Test Centre : _____

Roll No. : _____

Name of the Candidate : _____

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Entrance Test for M.Sc. (Computer Science) 2017

[PROGRAMME CODE : 30004]

Question Paper Series Code : A

QUESTION PAPER

Time : 3 hours *Maximum Marks* : 100

INSTRUCTIONS FOR CANDIDATES

Candidates must carefully read the following instructions before attempting the Question Paper :

(i) Write your Name, Roll Number and Name of the Test Centre in the space provided for the purpose on the top of this Question Paper and on the OMR Sheet.

(ii) This Question Paper has Two Parts : Part—A and Part—B.

(iii) Part—A (objective-type) has 40 questions of **1** mark each. All questions are compulsory.

(iv) Part—B (objective-type) has 60 questions of **1** mark each. All questions are compulsory.

(v) **A wrong answer will lead to the deduction of one-fourth (¼) of the marks assigned to that question.**

(vi) *Symbols have their usual meanings.*

(vii) **Please darken the appropriate circle of 'Question Paper Series Code' and 'Programme Code' on the OMR Sheet in the space provided.**

(viii) All questions should be answered on the OMR Sheet.

(ix) Answers written inside the Question Paper will **NOT** be evaluated.

(x) Calculators and Log Tables may be used. **Mobile Phones are not allowed.**

(xi) Pages at the end of the Question Paper have been provided for Rough Work.

(xii) **Return the Question Paper and the OMR Sheet** to the Invigilator at the end of the Entrance Test.

(xiii) **DO NOT FOLD THE OMR SHEET.**

INSTRUCTIONS FOR MARKING ANSWERS ON THE 'OMR SHEET'

Use BLUE/BLACK Ballpoint Pen Only

1. **Please ensure that you have darkened the appropriate circle of 'Question Paper Series Code' and 'Programme Code' on the OMR Sheet in the space provided.**

   Question Paper Series Code

   Write Question Paper Series Code **A** or **B** in the box and darken the appropriate circle.

   ☐ **A** or **B**

   ● Ⓑ

2. Use only Blue/Black Ballpoint Pen to darken the circle. Do not use Pencil to darken the circle for Final Answer.
3. Please darken the whole circle. ●
4. Darken ONLY ONE CIRCLE for each question as shown below in the example :

   Example :

Wrong	Wrong	Wrong	Wrong	Correct
● ⓑ ⓒ ●	⊘ ⓑ ⓒ ⓓ	⊘ ⓑ ⓒ ⊘	◉ ⓑ ⓒ ●	ⓐ ⓑ ⓒ ●

5. Once marked, no change in the answer is possible.
6. Please do not make any stray marks on the OMR Sheet.
7. Please do not do any rough work on the OMR Sheet.
8. Mark your answer only in the appropriate circle against the number corresponding to the question.
9. **A wrong answer will lead to the deduction of one-fourth of the marks assigned to that question.**
10. Write your six-digit Roll Number in small boxes provided for the purpose; and also darken the appropriate circle corresponding to respective digits of your Roll Number as shown in the example below.

    Example :

    ROLL NUMBER

1	3	5	7	2	0	2
●	①	①	①	①	①	①
②	②	②	②	●	②	●
③	●	③	③	③	③	③
④	④	④	④	④	④	④
⑤	⑤	●	⑤	⑤	⑤	⑤
⑥	⑥	⑥	⑥	⑥	⑥	⑥
⑦	⑦	⑦	●	⑦	⑦	⑦
⑧	⑧	⑧	⑧	⑧	⑧	⑧
⑨	⑨	⑨	⑨	⑨	⑨	⑨
⓪	⓪	⓪	⓪	⓪	●	⓪

PART—A

1. The function $f(x) = \sin^{-1}(\sin x)$ is

   a. periodic with period 2π

   b. periodic with period π

   c. periodic with period $\frac{\pi}{2}$

   d. non-periodic

2. The value of $\lim_{x \to 0} \frac{1 + x + x^2 - e^{-x}}{x^2}$ is equal to

   a. 1

   b. 0

   c. $\frac{1}{2}$

   d. 2

3. If $f : R \to R$ is defined by

$$f(x) = \begin{cases} \frac{\cos 3x - \cos x}{x^2}, & x \neq 0 \\ \alpha, & x = 0 \end{cases}$$

   and if f is continuous at $x = 0$, then α is equal to

   a. -2

   b. -4

   c. 1

   d. 2

4. If $f(x) = \cos x$ and $g(x) = [x + 1]$, where $[\cdot]$ denotes the greatest integer function, then $(g \circ f)'\left(\frac{\pi}{2}\right)$ is

   a. 0

   b. 1

   c. -1

   d. non-existent

5. If $f''(x) = -f(x)$ and $g(x) = f'(x)$, and $F(x) = \left\{f\left(\frac{x}{2}\right)\right\}^2 + \left\{g\left(\frac{x}{2}\right)\right\}^2$ and given that $F(5) = 5$, then $F(10)$ is

a. 5

b. 10

c. 0

d. 15

6. If

$$f(x) = \begin{cases} \frac{[x]-1}{x-1}, & x \neq 1 \\ 0, & x = 1 \end{cases}$$

where $[\cdot]$ denotes the greatest integer function, then at $x = 1$, $f(x)$ is

a. continuous and differentiable

b. differentiable but not continuous

c. continuous but not differentiable

d. neither continuous nor differentiable

7. If $s = 4t + \frac{1}{t}$ is the equation of motion of a particle, then its acceleration when velocity vanishes will be

a. 0

b. 16

c. 8

d. 1

8. If $\int_{\sin x}^{1} t^2 f(t)\,dt = 1 - \sin x$, for all $x \in \left[0, \frac{\pi}{2}\right]$, then $f\left(\frac{1}{\sqrt{3}}\right)$ is

a. 3

b. $\sqrt{3}$

c. $\frac{1}{3}$

d. 3^2

9. If $f(x)$ is a function defined on R such that $f'(x) = f'(x-1)$ for all $x \in [0, 1]$, $f(0) = 1$ and $f(1) = 41$, then $\int_0^1 f(t)dt$ equals

a. 41

b. 42

c. $\sqrt{41}$

d. 21

10. The solution of the differential equation $\cos x\, dy = y(\sin x - y)\, dx$, $0 < x < \frac{\pi}{2}$, is

a. $y \tan x = \sec x + c$

b. $\tan x = y \sec x + c$

c. $\sec x = (\tan x + c)\, y$

d. $y \sec x = (\tan x + c)$

11. The equation of the curve, in which the portion of the tangent included between the coordinate axes is bisected at the point of contact, represents

a. a parabola

b. an ellipse

c. a circle

d. a hyperbola

12. If the position vector of a point A is $\vec{a} + 2\vec{b}$ and $\vec{a}$ divides AB in the ratio 2 : 3, then the position vector of B is

a. $2\vec{a} - \vec{b}$

b. $\vec{b} - 2\vec{a}$

c. $\vec{a} - 3\vec{b}$

d. $\vec{b}$

13. If the points with position vectors $20\hat{i} + p\hat{j}$, $5\hat{i} - \hat{j}$ and $10\hat{i} - 13\hat{j}$ are collinear, then p is

a. 7

b. –37

c. –7

d. 37

14. If the position vectors of the vertices of a triangle are $2\hat{i} - \hat{j} + \hat{k}$, $\hat{i} - 3\hat{j} - 5\hat{k}$ and $3\hat{i} - 4\hat{j} - 4\hat{k}$, then the triangle is

a. equilateral

b. isosceles

c. right-angled isosceles

d. right-angled

15. If a, b, c are the pth, qth, rth terms of a harmonic progression, then the vectors $\vec{u} = \frac{1}{a}\hat{i} + \frac{1}{b}\hat{j} + \frac{1}{c}\hat{k}$ and $\vec{v} = (q-r)\hat{i} + (r-p)\hat{j} + (p-q)\hat{k}$

a. are parallel

b. are orthogonal

c. satisfy $\vec{u} \cdot \vec{v} = 1$

d. satisfy $|\vec{u} \times \vec{v}| = \hat{i} + \hat{j} + \hat{k}$

16. Three vectors $\vec{a}$, $\vec{b}$, $\vec{c}$ are such that $\vec{a} \times \vec{b} = 3(\vec{a} \times \vec{c})$. Also $|\vec{a}| = |\vec{b}| = 1$ and $|\vec{c}| = \frac{1}{3}$. If the angle between $\vec{b}$ and $\vec{c}$ is $\frac{\pi}{3}$, then

a. $\vec{b} = 3\vec{c} + \vec{a}$

b. $\vec{b} = 3\vec{a} - \vec{c}$

c. $\vec{b} = 3\vec{c} + 2\vec{a}$

d. $\vec{b} = 3\vec{c} - 2\vec{a}$

17. If the mean of a set of observations $x_1, x_2, ..., x_n$ is $\bar{X}$, then the mean of the observations $x_i + 2i$; $i = 1, 2, ..., n$ is

a. $\bar{X} + 2$

b. $\bar{X} + 2n$

c. $\bar{X} + (n + 1)$

d. $\bar{X} + n$

18. A group of 10 items has the arithmetic mean 6. If the arithmetic mean of 4 of those items is 7·5, then the mean of the remaining items is

a. 6·5

b. 5·5

c. 4·5

d. 5·0

19. If the standard deviation of a variable X is 2, then the standard deviation of the variable $\frac{2X+3}{7}$ is

a. 4

b. $\frac{4}{7}$

c. $\frac{8}{7}$

d. 1

20. Odds in favor of an event A are 2 to 1 and odds in favor of $A \cup B$ are 3 to 1. Consistent with this information, the smallest and the largest values for the probability of an event B are given by

a. $\frac{1}{6} \leq P(B) \leq \frac{1}{3}$

b. $\frac{1}{3} \leq P(B) \leq \frac{1}{2}$

c. $\frac{1}{12} \leq P(B) \leq \frac{3}{4}$

d. $\frac{1}{6} \leq P(B) \leq \frac{1}{2}$

21. Let E and F be two independent events. The probability that exactly one of them occurs is $\frac{11}{25}$ and the probability of none of them occurring is $\frac{2}{25}$. If $P(T)$ denotes the probability of occurrence of the event T, then

a. $P(E)=\frac{4}{5},\ P(F)=\frac{3}{5}$

b. $P(E)=\frac{1}{5},\ P(F)=\frac{2}{5}$

c. $P(E)=\frac{2}{5},\ P(F)=\frac{3}{5}$

d. $P(E)=\frac{4}{5},\ P(F)=\frac{1}{5}$

22. If C and D are two events such that $C \subsetneq D$ and $P(D) \neq 0$, then the correct statement is

a. $P\left(\frac{C}{D}\right)=P(C)$

b. $P\left(\frac{C}{D}\right) \geq P(C)$

c. $P\left(\frac{C}{D}\right)<P(C)$

d. $P\left(\frac{C}{D}\right)=\frac{P(C)}{P(D)}$

23. Let A and B be two independent events. If $P(A)=0{\cdot}3$ and $P(A \cup B^C)=0{\cdot}8$, then $P(B)$ is

a. $\frac{1}{7}$

b. $\frac{3}{7}$

c. $\frac{4}{7}$

d. $\frac{2}{7}$

24. The number of ways in which m students can be distinguished equally among m sections is

a. $\frac{(mn)!}{n!}$

b. $\frac{(mn)!}{(n!)^m}$

c. $\frac{(mn)!}{m!n!}$

d. $(mn)^m$

25. The number of proper divisors of 2520 is

a. 46

b. 52

c. 64

d. 48

26. The number of ways in which a team of eleven players can be selected from 22 players including 2 of them and excluding 4 of them is

a. ${}^{16}C_{11}$

b. ${}^{16}C_5$

c. ${}^{16}C_9$

d. ${}^{20}C_9$

27. $x^{\frac{1}{2}} \cdot x^{\frac{1}{4}} \cdot x^{\frac{1}{8}} \cdot x^{\frac{1}{16}} \ldots$ to ∞ is equal to

a. 0

b. 1

c. x

d. ∞

28. The set of values of parameter a, for which the function $f: R \to R$ defined by $f(x) = ax + \sin x$ is bijective, is

a. $[-1, 1]$

b. $R - (-1, 1)$

c. $R - [-1, 1]$

d. $R - (-1, 1]$

29. Let n be a fixed positive integer. If a relation R is defined on the set Z of integers by ${}_aR_b$ if and only if n divides $(a - b)$, then R is not

a. reflexive

b. symmetric

c. transitive

d. None of the above

30. If A and B are two sets such that $n(A \cap B^C) = 9$, $n(A^C \cap B) = 10$ and $n(A \cup B) = 24$, then $n(A \times B)$ is

a. 105

b. 210

c. 70

d. 90

31. The equation $5^{1+\log_5 \cos x} = 2 \cdot 5$ has

a. no solution

b. one solution

c. two solutions

d. more than two solutions

32. The least integral value of k, for which $(k-2)x^2 + 8x + k + 4 \geq 0$ for all $x \in R$, is

a. 5

b. 4

c. 3

d. None of the above

33. If

$$A=\begin{bmatrix}1 & 0 & 0\\ 0 & 1 & 1\\ 0 & -2 & 4\end{bmatrix} \text{ and } 6A^{-1}=A^2+cA+dI$$

then (c, d) is

a. $\{-6, 11\}$

b. $\{-11, 6\}$

c. $\{11, 6\}$

d. $\{6, 11\}$

34. If the trivial solution is the only solution of the system of equations $x-ky+z=0$, $kx+3y-kz=0$, and $3x+3y-z=0$, then the set of values of k is

a. $R-\{2\}$

b. $R-\{-3\}$

c. $\{2, -3\}$

d. $R-\{2, -3\}$

35. If α, β and γ are the roots of $x^3+ax^2+b=0$, then the value of

$$\begin{vmatrix}\alpha & \beta & \gamma\\ \beta & \gamma & \alpha\\ \gamma & \alpha & \beta\end{vmatrix}$$

is

a. $-a^3$

b. a^3-3b

c. a^3

d. a^2-3b

36. If $\begin{vmatrix}x & 2 & x\\ x^2 & x & 6\\ x & x & 6\end{vmatrix}=ax^4+bx^3+cx^2+dx+e$, then the value of $5a+4b+3c+2d+e$ is equal to

a. 0

b. −16

c. 16

d. −11

37. If $a \neq p$, $b \neq q$, $c \neq r$ and $\begin{vmatrix} p & b & c \\ p+a & q+b & 2c \\ a & b & r \end{vmatrix} = 0$, then $\frac{p}{p-a} + \frac{q}{q-b} + \frac{r}{r-c}$ is equal to

a. 3

b. 2

c. 1

d. 0

38. If a, b and c are in arithmetic progression, then the value of $(a+2b-c)(2b+c-a)(a+2b+c)$ is

a. $16abc$

b. $4abc$

c. $8abc$

d. $3abc$

39. If a, b and c are the pth, qth and rth terms of harmonic progression respectively, then

$$\begin{vmatrix} bc & ca & ab \\ p & q & r \\ 1 & 1 & 1 \end{vmatrix}$$

equals

a. 1

b. 0

c. -1

d. None of the above

40. The sum of n terms of the series $1+(1+x)+(1+x+x^2)+\ldots$ is

a. $\frac{1-x^n}{1-x}$

b. $\frac{x(1-x^n)}{1-x}$

c. $\frac{x(1-x)-x(1-x^n)}{(1-x)^2}$

d. None of the above

PART—B

41. The truth table for $(p \vee q) \vee (p \wedge r)$ is the same as the truth table for

a. $(p \vee q) \wedge (p \vee r)$

b. $(p \vee q) \wedge r$

c. $(p \vee q) \wedge (p \wedge r)$

d. $(p \vee q)$

42. If A and B are sets and $A \cup B = A \cap B$, then

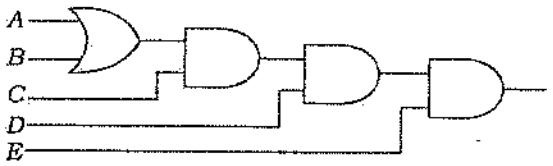
a. $A = \Phi$

b. $B = \Phi$

c. $A = B$

d. None of the above

43. Which of the following Boolean expressions represents the function of the logic circuit shown below?



a. $(A + B)[C + (DE)]$

b. $C(A + B)DE$

c. $(AB)(C + D + E)$

d. $(C(A + B)D)E$

44. Minterms are also called

a. standard sums

b. standard products

c. standard divisions

d. standard subtractions

45. If $f : R \to R$ is defined by $f(x) = x^2 + 1$, then the values of $f^{-1}(17)$ and $f^{-1}(-3)$ are respectively

a. $\{\varnothing\}, \{4, -4\}$

b. $\{3, -3\}, \{\varnothing\}$

c. $\{\varnothing\}, \{3, -3\}$

d. $\{4, -4\}, \varnothing$

46. Let $n(A)$ denote the number of elements in set A. If $n(A) = p$ and $n(B) = q$, then how many ordered pairs (a, b) are there with $a \in A$ and $b \in B$?

a. p^2

b. $p \times q$

c. $p + q$

d. 2^{pq}

47. Let R be a relation "$(x - y)$ is divisible by m", where x, y and m are integers and $m > 1$, then R is

a. symmetric, but not transitive

b. a partial order

c. an equivalence relation

d. anti-symmetric, but not transitive

48. Which of the following sets are null sets?

I. $X = \{x | x = 9,\ 2x = 4\}$

II. $Y = \{x | x = 2x,\ x \neq 0\}$

III. $Z = \{x | x - 8 = 4\}$

a. I and II only

b. I, II and III

c. I and III only

d. II and III only

49. Which one of the following standard SOP expressions corresponds to the truth table given below?

Inputs			*Outputs*
A	*B*	*C*	*X*
0	0	0	0
0	0	1	1
0	1	0	0
0	1	1	1
1	0	0	0
1	0	1	0
1	1	0	1
1	1	1	0

a. $X = A'B'C' + ABC + AB'C$

b. $X = ABC + ABC' + A'BC$

c. $X = AB'C + A'B'C + ABC'$

d. $X = A'B'C + A'BC + ABC'$

50. If f and g be the functions from the set of integers to itself, defined by $f(x) = 2x + 1$ and $g(x) = 3x + 4$, then the composition of f and g will be

a. $6x + 9$

b. $6x + 7$

c. $6x + 6$

d. $6x + 8$

51. The inverse of the function $f(x) = x^3 + 2$ is

a. $f^{-1}(y) = (y-2)^{1/2}$

b. $f^{-1}(y) = (y-2)^{1/3}$

c. $f^{-1}(y) = (y)^{1/3}$

d. $f^{-1}(y) = (y-2)$

52. The binary equivalent of the decimal number 231 is

a. $(11010111)_2$

b. $(10111011)_2$

c. $(11100011)_2$

d. $(11100111)_2$

53. Consider the statement, "Either $-2 \leq x \leq -1$ or $1 \leq x \leq 2$." The negation of this statement is

a. $x < -2$ or $2 < x$ or $-1 < x < 1$

b. $x < -2$ or $2 < x$

c. $-1 < x < 1$

d. $-2 < x < 2$

54. The hexadecimal equivalent of the binary number $(101101111010)_2$ is

a. $(B3A)_{16}$

b. $(B5B)_{16}$

c. $(B7A)_{16}$

d. $(A7B)_{16}$

55. Translate the following statement into first-order logic :

"For every a, if a is a philosopher, then a is a scholar."

a. $\forall$ a philosopher $(a) \rightarrow$ scholar (a)

b. $\exists$ a philosopher $(a) \rightarrow$ scholar (a)

c. $\forall$ a scholar $(a) \rightarrow$ philosopher (a)

d. $\exists$ a scholar $(a) \rightarrow$ philosopher (a)

56. Which of the following programming languages is also called the middle-level language?

a. C

b. FORTRAN

c. Pascal

d. COBOL

57. Which of the following is considered to be the default data type in C language?

a. int

b. char

c. float

d. double

58. Which of the following categories of operators has right-to-left associativity?

a. Arithmetic operators

b. Relational operators

c. Logical operators

d. Assignment operators

59. Which one of the following is the output of the segment of C language codes given below?

```
int x = 16;
printf("%d", x-8/2*4);
```

a. 16

b. 0

c. 48

d. 24

60. Which of the following is ***not*** a valid storage class in C language?

a. Auto

b. Register

c. Memory

d. Extern

61. Which one of the following is the value of the segment of C language codes given below?

```
int x=2;
printf("%d, %d", ++x, x++);
```

a. 4, 2

b. 4, 3

c. 3, 4

d. 2, 3

62. Assuming memory requirements of char, int and float variables as 1 byte, 2 bytes and 4 bytes respectively, which one of the following is the space allocated to the pointer variables defined below?

```
char *x; int*y; float *z;
```

a. x:2 bytes, y:2 bytes, z:2 bytes

b. x:1 byte, y:4 bytes, z:2 bytes

c. x:1 byte, y:2 bytes, z:4 bytes

d. x:4 bytes, y:2 bytes, z:1 byte

63. Which one of the following function prototypes declares a 'pointer to function'?

a. int *f(int, int);

b. int f(int *, int *);

c. int (*f)(int, int);

d. int *f(int*, int*);

64. Assuming memory requirement of char variable to be one byte, which one of the following is the size of the string array declared below?

```
char string[] = "South Asian University";
```

a. 20 bytes

b. 22 bytes

c. 23 bytes

d. 24 bytes

65. Which of the following C language statements will cause an infinite loop?

a. for (0; 0; 0);

b. for (1; 0; 1);

c. for (; ;);

d. for (1; 2>2; 1);

66. The default storage class for functions in C language is

a. extern

b. auto

c. static

d. register

67. Which one of the following is the value of the segment of C language codes given below?

```
int x = 2, y = x;
printf("%d", (x-y) ? (2*x+y) : (x-2*y));
```

a. 2

b. -2

c. 4

d. 0

68. Which of the following statements is false?

a. Arithmetic operators have higher precedence than relational operators.

b. Division operator has higher precedence than multiplication operator.

c. Assignment operators have right-to-left associativity.

d. An expression may have only one operator.

69. Which of the following C language keywords can be used to create aliases?

a. enum

b. typedef

c. auto

d. void

70. If p is an integer variable containing 16, then which one of the following will be the value of q after executing the C expression $q = p << 1$;

a. 8

b. 16

c. 32

d. 64

71. A function $f(n) \in O(g(n))$, if there are positive constants n_0 and c such that

a. $f(n) \leq c \cdot g(n), \ \forall n \geq n_0$

b. $f(n) \geq c \cdot g(n), \ \forall n \geq n_0$

c. $f(n) \leq c \cdot g(n), \ \forall n \leq n_0$

d. $f(n) \geq c \cdot g(n), \ \forall n \leq n_0$

72. The binary tree traversal has time complexity as $T(n) = 2T(n/2) + O(1)$. What is the value of $T(n)$?

a. $\Theta(\log_2 n)$

b. $\Theta(n^2)$

c. $\Theta(n)$

d. $\Theta(n \log_2 n)$

73. For an undirected graph G with v vertices and e edges, the sum of the degrees of all vertices is equal to

a. $2v$

b. $(2v - 1)/2$

c. $2e$

d. $e^2/2$

74. A full binary tree with $2n + 1$ nodes contains

a. n leaf nodes

b. n non-leaf nodes

c. $n - 1$ leaf nodes

d. $n - 1$ non-leaf nodes

75. What is the time complexity of fun(), which is defined as follows?

```
int fun(int n)
{
  int count = 0;
  for (int i = n; i > 0; i /= 2)
    for (int j = 0; j < i; j++)
      count +=1;
  return count;
}
```

a. $O(n^2)$

b. $O(n \log n)$

c. $O(n)$

d. $O(n \log n \log n)$

76. The minimum number of multiplications and additions required to evaluate the polynomial $P = 8x^3 + 7x^2 + 14x + 30$ are

a. 6, 3

b. 4, 2

c. 3, 3

d. 8, 3

77. The data structure required for Breadth First Search (BFS) over a graph is

a. queue

b. stack

c. array

d. tree

78. Consider the following three claims :

1. $(n+k)^m = \Theta(n^m)$, where k and m are constants
2. $2^{n+1} = O(2^n)$
3. $2^{2n+1} = O(2^n)$

Which of the above claims are correct?

a. 1 and 2 only

b. 1 and 3 only

c. 2 and 3 only

d. 1, 2 and 3 only

79. Assuming that the average case complexity of an algorithm is $\Sigma_{i=0}^{n} i^3$, the asymptotic complexity of the algorithm will be

a. $O(n^5)$

b. $\Omega(n^3)$

c. $\theta(n^4)$

d. All of the above

80. Assume that we have four different functions for a given operation and the functions use a single 'for' loop executing the same set of statements. The 'for' loops are as follows :

1. for(i = 0; i < n; i++)
2. for(i = 0; i < n; i += 2)
3. for(i = 1; i < n; i *= 2)
4. for(i = n; i > -1; i /= 2)

If n is the size of input, then which of the following functions is most efficient?

a. 1

b. 2

c. 3

d. 4

81. The Bellman-Ford algorithm does not work for graphs containing

a. negative weight edges

b. negative weight cycles

c. negative weight self-loop

d. positive weight cycles

82. Given the recurrence relation $T(n) = T(n-1) + \log_2 n$, the time complexity of $T(n)$ is

a. $O(\log n)$

b. $O(n)$

c. $O(n \log n)$

d. $O(n^2)$

83. Which of the following algorithms can be used to test if there exists at most one path between all pairs of vertices?

a. DFS

b. BFS

c. Dijkstra's algorithm

d. All of the above

84. Which of the following is the tightest upper bound that represents the time complexity of inserting an object into a complete binary search tree of n nodes?

a. $O(1)$

b. $O(\log n)$

c. $O(n)$

d. $O(n \log n)$

85. The Θ notation is

a. symmetric and reflexive

b. reflexive and transitive

c. symmetric and transitive

d. symmetric, reflexive, and transitive

86. The decimal equivalent of $(110011)_2$ is

a. 57

b. 55

c. 51

d. 53

87. The binary equivalent of the decimal number $(0{\cdot}625)_{10}$ is

a. $(0{\cdot}1011)_2$

b. $(0{\cdot}1010)_2$

c. $(0{\cdot}1101)_2$

d. None of the above

88. Which one of the following is true?

a. $(0{\cdot}11)_2 = (0{\cdot}75)_{10}$

b. $(0{\cdot}11)_2 = (0{\cdot}6)_8$

c. $(0{\cdot}11)_2 = (0{\cdot}C)_{16}$

d. All of the above

89. The 8421 representation of the decimal number 8 is

a. 1000

b. 1110

c. 1100

d. 1011

90. In the 1's complement method of binary subtraction of two unsigned binary numbers X and Y, the end-carry is

a. added

b. discarded

c. subtracted

d. None of the above

91. Which of the following is false?

a. $X(Y+Z) = X + XZ$

b. $\overline{X \cdot Y} = \overline{X} \cdot \overline{Y}$

c. $\overline{X+Y} = \overline{X} + \overline{Y}$

d. All of the above

92. The simplification of a Boolean expression with 3 variables needs a K-map with

a. 8 squares

b. 12 squares

c. 9 squares

d. 6 squares

93. Which of the following is ***not*** a universal logic gate?

a. NOT

b. NOR

c. NAND

d. Both NAND and NOR

94. In an 8 : 1 MUX, the total number of control inputs will be

a. 1

b. 4

c. 3

d. 2

95. To obtain 16 unique outputs, we should have a decoder with

a. 5 inputs

b. 4 inputs

c. 16 inputs

d. 8 inputs

96. To design an SR latch circuit, we need at least

a. 2 NOR gates

b. 3 NAND gates

c. 3 NOR gates

d. 2 XOR gates

97. In a combinational circuit, output depends on

a. present inputs

b. memory

c. present as well as previous inputs

d. All of the above

98. RAM stands for

a. Rapid Access Memory

b. Random Access Memory

c. Rapid Asynchronous Memory

d. Random Asynchronous Memory

99. To identify memory addresses we use

a. alphabets

b. binary numbers

c. hexadecimal numbers

d. octal numbers

100. 1 gigabyte is equal to

a. 2^{30} bytes

b. 2^{12} bytes

c. 2^{9} bytes

d. 2^{40} bytes

SPACE FOR ROUGH WORK

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