

26

QUESTION PAPER  
SERIES CODE  
**A**

Registration No. :

--	--	--	--	--

Centre of Exam. :

\_\_\_\_\_

Name of Candidate :

\_\_\_\_\_

Signature of Invigilator

**ENTRANCE EXAMINATION, 2017**

M.Phil./Ph.D. (JRF) & M.Tech.  
COMPUTER SCIENCE AND TECHNOLOGY

[ Field of Study Code : SCSJ (806)/MTCP (157) ]

Time Allowed : 3 hours

Maximum Marks : 100  
Weightage : 100

**INSTRUCTIONS FOR CANDIDATES**

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

- (i) Write your Name and Registration Number in the space provided for the purpose on the top of this Question Paper and in the Answer Sheet.
- (ii) Please darken the appropriate Circle of Question Paper Series Code on the Answer Sheet.
- (iii) All questions are compulsory.
- (iv) Answer all the 100 questions in the Answer Sheet provided for the purpose by darkening the correct choice, i.e., (a) or (b) or (c) or (d) with BALLPOINT PEN only against each question in the corresponding Circle. Any overwriting or alteration will be treated as wrong answer.
- (v) Each correct answer carries 1 mark. There will be negative marking and 0.25 mark will be deducted for each wrong answer.
- (vi) Answer written by the candidates inside the Question Paper will not be evaluated.
- (vii) Pages at the end have been provided for Rough Work.
- (viii) Return the Question Paper and Answer Sheet to the Invigilator at the end of the Entrance Examination. **DO NOT FOLD THE ANSWER SHEET.**

**INSTRUCTIONS FOR MARKING ANSWERS**

- 1. Use only Blue/Black Ballpoint Pen (do not use pencil) to darken the appropriate Circle.
- 2. Please darken the whole Circle.
- 3. Darken ONLY ONE CIRCLE for each question as shown in the example below :

Wrong ○ b ○ c ○	Wrong ⊗ b ○ c d	Wrong ⊗ b ○ c ⊗	Wrong ● b ○ c ○	Correct a b c ○
--------------------	--------------------	--------------------	--------------------	--------------------

- 4. Once marked, no change in the answer is allowed.
- 5. Please do not make any stray marks on the Answer Sheet.
- 6. Please do not do any rough work on the Answer Sheet.
- 7. Mark your answer only in the appropriate space against the number corresponding to the question.
- 8. Ensure that you have darkened the appropriate Circle of Question Paper Series Code on the Answer Sheet.

[www.solutionsadda.in](http://www.solutionsadda.in)

1. Determine the set,  $B = \{x \in R: |x - 1| < |x|\}$  where  $R$  is the set of real numbers.
- (a)  $B = \{x \in R: x > 2\}$   
 (b)  $B = \{x \in R: x > 1\}$   
 (c)  $B = \left\{x \in R: x > \frac{1}{2}\right\}$   
 (d) None of the above
2. The result of the multiplication  $12_7 * 21_7$  is
- (a)  $252_7$   
 (b)  $222_7$   
 (c)  $202_7$   
 (d) None of the above
3. If inorder traversing a tree results in E A C K F H D B G, the preorder traversal would return
- (a) FAEKCDBHG  
 (b) FAEKCDHGB  
 (c) EAFKHDCBG  
 (d) FEAKDCHBG
4. What are the eigenvalues of the following matrix?

$$\begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

- (a)  $-1, -1, 0, 0$   
 (b)  $1, -1, 0, 1$   
 (c)  $1, -1, 0, 0$   
 (d) None of the above
5. Among the following sequences, the converging sequence(s) will be

(i)  $\lim_{n \rightarrow \infty} \left( \frac{n}{n^2 + 1} \right)$

(ii)  $\lim_{n \rightarrow \infty} \left( \frac{(-1)^n n}{n^2 + 1} \right)$

- (a) only (i)  
 (b) only (ii)  
 (c) Both (i) and (ii)  
 (d) None of the above

6. What is the use of dirty bit in an operating system?
- (a) To mark the page with corrupt data
  - (b) To mark the page that it has been modified
  - (c) To mark a wrong page in the memory
  - (d) To mark that a page has been heavily used
7. Suppose that the number of students favouring a change in curricula in a university follows a binomial distribution. Previous reports show that 80% of the students favoured the change. If 200 students are selected at random, find the mean and variance.
- (a) 160, 64
  - (b) 180, 48
  - (c) 160, 32
  - (d) None of the above
8. For the relation scheme  $R(A, B, C)$  and the set of functional dependencies  $F = \{AB \rightarrow C, B \rightarrow D, D \rightarrow B\}$ , the candidate key(s) of  $R$  is/are
- (a)  $AB, BD$
  - (b)  $AB, AD$
  - (c)  $AD$
  - (d)  $AB$
9. What could be the reason for the better performance of a computer when the RAM size is increased?
- (a) Virtual memory space increases
  - (b) Fewer segmentation faults occur
  - (c) Fewer page faults occur
  - (d) Large RAMs are faster
10. Let  $\{f_n\}$  be the Fibonacci sequence of numbers defined by
- $$f_1 = 1, f_2 = 1 \text{ and } f_n = f_{n-1} + f_{n-2} \text{ for } n > 2$$
- If  $x_n = \frac{f_{n+1}}{f_n}$  for  $n \geq 1$ , then the sequence  $\{x_n\}$
- (a) diverges
  - (b) converges to  $\frac{1}{2}(1 - \sqrt{5})$
  - (c) converges to  $\frac{1}{2}(1 + \sqrt{5})$
  - (d) None of the above

11. How many number of cross points is needed in 8 lines cross point switch? Switch is full duplex with no self-connection.
- (a) 25  
 (b) 26  
 (c) 27  
 (d) 28
12. In how many different ways can 6 people be seated in a committee room with 7 chairs?
- (a) 5000  
 (b) 5020  
 (c) 5040  
 (d) 5060
13. Let “~” be an equivalence relation on the Euclidean plane  $R^2$  defined by :  
 for  $(x_1, y_1), (x_2, y_2)$  in  $R^2$ ,  $(x_1, y_1) \sim (x_2, y_2)$  if and only if  $x_1^2 - y_1^2 = x_2^2 - y_2^2$   
 Then the equivalence class of the point (1, 0) will be
- (a) a pair of straight lines  
 (b) a parabola  
 (c) an ellipse  
 (d) a hyperbola
14. The grammar with production rules  
 $S \rightarrow aSb \mid SS \mid \lambda$   
 generates language  $L$  given by
- (a)  $L = \{w \in \{a, b\}^* \mid n_a(w) = n_b(w) \text{ and } n_a(v) \geq n_b(v) \text{ where } v \text{ is any prefix of } w\}$   
 (b)  $L = \{w \in \{a, b\}^* \mid n_a(w) = n_b(w) \text{ and } n_a(v) \leq n_b(v) \text{ where } v \text{ is any prefix of } w\}$   
 (c)  $L = \{w \in \{a, b\}^* \mid n_a(w) \neq n_b(w) \text{ and } n_a(w) \geq n_b(w) \text{ where } v \text{ is any prefix of } w\}$   
 (d)  $L = \{w \in \{a, b\}^* \mid n_a(w) \neq n_b(w) \text{ and } n_a(v) \leq n_b(v) \text{ where } v \text{ is any prefix of } w\}$
15. Two aeroplanes I and II bomb a target in succession. The probabilities of I and II scoring a hit correctly are 0.3 and 0.2 respectively. The second plane will bomb only if the first misses the target. The probability that the target is hit by the second plane is
- (a) 0.2  
 (b) 0.14  
 (c) 0.06  
 (d) None of the above

16. In case of the direct method for obtaining the solution of the matrix equation  $Ax = b$ , on its completion, the original matrix becomes an upper triangular matrix when it is
- (a) Gauss elimination method
  - (b) Gauss-Jordan method
  - (c) Doolittle's method
  - (d) Crout's method

17. What is the output of the following program?

```
#include<stdio.h>
void f()
{
    static int i;
    ++i;
    printf("%d", i);
}
main()
{
    f();
    f();
    f();
}
```

- (a) 111
  - (b) 000
  - (c) 321
  - (d) 123
18. The bus used to connect the monitor to the CPU is
- (a) PCI bus
  - (b) SCSI bus
  - (c) memory bus
  - (d) Rambus
19. Blind write appears in
- (a) conflict serializable schedule
  - (b) view serializable schedule
  - (c) Both (a) and (b)
  - (d) None of the above

20. In a line drawing algorithm, the process of determining which pixels will provide the best approximation to the desired line is known as
- (a) aliasing
  - (b) aspect ratio
  - (c) rasterization
  - (d) refreshing
21. The probability that A speaks truth is  $\frac{4}{5}$ , while the probability for B is  $\frac{3}{4}$ . The probability that they contradict each other when asked to speak on a fact is
- (a)  $\frac{3}{20}$
  - (b)  $\frac{1}{5}$
  - (c)  $\frac{7}{20}$
  - (d) None of the above
22. Which of the following is an equivalence relation on a set  $S = \{1, 2, 3, 4, 5\}$  and the partition  $\{(1, 2), \{3\}, \{4, 5\}\}$ ?
- (a)  $R = \{(1, 1), (1, 2), (2, 1), (2, 2), (3, 3), (4, 4), (4, 5), (5, 4), (5, 5)\}$
  - (b)  $R = \{(1, 1), (1, 2), (2, 2), (3, 3), (4, 4), (4, 5), (5, 4), (5, 5)\}$
  - (c)  $R = \{(1, 1), (1, 2), (2, 1), (2, 2), (3, 3), (4, 4), (4, 5), (5, 5)\}$
  - (d)  $R = \{(1, 1), (2, 2), (3, 3), (4, 4), (4, 5), (5, 4), (5, 5)\}$
23. Find the sum of all the integers between 1 and 100 that leaves remainder 2 upon division by 6.
- (a) 850
  - (b) 920
  - (c) 1010
  - (d) None of the above
24. What is the time required to access a page having page hit ratio as 0.4, page access time from secondary memory as 100 ns and page access time from primary memory as 10 ns?
- (a) 64 ns
  - (b) 68 ns
  - (c) 66 ns
  - (d) 70 ns

25. Let  $(X, Y)$  be a bivariate random variable with joint cumulative distribution function (cdf)

$$F(x, y) = \begin{cases} (1 - e^{-x})(1 - e^{-y}), & 0 \leq x, y \leq \infty \\ 0, & \text{otherwise} \end{cases}$$

Find  $P(X < 1)$ .

- (a)  $(1 - e^{-1})(1 - e^{-2})$
- (b)  $(1 - e^{-1})$
- (c) 1
- (d) None of the above
26. The knapsack problem where the objective function is to minimize the profit is
- (a) greedy
- (b) dynamic 0/1
- (c) back tracking
- (d) branch and bound 0/1
27. How many memory bits are required for a 24-bit plane  $1024 \times 1024$  element raster in graphics?
- (a)  $24 \times 2^{20}$
- (b)  $48 \times 2^{10}$
- (c)  $64 \times 2^{20}$
- (d) None of the above
28. Suppose we have numbers between 1 and 1000 in a binary search tree and want to search for the number 363. Which of the following sequence cannot be the sequence of the node examined?
- (a) 2, 252, 401, 398, 330, 344, 397, 363
- (b) 924, 220, 911, 244, 898, 258, 362, 363
- (c) 925, 202, 911, 240, 912, 245, 258, 363
- (d) 2, 399, 387, 219, 266, 382, 381, 278, 363

29. Let  $a$  and  $b$  be integers. Let  $p$  be a prime number. Consider the statements

- (i) If  $p \mid a^{11}$ , then  $p \mid a$
- (ii) If  $p \mid a$  and  $p \mid (a^2 + b^2)$ , then  $p \mid b$
- (iii) If  $p \mid (a^9 + a^{17})$ , then  $p \mid a$

where the operator " $\mid$ " denotes "divides". Identify the number of false statements.

- (a) 0
- (b) 1
- (c) 2
- (d) 3

30. What can be used to overcome the difference in data transfer speeds of various devices?

- (a) Speed enhancing circuitry
- (b) Bridge circuits
- (c) Multiple buses
- (d) Buffer registers

31. Find the output :

```
#include<stdio.h>
void i(int *a, int *b)
{
a=b;
*a=2;}
int x=0, y=1;
int main()
{
i(&x, &y);
printf("%d%d\n", x, y);
return 0;
}
```

- (a) 22
- (b) 21
- (c) 02
- (d) 01

32. Let the joint probability density function  $f(.,.)$  be defined as

$$f(x, y) = \begin{cases} c(x^3 + y^3), & \text{if } 0 \leq x \leq 1, 0 \leq y \leq 1 \\ 0, & \text{otherwise} \end{cases}$$

where "c" is the normalization constant. Then, the value of "c" is equal to

- (a) 1
- (b) 2
- (c)  $2\sqrt{3}$
- (d)  $4\sqrt{3}$

33. What is the transformation matrix for mirror reflection with respect to the XY plane?

(a)  $\begin{pmatrix} -1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$

(b)  $\begin{pmatrix} 1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$

(c)  $\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$

(d) None of the above

34. Which of the following is a tautology?

(i)  $p \rightarrow (p \rightarrow q)$

(ii)  $p \rightarrow (q \rightarrow p)$

(iii)  $p \wedge \sim p$

- (a) Only (i)
- (b) Only (ii)
- (c) Only (iii)
- (d) All (i), (ii) and (iii)

35. Three balls are drawn at random one after another and without replacement from  $n$  balls numbered 1, 2, ...,  $n$ . The probability that the first will bear a number smaller than that of the second ball is

(a)  $1/2$

(b)  $\frac{1}{nC_3}$

(c)  $1/3$

(d) None of the above

36. If the average depth of a node in an  $n$ -node binary search tree is  $\Theta(\lg n)$ , then the height of the tree is

(a)  $O(n \lg n)$

(b)  $O(n)$

(c)  $O(\lg n)$

(d)  $O(\sqrt{n \lg n})$

37. Let  $f(\cdot)$  be the function defined recursively as

$$f(x) = \begin{cases} x - 10 & \text{if } x > 100 \\ f(f(x + 11)) & \text{if } 0 \leq x \leq 100 \end{cases}$$

Compute  $f(99)$ .

(a) 82

(b) 89

(c) 93

(d) None of the above

38. A, B, C, D and E play a game of cards. A says to B, "If you give me 3 cards, you will have as many as I have at this moment, while if D takes 5 cards from you, he will have as many as E has". A and C together have twice as many cards as E has. B and D together also have the same number of cards as A and C have taken together. If all together they have 150 cards, how many cards has C got?

(a) 28

(b) 29

(c) 31

(d) 35

39. How many triangles are formed by selecting points from a set of 15 points out of which 8 are collinear?
- (a) 800  
 (b) 824  
 (c) 844  
 (d) 854
40. There are 50 students admitted to a nursery class. Some students can speak only English and some can speak only Hindi. Ten students can speak both English and Hindi. If the number of students who can speak English is 21, then how many students can speak Hindi, only Hindi and only English?
- (a) 39, 29 and 11 respectively  
 (b) 37, 27 and 13 respectively  
 (c) 28, 18 and 22 respectively  
 (d) 21, 11 and 29 respectively

41. A firm had the following profits and investment expenditures during the period 1982–1990 :

Year	1982	1984	1986	1988	1990
Profit (\$ 1000)	200	400	600	800	1000
Investment expenditure (\$ 1000)	45	65	70	85	95

Calculate the correlation coefficient between profit and investment expenditure.

- (a) 1.896  
 (b) -1.0928  
 (c) 0.986  
 (d) None of the above

42. Among the following series, identify the converging series.

(i)  $\sum_{n=1}^{\infty} \cos n$

(ii)  $\sum_{n=1}^{\infty} \frac{1}{n \ln n}$

(iii)  $\sum_{n=1}^{\infty} \frac{1}{n}$

(a) (i) and (ii)

(b) (i) and (iii)

(c) (ii) and (iii)

(d) None of the above

43. A company's service center for camera repairing has two employees  $A$  and  $B$ . Employee  $A$  can repair 90% cameras for any defect and employee  $B$  can repair 60% of cameras for any defect. A customer brings a camera at the service center for repair. What is the probability that the camera will be repaired by either of them or both?

(a) 0.54

(b) 0.90

(c) 0.60

(d) 0.96

44. Let  $f: R \rightarrow R$  be a function defined by

$$f(x) = 3x^3 - x$$

where  $R$  denotes the set of real numbers. Then  $f$  is

(a) one-to-one

(b) onto

(c) both one-to-one and onto

(d) None of the above

45. In a city, there are three retail stores namely, S1, S2 and S3. The stores S1, S2 and S3 have 10%, 20% and 30% defective items of the same product. A buyer randomly reaches a store and purchases the item from there which happens to be defective. What is the probability that this item belongs to S2?
- (a)  $1/15$   
(b)  $1/5$   
(c)  $1/3$   
(d)  $1/10$
46. Consider the following statements :
- (i) For every real number  $x$ , there exists an integer  $n$  such that  $n \leq x < n + 1$   
(ii) There exists an integer  $n$  such that  $n \leq x < n + 1$  for every real number  $x$   
Identify the correct statement(s).
- (a) Only (i) is true  
(b) Only (ii) is true  
(c) Both (i) and (ii) are true  
(d) None of the above
47. In  $N$  bit Booth's multiplication algorithm, the largest number of operations will be
- (a)  $N$  additions and  $\log_2 N$  subtractions  
(b)  $\log_2 N$  additions and  $N$  subtractions  
(c)  $\log_2 N$  additions and  $\log_2 N$  subtractions  
(d) None of the above
48. How many ways can seven people form a circle by standing?
- (a) 780  
(b) 750  
(c) 710  
(d) None of the above

49. Choose the number "q" so that the rank of the following matrix is three :

$$\begin{bmatrix} 6 & 4 & 2 \\ -3 & -2 & -1 \\ 9 & 6 & q \end{bmatrix}$$

- (a) 0
- (b) 3
- (c) Such "q" does not exist
- (d) None of the above

50. How many ways are there to arrange the nine letters in the word ALLAHABAD?

- (a) 2520
- (b) 7560
- (c) 3780
- (d) 5040

51. On a service center of televisions, 18 televisions with malfunction came for repairing. The distribution of number of defects in the televisions is given below :

No. of defects (X)	No. of televisions (f)	Probability (p)
1	2	2/18
2	4	4/18
3	6	6/18
4	5	5/18
5	1	1/18

What is the variance of the distribution of number of defects?

- (a) 9.83
- (b) 2.94
- (c) 2.64
- (d) 1.19

52. In a group of persons traveling in a bus, 6 persons can speak Tamil, 15 can speak Hindi and 6 can speak Gujarati. In that group, none can speak any other language. If 2 persons in the group can speak all the three languages, then how many persons are there in the group?
- (a) 21
  - (b) 22
  - (c) 23
  - (d) 24
53. For integers  $a, b$ , consider the equation  $a + b + ab = 0$ . Then the number of solutions of the equation will be
- (a) 0
  - (b) 1
  - (c) 2
  - (d)  $\infty$
54. Consider a complete binary tree where the left and the right subtrees of the root are min-heaps. The lower bound for the operations to convert the tree to a heap is
- (a)  $\Omega(l)$
  - (b)  $\Omega(\lg n)$
  - (c)  $\Omega(n)$
  - (d)  $\Omega(n \lg n)$
55. Equivalence class partitioning is related to
- (a) structural testing
  - (b) functional testing
  - (c) mutation testing
  - (d) All of the above
56. The decimal number 68 in binary will be  
 $68_{10} = 01000100_2$   
and its negative number in two's complement will be
- (a) 1011 1011
  - (b) 1011 1100
  - (c) 1001 1011
  - (d) None of the above

57. Which of the following statements are true?

- (i) The context diagram should depict the system as a single bubble
  - (ii) External entities should be identified clearly at all levels of DFDs
  - (iii) Control information should not be represented in a DFD
  - (iv) A data store can be connected either to another data store or to an external entity
- (a) (i) and (ii)
  - (b) (ii) and (iii)
  - (c) (i) and (iii)
  - (d) (i), (ii) and (iii)

58. Which of the following softwares always resides in memory?

- (a) Editor
- (b) Loader
- (c) Linker
- (d) None of the above

59. Consider the following statements on sets :

- (i)  $\{1, 2\} \subseteq \{1, 2, \{1, 2\}\}$
- (ii)  $\{1, 2\} \in \{1, 2, \{1, 2\}\}$
- (iii)  $\{\{1, 2\}\} \subseteq \{1, 2, \{1, 2\}\}$

Identify the number of true statement(s).

- (a) One
- (b) Two
- (c) Three
- (d) None of the above

60. A fair die is rolled twice. The probability that an odd number will follow an even number is

- (a)  $1/2$
- (b)  $1/6$
- (c)  $1/3$
- (d)  $1/4$

61. How many committees of five people can be chosen from 20 men and 12 women if at least four women must be on each committee?

- (a) 10, 692
- (b) 10, 762
- (c) 10, 942
- (d) None of the above

62. For a biased die, the probabilities for the different faces to turn up are given below :

Face	1	2	3	4	5	6
Probability	0.1	0.32	0.21	0.15	0.05	0.17

The die is thrown and you are told that either the face 1 or the face 2 has turned up, then the probability that it is face 1, is

- (a)  $11/21$
- (b)  $16/21$
- (c)  $5/21$
- (d) None of the above

63. For a complete graph of  $n$  vertices, how many Hamiltonian circuits are possible?

- (a)  $n!$
- (b)  $(n - 1)!$
- (c)  $n!/2$
- (d)  $(n - 1)!/2$

64. Let  $A = \{1, 2, \dots, n\}$  and  $n > 3$ . How many subsets of  $A$  contain  $\{1, 2\}$ ?
- (a)  $2^n$
  - (b)  $2^{n-1}$
  - (c)  $2^{n-2}$
  - (d) None of the above
65. The binary number designations of the rows and columns of the K-map are in
- (a) binary code
  - (b) BCD code
  - (c) Gray code
  - (d) XS-3 code
66. Under what conditions on  $y_1, y_2, y_3$  do the points  $(0, y_1), (1, y_2)$  and  $(2, y_3)$  lie on a straight line?
- (a)  $y_1 = y_2 - y_3$
  - (b)  $y_1 = y_2 - 2y_3$
  - (c)  $y_1 = -2y_2 + y_3$
  - (d) None of the above
67. What is the role of Start and Stop bits in serial communication?
- (a) For error correction
  - (b) For error detection
  - (c) For synchronization
  - (d) To slow down the communication

68. For the function  $f(x_1, x_2) = x_1^3 - 12x_1x_2 + 8x_2^3$
- (a) (0, 0) is a local minimizer
  - (b) (2, 1) is a local maximizer
  - (c) (1, 1) is a critical point
  - (d) None of the above
69. Let  $A$  and  $B$  be matrices. Among the following statements, the number of correct statement(s) is/are
- (i) If  $A^2$  is defined, then  $A$  is necessarily a square matrix
  - (ii) If  $AB$  and  $BA$  are defined, then  $A$  and  $B$  are necessarily square matrices
  - (iii) If  $AB$  and  $BA$  are defined, then  $AB$  and  $BA$  are necessarily square matrices
  - (iv) If  $AB = B$ , then  $A = I$  where  $I$  is the identity matrix
- (a) 1
  - (b) 2
  - (c) 3
  - (d) 4
70. A group of 100 items has mean 60 and variance 25. If the mean of the first 50 items is 61 and standard deviation is 4.5, find the mean of the other 50 items.
- (a) 57
  - (b) 59
  - (c) 61
  - (d) None of the above
71. The longest common subsequence of the sequences  
 $X = \langle a, b, c, b, d, a, b \rangle$  and  $Y = \langle b, d, c, a, b, a \rangle$   
has length
- (a) 2
  - (b) 3
  - (c) 4
  - (d) None of the above

72. In a binary tree with 12 nodes has \_\_\_\_ null branches.
- (a) 11
  - (b) 13
  - (c) 6
  - (d) None of the above
73. If the pages belonging to the working set of the programs are in main memory
- (a) thrashing can be avoided
  - (b) RR scheduling becomes effective
  - (c) priority scheduling comes into force
  - (d) speed of I/O processor is increased
74. In a countrywide survey, it was found that 55% of the farmers produce rice, 25% of them produce jute and 15% of them produce both the cash crops. If a farmer is chosen at random from the countryside, what is the probability that he produces at least one of the two cash crops?
- (a) 0.7
  - (b) 0.68
  - (c) 0.59
  - (d) None of the above
75. The process of assigning load addresses to the various parts of the program and adjusting the code and data in the program to reflect the assigned addresses is called
- (a) assembly
  - (b) parsing
  - (c) relocation
  - (d) symbol resolution

76. There are two boxes, with one containing 4 red and 3 green balls and the other containing 3 blue and 4 green balls. One ball is drawn at random from each box. The probability that one of the balls is red and other blue will be

- (a) 17/49
- (b) 9/49
- (c) 12/49
- (d) 21/49

77. What is the output of the following program?

```
#include<iostream>
using namespace std;
class myclass
{
public:
int i;
myclass *operator->()
    {return this;}
};
int main()
{
myclass ob;
ob->i=10;
cout<<ob.i<< " " <<ob->i;
return 0;
}
```

- (a) 10 10
- (b) 10
- (c) Compile time error
- (d) Runtime error

78. Let  $A$  and  $B$  be two events such that  $P(A) = 0.7$ ,  $P(B) = 0.5$  and  $P(A \cap B) = 0.3$ . Compute  $P(B | A \cup B^c)$ .

- (a) 0.32
- (b) 0.28
- (c) 0.258
- (d) None of the above

79. If  $X$  and  $Y$  are independent binomial variates with parameters  $(n, p)$  and  $(m, p)$  respectively, what is the probability distribution of  $X + Y$ ?
- (a) Binomial
  - (b) Poisson
  - (c) Geometric
  - (d) None of the above
80. Identify the number of true statement(s) from the following :
- (i) Normal distribution of a continuous random variable has a bell-shaped symmetrical distribution
  - (ii) The  $t$  distribution of a continuous random variable is bell-shaped and is symmetric about zero
  - (iii) Every chi-square distribution extends indefinitely to the right from zero
- (a) 0
  - (b) 1
  - (c) 2
  - (d) 3
81. My bag can carry no more than ten books. I must carry at least one book each of Management, Mathematics, Physics and Fiction. Also, for every Management book I carry, I must carry two or more Fiction books and for every Mathematics book I carry, I must carry two or more Physics books. I earn 4, 3, 2 and 1 points for each Management, Mathematics, Physics and Fiction book respectively, I carry in my bag. I want to maximize the points, I can earn by carrying the most appropriate combination of books in my bag. The maximum points that I can earn are
- (a) 20
  - (b) 21
  - (c) 22
  - (d) 23

82. Find the quotient  $q$  and the remainder  $r$  when 11, 109, 999, 999 is divided by 1111.
- (a)  $q = 9, 999, 990$  and  $r = -1$
  - (b)  $q = 9, 999, 990$  and  $r = 111$
  - (c)  $q = 10, 000, 000$  and  $r = -1$
  - (d) None of the above
83. The productivity for a project of 24 KLOC was found to be 12 LOC programmer day. If there were 10 programmers employed for the project and they worked 20 days a month, find the number of months required to complete the project.
- (a) 11 months
  - (b) 10 months
  - (c) 9 months
  - (d) 8 months
84. What is the constraint on the specialization where an entity of a superclass entity set is required to belong to at least one subclass entity set?
- (a) Total, Overlap
  - (b) Total, Disjoint
  - (c) Partial, Overlap
  - (d) Partial, Disjoint
85. For a function of  $n$  variables, boundary value analysis yields
- (a)  $4n + 3$  test cases
  - (b)  $4n + 1$  test cases
  - (c)  $4n + 2$  test cases
  - (d) None of the above

86. Let  $A = \begin{bmatrix} a & b \\ c & d \end{bmatrix}$  be a matrix and it commutes with both the matrices  $B = \begin{bmatrix} 1 & 0 \\ 0 & 0 \end{bmatrix}$  and  $C = \begin{bmatrix} 0 & 1 \\ 0 & 0 \end{bmatrix}$ . Then
- (a)  $a = b, c = d = 0$   
 (b)  $a = c, b = d = 0$   
 (c)  $b = c, a = d = 0$   
 (d) None of the above
87. Three values of  $X$  and  $Y$  are to be fitted in a straight line in the form  $Y = A + BX$  by the method of least squares. Given  $\Sigma X = 6, \Sigma Y = 21, \Sigma X^2 = 14$  and  $\Sigma XY = 46$ , the value of  $A$  and  $B$  are respectively
- (a) 2 and 3  
 (b) 1 and 2  
 (c) 2 and 1  
 (d) 3 and 2
88. The mean of two samples of sizes 200 and 300 were found to be 25, 10 respectively. Further, let their standard deviations be 3 and 4 respectively. Then the variance of the combined samples of size 500 is
- (a) 64.2  
 (b) 65.2  
 (c) 67.2  
 (d) None of the above
89. The number of states in a minimal deterministic finite automaton corresponding to the language  $L = \{a^n \mid n \geq 5\}$  is
- (a) 3  
 (b) 4  
 (c) 5  
 (d) 6
90. Consider the relation schema  $R(A, B, C, D, E)$  and the set of functional dependencies  $F = \{AB \rightarrow CD, ABC \rightarrow E, C \rightarrow E\}$ . What is the highest normal form of  $R$ ?
- (a) 1 NF  
 (b) 2 NF  
 (c) 3 NF  
 (d) BCNF

91. Which of the sorting algorithm has stable time complexity?

- (a) Quick sort
- (b) Insertion sort
- (c) Merge sort
- (d) None of the above

92. The matrix

$$\begin{bmatrix} 1 & b \\ b & 9 \end{bmatrix}$$

is positive definite provided "b" lies in the interval

- (a)  $(-\infty, 3)$
- (b)  $(-3, \infty)$
- (c)  $(-\infty, -3) \cup (3, \infty)$
- (d) None of the above

93. A student appeared in the examination of five papers. He/she believes that his/her probability of getting A grade in each of the paper is 0.4. Assuming that the distribution of number of papers getting A grade is binomial, find the probability of getting A grade in all the five papers.

- (a) 0.02
- (b) 0.015
- (c) 0.01
- (d) None of the above

94. Two  $n$ -bit binary strings  $S_1$  and  $S_2$  are chosen randomly with uniform probability. The probability that the Hamming distance between these strings is equal to  $D$  is

- (a)  $\frac{{}^n C_d}{2^n}$
- (b)  $\frac{{}^n C_d}{2^d}$
- (c)  $\frac{d}{2^n}$
- (d)  $\frac{1}{2^d}$

95. Consider the following two languages :

$$L1 = \{a^n b^l a^k : n + l + k > 5\} \text{ and } L2 = \{a^n b^l a^k : n > 5, l > 3, k \leq l\}$$

Which of the following is true?

- (a)  $L1$  is regular language and  $L2$  is not regular language
- (b) Both  $L1$  and  $L2$  are regular languages
- (c) Both  $L1$  and  $L2$  are not regular languages
- (d)  $L1$  is not regular language and  $L2$  is regular language

96. The result of adding the two hexadecimal numbers

$$953A7 + AFDC8$$

will be

- (a) 14516F
- (b) 15616F
- (c) 16425F
- (d) None of the above

97. Let  $\{u_n\}$  and  $\{v_n\}$  be sequences defined recursively by  $u_1 = 0, v_1 = 1$  and

$$u_{n+1} = \frac{1}{2}(u_n + v_n), v_{n+1} = \frac{1}{4}(u_n + 3v_n) \text{ for } n \geq 1$$

Then  $(v_n - u_n)$  will be equal to

- (a)  $\frac{1}{2^{n-1}}$
- (b)  $\frac{1}{4^{n-1}}$
- (c)  $\frac{1}{8^{n-1}}$

- (d) None of the above

98. What is the output of the following program?

```
include<iostream>
using namespace std;
class sample {public : virtual void example() = 0;};
class one : public sample {void example () {cout<<"ubuntu";}};
class two : public sample {void example () {cout<<"is awesome";}};
int main() {
    sample *a1, *a2;
    one ex1; two ex2;
    a1=&ex1; a2=&ex2;
    a1->example(); a2->example();
}
```

- (a) ubuntu
- (b) is awesome
- (c) ubuntu is awesome
- (d) None of the above

99. Suppose  $X$  is a continuous random variable with density function  $f$ . What is the value of  $a$  for which  $E[|X - a|]$  is minimized?

- (a) Median of  $X$
- (b) Mode of  $X$
- (c) Geometric mean of  $X$
- (d) Harmonic mean of  $X$

100. The mean deviation from mean of the  $(2n + 1)$  observations :  $a, a + 1, a + 2, \dots, a + 2n$  is

(a)  $\frac{n(n - 1)}{2n + 1}$

(b)  $\frac{n(n + 1)}{2n + 1}$

(c)  $\frac{n(n + 2)}{2n + 1}$

- (d) None of the above

SPACE FOR ROUGH WORK

[www.solutionsadda.in](http://www.solutionsadda.in)

SPACE FOR ROUGH WORK

[www.solutionsadda.in](http://www.solutionsadda.in)