Question No.	Questions
1.	Length of the arc of the curve $x^2 + y^2 - 2ax = 0$ in the first quadrant is (1) $\frac{\pi a}{4}$ (2) $\frac{\pi a}{2}$ (3) πa (4) $2\pi a$
2.	Area between the parabolas $y^2 = 4ax$ and $x^2 = 4ay$ is (1) $\frac{16}{3}a^2$ (2) $\frac{16}{5}a^2$ (3) $\frac{8}{3}a^2$ (4) $\frac{8}{5}a^2$
3.	The number of arbitrary constants in the equation of a sphere are (1) 2 (2) 3 (3) 4 (4) 6
4.	Angle between the lines represented by $x^2 + 2bxy - y^2 = 0$ is (1) π (2) $\frac{\pi}{2}$ (3) $\frac{\pi}{3}$ (4) $\frac{\pi}{4}$
5.	If a right circular cone has three mutually perpendicular generators, then semi-vertical angle of the cone is (1) $\frac{\pi}{4}$ (2) $\tan^{-1}\left(\frac{1}{\sqrt{2}}\right)$ (3) $\frac{\pi}{3}$ (4) $\tan^{-1}\left(\sqrt{2}\right)$

Question No.	Questions
6.	If a/bc and (a, b) = 1, then a/c is the statement of (1) Gauss theorem (2) Wilson theorem (3) Fermat's theorem (4) Chinese Remainder theorem
7.	Which of the following congruences have solution ? (1) $x^2 \equiv -2 \pmod{61}$ (2) $x^2 \equiv 2 \pmod{61}$ (3) $x^2 \equiv -2 \pmod{59}$ (4) $x^2 \equiv 2 \pmod{59}$
8.	The highest power of 2 dividing $\lfloor 533$ is (1) 528 (2) 529 (3) 530 (4) 532
9.	If $\sin^{-1} x + \sin^{-1} y = \frac{2\pi}{3}$, then $\cos^{-1} x + \cos^{-1} y =$ (1) $\frac{\pi}{2}$ (2) $\frac{\pi}{3}$ (3) $\frac{\pi}{6}$ (4) $\frac{2\pi}{3}$
10.	If $\cosh x = 2$, then x = (1) $\log\left(2-\sqrt{5}\right)$ (2) $\log\left(2-\sqrt{3}\right)$ (3) $\log\left(2+\sqrt{5}\right)$ (4) $\log\left(2+\sqrt{3}\right)$

Question No.	Questions
11.	Dimension of $Q(\sqrt{2})$ over Q is (1) 4 (2) 2 (3) 1 (4) 3
12.	Which of the following is an orthogonal set ? (1) $\{(1,0,1), (1,0,-1), (-1,0,1)\}$ (2) $\{(1,0,1), (1,0,-1), (0,1,0)\}$ (3) $\{(1,0,1), (1,0,-1), (0,2,3)\}$ (4) none of these
13.	Let u, v be orthogonal set in an inner product space V. Then $\|u-v\|$ is (1) 0 (2) $\sqrt{3}$ (3) 2 (4) $\sqrt{2}$
14.	Let u = (1, 0, i), v = (2, 0, 1 + i). Then $< u, v >$ is (1) $1+i$ (2) $1-i$ (3) $2+i$ (4) $-1+i$
15.	Tangential velocity of a particle at a point is (1) $\frac{dx}{dt}$ (2) $\frac{dy}{dt}$ (3) $\frac{dt}{ds}$ (4) $\frac{ds}{dt}$
16.	A person weighing 70 Kg. is in a lift ascending with an acceleration of 1.4 m/sec^2. The thrust of his feet on the lift is (1) 584 N (2) 780 N (3) 784 N (4) 980 N

Question No.	Questions
17.	A particle is projected at such an angle that the horizontal range is three times the greatest height. Then the angle of projection is (1) $\tan^{-1}\frac{2}{3}$ (2) $\tan^{-1}\frac{4}{3}$ (3) $\tan^{-1}\frac{3}{2}$ (4) $\tan^{-1}\frac{5}{3}$
18.	A body of mass m has momentum M. Its Kinetic energy will be (1) $\frac{M^2}{2m}$ (2) $\frac{M^2}{m}$ (3) $\frac{1}{2} m M^2$ (4) $\frac{1}{2} m M$
19.	The expression for frequency of a S. H. M. is (1) $n = \frac{m}{\sqrt{2\pi}}$ (2) $n = \frac{\sqrt{m}}{2\pi}$ (3) $n = \sqrt{\frac{m}{2\pi}}$ (4) $n = \frac{m}{2\pi}$
20.	The law of force towards the pole under the curve $r^2 = 2ap$ is (1) $F \propto \frac{1}{r^2}$ (2) $F \propto \frac{1}{r^3}$ (3) $F \propto \frac{1}{r^5}$ (4) $F \propto \frac{1}{r^{3/2}}$

Question No.	Questions
21.	The number of abelian groups upto isomorphism of order 10^5 is (1) 5 (2) 7 (3) 45 (4) 49
22.	A communicative division ring is (1) group (2) vector space (3) field (4) integral domain
23.	Ring of polynomial over a field is a (1) prime field (2) unique factorization domain (3) irreducible (4) integral domain
24.	If integral domain D is of finite characteristic, then its characteristic is (1) prime number (2) natural number (3) even number (4) odd number
25.	Number of prime ideals of Z_{10} is (1) 4 (2) 3 (3) 2 (4) 1
26.	Starting with $x_0 = 1$, the next approximation x_1 to $2^{1/3}$ obtained by Newton's method is (1) $\frac{4}{3}$ (2) $\frac{5}{3}$ (3) $\frac{5}{4}$ (4) $\frac{6}{5}$
27.	In Simpson's $\frac{1}{3}$rd rule, the curve $y = f(x)$ is assumed to be a (1) circle (2) hyperbola (3) parabola (4) straight line

Question No.	Questions
28.	Gauss quadrature formula is used for (1) Numerical integration (2) Numerical differentiation (3) Interpolation (4) Solution of equations
29.	Let f (0) = 1, f (1) = 2.72, then the trapezoidal rule gives approximate value of $\int_0^1 f(x)\,dx$ as (1) 3.72 (2) 1.86 (3) 1.76 (4) 0.92
30.	Normal distribution becomes standard normal distribution when (1) $\mu = 0, \sigma = 0$ (2) $\mu = 1, \sigma = 0$ (3) $\mu = 1, \sigma = 1$ (4) $\mu = 0, \sigma = 1$
31.	$L\{e^{at} t^n\} =$ (1) $\frac{n}{(s-a)^{n+1}}$ (2) $\frac{\Gamma(n)}{(s-a)^n}$ (3) $\frac{\lfloor n}{(s-a)^n}$ (4) $\frac{\lfloor n}{(s-a)^{n+1}}$
32.	$L^{-1}\left\{\frac{1}{(s-4)^3}\right\} =$ (1) $t^2 e^{4t}$ (2) $\frac{1}{2} t^2 e^{4t}$ (3) $\frac{1}{2} t e^{4t}$ (4) $t e^{4t}$

Question No.	Questions
33.	Generating function for Bessel function $J_n(x)$ is (1) $e^x\left(\frac{1}{t}-t\right)$ (2) $e^{\frac{x}{2}}\left(\frac{1}{t}-t\right)$ (3) $e^x\left(t-\frac{1}{t}\right)$ (4) $e^{\frac{x}{2}}\left(t-\frac{1}{t}\right)$
34.	$\left\{J_{1/2}(x)\right\}^2+\left\{J-\frac{1}{2}(x)\right\}^2=$ (1) $\frac{\pi x}{2}$ (2) $\frac{2}{\pi x}$ (3) $\frac{\sqrt{2}}{\pi x}$ (4) $\frac{2}{\sqrt{\pi x}}$
35.	If $P_n(x)$ is Legendre polynomial of degree n, then $P_2(x)=$ (1) $\frac{1}{2}(3x^2-1)$ (2) $\frac{1}{2}(3x^2+1)$ (3) $\frac{3}{2}x^2-1$ (4) $x^2-\frac{1}{2}$
36.	Maximum size of a float variable is (1) 2 bytes (2) 3 bytes (3) 4 bytes (4) 8 bytes
37.	Which of following Keyword is used for the storage class 2 (1) auto (2) printf (3) external (4) scanf

Question No.	Questions
38.	The continue statement cannot be used with (1) while (2) for (3) switch (4) do
39.	The bitwise AND operator is used for (1) shifting bits (2) sorting (3) comparison (4) masking
40.	Number of real roots of the equation $x^{2n} - 1 = 0$ is (1) 2 (2) n (3) 2 n (4) n–1
41.	The value of 'c' of Lagrange's mean value theorem for $f(x) = x(x-1)$ in $[1, 2]$ is given by (1) $\frac{2}{3}$ (2) $\frac{3}{4}$ (3) $\frac{3}{2}$ (4) $\frac{4}{3}$
42.	Which of the following functions is not uniformly continuous in $[2, \infty)$, (1) $\sin x$ (2) e^x (3) $\frac{1}{x}$ (4) $\frac{1}{x^2}$
43.	For what value of k, the function $f(x, y) = \begin{cases} \frac{\sin^{-1}(xy-2)}{\tan^{-1}(3xy-6)}, & (x, y) \neq (1, 2) \\ K, & (x, y) = (1, 2) \end{cases}$ is continuous ? (1) 2 (2) $\frac{1}{2}$ (3) $\frac{1}{3}$ (4) $\frac{1}{4}$

Question No.	Questions
44.	The function $f(x, y) = 2x^4 - 3x^2y + y^2$ has (1) maxima at (0, 0) (2) neither maxima nor minima at (0, 0) (3) minima at (0, 0) (4) doubtful case at (0, 0)
45.	A unit vector perpendicular to the tangent and normal at a point of a space curve is called (1) Principal normal (2) Involute (3) Standard normal (4) Binormal
46.	The partial differential equation of all spheres whose centre lies on z-axis is (1) $qx - py = 0$ (2) $px - qy = 0$ (3) $qx + py = 0$ (4) $px + qy = 0$
47.	Solution of $px + qy = z$ is (1) $f\left(\frac{x}{y}, \frac{y}{z}\right) = 0$ (2) $f(xy, yz) = 0$ (3) $f(x^2, y^2) = 0$ (4) $f(x, y + z) = 0$
48.	The differential equation $f_{xx} + 2f_{xy} + 4f_{yy} = 0$ (1) parabolic (2) hyperbolic (3) linear (4) elliptic

Question No.	Questions
49.	The partial differential equation of the transverse vibrations of a string is (1) $\frac{\partial^2 y}{\partial t^2} = c^2 \frac{\partial^2 y}{\partial x^2}$ (2) $\frac{\partial^2 y}{\partial t^2} = c^2 \frac{\partial y}{\partial x}$ (3) $\frac{\partial^2 y}{\partial t^2} = c^2 \frac{\partial^3 y}{\partial x^3}$ (4) $\frac{\partial y}{\partial t} = c^2 \frac{\partial y}{\partial x}$
50.	The solution of $\frac{\partial^2 z}{\partial x^2} + \frac{\partial^2 z}{\partial y^2} = \frac{z}{a}$ is (1) $z = e^{y/a} f(x+y)$ (2) $z = e^{y/a} f(x-y)$ (3) $z = e^{a} f(x-y)$ (4) $z = e^{x/a} f(x+y)$
51.	If $x_r = \cos \frac{\pi}{2^r} + i \sin \frac{\pi}{2^r}$, then $x_1 x_2 x_3 \ldots\ldots x_n \ldots\ldots \infty =$ (1) $\frac{\pi}{2}$ (2) $-\pi/2$ (3) 1 (4) -1
52.	The value of Wronskion W (x, x^2, x^3) is (1) $3x^3$ (2) $3x^2$ (3) $2x^3$ (4) $2x^2$

Question No.	Questions
53.	Which of the following is not an integrating factor of $x\,dy = y\,dx$? (1) $\frac{x}{y}$ (2) $\frac{1}{xy}$ (3) $\frac{1}{x^2}$ (4) $\frac{1}{x^2+y^2}$
54.	The orthogonal trajectory of the family $x^2 - y^2 = c$ are given by (1) $\frac{x}{y} = c$ (2) $xy = c$ (3) $x - y = c$ (4) $x^2 + y^2 = c$
55.	If $y(x) = x \cos 2x$ is a particular solution of $\frac{d^2y}{dx^2} + ay = -4 \sin 2x$, then a = (1) 2 (2) -4 (3) 4 (4) 3
56.	The magnitude of maximum directional derivative of $\phi\,(x, y, z) = x^2 - 2y^2 + 4z^2$ at the point $(1, 1, -1)$ is (1) $\sqrt{21}$ (2) $3\sqrt{21}$ (3) $2\sqrt{21}$ (4) 21
57.	If $\vec{f}$ and $\vec{g}$ are irrotational, then $\vec{f} \times \vec{g}$ is (1) 0 (2) solenoidal (3) irrotational (4) constant

Question No.	Questions
58.	If $\hat{n}$ is outward unit normal drawn to a closed surface S, having volume V, then $\iiint_V \text{div}(\hat{n})\, dV =$ (1) 2 V (2) V (3) 2 S (4) S
59.	In an orthogonal curvilinear system, which one of the following statements is correct ? (1) $\text{div}\left(\text{curl}\, \vec{f}\right) = 0$ (2) $\text{curl}\left(\text{curl}\, \vec{f}\right) = \vec{0}$ (3) $\text{curl}\left(\text{div}\, \vec{f}\right) = 0$ (4) $\text{div}\,(\text{grad}\, \phi) = 0$
60.	Using Stoke's theorem, $\oint_c (yz\, dx + xz\, dy + xy\, dz)$, where c is the curve $x^2 + y^2 = 1$, $z = y^2$; is (1) 2 (2) 1 (3) $\frac{1}{2}$ (4) 0
61.	Absolute units of moment in S. I. system is (1) Kg. m (2) Dyne centimeter (3) Newton meter (4) gm. cm.
62.	The centre of gravity of a thin uniform triangular lamina divides every median in the ratio (1) 2 : 1 (2) 1 : 2 (3) 2 : 3 (4) 3 : 2

Question No.	Questions
63.	The line of action of a force such that axis of the couple is coincident with this line, is called (1) screw (2) central line (3) wrench (4) central axis
64.	The constant ratio which the limiting friction bears to the normal reaction is called (1) Limiting Reaction (2) Co-efficient of Friction (3) Statical Friction (4) Saturated Friction
65.	Minimum distance between two forces which are equivalent to given system (R, K) and inclined at a given angle 2α is (1) $\frac{K}{R}\sin\alpha$ (2) $\frac{K}{R}\cos\alpha$ (3) $\frac{K}{R}\cot\alpha$ (4) $\frac{R}{K}\cot\alpha$
66.	If p and q are positive real numbers, then the series $\frac{2p}{1^q}+\frac{3p}{2^q}+\frac{4p}{3^q}+\cdots\cdots$ is convergent for (1) $p<q+1$ (2) $p<q-1$ (3) $p=q$ (4) $p<q$

Question No.	Questions
67.	If $a_n = \frac{\cos(n\pi/2)}{n}$, then the sequence $\{a_n\}$ is (1) Convergent to 0 (2) Convergent to 1 (3) Convergent to $\frac{1}{2}$ (4) diverges
68.	The limit superior and limit inferior of $\left\{\frac{(-1)^n}{n^2}\right\}$ are respectively equal to (1) 1; 0 (2) $-1, 1$ (3) 0, 0 (4) 0, 1
69.	If δ_n denotes the sum of n terms of the series $1+\frac{1}{\sqrt{2}}+\frac{1}{\sqrt{3}}+\cdots\cdots+\frac{1}{\sqrt{n}}+\cdots\cdots$, then (1) $\delta_n > n$ (2) $\delta_n > n^{3/2}$ (3) $\delta_n > n^2$ (4) $\delta_n > n^{1/2}$
70.	If m is fixed positive integer, then $\lim_{n\to\infty} \frac{1}{n}\left[(m+1)(m+2)\cdots\cdots(m+n)\right]^{\frac{1}{n}} =$ (1) $\frac{1}{e}$ (2) e (3) $\frac{2}{e}$ (4) $\frac{3}{e}$
71.	The integral $\int_0^1 x^{m-1}(1-x)^{n-1}dx$ is convergent, when (1) $n > 0, m = 0$ (2) $m > 0, n = 0$ (3) $m > 0, n > 0$ (4) $m = 0, n > 1$

Question No.	Questions
72.	Let f be a bounded function defined on the bounded interval [a, b]. Then, f is Riemann integral on [a, b] iff (1) $\int_a^b f \le \int_a^{\bar{b}} f$ (2) $\int_a^b f = \int_a^{\bar{b}} f$ (3) $\int_a^b f \ge \int_a^{\bar{b}} f$ (4) $\int_a^b f + \int_a^{\bar{b}} f = 0$
73.	The integral $\int_0^\infty x^{n-1} e^{-x}\, dx$ is divergent, when (1) $n > 0$ (2) $n \le 0$ (3) $n > 1$ (4) $n = \frac{1}{2}$
74.	If A is an open set and B is a closed set in R^n, then (1) B–A is null set (2) B–A is semi-open set (3) B–A is open set (4) B–A is closed set
75.	Which of the following is not correct about the cantor ternary set ? (1) It is dense (2) It is closed (3) It is uncountable (4) It is perfect set
76.	The complement of non-empty open set of metric space is (1) null set (2) open set (3) closed set (4) semi-open set
77.	If X is a complete metric space, E is non-empty open subset of X, then (1) E is of first category (2) E is of second category (3) E is a null set (4) None of these

Question No.	Questions
78.	If G is a set of integers and $a.b \equiv a - b$, then G is (1) semi-group (2) non-group (3) monoid (4) quasi-group
79.	If $G = \{1, -1, i, -i\}$ is a multiplicative group, then order of $-i$ is (1) 5 (2) 4 (3) 3 (4) 2
80.	Every group of prime order is (1) abelian (2) sub-group (3) normal group (4) cyclic
81.	The sum of the characteristic roots of the matrix $\begin{bmatrix} 3 & 7 & 6 \\ 2 & 24 & 3 \\ 0 & 1 & -8 \end{bmatrix}$ is (1) 17 (2) 19 (3) 21 (4) 25
82.	If the given matix A is $A = \begin{bmatrix} 1 & 0 & 1 \\ \sin\theta & \cos\theta & -\sin\theta \\ -\cos\theta & \sin\theta & \cos\theta \end{bmatrix}$, then $\lvert \text{Adj } A \rvert =$ (1) 3 (2) 4 (3) $\sin 2\theta$ (4) 0

Question No.	Questions
83.	Determinant of an orthogonal matrix is (1) -1 (2) 1 (3) 0 (4) ± 1
84.	The quadratic form $ax^2 + 2hxy + by^2$ is positive definite iff (1) $a > 0, b > 0, h > 0$ (2) $a > 0, h^2 - ab > 0$ (3) $a > 0, ab - h^2 > 0$ (4) $a > 0, h^2 - ab = 0$
85.	If α, β, γ are the roots of the equation $x^3 - px^2 + qx - r = 0$, then $\sum \alpha^2 \beta^2 =$ (1) $q^2 - 2pr$ (2) $p^2 - 2qr$ (3) $r^2 - 2pq$ (4) 0
86.	The least number of imaginary roots of the equation $x^8 + 5x^3 + 2x - 3 = 0$ is (1) 6 (2) 4 (3) 2 (4) 0
87.	$\lim_{x \to -\infty} \left(\sqrt{9x^2 - x} + 3x\right) =$ (1) 3 (2) $\frac{1}{3}$ (3) $\frac{1}{4}$ (4) $\frac{1}{6}$

Question No.	Questions
88.	If $f(x) = a\|\sin x\| + b\, e^{|x|} + c\|x\|^3$ and f (x) is differentiable at x = 0, then (1) $a = 0; b \in R, c = 0$ (2) $a = 0, b = 0; c \in R$ (3) $a \in R; b = 0, c = 0$ (4) $a = 0, b = 0; c = 0$
89.	If a curve of nth degree has n asymptotes, then they cut the curve in how many points ? (1) $n(n-1)$ (2) $n-2$ (3) $n(n-2)$ (4) n
90.	For the curve $r = a \sin n\theta$, radius of curvature at the pole is (1) na (2) $\frac{na}{3}$ (3) 2na (4) $\frac{na}{2}$
91.	In Binomial distribution the parameter n ranges over the (1) positive real numbers (2) positive rational numbers (3) positive integers (4) integers

Question No.	Questions
92.	The Jacobi's iteration method for the set of equations $x_1 + ax_2 = 2$, $ax_1 + x_2 = 7$ $\left(a \neq \frac{1}{\sqrt{2}}\right)$ converges for (1) $a = 1$ (2) $\lvert a \rvert < \frac{1}{\sqrt{2}}$ (3) $a = \frac{1}{\sqrt{2}}$ (4) $\frac{1}{\sqrt{2}} < a < \frac{3}{\sqrt{2}}$
93.	$\int_0^2 \left(8 - x^3\right)^{-\frac{1}{3}} dx =$ (1) $\beta\left(\frac{1}{3}, \frac{2}{3}\right)$ (2) $\frac{1}{2}\beta\left(\frac{1}{3}, \frac{2}{3}\right)$ (3) $\frac{2}{3}\beta\left(\frac{1}{3}, \frac{2}{3}\right)$ (4) $\frac{1}{3}\beta\left(\frac{1}{3}, \frac{2}{3}\right)$
94.	If f (x) is an even function of x in $[-\pi, \pi]$, then Fourier series of f (x) consists of terms (1) with sines only (2) with cosines only (3) with constants (4) with sines and cosines both
95.	$\lceil n \cdot \lceil 1 - n =$ (1) $\frac{\pi}{\sin n\pi}$ (2) $\frac{\sin n\pi}{\pi}$ (3) $\frac{2}{\sin n\pi}$ (4) $\frac{\pi}{\sin \frac{n\pi}{2}}$

Question No.	Questions
96.	The function $f(z) = \|z\|^2$ is (1) everywhere analytic (2) nowhere analytic (3) analytic at $z = 0$ (4) not defined at $z = 0$
97.	If $f(z) = u(x, y) + i\,v(x, y)$ is analytic, then $f'(z) =$ (1) $\frac{\partial u}{\partial x} - i\frac{\partial u}{\partial y}$ (2) $\frac{\partial u}{\partial x} - i\frac{\partial v}{\partial x}$ (3) $\frac{\partial u}{\partial y} + i\frac{\partial v}{\partial x}$ (4) $\frac{\partial u}{\partial y} - i\frac{\partial v}{\partial x}$
98.	Fixed point of the mapping $w = \frac{3z-4}{z-1}$ is (1) $z = 2$ (2) $z = 4$ (3) $z = 3$ (4) $z = 1$
99.	If V is the vector space of all polynomials of degree $\leq n$ over R, then dim V is (1) $n - 1$ (2) n (3) $n + 1$ (4) n^2
100.	A bijective linear transformation is called (1) monomorphism (2) homomorphism (3) isomorphism (4) epimorphism

Sr. No. 11223

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