ENTRANCE EXAMINATION FOR ADMISSION, JUNE 2005.

M.Tech. (COMPUTER SCIENCE AND ENGINEERING)

COURSE CODE : 376

Register Number :

Signature of the Invigilator
(with date)

COURSE CODE : 376

Time : 2 Hours   Max : 360 Marks

Instructions to Candidates :

1. Write your Register Number within the box provided on the top of this page and fill in the page 1 of the answer sheet using pen.

2. Do not write your name anywhere in this booklet or answer sheet. Violation of this entails disqualification.

3. Read each question carefully and shade the relevant answer (A) or (B) or (C) or (D) in the relevant box of the ANSWER SHEET using HB pencil.

4. Avoid blind guessing. A wrong answer will fetch you –1 mark and the right answer will fetch 4 marks.

5. Do not write anything in the question paper. Use the white sheets attached at the end for rough works.

6. Do not open the question paper until the start signal is given.

7. Do not attempt to answer after stop signal is given. Any such attempt will disqualify your candidature.

8. On stop signal, keep the question paper and the answer sheet on your table and wait for the invigilator to collect them.

9. Use of Calculators, Tables, etc. are prohibited.

10. Follow the instructions given in the question paper and page 1 of the answer sheet

Note : For all the questions, there are two more options, namely,

        (D)   All of the above

        (E)   None of the above.

1. Which of the following is not true?

    (A) Every context free language is acceptable by Push down automata

    (B) Every regular expression is acceptable by finite automata

    (C) Every context sensitive language is acceptable by LDA

2. The language generated by the grammar :
$$G = (\{S, A\}, S, \{0,1\}, \{S \to 0A; A \to 1S, 1\})$$

    (A) {0,01, 010, 011, 01010, 0101011,...}

    (B) {0,01, 010, 011, 01010, 010101...}

    (C) {0,01, 010, 011, 01010, 0101001,....}

3. Pumping lemma is used to

    (A) find whether the grammar is regular

    (B) find whether the grammar is regular but not context free

    (C) find whether the grammar is regular but not context sensitive

4. The language $0^* 1^*$ is generated by

    (A) $G = (\{S, A\}, S, \{0,1\}, \{S \to 0A; 0; A \to 1S, 1\})$

    (B) $G = (\{S, A\}, S, \{0,1\}, \{S \to 0A, 0S, \varepsilon; A \to 1A, 1, \varepsilon\})$

    (C) $G = (\{S, A\}, S, \{0,1\}, \{S \to 0A, 0S; A \to 1S, 1\})$

5. The responsibility of QAG is

    (A) to ensure the quality of the software product

    (B) to ensure the quality of the software process

    (C) to ensure the quality of the software project

6. What is meant by BETA testing?

    (A) It is testing the software at developer's site

    (B) It is testing the software at customer's site

    (C) It is testing the software at wherever you want

7. Which of the following suffices to convert an arbitrary CFG to an LL(1) grammar?

   (A) Removing left recursion alone

   (B) Factoring the grammar alone

   (C) Removing left recursion and factoring the grammar

8. Which is not a data structure used for symbol table construction?

   (A) Hash Table

   (B) Self Organizing List

   (C) Direct Acyclic Graph

9. Consider the following statement

   $$A = A + 0 ;$$

   In which phase of compilation, above given statement will be optimized?

   (A) Code Generation Phase

   (B) Intermediate Code Generation Phase

   (C) Syntax Analysis Phase

10. What is/are the additional functions of a scanner?

    (A) Removing comments

    (B) Removing white spaces

    (C) Preparing source code list with line numbers

11. Which is not a shift-reduce parser?

    (A) LR Parser

    (B) Operator Precedence Parser

    (C) Predictive Parser

12. Which phase of compilation is hardware dependent?

    (A) Code Generation

    (B) Code Optimization

    (C) Intermediate Code Generation

13. In a fixed block size file system having a larger block size leads to

    (A) better disk space utilization but poorer disk throughput

    (B) better disk space utilization and better disk throughput

    (C) poorer disk space utilization but better disk throughput

14. Which of the following is/are true about virtual memory systems that use pages?

    I.   The virtual address space can be larger than the amount of physical memory

    II.   Programs must be resident in main memory throughout their execution

    III. Pages correspond to semantic characteristics of the program

(A) I and II

(B) I and III

(C) II and III

Consider the following procedure for the question no.s 15 and 16.

```
procedure simple
a : integer;
b : integer;
procedure confuse (x,y)
begin
    y = y+ b;
    x = b + x;
    b = x +b;
    a = y;
end confuse;
begin
    a = 2; b = 7;
    confuse(a,b);
    write(a); write(b);
end simple
```

The output of procedure simple depends on the parameter-passing method used.

15. Suppose that all parameters are passed by value. Which of the following values are the output of a and b when procedure simple is called?

(A) 9 14   (B) 14 16   (C) 30 30

16. Suppose that all parameters are passed by reference. Which of the following values are the output of a and b when procedure simple is called?

(A) 9 14   (B) 14 16   (C) 30 30

17. In systems with support for automatic memory management, a garbage collector typically has the responsibility for reclaiming allocated memory objects whose contents cannot affect any future legal computation. Such objects are identified by determining that they cannot be reached from a root set. Which of the following is NOT part of the root set in a typical garbage collector?

(A) Actual parameters of the active procedures

(B) Dynamically allocated objects on the heap

(C) Global variables of the program

18. Which of the following is NOT a reasonable justification for choosing to busy-wait on an asynchronous event?

(A) The wait is expected to be short

(B) A busy-wait loop is easier to code than interrupt handler

(C) The program executes on a time-sharing system

19. Which of the following characteristics of a programming language is best specified using a context-free grammar?

(A) Identifier length   (B) Maximum level of nesting

(C) Operator precedence

20. Consider the syntax directed definition shown below.

$S \rightarrow \textbf{Id} : E$ {gen (id place = E.place;);}

$E \rightarrow E_1 + E_2$ (t = newtemp ( );

         gen (t = E 1. Place + E 2. place;)

         E.place = t}

$E \rightarrow \textbf{Id}$ { E.place = id.place;}

Here, gen is a function that generates the output code, and newtemp is a function that returns the name of a new temporary variable on every call. Assume that t_i's are the temporary variable names generated by newtemp. For the statement '$X := Y + Z'$, the 3-address code sequence generated by this definition is

(A) $t_1 = Y + Z; X = t_1$ (B) $t_1 = Y; T_2 = t_1 + Z; X = t_2$

(C) $t_1 = Y; T_2 = Z \; t_3 = t_1 + t_2; X = t_3$

21. Which of the following is true?

   (A) The Greedy approach and Dynamic Programming approach of solving a problem are equivalent as they help to select a subset of inputs from a set of inputs

   (B) Dynamic Programming provides a better time complexity than Greedy technique

   (C) All problems that can be solved using Dynamic Programming can be solved using Greedy Technique

22. Which of the following algorithm produces the sorted list in ascending order by arranging the elements in descending order?

   (A) Quick Sort   (B) Bubble Sort   (C) Selection Sort

23. Pick the odd one out

   (A) Bubble sort and Selection sort   (B) Heap sort and Merge sort

   (C) Quick sort and Insertion sort

24. When a recursive algorithm is converted to an iterative algorithm

   (A) its space complexity increases   (B) its time complexity increases

   (C) length of the program increases

25. You are to swap the left child and right child of a binary tree. Which of the traversal algorithm is best suited for it

   (A) Preorder   (B) Post order   (C) Inorder

26. Which of the following is very important in an algorithm

   (A) iteration   (B) selection   (C) sequence

27. The best case, worst case and average case of an algorithm depends on

   (A) Number of control loops used in the algorithm

   (B) Recursive calls used in the algorithm

   (C) Type of control loops used in the algorithm

28. When an algorithm having complexity in Big Oh is executed on high speed computer

   (A) Big oh does not change

   (B) Big oh complexity becomes Omega complexity

   (C) Big oh becomes theta

29. Apart from the inputs being in ascending order, quick sort executes with minimum number of comparisons when

(A) Elements are in descending order

(B) The partition element is exactly in the middle

(C) Only two elements in the input are out of place

30. In the given elements 11, 15, 16, 20, 23, 24, 28, What is the average number of comparison required to determine that an element is not present in the above list

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

31. To delete an element at position i from an integer array

Which of the data structure is suitable for the following?

(A) Make the element at position i to 0

(B) Copy the entire contents of array to another except the element at position i

(C) Make the element at position i -ve

32. To implement a buffer

(A) File   (B) Linked list   (C) Array

33. To implement a request handler in a web server

(A) stack   (B) queue   (C) arrays

34. Which of the data structure is not suitable for building a cache

(A) File   (B) Linked List   (C) Array

35. Assume that a data file has a large index consisting of N items, where N is large. If binary search is used to find an item, then which of the following is the average complexity which represents the number of comparisons to determine the item

(A) $(\log N) - 1$ (B) $N \log N$ (C) $(N+1) \log N$

36. A threaded binary tree helps to

(A) Insert elements easily in the tree

(B) Reduce the time of search in a binary tree

(C) Construct an optimal binary tree

37. Which of the following is true about the Adjust procedure which adjusts the elements in the heap after removing the maximum element from the heap?

   (A) Requires log n time in the worst case for adjusting a single element

   (B) The adjusted element traverses utmost the number of levels of the heap

   (C) Makes n-1 comparisons

38. If you are in a Max position and the children in Min position has values as 5 and 3 which of the child will be pruned?

   (A) 5   (B) 3   (C) both need not be pruned

39. To determine a nearest neighbour to add to the spanning tree using the Prim's algorithm takes

   (A) O(n) time

   (B) $O(n^2)$ time

   (C) O(E) time where E is the number of edges

40. Front = Rear is a condition for

   (A) Queue Empty   (B) Queue Full

   (C) Both Queue Empty and Queue Full

41. Which of the following is considered to be the class of adaptive algorithms.

   (A) centralized routing algorithms   (B) isolated routing algorithms

   (C) distributed routing algorithms

42. Which of the following corresponds to network addressable units (NAU)

   (A) Logical unit   (B) Physical Unit

   (C) System services control point

43. The entities in the same layer on different machines are called

   (A) peer entities   (B) application entities

   (C) presentation entities

44. Token Management is related with

   (A) presentation layer service   (B) session layer service

   (C) data link layer service

45. The first carrier sense protocol is

   (A) Non-persistent CSMA   (B) P-Persistence CSMA

   (C) 1-Persistent CSMA

46. Which of the following polynomial code is used when the character length is 6 bits

   (A) CRC - 12   (B) CRC - 16   (C) CRC - CCITT

47. The strategy for handling errors when frames are pipelined is

   (A) Simplex Stop-and-Wait

   (B) Selective Repeat

   (C) Positive acknowledgement with retransmission

48. Usenet offers

   (A) File transfer   (B) Electronic mail

   (C) News

49. The OSI network address is

   (A) up to 40 bytes long   (B) up to 10 bytes long

   (C) up to 20 bytes long

50. The service provided by the data link layer is

   (A) Unacknowledged connectionless service

   (B) Acknowledged connectionless service

   (C) Connection oriented service

51. Software project metrics model should measure the projects

   (A) inputs   (B) outputs   (C) results

52. Which of the following depicts the measures of software quality

   (A) correctness   (B) maintainability

   (C) integrity

53. Which phase of SE is the most costly

   (A) design   (B) implementation

   (C) maintenance

54. It is a collection of hardware and software resources that connects two dissimilar networks

(A) router   (B) gateway   (C) FTP

55. About data processing which of the following is NOT true?

(A) Sequential file processing means that records are in order according to a key field

(B) Direct file processing allows the computer to go directly to the desired record

(C) Batch processing is a technique of processing transaction in any order they occur, at the time they occur

56. The quantization aspect that the graphics programmers generally concerned with is

(A) sampling rate   (B) aperture time   (C) coding error

57. The adverse side effects of scan conversion is

(A) aliasing

(B) unequal intensity of diagonal lines

(C) over striking in photographic applications

58. Subcategory of oblique projection is

(A) Cavalier   (B) Isometric   (C) Diametric

59. 3D viewing of an object requires

(A) Specification of projection plane

(B) Center of projection

(C) View volume.

60. The maximum no. of nodes in a binary tree of depth k is

(A) $2^k + 1$ (B) $2^k - 1$ (C) 2^k

61. Which is the graph representation

(A) adjacency matrix   (B) adjacency list

(C) adjacency multi lists

62. The complexity of the shortest path algorithms is

(A) $O(n^2)$ (B) $O(n)$ (C) $O(\log n)$

63. The computing time of the topological ordering problem is

(A) O(ne)   (B) O(n+e)   (C) O(log n)

64. Any decision tree that sorts n distinct elements has a height of atleast

(A) $n!$ (B) n^2 (C) $\log_2(n!)+1$

65. The ability to modify the database schema without causing changes to existing application programs is called ————————— data independence.

(A) Logical   (B) Physical   (C) View

66. If $R=(A,B,C,D,E)$ and A uniquely identifies a tuple then AB is a ——————— key.

(A) candidate   (B) superkey   (C) primary key

67. If an entity set does not have sufficient attributes to form a primary key, it is called as a ——————— entity set

(A) Weak   (B) Dependent   (C) Partial

68. ——————— is not a fundamental relational Algebra operation

(A) set difference   (B) set intersection

(C) rename

69. The number of tuples that would result in the natural join of two relations of size n1 and n2 tuples respectively is

(A) n1   (B) n1+ n2   (C) n1*n2

70. ——————— is a procedural query language

(A) Tuple relational calculus   (B) Relational Algebra

(C) Tuple calculus

71. A condition that we wish the database always to satisfy is called

(A) trigger   (B) assertion   (C) functional dependency

72. If R = (A, B, C, D, E) and the functional dependency F = (A->B, BD->C), which of the following holds?

(A) AD->C   (B) A->BD   (C) A->BCD

73. If R = (name, age, id, address) and F = (name-> age, id age-> address), then name id->address hold good as per ——————————— rule.

   (A) augmentation   (B) decomposition (C) pseudotransitivity

74. If R = (A, B, C, D, E, F) with AB as the primary key and F = (B->F, A->C, AB->DE, AB->F) then the relation is in ——————————— normal form.

   (A) first   (B) second   (C) third

75. Which of the following statement is false

   (A) Every BCNF decomposition is lossless

   (B) Every BCNF is in 3NF

   (C) Every BCNF is dependency preserving

76. For R1 and R2 to be a lossless decomposition of R which of the following functional dependency should be present in F+

   (A) R1^R2->R1   (B) R1UR2->R1   (C) R1^R2->R

77. Indices whose search key specifies an order different from the sequential order of the file are called

   (A) secondary indices   (B) inverted indices

   (C) distributed indices

78. Which of the following is true with multilevel index

   (A) requires more number of I/O operation compared to binary search

   (B) requires fewer I/O operations

   (C) requires less storage compared to a single large index

79. A B+ tree of order n contains ——————————— search keys and ———————————
   pointers.

   (A) n-1, n   (B) n, n-1   (C) n,n

80. The update authorization on a database allows

   (A) modification, deletion, insertion

   (B) allows modification, no insertion

   (C) allows modification, no deletion

81. Integrity of data refers to

    (A) protection from malicious access

    (B) avoidance of accidental loss of consistency

    (C) protection from unauthorized modification of data

82. Which of the following statement is true about hash index?

    (A) provides direct access to data

    (B) used as a secondary index structure

    (C) not suited for growing databases

83. Hashing technique that allows the hash function to be modified according to the growth or shrinkage of database is called

    (A) auto hashing   (B) dynamic hashing

    (C) variable hashing

84. If F = (A->BC, B->C, A->B, AB->C), the canonical cover of F is

    (A) (A->B, B->C)   (B) (B->A, C->B)   (C) (A->C, A->B)

85. Consider the following C function.

    float fun(float x, int y) {

        float p, s; int i;

        for (s=1, p=1, i=1 ; i<y ; i++) {

            p* = x/i;

            s+=p;

        }

        return s;

    }

    For large values of y, the return value of the function fun best approximates

    (A) x^y (B) e^x (C) $\ln(1+x)$

86. Assume the following C variable declaration

int*X[10], Y[10][10];

Of the following expressions which will not give compile-time errors if used as left hand sides of assignment statements in a C program?

(A) X[1][2]   (B) Y[1]   (C) Y[3] [2]

87. Consider the C program shown below.

```
# include <stdio.h>
#define writef(x) printf("%d",x)
int x;
void Confuse (int z)
{
    z+ = x; writef(z);
}
void NoConfuse(int*y)
{
    int x = *y+2;
    Confuse(x); *y = x-1;
    writef(x);
}
main(void)
{
    x=5;
    NoConfuse(&x);
    writef(x);
}
```

The output of this program is

(A)   12 7 6

(B)   14 6 6

(C)   7 6 6

88. Consider the function f defined below.

```
struct item {
  int data;
  struct item*next;
};

int f(struct item*p) {
      return ((P == NULL) ||(p->next==NULL) ||
      ((p->data <=p-> next->data) & &
        f(p - >next)));
}
```

For a given linked list p, the function f returns 1 if and only if

(A)   the list is empty

(B)   the list has exactly one element

(C)   the elements in the list are sorted in non-decreasing order of data value

89. Consider the following program

```
#include<stdio.h>
main()
{
 char*pname1, *pname2= "I Love India";
 pname1 = malloc(strlen(pname2));
 strcpy(pname1, pname2);
 printf("%s", pname 1);
 free(pname 1);
}
```

What will be the output?

(A)   free() fails   (B)   strcpy() fails   (C)   compilation error

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90. What is the output for the program given below?

```
typedef enum result {GOOD, BAD, WORST,} BAD1;
main()
{
BAD1 g1;
g1=BAD;
printf("%d", g1);
}
```

(A) 0   (B) 1   (C) 2

———————