

प्रश्न पुस्तिका / QUESTION BOOKLET

विषय / Subject :

COMPUTER ENGINEERING

कोड / Code : 05

पुस्तिका में पृष्ठों की संख्या /

Number of Pages in Booklet : 32

पुस्तिका में प्रश्नों की संख्या /
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COMPUTER ENGINEERING

05
विषय कोड

A बुकलेट
सिरीज

समय / Time : 2 घंटे / Hours

पूर्णांक / Maximum Marks : 100

INSTRUCTIONS

1. Answer all questions.
2. All questions carry equal marks.
3. Only one answer is to be given for each question.
4. If more than one answers are marked, it would be treated as wrong answer.
5. Each question has four alternative responses marked serially as 1, 2, 3, 4. You have to darken only one circle or bubble indicating the correct answer on the Answer Sheet using BLUE BALL POINT PEN.
6. 1/3 part of the mark(s) of each question will be deducted for each wrong answer. (A wrong answer means an incorrect answer or more than one answers for any question. Leaving all the relevant circles or bubbles of any question blank will not be considered as wrong answer.)
7. The candidate should ensure that Series Code of the Question Paper Booklet and Answer Sheet must be same after opening the envelopes. In case they are different, a candidate must obtain another Question Paper of the same series. Candidate himself shall be responsible for ensuring this.
8. Mobile Phone or any other electronic gadget in the examination hall is strictly prohibited. A candidate found with any of such objectionable material with him/her will be strictly dealt as per rules.
9. Please correctly fill your Roll Number in O.M.R. Sheet. 5 marks will be deducted for filling wrong or incomplete Roll Number.

Warning : If a candidate is found copying or if any unauthorised material is found in his/her possession, F.I.R. would be lodged against him/her in the Police Station and he/she would liable to be prosecuted under Section 3 of the R.P.E. (Prevention of Unfairmeans) Act, 1992. Commission may also debar him/her permanently from all future examinations of the Commission.

निर्देश

1. सभी प्रश्नों के उत्तर दीजिए।
2. सभी प्रश्नों के अंक समान हैं।
3. प्रत्येक प्रश्न का केवल एक ही उत्तर दीजिए।
4. एक से अधिक उत्तर देने की दशा में प्रश्न के उत्तर को गलत माना जाएगा।
5. प्रत्येक प्रश्न के चार वैकल्पिक उत्तर दिये गये हैं, जिन्हें क्रमशः 1, 2, 3, 4 अंकित किया गया है। अभ्यर्थी को सही उत्तर निर्दिष्ट करते हुए उनमें से केवल एक गोले अथवा बबल को उत्तर-पत्रक पर नीले बॉल प्वाइंट पेन से गहरा करना है।
6. प्रत्येक गलत उत्तर के लिए प्रश्न अंक का 1/3 भाग काटा जायेगा। गलत उत्तर से तात्पर्य अशुद्ध उत्तर अथवा किसी भी प्रश्न के एक से अधिक उत्तर से है। किसी भी प्रश्न से संबंधित गोले या बबल को खाली छोड़ना गलत उत्तर नहीं माना जायेगा।
7. प्रश्न-पत्र पुस्तिका एवं उत्तर पत्रक के लिफाफे की सील खोलने पर परीक्षार्थी वह सुनिश्चित कर लें कि उसके प्रश्न-पत्र पुस्तिका पर वही सीरीज अंकित है जो उत्तर पत्रक पर अंकित है। इसमें कोई भिन्नता हो तो वीक्षक से प्रश्न-पत्र की ही सीरीज वाला दूसरा प्रश्न-पत्र का लिफाफा प्राप्त कर लें। ऐसा न करने पर जिम्मेदारी अभ्यर्थी की होगी।
8. मोबाईल फोन अथवा इलेक्ट्रॉनिक यंत्र का परीक्षा हॉल में प्रयोग पूर्णतया वर्जित है। यदि किसी अभ्यर्थी के पास ऐसी कोई वर्जित सामग्री मिलती है तो उसके विरुद्ध आयोग द्वारा नियमानुसार कार्यवाही की जायेगी।
9. कृपया अपना रोल नम्बर ओ.एम.आर. पत्रक पर सावधानी पूर्वक सही भरें। गलत अथवा अपूर्ण रोल नम्बर भरने पर 5 अंक कुल प्राप्तांकों में से अनिवार्य रूप से काटे जाएंगे।

चेतावनी : अगर कोई अभ्यर्थी नकल करते पकड़ा जाता है या उसके पास से कोई अनधिकृत सामग्री पाई जाती है, तो उस अभ्यर्थी के विरुद्ध पुलिस में प्राथमिकी दर्ज कराई जायेगी और आर. पी. ई. (अनुचित साधनों की रोकथाम) अधिनियम, 1992 के नियम 3 के तहत कार्यवाही की जायेगी। साथ ही आयोग ऐसे अभ्यर्थी को भविष्य में होने वाली आयोग की समस्त परीक्षाओं से विवर्जित कर सकता है।

- 1 Consider a sequence of numbers in base X
245, 556, 112, 332, 163, 852, 332

From above data it can be inferred that

- (1) $X \geq 8$
 - (2) $X \leq 8$
 - (3) $X \geq 9$
 - (4) $X \leq 9$
- 2 A 2-byte data $d_{15}d_{14}d_{13}d_{12}d_{11}d_{10}$ is transmitted from A to B. Here d_0 represents LSB (least significant bit). If transmitted value is 1947 and received value is 1663, bits in error are
- (1) $d_7d_4d_3d_2$
 - (2) $d_8d_5d_4d_2$
 - (3) $d_7d_5d_3d_2$
 - (4) insufficient data to infer correct results

3

```
#include <stdio.h>
int main(void) {
    int a=10, b=20;
    a, b = (b, a);
    printf("%d %d\n", a, b);
}
```

Output of this program shall be

- (1) 20 10
- (2) 10 10
- (3) 20 20
- (4) Program can not be compiled as line 4 is in error.

4 Owing to a faulty implementation of compiler, precedence of operators from highest to lowest is assigned as follows:

Addition, Multiplication, Subtraction and Division

Expression $23 + 53 - 18 * 2 / 4$ shall result in an output value of

- (1) 67
- (2) 3
- (3) 10
- (4) 76

5 Consider an expression

$$A \otimes A \otimes A \dots \dots \dots A \otimes A$$

Here \otimes represents XOR operation. This boolean expression evaluates to

- (1) FALSE if number of XOR operations are even.
- (2) FALSE if number of XOR operations are odd.
- (3) TRUE if A is TRUE
- (4) TRUE if A is FALSE

6 $X_4 = 573_8$. Value of X is

- (1) 13312
- (2) 22323
- (3) 23312
- (4) 12323

7 Consider a 16 bit computer system in which signed numbers are represented using 2's complement. Most significant bit represents sign and is 0 for positive numbers and 1 for negative numbers. Consider two signed numbers $A = C91C_{16}$ and $B = F1EE_{16}$

- (1) $A \geq B$
- (2) $A \leq B$
- (3) magnitude of A = magnitude of B
- (4) Insufficient data to infer results.

8 Right shifting a number N (in radix r number system) by m places equivalent to

- (1) dividing number by r^m
- (2) multiplying number by r^m
- (3) dividing number by r^{m-1}
- (4) multiplying number by r^{m-1}

9 Value of $2453_7 + 4136_7$ is given by

- (1) 6226_7
- (2) 2626_7
- (3) 6622_7
- (4) 6262_7

10 What is outcome of following?

$$A = A \oplus B$$

$$B = A \oplus B$$

$$A = A \oplus B$$

- (1) $A = \text{TRUE}$, $B = \text{TRUE}$.
- (2) $A = \text{FALSE}$, $B = \text{FALSE}$.
- (3) A and B are complement of each other.
- (4) Values of A and B are swapped (exchanged).

11 Consider following C code fragment:

unsigned char a, b, flag;

a = 8;

b = a << 4;

flag = num & b;

Value of flag is TRUE if and only if

- (1) LSB (least significant bit) of num is one.
- (2) MSB (most significant bit) of num is one.
- (3) num is a negative number.
- (4) Both num and b are TRUE.



12 Consider following C code fragment :

```
int *pa, *pb;  
  
(*pa) = 25;  
  
pb = pa;  
  
(*pa)++;  
  
pb++;  
  
printf("%d \t %d\n", (*pa), (*pb));
```

Output of this code is

- (1) 25,26
- (2) 26,25
- (3) 26,27
- (4) 26, unknown

13 A is set of all English alphabets and D is set of digits.

$$A = \{ 'a', 'b', \dots, 'y', 'z', 'A', 'B', \dots, 'Y', 'Z' \}$$

$$D = \{ '0', '1', \dots, '8', '9' \}$$

An identifier in C can be described by following regular expression

- (1) a^+ , $a \in A$
- (2) a^+ , $a \in A \cup D$
- (3) a^+b^* , $a \in A, b \in D$
- (4) ab^* , $a \in A, b \in A \cup D$

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- 14 Which of the following data types is not supported by C language.
- (1) char
 - (2) long
 - (3) double
 - (4) string

- 15 What shall be output of following statement ?
- unsigned char c;
- c = c >> 8;
- (1) zero if c is even and one if c is odd
 - (2) one if c is even and zero if c is odd
 - (3) zero if $c \geq 128$ otherwise one
 - (4) zero if ≤ 128 otherwise one

- 16 A C compiler reserves 1, 4, 8 bytes respectively for char, int, float data types. What shall be outcome of following C code fragment.

```
struct grade {  
    int m, s, l;  
    union {  
        char c[10]; int k;  
        int k;  
    }  
    float p;  
} a;  
printf("%d\n", sizeof(a));
```

- (1) 20
- (2) 30
- (3) 34
- (4) 40

17 Consider following statement

```
int a, b, c;
b = ~ a;
c = b ++;
```

- (1) c is 1's complement of a
- (2) c is always 0
- (3) c is 2's complement of a
- (4) c is always 1

18 A continue statement in a while loop shall

- (1) transfer control to statement just before while loop
- (2) transfer control to first statement of while loop
- (3) transfer control to last statement of while loop
- (4) transfer control to test condition of while loop

19 Which of the following values can not be an argument to switch statement in C?

- (1) 'X'
- (2) 2
- (3) 2.3
- (4) '2'

20 Which of the following is not a valid C constant?

- (1) "234"
- (2) 'XY'
- (3) 0x12A
- (4) 0237



- 21 Which of the following sorting methods is not suited for an already sorted sequence?
- (1) mergesort
 - (2) selection sort
 - (3) bubble sort
 - (4) insertion sort
- 22 In a double linked list, next and prev are pointers to next and previous nodes of the current node. For first node, prev is null and for last node next is null. Following four statements are needed to insert a new node x after node t.
- (Statement A) `t->next = x;`
 - (Statement B) `x->prev = t;`
 - (Statement C) `x->next = t->next;`
 - (Statement D) `t->next->prev = x;`
- Correct order of these statements for insertion shall be
- (1) C, D, A, B
 - (2) A, B, C, D
 - (3) D, C, B, A
 - (4) B, C, A, D
- 23 Minimum and maximum height of a binary search tree of n nodes is
- (1) $1, \log_2 n$
 - (2) $\log_2 n, \log_2 n$
 - (3) $\log_2 n, n$
 - (4) n, n^2



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24 Which of the following statements describe Binary Search Tree correctly?
For every node, value

- (1) is more than value at its left child and less than value at its right child.
- (2) is less than value at both its left and right child.
- (3) is more than value at any node in left subtree and less than value at any node in its right subtree.
- (4) Both (1) and (3).

25 Consider n elements $a_1, a_2, \dots, a_{n-1}, a_n$. These elements are pushed into stack one by one. After every two push, one pop operation is carried out. Contents of stack after all elements have been pushed shall be

- (1) $a_1, a_3, a_5, \dots, a_{n-1}$ (n is even) otherwise $a_1, a_3, a_5, \dots, a_{n-2}, a_n$ (n is odd)
- (2) $a_2, a_4, a_6, \dots, a_n$ (n is even) otherwise $a_2, a_4, a_6, \dots, a_{n-2}, a_{n-1}$ (n is odd)
- (3) $a_1, a_3, a_5, \dots, a_{n-1}$ (n is even) otherwise $a_2, a_4, a_6, \dots, a_{n-2}, a_{n-1}$ (n is odd)
- (4) $a_2, a_4, a_6, \dots, a_n$ (n is even) otherwise $a_1, a_3, a_5, \dots, a_{n-2}, a_n$ (n is odd)

26 Inorder and preorder traversal of a tree are UVXQTRWN and QXUVTRWN. Postorder traversal for this tree is given by

- (1) VUXTWNRQ
- (2) VUXWNRTQ
- (3) VUXWNTRQ
- (4) VUXWRNTQ

27 Binary search is applicable in

- (1) Array and AVL tree
- (2) Array and Heap tree
- (3) Queue and AVL tree
- (4) Queue and Heap tree

5
5
5
5
5

28 Lexicographical ordering refers to occurrence of words in dictionary. As "Above" comes before "Able", "Above" < "Able" in lexicographical ordering. Time complexity to determine lexicographical ordering of two English words of length m and n is

- (1) $O(\log_2(m+n))$
- (2) $O(m+n)$
- (3) $O(\min(m,n))$
- (4) $O(\max(m,n))$

29 Time to determine mean of a sorted array of n elements is given by

- (1) $O(\log_2 n)$
- (2) $O(n^2)$
- (3) $O(n)$
- (4) $O(n^{1/2})$

30 Assuming all numbers are in 2's complement representation, which of the following numbers is divisible by 11401011 ?

- (1) 11100111
- (2) 11100100
- (3) 11010111
- (4) 11011011

31 The Dining Graduate Students problem is as follows. Six graduate students are seated around a table with a large deep dish pizza in the middle. Graduate students are very refined and so they eat pizza with forks and knives. There are three forks and three knives in a pile next to the pizza. Each student uses the following algorithm to eat - (i) Pick up a knife, (ii) Pick a fork, (iii) Cut out a slice of pizza and eat it, (iv) Return the knife and fork to the pile. Which of the following is a correct statement for this problem.

- (1) Deadlock can occur but may be avoided.
- (2) Deadlock can occur and can not be avoided.
- (3) Deadlock can not occur.
- (4) None of the above

- 32 Pointer head points to first node of a linked list. Each node has link to next node. Time complexity to swap values of p^{th} and q^{th} nodes shall be
- (1) $O(p^2+q^2)$
 - (2) $O(\max(p,q))$
 - (3) $O(1)$
 - (4) $O((p+q)^2)$
- 33 Consider a schema $R(A, B, C, D)$ and functional dependencies $A \rightarrow B$ and $C \rightarrow D$. Then the decomposition of R into $R_1(AB)$ and $R_2(CD)$ is
- (1) dependency preserving but not lossless join
 - (2) lossless join but not dependency preserving
 - (3) dependency preserving and lossless join
 - (4) not dependency preserving and not lossless join
- 34 If \max is a function that returns the larger of the two integers, given as arguments, then which of the following statements finds the largest of three given numbers?
- (1) $\max(\max(a,b), \max(a,c))$
 - (2) $\max(\max(a,b), \max(b,c))$
 - (3) $\max(b, \max(a,c))$
 - (4) all of the above
- 35 Every node of a tree has exactly 3 children. If root is at height 1, number of nodes in a full tree (every level is full except last level that consists of leaf nodes only) of height h is given by
- (1) $(3^h-1)/2$
 - (2) $(3^{h+1}-1)/2$
 - (3) $(3^{h-1}-1)/2$
 - (4) (3^h-1)

36 Which one of the following regular expressions is NOT equivalent to the regular expression $(a+b+c)^*$?

- (1) $(a^*+b^*+c^*)^*$
- (2) $(a^*b^*c^*)^*$
- (3) $(a^*b^*+c^*)^*$
- (4) $((ab)^*+c^*)^*$

37 The grammar having production rules $S \rightarrow AB \mid AS, A \rightarrow aA \mid a, B \rightarrow b$ generates

- (1) $a a^*b$
- (2) $a (ab)^* b$
- (3) $(ab)^*$
- (4) $a a^* b^+$

38 `char c1 = -128, c2, c3;`

`c2 = c1+10;`

`c3 = c1-10;`

`printf("%d %d", c2, c3);`

For above C code fragment, answer would be

- (1) -118 +118
- (2) -118 -138
- (3) 10 -118
- (4) 10 -10

```

39 int main(void) {

    int a, b, c;

    a = 29;  b = 6;  c = ++a/b--;

    printf("%f \n", (float) c);

    return 1;

}

```

Above C code, when executed, displays

- (1) 5.8
- (2) 5.0
- (3) 6.0
- (4) 6.8

40 In C two int variables are initialized as follows

```

int A, B;

A = 0x98F0; B = 0x54CF;

printf("%x \t %x \n", A & B, A | B);

```

Execution of above code shall print

- (1) 10C0 CDFE
- (2) C010 DCFE
- (3) 10C0 DCFE
- (4) C010 CDFE

```
41 #include <stdio.h>

void main(void) {
    int a;

    a = 10--;

    return;
}
```

Compilation of above C code yields error: lvalue required as decrement operand. This may be because

- (1) Function main does not accept void as argument.
 - (2) Decrement operator can not be applied to a constant.
 - (3) variable a is of type int and can not be assigned a constant.
 - (4) Function main does not return any value.
- 42 Which of the following is an universal gate?
- (1) AND
 - (2) NAND
 - (3) OR
 - (4) UGATE
- 43 A ROM is used to store the table for multiplication of two 8-bit unsigned integers. The size of ROM (in bytes) required is
- (1) 256×4
 - (2) 64 K
 - (3) $4 \text{ K} \times 16$
 - (4) $64 \text{ K} \times 4$

44 The best data structure to check whether an arithmetic expression has balanced parentheses is a/an

- (1) stack
- (2) priority queue
- (3) array
- (4) linked list

45 If A^C represents complement of set A and U represents universal set, choose the correct statement.

- (1) $(A^C \cup B)^C = (A \cap B)^C$
- (2) $(A^C \cup B)^C = (A \cap U)^C$
- (3) $(A^C \cup B)^C = (A \cap B^C)$
- (4) $(A^C \cup B)^C = (A \cap U^C)$

46 It is given that a pointer requires 4 bytes and an integer needs 2 bytes. For the following C variable declaration

```
int *a[10], b[10][10];
```

Which of the following statements shall print same values ?

- I `printf("%p %p", &a[10], &a[0]+4*10);`
- II `printf("%p %p", &b[0], &b[0][0]);`
- III `printf("%p %p", b, &b[0]);`
- IV `printf("%p %p", a, b);`

- (1) I, II, and IV only
- (2) II, and III only
- (3) II and IV only
- (4) IV only



- 51 Consider the statement, "Either $-3 \leq x < 5$ or $x \geq 10$ ". The negation of this statement is
- (1) $x < -3$ or $5 < x \leq 10$
 - (2) $x \leq -3$ or $5 \leq x < 10$
 - (3) $x < -3$ or $5 \leq x < 10$
 - (4) $x \leq -3$ or $5 \leq x \leq 10$
- 52 Identify incorrect statement.
- (1) A 2-PDA is as powerful as Turing machine.
 - (2) A multi-tape Turing machine has more computational power than single tape Turing machine.
 - (3) A deterministic finite state machine can be used for lexical analysis.
 - (4) PDA is not as computationally powerful as Turing Machine.
- 53 Number of k -maps for 5 boolean variables are
- (1) 2^5
 - (2) $2^2 \times 2^2 \times 2^2 \times 2^2 \times 2^2$
 - (3) $2^2 \times 2^5$
 - (4) 2^{32}
- 54 Consider following C code segment. What is the output ?
- ```
char *s[6] = {"these", "fruit", "are", "sweet"};
printf("%c %c %c %c", s[0][0], s[1][1], s[2][2], s[3][3]);
```
- (1) tfas
  - (2) sweet
  - (3) tree
  - (4) these fruit are sweet

- 55 Correct order of phases of code compilation is
- (1) syntax, lexical, semantics, intermediate code generation
  - (2) lexical, intermediate code generation, syntax, semantics,
  - (3) lexical, syntax, intermediate code generation, semantics
  - (4) lexical, semantics, syntax, intermediate code generation
- 56 Correct sequence of operations in an Instruction cycle is
- (1) Operand(s) Fetch, Decode, Opcode Fetch, Execute
  - (2) Opcode Fetch, Decode, Operand(s) Fetch, Execute
  - (3) Decode, Opcode Fetch, Operand(s) Fetch, Execute
  - (4) Opcode Fetch, Decode, Execute, Operand(s) Fetch
- 57 In a 12 bit integer, least significant bit is set to zero and most significant bit is set to one. Range of values this integer can assume is
- (1) {0, 2, 4, 8,.....2048}
  - (2) {2048,2050,.....4094}
  - (3) {0, 1, 2, 3,.....2048}
  - (4) {2048,2049,.....4095}

- 58 Consider a swapping system in which memory consists of the following hole sizes

$H_0 = 32K, H_1 = 14K, H_2 = 10K, H_3 = 28K, H_4 = 17K, H_5 = 19K,$   
 $H_6 = 20K, H_7 = 15K.$

For successive requests of (i) 22 K, (ii) 6KB and (iii) 9KB, best fit shall allocate

- (1)  $H_0, H_0, H_1$
  - (2)  $H_3, H_3, H_2$
  - (3)  $H_3, H_1, H_0$
  - (4)  $H_7, H_6, H_5$
- 59 Consider a program P that consists of two source modules  $M_1$  and  $M_2$  contained in two different files. If  $M_1$  contains a reference to a function defined in  $M_2$ , the reference will be resolved at
- (1) run time
  - (2) compile time
  - (3) link time
  - (4) load time

- 60 The running time of an algorithm is given by

$$T(n) = T(n-1) + T(n-2), \text{ if } n > 2$$

$n$ , otherwise

the order of this algorithm is

- (1)  $n$
- (2)  $n^2$
- (3)  $\log_2 n$
- (4)  $n \log_2 n$

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- 61 Match the following sets
- |     |                   |    |              |
|-----|-------------------|----|--------------|
| I   | Memory management | a. | Throughput   |
| II  | Scheduling        | b. | Semaphore    |
| III | Thrashing         | c. | Segmentation |
| IV  | Critical Section  | d. | Preemptive   |
- (1) I-a, II-c, III-b, IV-d  
(2) I-d, II-b, III-c, IV-a  
(3) I-a, II-b, III-c, IV-d  
(4) I-e, II-d, III-a, IV-b
- 62 Maximum number of edges in a n-node undirected graph without self-loops is
- (1)  $n^2$   
(2)  $n(n-1)/2$   
(3)  $n(n-1)$   
(4)  $n(n+1)/2$
- 63 Which normal form is considered adequate for database design?
- (1) 3NF  
(2) 2NF  
(3) 1NF  
(4) 4NF

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64 For following two sets

- |     |                  |   |                    |
|-----|------------------|---|--------------------|
| I   | Compiler         | a | LRU                |
| II  | Function         | b | Extended machine   |
| III | Operating System | c | Language processor |
| IV  | Paging           | d | Call by value      |

Identify the correct matching.

- (1) I-c, II-d, III-b, IV-a
- (2) I-b, II-d, III-c, IV-a
- (3) I-c, II-d, III-a, IV-b
- (4) I-d, II-c, III-b, IV-a

65 If 73 (in base-x number system) is equal to 54 (in base y-number system), the possible values of x and y are

- (1) 8, 11
- (2) 8, 16
- (3) 9, 13
- (4) 10, 12

66 Consider a boolean function  $f = (a + bc).(pq + r)$ . Complement  $f'$  of function  $f$  is

- (1)  $(a' + b'c') (p'q' + r')$
- (2)  $a' (b' + c') + (p' + q') r'$
- (3)  $(a' + b'c') + (p'q' + r')$
- (4)  $(a'b'c') + (p'q'r')$

67 The minimum number of bits required to represent numbers in the range -28 to +31 is:

- (1) 5
- (2) 6
- (3) 7
- (4) 8

68 Consider the following code segment.

```

X = 1;
i = 1;
while (x ≤ 1000)
{
 x = 2x;
 i = i + 1;
}

```

What is the value of i at the end of the code segment?

- (1) 4
- (2) 5
- (3) 6
- (4) 7

69 Consider the following C function

```

void swap(int a, int b)
{
 int temp;
 temp=a;
 a = b;
 b=temp;
}

```

In order to exchange the values of the two variables x and y.

- (1) call swap(x, y)
- (2) call swap( &x, &y)
- (3) swap(x, y) cannot be used as it does not return any value
- (4) swap(x, y) cannot be used as the parameters are passed by value.

70. What will be the output of following code segment in C ?

```
#define fourth(x) x*x*x*x

void main() {
 int y=1;
 printf("%d",fourth(y+6));}
```

- (1) 25
- (2) 2401
- (3) 1296
- (4) None of the above

71. A static variable

- (1) can not be initialized
- (2) is initialized once at the commencement of execution and can not be changed at run time
- (3) retains its value throughout the file of the program
- (4) is same as an automatic variable but is placed at the end of a program

72. Addition of two n-bit numbers can generate a number having atmost

- (1)  $n+1$  bits
- (2)  $n+2$  bits
- (3)  $2n$  bits
- (4)  $n^2$  bits

73. The correct matching for the following pairs is

- |   |                    |   |                    |
|---|--------------------|---|--------------------|
| a | Activation record  | 1 | Linking loader     |
| b | Location counter   | 2 | Garbage collection |
| c | Reference counts   | 3 | Subroutine call    |
| d | Address relocation | 4 | Assembler          |

- (1) a-3, b-4, c-1, d-2
- (2) a-4, b-3, c-1, d-2
- (3) a-4, b-3, c-2, d-1
- (4) a-3, b-4, c-2, d-1

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74 Level order traversal of a rooted tree can be done by starting from the root and performing

- (1) preorder traversal
- (2) in-order traversal
- (3) depth first search
- (4) breadth first search

75 Match OS abstractions in left column to the hardware components in right column

- |                          |              |
|--------------------------|--------------|
| a. Thread                | 1. Interrupt |
| b. Virtual Address Space | 2. Memory    |
| c. File System           | 3. CPU       |
| d. Signal                | 4. Disk      |

- (1) a - 2, b - 4, c - 3, d - 1
- (2) a - 1, b - 2, c - 3, d - 4
- (3) a - 3, b - 2, c - 4, d - 1
- (4) a - 4, b - 2, c - 2, d - 1

76 Identify correct matching of the following sets.

- |                        |                       |
|------------------------|-----------------------|
| a. Transaction         | 1. index              |
| b. Natural join        | 2. relational algebra |
| c. B-tree              | 3. two phase locking  |
| d. Concurrency control | 4. ACID               |

- (1) a-1, b-2, c-3, d-4
- (2) a-2, b-1, c-4, d-3
- (3) a-3, b-2, c-1, d-4
- (4) a-4, b-2, c-1, d-3



- 77 Semantic errors can be detected at
- (1) compile time only
  - (2) run-time only
  - (3) both compile time and run-time only
  - (4) none of these
- 78 A 2-bit full adder circuit requires 2-input logic gates. Correct combination of these gates is ..
- (1) Two XOR gates, Two AND gates, One OR gate
  - (2) Two NOR gates, Two NAND gates
  - (3) One XOR gate, One AND gate, One OR gate
  - (4) None of the above
- 79 Which of the following is NOT a characteristic of relational DBMS?
- (1) tables
  - (2) tree-like structures
  - (3) complex logical relationships
  - (4) records
- 80 Palindromes can not be recognized by finite state machine because
- (1) it can not remember large amount of information
  - (2) it can not fix mid-point
  - (3) Even for a known mid-point, it can not check if second half matches first half.
  - (4) All of these

5  
5  
5  
5  
5

- 81 Interval between the time of submission and completion of the job is called
- (1) Waiting Time
  - (2) Turnaround Time
  - (3) Response Time
  - (4) Throughput
- 82 What is the place in a computer where the operating system, application programs, and data in current use are kept so that they can be quickly reached by the computer's A.
- (1) Access Control List
  - (2) Microprocessor
  - (3) Random Access Memory
  - (4) System Tray
- 83 The term 'page traffic' describes
- (1) Number of pages in memory at a given instant.
  - (2) Number of papers required to be brought in at a given page request.
  - (3) The movement of pages in and out of memory.
  - (4) Number of pages of executing programs loaded in memory.
- 84 To avoid the race condition, the number of processes that may be simultaneously inside their critical section is
- (1) any number
  - (2) 4
  - (3) 2
  - (4) 1

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- 85 The scheduling in which CPU is allocated to the process with least CPU-burst time is called
- (1) Priority Scheduling
  - (2) Shortest job first Scheduling
  - (3) Round Robin Scheduling
  - (4) Multilevel Queue Scheduling
- 86 Which of the following programming languages is related to AI (Artificial Intelligence) development?
- (1) C language
  - (2) C++ language
  - (3) Java language
  - (4) Prolog language
- 87 A program is 80% parallelizeable. Speedup by using 2 processors in parallel as compared to one processor only shall be
- (1) 1.25
  - (2) 1.5
  - (3) 1.67
  - (4) 2
- 88 The "blocking factor" of a file is.
- (1) The number of blocks accessible to a file
  - (2) The number of blocks allocated to a file
  - (3) The number of logical records in one physical record
  - (4) None of the above
- 89 The Banker's algorithm is used
- (1) To detect deadlock in operating system
  - (2) To prevent deadlock in operating system
  - (3) To reactify a deadlocked state.
  - (4) None of the above

- 90 Object oriented programmers primarily focus on
- (1) procedure to be performed
  - (2) the step by step statements needed to solve a problem
  - (3) the physical orientation of objects within a program
  - (4) objects and the tasks that must be performed with those objects

- 91 Consider the languages

$L1 = \{ww^R \mid w \in \{0, 1\}^*\}$  where  $w^R$  is the reverse of  $w$ .

$L2 = \{w\#w^R \mid w \in \{0, 1\}^*\}$ , where  $w^R$  is the reverse of  $w$ ,  
 $\#$  is a special symbol

$L3 = \{sw \mid w \in \{0, 1\}^*\}$

Which one of the following is TRUE?

- (1)  $L1$  is a deterministic CFL
- (2)  $L2$  is a deterministic CFL
- (3)  $L3$  is a CFL, but not a deterministic CFL
- (4)  $L3$  is a deterministic CFL.

- 92 Consider the following grammar.

$S \rightarrow (S)$

$S \rightarrow x$

Which of the following statements is (are) true?

- I. The grammar is ambiguous.
  - II. The grammar is suitable for top-down parsing.
  - III. The grammar is suitable for bottom-up parsing.
- (1) I only
  - (2) II only
  - (3) III only
  - (4) II and III only

- 93 Hamming distance between two  $10001111_2$  and  $10010011_2$  is
- (1) 3
  - (2) 4
  - (3) 6
  - (4) 7
- 94 Start and stop bits are used in serial communication for
- (1) error detection
  - (2) error correction
  - (3) synchronization
  - (4) speeding up communication
- 95 Type checking is normally done during
- (1) Lexical analysis
  - (2) Syntax analysis
  - (3) Syntax-directed translation
  - (4) Code optimization
- 96 "Employee's salary should not be greater than Rs. 7000". This is an example of
- (1) Infeasible constraint
  - (2) Integrity constraint
  - (3) Overdefined constraint
  - (4) Field constraint

97 Which of the following logic expression is incorrect:

- (1)  $(a + b) (a + \bar{b}) = a$
- (2)  $ab + \bar{a}c + bc = b + a\bar{c}$
- (3)  $\overline{(a+b)} = \bar{a} \bar{b}$
- (4)  $a + \bar{a}b = a + b$

98. Prefix and postfix expressions for following infix expressions are  $A+B+C*(D+E+F)$  ..

- (1)  $++AB*C+*DEF, AB+CDE*F++$
- (2)  $+AB+*C+*DEF, AB+C+DE*F+*$
- (3)  $*++ABC+*DEF, AB+CDE*F++$
- (4)  $++AB*C+*DEF, AB+CD+E*F++$

99 Consider two cache organizations: the first one is 32 KB 2-way set associative with 32- byte block size. The second one is of the same size but direct mapped. The size of an address is 32 bit in both cases. A 2-to-1 multiplexer has latency of 0.6 ns while a k-bit comparator has a latency of  $k/10$  ns. The hit latency of the set associative organization is  $h_1$ , while that of the direct mapped one is  $h_2$ . The value of  $h_1$  and  $h_2$  will be.

- (1) 2.4 ns and 2.3 ns
- (2) 2.1 ns and 1.3 ns
- (3) 1.1 ns and 1.8 ns
- (4) 1.7 ns and 1.6 ns

100 The addressing mode used in an instruction of the form  $ADD AX, M$  is:

- |              |               |
|--------------|---------------|
| (1) direct   | (2) immediate |
| (3) indirect | (4) index     |