1. In a triangle with one angle $2\pi/3$, the lengths of the sides form an AP. If the length of the greatest side is 7 cm, the radius of the circumcircle of the triangle is **(JNUEE-2006)**

(a) (b)

(c) (d)

2. If in a triangle ABC, sin A, sin B, sin C are in AP, then **(JNUEE-2006)**
   (a) the altitudes are in AP
   (b) the altitudes are in HP
   (c) the altitudes are in GP
   (d) None of above

4. The direction vector along which the function $f(x, y) = x^2 / 2 + y^2 / 2$ decreases most rapidly at the point (1, 1) is given by **(JNUEE-2006)**

(a)

(b)

(c)

(d)

5. The function $f: R^2 \to R$ is defined by

(JNUEE-2006)
   (a) is differentiable at (0, 0)
   (b) is continuous but not differentiable at (0, 0)
   (c) is not continuous at (0, 0)
   (d) has continuous partial derivatives at (0, 0)

10. The address lines required for a 256 K word memory are **(JNUEE-2006)**
   (a) 8 (b) 10
   (c) 18 (d) 20
11. A sequential circuit is one in which the state of the output is **(JNUEE-2006)**
   (a) entirely determined by the states of the input
   (b) determined by the present input as well as past state
   (c) unpredictable
   (d) not possible at all
12. If $\sin(\alpha + \beta) = 1$ and $\sin(\alpha - \beta) = 1/2$ where a, b $\in [0, \pi/2]$, then **(JNUEE-2006)**
   (a) equal (b) 2
   (c) 3 (d) 4
13. Propositional formula $P \wedge (Q \vee R)$ ® $(P \wedge Q) \vee (P \wedge R)]$ is a **(JNUEE-2006)**
   (a) tautology (b) contradiction
   (c) contingency (d) None of above

15. If the random variable X, Y and Z have the means $m_x = 2$, $m_y = -3$ and $m_z = 2$, the variances and and covariances cov (X, Y) = – 2, cov(X, Z) = – 1 and cov (Y, Z) = 1; the variance of W = 3X – Y + 2Z is **(JNUEE-2006)**
   (a) 17 (b) 18
   (c) 20 (d) None of these
16. The determinant

is independent of **(JNUEE-2006)**
   (a) n (b) a
   (c) x (d) None of above
17. If a, b and c are three positive real numbers, then the minimum value of the expression

is **(JNUEE-2006)**
   (a) 1 (b) 2
   (c) 3 (d) None of above
18. If p, and r are any real numbers, then **(JNUEE-2006)**
   (a) max (p, q) < max (p, q, r)

   (b) min (p, q) = (p + q – |p – q|)
   (c) min (p, q) < min (p, q, r)
   (d) None of above
19. A computationally efficient way to compute the sample mean of the data $x_1, x_{,,}, ..., x_n$, is as follows :

(JNUEE-2006) (a) j
(b)j + 1
   (c) j(j – 1) (d) j^{-1}
20. A system composed of n separate components is said to be parallel system if it functions when at least one of the components functions. For such a system. If a component i functions with probability p_i independent of other components, i = 1, 2, ..., n, what is the probability that the system functions? **(JNUEE-2006)**
   (a) $p_1 p_2 ... p_n$
   (b) $p_1 + p_2 + ... + p_n$
   (c) $1 - (1 - p_1)(1 - p_2) ... (1 - p_n)$
   (d) $(1 - p_1)(1 - p_2) ... (1 - p_n)$
21. Centre of mass of a half disc with radius a and uniform mass density is equal to **(JNUEE-2006)**
   (a) $2a / 3\pi$ (b) $4a / 3\pi$
   (c) $a / 4\pi$ (d) $a / 2\pi$

25. If the number $(z - 1) / (z + 1)$ is purely imagninary,

then **(JNUEE-2006)**

(a) $|z| = 1$ (b) $|z| > 1$
(c) $|z| < 1$ (d) $|z| > 2$

26. If $F = (y^2 + z^3, 2xy - 5z, 3xz^2 - 5y)$, then a scalar function $\Phi(x, y, z)$ such that $F = \text{grad}(\Phi)$ is given by **(JNUEE-2006)**

(a) $xy + xz^3 - yz + c$ (b) $y + xz^2 + 2xy + c$
(c) $xy^2 + xz^3 - 5yz + c$ (d) $xyz + xz^2 + yz + c$

27. A person walking along a straight road observes that at two points 1 km apart, the angles of elevation of a pole in front of him are 30^o and 75^o. The height of the pole is **(JNUEE-2006)**

(a) (b)

(c) (d)

28. X is a continuous random variable with probability function
$f(x) = N \exp(-x^2 + 6x), -\infty < x < \infty$
The value of N is **(JNUEE-2006)**

(a) (b) e^{-9}

(c) (d) None of above

30. The value of $ydx + (y^3 - xy^2)\,dy$ where C is the boundary of the region enclosed by the circles $x^2 + y^2 = 4$, $x^2 + y^2 = 16$ is **(JNU-2006)**

(a) 2π (b) 12π
(c) 120π (d) None of above

31. Let are three non-coplanar vectors, and let be the vectors defined by the relations

Then the value of the expression is equal to

(a) 0 (b) 1
(c) 2 (d) 3 **(JNU-2006)**

32. Consider a complete binary tree. The number of nodes at level k is **(JNU-2006)**

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

35. Backward Euler method for solving differential equation $= f(x, y)$ is **(JNU-2006)**

(a) $y_{n+1} = y_n + hf(x_{n+1}, y_{n+1})$
(b) $y_{n+1} = y_{n+1} + 2hf(x_n, y_n)$
(c) $y_{n+1} = y_n + hf(x_n, y_n)$
(d) $y_{n+1} = (1 + h) f(x_{n-1}, y_{n+1})$

38. What is the meaning of following declarations?
int (*) f(); **(JNU-2006)**

(a) f is a function returning integer value
(b) f is a function returning pointer to integer
(c) f is pointer to a function returning integer
(d) It is not a valid declaration

39. Program counter PC is used to store **(JNU-2006)**

(a) the number of statements in a program
(b) the number of instructions in a process
(c) the address of the next instruction to be executed
(d) the address of the first instruction of process

40. (Z + X) is equal to **(JNU-2006)**

(a) (Z + Y) (Z + Y) (b) Z(X + Y)
(c) X . Z + Y (d) ZX + ZY + XY

41. Let $b_n =$ $(x, a_{n-1})\,dx$ and (x, b_{n-1}) dx, $c_n = a_n + b_n$. Then the sequence coverges to **(JNU-2006)**

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

43. The number of solutions to the equation is **(JNU-2006)**

(a) 1 (b) 2
(c) 3 (d) 4

44. If $= y$, then is equal to **(JNU-2006)**

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

45. If $\sin\theta$ and $\cos\theta$ are the roots of the equation $ax^2 - bx + c = 0$, then a, b and c satisfy the relation **(JNU-2006)**

(a) $a^2 + b^2 + 2ac = 0$ (b) $a^2 - b^2 + 2ac = 0$
(c) $a^2 + c^2 + 2ab = 0$ (d) $a^2 - b^2 - 2ac = 0$

46. The number of solutions of the equation $\sin 5x \cos 3x = \sin 6x \cos 2x$ in the interval $[0, \pi]$ is

(a) 3 (b) 4
(c) 5 (d) 6 **(JNU-2006)**

48. X is an exponential random variable with parameter λ with p.d.f. Identify the correct one **(JNU-2006)**

(a) $P(X > s + t) = P(X > s)P(X > t)$
(b) $P(X > s + t) = P(X > s) + P(X > t)$
(c) $P(X > s + t) = 1 - P(X = s)P(X = t)$
(d) $P(X > s + t) = \lambda\, stP(X > s)P(X > t)$

52. The number of vectors of unit length perpendicular to the vectors $= (1, 1, 0)$ and $= (0, 1, 1)$ is **(JNU-2006)**

(a) one (b) two
(c) three (d) None of above

53. Given the following Truth Table :

(R is the result)

(JNU-2006)

Above TT corresponds to following formula

(a) $A \rightarrow B$ (b) $B \rightarrow A$

(c) $A \rightarrow B \quad B \rightarrow A$ (d) None of above

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

```
int array [5], i, *p;
for (i = 0; i < 5; i++)
    array[i] = i;
ip = array;
print("%d \ n", *(ip + 3*sizeof(int)))
```

(JNU-2006)

(a) 3 (b) 6

(c) Garbage (d) None of above

55. If the vectors (a, 1, 1), (1, b, 1) and (1, 1, a) ($a \neq b \neq c \neq 1$) are coplanar, then **(JNU-2006)**

is equal to

(a) 3 (b) 2

(c) 1 (d) 0 **(JNU-2006)**

56. The number of terms in the exponential series such that their sum gives the value of e^x correct to six decimal places at x = 1 is **(JNU-2006)**

(a) 6 (b) 8

(c) 10 (d) 14

57. Newton's iterative formula to find is **(JNU-2006)**

(a) $x_{n+1} = x_n (2 - Nx_n)$

(b) $x_{n+1} = x_n (2 + Nx_n)$

(c)

(d) None of above

58. The equations have infinite number of solutions if **(JNU-2006)**

(a) $\lambda = 5$ (b) $\mu = 5$

(c) $\lambda = \mu = 5$ (d) None of above

59. Determine the value of K for which the function given by $f(x, y) = kxy$ for x = 1, 2, 3 and y = 1, 2, 3 can serve as a joint probability distribution **(JNU-2006)**

(a) (b) 1

(c) (d) 8

63. The TEST instruction for 8086 microprocessor performs the function of **(JNU-2006)**

(a) destructive AND

(b) non-destructive AND

(c) wait for an event

(d) None of above

64. Let is the kth Fibonacci number,

$f_0 = f_1 = 1, f_{n+1} = f_n + f_{n-1}$. Then the value of is equal to **(JNU-2006)**

(a) 1 / 2 (b)

(c) (d) None of above

65. The real value of θ for which the expression

is a real number is **(JNU-2006)**

(a) $2n\pi$ (b) $(2n + 1)\pi$

(c) $2n\pi \pm \pi / 2$ (d) None of above

66. If $\cos\alpha + \cos\beta + \cos\gamma = \sin\alpha + \sin\beta + \sin\gamma = 0$, then which of the following are true?

(JNU-2006)

(a) $\cos 2\alpha + \cos 2\beta + \cos 2\gamma = 0$

(b) $\cos(\alpha + \beta) + \cos(\beta + \gamma) + \cos(\gamma + \alpha) = 0$

(c) $\sin 2\alpha + \sin 2\beta + \sin 2\gamma = 0$

(a) (a) and (b) only (b) (b) and (c) only

(c) (c) and (a) only (d) (a), (b) and (c)

67. The set of real x such that is **(JNU-2006)**

(a) $(-\infty, -1)$ (b) $(-\infty, 0)$

(c) $(-\infty, \infty)$ (d) None of above

68. If $\sin x + \sin^2 x = 1$, then the value of $\cos^{12} x + 3\cos^{10} x + 3\cos^8 x + \cos^6 x - 1$ is equal to **(JNU-2006)**

(a) 0 (b) 1

(c) – 1 (d) None of these

71. Which of the following pairs is logically equivalent? **(JNU-2006)**

(a) $A \rightarrow B$ and $\neg A \vee B$

(b) $\neg (A \vee B)$ and $\neg A \wedge \neg B$

(c) $(A \vee \neg B) \rightarrow C$ and $(\neg A \wedge B \vee C)$

(d) All of above

72. What will be the output of following program segment? **(JNU-2006)**

```
int i j;
j = 0
for (i = 1; i < 10; i ++)
continue;
++ j;
printf("%d", j);
```

(a) 0 (b) 55

(c) 10 (d) None of above

73. Hexadecimal D9 is equivalent to octal **(JNU-2006)**

(a) 113 (b) 331

(c) 131 (d) 313

78. If X = 6, y = 11, z = –2, find the value of the statement ((x / 2) > y) || (x > x) is C language

(JNU-2006)

(a) 0 (b) 1

(c) 3 (d) None of above

83. The value of k for which the points A(1, 0, 3), B(–1, 3, 4), C(1, 2, 1) and D(k, 2, 5) are coplanar is **(JNU-2006)**

(a) 1 (b) 2

(c) 0 (d) – 1

86. The value of is **(JNU-2006)**
(a) 0 (b) 1
(c) 2 (d) 3

87. If $z = x + iy$, $z^{1/3} = a - ib$, $a \neq \pm ba$, $b \neq 0$, then $= k(a^2 - b^2)$, where k is equal to **(JNU-2006)**
(a) 0 (b) 2
(c) 4 (d) None of above

88. The inequality $n ! > 2^{n-1}$ is true for **(JNU-2006)**
(a) all $n \in N$ (b) $n > 2$
(c) $n > 1$ (d) $n \notin N$

89. The equation $3 \sin^2 x + 10 \cos x - 6 = 0$ is satisfied for $n \in I$, if
(JNU-2006)
(a) $x = n\pi + \cos^{-1}(1/3)$
(b) $x = n\pi - \cos^{-1}(1/3)$
(c) $x = 2n\pi + \cos^{-1}(1/3)$
(d) None of above

90. If are two unit vectors, then the vector is parallel to the vector
(JNU-2006)
(a) (b)
(c) (d)

91. The solution set of the inequality $||x| - 1| < 1 - x$ is **(JNU-2006)**
(a) (1, 1) (b) $(0, \infty)$
(c) $(-1, \infty)$ (d) None of above

92. The solution set of the inequality $4^{-x+0.5} - 7.2^{-x} - 4 < 0$ $(x \in \Re)$ is **(JNU-2006)**
(a) $(-\infty, \infty)$ (b) $(-2, \infty)$
(c) $(2, \infty)$ (d) (2, 3.5)

93. If $x \cos \alpha + y \sin \alpha = x \cos \beta + y \sin \beta = 2a$ $(0 < \alpha, \beta < \pi / 2)$, then it is also true that **(JNU-2006)**

(i)

(ii)

(iii)

(iv)
The correct possibilities are **(JNU-2006)**
(a) (i) and (ii) only (b) (iii) and (iv) only
(c) (i) and (iii) only (d) (ii) and (iv) only

95. The number of flip-flops used to construct a ring counter which counts from decimal one to decimal eight will be **(JNU-2006)**
(a) 1 (b) 2
(c) 3 (d) 4

98. The least value of the expression $2 \log_{10}(x) - \log_x (0.01)$, for $x > 1$ is **(JNU-2006)**
(a) 10 (b) – 0.01
(c) 2 (d) None of above

99. If then one of the values of y is **(JNU-2006)**
(a) tan A (b) cot A
(c) – tan (2A) (d) – cot A

100. The expression sin x + 4 cos x lies in the interval **(JNU-2006)**
(a) (– 4, 4) (b)
(c) (d)

101. Let a, b, c > 0. The series **(JNU-2006)**

is convergent if
(a) a = bc (b)
(c) (d)

104. If the area of a triangle on the complex plane formed by the points z, z + iz and iz is 50, then | z | is **(JNU-2006)**
(a) 1 (b) 5
(c) 10 (d) 15

105. If A lies in the second quadrant and $3 \tan A + 4 = 0$, the value of $2 \cot A - 5 \cos A + \sin A$ is equal to **(JNU-2006)**
(a) – 53 / 10 (b) 23 / 10
(c) 37 / 10 (d) 7 / 10

106. If $\tan(\pi \cos \theta) = \cot(\pi \sin \theta)$, then $\cos(\theta - \pi / 4)$ is equal to **(JNU-2006)**
(a) (b)
(c) (d)

107. The value of $\tan 1^\circ \tan 2^\circ \ldots \tan 89^\circ$ is **(JNU-2006)**
(a) – 1 (b) 0
(c) 1 (d) None of above

108. If and are given vectors, then a vector satisfying and is **(JNU-2006)**
(a) (5/3, 2/3, 2/3) (b) (2/3, 5/3, 2/3)
(c) (2/3, 2/3, 5/3) (d) None of above

112. The propagation delay encountered in a ripple carry adder of four-bit size, with delay of a single flip-flop as t_p will be **(JNU-2006)**
(a) 0 (b) $t_p + 4$

(c) $t_p / 2$ (d) exp (t_p) **(JNU-2006)**

113. The Gray code equivalent of 1010_2 will be **(JNU-2006)**
(a) 1111 (b) 0101
(c) 0011 (d) 1001

114. The 2's complement of N in n bit is **(JNU-2006)**
(a) 2^n (b) $2^n - N$
(c) 2^N (d) N – 2

115. What is the output of following program?

```
#(include < stdio.h>
main()
{
    int a, b, funct(int *a, int b);
    a = 20;
    b = 20;
    funct(& a, b);
    printf("a – %d b = %d", a, b);
}
funct(int *a, int b)
{
    *a = 10
    b = b + 10
    return;
}
```

(JNU-2006)
(a) a = 10 b = 20 (b) a = 20 b = 10
(c) a = 20 b = 30 (d) None of above

116. What is the output of following program?

```
#include < stdio.h>
main()
{
    int n, a, sum(int n);
    int(*ptr)(int n);
    n = 100;
    ptr – & sum;
    a = (*ptr)(n);
    printf("Sum = %d \ n", a);
}
int sum(int n)
{
int i j;
j = 0
for (i = 1; i < = n; i ++)
    j + = i;
  return(j);
}
```

(JNU-2006)
(a) Sum = 5050
(b) Sum = 5000
(c) Produces compile time error
(d) Produces run time error

117. If $z = (\lambda + 3) + i(5 - \lambda^2)^{1/2}$, then the locus of z is a / an
(a) ellipse (b) circle
(c) plane (d) None of above

118. If then x = **(JNU-2006)**
(a) 4 (b) 2
(c) 3.14 (d) None of above

119. The number of real solutions of $\sin(e^x) = 5^x + 5^{-x}$ is **(JNU-2006)**
(a) infinite (b) 5
(c) 0 (d) None of above