JNU MCA - 2002

1. If α and β are the root of $4x^2 + 3x + 7 = 0$, then the value of $\left(\frac{1}{\alpha}\right) + \left(\frac{1}{\beta}\right)$ is

(a) $-\frac{3}{4}$ (b) $-\frac{3}{7}$ (c) $\frac{3}{7}$ (d) $\frac{4}{7}$

2. A probability distribution must possess

(a) mean (b) mode

(c) moment generation function (d) distribution function

3. The coefficient of x^2 in the expansion of e^{3x+4} is

(a) $\frac{9e^2}{2}$ (b) $\frac{9e^4}{2}$ (c) $\frac{3e^4}{2}$ (d) $\frac{3e^2}{2}$

4. The medians of a triangle meet at $(0, -3)$. While its two vertices are $(-1, 4)$ and $(5, 2)$, the third vertex is at

(a) $(4, 5)$ (b) $(-1, 2)$ (c) $(7, 13)$ (d) $(-4, -15)$

5. The value of $(1 + i)^4 \left(1 + \frac{1}{i}\right)^4$ is

(a) 12 (b) -12 (c) 16 (d) -16

6. Let f be a one-one function with domain $\{a, b, c\}$ and range $\{x, y, z\}$. If $f(a) = y$, then which of the following is true ?

(a) $f(b) = x, f^{-1}(z) = a$ (b) $f(b) = z, f^{-1}(y) = c$

(c) $f(c) = z, f^{-1}(x) = b$ (d) $f(c) = x, f^{-1}(x) = b$

7. In a Poisson distribution

(a) mean and variance are equal (b) mean is greater than variance

(c) mean is smaller than variance (d) no relation between mean and variance

8. The vector $\vec{\mathbf{b}} \times \vec{\mathbf{c}} + \vec{\mathbf{c}} \times \vec{\mathbf{a}} + \vec{\mathbf{a}} \times \vec{\mathbf{b}}$, when expressed as a single vector product is

(a) $(\vec{\mathbf{c}} - \vec{\mathbf{a}}) \times (\vec{\mathbf{c}} - \vec{\mathbf{b}})$ (b) $(\vec{\mathbf{b}} + \vec{\mathbf{a}}) \times (\vec{\mathbf{c}} + \vec{\mathbf{a}})$ (c) $(\vec{\mathbf{a}} - \vec{\mathbf{b}}) \times (\vec{\mathbf{c}} - \vec{\mathbf{a}})$ (d) $(\vec{\mathbf{b}} - \vec{\mathbf{a}}) \times (\vec{\mathbf{c}} - \vec{\mathbf{a}})$

9. If A and B are two, events, the probability that exactly one of them occurs is

(a) $P(A) + P(B) - 2P(A \cap B)$ (b) $P(A) + P(B) - P(A \cap B)$

(c) $P(A^C) + P(B^C) - 2P(A^C \cap B^C)$ (d) $P(A \cap B^C) + P(A^C \cap C)$

10. Special software to create a job queue is called a/an

(a) driver (b) spooler (c) interpreter (d) linkage editor

11. Which of the following is incorrect ?

(a) $|a+b| \le |a|+|b|$ (b) $|a-b| \le |a|+|b|$ (c) $|a-b| \le |a|-|b|$ (d) $|a-b|=0 \Leftrightarrow a=b$

12. If $p^2+q^2=1$ and $X=(3p-4p^3)^2+(3q-4q^3)^2$, then the value of $\underline{x}$ is

(a) 1 (b) 3 (c) 6 (d) 12

13. Let $A_\theta = \begin{bmatrix} \cos\theta & \sin\theta \\ -\sin\theta & \cos\theta \end{bmatrix}$, then which of the following is incorrect ?

(a) $A_\alpha A_\beta \neq A_\beta A_\alpha$ (b) $A_\alpha A_\beta = A_{\alpha+\beta}$ (c) $A_\alpha A_{-\alpha} = I$ (d) $(A_\alpha)^n = A_{n\alpha}$

14. ..... must be applied to access an element of a stack

(a) Top (b) Pop (c) Push (d) Exit

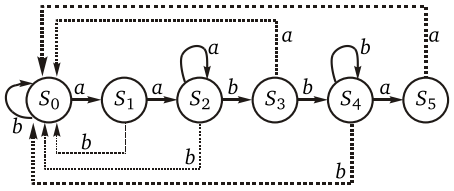
15. In the following code fragment

```
i=0 ;
while (.....)
{printf (''hello\n'');
i++;
}
```

the condition for the while loop to execute 20 times is

(a) i<20 (b) i<=20 (c) !i<20 (d) i=20

16. Which of the following strings does not contain the pattern recognized by the given pattern matching graph ?



(a) aabba (b) aaabbbbaaa (c) abaabbaaabbb (d) abaabaaabbb

17. Two towns A and B are 60 km apart. A school is to be built to serve 150 students in town A and 50 students in town B. If the total distance to be travelled by all 200 students is to be as small as possible, then the school should be built at

(a) town A (b) town B

(c) 45 km from town B (d) 45 km from town A

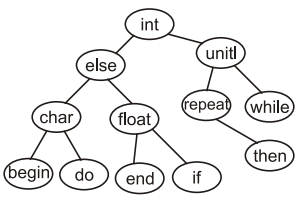
18. The value of $\int_0^{\pi/4} \frac{\sin x + \cos x}{25 + 144\sin 2x}\,dx$ is

(a) $\frac{1}{78}\log_e \frac{1}{5}$ (b) $\frac{1}{156}\log_e 5$ (c) $\frac{1}{78}\log_e 5$ (d) None of these

19. The equation of the latus rectum of the parabola $y^2 + 4ax = 0$ is

(a) $y = a$ (b) $y = -a$ (c) $x = a$ (d) $x = -a$

20. The following is



(a) Heap (b) Binary search tree

(c) Complete binary tree (d) None of these

21. The area of the triangle having the vertices (4, 6), (x, 4) (6, 2) is 10 sq units. The value of x is

(a) 0 (b) 1 (c) 2 (d) None of these

22. Turnaround time is

(a) The time a program waits before execution starts

(b) The start time

(c) The execution time

(d) The time between start and the end of the program

23. The angle between the tangents from the point (4, 3) to the circle $x^2 + y^2 - 2x - 2y = 0$ is

(a) $\frac{\pi}{2}$ (b) $\frac{\pi}{3}$ (c) $\frac{\pi}{4}$ (d) None of these

24. Given below are the decimal numbers with the corresponding 10's complements. Which of the following is an incorrect pair ?

	Decimal No.	10's complement
(a)	7392	2608
(b)	3754	6264
(c)	81.75	19.25
(d)	34.56	65.44

25. In artificial intelligence, Brain : Computer : : Knowledge : .....

(a) Storage (b) Data (c) Analysis (d) Synthesis

26. The least integer n such that $7^n > 10^5$, given $\log 343 = 2.5353$, is

(a) 3 (b) 4 (c) 5 (d) 6

27. The value of $\cos(2\cos^{-1} x + \sin^{-1} x)$, for $0 \le \cos^{-1} x \le \pi$ and $-\frac{\pi}{2} \le \sin^{-1} x \le \frac{\pi}{2}$ at $x = \frac{1}{3}$, is

(a) $\frac{-2}{\sqrt{3}}$ (b) $-2.\sqrt{3}$ (c) $\frac{2\sqrt{2}}{\sqrt{3}}$ (d) $-\frac{2\sqrt{2}}{3}$

28. Which of the following transmission systems provide the highest data rate to an individual device ?

(a) Computer bus (b) Voice band modem

(c) Telephone line (d) Leased line

29. Consider the propositions, P : I am at home; Q : I am unwell; R : I am outdoors; S : I am outdoors only if I am well. In terms of the above propositions and the logic connectives, S can be written as

(a) $\sim P \to Q$ (b) $R \to Q$ (c) $\sim R \to Q$ (d) $R \to \sim Q$

30. Consider the production rules of a grammar G, S $\to$ AA, A $\to$ aa, $B \to bb$. The language generated by G is

(a) $L(G)$ = {aaaa, bbbb, abba, baab} (b) $L(G)$ = {abab, baba, aaba, abaa}

(c) $L(G)$ = {aaaa, aabb, bbaa, bbbb} (d) $L(G)$ = {aaaa, abba, bbaa, bbbb}

31. If the cube roots of unity are 1, ω, ω^2, then the roots of the equation $(x-1)^3 + 8 = 0$ are

(a)f–1, $1 + 2\omega$, $1 + 2\omega^2$ (b) $-1, 1 - 2\omega, 1 - 2\omega^2$ (c) $-1, -1, -1$ (d) None of these

32. If $y = \log_e x$ and n is a positive integer, then $\frac{d^n y}{dx^n}$ is equal to

(a) $\left(-\frac{e}{x}\right)^n$ (b) $(n-1)x^{-n}$ (c) $(n-1)!\, x^{-n}$ (d) $(-1)^{n-1}(n-1)!\, x^{-n}$

33. If $\cos\theta + \sin\theta = \sqrt{2}\cos\theta$, then $\cos\theta - \sin\theta$ is equal to

(a) $\sqrt{2}\sin\theta$ (b) $\sqrt{2}\sec\theta$ (c) $\frac{\sin\theta}{\sqrt{2}}$ (d) $\frac{\cos\theta}{\sqrt{2}}$

34. The value of $\int_{-3}^{+3} |x|\,dx$ is

(a) 3 (b) 9 (c) 18 (d) None of these

35. Third generation computers

(a) were the first to use built-in error detecting devices

(b) used transistors instead of vacuum tubes

(c) were the first to use neural network

(d) None of the above

36. If $\vec{\mathbf{a}} \times \vec{\mathbf{b}} = \vec{\mathbf{a}} \times \vec{\mathbf{c}}$, $a \neq 0$, then

(a) $\vec{\mathbf{b}} = \vec{\mathbf{c}} + \lambda \vec{\mathbf{a}}$ (b) $\vec{\mathbf{c}} = \vec{\mathbf{a}} + \lambda \vec{\mathbf{b}}$ (c) $\vec{\mathbf{a}} = \vec{\mathbf{b}} + \lambda \vec{\mathbf{c}}$ (d) None of these

37. The primary memory of a personal computer consists of

(a) ROM only (b) RAM only

(c) Both RAM and ROM (d) Memory module

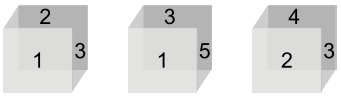
38. If $a\cos 2\theta + b \sin 2\theta = c$ has two solutions θ_1 and θ_2, then $\tan(\theta_1 + \theta_2)$ is equal to

(a) $\frac{b}{a}$ (b) $\frac{a}{b}$ (c) $\frac{c-a}{b}$ (d) $\frac{b}{a+c}$

39. A number is chosen from each of the two sets {1, 2, 3, 4, 5, 6, 7, 8, 9} and {1, 2, 3, 4, 5, 6, 7, 8, 9}. If p_1 denotes the probability that the sum of the two numbers be 10 and p_2 the probability that their sum be 8, then $(p_1 + p_2)$ is

(a) $\frac{7}{729}$ (b) $\frac{137}{729}$ (c) $\frac{16}{81}$ (d) $\frac{137}{81}$

40. What should be the number opposite to 3 ?



(a) 1 (b) 6 (c) 5 (d) 4

41. If $\sqrt{(p+1)} - \sqrt{(p-1)} = 0$, then p is a

(a) natural number (b) integer (c) rational (d) None of these

42. The number of ways of dividing 15 objects into groups of 7, 5, 3 respectively, is

(a) $\frac{15!}{7!5!\ 3!}$ (b) $\frac{15!}{7!\ 3!}$ (c) $\frac{15!}{7!}$ (d) 15!

43. One of the factors of $\begin{vmatrix} x+a & x & x \\ x & x+a & x \\ x & x & x+a \end{vmatrix}$ is

(a) $x + a$ (b) $x + 3a$ (c) $3x + a$ (d) $3x + 3a$

44. The greatest value of $\sin\theta\cos\theta$ is

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

45. Which of the following Boolean expression is true ?

(a) 2 * 2 + 3 = 10 (b) (2 * 4) and not (4 * 3)

(c) (5 * 6) or 3 div 3 = 1 (d) −7 * 2 + 2 * 7 = 1

46. If $r = r_1 - r_2 - r_3$, then the triangle is

(a) Isosceles (b) Acute angled (c) Obtuse angled (d) Right angled

47. The solution of the differential equation $(1 + x^2)\, dy/dx = (1 + y^2)$ is

(a) $y - x = 1 + xy$ (b) $y - x = 1 + 3xy$ (c) $y - x = a(1 + xy)$ (d) $y/x = (1 + xy)/a$

48. The locus of the point such that the ratio of its distance from two given points is constant k $(\neq 1)$ is a

(a) straight line (b) circle (c) parabola (d) ellipse

49. Multiplication of 47_8 by 52_8 is

(a) 3144_8 (b) 4147_8 (c) 3184_8 (d) 3146_8

50. If SHIP is written as VKLS, then PENCIL will be written as

(a) RGPEKN (b) SHQFLO (c) SHFQLO (d) RGPKEN

51. If the sum of the root of $px^2 + qx + r = 0$ is equal to the sum of the their squares, then q^2 is equal to

(a) $r(p - 2q)$ (b) $r(2q - p)$ (c) $p(q - 2r)$ (d) $p(2r - q)$

52. What will be the value of $\underline{x}$ and $\underline{y}$ after execution of the following (C language) statement ?

$$n = 5;\ x = n + +;\ y = - - x;$$

(a) 6, 5 (b) 5, 4 (c) 6, 6 (d) 5, 5

53. Which of the following is true for testing and debugging ?

(a) Testing checks for logical error in the programs, while debugging is a process of correcting those errors in the program

(b) Testing detects the syntax errors in the program while debugging corrects those errors in the program

(c) Testing is independent of debugging

(d) All of the above

54. A person standing on the bank of a river observes that the angle α subtended by the tree on the opposite bank is twice the angle subtended by it when moves away a distance twice as much as the breadth of the river. Angle α is

(a) $\frac{\pi}{6}$ (b) $\frac{\pi}{12}$ (c) $\frac{\pi}{2}$ (d) $\frac{\pi}{3}$

55. If $\log 2$, $\log(2^x - 1)$ and $\log(2^x + 3)$ are in AP, then the value of x is given by

(a) $\log_2 5$ (b) $\log_5 2$ (c) $\log_3 5$ (d) $\log_5 3$

56. The postfix notation of the arithmetic expression $a * ((c + d) + d / a)$ is

(a) $*a/+ c\ d\ a$ (b) $a\ c\ d\ a * + /$ (c) $a\ c\ d + * a /$ (d) $a\ c\ d + a / *$

57. The function $f(x) = \dfrac{x - |x|}{x}$ $(x \neq 0)$

$= 0$ $(x = 0)$

is

(a) continuous nowhere (c) continuous everywhere except at $x = 0$

(c) continuous everywhere (d) cannot say anything

58. All the values of x that satisfy the inequalities $x^2 - 3x + 2 > 0$ and $x^2 - 3x - 4 \leq 0$ are given by $-1 \leq x < \ldots$ and $\ldots < x \leq 4$

(a) 0, 1 respectively (b) 1, 0 respectively

(c) 1, 2 respectively (d) 0, 2 respectively

59. I/O redirection

(a) implies changing the name of a file

(b) can be employed to use an existing file as input for a program

(c) implies connecting 2 program through a pipe

(d) None of the above

60. If $f(x) = x^2 - 2x + 2$, then which of the following is true ?

(a) $f(x)$ has a maximum at $x = 1$ (b) $f(x)$ has a maximum at $x = 2$

(c) $f(x)$ has a minimum at $x = 1$ (d) $f(x)$ has no maxima or minima

61. If $x = \frac{a(1-t^2)}{(1+t^2)}$ and $y = \frac{2bt}{(1+t^2)}$, then dy / dx is

(a) $\frac{2b}{a}$ (b) $\frac{-2b}{a}$ (c) $\frac{b}{a}$ (d) $\frac{-b}{a}$

62. The locus of the mid-point of a chord of the circle $x^2 + y^2 = 16$, which subtends a right angle at the origin, is

(a) $x^2 + y^2 = 8$ (b) $x^2 + y^2 = 4$ (c) $x^2 + y^2 = 2$ (d) $x^2 + y^2 = 0$

63. The equation $x - \frac{2}{(x-1)} = 1 - \frac{2}{(x-1)}$ has

(a) no roots (b) one root (c) two equal roots (d) infinitely many roots

64. The equations $3x + y + 2z = 3$, $2x - 3y - z = -3$, $x + 2y + z = 4$ have

(a) infinite number solutions (b) no solution

(c) a unique solution (d) None of these

65. The value of $\lim_{x \to 0} \frac{|\sin x|}{x}$ is

(a) 1 (b) -1 (c) ∞ (d) Does not exist

66. The missing number in the series 7, 11, ..., 17, 19, 23 is

(a) 15 (b) 19 (c) 13 (d) 9

67. If $x + y = \sin(x + y)$, then $\frac{dy}{dx}$ is

(a) 1 (b) -1 (c) $1 - \cos(x + y)$ (d) $1 + \cos(x + y)$

68. If $ax^2 + bx + c = 0$, where a, b, c are all positive, then both roots of the equation will be

(a) real and positive (b) real and negative

(c) having negative real parts (d) None of these

69. If a, b, c are any three coplanar vectors, then

(a) $\vec{\mathbf{a}} \cdot (\vec{\mathbf{b}} \times \vec{\mathbf{c}}) = 0$ (b) $\vec{\mathbf{a}} \cdot (\vec{\mathbf{b}} \times \vec{\mathbf{c}}) = 1$ (c) $\vec{\mathbf{a}} \cdot (\vec{\mathbf{b}} \times \vec{\mathbf{c}}) = \vec{\mathbf{a}}$ (d) $\vec{\mathbf{a}} \cdot (\vec{\mathbf{b}} \times \vec{\mathbf{c}}) = \vec{\mathbf{b}}$

70. The probability that a non-leap year should have 53 Sunday is

(a) $\frac{53}{365}$ (b) $\frac{52}{365}$ (c) $\frac{6}{7}$ (d) $\frac{1}{7}$

71. If $\frac{\sin(x+y)}{\sin(x-y)} = \frac{p+q}{p-q}$, then $\frac{\tan x}{\tan y}$ is equal to

(a) $\frac{q}{p}$ (b) $\frac{p}{q}$ (c) pq (d) $\frac{1}{pq}$

72. For a frequency distribution of marks in Mathematics for 100 students, the average was found to be 80. Later on it was discovered that 48 was misread as 84. The correct mean is

(a) 80.36 (b) 79.36 (c) 79.64 (d) 80.64

73. If in the expansion of $(x + y)^n$ the coefficients of 4th and 13th terms are equal, then n is

(a) 15 (b) 17 (c) 9 (d) Cannot be determined

74. If a, b, c are real numbers such that $a^2 + b^2 + c^2 = 1$, then $ab + bc + ca > \ldots$

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

75. Consider the following program segment :

```
j = 2;
while (i % j)j = j + 1;
if (j < i) printf (''%d'', j);
```

For a given $i >= 2$, this program segment prints j only if

(a) i is a prime (b) j does not divide i

(c) j is odd (d) i is not a prime

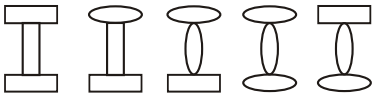
76. The average time necessary for the correct sector of a disk to arrive at the read-write head is

(a) Down time (b) Seek time (c) Rotational delay (d) Access time

77. Following list of cities is assigned in order to a linear array CITY : Paris, London, New York, Chennai, Koln, Zurich, Mumbai, Delhi, Arlington, Newton, Washington, Rome, Bangkok, Amsterdam, Uppsala. On assigning values to a variable START and an array LINK, an alphabetical listing of cities with CITY, LINK and START is formed. If i is the index of CITY corresponding to Mumbai, then the values of START and LINK (i) respectively are

(a) 9, 13 (b) 5, 14 (c) 12, 6 (d) 14, 10

78. What is the next figure ?



(a)  (b)  (c)  (d) 

79. Consider the circle $x^2 + y^2 = 14x$. The point $P(6, -7)$ is

(a) on the circle (b) in the circle (c) outside the circle (d) None of these

80. If a population grows at the rate of 5% per year, it will double (in years) after

(a) 20 (b) 20 log 2 (c) 2 log 2 (d) 22

81. The eccentricity of a rectangular hyperbola is always

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

82. The only integral root of the equation $\begin{vmatrix} 2-y & 2 & 3 \\ 2 & 5-y & 6 \\ 3 & 4 & 10-y \end{vmatrix} = 0$, is

(a) $y = 0$ (b) $y = 1$ (c) $y = 2$ (d) $y = 3$

83. The domain of the function $y = [(1 / \log_{10}(1 - x))] + \sqrt{x + 2}$, is

(a) $[-3, -2]$ excluding $(-2, 5)$ (b) $[0, 1]$ excluding 0.5

(c) $[-2, 1]$ excluding 0 (d) None of these

84. The solution of the equation $|z| = z + 1 + 2i$ is

(a) $\frac{3}{2} - 2i$ (b) $3 - 2i$ (c) $\frac{3}{2} + 2i$ (d) $2 - \frac{3}{2}i$

85. A coin is biased so that the probability of head = 1/4. The coin is tossed five times. The probability of obtaining two heads and three tails with heads occurring in succession is

(a) $(5 \times 3^3)/4^5$ (b) $3^3 / 5^4$ (c) $3^3 / 4^5$ (d) $3^3 / 4^4$

86. The harmonic mean of two numbers is 4. The arithmetic mean A and geometric mean G of these two numbers satisfy the equation $2A + G^2 = 27$. The two numbers are

(a) 3, 6 (b) 4, 5 (c) 2, 7 (d) None of these

87. What is the result of the following program ?

```
int f (int & x)
{
x + +;
return x;
}
void main ()
{
int result, x = 5;
result = f (x) * f (x);
printf (''%d'', result);
}
```

(a) 36 (b) 42 (c) 30 (d) 25

88. Which of the following is an example of a spooled device ?
(a) A line printer used to print the output of a number of jobs
(b) A terminal used to enter data to a running program
(c) A secondary storage device in a virtual memory system
(d) A graphic display device

89. If $f(x) = (\cos x + i \sin x)(\cos 3x + i \sin 3x) \ldots \cos\{(2n-1)x + i \sin(2n-1)x\}$.
(a) $n^2 f(x)$ (b) $-n^4 f(x)$ (c) $-n^2 f(x)$ (d) $n^4 f(x)$

90. In an ellipse with eccentricity $\frac{1}{\sqrt{3}}$ the equation of the diameter conjugate to the diameter $3y = -2x$ is
(a) $3y = x$ (b) $y = 3x$ (c) $y = -x$ (d) $y = x$

91. The equation $x + e^x = 0$ has
(a) no real root (b) two real roots
(c) one real negative root (d) one real positive root

92. The derivative of $\sin^{-1}\frac{(1-x^2)}{(1+x)^2}$ w r t $\sin^{-1}\frac{2x}{1+x^2}$ is
(a) -1 (b) 0 (c) x (d) $1/x$

93. A square is inscribed in a circle $x^2 + y^2 - 2x + 4y + 3 = 0$. Its sides are parallel to the coordinates axes. The one vertex of the square is
(a) $(1+\sqrt{2}, -2)$ (b) $(1-\sqrt{2}, -2)$ (c) $(1, -2+\sqrt{2})$ (d) None of these

94. 15 coupons are numbered 1, 2, ... 15. Seven coupons are selected at random, one at a time, with replacement. The probability that the largest number appearing on a selected coupon is 9, is
(a) $(9/16)^6$ (b) $(8/15)^7$ (c) $(3/7)^7$ (d) None of these

95. The 7th term of the series 3, 9, 20, 38, 65,... is
(a) 154 (b) 165 (c) 175 (d) 184

96. The sides of an equilateral triangle, a square and a regular hexagon circumscribed in a circle are in
(a) GP (b) HP (c) AP (d) None of these

97. The root of $x^3 - 2x - 5 = 0$, correct to three decimal places by using Newton-Raphson method is
(a) 1.0404 (b) 2.0946 (c) 1.7321 (d) 0.7011

98. Let A and B be any two arbitrary events, then, which of the following is true ?
(a) $P(A \cup B) = P(A) + P(B)$ (b) $P(A \cap B) = P(A)P(B)$
(c) $P(A/B) = P(A \cap B)P(B)$ (d) $P(A \cup B) \leq P(A) + P(B)$

99. In a vectored interrupt
(a) The branch address is assigned to a fixed location in memory
(b) The branch address is obtained from a register in the process
(c) The interrupting source supplied the branch information to the processor through an interrupt vector
(d) All of the above

100. A relation over a set $S = \{3, 6, 9, 12\}$ is defined by $\{\{3, 3\}, \{6, 6\}, \{9, 9\}, \{12, 12\}, \{6, 12\}, \{3, 9\}, \{3, 12\}, \{3, 6\}\}$. Which of the following properties hold this relation ?
(a) Reflexive only (b) Reflexive and symmetric
(c) Reflexive, symmetric and transitive (d) Reflexive and transitive

101. Initialization cannot be part of the definition if the storage class of an array is
(a) static (b) external
(c) automatic (d) None of these

102. The area of the triangular region whose sides have the equations $y = 2x + 1$, $y = 3x + 1$ and $x = 4$ is
(a) 9 (b) 7 (c) 10 (d) 8

103. If A, B, C are angles of a triangle then the value of $\begin{vmatrix} \sin^2 A & \cot A & 1 \\ \sin^2 B & \cot B & 1 \\ \sin^2 C & \cot C & 1 \end{vmatrix}$ is

(a) 0 (b) 1 (c) π (d) $\frac{\pi}{2}$

104. The value of $4\{{}^nC_1 + 4.{}^n C_2 + 4^2 . {}^nC_3 + \ldots + 4^{n-1}\}$ is

(a) 0 (b) $5^n + 1$ (c) 5^n (d) $5^n - 1$

105. If λ is an eigenvalue of a matrix A, then it is a solution to

(a) $(A - \lambda I) = 0$ (b) $\det|A - \lambda I| = 0$

(c) $\det|A - I| = 0$ (d) $\det|A - \lambda| = 0$

106. Zero has two representations in

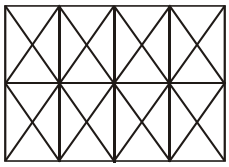
(a) Sign magnitude (b) 1's complement

(c) 2's complement (d) None of these

107. Let A be a two dimensional array of 10 rows and 12 columns. If the array is stored in row-major order then the address of the location $A[i][j]$ is

(a) $12j + i + 1$ (b) $12i + j + 1$ (c) $12j + i$ (d) $12i + j$

108. The number of squares in the figure given below is



(a) 11 (b) 21 (c) 24 (d) 26

109. If $(n - m)$ is odd, then $\int_0^{\pi} \cos mx \sin nx\, dx$ is

(a) $\frac{2n}{(n^2 - m^2)}$ (b) $\frac{2n}{(m^2 - n^2)}$ (c) $\frac{2m}{(n^2 - m^2)}$ (d) 0

110. ${}^{n-1}C_3 + {}^{n-1}C_4 > {}^nC_3$ if $n > \ldots$

(a) 5 (b) 6 (c) 7 (d) 8

111. Let $\tan\alpha = \frac{m}{(m+1)}$ and $\tan\beta = \frac{1}{(2m+1)}$, then the value of $(\alpha + \beta)$ is

(a) $\frac{\pi}{3}$ (b) $\frac{\pi}{6}$ (c) $\frac{\pi}{2}$ (d) $\frac{\pi}{4}$

112. For a binomial distribution, the mean is $\frac{15}{4}$ and the variance is $\frac{15}{16}$. The value of p is

(a) $\frac{1}{2}$ (b) $\frac{15}{16}$ (c) $\frac{1}{4}$ (d) $\frac{3}{4}$

113. If the roots of $x^2 - bx + c = 0$ are two consecutive integers, then $b^2 - 4c$ is

(a) 0 (b) 1 (c) 2 (d) None of these

114. If $A = \begin{vmatrix} a^2 & b^2 & c^2 \\ (a+1)^2 & (b+1)^2 & (c+1)^2 \\ (a-1)^2 & (b-1)^2 & (c-1)^2 \end{vmatrix}$ and $B = \begin{vmatrix} a^2 & b^2 & c^2 \\ a & b & c \\ 1 & 1 & 1 \end{vmatrix}$ then

(a) $A = 4B$ (b) $A = 2B$

(c) $A = B$ (d) None of these

115. The differential equation of all circles passing through the origin and having their centres on the y-axis is

(a) $(x^2 + y^2)\dfrac{dy}{dx} = 2xy$ (b) $(x^2 - y^2)\dfrac{dy}{dx} = 2xy$

(c) $dy/dx = 2xy\,(x^2 + y^2)$ (d) $\dfrac{dy}{dx} = 2xy\,(x^2 - y^2)$

116. The output of the following program is

```
void incr ()
{
static int i;
printf (''%d'', ++i);
}
void decr()
{
static int i;
printf (''%d'', i--);
}
void main ()
{
incr (); decr(); incr();
}
```

(a) 111 (b) 101 (c) 102 (d) garbage

117. If A, B, C are sets, then $A - (B - C)$ is equivalent to

(a) $(A - B) \cup (A \cap C)$ (b) $(A - B) \cap (A - C)$

(c) $A - (B \cap C)$ (d) $(A - B) \cup (A - C)$

118. The default parameter passing mechanism in a C program

(a) call by reference (b) call by value

(c) call by value result (d) None of these

119. The sum of the first n terms of the series $1^2 + 2 \cdot 2^2 + 3^2 + 2 \cdot 4^2 + 5^2 + 2 \cdot 6^2$ is $\dfrac{n(n+1)}{2}$, when n is even. When n is odd, the sum will be

(a) $n^2(n+1)$ (b) $\dfrac{n^2(n+1)}{2}$ (c) $\dfrac{n^2(n+1)^2}{4}$ (d) $\dfrac{n^2(n+1)}{16}$

120. The equation of the circle drawn with the focus of the parabola $(x-1)^2 - 8y = 0$ as its centre and touching the parabola at its vertex is

(a) $x^2 + y^2 - 2x - 4y + 1 = 0$ (b) $x^2 + y^2 - 2x - 4y = 0$

(c) $x^2 + y^2 - 4y + 1 = 0$ (d) $x^2 + y^2 - 4y = 0$