M.Tech in CS and M.Tech in IT Entrance Model Questions

Discrete Mathematics 10 X 1 = 10

1. Which of the following is a *proposition*?
   (a) "How are you?"
   (b) "x + 5 = 10"
   (c) "The sky is blue"
   (d) "Go away!"
2. 5. The chromatic number of a complete graph K_n is:
   (a) 1
   (b) N
   (c) n – 1
   (d) log2n
3. How many distinct permutations are there of the word “DISCRETE”?
   (a) 40320
   (b) 20160
   (c) 40320 / 2
   (d) 10080
4. Which algorithm is used to find the shortest path in a weighted graph?
   (a) Prim’s algorithm
   (b) Kruskal’s algorithm
   (c) Dijkstra’s algorithm
   (d) Bellman-Ford algorithm
5. How many 3-digit numbers can be formed using digits 1 to 5 without repetition?
   (a) 60
   (b) 125
   (c) 20
   (d) 100
6. The total number of terms in the expansion of (a+b)n(a + b)^n(a+b)n is:
   (a) n
   (b) n+1
   (c) 2n
   (d) 2n+1
7. Which of the following is a tautology?
   (a) $p \wedge \neg p$
   (b) $p \vee \neg p$
   (c) $\neg(p \vee q) \equiv \neg p \wedge \neg q$
   (d) $p \rightarrow q \equiv q \rightarrow p$
8. The negation of the statement “All birds can fly” is:
   (a) Some birds can fly.
   (b) No bird can fly.
   (c) Some birds cannot fly.
   (d) All birds cannot fly.
9. The contrapositive of the statement “If ppp, then qqq” is:
   (a) If q, then p
   (b) If ¬p, then ¬q
   (c) If ¬q, then ¬p
   (d) $p \leftrightarrow q$

10. A graph with one vertex and no edges is called
    (a) trivial graph
    (b) Complete Graph
    (c) Bipartite Graph
    (d) Regular Graph

Operating System 10 x 1 = 10

11. What is a system call?

    (a) User request for a program
    (b) Communication between computers
    (c) Interface between user and hardware
    (d) an interface between a program and the operating system.
12. What is context switching?
    (a) Switching between virtual machines
    (b) Terminating a process
    (c) Saving and restoring process states
    (d) Starting a new process
13. What causes a process to transition from running to waiting state?
    (a) Process completes
    (b) Interrupt
    (c) I/O request
    (d) Time slice expired
14. Which of the following can solve critical section problems?
    (a) Deadlock
    (b) Race conditions
    (c) Semaphores
    (d) Paging
15. Which of the following is not a condition for deadlock?
    (a) Mutual exclusion
    (b) Circular wait
    (c) Starvation
    (d) Hold and wait
16. Which strategy is used in Banker's algorithm?
    (a) Preemption
    (b) Safe state checking
    (c) LRU
    (d) Disk scheduling
17. What is the purpose of paging?
    (a) Speed up cache
    (b) Allocate large files
    (c) Break memory into fixed-sized blocks
    (d) Switch contexts

18. Page fault occurs when:
    (a) CPU cache is empty
    (b) Page is not in main memory
    (c) OS crashes
    (d) Disk is full
19. Which of the following disk scheduling algorithms may cause starvation?
    (a) FCFS
    (b) SSTF
    (c) SCAN
    (d) C-SCAN
20. The main difference between microkernel and monolithic kernel is:
    (a) Microkernel runs all OS services in kernel space
    (b) Monolithic is slower
    (c) Microkernel separates services from kernel
    (d) Monolithic does not support multitasking

Data structure and algorithm 10 x 1 = 10

21. Which of the following data structures is best suited for implementing recursion?

    (a) Queue
    (b) Stack
    (c) Linked List
    (d) Heap
22. What is the time complexity of searching for an element in a balanced binary search tree (BST)?

    (a) O(1)
    (b) O(n)
    (c) O(log n)
    (d) O(n log n)
23. In an AVL Tree, the balance factor of any node must be:

    (a) -2, -1, 0, 1, 2
    (b) -1, 0, 1
    (c) 0, 1
    (d) 0 only
24. What is the worst-case time complexity of QuickSort?

    (a) O(n log n)
    (b) O(log n)
    (c) $O(n^2)$
    (d) O(n)

25. Which graph traversal algorithm is used in Dijkstra's shortest path algorithm?
    (a) DFS
    (b) BFS
    (c) Greedy
    (d) Dynamic Programming
26. In which traversal method of a binary tree is the root node visited between the left and right sub-trees?
    (a) Preorder
    (b) Postorder
    (c) Inorder
    (d) Level-order
27. In a max-heap, the smallest element is always located at:
    (a) Root
    (b) Leaf
    (c) Left child of root
    (d) Cannot be determined
28. Which of the following is used to represent hierarchical data?
    (a) Array
    (b) Stack
    (c) Tree
    (d) Queue
29. Which data structure uses FIFO principle?
    (a) Stack
    (b) Queue
    (c) Tree
    (d) Graph
30. Which of the following graph traversal algorithms uses a queue?
    (a) Depth First Search
    (b) Breadth First Search
    (c) Dijkstra's Algorithm
    (d) Floyd-Warshall Algorithm

Computer Network **10 x = 10**

31. Which of the following is NOT a type of network?
    (a) LAN
    (b) WAN
    (c) PAN
    (d) VDU
32. Which layer of the OSI model is responsible for routing?
    (a) Transport
    (b) Network
    (c) Data Link
    (d) Session

33. Which device operates at the Data Link layer?
    (a) Switch
    (b) Router
    (c) Modem
    (d) Repeater
34. The TCP/IP model consists of how many layers?
    (a) 4
    (b) 5
    (c) 6
    (d) 7
35. Which signal type is continuous and varies in amplitude or frequency?
    (a) Digital
    (b) Binary
    (c) Analog
    (d) Pulse
36. Which type of multiplexing assigns separate frequencies to multiple signals?
    (a) TDM
    (b) FDM
    (c) CDM
    (d) WDM
37. Which of the following is NOT a transmission medium?
    (a) Coaxial cable
    (b) Optical fiber
    (c) Satellite
    (d) Protocol
38. Which mode of transmission allows data in both directions, but only one at a time?
    (a) Simplex
    (b) Half-duplex
    (c) Full-duplex
    (d) None of the above
39. Which method is used to detect single-bit errors?
    (a) Block coding
    (b) Cyclic redundancy check
    (c) Parity check
    (d) Checksum
40. Which of the following is a noiseless channel protocol?
    (a) Stop-and-wait
    (b) Go-back-N
    (c) ALOHA
    (d) Simplest Protocol

Database Management System (DBMS) 10 x 1 = 10

41. What is the primary purpose of a Database Management System (DBMS)?
    (a) To store data in files
    (b) To provide an interface for managing databases efficiently
    (c) To replace all file systems
    (d) To only handle numerical data
42. Which of the following is **not** a characteristic of a database?
    (a) Data redundancy
    (b) Data independence
    (c) Data integrity
    (d) Data inconsistency
43. The three-schema architecture consists of:
    (a) Conceptual, Logical, and External schemas
    (b) Internal, Logical, and Physical schemas
    (c) Conceptual, Internal, and External schemas
    (d) Physical, Virtual, and External schemas
44. Data abstraction in DBMS helps in:
    (a) Hiding implementation details from users
    (b) Increasing data redundancy
    (c) Decreasing security
    (d) Eliminating data models
45. In an ER diagram, a diamond shape represents:
    (a) Entity
    (b) Attribute
    (c) Relationship
    (d) Key
46. A weak entity type is one that:
    (a) Has no primary key of its own
    (b) Has multiple primary keys
    (c) Does not participate in any relationship
    (d) Cannot have attributes
47. The constraint where an entity in a relationship must be associated with exactly one entity in another set is called:
    (a) One-to-One
    (b) One-to-Many
    (c) Many-to-One
    (d) Many-to-Many
48. Specialization and Generalization are concepts related to:
    (a) Relational Algebra
    (b) Extended ER Model
    (c) SQL Queries
    (d) Normalization
49. Which operation selects tuples that satisfy a given condition?
    (a) PROJECT
    (b) SELECT
    (c) JOIN
    (d) RENAME

50. The relational algebra operation that combines two relations based on a condition is:
    (a) UNION
    (b) INTERSECTION
    (c) JOIN
    (d) DIVISION

Web Technology — 10 x 1 = 10

51. What does HTTP status code 201 mean?
    (a) Created
    (b) OK
    (c) No Content
    (d) Moved Permanently
52. What does REST stand for?
    (a) Representational State Transfer
    (b) Readable Server Technology
    (c) Reliable External Server Tool
    (d) Remote Execution Structured Task
53. Which of the following is *not* a REST constraint?
    (a) Stateless
    (b) Multi-threading
    (c) Layered System
    (d) Client-Server
54. In React, what is a "hook"?
    (a) A function that lets you use state and lifecycle
    (b) A routing method
    (c) A type of component
    (d) A library
55. In Vue.js, the v-model directive is used for:
    (a) Event binding
    (b) Data binding
    (c) Routing
    (d) Component creation
56. Which of the following is a feature of Single Page Applications (SPA)?
    (a) Full page reloads
    (b) Server-side rendering only
    (c) No use of JavaScript
    (d) Client-side routing
57. Which API allows storage that persists even after the browser is closed?
    (a) sessionStorage
    (b) localStorage
    (c) cacheStorage
    (d) tempStorage

58. What is the purpose of fetch() in JavaScript?

(a) To make HTTP requests
(b) To load CSS
(c) To fetch local variables
(d) To update the DOM

59. What is XSS?

(a) XML Secure Service
(b) Cross-Site Spoofing
(c) Cross-Site Scripting
(d) External Script Session

60. How can CSRF attacks be prevented?

(a) Using tokens and validating them
(b) Avoiding cookies
(c) Using POST only
(d) Using CAPTCHA

C Programming **10 x 1 = 10**

61. What is the correct value to return from the main() function to indicate successful execution?
(a) 0
(b) 1
(c) -1
(d) Void

62. Which operator is used to access the value stored at a memory address pointed to by a pointer?
(a) &
(b) *
(c) ->
(d) %

63. Which of the following is used to dynamically allocate memory in C?
(a) calloc()
(b) malloc()
(c) realloc()
(d) All of the above

64. What will be the output of the following code?

```
int a = 5;
printf("%d", a++ + ++a);
```

(a) 10
(b) 11
(c) Undefined behavior
(d) 12

65. Which of the following data types has the highest precision?
    (a) Float
    (b) Double
    (c) Int
    (d) Char
66. What is the output of the following code?
    int x = 4;
    printf("%d", x == 4);

    (a) True
    (b) False
    (c) 1
    (d) 0
67. Which of the following header files is required for the printf() function?
    (a) stdlib.h
    (b) string.h
    (c) stdio.h
    (d) conio.h
68. How is a multi-line comment written in C?
    (a) # comment
    (b) // comment //
    (c) /* comment */
    (d) <!-- comment -->
69. Which of the following is not a valid storage class in C?
    (a) Auto
    (b) Static
    (c) Register
    (d) Heap
70. Which function is used to compare two strings in C?
    (a) strcopy()
    (b) strcmp()
    (c) strcomp()
    (d) equal()

Subjective Type (Emerging Technologies) **Marks: 30**

This section will contain three descriptive questions related to recent trends and emerging technologies in the field of Computer Science and Information Technology.