

Hi-Tech Institute Ghaziabad
Model paper-1
Branch/Section:ME//EE/CS

Subject Name: APPLIED MATHS-3
SEMESTER: 3rd - SEM-2023-2024

Max. Marks:50
Time: 1:30 Hrs.

Faculty Name: ISTAKBAL KHAN

Instructions:

- ❖ Be precise to your answer.
- ❖ Assume missing data suitably, if any

Note: All questions are compulsory सभी प्रश्न अनिवार्य हैं।

QUESTION NO.-1

Answer any Two parts of the following:

[5 x 2 = 10]

A.	यदि Matrix $A = \begin{bmatrix} 1 & 1 & 0 \\ 0 & 1 & 1 \\ 0 & 0 & 1 \end{bmatrix}$ then find A^{-1}	5
B.	Find rank of a Matrix $A = \begin{bmatrix} 0 & 2 & 3 \\ 0 & 4 & 6 \\ 0 & 6 & 9 \end{bmatrix}$	5
C.	यदि $A = \begin{bmatrix} 1 & 0 \\ 0 & 0 \end{bmatrix}$, $B = \begin{bmatrix} 0 & 1 \\ 0 & 0 \end{bmatrix}$ Find AB and BA .	5

QUESTION NO.-2

Answer any Two parts of the following:

[5 x 2 = 10]

A.	यदि $u = x^2 \tan^{-1}\left(\frac{y}{x}\right) - y^2 \tan^{-1}\left(\frac{x}{y}\right)$ then Prove that $\frac{\partial^2 u}{\partial x \partial y} = \frac{x^2 - y^2}{x^2 + y^2}$	5
B.	अवकल समीकरण $\frac{d^2 y}{dx^2} - 5 \frac{dy}{dx} + 6y = e^{4x}$ (Solve differential equation)	5
C.	Find Degree and order of $\frac{d^2 y}{dx^2} + \left[1 + \left(\frac{dy}{dx}\right)^2\right]^{\frac{3}{2}}$	5

QUESTION NO.-3

Answer any Two parts of the following:

[5 x 2 = 10]

A.	Find the solution: $(D^2 - 2D + 1)y = x \sin x$	5
B.	Solve $\frac{dy}{dx} = e^{x-y} + x^2 e^y$	5
C.	Find General equation of a Sphere, Also find its Centre and Radius (गोले का व्यापक समीकरण, इसका केन्द्र और त्रिज्या लिखिये?)	5

QUESTION NO.-4

[5 x 2 = 10]

Answer any Two parts of the following:

A.	यदि $z = f\left(\frac{y}{x}\right)$ तो $x \frac{\partial z}{\partial x} + y \frac{\partial z}{\partial y}$ का मान (value) बताइये ?	5
B.	यदि $\vec{a} = t\hat{i} - t^2\hat{j} + (t-1)\hat{k}$ $\vec{b} = 2t^2\hat{i} + 6t\hat{k}$ then Prove that $\int_0^1 (\vec{a} \times \vec{b}) dt = -\frac{3}{2}\hat{i} - \frac{13}{6}\hat{j} + \frac{2}{5}\hat{k}$	5
C.	यदि $f = \hat{i}(x+y+1) + \hat{j} + \hat{k}(-x-y)$ then Prove that $f \cdot \text{Curl } f = 0$	5

QUESTION NO.-5

[5 x 2 = 10]

Answer any Two parts of the following:

A.	Solve: $\int_0^1 \int_0^2 (x+y) dx dy$ OR $(1-x) dy - (3+y) dx = 0$	5
B.	Verify Cayley Hamilton Theorem For the matrix $A = \begin{bmatrix} 2 & -1 & 1 \\ 1 & 2 & 1 \\ 1 & -1 & 2 \end{bmatrix}$	5
C.	यदि $u = a(x^2 + y^2)$ then find Jacobian u and v with respect $v = b(x^2 - y^2)$ x and y .	5