

**Entrance Examination for Admission to the M.Tech. Courses
in the Teaching Departments, 2021**

CSS

COMPUTER SCIENCE

--

General Instructions

1. The Question Paper is having two Parts — Part 'A' Objective type (60%) & Part 'B' Descriptive type (40%).
2. Objective type questions which carry 1 mark each are to be (✓) 'tick marked' in the response sheets against the appropriate answers provided.
3. 8 questions are to be answered out of 12 questions carrying 5 marks each in Part 'B'.
4. **Negative marking** : 0.25 marks will be deducted for each wrong answer in Part 'A'.

Time : 2 Hours

Max. Marks : 100

To be filled in by the Candidate									
Register Number	in Figures								
	in words								

--

PART – A
(Objective Type)

Choose appropriate answer from the options in the questions. **One mark each.**
(60 × 1 = 60)

1. The worst case occur in linear search algorithm when
 - a) Item is somewhere in the middle of the array
 - b) Item is not in the array at all
 - c) Item is the last element in the array
 - d) Item is the last element in the array or is not there at all

DO NOT WRITE HERE

-
2. The best average behavior is shown by which of the following sorting algorithms?
- a) Merge sort
 - b) Heap sort
 - c) Quick sort
 - d) Bubble sort
3. A bottom up parser generates
- a) left-most derivation
 - b) right most derivation
 - c) right most derivation in reverse
 - d) left-most derivation in reverse

4. Which of the following is not true about memory management?
- a) Virtual memory is used only in multi user systems
 - b) Segmentation suffers from external fragmentation
 - c) Paging suffers from internal fragmentation
 - d) Segmented memory can be paged
5. Which of the following characteristics of a programming language is best specified using a context-free grammar?
- a) Operator precedence
 - b) Maximum level of nesting
 - c) Identifier length
 - d) Type compatibility
6. The probability that it will rain today is 0.5. The probability that it will rain tomorrow is 0.6. The probability that it will rain whether today or tomorrow is 0.7. Then the probability that it will rain today and tomorrow is
- a) 0.3
 - b) 0.25
 - c) 0.35
 - d) 0.4
7. Of the following sorting algorithms, which has a running time that is LEAST dependent on the initial ordering of the input?
- a) Insertion Sort
 - b) Quick Sort
 - c) Merge Sort
 - d) Selection Sort
8. A certain algorithm **A** has been shown to have running time $O(N^{2.5})$ where N is the size of the input. Which of the following is not true about algorithm **A**?
- a) There exist constants C_1 and C_2 such that for all N the running time is less than $C_1N^{2.5} + C_2$ seconds.
 - b) For all N , there may be some inputs for which the running time is more than $N^{2.4}$ seconds.
 - c) For all N , there may be some inputs for which the running time is less than $N^{2.5}$ seconds.
 - d) For all N , there may be some inputs for which the running time is more than $N^{2.6}$ seconds.

9. Which of the following, best characterizes computers that use memory-mapped I/O?
- The computer provides special instructions for manipulating I/O ports.
 - I/O ports are placed at addresses on the bus and are accessed just like other memory locations.
 - I/O can be performed only when memory management hardware is turned on
 - None of these

10. The normal form that is considered adequate for relational database design is
- 2NF
 - 3NF
 - 4NF
 - BCNF

11. Let S be the statement

```

for i: = 1 to N
{
    v[i]=v[i]+1;
}

```

Which of the following performs the same change to v as S?

- | | |
|--|--|
| <p>a) i: = 0;
while i ≤ N
{i := i+1; v[i]=v[i]+1;}</p> | <p>b) i: = 1;
while i < N
{v [i] = v[i]+1; i := i+1;}</p> |
| <p>c) i: = 0;
while i < N
{v [i+1]=v[i+1]+1; i := i+1;}</p> | <p>d) None of these</p> |

12. Which of the following must be true of multiprogrammed systems in order that a single copy of a program can be shared by several users?
- The program is a macro
 - The program is recursive
 - The program is reentrant
- I only
 - II only
 - III only
 - None of these

13. The testing method which is normally used as the acceptance test for a software system is
- a) Regression Testing b) Integration Testing
 c) Unit Testing d) Functional Testing
14. If the expression $((2 + 3) * 4 + 5 * (6 + 7) * 8) + 9$ is evaluated with $*$ having precedence over $+$, then the value obtained is the same as the value of which of the following prefix expressions?
- a) $+++2\ 3\ 4\ **\ 5\ +\ 6\ 7\ 8\ 9$ b) $+*++\ 2\ 3\ 4\ **\ 5\ +\ 6\ 7\ 8\ 9$
 c) $*++\ 2\ 3\ 4\ **\ 5\ ++\ 6\ 7\ 8\ 9$ d) $+*+*\ 2\ 3\ 4\ ++\ 5\ *6\ 7\ 8\ 9$
15. What is the result of execution of the following 'c' statements?
- ```
int i = 5;
do
{
 putchar(i + 100);
 printf("%d",i--);
}
while(i);
```
- a) i5h4g3f2e1                                      b) 14h3g2f1e0  
 c) An error message                              d) 13i8gf1e0
16. Routers function in which layer?
- a) physical and data link layer  
 b) physical, data link, and network layer  
 c) data link and network  
 d) network and transport
17. Which of the following is the most appropriate format for graphics that are to be embedded within Internet document?
- a) BMP                      b) TIFF                      c) GIF                      d) HTML

18. Dirty bit is used to show the
- a) page with corrupted data
  - b) the wrong page in the memory
  - c) page that was modified after being loaded into cache memory
  - d) page that is less frequently accessed
19. Any set of Boolean operators that is sufficient to represent all Boolean expressions is said to be complete. Which of the following is NOT complete?
- a) {AND, NOT}
  - b) {NAND}
  - c) {AND, OR}
  - d) {NOR}
20. Which of the following job scheduling policies is starvation-free?
- a) Round-robin
  - b) Priority queuing
  - c) Shortest job first
  - d) None of these
21. A bag contains 3 green marbles, 4 blue marbles and 2 orange marbles. If a marble is picked at random, then the probability that it is not an orange marble is
- a)  $1/4$
  - b)  $1/3$
  - c)  $4/9$
  - d)  $7/9$
22. Bit parity check. when performed on a byte, can catch
- a) odd number of errors
  - b) even number of errors
  - c) any number of errors
  - d) none of the above
23. In \_\_\_\_\_, we combine signals from different sources to fit into a larger bandwidth.
- a) Spread Spectrum
  - b) Line coding
  - c) Block coding
  - d) None of these
24. In which way can a macro processor for assembly language be implemented?
- a) independent two-pass processor
  - b) independent one-pass processor
  - c) processor incorporated into pass of a standard two-pass assembler
  - d) all of these







39. Consider a 32 bit microprocessor, with a 16 bit external data bus, driven by an 8 MHz input clock. Assume that the microprocessor has a bus cycle whose minimum duration equals four input clock cycles. What is the maximum data transfer rate for this microprocessor?
- a)  $8 \times 10^6$  bytes/sec                      b)  $4 \times 10^6$  bytes/sec  
c)  $16 \times 10^6$  bytes/sec                      d)  $4 \times 10^9$  bytes/sec
40. Consider a virtual memory system with FIFO page replacement policy. For an arbitrary page access pattern, increasing the number of page frames in main memory will
- a) Always decrease the number of page faults  
b) Always increase the number of page faults  
c) Sometimes increase the number of page faults  
d) Never affect the number of page faults
41. Which of the following is the 16 bit registers in 8085 processor?
- a) Stack Pointer                                      b) Program Counter  
c) IR                                                      d) Both (a) and (b)
42. A process executes the code
- ```
fork();
fork();
fork();
```
- The total number of child processes created is
- a) 3 b) 4 c) 7 d) 8
43. A CPU generates 32-bit virtual addresses. The page size is 4 KB. The processor has a Translation Look-aside Buffer (TLB) which can hold a total of 128 page table entries and is 4- way set associative, The minimum size of the TLB tag is
- a) 11 bits b) 13 bits c) 15 bits d) 20 bits

44. How many 8-bit characters can be transmitted per second over a 9600 baud serial communication link using asynchronous mode of transmission with one start bit, eight data bits, and one parity bit?
- a) 600 b) 800 c) 876 d) 1200
45. Which of the following depends on the microprocessor speed?
- a) Clock b) Data Bus Width
c) Address Bus Width d) Size of Register
46. Packets of the same session may be routed through different paths in
- a) TCP, but not UDP b) TCP and UDP
c) UDP but not TCP d) Neither TCP, nor UDP
47. Let E1 and E2 be two entities in an ER diagram with simple single-valued attributes. R1 and R2 are two relationships between E1 and E2, where R1 is one-to-many and R2 is many-to-many. R1 and R2 do not have any attributes of their own. What is the minimum number of tables required to represent this situation in the relational model?
- a) 2 b) 3 c) 4 d) 5
48. Which data type can store unstructured data?
- a) RAW b) CHAR c) NUMERIC d) VARCHAR
49. Relation R with an associated set of functional dependencies, F, is decomposed into BCNF. The redundancy (arising out of functional dependencies) in the resulting set of relations is
- a) Zero
b) More than zero but less than that of an equivalent 3NF decomposition
c) Proportional to the size of F+
d) Indeterminate
50. Which one of the following socket API functions converts an unconnected active TCP socket into a passive socket?
- a) Connect b) Bind c) Listen d) Accept

56. In a compiler, keywords of a language are recognized during
- Parsing of the program
 - The code generation
 - The lexical analysis of the program
 - Dataflow analysis
57. Which of the following is essential for converting an infix expression to the postfix from efficiently?
- An operator stack
 - An operand stack
 - An operand stack and an operator stack
 - A parse tree
58. Which of the following sets can be recognized by a Deterministic Finite-state Automaton?
- The number 1, 2, 4, 8, 2^n , written in binary
 - The number 1, 2, 4,, 2^n , written in unary.
 - The set of binary strings in which the number of zeros is the same as the number of ones.
 - The set {1, 101, 11011, 1110111,
59. Heap allocation is required for languages
- that support recursion
 - that support dynamic data structures
 - that use dynamic scope rules
 - none of the above
60. An operating system contains 3 user processes each requiring 2 units of resource R . The minimum number of units of R such that no deadlocks will ever arise is
- 3
 - 5
 - 4
 - 6

ANSWER SHEET — P ART – A

1	A	B	C	D	E
2	A	B	C	D	E
3	A	B	C	D	E
4	A	B	C	D	E
5	A	B	C	D	E
6	A	B	C	D	E
7	A	B	C	D	E
8	A	B	C	D	E
9	A	B	C	D	E
10	A	B	C	D	E
11	A	B	C	D	E
12	A	B	C	D	E
13	A	B	C	D	E
14	A	B	C	D	E
15	A	B	C	D	E
16	A	B	C	D	E
17	A	B	C	D	E
18	A	B	C	D	E
19	A	B	C	D	E
20	A	B	C	D	E

21	A	B	C	D	E
22	A	B	C	D	E
23	A	B	C	D	E
24	A	B	C	D	E
25	A	B	C	D	E
26	A	B	C	D	E
27	A	B	C	D	E
28	A	B	C	D	E
29	A	B	C	D	E
30	A	B	C	D	E
31	A	B	C	D	E
32	A	B	C	D	E
33	A	B	C	D	E
34	A	B	C	D	E
35	A	B	C	D	E
36	A	B	C	D	E
37	A	B	C	D	E
38	A	B	C	D	E
39	A	B	C	D	E
40	A	B	C	D	E

41	A	B	C	D	E
42	A	B	C	D	E
43	A	B	C	D	E
44	A	B	C	D	E
45	A	B	C	D	E
46	A	B	C	D	E
47	A	B	C	D	E
48	A	B	C	D	E
49	A	B	C	D	E
50	A	B	C	D	E
51	A	B	C	D	E
52	A	B	C	D	E
53	A	B	C	D	E
54	A	B	C	D	E
55	A	B	C	D	E
56	A	B	C	D	E
57	A	B	C	D	E
58	A	B	C	D	E
59	A	B	C	D	E
60	A	B	C	D	E

COMPUTER SCIENCE

PART – B

(Descriptive Type)

Answer **any eight** questions.

(8 × 5 = 40 Marks)

1. What are the applications of stacks?
2. In a population having normal distribution exactly 7% of items are under 35 and 79% are under 63. What is the mean and standard deviation of the distribution?
3. How does a grammar become ambiguous? Explain how this problem can be resolved.
4. How can we perform deadlock avoidance using Banker's algorithm?
5. Explain the working of bubble sort algorithm with the help of a suitable example.
6. Explain the concept of pipelining. How can we compute the average instruction time of a process?
7. Explain the steps in the process of obtaining a minimum SOP expression using Karnaugh map. Simplify $XYZ + XY\bar{Z} + \bar{X}YZ + \bar{X}\bar{Y}\bar{Z} + X\bar{Y}\bar{Z} + XYZ$.
8. Explain the requirements and security implications for cryptographic hash functions.
9. Describe semaphore and its usage.
10. Explain the operation of an n-bit ring counter.
11. Discuss BCNF with an example. Why is it used and how does it differ from 3 NF?
12. Discuss the different optimization techniques adopted by an optimizing compiler.

