

M. C. A. ENTRANCE

Test Code: MTJNU-I

Total Questions: 120

Max. Time: 180 Min.

1. If u and v denote respectively the number of leaves of the curves $r = a \cos 2\theta (a > 0)$ and $r = b \sin 3\theta (b > 0)$, then

- (a) $u < v$ (b) $u > v$
(c) $u = v$ (d) $u = v = 0$

2. Two verticals AL and BM of heights $20m$ and $80m$ respectively stand apart on a horizontal plane. If A, B be the feet of the poles and AM and BL intersect at P , then the height of P is equal to

- (a) $50m$ (b) $18m$
(c) $16m$ (d) $15m$

3. For the curve $\beta y^2 = (x + \alpha)^3, \alpha, \beta$ are the constants, the square of subtangent

- (a) is constant
(b) varies as x^2
(c) varies as y^3
(d) varies as the subnormal

4. P is a set containing n elements. Subset A of P is chosen, and the original set is reconstructed by removing the elements of A from it. Also, another subset B of P is chosen. Then the number of ways of choosing A and B such that A and B have no elements in common is

- (a) 2^n (b) 3^n
(c) 4^n (d) 5^n

5. The length of the shadow of a vertical pole of height h , thrown by the sun's rays at three different moments are $h, 2h$ and $3h$. The sum of the angles of elevation of the rays at these three moments is equal to

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

6. If $\left| \cos \theta \left\{ \sin \theta + \sqrt{\sin^2 \theta + \sin^2 \alpha} \right\} \right| \leq k$, then the value of k is

- (a) $\sqrt{1 + \cos^2 \alpha}$ (b) $\sqrt{1 + \sin^2 \alpha}$
(c) $\sqrt{2 + \sin^2 \alpha}$ (d) $\sqrt{2 + \cos^2 \alpha}$

7. If $\sin x + \sin^2 x = 1$, then the value of $\cos^{12} x + 3 \cos^{10} x + 3 \cos^8 x + \cos^6 x$

+ $2 \cos^4 x + \cos^2 x - 2$ is equal to

- (a) 0 (b) $\sin x$
(c) 2 (d) $\sin^2 x$

8. If x is real, then the least value of the expression $(ax^2 + bx + c), a > 0$ is

- (a) $-\frac{b}{2a}$ (b) $b^2 - 4ac$
(c) $\frac{4ac - b^2}{4a}$ (d) $\frac{4ac - b^2}{4a^2}$

9. What is the output of the following program segment

```
main ( )
{
    enum code
    {
        add,
        delete,
        modify,
        unchanged
    };
    typedef enum code CODE;
    CODE c,d;
    c = add;
    d = modify;
    printf ("c = %d d = %d", c, d);
}
```

(a) compilation error (b) $c = 0, d = 0$

(c) $c = 0, d = 2$

(d) $c = 2, d = 2$

10. Let $\overrightarrow{OA} = \overrightarrow{a}$, $\overrightarrow{OB} = 10\overrightarrow{a} + 2\overrightarrow{b}$ and $\overrightarrow{OC} = \overrightarrow{b}$, where O, A and C are non-collinear points. Let p denotes the area of the quadrilateral $OABC$ and q denotes the area of the parallelogram with OA and OC as adjacent sides. Then p/q is equal to

(a) 4

(b) 6

(c) 2

(d) 5

11. Turn around time is

(a) the time a program waits before execution starts

(b) the start time

(c) the execution time

(d) the time between start & the end of the program

12. Which of the following is true for testing & debugging in a program

(a) Testing detects logical errors, debugging corrects those errors

(b) Testing detects syntax errors, debugging corrects those errors

(c) Testing is independent of debugging

(d) All of the above

13. If $f(x) = \sin(\log x)$, then the value of

$$f(xy) + f\left(\frac{x}{y}\right) - 2f(x)\cos(\log y) \text{ is}$$

(a) 1 (b) 0 (c) -1 (d) $\sin(\log x) \cdot \cos(\log y)$

14. If $y = \int_{\cos x}^x (u + u^2) du$. Then $\frac{dy}{dx}$ is

(a) $x + x^2 + \sin x \cos x + \cos^2 x \sin x$

(b) $(x + x^2) + 2 \sin x \cos x$

(c) $\frac{x^2}{2} + \frac{x^3}{3} - \frac{\cos^2 x}{2} - \frac{\cos^2 x}{3}$

(d) $x + \frac{x^2}{2} + \frac{\cos x}{\sin x}$

15. The moment of the couple formed by the forces $5\hat{i} + \hat{k}$ and $-5\hat{i} - \hat{k}$ acting at the point $(9, -1, 2)$ and $(3, -2, 1)$ respectively, is:

(a) $-\hat{i} + \hat{j} + 5\hat{k}$ (b) $\hat{i} - 11\hat{j} - 5\hat{k}$

(c) $-\hat{i} + 11\hat{j} + 5\hat{k}$ (d) $\hat{i} - \hat{j} - 5\hat{k}$

16. If n is a natural number such that $n = P_1^{\alpha_1} \cdot P_2^{\alpha_2} \cdot P_3^{\alpha_3} \dots P_k^{\alpha_k}$ where

$\alpha_1 + \alpha_2 + \alpha_3 + \dots + \alpha_k \geq k$ and $P_1, P_2, P_3, \dots, P_k$ are

distinct primes, then $\log_e n$ is

(a) $\leq k \log_e 2$

(b) $= k \log_e 2$

(c) $> k \log_e 2$

(d) $\geq k \log_e 2$

17. If $f(x) = |\log|x||$, then

(a) $f(x)$ is continuous and differentiable $\forall x$ in its domain

(b) $f(x)$ is continuous but not differentiable at $x = \pm 1$

(c) $f(x)$ is neither continuous nor differentiable at $x = \pm 1$

(d) $f(x)$ is not continuous but differentiable at $x = \pm 1$

18. If G is an abelian group under the binary operation $*$, defined by $a * b = a + b - ab$, then $a * (b * c)$ is equal to

(a) $a + b + c + ab + bc + ca$

(b) $a + b + c - abc$

(c) $a + b + c - ab - bc - ca + abc$

(d) $a + b + c + ab + bc + ca - abc$

19. The worst case search time using a binary search tree could be

(a) $O(\log_2 n)$

(b) $O(\log_e n)$

(c) $O(n)$

(d) $O(n^2)$

20. An interrupt is

(a) a program that stops the CPU

(b) a response to an asynchronous or exceptional event

(c) a program that is invoked when a printer is out of paper

(d) an operating system module

21. If the number 9.089 is rounded off to three significant figures. Then the round off error is

(a) 0.01

(b) -0.001

(c) 0.001

(d) -0.01

22. Which of the following is the correct order for a given number α in an increasing order

(a) $\log_2 \alpha < \log_3 \alpha < \log_e \alpha < \log_{10} \alpha$

(b) $\log_{10} \alpha < \log_3 \alpha < \log_e \alpha < \log_2 \alpha$

(c) $\log_{10} \alpha < \log_e \alpha < \log_2 \alpha < \log_3 \alpha$

(d) $\log_3 \alpha < \log_e \alpha < \log_2 \alpha < \log_{10} \alpha$

23. Which of the following is an example of a bounded medium?

(a) Coaxial cable

(b) Wave guide

- (c) Fiber optic cable (d) All of the above

24. The Normal distribution

- (a) depends on discrete random variable
(b) depends on continuous random variable
(c) does not depend on random variable
(d) none of these

25. The circular asymptote of the curve $r = a \frac{e^\theta + 1}{e^\theta - 1}$ is

- (a) $r = 0$ (b) $r = a$
(c) $r = \frac{a}{2}$ (d) $\theta = 0$

26. Match the following

- | | |
|--------------------------------|--|
| 1. Data link layer | (i) the lowest layer of an OSI model |
| 2. Physical layer | (ii) performs routing and communication |
| 3. Presentation layer | (iii) detection and recovery of errors in transmitted data |
| 4. Network layer | (iv) provides syntax & semantics of data |
| (a) 1(iii), 2(i), 3(iv), 4(ii) | (b) 1(ii), 2(i), 3(iv), 4(iii) |
| (c) 1(iv), 2(i), 3(ii), 4(iii) | (d) 1(ii), 2(i), 3(iii), 4(iv) |

27. Let z be a complex number satisfying $z^2 + z + 1 = 0$. If n is not a multiple of 3, then the value of $z^n + z^{2n}$ is

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

28. Simpson rule of evaluation of $\int_a^b f(x)dx$ requires the interval $(b - a)$ to be divided into

- (a) $3n$ intervals
(b) $2n$ intervals
(c) $(2n+1)$ intervals
(d) any number of intervals

29. The worst case running time of quick sort is

- (a) $O(n \log_2 n)$ (b) $O(n \log_e n)$
(c) $O(n^2)$ (d) $O(n^3)$

30. The total time to prepare a disk drive mechanism for a block of data to be read from it is

- (a) seek time
(b) transmission time
(c) latency + seek time
(d) latency + seek + transmission time

31. The projection of the vector $\vec{i} + \vec{j} + \vec{k}$ on the line whose vector equation is $\vec{r} = (3+t)\vec{i} + (2t-1)\vec{j} + 3\vec{k}$, t being the scalar

- (a) $1/\sqrt{14}$ (b) 6
(c) $6/\sqrt{14}$ (d) $\sqrt{14}$

32. The equation $a \sin x + b \cos x = c$ where $|c| > \sqrt{a^2 + b^2}$ has

- (a) one solution
(b) two solutions
(c) no solution
(d) infinite number of solutions

33. The cubic equation whose two roots are 1, $3+2i$ is

- (a) $x^3 - 7x^2 + 12x - 13 = 0$
(b) $x^3 - 9x^2 + 19x - 10 = 0$
(c) $x^3 - 7x^2 + 19x - 13 = 0$
(d) $x^3 - 9x^2 + 12x - 10 = 0$

34. The differential equation of all circles which passes through the origin and whose centres lie on y-axis is

- (a) $(x^2 - y^2) \frac{dy}{dx} - 2xy = 0$
(b) $(x^2 - y^2) \frac{dy}{dx} + 2xy = 0$
(c) $(x^2 - y^2) \frac{dy}{dx} - xy = 0$
(d) $(x^2 - y^2) \frac{dy}{dx} + xy = 0$

35. In a purse there are 9 five paisa coins and a one rupee coin. In another purse there are all 10 five paisa coins. 9 coins are taken from the former and put into the second and then 9 coins are taken from the latter and put into the first. What is the chance that the rupee coin is still in the first purse.

- (a) $1/9$ (b) $10/19$
(c) $5/19$ (d) $14/19$

36. Which of the following is an advantage of using fiber optic data transmission

- (a) Fast data transmission (b) Low noise level
(c) Few transmission errors (d) All of the above

37. To sort a file which is so large that it cannot be fitted in the RAM available. Then the sorting algorithm that to use is

- (a) Merge sort (b) Bubble sort

(c) Quick sort

(d) Insertion sort

38. The n th node in a singly linked list is accessed via(a) the first n nodes

(b) 1 node only, the head

(c) the first $(n+1)$ nodes(d) the first $(n-1)$ nodes

39. How many bits does one need to encode all twenty six letters, ten symbols & ten numerals?

(a) 2

(b) 5

(c) 6

(d) 46

40. A computer that has 32K storage locations, exactly how many storage locations are there?

(a) 32000

(b) 3768

(c) 32768

(d) 32700

41. What will be the output of the following program segment?

main ()

{ int i=1, j=1;

for (; j; printf("%d%d", i, j))

j=i++<=5; }

(a) 11 22 31 42 53 64

(b) 21 31 41 51 61 70

(c) 21 31 41 51 61 71

(d) 11 22 31 42 53

42. A and B play 12 games of chess, 6 are won by A , 4 are won by B and 2 end in a tie. They agree to play a tournament which consists of 3 games. The probability that A and B win alternately is:(a) $1/8$ (b) $19/27$ (c) $5/72$ (d) $5/36$ 43. If $i = \sqrt{-1}$, then $4 + 5\left(\frac{-1}{2} + \frac{i\sqrt{3}}{2}\right)^{334} + 3\left(\frac{-1}{2} + \frac{i\sqrt{3}}{2}\right)^{365}$ is equal to(a) $1 - i\sqrt{3}$ (b) $-1 + i\sqrt{3}$ (c) $i\sqrt{3}$ (d) $-i\sqrt{3}$

44. The general solution of the differential equation

 $(x+a)p^2 + (x-y)p - y = 0$ where $p = \frac{dy}{dx}$ is(a) $y = cx + \frac{ac^2}{c+1}$ (b) $y = cx - \frac{ac^2}{c+1}$ (c) $y = -cx + \frac{ac^2}{c+1}$ (d) $y = -cx - \frac{ac^2}{c+1}$

45. If a Linear Programming Problem has more than one optimal solutions then it has

(a) two optimal

(b) three optimal

(c) four optimal

(d) infinite optimal solutions

46. Array elements can be passed to a function by

(a) value

(b) reference

(c) both (a) & (b)

(d) none of these

47. A series $\sum (-1)^{n-1} U_n$ is said to be absolutely convergent, if(a) $\sum (-1)^{n-1} U_n$ and $\sum |U_n|$ both converges(b) $\sum (-1)^{n-1} U_n$ Converges but $\sum U_n$ diverges(c) $\sum (-1)^{n-1} U_n$ and $\sum U_n$ both diverges(d) $\sum (-1)^{n-1} U_n$ diverges but $\sum U_n$ converges48. Suppose values taken by a variable X are such that $a \leq x_i \leq b$ where x_i denotes the value of X in the i th case for $i=1, 2, \dots, n$, then(a) $a \leq \text{var}(x) \leq b$ (b) $a^2 \leq \text{var}(x) \leq b^2$ (c) $\frac{a^2}{r} \leq \text{var}(x)$ (d) $(b-a)^2 \geq \text{var}(x)$

49. Using LRU replacement algorithm with 3 frames, the number of page faults that occur for the following reference string:

1, 2, 3, 4, 2, 1, 5, 6, 2, 1, 2, 3, 7, 6, 3, 2, 1, 2, 3, 6 is

(a) 12

(b) 15

(c) 18

(d) 20

50. A necessary and sufficient condition for a non-empty subset H of a group G to be a subgroup is(a) $a \in H, b \in H \Rightarrow ab \in H$ (b) $a \in H, b \in H \Rightarrow ab^{-1} \in H$ (c) $a \in H, b \in H \Rightarrow a^{-1}b^{-1} \in H$

(d) all of the above

51. Let P be a point on the hyperbola $x^2 - y^2 = a^2$ where a is a parameter such that P is nearest to the line $y=2x$. The locus of P is(a) $2x - 2y = 0$ (b) $2y - x = 0$ (c) $x + 2y = 0$ (d) $2y + 2x = 0$

52. The rate at which bacteria multiply is proportional to the instantaneous number present. If the original number doubles in 2 hours, then in what time it will be triple

(a) $2 \cdot \frac{\log 3}{\log 2}$ hours(b) $2 \cdot \frac{\log 2}{\log 3}$ hours

(c) $\frac{\log 3}{\log 2}$ hours

(d) $\frac{\log 2}{\log 3}$ hours

53. What is the maximum number of nodes in a heap with 8 leaf nodes?

- (a) 31
(c) 16

- (b) 18
(d) 15

54. The order of permutation $f = \begin{pmatrix} 1 & 2 & 3 & 4 \\ 1 & 3 & 4 & 2 \end{pmatrix}$ is

- (a) 0
(c) 2

- (b) 1
(d) 3

55. Which of the following functions is non-homogeneous

(a) $x^2y + xy^2$

(b) $\left(\frac{x^{1/3} + y^{1/3}}{x^{1/4} - y^{1/4}} \right)^{1/2}$

(c) $x^2 \sin\left(\frac{y}{x}\right)$

(d) $\tan\left(\frac{x^2 + y^2}{x + y}\right)$

56. If in a moderately skew ness distribution the values of mode and mean are 6λ and 9λ respectively, then the value of the median is

- (a) 8λ
(c) 6λ

- (b) 7λ
(d) 5λ

57. If X and Y are independent variables, then the two lines of regression are:

- (a) $X = 0, Y = 0$
(b) $X = 0, Y = \text{constant}$
(c) $X = \text{constant}, Y = 0$
(d) $X = \text{constant}, Y = \text{constant}$

58. The boundary value problem

$\frac{d^2y}{dx^2} + y = 0, x \in [0, \pi], y(0) = 0, y(\pi) = 0$ has

- (a) unique solution
(c) finitely many solution

- (b) no solution
(d) infinite solutions

59. What will be the output of the following program segment?

```
main ( )
{
    int y, s=2, t=5;
    y=fun (s + t);
    printf ("s=%d t=%d y=%d", s, t, y);
}

int t = 8;

fun (s)
{
    int s;
    s++;
    t++;
}
```

return (s+t); }

(a) $s = 3, t = 5, y = 18$

(c) $s = 5, t = 2, y = 17$

(b) $s = 2, t = 5, y = 17$

(d) $s = 3, t = 5, y = 17$

60. If $\log 2, \log(2^x - 1)$ and $\log(2^x + 3)$ are in A.P., then $2, 2^x - 1, 2^x + 3$ are in

- (a) A.P.
(c) G.P.

- (b) H.P.
(d) All

61. The area of the lemniscate $r^2 = a^2 \cos 2\theta$ is given by

(a) $4 \int_0^{\pi/4} \int_0^{a\sqrt{\cos 2\theta}} r dr d\theta$

(b) $2 \int_0^{\pi/2} \int_0^{a\sqrt{\cos 2\theta}} r dr d\theta$

(c) $4 \int_0^{\pi/2} \int_0^{a\sqrt{\cos 2\theta}} r dr d\theta$

(d) $2 \int_0^{\pi} \int_0^{a\sqrt{\cos 2\theta}} r dr d\theta$

62. $\frac{1}{2} + \frac{1}{2^2} + \frac{1}{2^3} + \dots + \frac{1}{2^m}, m > 0$ is

- (a) monotonically increasing
(c) monotonically decreasing

- (b) non-monotonic
(d) none of these

63. The Kurtosis of a data is given by

(a) $\frac{\mu_3}{\mu_2^2}$

(b) $\frac{\mu_4}{\mu_2^2}$

(c) $\frac{\mu_2^3}{\mu_2^2}$

(d) $\frac{\mu_2^3}{\mu_3^2}$

64. Which of the following algorithm design technique is used in the Quick Sort algorithm?

- (a) Dynamic programming
(c) Divide and conquer

- (b) Backtracking
(d) Greedy method

65. Origin on the curve $3x^4 + y^4 + 3y(x^2 - y^2) = 0$ is

- (a) not a singular point
(b) double point
(c) triple point
(d) singular point of order 4

66. If the rank of a matrix A is 2, then rank of 2A is

- (a) 4
(c) 3

- (b) 2
(d) 1

67. If the constraints in a Linear Programming Problem are changed

- (a) the problem is to be re-evaluated
(b) the objective function has to be modified
(c) the change in constraints is ignored
(d) solution is not defined

68. A null vector space V(F) has

- (a) no element

- (b) only one element which is additive identity
 (c) any one element
 (d) any number of elements

69. The following sequence of operations is performed on a stack:

PUSH(10), PUSH(20), POP, PUSH (10), PUSH (20), POP, POP, POP, PUSH (20), POP

The sequence of values popped out is

- (a) 20, 10, 20, 10, 20 (b) 20, 20, 10, 10, 20
 (c) 10, 20, 20, 10, 20 (d) 20, 20, 10, 20, 10

70. In flow chart diamond is used for

- (a) decision (b) input
 (c) processing (d) output

71. $\lim_{x \rightarrow \infty} \frac{x^n}{e^x} = 0$, (x integer), for

- (a) no value of n
 (b) all values of n
 (c) only negative values of n
 (d) only positive values of n

72. If the probability that a person suffers a bad reaction from a certain medium is 0.001, then the probability that out of 2000 persons, exactly 3 will suffer bad reaction is

- (a) $1/2 e^{-3}$ (b) $4/3 e^{-2}$
 (c) $\frac{3}{4} e^{-3}$ (d) $2e^{-3}$

73. Let N be the set of natural numbers, then which of the following is an unbounded set?

- (a) $X = \{x \mid x = \frac{1}{n} \forall n \in N\}$
 (b) $Y = \{x \mid x = \frac{1}{2^n} \forall n \in N\}$
 (c) $Z = \{x \mid x = 2^n \forall n \in N\}$
 (d) $Z = \{x \mid x \in N \text{ and } x < 0.372\}$

74. Given the sample mean m of a population of n data, the simple mean when a new item x is added to the population is

- (a) $\frac{mn+x}{n+1}$ (b) $\frac{mx+x}{2}$
 (c) $\frac{(n+1)m}{n} + \frac{x}{n+1}$ (d) $\frac{(n+1)m+x}{n}$

75. If the circle $x^2 + y^2 + 4x + 22y + c = 0$ bisects the circumference of the circle

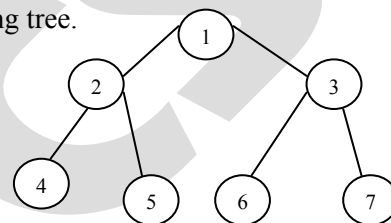
$x^2 + y^2 - 2x + 8y - d = 0$ then $c + d$ is equal to

- (a) 60 (b) 50
 (c) 40 (d) 56

76. P is a fixed point (a, a, a) on a line through the origin equally inclined to the axes, then any plane through P perpendicular to OP , makes intercepts on the axes. The sum of its reciprocals is equal to

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

77. Consider the following tree.



If the post order traversal gives $ab - cd * +$ then the label of the nodes 1, 2, 3 ... will be

- (a) $+, -, *, a, b, c, d$ (b) $a, -, b, +, c, *, d$
 (c) $a, b, c, d, -, *, +$ (d) $-, a, b, +, *, c, d$

78. If $\frac{x^2 - bx}{ax - c} = \frac{\lambda - 1}{\lambda + 1}$ has roots equal in magnitude and

opposite in sign then the value of λ is

- (a) $a/b/a+b$ (b) $a+b/a-b$
 (c) c (d) $1/c$

79. Let $f'(x) = \int_0^x t \sin \frac{1}{t} dt$. Then the number of points

of discontinuity of the function $f(x)$ in the open interval $(0, \pi)$ is

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

80. The number of positive integers satisfying the inequality $n+1C_{n-2} - n+1C_{n-1} \leq 100$ is

- (a) 9 (b) 8
 (c) 5 (d) 10

81. If $f(x) = \{x - [x]\} |\cos \pi x|$ where $[.]$ is the greatest integer function, then $f(x)$ is

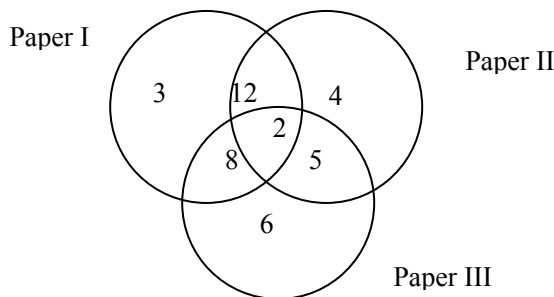
- (a) an even function (b) an odd function
 (c) a periodic function (d) one-one function

82. Out of 16 players of a cricket team, 4 are bowlers and 2 are wicket keepers. A team of 11 players is to be chosen so as to contain at least 3 bowlers and at least 1 wicket-

keeper. The number of ways in which the team can be selected is

- (a) 2400 (b) 2472
(c) 2500 (d) 960

83. Consider the Venn-diagram given below. The numbers in the Venn-diagram indicate the number of persons reading the newspapers. The diagram is drawn after surveying 50 persons. In a population of 10,000 how many can be expected to read at least two newspapers?



- (a) 5000 (b) 5400
(c) 6000 (d) 6250

84. Which of the following is an example of a spooled device

- (a) A line printer used to print the output of a number of job
(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

85. A data dictionary does not provide information about

- (a) where data is stored
(b) the size of the disk storage
(c) who owns the data
(d) security & privacy limitations

86. If A and B are the matrices of same order such that $AB=A$ and $BA=B$, then A and B matrices are

- (a) Involutory (b) Idempotent
(c) Orthogonal (d) Nilpotent

87. A graph in which the number of edges is much less than the possible number of vertices squared is

- (a) dense graph (b) sparse graph
(c) incomplete graph (d) all of the above

88. Origin is a limiting point of a co-axial system of which $x^2 + y^2 - 6x - 8y + 1 = 0$ is a member. The other limiting point is

- (a) $\left(\frac{-3}{25}, \frac{-4}{25}\right)$ (b) $\left(\frac{3}{25}, \frac{4}{25}\right)$

- (c) $\left(\frac{4}{25}, \frac{3}{25}\right)$ (d) $\left(\frac{-4}{25}, \frac{-3}{25}\right)$

89. What is the output of the following program segment?
main ()

```
{
    struct
    {
        char name [25];
        char language [10];
    }a;
    static struct a={"Hacker","C"};
    printf ("%s%s",a.name,a.language);
}
```

(a) Hacker C (b) Hacker Hacker
(c) compilation error (d) C C

90. In an absolute loading scheme, the function accomplished by an assembler is

- (a) reallocation (b) allocation
(c) loading (d) linking

91. If ϕ is inverse of f and $f'(x) = \frac{1}{1+x^{n'}}$, then $\phi'(x)$ equals

- (a) $1+x^n$ (b) $1+[f(x)]^n$
(c) $1+[\phi(x)]^n$ (d) $1+[f'(x)]^n$

92. AD is a median of the $\triangle ABC$. If AE and AF are medians of the triangles ABD and ADC respectively, and

$AD = m_1, AE = m_2, AF = m_3$, then $\frac{a^2}{8}$ is equal to

- (a) $m_2^2 + m_3^2 - 2m_1^2$ (b) $m_1^2 + m_2^2 - 2m_3^2$
(c) $m_2^2 + m_3^2 - m_1^2$ (d) $m_1^2 + m_2^2 - m_3^2$

93. The sum of the infinite series

$\cot^{-1}(2.1^2) + \cot^{-1}(2.2^2) + \cot^{-1}(2.3^2) + \cot^{-1}(2.4^2) + \dots$ is equal to

- (a) $\pi/5$ (b) $\pi/4$
(c) $\pi/3$ (d) $\pi/2$

94. If $\frac{1}{1^2} + \frac{1}{2^2} + \frac{1}{3^2} + \dots \infty$, Then

$$\frac{1}{1^2} + \frac{1}{3^2} + \frac{1}{5^2} + \dots =$$

- (a) $\pi^2/8$ (b) $\pi^2/12$
(c) $\pi^2/3$ (d) $\pi^2/2$

95. If A_1 and A_2 are two independent events then

$$P\{(\bar{A}_1) \cap (A_1 \cup A_2) \cap (\bar{A}_2)\}$$

- (a) $\leq 1/4$ (b) $\geq 1/4$

(c) $> 1/4$

(d) $< 1/4$

96. The roots α, β and γ of an equation $x^3 - 3ax^2 + 3bx - c = 0$ are in A. P.

(a) $\beta = b/a$

(b) $\beta = b/c$

(c) $\beta = c/b$

(d) $\beta = a/b$

97. The number of positive integral solutions of $xyz = 42$ for each $x, y, z > 0$ is

(a) 30

(b) 27

(c) 8

(d) 42

98. The output of the following program segment is
main ()

```
{ static int j, x=0;
  for (j=0; j<=5; j++)
{ switch (j - 1)
{ case 0:
  case -1:
```

```
x += 1;
```

```
break;
```

```
case 1:
```

```
case 2:
```

```
case 3: x += 2;
```

```
break;
```

```
default:
```

```
x += 3; }
```

```
printf ("%d", x); }
```

(a) 1 2 4 6 8 11

(b) 1 1 2 2 2 3

(c) 1 2 3 5 7 9

(d) 2 4 6 8 10 12

99. For any integer y , the integral

$$\int_0^\pi e^{\cos^2 y} \cdot \cos^3(2y+1) y dy$$

(a) π

(b) 1

(c) 0

(d) $\pi/2$

100. The angle between the asymptotes of the hyperbola $b^2x^2 - a^2y^2 = a^2b^2$ is

(a) $2 \tan^{-1}(a/b)$

(b) $\tan^{-1}(a/b)$

(c) $\tan^{-1}(b/a)$

(d) $2 \tan^{-1}(b/a)$

101. For three non-coplanar vectors $\vec{a}, \vec{b}, \vec{c}$ the relation

$$|\vec{a} \times \vec{b} \cdot \vec{c}| = |\vec{a}| |\vec{b}| |\vec{c}| \text{ holds iff}$$

(a) $\vec{b} \cdot \vec{c} = \vec{c} \cdot \vec{a} = 0$

(b) $\vec{a} \cdot \vec{b} = \vec{b} \cdot \vec{c} = 0$

(c) $\vec{a} \cdot \vec{b} = \vec{b} \cdot \vec{c} = \vec{c} \cdot \vec{a} = 0$

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

102. The Criteria for data structure evaluation is

(a) Space utilization

(b) Time efficiency

(c) Both (a) & (b)

(d) Frequency

103. C programming does no automatic array bound checking. This statement is

(a) true

(b) false

(c) can't say

(d) none of these

104. The pole of the line $3x + 4y - 45 = 0$ with respect to the circle $x^2 + y^2 - 6x - 8y + 5 = 0$ is

(a) (3, 4)

(b) (6, 8)

(c) (5, 8)

(d) (-3, -5)

105. If $\lim_{x \rightarrow a} \left(\frac{f(x)}{g(x)} \right)$ exists, then

(a) both $\lim_{x \rightarrow a} f(x)$ and $\lim_{x \rightarrow a} g(x)$ must exist(b) $\lim_{x \rightarrow a} f(x)$ need not exist but $\lim_{x \rightarrow a} g(x)$ exist(c) neither $\lim_{x \rightarrow a} f(x)$ nor $\lim_{x \rightarrow a} g(x)$ may exist(d) $\lim_{x \rightarrow a} f(x)$ exists but $\lim_{x \rightarrow a} g(x)$ does not exist

106. In Round Robin CPU scheduling, as the time quantum is increased, the average turn around time

(a) increases

(b) decreases

(c) remains constant

(d) varies irregularly

107. For a continuous series, mode is given by:

(a) $l + \left(\frac{f_1}{f_m - f_1 - f_2} \right) x_i$

(b) $l + \left(\frac{f_m - f_1}{f_m - f_1 - f_2} \right) x_i$

(c) $l + \left(\frac{f_m - f_1}{2f_m - f_1 - f_2} \right) x_i$

(d) $l + \left(\frac{2f_m - f_1}{2f_m - f_1 - f_2} \right) x_i$

108. In a system of linear equations, if A is the co-efficient matrix and D the constant matrix, such that:

$|A| = 0$ and $(\text{adj.} A) \cdot D = 0$ then the system of equations has:

(a) unique solution

(b) infinite solutions

(c) two solutions

(d) no solution

109. The node containing the minimum value in a binary search tree of integers must be

(a) a leaf node

(b) the root node

- (c) a node with an empty right child
(d) a node with an empty left child

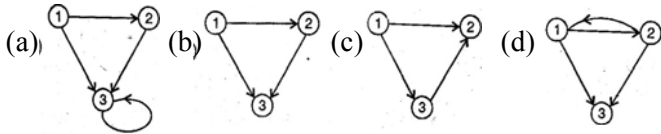
110. With round robin CPU scheduling in a time shared system

- (a) very large time slices degenerates into FCFS algorithm
(b) very small time slices degenerates into LIFO algorithm
(c) extremely small time slices improves performance
(d) none of these

111. If at any point on a curve is the subtangent and subnormal are equal, then the tangent =

- (a) ordinate
(b) $\sqrt{2}$ ordinate
(c) $\sqrt{2}$ ordinate
(d) $\sqrt{\text{ordinate}}$

112. Let M be a 3×3 , adjacency matrix corresponding to a given graph of three nodes labeled 1, 2, 3. If entry (1, 3) in M^3 (adjacency matrix with path length 3) is 2, then the graph is



113. A sample is said to be large sized, if its size n is

- (a) < 20
(b) < 30
(c) > 30
(d) > 20

114. A distribution has a median 4, lower quartile 4 and upper quartile 6. The Bowley's coefficient of skewness

- (a) 1.5
(b) 1
(c) -1
(d) 0

115. If A and B are two independent events, then $P(\bar{A} / \bar{B})$ equals

- (a) $\frac{1 - P(A \cup B)}{1 - P(B)}$
(b) $1 - P(A / B)$
(c) $1 - P(\bar{A} / B)$
(d) $\frac{P(\bar{A})}{P(\bar{B})}$

116. If $\phi(x) = \phi'(x)$ and $\phi(1) = 2$ then $\phi(3)$ equals

- (a) $2e$
(b) e^2
(c) $3e^2$
(d) $2e^2$

117. The ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ and the straight line

$y = mx + c$ intersect in real points only if

- (a) $c^2 - b^2 \leq a^2 m^2$
(b) $a^2 m^2 > c^2 - b^2$
(c) $a^2 m^2 \leq c^2 - b^2$
(d) $c \geq b$

118. The sum of first 10 terms of the series $\cot^{-1} 3 + \cot^{-1} 7 + \cot^{-1} 13 + \cot^{-1} 21 + \dots$ is

- (a) $\tan^{-1}\left(\frac{5}{6}\right)$
(b) $\tan^{-1}(1000)$
(c) $\tan^{-1}\left(\frac{6}{5}\right)$
(d) $\tan^{-1}\left(\frac{1}{100}\right)$

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

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

120. In seven layers OSI network architecture, the fourth layer is

- (a) Data link central layer
(b) Session layer
(c) Transport layer
(d) Presentation layer