MCA
Previous Year Paper
JNU 2009

1. If $u = F(x - y,\ y - z,\ z - x)$, then $\dfrac{\partial u}{\partial x} + \dfrac{\partial u}{\partial y} + \dfrac{\partial u}{\partial z}$ is equal to

   (a) 3   (b) 0   (c) 1   (d) None of the above

2. Disk allocation used in UXIX is similar to

   (a) contiguous allocation   (b) indexed allocation

   (c) linked allocation   (d) a variant of linked allocation

3. The positive integer just greater thatn $(1 + 0.0001)^{10000}$ is

   (a) 4   (b) 5   (c) 2   (d) 3

4. The height of an open-cylinder of given surface and greatest volume is equal to

   (a) two times the radius of the base   (b) half of the radius of the base

   (c) radius of the base   (d) 1/9th of the radius of the base

5. If $(G,\ *)$ is an Abelian group, then

   (a) $x = x^{-1}$, for any $x \in G$ (b) $x = x^2$, for any $x \in G$

   (c) $(x * y)^2 = x^2 * y^2$, for any $x, y \in G$ (d) G is of finite order

6. Consider the following statements:

        Dhoni is a good sportsman.

        Sportsmen are healthy

   Conclusions :

   I. All healthy persons are sportsmen

   II. Dhoni is healthy

   Which one of the following is derived as conclusion ?

   (a) Only conclusion 1 follows   (b) Only conclusion II follows

   (c) Either I or II follows   (d) Neither I nor II follows

7. The value of $\int_0^\infty \int_x^\infty \dfrac{e^{-y}}{y}\, dx\, dy$ is

   (a) -1 (b) 1   (c) 0   (d) ∞

8. For which three values of c, then given matrix A is not invertible ?

$$A = \begin{bmatrix} 2 & c & c \\ c & c & c \\ 8 & 7 & c \end{bmatrix}$$

   (a) {2, 8, 7}   (b) {1, 2, 8}   (c) {0, 2, 7}   (d) None of the above

9. The surface area of the section of the cylinder $x^2 + y^2 = a^2$ made by the plane $x + y + z = a$ is

   (a) $3\pi a^2$ (b) $\sqrt{3}\pi a^2$ (c) $\sqrt{3}\pi a^2$ (d) None of the above

10. If A and B are symmetric matrices, which of these are certainly symmetric ?

    (i) $A^2 - B^2$ (ii) $(A + B)(A - B)$ (iii) ABA (d) $ABAB$

    (a) (i) and (iii) only   (b) (i) and (iv) only   (c) (ii) and (iii) only   (d) (ii), (iii) and (iv) only

11. If a system is in an unsafe state, then

    (a) it is deadlocked   (b) it is starving

    (c) it may enter into deadlock   (d) it will never enter into deadlock

12. The solution of differential equation $\dfrac{dy}{dx} + y \cos x = \dfrac{1}{2} \sin 2x$ is given by

    (a) $y = \cos x - 1 + ce^{-\cos x}$ (b) $y = \sin x - 1 + ce^{-\cos x}$

    (c) $y = \sin x - 1 + ce^{-\sin x}$ (d) $y = \cos x - 1 + ce^{-\sin x}$

13. In an LPP model in its standard form, three of the constraints are

    I. $x_1 + x_2 \le 2$

    II. $2x_1 + 2x_2 \le 3$

    III. $3x_1 + 3x_2 \le 8$

    Removal of which of the constrains will not affect the optimality ?

    (a) II and III   (b) I and II   (c) I and III   (d) I only

14. Given a 2×2 matrix A with eigenvalues 2 and -3, the eigenvalues of the matrix A^2

    (a) are 4 and -9 (b) are 2 and -3

    (c) are 4 and 9   (d) cannot be determined from the given data

15. For what value of k, will the equations

         $2x + 3y = 5$

    and $6x + ky = 15$

    have an infinite number of solutions ?

    (a) 7   (b) 8   (c) 9   (d) 10

16. In the bisection method for finding the roots of the equation, the approximate relative error is always

    (a) greater than the relative error   (b) equal to the relative error

    (c) less than the relative error   (d) None of the above

17. The fastest logic family out of the following is

    (a) ECL   (b) RTL   (c) DTL   (d) TTL

18. The strongest of the following algebraic structures is

    (a) group   (b) field   (c) ring   (d) monoid

19. If $A + B$ means A is the daughter of B, $A \times B$ means A is the son of B, $A - B$ means A is the wife of B, then in the expression $Z \times T - S \times U + P$, what is U to Z ?

    (a) Mother   (b) Grandmother   (c) Father   (d) Cannot be determined

20. There are sixteen 2 by 2 matrices whose entries are 1s and 0s. Of these, how many are invertible ?

    (a) 6   (b) 8   (c) 10   (d) None of the above

21. Cyclomatic number of a graph is also known as its

    (a) rank   (b) complexity   (c) nullity   (d) None of the above

22. The function $f(x) = \begin{cases} 0, & x = 0 \\ \sin \dfrac{1}{x}, & x \ne 0 \end{cases}$ is

    (A) continuous   (b) discontinuous

    (c) differentiable such that $f'(0) = 1$ (d) differentiable such that $f'(0) = -1$

23. Using $(r - 1)^s$ complement scheme, the result of adding $(+F12A)_{16}$ with $(-IBCD)_{16}$ will be

    (a) 10D55C   (b) 11D55C   (c) 00D55D   (d) 10D55D

24. Find the odd one
    (a) Ballot   (b) Manifesto   (c) Election   (d) Vote

25. The value of $\int_0^9 dx \int_0^{x^2} e^{y/x} dy$ is
    (a) $1 - e^2$ (b) $e^2 - 1$ (c) $1 - e$ (d) $e - 1$

26. The volume of the solid bounded by the surface $x = 0$, $y = 0$, $z = 0$ and $x + y + z = 1$ is given by
    (a) 1/2   (b) 1/3   (c) 1/6   (d) None of the above

27. In MCA, JNU Entrance Examination, a student scores 4 marks for every correct answer and loses 1 mark for every wrong answer. If he attempts 75 questions and secures 125 marks, the number of questions he attempts correctly is
    (a) 35   (b) 40   (c) 42   (d) 46

28. Which of the following parameter passing techniques is supported by $C + +$ but not by C ?
    (a) Pass by value   (b) Pass by reference
    (c) Pass by value-result   (d) All of the above

29. The solution of differential equation $\dfrac{dy}{dx} = \sin\left(\dfrac{y}{x}\right) + \dfrac{y}{z}$ is given by
    (a) $\cot\left(\dfrac{y}{2x}\right)$ (b) $\cot\left(\dfrac{2x}{y}\right)$ (c) $\tan\left(\dfrac{2x}{y}\right)$ (d) $\tan\left(\dfrac{y}{2x}\right)$

30. If PAINT is coded as 74128 and EXCEL is coded as 93596, how will ACCEPT be encoded ?
    (a) 455978   (b) 547978   (c) 554978   (d) 735961

31. What is the output of the following C++ program ?
    ```
    void hello(int x = 0, int y=0)
    {cout << "Hi There";}
    void hello(int x)
    {cot << "How are U doing today ?";}
    void main(void)
    {int a = 10; Hello{a};
    }
    ```
    (a) Hi There   (b) How are U doing today
    (c) Results in runtime error   (d) Results in compilation error

32. The solution of $\dfrac{d^2 y}{dx^2} - 2\dfrac{dy}{dx} + y = xe^x \sin x$ is given by
    (a) $y = (c_1 + c_2 x) e^x - (x \sin x + 2 \cos x) e^x$ (b) $y = xe^x - (x \sin x + 2 \cos x) e^x$
    (c) $y = (c_1 + c_2 x) e^x + (x \sin x + 2 \cos x) e^x$ (d) $y = (c_1 + c_2 x) e^x + (x \cos x + 2 \tan x) e^x$

33. The area bounded by $y^2 = u - x$ and $y^2 = x$ is
    (a) $\dfrac{16}{3\sqrt{2}}$ (b) $\dfrac{8}{3\sqrt{2}}$ (c) $\dfrac{16\sqrt{2}}{3}$ (d) $\dfrac{16\sqrt{3}}{3}$

34. Point out the odd me
    (a) Advise   (b) Counsel   (c) Suggest   (d) Direct

35. The coordinates of the centre of the smallest circle touching the circle $x^2 + y^2 = 4$ and line $x + y = 5\sqrt{2}$ is
    (a) $\left(\dfrac{7}{2\sqrt{2}}, \dfrac{7}{2\sqrt{2}}\right)$ (b) $\left(\dfrac{3}{2}, \dfrac{3}{2}\right)$ (c) $\left(\dfrac{7}{2\sqrt{2}}, \dfrac{7}{3\sqrt{2}}\right)$ (d) None of the above

36. The mean mark of 25 students of Section XA in an examination is 67 and that of 30 students of Section XB is 75. The mean of the marks of all the 55 students is
    (a) 71   (b) 71·4   (c) 72   (d) 72 · 4

37. As oxygen is related to burn, carbon dioxide is related to

    (a) isolate   (b) foam   (c) extinguish   (d) explode

38. What is the negation of $-(p \leftrightarrow q)$?

    (a) $\sim p \leftrightarrow \sim q$ (b) $\sim p \leftrightarrow q$ (c) $p \rightarrow \sim q$ (d) None of the above

39. The equation of the plane containing the line $\dfrac{x+1}{-3} = \dfrac{y-3}{2} = \dfrac{z+2}{1}$ and the point $(0, 7, -7)$ is

    (a) $x + y + z = 1$ (b) $x + y + z = 2$ (c) $x + y + z = 0$ (d) None of the above

40. How many characters per sec (7 bits + 1 parity) can be transmitted over a 2400 b.p.s. line if the transfer is synchronous ?

    (a) 300   (b) 240   (c) 250   (d) 275

41. An equilateral treiangle is inscribed in the parabola $y^2 = 4ax$, such that one vertex of this triangle coincides with the vertex of the parabola. The length of this side of triangle is

    (a) $4a\sqrt{3}$ (b) $6a\sqrt{3}$ (c) $2a\sqrt{3}$ (d) $48a\sqrt{3}$

42. In a hypothetical language, all operators have equal precedence and associate to the left. The value of the expression $5 \times 3 - 3 - 1 \times 2$ is this language would is

43. Euler formula for testing the planarity of a graph with v vertices, e edges and r faces is

    (a) $v = e - r + 1$ (b) $v = e - r + 2$ (c) $v = e + r + 2$ (d) $v = e + r$

44. The output of the SQL statement SELECT 'Hi' FROM DUAL WHERE NULL = NULL; will be

    (a) Hi   (b) FALSE   (c) TRUE   (d) No output

45. The value of λ, so that the vector $\vec{U} = (x + 3y)\,\hat{i} + (y - 2z)\,\hat{j} + (x + \lambda z)\,\hat{k}$ is a solenoidal vector, is

    (a) -2 (b) 1   (c) 3   (d) None of the above

46. If MADRAS can be written as ARSARS, how can ARKONAM be written in that code ?

    (a) ROAAKNM   (b) ROAKANM   (C) ROAKNNM   (D) ROAKNAM

47. The value of $\displaystyle\oint_C \dfrac{e^{2z}}{(z+1)^4}\,dz$, where C is the circle $|z| = 2$ is

    (a) $\dfrac{\pi}{3}\,ie^{-2}$ (b) $\dfrac{2\pi}{3}\,ie^{-2}$ (c) $\dfrac{8\pi}{3}\,ie^{-2}$ (d) None of the above

48. To implement the expression $\overline{A}BCD + ABC\overline{D} + A\overline{B}CD$, it takes one OR gate and

    (a) one AND gate   (b) three AND gates

    (c) three AMD gates and four inverters   (d) three AND gates and three inverters

49. The probability that the ace of spades will be drawn from a pack of well-shuffled cards at least once in 104 consecutive trials using Poisson distribution is

    (a) e^2 (b) e^{-2} (c) $1 - e^2$ (d) $1 - e^{-2}$

50. The vectors $a = i + j + mk$, $b = i + j + (m+1)k$ and $c = i - j + mk$ are coplanar if m is equal to

    (a) 1   (b) 4   (c) 3   (d) None of the above

51. Dual of $(q \rightarrow p) \rightarrow r$ is

    (a) $(q \rightarrow p) \rightarrow r$ (b) $p \rightarrow (q \rightarrow r)$ (c) $(p \vee \sim q) \vee r$ (d) None of the above

52. Consider the following subsets of the real space R^3 :

    I. $\{\{x_1, x_2, x_3) : x_2, x_3 = 0\}$

    II. $\{(x_1, x_2, x_3) : x_2 - x_3 + 2x_1 = 0\}$

    III. $\{(x_1, x_2, x_3) : x_3 \le x_2 \le x_1 \text{ mut be true}\}$

    How many of them are subspaces of R^3 ?

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

53. Choose a word that belongs to the group of ohm : watt : volt

    (a) Light   (b) Electricity   (c) Hour   (d) Ampere

54. The harmonic mean of the roots of the equation $(5 + \sqrt{2})\,x^2 - (4 + \sqrt{5})\,x + 8 + 2\sqrt{5} = 0$ is

    (a) 2   (b) 6   (c) 8   (d) 4

55. Relations produced from an E-R model will always be in
    (a) first normal form
    (b) second normal form
    (c) third normal form
    (d) fourth normal form

56. The region of the Argand plane defined by $|z - i| + |z + i| \le 4$ is
    (a) interior of an ellipse
    (b) exterior of a circle
    (c) interior and boundary of an ellipse
    (d) None of the above

57. If $x + iy = \dfrac{1}{1 - \cos\theta + 2i\sin\theta}$, $\theta \ne 2n\pi$, $n \in I$, then maximum value of x is
    (a) 1
    (b) 2
    (c) 1/2
    (d) 1/3

58. Find out the meaning of the given declaration in C language
    int(*p) [5];
    (a) p is a one-dimensional array of length 5 of pointers to integers
    (b) p is a pointer to a 5-element integer array
    (c) Same as int(*p)[5];
    (d) None of the above

59. Which set of numbers is similar to the set (63, 49, 35) ?
    (a) (72, 40, 24)
    (b) (72, 48, 24)
    (c) (64, 40, 28)
    (d) (81, 63, 45)

60. The only value of x satisfying the equation $6\sqrt{\dfrac{x}{x+4}} - 2\sqrt{\dfrac{x+4}{x}} = 11$, where $x \in R$ is
    (a) 4/35
    (b) $-4/35$
    (c) 16/3
    (d) $-16/3$

61. IF CHARCOAL is coded as 45164913 and MORALE is coded as 296137, how is the word COLLER coded ?
    (a) 397758
    (b) 497758
    (c) 483359
    (d) 493376

62. In a class, there are 18 boys who are over 160 cm tall. If these constitute three-fourths of the boys and the total number of boys is two-thirds of the total number of students in the class, then the number of girls in the class is
    (a) 6
    (b) 12
    (c) 18
    (d) 24

63. Centre of the arc represented by $\arg\left(\dfrac{z - 3i}{z - 2i + 4}\right) = \dfrac{\pi}{4}$ is
    (a) $\dfrac{1}{2}(5i + 5)$
    (b) $\dfrac{1}{2}(5i - 5)$
    (c) $\dfrac{1}{2}(9i + 5)$
    (d) $\dfrac{1}{2}(9i - 5)$

64. The dual simplex method starts with a/an
    (a) feasible but superoptimal solution
    (b) feasible but suboptimal solution
    (c) infeasible but superoptimal solution
    (d) infeasible but suboptimal solution

65. The flip-flop most suitable for parallel loading of data is
    (a) R-S flip-flop
    (b) D flip-flop
    (c) J-K flip-flop
    (d) T flip-flop

66. Is $\sin^{-1} x + \sin^{-1} y + \sin^{-1} z = 3\pi/2$, then the value of $x^{100} + y^{100} + z^{100} - \dfrac{9}{x^{101} + y^{101} + z^{101}}$ is
    (a) 0
    (b) 1
    (c) 2
    (d) 3

67. using module 2 arithmetic 1001011 divided by 1011 results in a remainder
    (a) 101
    (b) 100
    (c) 110
    (d) 111

68. The maximum value of $1 + \sin\left(\dfrac{\pi}{4} + \theta\right) + 2\cos\left(\dfrac{\pi}{4} - \theta\right)$ for real values of θ is
    (a) 3
    (b) 4
    (c) 5
    (d) None of the above

69. The number of possible binary trees with 4 nodes is
    (a) 12
    (b) 13
    (c) 14
    (d) 15

70. A differential equation associated to the primitive $y = a + be^{5x} + ce^{-7x}$ is

(a) $y_3 + 2y_2 - y_1 = 0$ (b) $4y_3 + 5y_2 - 20y_1 = 0$

(c) $y_3 + 2y_2 - 35y_1 = 0$ (d) None of the above

71. A shelf holds n books in a row. How many ways are there to choose r books so that no two adjacent books are chosen ?

(a) $^n C_r$ (b) $^{n+1} C_r$ (c) $^{n-r+1} C_r$ (d) $^{n-r} C_r$

72. Choose the pair in which the words are differently related

(a) Beautician : Parlour   (b) Chemist : Medicine

(c) Lawyer : Court   (d) Engineer : Site

73. Using signed megnitude representation overflow can be detected with the operands as carry into the sign and the carry out of the sign bit by using the gate

(a) OR   (b) AND   (c) XOR   (d) NOT

74. As RATIONAL is to RATNIOLA, TRIBAL is to

(a) TIRLAB   (b) TRIALB   (c) TIRLABA   (d) TRILBA

75. Rahul and Sarvesh take turns in throwing two dice; the first to throw 10 (sum of two dice) is being awarded the prize. If Rahul gets the first turn to throw the dice, their chances of winning are in the ratio

(a) 10 : 11   (b) 11 : 10   (c) 11 : 12   (d) 12 : 11

76. The probability density function $f(x)$ of a continuous random variable x is defined by

$$f(x) = \begin{cases} Ax^{-3}, & 5 \le x \le 10 \\ 0, & \text{otherwise} \end{cases}$$

The value of A is

(a) 50   (b) 1   (c) -200 (d) 200/3

77. In the cigarette smoking population 70% are men and 30% are women. 10% of these men and 20% of these women smoke 'WILLS'. The probability that a person smoking 'WILLS' will be a man is

(a) 6/13   (b) 7/13   (c) 3/13   (d) 10/13

78. In 1's complement arithmetic a carry generated should be

(a) added   (b) subtracted   (c) appended   (d) discarded

79. If P is a variable on the ellipse $\dfrac{x^2}{a^2} + \dfrac{y^2}{b^2} = 1$ with AA' as the major axis, then the maximum area of the triangle APA' is

(a) ab (b) $2ab$ (c) $ab/2$ (d) $\sqrt{ab}$

80. Select the odd numeral pair

(a) 24-21   (b) 46-32   (c) 63-23   (d) 84-24

81. The incidence of occupational disease in an industry is such that the workers have 20% chance of suffering from it. The probability that out of 6 workers 4 or more will catch the disease is

(a) 2/3   (b) 40/2125   (c) 53/2125   (d) 50/2125

82. There are four algorithms $A1$, $A2$, $A3$, $A4$ with complexity of the order of $\log(n)$, $\log(\log(n))$, $n\log(n)$, $n/\log(n)$ respectively. Which of these algorithms is the best ?

(a) $A1$ (b) $A2$ (c) $A3$ (d) $A4$

83. The arithmetic mean of the series $^n C_0$, $^n C_1$, $^n C_2$, $\ldots$, $^n C_n$ is

(a) $2^n/(n+1)$ (b) $2^n/n$ (c) $2^{n-1}/(n+1)$ (d) None of the above

84. If a variate X is expressed as a linear function of two variables U and V in the form $X = aU + bV$, then mean $\bar{X}$ of X is

(a) $a\bar{U} - b\bar{V}$ (b) $\bar{U} + \bar{V}$ (c) $b\bar{U} + a\bar{V}$ (d) None of the above

85. The standard diviation (SD) of a variate x is σ. The SD of the variate $(ax + b)/c$, where a, b, c are constants, is

(a) $\left(\dfrac{a}{c}\right)\sigma$ (b) $\left|\dfrac{a}{c}\right|\sigma$ (c) $\left(\dfrac{a^2}{c^2}\right)\sigma$ (d) None of the above

86. A student obtains 75%, 80% and 85% marks in three subjects. If the marks of another subject is added, the average cannot be less than

    (a) 60%   (b) 65%   (c) 80%   (d) 90%

87. Which one of the following transformations reduces the differential equation $\dfrac{dz}{dx} + \dfrac{z}{x}\log z = \dfrac{z}{x^2}(\log z)^2$ into the form $\dfrac{du}{dx} + uP(x) = Q(x)$?

88. The value of ${}^nC_0\ {}^{2n}C_n - {}^nC_1\ {}^{2n-1}C_n + {}^nC_2\ {}^{2n-2}C_n - {}^nC_3\ {}^{2n-3}C_n + \ldots + (-1)^n\ {}^nC_n\ {}^nC_n$ is

    (a) 0   (b) 1   (c) $(-1)^n$ (d) 2^n

89. Q is the brother of R, P is the sister of Q, T is the brother of S, S is the daughter of R, then Q is the uncle of whom ?

    (a) R and P (b) P and T (c) Q and T (d) S and T

90. The necessary and sufficient condition for a complete graph of n vertices K_n to be Eularian is

    (a) n should be even   (b) n should be odd

    (c) n is a composite number   (d) n is a prime number

91. Solution of the differential equation $2y\sin x\,\dfrac{dy}{dx} = 2\sin x\cos x - y^2\cos x$ satisfying $y(\pi/2) = 1$ is given by

    (a) $y^2 = \sin x$ (b) $y = \sin^2 x$ (c) $y^2 = \cos x + 1$ (d) $y^2\sin x = 4\cos^2 x$

92. What is the possible number of binary relations on a set S having n elements which are symmetric and antisymmetric ?

    (a) 0   (b) 1   (c) n^2 (d) 2^n

93. The equation $\left|\sqrt{x^2 + (y-1)^2} - \sqrt{x^2 + (y+1)^2}\right| = K$ will represent a hyperbola for

    (a) $K \in (0,\ 2)$ (b) $K \in (-2,\ 1)$ (c) $K \in (1,\ \infty)$ (d) $K \in (0,\ \infty)$

94. A hash table can store a maximum of 10 records. Currently there are records in locations 1, 3, 4, 7, 8, 9, 10. The probability of a new record going into location 2, with a hash function resolving collisions by linear probing is

    (a) $0\cdot 6$ (b) $0\cdot 1$ (c) $0\cdot 2$ (d) $0\cdot 5$

95. If $a + b + c \neq 0$ and $\begin{vmatrix} a-x & c & b \\ c & b-x & a \\ b & a & c-x \end{vmatrix} = 0$, then the total number of different values of x is equal to

    (a) 1   (b) 2   (c) 3   (d) None of the above

96. The UPSC has a list of 150 persons. Out of these 50 are women and 100 are men. 125 of them know Hindi and remaining do not know Hindi. 90 of them are teachers and remaining are not teachers. What is the probability of selecting a Hindi-knowing woman teacher as examiner ?

    (a) 1/6   (b) 3/5   (c) 2/9   (d) 5/6

97. As attribute of one table matching the primary key of another table is known as

    (a) candidate key   (b) composite key   (c) foreign key   (d) secondary key

98. Let $p(x) = 0$ be a polynomial equation of least possible degree with rational coefficients having $\sqrt[3]{7} + \sqrt[3]{49}$ as one of its roots. The product of all the roots of $p(x) = 0$ is

    (a) 56   (b) 63   (c) 7   (d) 49

99. The value of $\tan 100^{\circ} + \tan 125^{\circ} + 100^{\circ}\tan 125^{\circ}$ is

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

100. Contrapositive of the statement "If a number is divisible by 9, then it is divisible by 3" is

    (a) If a number is not divisible by 3, it is not divisible by 9

    (b) If a number is not divisible by 3, it is divisible by 9

    (c) If a number is not divisible by 9, it is not divisible by 3

    (d) None of the above

101. In the set of integers, a relation R is defined as aRb, if and only if $b = |a|$. Relation R is
   (a) reflexive   (b) irreflexive   (c) symmetric   (d) antisymmetric

102. A and B are two sets with cardinality m and n respectively. The number of possible one-to-one mapings from A to B, when $m < n$ is
   (a) m^n (b) $^m C_n$ (c) $^n P_m$ (d) $^m P_2$

103. The missing number in the given figure is
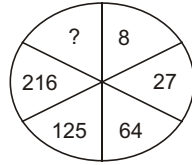
   (a) 4   (b) 305   (c) 343   (d) 729

104. The most general values for which $\tan \theta = -1$, $\cos \theta = 1/\sqrt{2}$ are
   (a) $n\pi + 7\pi/4$ (b) $n\pi + (-1)^n \, 7\pi/4$ (c) $2np + 7\pi/4$ (d) $2n\pi + (-1)^n \, 7\pi/4$

105. The meaning of 'baud' in network is
   (a) the number of bits transmitted per unit time
   (b) the number of bytes transmitted per unit time
   (c) the rate at which the signal changes
   (d) None of the above

106. The radius of the circle in which the sphere $x^2 + y^2 + z^2 + 2x - 2y - 4z - 19 = 0$ is cut by the plane $x + 2y + 2z + 7 = 0$ is
   (a) 2   (b) 3   (c) 4   (d) 1

107. If every region of a simple planar graph (with n vertices and e edges) embedded in a plane is bounded by k edges, then
   (a) $e = \dfrac{k(n-2)}{k-2}$ (b) $e = \dfrac{k(k-2)}{n-2}$ (c) $e = \dfrac{n(k-2)}{n-2}$ (d) $e = \dfrac{n(n-2)}{k-2}$

108. Given a 32 bit machine and the memory management scheme with page size 4K, how many pages are possible ?
   (a) 2^{12} (b) 2^{20} (c) 2^{32} (d) 2^4

109. The equation of the tangent to the conic $x^2 - y^2 - 8x + 2y + 11 = 0$ at (2, 1) is
   (a) $x + 2 = 0$ (b) $2x + 1 = 0$ (c) $x - 2 = 0$ (d) $x + y + 1 = 0$

110. heap allocation is required for languages that
   (a) support recursion   (b) support dynamic data structures
   (c) use dynamic scope rules   (d) None of the above

111. Sanjay travelled from a point X straight to Y at a distance of 80 meters. He turned right and walked 50 meters, then again turned right and walked 70 meters. Finally, he turned right and walked 50 meters. How far is he from the starting point ?
   (a) 10 meters   (b) 20 meters   (c) 50 meters   (d) 70 meters

112. Thrashing occurs quite often when the page allocation policy is
   (a) local   (b) global   (c) Both (a) and (b)   (d) None of the above

113. If ω is a complex cube root of unity, then the value of the expression
$$\cos \left[\{ (1 - \omega)(1 - \omega^2) + \ldots + (10 - \omega)(10 - \omega^2) \} \frac{\pi}{900} \right]$$
   is
   (a) -1 (b) 0   (c) 1   (d) $\sqrt{3}/2$

114. The refresh rate below which a picture flickers is
   (a) 25   (b) 30   (c) 35   (d) 60

115. How many rectangles are there in the given figure ?
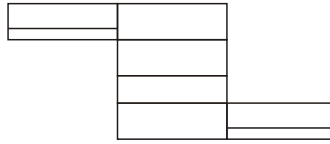
    (a) 8   (b) 17   (c) 18   (d) 20

116. The distance of the point (1, 0, − 3) from the plane $x - y - z = 9$ measured parallel to the line $\dfrac{x - 2}{2} = \dfrac{y + 2}{2} = \dfrac{z - 6}{-6}$ is

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

117. Identify the group of letters, which is different from others

    (a) BDGK   (b) JLOS   (c) NPSW   (d) MORU

118. An LPP having 2 optimal solutions must have

    (a) more than 3 constraints   (b) more than 2 optimal solutions

    (c) even number of constraints   (d) None of the above

119. A unit vector in XZ-plane making angles $\dfrac{\pi}{4}$ and $\dfrac{\pi}{3}$ respectively with $u = 2i + 2j - k$ and $v = j - k$ is

    (a) $\dfrac{1}{\sqrt{2}}(-i + k)$ (b) $\dfrac{1}{\sqrt{2}}(i - k)$ (c) $-\dfrac{1}{\sqrt{2}}(i + k)$ (d) None of the above

120. Which of the following methods gives the least error when e^{x} is integrated from 0 to $0 \cdot 4$?

    (a) Trapezoidal rule with the interval width as $0 \cdot 2$

    (b) Trapezoidal rule with the interval with as $0 \cdot 1$

    (c) Simpson's rule with the interval width as $0 \cdot 1$

    (d) Simpson's rule with the interval width as $0 \cdot 2$