CUET PG MATHEMATICS 2025
(IFAS SOLVED PAPER)

Q.1 The value of the integral $\int_0^\infty \int_0^x x e^{\frac{-x^2}{y}}\, dy\, dx$ is:

1.1

2. $\frac{3}{2}$

3. 0

4. $\frac{1}{2}$

Q.2 Let V(F) be a finite dimensional vector space and T: V→ V be a linear transformation. Let R(T) denote the range of T and N (T) denote the null space of T. If rank $(T) = rank(T^2)$ the following are correct?

A. N(T) = R(T)

B. $N(T) = N(T^2)$

C. $N(T) \cap R\ (T) = \{0\}$

D. $R(T) = R(T^2)$

1. A, B and D only
2. A, B and C only
3. A, B, C and D
4. B, C and D only

Q.3 Let [x] be the greatest integer function, where x is a real number, then $\int_0^1 \int_0^1 \int_0^1 ([x] + [y] + [y])\, dx\, dy\, dz =$

1. 0

2. $\frac{1}{3}$

3. 1

4. 3

Q.4 If 'a' is an imaginary cube root of unity, then $(1 - a + a^2)^5 + (1 + a - a^2)^5$ is equal to:

1. 4
2. 5
3. 32
4. 16

Q.5 For the given linear programming problem,

Minimum $Z = 6x + 10y$

subject to the constraints

$x \geq 6;\ y \geq 2;\ 2x + y \geq 10;\ x, y \geq 0,$

the redundant constraints are:

1. $x \geq 6, 2x + y \geq 10$
2. $2x + y \geq 10$
3. $x \geq 6, y \geq 2, x \geq 0, y \geq 0$

4. $y \geq 2, x \geq 0$

Q.6 The solution of the differential equation $(xy^3 + y)dx + (2x^2y^2 + 2x + 2y^4)dy = 0$

1. $3x^2 + 6y^5x - 2y^6 + C$, where C is an arbitrary constant
2. $3xy^4 + 3xy^2 + y^6 + C$, where C is an arbitrary constar
3. $6xy^2 - 2y^4x + x + C$, where C is an arbitrary constant
4. $3x^2y^4 + 6xy^2 + 2y^6 + C$, where C is an arbitrary const

Q.7 The locus of point z which satisfies $arg\left(\frac{z-1}{z+1}\right) = \frac{\pi}{3}$ is:

1. $x^2 + y^2 - 2y + 1 = 0$
2. $3x^2 + 3y^2 + 10x + 3 \geq 0$
3. $3x^2 + 3y^2 + 10x + 3 = 0$
4. $x^2 + y^2 - \frac{2}{\sqrt{3}}y - 1 = 0$

Q.8 If, $u - y^3 - 3x^2y$ be a harmonic function then its corresponding analytic function f(z), where z=x + iy, is:

1. $f(z) = z^2 + C$; where C is an arbitrary constant
2. $f(z) = i(z^2 + C)$; where C is an arbitrary constant
3. $f(z) = z^3 + C$; where C is an arbitrary constant
4. $f(z) = i(z^3 + C)$; where C is an arbitrary constant

Q.9 If p is a prime number and O(G) denotes the order of a group G and p|O(G), then group G has an element of order p. Then, this is a statement of

1. Lagrange's Theorem
2. Sylow's Theorem
3. Euler's Theorem
4. Cauchy's Theorem

Q.10 Which of the following set of vectors forms the basis for $\mathbb{R}^3$?

1. $S = \{(1,1,1), (1,0,1)\}$
2. $S = \{(1,1,1), (1,2,3), (2,-1,1)\}$
3. $S = \{(1,2,3), (1,3,5), (1,0,1), (2,3,0)\}$
4. $S = \{(1,1,2), (1,2,5), (5,3,4)\}$

Q.11 For any Linear Programming Problem (LPP), choose the correct statement:

A. There exists only finite number of basic feasible solutions to LPP

B. Any convex combination of k-different optimum solution to a LPP is again an optimum solution to the problem

C. If a LPP has feasible solution, then it also has a basic feasible solution

D. A basic solution to $AX = b$ is degenerate if one or more of the basic variables vanish

1. A, B and C only

2. A, C and D only
3. A, B and D only
4. A, B, C and D

Q.12 Which of the following forms a linear transformation:
1. $T: \mathbb{R}^3 \to \mathbb{R}, T(x,y) = xy$
2. $T: \mathbb{R}^2 \to \mathbb{R}^3, T(x,y) = (x+1, 2y, x+y)$
3. $T: \mathbb{R}^2 \to \mathbb{R}^3, T(x,y,z) - (|x|, 0)$
4. $T: \mathbb{R}^2 \to \mathbb{R}^2, T(x,y) = (x+y, x)$

Q.13 The value of the integral $\int\int_R (x+y)\, dydx$ in the region R bounded by $x = 0, x = 2, y = x, y = x + 2$, is
1. 3
2. 8
3. 12
4. 16

Q.14 If $\vec{F} = x^2\hat{\imath} + z\hat{\jmath} + yz\hat{k}, for\ (x,y,z) \in \mathbb{R}^3$, then $\iint_S \vec{F}.\overrightarrow{dS}$, where S is the surface of the cube formed by $x = \pm 1, y = \pm 1, z = \pm 1$, is
1. 24
2. 6
3. 1
4. 0

Q.15 A ring (R, +,), where all elements are idempotent is always:
1. a commutative ring
2. not an integral domain.
3. a field
4. an integral domain with unity

Q.16 The solution of the differential equation $xdy - ydx = (x^2 + y^2)dx$, is
1. $y = tan\ (x + c)$; where c is an arbitrary constant
2. $x - y\ tan\ (x + c)$; where c is an arbitrary constant
3. $y = x \tan^{-1}(y + c)$; where c is an arbitrary constant
4. $y = x\ tan\ (x + c)$; where c is an arbitrary constant

Q.17 If $\overrightarrow{F}$ be the force and C is a non-closed are, then $\int_C \overrightarrow{F}.\overrightarrow{dr}$ represents:
1. Flux
2. Circulation
3. Work done

4. Conservative field.

Q.18 Which of the following statement is true:
1. Continuous image of a connected set is connected
2. The union of two connected sets, having non-empty intersection, may not be a connected set
3. The real line R. is not connected
4. A non-empty subset X of $\mathbb{R}$ is not connected if X is an interval or a singleton set

Q.19 The number of maximum basic feasible solution of the system of equations AX=b, where A is $m \times n$ matrix, b is $n \times 1$ column matrix and rank of A is $\rho(4) = m$, is:
1. $m + n$
2.$m - n$
3. mn
4. n_{c_m}

Q.20 Let $\mathrm{m}, n \in N$ such that mn and $P_{m\times n}(\mathbb{R})$ and $Q_{n\times m}(\mathbb{R})$ are matrices over real numbers and let $\rho(V)$ denotes the rank of the matrix V. Then, which of the following are NOT possible.
A. $\rho(PQ) = n$
B. $\rho(QP) = m$
C. $\rho(PQ) = m$
D. $\rho(QP) = [(m + n/2)]$, where [ ] is the greatest integer function
1. A and D only
2. B and C only
3. A, C and D only
4. A, B and C only

Q.21The value of the double integral $\iint_R e^{x^2} dxdy$, where R is a region given by $2y \leq x \leq 2$ and $0 \leq y \leq 1$, is:
1. $(e^4 - 1)$
2. $\frac{1}{4}(e^4 - 1)$
3. $\frac{1}{4}(e^4 + 1)$
4. $\frac{1}{2}(e^4 - 1)$

Q.22 The given series $1 - \frac{1}{2^p} + \frac{1}{3^p} - \frac{1}{4^p} \ldots. (p > 0)$ is conditionally convergent, if 'p' lies in the interval:
1. (0, 1]
2. [0, 1]
3. $(1, \infty)$
4. $[1, \infty)$

Q.23 The value of $\int\iint_R \frac{dx\,dy\,dz}{x^2+y^2+z^2}$,where $E: x^2+y^2+z^2=a^2$, is

1. $\pi\alpha$
2. $2\pi\alpha$
3. $4\pi\alpha$
4. $8\pi\alpha$

Q.24 Which of the following statements are true for group of permutations?

A. Every permutation of a finite set can be written as a cycle or a product of disjoint cycles

B. The order of a permutation of a finite set written in a disjoint cycle form is the least common multiple of the lengths of the cycles

C. If A_n, is a group of even permutation of n-symbol $(n > 1)$, then the order of A_n, is n!

D. The pair of disjoint cycles commute

1. A, B and D only
2. A, B and C only
3. A, B, C and D.
4. B, C and D only

Q.25 If C is a triangle with vertices (0, 0), (1, 0) and (1,1) which are oriented counter clockwise, then $\int_C 2xydx + (x^2+2x)dy$ is equal to:

1. $\frac{1}{2}$
2. 1
3. $\frac{3}{2}$
4. 2

Q.26 Which one of the following mathematical structure forms a group?

1. $(\mathbb{N},*)$, where a*b=a for all $a, b \in \mathbb{N}$
2. $(\mathbb{Z},*)$, where a*b=a-b, for all $a, b \in \mathbb{Z}$
3. ($\mathbb{R}$,*), where a*b=a+b+1, for all a, b ∈ $\mathbb{R}$
4. ($\mathbb{R}$, *), where a*b=a|b|, for all a, b ∈ $\mathbb{R}$

Q.27 The system of linear equations x + y + z = 6, x + 2y + 5z = 10, 2x + 3y + λz = μ has a unique solution, if

1. $\lambda \neq 16, \mu = 6$
2. $\lambda = 6, \mu = 16$
3. $\lambda = 6, \mu \neq 16$
4. $\lambda \neq 6, \mu \in \mathbb{R}$

Q.28 Match List-I with List-II and choose the correct option:

LIST-I (Sat)	LIST-II (Supremum/Infimum)

A. $S = \{2,3,5,10\}$	I Inf S=2
B. $S = (1,2] \cup [3,8)$	II Sup S=5, Inf S =-5
C. $S = \{2, 2^2, 2^3, \dots, 2^4, \dots\}$	III Sup S=10, Inf S =2
D. $S = \{x \in \mathbb{Z}: x^2 \leq 25\}$	IV Sup S=8, Inf S =1

1. A-I, B-II, C-III, D-IV
2. A-I, B-III, C-II, D-IV
3. A-I, B-II, C-IV, D-III
4. A-III, B-IV, C-I, D-II

Q.29 Let $f: \mathbb{R} \times \mathbb{R} \to \mathbb{R}$ be defined as $f(x,y) = \begin{cases} \frac{x}{\sqrt{x^2+y^2}}; & x \neq 0, y \neq 0 \\ 1; & x = 0, y = 0 \end{cases}$ following statement is true?

1. $\lim_{(x,y)\to(0,0)} f(x,y)$ does not exist
2. $f(x,y)$ is continuous but not differentiable
3. $f(x,y)$ is differentiable function
4. $f(x,y)$ have removable discontinuity

Q.30 Find the residue of (67+89+90 +87) (mod11)

1. 3
2. 0
3. 2
4. 1

Q.31 If U and Ware distinct 4- dimensional subspaces of a vector space V of dimension 6, then the possible dimensions of $U \cap W$ is:

1. 1 or 2
2. exactly 4
3. 3 or 4
4. 2 or 3

Q.32 If $v = \sin^{-1}\left(\frac{x^{\frac{1}{3}}+y^{\frac{1}{3}}}{x^{\frac{1}{2}}+y^{\frac{1}{2}}}\right)$, then $\frac{\partial v}{\partial x} + \frac{\partial v}{\partial y}$ is equal to :

1. $\frac{12}{\tan v}$
2. $\frac{1}{12}\tan v$
3. $-\frac{1}{12}\tan v$
4. $\frac{-12}{\tan v}$

Q.33 If $\vec{F}$ is a vector point function and ϕ is a scalar point function, then match List-I with List-II and choose the correct option:

LIST-I	LIST-II

A div (grad ϕ)	I $\frac{1}{2}\nabla\left\|\vec{f}\right\|^2 - (\vec{f}.\nabla)\vec{f}$
B curl (grad ϕ)	II grad$(div\ \vec{f}) - \nabla^2\vec{f}$
C $\vec{f} \times curl\ \vec{f}$	III $\vec{0}$
D $curl(curl\ \vec{f})$	IV ∇.∇ ϕ

1. A-I. B-II, C-III, D-IV
2. A-IV, B-III, C-II, D.I
3. A-I, B-II, C-IV, D-III
4. A-IV, B-III, C-I, D-II

Q.34 The orthogonal trajectory of the cardioid $r = a(1 - cos\theta)$, where 'a' is an arbitrary constant is:
1. $\gamma = b(l + cos\theta)$, where b is an arbitrary constant
2. $r = b(1 - cos\theta)$, where b is an arbitrary constant
3. $r = b(1 + sin\theta)$, where b is an arbitrary constant
4. $r = b(1 - sin\theta)$, where b is an arbitrary constant

Q.35 The solution of the differential equation $(x^2 - 4xy - 2y^2)dx + (y^2 - 4xy - 2x^2)dy = 0$, is
1. $x^2 + 6x^2y - 6xy^2 - y^3 + C$, where C is an arbitrary constant
2. $x^3 - 6x^2y - 6xy^2 + y^3 + C$, where C is an arbitrary constant
3. $x^2 - 6x^2y - 6xy^2 - y^3 + C$, where C is an arbitrary constant
4. $x^3 + 6x^2y + 6xy^2 + y^3 + C$, where C is an arbitrary constant

Q.36 Let $f(x)$ be a real valued function defined for all $x \in \mathbb{R}$., such that
$|f(x) - f(y)| \leq (x - y)^2, \forall, x, y, \in \mathbb{R}$, then
1. $f(x)$ is nowhere differentiable
2. $f(x)$ is a constant function
3. $f(x)$ is strictly increasing function in the interval [0,1]
4. $f(x)$ is strictly increasing function for all $x \in \mathbb{R}$

Q.37 The value of $\int_0^{1+i}(x^2 - iy)\,dz$, along the path $y = x^2$ is:
1. $\frac{5}{6} - \frac{1}{6}i$
2. $\frac{5}{6} + \frac{1}{6}i$
3. $\frac{1}{6} - \frac{5}{6}i$
4. $\frac{1}{6} + \frac{5}{6}i$

Q.38 If $A = \begin{bmatrix} 2 & 4 & 1 \\ 0 & 2 & -1 \\ 0 & 0 & 1 \end{bmatrix}$ satisfies $A^3 + \mu A^2 - \lambda A - 4I_3 = 0$ then the respective values of λ and μ are:
1. 5, 8
2. 8, 5

3. 5, 8

4. -8, 5

Q.39 Let R be the planar region bounded by the lines $x = 0. y = 0$ and the curve $x^2 + y^2 = 4$ in the first quadrant. Let C be the boundary of R. oriented counter clockwise. Then, the value of $\oint_C x(1-y)dx + (x^2 - y^2)dy$ is equal to:

1. 0
2. 2
3. 4
4. 8

Q.40 If. $I_n = \int_{-x}^{\pi} \frac{cos(\pi x)}{1+2^x} dx, n = 0, 1, 2, \ldots$, then which of the following are correct:

A. $I_n = I_{n+2}$, for n = 0,1,2,…

B. $I_n = 0$, for all n = 0,1,2,…

C. $\sum_{\pi=1}^{10} I_n = 2^{10}$

D. $\sum_{\pi=1}^{10} I_n = 0$

1. A, B and D only
2. A and C only
3. B and D only
4. A, C and D only

Q41 If $f(z) = (x^2 - y^2 - 2xy) + (x^2 - y^2 + 2xy)$ and $f'(x) = cz$, where c is a complex constant, then $|c|$ is equals to:

1. $\sqrt{3}$
2. $\sqrt{2}$
3. $3\sqrt{3}$
4. $2\sqrt{2}$

Q42 The value of $\int_0^x \frac{x\, sinx}{1+\cos^2 x} dx$ is:

1. $\frac{\pi^2}{2}$
2. $\frac{\pi^2}{4}$
3. $\frac{\pi^2}{6}$
4. $\frac{\pi^2}{8}$

Q.43 A complete solution of $y'' + a_1 y' + a_2 y = 0\ is\ y = b_1 e^{-x} + b_2 e^{-3x}$, where a_1, a_2, b_1 and by are constants, then the respective values of a_1 and a_2 are:

1. 3, 3
2. 3, 4

3. 4, 3
4. 4, 4

Q.44 Match List-I with List-II and choose the correct option:

LIST-I (Infinite Series)	LIST-II (Nature of Series)
A 12-7-3-2+12-7-3-2+.....	I convergent
B $1-\frac{1}{2}+\frac{1}{3}-\frac{1}{4}+\cdots$	II oscillatory
C $\sum_{n=0}^{\infty}\{(n^3+1)^{1/3}-n\}$	III divergent
D $\sum_{n=0}^{\infty}\frac{1}{n\left(1+\frac{1}{n}\right)}$	IV conditionally convergent

1. A-1, B-II, C-III, D.IV
2. A-II, B-I, C-III, D-IV
3. A-II, B-IV, C-III, D-I
4. A-II, B-IV, C-I, D-III

Q.45 Let $f(x) = |x| + |x-1| + |x+1|$ be a function defined on $\mathbb{R}$., then $f(x)$ is:
1. differentiable for all $x \in \mathbb{R}$.
2. differentiable for all $x \in \mathbb{R}$ other than $x - 1,0,1$
3. differentiable only for $x = -1,0,1$
4. not differentiable at any real point

Q.46 If G is a cyclic group of order 12, then the order of Aut(G) is:
1. 1
2. 5
3. 4
4. 77

Q.47 The value of v3 for which the vector $\vec{v} = e^y sin\, x\hat{\imath} + e^y cosx\hat{\jmath} + v_3\hat{k}$ is solenoidal, is:
1.2 $ze^y cosx$
2.$-2ze^y cosx$
3. $-2e^y cosx$
4. $2e^y cosx$

Q.48 Let A and B be two symmetric matrices of same order, then which of the following statement are correct:
A. AB is symmetric
B. A+B is symmetric
C.$A^T B - AB^T$
1). $BA - (AB)^T$
1. A, B and D only

2. A, B and C only

3. A, B, C and D

4. B, C and D only

Q.49 Which of the following function is discontinuous at every point of $\mathbb{R}$?

1, if x is rational

1. $f(x) = \begin{cases} 1, & \text{if x is irrational} \\ -1, & \text{if x is irrational'} \end{cases}$

2. $f(x) = \begin{cases} x, & \text{if x is irrational} \\ 0, & \text{if x is irrational} \end{cases}$

3. $f(x) = \begin{cases} x, & \text{if x is irrational} \\ 2x, & \text{if x is irrational} \end{cases}$

4. $f(x) = \begin{cases} x, & \text{if x is irrational} \\ -x, & \text{if x is irrational} \end{cases}$

Q.50 The value of $\lim_{n\to\infty}\left(\sqrt{4n^2+n}-2n\right)$is:

1. $\frac{1}{2}$

2.0

1. $\frac{1}{4}$

4.1

Q.51 The function $f(z) = |z|^2$ is differentiable, at

1. $z = 0$

2. for all $z \in \mathbb{C}$

3. no $z \in \mathbb{C}$

4. $z \neq 0$

Q52 In Green's theorem, $\int_C (x^2yx + x^2dy) = \iint_R f\,(x,y)dxdy$, where C is the boundary described counter clockwise of the triangle with vertices (0, 0), (1, 0), (1, 1) and R is the region bounded by a simple closed curve C in the x-y plane, then f(x, y) is equal to:

1. $x - x^2$

2. $2x - x^2$

3. $y - x^2$

4. $2y - x^2$

Q53 Which of the following are correct:

A. Every infinite bounded set of real number has a limit point

B. The set $S = \{x: 0 < x \leq 1, x \in \mathbb{R}\}$ is a closed set

C. The set of whole real numbers is open as well closed set

D. The set $S = \left\{1, -1, \frac{1}{2}, \frac{1}{-2}, \frac{1}{3}, \frac{1}{-3} \dots.\right\}$ is neither open set nor closed set

1. A. B and C Only

2. A. C and D Only

3. B, C and D Only

4. D Only

Q54 Match List-I with List-II and choose the correct option:

LIST-I (Differential)	LIST-II (Order/degree/nature)
A. $\left\{y + x\left(\frac{dy}{dx}\right)^2\right\}^{5/3} = x\left(\frac{d^2y}{dx^2}\right)$	I. order=2 Degree=2 Non-linear
B. $\left(\frac{d^2y}{dx^2}\right)^{1/3} = \left(y + \frac{dy}{dx}\right)^{1/2}$	II. order=1 Degree=-1 linear
C. $y = x\left(\frac{dy}{dx}\right) + \left[1 + \left(\frac{dy}{dx}\right)^2\right]^{1/2}$	III. order=1 Degree=3 Non-linear
D. $(2 + x^3)\left(\frac{dy}{dx}\right) = \left(e^{\sin x}\right)^{1/2} + y$	IV. order=1 Degree=2 Non-linear

1. A-III, B-I, C-II.D-IV

2. A-I, B-III, C-II, D-IV

3. A-III, B-I, C-IV, D-II

4. A-III, B-IV, C-I, D-II

Q. 55 If $x \epsilon \mathbb{R}$ and a particular integral (P.L) of $(D^2 - 2D + 4)y = e^x \sin x$ is $\frac{1}{2}e^x f(x)$, then $f(x)$ is

1. an increasing function on $[0, x]$

2. a decreasing function on $[0, \pi]$

3. a continuous function on $[-2\pi, 2\pi]$

4. not differentiable function at $x = 0$

Q.56 Let D be the region bounded by a closed cylinder $x^2 + y^2 = 16, z = 0$ and $z = 4$, then the value of $\iint\int_D (\nabla.\vec{V})dV$, where $\vec{V} = 3x^2\hat{\imath} + 3y^2\hat{\jmath} + z\hat{k}$, is:

1. 64π

2. 128π

3. $\frac{64\pi}{3}$

4. 48π

Q57 The solution of the differential equation

$\frac{xdy - ydx}{xdx + ydy} = \sqrt{x^2 + y^2}$, is:

A. $\frac{x}{y} = \sin^{-1}\sqrt{1 - x^2 + C}$; where C is a constant

B. $\sqrt{x^2 + y^2} = \tan^{-1}\frac{y}{x} + C$; where C is a constant

C. $1 + x^2 \tan^{-1}(y) + C$; where C is a constant

D. $y = x\, tan\, an(\sqrt{x^2 + y^2}) + C$; where C is a constant

1. B and D only
2. A, B and D only
3. C and D only
4. A, B, C and D

Q58 Let A be a 2×2 matrix with det $(A) = 4$ and $trace(A) = 5$. Then the value of trace(A^2) is:

1.10

2. 13

3. 17

4. 18

Q.59 Which of the following are subspaces of vector space $\mathbb{R}^3$:

A. $\{(x, y, z): x + y = 0\}$

B. $\{(x, y, z): x - y = 0\}$

C. $\{(x, y, z): x + y = 1\}$

D. $\{(x, y, z): x - y = 1\}$

1. A and C only
2. A, B and C only
3. A and B only
4. A and D only

Q.60 Match List-I with List-II and choose the correct option:

LIST-I (Function)	LIST-II (Value)
A. $\int_\gamma \frac{1}{z-a} dz$, where $\gamma: \lvert z - a \rvert = r, r > 0$	I. $-4 + 2i\pi$
B. $\int_\gamma \frac{z+2}{z} dz$, where $\gamma: z = 2e^{it}, 0 \le t \le \pi$	II. $2i\pi(e^4 - e^2)$
C. $\int_\gamma \frac{e^{2z}}{(z-1)(z-2)} dz$, where $\gamma: \lvert z \rvert = 3$	III. $2i\pi$
D. $\int_\gamma \frac{z^2-z+1}{2(z-2)} dz$, where $\gamma: \lvert z \rvert = 2$	IV. $i\pi$

1. A-I, B-II, C-III, D-IV
2. A-I, B-III, C-II, D-IV
3. A-III, B-I, C-II, D-IV
4. A-III, B-IV, C-I, D-II

Q61 Consider the function $f(x, y) = x^2 + xy^2 + y^4$, then which of the following statement is correct:

1. $f(x, y)$ has neither a maxima nor a minima at the origin (0,0)

2. $f(x, y)$ has a minimum value at the origin (0,0)
3. origin (0,0) is a saddle point of $f(x, y)$
4. $f(x, y)$ has a maximum value at the origin (0, 0)

Q 62 If $S = \lim_{n\to\infty} \left(1 - \frac{1}{2^2}\right)\left(1 - \frac{1}{3^2}\right) \dots \left(1 - \frac{1}{n^2}\right)$ then S is equal to:

1. 0
2. $\frac{1}{4}$
2. $\frac{1}{2}$
4. 1

Q 63 If p is a prime number and a group G is of the order p^2, then G is:

1. trivial
2. non-abelian
3. non-cyclic
4. either cyclic of order p^2 or isomorphic to the product of two cyclic groups of order p each

Q 64 Match List-I with List-II and choose the correct option:

LIST-I	LIST-II
A. The solution of an ordinary differential equation of order 'n' has	I. singular solution
B. The solution of a differential equation which contains no arbitrary constant is	II. complete primitive
C. The solution of a differential equation which is not obtained from the general solution is	III. arbitrary constants
D. The solution of a differential equation containing as many as arbitrary constants as the order of a differential equation is	IV. particular solution

1. A-I, B-II, C-III, D-IV
2. A-I, B-III, C-II, D-IV
3. A-I, B-II, C-IV, D-III
4. A-III, B-IV, C-ID-II

Q 65 Match List-I with List-II and choose the correct option:

LIST-I (Differential Equation)	LIST-II (Integrating Factor)
A. $(y - y^2)dx + xdy = 0$	I. $\frac{1}{\tan x}$
B. $(xy + y + e^{-x})dx + (x + e^{-x})dy = 0$	II. $\frac{1}{x^2y^2}$
C. $sin2x \frac{dy}{dx} = 2y + 2cos2x$	III. e^x
D. $(2xy + y)dx + (2y^3 - x)dy = 0$	IV. $\frac{1}{y^2}$

1. A-I, B-II, C-IV, D-III
2. A-II, B-III, C-ID-IV
3. A-I, B-II, C-III, D-IV
4. A-III, B-IV, C-I, D-II

Q 66 Let f be a continuous function on $\mathbb{R}$ and $F(x) = \int_{x-2}^{x+2} f(t)dt$, then $F'(x)$ is
1. $f(x-2) - f(x+2)$
2. $f(x-2)$
3. $f(x+2)$
4. $f(x+2) - f(x-2)$

Q 67 Consider the following:
Let $f(z)$ be a complex valued function defined on a subset $S \subset \mathbb{C}$ of complex numbers. Then which of the following are correct?
A. The order of a zero of a polynomial equals to the order of its first non-vanishing derivative at that zero of the polynomial
B. Zeros of non-zero analytic function are isolated
C. Zeros of $f(z)$ are obtained by equating the numerator to zero if there is no common factor in the numerator and the denominator of $f(z)$
D. Limit points of zeros of an analytic function is an isolated essential singularity
1. A, B and D only
2. A, B and C only
3. A, B, C and D
4. B, C and D only

Q 68 Maximize $Z = 2x + 3y$.
subject to the constraints:
$x + y \leq 2$
$2x + y \leq 3$
$x, y \geq 0$
1. 5
2. 6
3. 7
4. 10

Q 69 If the vectors $\left\{\begin{bmatrix} 1 \\ -1 \\ 3 \end{bmatrix}, \begin{bmatrix} 1 \\ 2 \\ -3 \end{bmatrix}, \begin{bmatrix} p \\ 0 \\ 1 \end{bmatrix}\right\}$ are linearly dependent, then the value of p is:
1. 2
2. 4
3. 1
4. 6

Q 70 The integral domain of which cardinality is not possible:

A. 5

B. 6

C. 7

D. 10

1. A and B only
2. A and C only
3. B and D only
4. C and D only

Q 71 If C is the positively oriented circle represented by $|z| = 2$,then $\int_C \frac{e^{2z}}{z^4} dz$ is

1. $\frac{2\pi i}{3}$
2. πi
3. $\frac{4\pi i}{3}$
4. $\frac{8\pi i}{3}$

Q.72 The value of integral $\oint_C \frac{z^3 - z}{(z-z_0)^3} dz$,

where z_0 is outside the closed curve C described in the positive sense, is

1. 1
2. 0
3. $\frac{-8\pi i}{3} e^{-2}$
4. $\frac{2\pi i}{3} e^2$

Q.73 Match List-I with List-II and choose the correct option:

LIST-I (Function)	LIST-II (Expansion)
A. $\log(1-x)$	I. $1 + \frac{1}{6} + \frac{3}{40} + \frac{15}{336} + - - -$
B. $\sin^{-1} x$	II. $1 - \frac{1}{2} + \frac{1}{3} - \frac{1}{4} + - - -$
C. $\log 2$	III. $x + \frac{1}{2} + \frac{x^3}{3} + \frac{1.3}{2.4}\frac{x^5}{5} + \frac{1.3}{2.4}\frac{x^7}{7} + \cdots, -1 < x \le 1$
D. $\frac{\pi}{2}$	IV. $-x - \frac{x^2}{2} - \frac{x^3}{3} - \cdots, -1 < x \le 1$

1. A-IV, B-III, C-II, D-I
2. A-III, B-IV, C-I,D-II
3. A-III, B-IV, C-II, D-I
4. A-I, B-II, C-III, D-IV

Q.74 Which of the following are correct?

A. A set $S = \{(x, y)|xy \le 1: x, y \in \mathbb{R}\}$ is a convex set

B. A set $S = \{(x, y)|x^2 + 4y^2 \leq 12: x, y \in \mathbb{R}\}$ is a convex set
C. A set $S = \{(x, y)|y^2 - 4x \leq 0: x, y \in \mathbb{R}\}$ is a convex set
D. A set $S = \{(x, y)|x^2 + 4y^2 \geq 12: x, y \in \mathbb{R}\}$ is a convex set
1. B and C only
2. A, B and C only
3. A, B, C and D
4. B, C and D only

Q.75 For the function $f(x, y) = x^3 + y^3 - 3x - 12y + 12$, which of the following are correct:
A. minima at (1, 2)
B. maxima at (-1,-2)
C. neither a maxima nor a minima at (1,-2) and (-1, 2)
D. the saddle points are (-1, 2) and (1,-2)
1. A. B and D only
2. A, B and C only
3. A, B, C and D
4. B, C and D only