

Section A: Objective Type Questions**Q1. Choose the appropriate Answer:** (8x1.5=12)

- i. The function ' e^x ' is a
 - A even function B exponential function
 - C experimental function D all the above
- ii. Every derivable function is continuous.
 - A true B false
 - C not necessarily D cannot say
- iii. The partial differential with respect to x is represented by
 - A $\frac{d}{dx}$ B $\frac{\partial}{\partial x}$
 - C both A & B D none of the above
- iv. $\int \frac{1}{x-a} dx =$
 - A $\log x + c$ B $\log(x-a) + c$
 - C $\log(x-a+c)$ D none of the above
- v. The order of a differential equation is same as its degree.
 - A always B sometimes
 - C cannot say D none of the above
- vi. $\frac{dy}{dx} = f(x, y)$ is a
 - A homogeneous differential equation B heterogeneous differential equation
 - C either A or B D none of the above
- vii. The Trace of square matrix A is the _____ of elements on the main diagonal of A.
 - A sum B difference
 - C multiple D none of the above
- viii. The diagonal elements of a skew-symmetric matrix are
 - A equal to 1 B equal to 0
 - C equal to -1 D cannot say

Q2: Answer all the Questions (8 x 4 =32)

- i. Define even and odd functions. Give two examples of each.
- ii. Describe various types of discontinuities of a function.
- iii. Verify that the differential equation $(1 - 2xy - y^2)dx - (x + y)^2 dy = 0$ is exact.
- iv. Find the value of $\int_0^1 \frac{1}{1+x^2} dx$ by making a proper substitution.
- v. Solve the differential equation $\frac{dy}{dx} = xy + x + y + 1$.
- vi. Solve the differential equation $y' + 2xy = x$.
- vii. Obtain AB, where $A = \begin{bmatrix} 1 & -2 \\ 3 & -1 \end{bmatrix}$ and $B = \begin{bmatrix} 5 & -1 \\ -2 & 3 \end{bmatrix}$.
- viii. Define symmetric and skew-symmetric matrices. Give an example of each.

Section – C: Descriptive Type Questions (Medium Type)**Answer all the questions:** (4 x 7=28)**Q 3.** Identify the point of discontinuity of the function $f(x) = \frac{(x-2)}{(x-4)}$.

OR

Obtain the derivative of $y = (ax + b)^n$.**Q 4.** If $z = x\left(\frac{x-a}{y-b}\right)$, find $\frac{\partial z}{\partial x}$, $\frac{\partial z}{\partial y}$.

OR

Solve the integral $\int x^3 e^{-x} dx$.**Q 5.** Solve the differential equation

$$\left(1 + e^{x/y}\right)dx + e^{x/y}\left(1 - \frac{x}{y}\right)dy = 0.$$

OR

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Find the general solution of $y'' + 2y' + 6y = 0$.

Q6. State and prove reversal law of transposes.

OR

Find the Determinant of the matrix $A = \begin{bmatrix} -1 & 0 & 3 \\ 1 & -1 & 1 \\ 0 & 3 & 2 \end{bmatrix}$.

Section – D: Descriptive Type Questions (Long Type)

Answer any two of the following: (2 x 14=28)

Q 7. Find the value of k such that the function $f(x) = \frac{x^2+x+6}{x^2+kx-3}$ is not continuous at $x=3$.

Q 8. If $z = x^3y - xy^3$. Find the total derivative $\frac{dz}{dx}$.

Q 9. Solve $(x^2 + y^2)dx + 2xydy = 0$.

Q 10. Find the inverse of the matrix $A = \begin{bmatrix} -1 & 0 & 3 \\ 1 & -1 & 1 \\ 0 & 3 & -2 \end{bmatrix}$