PhD Entrance Examination

Computer Science and Engineering

Q1. The number of elements in the power set of (A U B), where A = {2, 3, 5, 7} and B = {2, 5, 8, 9} are

(A) 256
(B) 64
(C) 16
(D) 4

Q2.Let T(n) be the function defined by T(n) = 1 and T(n)= 2T(n/2) $+\sqrt{n}$, which of the following is TRUE ?

(A) $T(n) = O(\sqrt{n})$
(B) $T(n) = O(\log_2 n)$
(C) $T(n) = O(n)$
(D) $T(n) = O(n^2)$

Q3.Which of the following statement is false ?

(A) Every tree is a bipartite graph
(B) A tree contains a cycle
(C) A tree with n nodes contain n-1 edges
(D) A tree is a connected graph

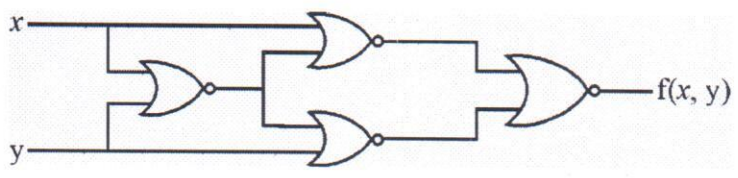
Q4. A coin is tossed twice. What is the probability that the head occurs at least once ?

(A) 4/4
(B) 2/4
(C) 3/4
(D) 0

Q5.The characteristic equation of a T flip-flop is:

(A) $Q_{n+1} = TQ'_n + T'Q_n$
(B) $Q_{n+1} = T + Q_n$
(C) $Q_{n+1} = TQ_n$
(D) $Q_{n+1} = T'Q'_n$

Q6. Identify the logic function performed by the circuit shown



(A) exclusive OR
(B) exclusive NOR
(C) NAND
(D) NOR

Q7. The octal equivalent of hexadecimal $(A.B)_{16}$ is :
(A) 47.21
(B) 12.54
(C) 12.71
(D) 17.21

Q8. What is the maximum number of different Boolean functions involving n Boolean variables?
(A) n^2
(B) $(2)^{2^n}$
(C) 2^n
(D) $(2)^{n^2}$

Q9. Interrupts which are initiated by an instruction are
(A) Internal
(B) External
(C) Hardware
(D) Software

Q10. Computers can have instruction formats with
(A) only two address and three address instructions
(B) only one address and two address instructions
(C) only one address, two address and three address instructions
(D) zero address, one address, two address and three address instructions

Q11. The concept of pipelining is most effective in improving performance if the tasks being performed in different stages:
(A) require different amount of time
(B) require about the same amount of time
(C) require different amount of time with time difference between any two tasks being same
(D) require different amount with time difference between any two tasks being different

Q12. 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

Q13. How many data values can be held by an array declared as **A(-1...m, 1...m)** ?

(A) m
(B) m^2
(C) m(m+1)
(D) m(m+2)

Q14. The postfix expression for the infix expression:
A+B*(C+D)/F+D*E is

(A) AB+CD+*F/D+E*
(B) ABCD+*F/DE*++
(C) A*B+CD/F*DE++
(D) A+*BCD/F*DE++

Q15. The number of nodes in a complete binary tree of height, ***h*** (with roots at level 0) is equal to

(A) $2^0 + 2^1 + \ldots\ldots 2^h$
(B) $2^0 + 2^1 + \ldots\ldots 2^{h-1}$
(C) $2^0 + 2^1 + \ldots\ldots 2^{h+1}$
(D) $2^1 + \ldots\ldots 2^{h+1}$

Q16. Which of the following algorithm solves the all-pair shortest path problem

(A) Dijkstra's algorithm
(B) Floyd's algorithm
(C) Prim's algorithm
(D) Warshall's algorithm

Q17. Which of the following sorting algorithm is of divide-and-conquer type?

(A) Bubble sort
(B) Insertion sort
(C) Quick sort
(D) All of above

Q18. Match the following :

a. calloc( )	i. Frees previously allocated space
b. free( )	ii. Modifies previously allocated space
c. malloc( )	iii. Allocates space for array
d. realloc( )	iv. Allocates requested size of space

(A) a - iii b - i c - iv d - ii
(B) a - iii b - ii c - i d - iv
(C) a - iii b - iv c - i d - ii
(D) a - iv b - ii c - iii d - i

Q19. What is the value of the postfix expression ?

a b c d + – * (where a = 8, b = 4, c = 2 and d = 5)

(A) $-\frac{3}{8}$ (B) $-\frac{8}{3}$

(C) 24 (D) –24

Q20. Linked lists are not suitable for implementing:

(A) Insertion sort
(B) radix sort
(C) polynomial manipulation
(D) binary search

Q21. A process executes the following code

for (i=0; i<n; i++) fork ( );

The total number of child processes created are

(A) n

(B) 2^n-1

(C) 2^n

(D) $2^{n+1}-1$

Q22. When we pass an array as an argument to a function, what actually gets passed ?

(A) Address of the last array element
(B) Values of the elements of the array
(C) Base address of the array
(D) Number of elements of the array

Q23. Which of the following is true for the language $\{a^p \mid p \text{ is a prime}\}$?

(A) It is not accepted by a Turing Machine.
(B) It is regular but not context – free
(C) It is context –free but not regular
(D) It is neither regular nor context-free, but accepted by a Turing Machine.

Q24.Match the following :Given the recursively enumerable language (L_{RE}), the context sensitive language(L_{CS}), the recursive language(LREC), the context free language (L_{CF}) and deterministic context free language (L_{DCF}). The relationship between these families is given by

(A) $L_{CF} \subseteq L_{DCF} \subseteq L_{CS} \subseteq L_{RE} \subseteq L_{REC}$
(B) $L_{CF} \subseteq L_{DCF} \subseteq L_{CS} \subseteq L_{REC} \subseteq L_{RE}$
(C) $L_{DCF} \subseteq L_{CF} \subseteq L_{CS} \subseteq L_{RE} \subseteq L_{REC}$
(D) $L_{DCF} \subseteq L_{CF} \subseteq L_{CS} \subseteq L_{REC} \subseteq L_{RE}$

Q25. Which of the following is the most powerful parsing method ?
(A) LL(I)
(B) Canonical LR
(C) SLR
(D) LALR

Q26.Given the following expressions of a grammar
$E \rightarrow E * F / F + E / F$
$F \rightarrow F - F / id$
Which of the following is true ?
(A) * has higher precedence than +
(B) – has higher precedence than *
(C) + and – have same precedence
(D) + has higher precedence than *

Q27.Which of the following suffices to convert an arbitrary CFG to an LL(1) grammar ?
(A) Removing left recursion alone
(B) Removing the grammar alone
(C) Removing left recursion and factoring the grammar
(D) None of the above

Q28. A shift reduce parser suffers from
(A) shift reduce conflict only
(B) reduce reduce conflict only
(C) both shift reduce conflict and reduce reduce conflict
(D) shift handle and reduce handle Conflicts

Q29. Banker s algorithm for resource allocation deals with
(A) Deadlock prevention
(B) Deadlock avoidance
(C) Deadlock recovery
(D) Mutual exclusion

Q30. Process P1 needs 50 frames and Process P2 needs 100 frames and there are only 70 frames available? Then how many frames will be allocated to the process P1 and P2?
(A) 41, 58
(B) 45, 39
(C) 23, 46
(D) None of above

Q31. Given memory partitions of 100K, 500K, 200K, 300K, and 600K (in order), which one of the First-fit, Best-fit, and Worst-fit algorithms able to place the processes of 212K, 417K, 112K, and 426K (in order) in memory?
(A) Both First fit and Best fit
(B) First fit only
(C) Best fit only

(D) None of the Above

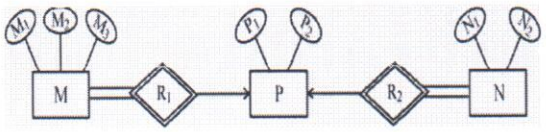
Q32. Aging is technique used to

(A) increase the priority of processes that are waiting for long time
(B) decrease the priority of processes that are waiting for long time
(C) increase the priority of processes that are currently running
(D) decrease the priority of processes that are currently running

Q33. Assume transaction A holds a shared lock R. If transaction B also requests for a shared lock on R, it will

(A) result in a deadlock situation
(B) immediately be granted
(C) immediately be rejected
(D) be granted as soon as it is released

Q34. Consider the following ER diagram :



The minimum number of tables required to represent M, N, P, R1, R2 is

(A) 2 (B) 3
(C) 4 (D) 5

Q35. Consider a schema R(A, B, C, D) and functional dependencies A $\rightarrow$ B and C $\rightarrow$ D. Then the decomposition R_1(A, B) and R_2(C, D) is

(A) Dependency preserving but not lossless join
(B) Dependency preserving and lossless join
(C) Lossless Join but not dependency preserving
(D) Lossless Join

Q36.Multi- valued dependency among attributes is checked at which level?

(A) 2 NF
(B) 3 NF
(C) 4 NF
(D) 5 NF

Q37. Which of the following is/are example(s) of stateful application layer protocols?

(i) HTTP
(ii) FTP
(iii) TCP
(iv) POP3

(A) (i) and(ii)only

(B) (ii) and(iii)only
(C) (ii) and(iv)only
(D) (iv)only

Q38. Express a period of 100 ms in microseconds,

(A) 10^3 μs
(B) 10^4 μs
(C) 10^5 μs
(D) 10^6 μs

Q39. The maximum window size for data transmission using the selective reject protocol with n-bit frame sequence numbers is

(A) 2n (B) 2^{n-1} (C) 2n-1 (D)2^{n-2}

Q40. A subnet has been assigned a subnet mask of 255.255.255.192. What is the maximum number of hosts that can belong to this subnet?

(A) 14
(B) 30
(C) 62
(D) 126

Computer Sc. & Engg.

Answer keys PhD Enterance Exam (Set-2)

Question Number	Answer
1	B
2	C
3	B
4	C
5	A
6	B
7	B
8	B
9	D
10	D
11	B
12	C
13	D
14	B
15	A
16	B
17	C
18	A
19	D
20	D
21	B
22	C
23	D
24	D
25	B

Question Number	Answer
26	B
27	D
28	C
29	B
30	C
31	C
32	A
33	B
34	B
35	A
36	C
37	C
38	C
39	B
40	C