 2/3

5   Seven (distinct) car accidents occurred in a week. What is the probability that they all occurred on the same day?

   A. 1/77
   B. 1/76
   C. 1/27
   D. 7/27

6   The probability that event A will occur is 0.6. Given that event A occurs, the probability that event B will occur is 0. The probability that both events A and B will occur is:

    A.   1
    B.   0
    C.   insufficient information to determine
    D.   0.6

7   A binary operation \oplus on a set of integers is defined as x \oplus y = x2 + y2. Which one of the following statements is TRUE about \oplus?

    A.   Commutative but not associative
    B.   Both commutative and associative
    C.   Associative but not commutative
    D.   Neither commutative nor associative

8   The following is the Hasse diagram of the poset [{a, b, c, d, e}, ≤]. The poset is
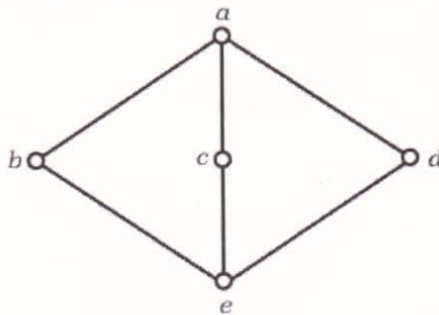
    A.   not a lattice
    B.   a lattice but not a distributive lattice
    C.   a distributive lattice but not a Boolean algebra
    D.   a Boolean algebra

9   The cardinality of the power set of {0, 1, 2 . . ., 10} is _____.

    A.   1024
    B.   1023
    C.   2048
    D.   2043

10   In how many ways can 10 books be arranged on a shelf such that a particular pair of books should always be together?

    A.   9! × 2!
    B.   9!
    C.   10! × 2!
    D.   10!

11 The recurrence relation capturing the optimal execution time of the towers of Hanoi problem with n discs is:

    A. $T(n) = 2T(n-2) + 1$
    B. $T(n) = 2T(n-1) + 1$
    C. $T(n) = 2T(n-1) + 2$
    D. $T(n) = 2T(n-2) + 2$

12 A simple graph G with n − vertices is connected if the graph has

    A. $(n - 1)(n - 2)/2$ edges
    B. more than $(n - 1)(n - 2)/2$ edges
    C. less than $(n - 1)(n - 2)/2$ edges
    D. $\sum k(i=1)\ C(ni, 2)$ edges

13 Number of binary trees formed with 5 nodes are

    A. 32
    B. 36
    C. 120
    D. 42

14 A combinational circuit is one in which the output depends on the

    A. input combination at the time
    B. input combination and the previous output
    C. input combination at that time and the previous input combination
    D. present output and the previous output

15 What is the minimum number of two-input NAND gates used to perform the function of two input OR gate?

    A. one
    B. two
    C. three
    D. four

16 The 10's complement of $(715)_8$ is

    A. 63
    B. 539
    C. 285
    D. 395

17 In a digital counter circuit feedback loop is introduced to

    A. Improve distortion
    B. Improve stability
    C. Reduce the number of input pulses to reset the counter ✓
    D. Asynchronous input and output pulses

18 For a memory system, the cycle time is

    A. Same as the access time
    B. Longer than the access time ✓
    C. Shorter than the access time
    D. multiple of the access time

19 A networking system has n layers. Application generated message of length M bytes. At each of length M bytes. At each of the layer, an h-byte header is added, what fraction of the network bandwidth is filled with headers?

    A. M/(n x M) bytes
    B. h x n x M bytes
    C. (n x h) / M bytes ✓
    D. M / (n x m)

20 The number of instructions needed to add 'n' numbers and store the result in memory using only one address instructions is

    A. n
    B. n+1 ✓
    C. n-1
    D. independent of n

21 Which of the following need not be a binary tree?

    A. Search tree
    B. Heap
    C. AVL-Tree
    D. B-Tree ✓

22 The postfix form of the expression $(A+B)*(C*D-E)*F/G$ is

    A. AB+CD * E−FG/** ✓
    B. AB+CD * E−F**G/
    C. AB+CD * E−*F*G/
    D. AB+CDE* −*F*G/

23 A text is made up of the characters a, b, c, d, e each occurring with the probability .12, .4, .15, .08 and .25 respectively. The optimal coding technique will have the average length of

    A. 2.15

    B. 3.01

    C. 2.3

    D. 1.78

24 Let X be a problem that belongs to the class NP. Then which one of the following is TRUE?

    A. There is no polynomial time algorithm for X.

    B. If X can be solved deterministically in polynomial time, then P = NP.

    C. If X is NP-hard, then it is NP-complete.

    D. X may be undecidable.

25 L and ~L are recursive enumerable then L is

    A. Regular

    B. Context free

    C. Context sensitive

    D. Recursive

26 A class of language that is closed under

    A. union and complementation has to be closed under intersection

    B. intersection and complement has to be closed under union

    C. union and intersection has to be closed under complementation

    D. both (A) and (B)

27 The CFG s---> as | bs | a | b , is equivalent to regular expression

    A. (a + b)

    B. (a + b) (a + b)*

    C. (a + b) (a + b)

    D. None of these

28 Which of the following pairs of regular expressions are equivalent?

    A. 1 (01)* and (10)* 1

    B. x (xx) * and (xx) * x

    C. x+ and x+x*+

    D. All of these

29 The identification of common sub-expression and replacement of run-time computations by compile-time computations is

    A. local optimization
    B. loop optimization
    C. constant folding
    D. data flow analysis

30 A language L allows declaration of arrays whose sizes are not known during compilation. It is required to make efficient use of memory. Which one of the following is true?

    A. a compiler using static memory allocation can be written for L
    B. a compiler cannot be written for L ; an interpreter must be used
    C. a compiler using dynamic memory allocation can be written for L
    D. none of these

31 In what module multiple instances of execution will yield the same result even if one instance has not terminated before the next one has begun?

    A. Non reusable module
    B. Serially usable
    C. Re-entrable module
    D. None of these

32 Substitution of values for names whose values are constant, is done in

    A. local optimization
    B. loop optimization
    C. constant folding
    D. none of these

33 A computer system has 6 tape drives, with 'n' processes competing for them. Each process may need 3 tape drives. The maximum value of 'n' for which the system is guaranteed to be deadlock free is

    A. 4
    B. 3
    C. 2
    D. 1

34 Access to moving head disks requires three periods of delay before information is brought into memory. The response that correctly lists the three time delays for the physical access of data in the order of the relative speed from the slowest to the fastest is

    A. latency time, cache overhead time, seek time
    B. transmission time, latency time, seek time
    C. seek time, latency time, transmission time
    D. cache overhead time, latency time, seek time

35 Consider a computer with 8 Mbytes of main memory and a 128 K cache. The cache block size is 4 K. It uses a direct mapping scheme for cache management. How many different main memory blocks can map onto a given physical cache block?

    A. 2048
    B. 256
    C. 64
    D. None of these

36 A long-term monitor

    A. should show any immediate performance problems
    B. should show I/O, paging, and processor activity
    C. need show only the I/O and processor activity
    D. usually reports only on terminal displays

37 In a paged segmented scheme of memory management, the segment table itself must have a page table because

    A. the segment is spread over a number to hit in one page
    B. each segment is spread over a number of pages
    C. segment tables point to page tables and not to the physical location of the segment
    D. the processor's description base register points to a page table

38 A table has fields F1, F2 , F3 , F4, F5 with the following functional dependencies
F1 —> F3,
F2 —> F4
(FI,F2) —> F5
In terms of normalization, this table is in

    A. 1 NF
    B. 2 NF
    C. 3 NF
    D. None of these

39 The physical location of a record is determined by a mathematical formula that transforms a file key into a record location is

    A. B-Tree File
    B. Hashed File
    C. Indexed File
    D. Sequential file.

40 Which of the following is a valid SQL type?

    A. CHARACTER
    B. NUMERIC
    C. FLOAT
    D. All of the above