Roll. No.

Signature of Invigilators

**Computer Science
(19/36)**

(in figures as in Hall Ticket)

Roll No. _____

_____

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(in words)

Maximum Marks: 50No. Of Printed Pages :8

Instruction for the Candidate:

1. Write your Roll Number in the space provided on the top of this page.
2. This paper consists of **FIFTY (50)** multiple choice type questions. Each Question carries **ONE (1)** mark.
3. At the commencement of examination, the question booklet will be given to you. In the first 5 minutes, you are requested to open the booklet and compulsorily examine it as below:
   a. To have access to the Question Booklet, tear off the paper seal on the edge of this cover page, Do not accept a booklet without sticker seal and do not accept an open booklet.
   b. Tally the number of pages and number of questions in the booklet with the information printed on the cover page. Faculty booklets due to pages/questions missing or duplicate or not in serial order or any other discrepancy should be got replaced immediately by a correct booklet from the invigilator within the period of 5 minutes. Afterwards, neither the Question Booklet will be replaced nor any extra time will be given.
   c. After this verification is over, the Test Booklet Number should be entered on the OMR Answer Sheet and the OMR Answer Sheet Number should be entered on this Test Booklet.
4. Each item has four alternative responses marked (A), (B), (C) and (D). You have to darken the circle as indicated below on the correct response against each item.

   Example: (A) ● (C) (D) where (B) is correct response.
5. Your responses to the items are to be indicated on the OMR Answer Sheet under Paper – II only. If you mark your response at any place other than in the circle in the OMR Answer Sheet, it will not be evaluated.
6. Read instructions given inside carefully.
7. Rough Work is to be done in the end of this booklet.
8. If you write your Name, Roll Number, Phone Number or put any mark on any part of the OMR Answer Sheet, except for the space allotted for the relevant entries, which may disclose your identity, or use abusive language or employ any other unfair means, such as change of response by scratching or using white fluid, you will render yourself liable to disqualification.
9. You have to return the original OMR Answer Sheet to the invigilator at the end of the examination compulsorily and must not carry it with you outside the Examination Hall. You are however, allowed to carry original question booklet and duplicate copy of OMR Answer Sheet on conclusion of examination
10. Use only Blue/ Black Ball point pen.
11. Use of any calculator or log table etc., is prohibited.
12. There shall be no negative marking.

Note: This paper contains **FIFTY (50)** multiple-choice questions. Each Question carries**ONE (1)** mark.

01) The universal gates are
   A) AND, OR
   B) NAND, NOR
   C) EX-OR, EX-NOR
   D) All above

02) How many flip-flops are needed for MOD-16 ring counter and MOD-16 Johnson counter?
   A) 16, 8
   B) 8, 16
   C) 4, 8
   D) 8, 4

03) Simplified form of Boolean expression (X+Y+XY) (X+Z) is
   A) X + Y + Z
   B) XY + YZ
   C) X + YZ
   D) XZ + Y

04) A combination circuit is one in which the output depends on the
   A) input combination at the time
   B) input combination and previous output
   C) input combination at that time and the previous input combination
   D) present output and the previous output

05) The binary equivalent of octal number 13.54 is
   A) 1011.1011
   B) 1101.1110
   C) 1001.1110
   D) all of these

06) Which of the following is not involved in a memory write operation?
   A) MDR
   B) MAR
   C) PC
   D) Data bus

07) In which of the following technique there will be no interrupt?
   A) Programmed I/O
   B) Interrupt driven I/O
   C) DMA
   D) Polling

08) Which of the following technique is used in a pipelined processor, when there is a conditional branch?
   A) Branch prediction
   B) Delayed instruction exe
   C) Loop buffer
   D) All of the above

09) Which memory is non-volatile and may be written only once?
   A) RAM
   B) EE-ROM
   C) EPROM
   D) PROM

10) Consider a high speed 40 ns memory cache with a successful hit ratio of 80%. The regular memory has an access time of 100 ns. What is the average effective time for CPU to access memory?
   A) 52 ns
   B) 60 ns
   C) 70 ns
   D) 80 ns

11) IBM's Token Ring network uses
   A) adaptive routing
   B) source routing
   C) alternative routing
   D) spanned tree routing

12) What are the reasons for choosing an UDP by an application?
   A) No connection establishment
   B) No connection state
   C) Small packet header
   D) All of the above

13) Which type address class is used for multicast address?
   A) Class A
   B) Class B
   C) Class C
   D) Class D

14) The advantage of use case during requirement analysis phase is,
   A) It focuses on external behavior only
   B) It focuses on internal behavior only
   C) It focuses on additional behavior
   D) It focuses on internal and external behavior

15) Which of the following transport layer protocol is used to support electronic mail?
   A) SMTP
   B) IP
   C) TCP
   D) UDP

16) Decryption and encryption of data are responsibility of
   A) physical layer
   B) data link layer
   C) presentation layer
   D) session layer

17) Mutual exclusion problem occurs between
   A) two disjoin processes that do not interact
   B) processes that share resources
   C) processes that do not use the same resource
   D) none of these

18) In real-time operating system, which of the following is the most suitable scheduling scheme?
   A) round robin
   B) first-come-first-served
   C) preemptive
   D) random scheduling

19) Protection against computer virus is
   A) prevention
   B) practice of safe computing
   C) purchasing unopened software from vendors
   D) avoiding free or pirated copies from public sources

20) The essential content in each entry of a page table is/are
   A) virtual page number
   B) page frame number
   C) both virtual page number and page frame number
   D) access right information

21) 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

22) If ABCDE are the attributes of a table and ABCD is a super key and ABC is also super key then
   A) A B C must be candidate key
   B) A B C cannot be super key
   C) A B C cannot be candidate key
   D) A B C may be candidate key

23) Which one is not a query language?
   A) SQL
   B) QBE
   C) Data log
   D) MySQL

24) If a relation is in 2NF, then it can be in 3NF by removing
   A) repeating groups
   B) partial dependences
   C) transitive dependences
   D) overlapping dependences

25) For a set of n transactions, there exist _____ different valid serial schedules.
   A) n
   B) n^2
   C) n/2
   D) n!

26) Assuming P != NP, which of the following is true ?
   A) NP-complete = NP
   B) NP-complete has no common part with P class
   C) NP-hard = NP
   D) P = NP-complete

27) Consider a situation where you don't have function to calculate power (pow() function in C) and you need to calculate x^n where x can be any number and n is a positive integer. What can be the best possible time complexity of your power function?
   A) O(logn)
   B) O(nlogn)
   C) O(n)
   D) None of above

28) What is recurrence for worst case of QuickSort and what is the time complexity in Worst case?
   A) Recurrence is T(n) = T(n-2) + O(n) and time complexity is O(n^2)
   B) Recurrence is T(n) = T(n-1) + O(n) and time complexity is O(n^2)
   C) Recurrence is T(n) = 2T(n/2) + O(n) and time complexity is O(nLogn)
   D) d) Recurrence is T(n) = T(n/10) + T(9n/10) + O(n) and time complexity is O(nLogn)

29) Which of the following is not a stable sorting algorithm in its typical implementation?
   A) Insertion Sort
   B) Merge Sort
   C) Quick Sort
   D) Bubble Sort

30) What minimum no. comparisons are required for merging two sorted array in the third array in sorted order. Assume the size of first and second array is m and n respectively.
   A) m*n
   B) m+n
   C) m+n-1
   D) m+n-2

31) Regular language may be accepted by
   A) Finite state machine
   B) Turing Machine
   C) Push Down Automata
   D) All of above

32) The context free grammar is not recognized by
   A) Finite state machine
   B) Turing Machine
   C) Push Down Automata
   D) All of above

33) Which type of grammar is the most unrestricted grammar from the following.
   A) Type 0
   B) Type 1
   C) Type 2
   D) Type 3

34) Which of the following pairs have SAME expressive power?
   1) Deterministic finite automata(DFA) and Non-deterministic finite automata(NFA)
   2) Deterministic push down automata(DPDA)and Non-deterministic push down automata(NPDA)
   3) Deterministic single-tape Turing machine and Non-deterministic single-tape Turing machine
   4) Single-tape Turing machine and multi-tape Turing machine

   A) 1, 2 & 3
   B) 1 , 3 & 4
   C) 2, 3 & 4
   D) 1, 2 & 4

35) Consider the languages
   $L1 = \{0^i1^j \mid i \mathrel{!=} j\}$. $L2 = \{0^i1^j \mid i = j\}$. $L3 = \{0^i1^j \mid i = 2j+1\}$. $L4 = \{0^i1^j \mid i \mathrel{!=} 2j\}$. (i & j are in terms of power)
   A) Only L2 is context free
   B) Only L2 and L3 are context free
   C) Only L1 and L2 are context free
   D) All are context free

36) Router used at which layer
    A) Physical
    B) Network
    C) Data link
    D) Application

37) http is used in which layer
    A) Physical
    B) Network
    C) Data link
    D) Application

38) The grammar S → aSa | bS | c is
    A) LL(1) but not LR(1)
    B) LR(1)but not LR(1)
    C) Both LL(1)and LR(1)
    D) Neither LL(1)nor LR(1)

39) Match all items in Group 1 with correct
    options from those given in Group 2.
    Group 1   Group 2
    P. Regular expression   1. Syntax analysis
    Q. Pushdown automata   2. Code generation
    R. Dataflow analysis   3. Lexical analysis
    S. Register allocation   4. Code optimization

    A) P-4. Q-1, R-2, S-3
    B) P-3, Q-1, R-4, S-2
    C) P-3, Q-4, R-1, S-2
    D) P-2, Q-1, R-4, S-3

40) Which of the following statements are TRUE?
    I.   There exist parsing algorithms for
          some programming languages
          whose complexities are less than $O(n^3)$.
    II.   A programming language which allows
          recursion can be implemented with
          static storage allocation.
    III. No L-attributed definition can be
          evaluated in The framework of
          bottom-up parsing.
    IV.   Code improving transformations can
          be performed at both source
          language and intermediate code level.
    A) I and II
    B) II and IV
    C) III and IV
    D) None of above

41) Which algorithm gives lowest decrease key
    operation cost O(1)
    A) Fibonacci Heap
    B) Binomial heap
    C) Min/Max heap
    D) None of above

42) Extract minimum operation is performed at the
    lowest cost O(logn) by
    A) Fibonacci Heap
    B) Binomial heap
    C) Binary heap
    D) All of above

43) Output of following statement.
    int m;
    Printf("%d,scanf("%d",&m));
    A) 0 or 1
    B) Value inputed by the user
    C) Error is statement
    D) None of above

44) For an undered graph which searching
    techniques performs best.
    A) Depth First
    B) Breadth First
    C) Depends on the graph
    D) None of Above

45) The travelling salesman is having complexity?
    A) $O(n^2)$
    B) $O(n!)$
    C) $O(2^n)$
    D) $O(3^n)$

46) Consider the following C code segment.

```
for (i = 0, i<n; i++)
{   for (j=0; j<n; j++)
  {
    if (i%2)
    {
       x += (4*j + 5*i);
       y += (7 + 4*j);
    }
  }
}
```

A) The code contains loop invariant computation
B) There is scope of common sub-expression elimination in this code
C) There is scope of strength reduction in this code
D) There is scope of dead code elimination in this code

47) Assume int is 4 bytes, char is 1 byte and float is 4 bytes. Also, assume that pointer size is 4 bytes (i.e. typical case)

```
char *pfChar;
 int *pfInt;
float *pfFloat;

sizeof(pfChar);
sizeof(pfInt);
sizeof(pfFloat);
```

What's the size returned for each of sizeof() operator?
A) 4 4 4
B) 1 4 4
C) 4 1 4
D) 1 3 4

48) Consider the following variable declarations and definitions in C
   i)   int v_7 = 1;
   ii)   int 7_v = 2;
   iii) int _ = 3;
A) Both i) and iii) are valid.
B) Only i) is valid.
C) Both i) and ii) are valid.
D) None of above

49) Runtime polymorphism is used to
A) One to many relationship of inheritance
B) only to assign parent class object to child class object
C) only to assign child class object to parent class object
D) None of these

50) Output of following program (No Syntax error is there)

```
int main()
 {
   void demo();
   void (*fun)();
   fun = demo;
   (*fun)();
   fun();
   return 0;
}
void demo()
{ printf("MSUBARODA ");
}
```

A) MSUBARODA MSUBARODA
B) MSUBARODA
C) Error
D) None of the above

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Rough Work: