1. Let $f:\mathbb{R}\to\mathbb{R}$ is a differentiable function and $f(1)=4$, then the value of

$$\lim_{x\to1}\int_4^{f(x)}\frac{2t}{x-1}\,dt$$

is

(A) $8f'(1)$

(B) $4f'(1)$

(C) $2f'(1)$

(D) $f'(1)$

2. Let $f(2)=4$ and $f'(2)=4$, then

$$\lim_{x\to2}\frac{xf(2)-2f(x)}{x-2}$$

is given by

(A) 2

(B) -2

(C) -4

(D) 3

3. If $10^{2y}=25$ then 10^{-y}equals to

(A) $\frac{1}{625}$

(B) $\frac{1}{25}$

(C) $-\frac{1}{5}$

(D) $\frac{1}{5}$

4. If 2^n-1 is prime, then n is prime and $2^{n-1}(2^n-1)$ is given by

(A) a random number

(B) infinity

(C) a perfect number

(D) 0

5. If

$$\lim_{x\to0}\frac{\tan x-x}{x^2\tan x}=\frac{1}{m}.$$

The value of m is equal to ....

(A) 1

(B) 3

(C) 5

(D) 7

6. The coefficient of $(x-1)^2$ in the Taylor series expansion of

$$f(x)=x^2e^x\ \ (x\in R)$$

about $x=1$ is given by

(A) $\frac{3}{2}e$

(B) $\frac{5}{2}e$

(C) $\frac{7}{2}e$

(D) $\frac{9}{2}e$

If $z = \tan^{-1}\left(\frac{y}{x}\right)$, then $dz =$

(A) $\frac{xdy + ydx}{x^2 + y^2}$

(B) $\frac{xdy + ydx}{x^2 - y^2}$

(C) $\frac{xdy - ydx}{x^2 - y^2}$

(D) $\frac{xdy - ydx}{x^2 + y^2}$

8. If λ be an eigenvalue of a non-singular matrix A, then eigenvalue of A^{-1} be

(A) λ^{-1}.

(B) λ.

(C) $\frac{\lambda}{2}$.

(D) none of these.

9. A particular integral of

$$\frac{d^2y}{dx^2} - (a+b)\frac{dy}{dx} + aby = Q(x)$$

is

(A) $e^{ax}\int\left[e^{(a-b)x}(Q(x)e^{bx})\right]dx$

(B) $e^{ax}\int\left[e^{(a-b)x}(Q(x)e^{-bx})\right]dx$

(C) $e^{-ax}\int\left[e^{(a-b)x}(Q(x)e^{bx})\right]dx$

(D) $e^{ax}\int\left[e^{(b-a)x}(Q(x)e^{-bx})\right]dx$

10. What are the order and degree respectively of the differential equation

$$\frac{d^2}{dx^2}\left(\frac{d^2y}{dx^2}\right)^{-3/2} = 0$$

(A) 1, 4

(B) 4, 4

(C) 1, 1

(D) 4, 1

11. The partial differential equation by eliminating the arbitrary function, ϕ, from

$$\phi\left(z^2 - xy, \frac{x}{z}\right) = 0$$

is

(A) $x^2\frac{\partial z}{\partial x} - \frac{\partial z}{\partial y} = zx$

(B) $\frac{\partial z}{\partial x} - (xy - z^2)\frac{\partial z}{\partial y} = z$

(C) $\frac{\partial z}{\partial x} - \frac{\partial z}{\partial y} = z$

(D) $x^2\frac{\partial z}{\partial x} - (xy - z^2)\frac{\partial z}{\partial y} = zx$

12. For $a,\ b,\ c \in R$, if the differential equation

$$(ax^2y^2 + bxy + y^2)dx + (2x^2 + cxy + x^3y)dy = 0$$

is exact, then

(A) $a = \frac{3}{2}, b = 4, c = 2$

(B) $a = \frac{3}{2}, b = 4, c = 1$

(C) $a = \frac{5}{2}, b = 2, c = 2$

(D) $a = \frac{5}{2}, b = 4, c = 2$

13. If $u = u(x,y)$, $v = v(x,y)$ are functionally dependent, then

$$\begin{vmatrix} \frac{\partial u}{\partial x} & \frac{\partial v}{\partial x} \\ \frac{\partial u}{\partial y} & \frac{\partial v}{\partial y} \end{vmatrix} =$$

(A) 1

(B) -1

(C) 0

(D) ∞

14. If $A = P(x,y,z)i + Q(x,y,z)j + R(x,y,z)k$ and $r = xi + yj + zk$, then the necessary and sufficient condition for the integrability of the total differential equation $A.dr = 0$ is

(A) $A\ .\ curl(A) = 0$

(B) $A\ .\ (A \times A) = 0$

(C) $A\ .\ div(A) = 0$

(D) $A\ .\ grad(A\ .\ A) = 0$

15. If

$$\int_0^{\pi} xe^{\sin(x)}dx = \alpha \int_0^{\pi} e^{\sin(x)}dx,$$

then $\alpha =$

(A) π

(B) $\frac{5\pi}{4}$

(C) $\frac{3\pi}{2}$

(D) $\frac{\pi}{2}$

16. The length of subnormal to the parabola $y^2 = 4ax$ at any point is equal to

(A) $a\sqrt{2}$

(B) $2\sqrt{2}a$

(C) $\frac{a}{\sqrt{2}}$

(D) $2a$

17. The latus rectum of the ellipse $5x^2 + 9y^2 = 45$ is

(A) $\frac{5}{3}$ (B) $\frac{10}{3}$

(C) $\frac{2\sqrt{5}}{3}$ (D) $\frac{\sqrt{5}}{3}$

18. If α, β, γ be the angles which a line makes with the axes, then

(A) $\sin^2\alpha + \sin^2\beta + \sin^2\gamma = 1$ (B) $\sin^2\alpha + \sin^2\beta + \sin^2\gamma = 2$

(C) $\sin^2\alpha + \sin^2\beta + \sin^2\gamma = 3$ (D) $\sin^2\alpha + \sin^2\beta + \sin^2\gamma = 4$

19. If the general equation of a cone of second degree having vertex as origin as

$$ax^2 + by^2 + cz^2 + 2fyz + 2gzx + 2hxy = 0$$

Then the general equation of a cone of second degree which passes through the axes is

(A) $fyz + 2gzx + 2hxy = 0$ (B) $2fyz + gzx + 2hxy = 0$

(C) $fyz + gzx + hxy = 0$ (D) $fyz + 2gzx + hxy = 0$

20. Angle between the lines

$$\frac{x}{1} = \frac{y}{0} = \frac{z}{-1}$$

and

$$\frac{x}{3} = \frac{y}{4} = \frac{z}{5}$$

(A) $\cos^{-1}\frac{1}{5}$ (B) $\cos^{-1}\frac{2}{5}$

(C) $\cos^{-1}\frac{3}{5}$ (D) $\cos^{-1}\frac{4}{5}$

21. If A_x, A_y, A_z be the areas of the projections of a plane area A on the yz, zx and xy planes, then

(A) $A = \sqrt{A_x^2 + 2A_y^2 + 3A_z^2}$ (B) $A = \sqrt{A_x^2 + A_y^2 + A_z^2}$

(C) $A = \sqrt{2A_x^2 + 3A_y^2 + A_z^2}$ (D) $A = \sqrt{3A_x^2 + 2A_y^2 + A_z^2}$

22. Two members of the system of spheres be

$$x^2 + y^2 + z^2 + 2u_1x + d_1 = 0,$$
$$x^2 + y^2 + z^2 + 2u_2x + d_2 = 0.$$

The radical plane of these two members is

(A) $2(u_1 - u_2)x + (d_1 + d_2) = 0$ (B) $2(u_1 + u_2)x + (d_1 + d_2) = 0$

(C) $2(u_1 + u_2)x + (d_1 - d_2) = 0$ (D) $2(u_1 - u_2)x + (d_1 - d_2) = 0$

23. The condition that the plane $lx + my + nz = p$ may touch the central conicoid $ax^2 + by^2 + cz^2 = 1$ is

(A) $\frac{l}{a} + \frac{m}{b} + \frac{n}{c} = 0$

(B) $\frac{l}{a} + \frac{m}{b} + \frac{n}{c} = p$

(C) $\frac{l^2}{a} + \frac{m^2}{b} + \frac{n^2}{c} = p^2$

(D) $\frac{l^2}{a} + \frac{m^2}{b} + \frac{n^2}{c} = 0$

24. If a function f is defined in some neighbourhood of (a, b), then the limit

$$\lim_{(x,y)\to(a,b)} f(x, y) = l$$

is called simultaneous limit. The limits

$$\lim_{x\to a}\lim_{y\to b} f(x, y) = \lambda$$

$$\lim_{y\to b}\lim_{x\to a} f(x, y) = \lambda'$$

are called repeated limits. If $\lambda \neq \lambda'$, then the ....

(A) simultaneous limit exists.

(B) simultaneous limit cannot exist.

(C) simultaneous limit may or may not exist.

(D) none of these.

25. If $f(x, y, z) = 3x^4y + y^3z + z^6x$ for all $(x, y, z) \in R$ and $\nabla \equiv \frac{\partial}{\partial x}i + \frac{\partial}{\partial y}j + \frac{\partial}{\partial z}k$, then the value of $\nabla \cdot (\nabla \times \nabla f) + \nabla \cdot (\nabla f)$ at (1, 2, 1) is

(A) 68

(B) 78

(C) 88

(D) None of these

26. If the integral

$$\int_0^1 \int_0^1 \frac{dxdy}{\sqrt{(1 - x^2)(1 - y^2)}} = p^2 ,$$

then p is equal to

(A) $\frac{\pi}{4}$

(B) $\frac{\pi}{3}$

(C) $\frac{\pi}{2}$

(D) π

27. The equation of the tangent plane to the surface $2x^2 + y^2 + 2z = 3$ at the point $(2,\ 1,\ -3)$ is

(A) $4x + y + z = 6.$

(B) $4x + 4y + 2z = 3.$

(C) $x + y + 3z = 3.$

(D) none of these.

28. If $\vec{F} = grad\ (x^3 + y^3 + z^3 - 3xyz)$, then $\vec{F}$ is called

(A) solenoidal vector point function

(B) irrotational vector

(C) zero vector

(D) none of these

29. If

$$\vec{r}(t) = \begin{cases} 2i - j + 2k\,, when & t = 2 \\ 4i - 2j + 3k\,, when & t = 3 \end{cases}$$

then

$$\int_2^3 \left(\vec{r}.\frac{d\vec{r}}{dt}\right) dt =$$

(A) 10
(B) 20
(C) 30
(D) 40

30. If f is function of two variables $x,\ y$ and $A = f_{xx}(a,b),\ \ B = f_{xy}(a,b),\ \ C = f_{yy}(a,b)$. Then $f(a,b)$ will be a maximum value if $AC - B^2 > 0$ and

(A) $A > 0$
(B) $A < 0$
(C) $A = 0$
(D) none of these.

31. A theorem is stated as: "The integral of the divergence of a vector function F over some volume is equal to the vector flux through the surface bounding the given volume". This is known as ....

(A) Green's theorem
(B) Stokes' theorem
(C) Gauss's divergence theorem
(D) Mean-value theorem

32. The function

$$f(x,y) = x^3 + y^3 - 3x - 12y + 20$$

has four stationary points $(1,2), (-1,\ 2),\ (1,-2),\ (-1,-2)$. The saddle points are

(A) $(1,2), (-1,2)$
(B) $(-1,2), (1,-2)$
(C) $(1,-2), (-1,-2)$
(D) $(1,2), (-1,-2)$

33. The Serret-Frenet formulae can be written in the form $t' = w \times t,\ n' = w \times n,\ b' = w \times b$, the value of w is............, where $t,\ n,\ b,\ \kappa,\ \tau$ are tangent, normal, bi-normal, curvature and torsion respectively.

(A) $w = \tau t + \kappa b$
(B) $w = \tau t - \kappa b$
(C) $w = \tau t$
(D) $w = \kappa b$

34. A mapping $f: \mathbb{R} \to \mathbb{R}$ which is defined as $f(x) = \cos x,\ \ x \in \mathbb{R}$ is

(A) one-one only
(B) onto only
(C) one-one onto
(D) neither one-one nor onto

35. A subgroup H of a group G is normal in G if $g^{-1}Hg =$.. ... ... for all $g \in G$.

(A) G
(B) GH
(C) HG
(D) H

36. Let G be a finite group, K a normal subgroup of G and P a Sylow subgroup of K. If N is the normalizer of P in G (i.e., $N = \{g \in G \mid gPg^{-1} = P\}$) then $G =$

(A) $K.N$

(B) $G.N$

(C) $G.K$

(D) none of these.

37. Let R be a commutative ring and$A$ be an ideal of R. If A is contained in every maximal ideal of R, then $S^{-1}R =$

(A) S

(B) A

(C) R

(D) none of these.

38. The last digit of 2^{80} is

(A) 2

(B) 4

(C) 6

(D) 8

39. If S is the set of all real numbers except (-1) and o is an operation defined by

$$aob = a + b + ab.$$

The solution of the equation $2oxo5 = 7$ in S is ________.

(A) $x = -\frac{1}{3}$

(B) $x = -\frac{10}{7}$

(C) $x = -\frac{17}{18}$

(D) $x = -\frac{5}{9}$

40. If in a group G, $a^3 = e, aba^{-1} = b^2$ for $a, b \in G$ then the $O(b) =$

(A) 3

(B) 5

(C) 7

(D) 11

41. Let R be a commutative ring with unity and let A be an ideal of R. Then R/A is .... if and only if A is prime.

(i) an integral domain (ii) a field

(A) Only (i) is correct.

(B) Only (ii) is correct.

(C) Both (i) and (ii) are correct.

(D) Both (i) and (ii) are not correct.

42. The series

$$\frac{1}{1^p} + \frac{1}{2^p} + \frac{1}{3^p} + \cdots + \frac{1}{n^p} + \cdots$$

is

(A) convergent if $p > 1$ and divergent if $p \leq 1$.

(B) convergent if $p > -1$ and divergent if $p \leq -1$.

(C) convergent if $p < 1$ and divergent if $p \geq 1$.

(D) Not convergent anywhere.

43. Every infinite bounded set has

(A) no limit point.

(B) infinite limiting points.

(C) at least one limit point.

(D) only one limit point.

44. If $\sum u_n$ is a positive term series and

$$\lim_{n\to\infty} (u_n)^{\frac{1}{n}} = m$$

then

(A) $\sum u_n$ is convergent if $m = 1$.

(B) $\sum u_n$ is convergent if $m < 1$.

(C) $\sum u_n$ is convergent if $m > 1$.

(D) none of these.

45. Let A be a nonempty subset of $\mathbb{R}$ bounded above. Set $B = \{-a; a \in A\}$. Then in f B =

(A) $\sup A$.

(B) 0.

(C) $-\sup A$.

(D) none of these.

46. If (x_n) and (y_n) are bounded real sequences, the

$$\lim_{n\to\infty} sup(x_n + y_n)$$

(A) $\leq \lim_{n\to\infty} sup\, x_n + \lim_{n\to\infty} sup\, y_n$

(B) $\geq \lim_{n\to\infty} sup\, x_n + \lim_{n\to\infty} sup\, y_n$

(C) $\leq \lim_{n\to\infty} sup\, x_n - \lim_{n\to\infty} sup\, y_n$

(D) $\geq \lim_{n\to\infty} sup\, x_n - \lim_{n\to\infty} sup\, y_n$

47. Let f, g and h be three real-valued functions defined on$\subset \mathbb{R}$. Assume that for all $x \in I$,

$$f(x) \leq g(x) \leq h(x)$$

and that for $x_0 \in I$,

$$\lim_{x\to x_0} f(x) = \lim_{x\to x_0} h(x) = m$$

then

$$\lim_{x\to x_0} g(x) =$$

(A) m.

(B) $\frac{m}{2}$.

(C) m^2.

(D) none of these.

48. A set is said to be compact if and only if every infinite subset of the set has

(A) no limit point in the set.

(B) a limit point in the set.

(C) infinitely many limit points in the set.

(D) none of these.

49. The limit of the sequence

$$S_n = \frac{3 + 2\sqrt{n}}{\sqrt{n}}$$

is

(A) 0 (B) 1

(C) 2 (D) 3

50. The infinite series

$$\sum_{n=0}^{\infty}(-1)^n \frac{1}{2n+1} = K.$$

Then K is

(A) $\sqrt{2\pi}$ (B) $\sqrt{3\pi}$

(C) $\frac{\pi}{3}$ (D) $\frac{\pi}{4}$

51. Let $f: [a, b] \to \mathbb{R}$ be a bounded function. Let $m, M \in \mathbb{R}$ be such that for all x we have $m \leq f(x) \leq M$. For any partition P of $[a, b]$,................................, where $L(P, f)$ the lower Darboux sum and $U(P, f)$ the upper Darbouxsum.

(A) $m(b-a) \leq L(P, f) \leq U(P, f) \leq M(b-a)$ (B) $m(b+a) \leq L(P, f) \leq U(P, f) \leq M(b+a)$

(C) $m(a-b) \leq L(P, f) \leq U(P, f) \leq M(a-b)$ (D) none of these

52. The vector (x, y) and $(-y, x)$ with respect to standard inner product are

(A) orthogonal. (B) orthonormal.

(C) continuous. (D) None of these.

53. If A and B are two non-singular matrix of same order, then

(A) $(AB)^{-1} = A^{-1}B^{-1}$ (B) $(AB)^{-1} = B^{-1}A^{-1}$

(C) $(AB)^{-1} = AB$ (D) $(AB)^{-1} = A^{-1}B$

54. For given system of equations$AX = b$, where order of A is n , then the system have a unique solution if

(A) Rank (A) $\neq$ rank (A: b) = n (B) Rank (A) $\neq$ rank (A: b) $\neq$ n

(C) Rank (A) = rank (A: b) = n (D) None of these

55. If W_1 and W_2 be finite dimensional vector subspaces of a vector space V. If $\dim W_1 = 2, \dim W_2 = 2, \dim(W_1 + W_2) = 3$, then $\dim(W_1 \cap W_2)$ is

(A) 1 (B) 2

(C) 3 (D) 4

56. The set of all bijections from a finite set X to itself is called the set of

(A) identity elements. (B) inverse elements.

(C) permutations on X. (D) none of these.

57. If V is an inner product space, then for $\alpha, \beta \in V$..............

(A) $||\alpha + \beta|| \geq ||\alpha|| + ||\beta||$ (B) $||\alpha + \beta|| = ||\alpha|| + ||\beta||$

(C) $||\alpha + \beta|| \leq ||\alpha|| + ||\beta||$ (D) none of these.

58. If V and W are vector spaces over field F and T is a linear transformation from V to W. If V is finite dimensional then

(A) $Rank\ (T) = nullity\ (T)$ (B) $Rank\ (T) = nullity\ (T) + \dim(V)$

(C) $Rank\ (T) + \dim(V) = nullity\ (T)$ (D) $Rank\ (T) + nullity\ (T) = \dim(V)$

59. W be a subspace of a finite dimensional vector space V, then $\dim \frac{V}{W} =$

(A) $\dim V - \dim W$. (B) $\dim W - \dim V$.

(C) $\dim VW$. (D) none of these.

60. Three forces acting on a particle are in equilibrium. The angle between the first and second is 90° and the angle between second and third is 120°. Then the ratio of forces is ....

(A) $\sqrt{3} : 1 : 3$ (B) $\sqrt{2} : 2 : 3$

(C) $\sqrt{3} : 1 : 2$ (D) $\sqrt{3} : 2 : 3$

61. Two parallel forces with different lines of action are said to form a couple if they are

(A) equal and like forces (B) unequal and like forces

(C) unequal and unlike forces (D) equal and unlike forces

62. The center of gravity of a solid hemisphere of radius R lies on the central radius at a distance x from the center, then x is equals to

(A) $\frac{R}{8}$ (B) $\frac{3R}{8}$

(C) $\frac{5R}{8}$ (D) $\frac{7R}{8}$

63. Two balls are projected from the same point in directions inclined at 60° and 30° to the horizontal. If they attain same height, then ratio of their velocities of projection is

(A) $\frac{1}{\sqrt{3}}$

(B) $\frac{1}{\sqrt{5}}$

(C) $\frac{\sqrt{3}}{2}$

(D) $\frac{\sqrt{5}}{2}$

64. An elastic ball hits a horizontal floor vertically with a speed of u and is allowed to strike the floor another two times after which it rebounds from the floor with a velocity $\frac{27u}{64}$. Neglecting the air resistance, the coefficient of elasticity between the ball and the floor is

(A) $\frac{1}{4}$

(B) $\frac{1}{2}$

(C) $\frac{3}{4}$

(D) 1

65. Law stated, "Each planet describes an ellipse having the sun in one of its foci". This law is known as

(A) Hooke's Law

(B) Newton's Law

(C) Kepler's Law

(D) Euler's Law

66. Any infinite set of non-empty, mutually disjoint, open sets in a separable metric space X is

(A) uncountable

(B) both of them.

(C) countable

(D) none of these.

67. Let (X, d) be a metric space and $x, x', y, y' \in X$, then

(A) $|d(x,y) - d(x',y')| \geq d(x,x') + d(y,y')$

(B) $|d(x,y) - d(x',y')| \leq d(x,x') + d(y,y')$

(C) $|d(x,y) - d(x',y')| \geq 2d(x,y')$

(D) none of these.

68. If $a^2 + b^2 = 1$, then

$$\frac{1+a+ib}{1+a-ib}$$

is equal to

(A) $a + ib$

(B) $a - ib$

(C) $b + ia$

(D) $b - ia$

69. If 1, ω, ω^2 are the cube roots of unity, then the roots of

$$(x-1)^3 + 8 = 0$$

are

(A) $1, \omega, \omega^2$

(B) $-1, 1+2\omega, 1+2\omega^2$

(C) $-1, 1-2\omega, 1-2\omega^2$

(D) $1, \omega, 2\omega$

70. If $x+yi$ and $a+bi$ are two complex numbers such that $(x+y) > (a+b)$. Then which of the following is correct.

(A) $4+3i > 1+2i$

(B) $5+6i > 4+3i$

(C) $7+8i > 3+7i$

(D) none of these.

71. If $\phi(x,y)$ and $\psi(x,y)$ are functions with continuous second derivative, then $\phi(x,y)+i\psi(x,y)$ can be expressed as an analytic function of $x+iy$, when

(A) $\frac{\partial\phi}{\partial x} = -\frac{\partial\psi}{\partial x}, \quad \frac{\partial\phi}{\partial y} = \frac{\partial\psi}{\partial y}$

(B) $\frac{\partial\phi}{\partial y} = -\frac{\partial\psi}{\partial x}, \quad \frac{\partial\phi}{\partial x} = \frac{\partial\psi}{\partial y}$

(C) $\frac{\partial^2\phi}{\partial x^2} + \frac{\partial^2\phi}{\partial y^2} = \frac{\partial^2\psi}{\partial x^2} + \frac{\partial^2\psi}{\partial y^2} = 1$

(D) $\frac{\partial\phi}{\partial x} + \frac{\partial\psi}{\partial y} = \frac{\partial\psi}{\partial x} + \frac{\partial\psi}{\partial y} = 0$

72. The argument of the complex number

$$z = \frac{\left(1+i\sqrt{3}\right)^2}{4i\left(1-i\sqrt{3}\right)}$$

is

(A) $\frac{\pi}{6}$

(B) $\frac{\pi}{4}$

(C) $\frac{\pi}{2}$

(D) π

73. The solution of the equation $|z| - z = 1 + 2i$ is ……, where $z = x + yi$.

(A) $\frac{3}{2} - 2i$

(B) $\frac{5}{2} - 3i$

(C) $\frac{5}{3} - i$

(D) $\frac{7}{2} - 4i$

74. If $z = (\lambda+3) + i\sqrt{5-\lambda^2}$; then the locus of z is

(A) a straight line

(B) a circle

(C) an ellipse

(D) a parabola

75. If $u = x^3 - 3xy^2$ is harmonic function, the analytic function $f(z)$ is

(A) $z^2 + c$

(B) $z^3 + c$

(C) $z^4 + c$

(D) none of these

76. If $f: D(0,1) = \{z: |z| < 1\}$ is an analytic function which satisfies $f(0) = 0$, and if $|Re\ f(z)| < 1$ for all $z \in D(0,1)$, then $|f'(0)| \leq$

(A) $\frac{4}{\pi}$

(B) $\frac{5}{\pi}$

(C) $\frac{6}{\pi}$

(D) $\frac{7}{\pi}$

77. The sum $1 + i^2 + i^4 + i^6 + \cdots + i^{2n}$

(A) is positive.

(B) is negative.

(C) is 0.

(D) cannot be determined.

78. The moment generating function of the Poisson distribution

(A) $M_X(t) = e^{\lambda(e^t - 1)}$

(B) $M_X(t) = 2e^{\lambda(1-e^t)}$

(C) $M_X(t) = \lambda e^{\lambda(e^t-1)}$

(D) None of these

79. The fourth moment of the Binomial distribution, $B(r; n, p)$, about the origin is................................, where $q = 1 - p$.

(A) $npq(1 + (n-2)pq)$

(B) $npq(q - p)$

(C) $npq(1 + 2(n-2)pq)$

(D) $npq(1 + 3(n-2)pq)$

80. If the correlation coefficient between the variables x and y is $\frac{1}{2}$, then the correlation between the variables $3x - 4$ and $4 - 3y$ is:

(A) 1

(B) $\frac{1}{2}$

(C) $-\frac{1}{2}$

(D) 0

81. An urn P contains 5 white and 4 red balls and urn B contains 6 white and 3 red balls. An urn is selected at random and a ball is drawn from it. The probability that the ball is white, is

(A) $\frac{5}{18}$

(B) $\frac{11}{18}$

(C) $\frac{7}{18}$

(D) None of these

82. If X and Y are two discrete random variables with variances 3 and 4 respectively. Then the variance of $3X + 2Y$ is

(A) 33

(B) 34

(C) 43

(D) 44

88. If the entry (2,2) is a saddle point for the game

		Player B		
		B_1	B_2	B_3
	A_1	2	4	5
Player A	A_2	10	7	Q
	A_3	4	P	6

Then the ranges of values of P and Q are

(A) $P \leq 7, Q \geq 7$

(B) $P \neq 7, Q \leq 7$

(C) $P \geq 7, Q \leq 7$

(D) $P \leq 7, Q \neq 7$

89. The value of the square game

		Player B	
		B_1	B_2
	A_1	1	3
Player A	A_2	7	-5

is

(A) 10/7

(B) 11/7

(C) 12/7

(D) 13/7

90. Method used to solve Assignment problem is called:

(A) Modified Distribution method

(B) Reduced Matrix method

(C) Hungarian method

(D) Branch and Bound method

91. The order of convergence of Regula-falsi method is

(A) 1.62

(B) 1

(C) 2

(D) 2.62

92. If $y_{\pm i} = f(x_{\pm i}),\ i = 0, 1, 2, \dots,\ n$ are given for $2n + 1$ equidistant points, where $x_{\pm i} = x_0 \pm ih$ and $\phi(x)$ is Stirling's interpolation formula, then $\phi''(x_0) =$

(A) $\frac{1}{h^2}\left[\Delta^2 y_{-1} - \frac{1}{12}\Delta^4 y_{-2} + \cdots\right]$

(B) $\frac{1}{h^2}\left[\Delta^2 y_{-2} - \frac{1}{12}\Delta^4 y_{-3} + \cdots\right]$

(C) $\frac{1}{h^2}\left[\Delta^3 y_{-1} - \frac{1}{12}\Delta^4 y_{-2} + \cdots\right]$

(D) $\frac{1}{h^2}\left[\Delta^3 y_{-2} - \frac{1}{12}\Delta^4 y_{-3} + \cdots\right]$

93. An error of 1% is made in measuring the major and minor axis of an ellipse. The percentage error in the area of the ellipse is

(A) 1%

(B) 2%

(C) 3%

(D) 4%

94. In case of multiple roots of a non-linear equation $f(x) = 0$, the order of convergence of Newton-Raphson method

$$x_{n+1} = x_n - \frac{f(x_n)}{f'(x_n)}$$

is

(A) 0
(B) 1
(C) 2
(D) 3

95. If Δ and ∇ are forward and backward difference operators respectively, then

$$(1+\Delta)(1-\nabla) =$$

(A) 0
(B) -1
(C) 1
(D) None of these

96. If $L_i(x)$ is Lagrangian function of degree less than or equal to n, then

$$\sum_{i=0}^{n} L_i(x) =$$

(A) 0
(B) 1
(C) -1
(D) ∞

97. The error in the non-composite trapezoidal rule is

$$E = \int_{x_0}^{x_1} f(x)dx - \frac{h}{2}[y_0 + y_1]$$

with $h = x_1 - x_0$ and $y = f(x)$, then E is

(A) $\cong -\frac{h^3}{24} f''(r),\ x_0 < r < x_1$
(B) $\cong -\frac{h^3}{48} f''(r),\ x_0 < r < x_1$
(C) $\cong -\frac{h^3}{12} f''(r),\ x_0 < r < x_1$
(D) $\cong -\frac{h^3}{36} f''(r),\ x_0 < r < x_1$

98. In Simpson's $\frac{1}{3}rd$ rule we replace the graph of the given function by some

(A) second degree polynomials
(B) third degree polynomials
(C) fourth degree polynomials
(D) fifth degree polynomials

99. Sum of two binary numbers $(100101)_2 + (10101)_2 =$

(A) 0111010
(B) 0110110
(C) 0111111
(D) 1101001

100. In C programming language, data type for decimal number is

(A) int
(B) char
(C) float
(D) number