Seat No. / Enrolment No.:

GUJARAT TECHNOLOGICAL UNIVERSITY

Diploma Engineering – SEMESTER – 2 (OLD) – EXAMINATION – Summer-2025

Subject Code: 4320001 **Date: 18-06-2025**

Subject Name: Applied Mathematics

Time: 10:30 AM TO 01:00 PM **Total Marks: 70**

Instructions:

1. **Attempt all questions.**
2. **Make Suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **Use of simple calculators and non-programmable scientific calculators are permitted.**
5. **English version is authentic.**

Q.1 Fill in the blanks using appropriate choice from the given options 14

(યોગ્ય વિકલ્પ પસંદ કરી ખાલીજગ્યા પૂરો)

1. $\begin{bmatrix}1 & 2\\3 & 4\end{bmatrix}+\begin{bmatrix}1 & -1\\1 & 3\end{bmatrix}=$ _____

$(a)\begin{bmatrix}1 & 2\\3 & 12\end{bmatrix}$ $(b)\begin{bmatrix}3 & 5\\7 & 7\end{bmatrix}$ $(c)\begin{bmatrix}2 & -1\\4 & 9\end{bmatrix}$ $(d)\begin{bmatrix}2 & 1\\4 & 7\end{bmatrix}$

૧. $\begin{bmatrix}1 & 2\\3 & 4\end{bmatrix}+\begin{bmatrix}1 & -1\\1 & 3\end{bmatrix}=$ _____

(અ)$\begin{bmatrix}1 & 2\\3 & 12\end{bmatrix}$ (બ)$\begin{bmatrix}3 & 5\\7 & 7\end{bmatrix}$ (ક)$\begin{bmatrix}2 & -1\\4 & 9\end{bmatrix}$ (ડ)$\begin{bmatrix}2 & 1\\4 & 7\end{bmatrix}$

2. $Order\ of\ the\ Matrix\ [0 \quad -4 \quad 2]\ \ is$ _____

$(a)2\times 2$ $(b)\ 1\times 1$ $(c)1\times 3$ $(d)3\times 1$

૨. શ્રેણિક $[0 \quad -4 \quad 2]$ની કક્ષા _____છે.

(અ) 2×2 (બ) 1×1 (ક)1×3 (ડ)3×1

3. $\frac{1}{2}\begin{bmatrix}-2 & 4 & 12\\8 & 7 & 9\end{bmatrix}=$ _____

$(a)\begin{bmatrix}-4 & 8 & 24\\16 & 14 & 18\end{bmatrix}$ $(b)\begin{bmatrix}-1 & 2 & 6\\4 & \frac{7}{2} & \frac{9}{2}\end{bmatrix}$ $(c)\begin{bmatrix}-4 & 16 & 24\\4 & \frac{7}{2} & \frac{9}{2}\end{bmatrix}$ $(d)None\ of\ these$

3. $\frac{1}{2}\begin{bmatrix}-2 & 4 & 12\\8 & 7 & 9\end{bmatrix}=$ _____

(અ)$\begin{bmatrix}-4 & 8 & 24\\16 & 14 & 18\end{bmatrix}$ (બ)$\begin{bmatrix}-1 & 2 & 6\\4 & \frac{7}{2} & \frac{9}{2}\end{bmatrix}$ (ક)$\begin{bmatrix}-4 & 16 & 24\\4 & \frac{7}{2} & \frac{9}{2}\end{bmatrix}$ (ડ)આમાંથી એકેય નહીં

4. $The\ Adjoint\ Matrix\ of\ Matrix\ A=\begin{bmatrix}1 & 2\\3 & -1\end{bmatrix}\ is$ _____

$(a)\begin{bmatrix}-1 & 2\\3 & 1\end{bmatrix}$ $(b)\begin{bmatrix}-1 & -3\\-2 & 1\end{bmatrix}$ $(c)\begin{bmatrix}1 & 3\\2 & -1\end{bmatrix}$ $(d)\begin{bmatrix}-1 & -2\\-3 & 1\end{bmatrix}$

૪. શ્રેણિક $A=\begin{bmatrix}1 & 2\\3 & -1\end{bmatrix}$ નો સહવયજ શ્રેણિક _____છે.

(અ)$\begin{bmatrix}-1 & 2\\3 & 1\end{bmatrix}$ (બ)$\begin{bmatrix}-1 & -3\\-2 & 1\end{bmatrix}$ (ક)$\begin{bmatrix}1 & 3\\2 & -1\end{bmatrix}$ (ડ)$\begin{bmatrix}-1 & -2\\-3 & 1\end{bmatrix}$

5. $f(x)=e^{4x}$ then $f'(0)=$ _____

(a) 1 (b) 0 (c) 4 (d) e^4

૫. જો $f(x)=e^{4x}$નો $f'(0)=$ _____

(અ) 1 (બ) 0 (ક) 4 (ડ) e^4

6.If y=log$(4x+3)$ then $\frac{dy}{dx}$ =_____

(a) $\frac{1}{4x+3}$ (b) $\frac{3}{4x+3}$ (c) $\frac{4}{4x+3}$ (d) 0

૬. જો y=log$(4x+3)$ તો $\frac{dy}{dx}$ =_____

(અ)$\frac{1}{4x+3}$ (બ) $\frac{3}{4x+3}$ (ક) $\frac{4}{4x+3}$ (ડ) 0

7. If y=x^5 then $\frac{d^5y}{dx^5}$ = _____

(a) 120 (b) $120x$ (c) 0 (d) 1

૭ .જો y=x^5તો $\frac{d^5y}{dx^5}$ = _____

(અ) 120 (બ) $120x$ (ક) 0 (ડ) 1

8. $\int 5x^4\,dx =$ _____ $+c$

$(a)20x^3(b)4x^3(c)x^5$ (d) $\frac{x^5}{5}$

૮. $\int 5x^4\,dx =$ _____ $+c$

(અ)$20x^3$(બ)$4x^3$(ક)x^5 (ડ) $\frac{x^5}{5}$

9.$\int_1^e \frac{1}{x}dx =$ _____

$(a)\frac{-1}{x^2}(b)$ 1 $(c)0$ $(d)\log x$

૯ $\int_1^e \frac{1}{x}dx =$ _____

(અ)$\frac{-1}{x^2}$(બ) 1 (ક)0 (ડ) $\log x$

10. $\int sec^2x\,dx =$ _____ $+c$

$(a)cosec\ x$ $(b)-cosec\ x$ $(c)tanx$ $(d)-\tan x$

૧૦. $\int sec^2x\,dx =$ _____ $+c$

(અ)$cosec\ x$ (બ) $-cosec\ x$ (ક)$tanx$ (ડ) $-\tan x$

11. The order and degree of the differential equation: $\left(\frac{d^3y}{dx^3}\right)^3+\left(\frac{d^2y}{dx^2}\right)^4+x\cos y=0$ is ____and ____.

(a) 3,3 (b) 2,4 (c) 3,4 (d) 4,1

૧૧ વિકલ સમીકરણ $\left(\frac{d^3y}{dx^3}\right)^3+\left(\frac{d^2y}{dx^2}\right)^4+x\cos y=0$ ની કક્ષા ____અને પરિમાણ ____છે.

(અ)3,3 (બ) 2,4 (ક) 3,4 (ડ) 4,1

12.The integrating factor of the differential equation $\frac{dy}{dx}+y=4x$ is ---

(a) x (b) e^x (c) $\log x$ (d)$\frac{1}{x}$

૧૨.વિકલ સમીકરણ $\frac{dy}{dx}+y=4x$નો સંકલયકારક અવયવ ---છે.

(અ) x (બ) e^x (ક) $\log x$ (ડ) $\frac{1}{x}$

13.The Mean of First Five even natural numbers is_____
(a)6 (b) 30 (c)15 (d) 12.5
૧૩. પ્રથમ પાંચ બેકી પ્રાકૃતિક સંખ્યાનો મધ્યક =_____
(અ)6 (બ)30 (ક)15 (ડ) 12.5

14. For n observations $x_1, x_2, x_3 \ldots\ldots x_n$ and Mean $\bar{x}$ standard deviation is _____
(a) $\frac{\sum(x_i-\bar{x})^2}{n}$ $(b)\sqrt{\frac{\sum(x_i-\bar{x})^2}{n}}$
(c) $\sqrt{\frac{\sum|x_i-\bar{x}|}{n}}$ (d) none of these
૧૪. n અવલોકનો $x_1, x_2, x_3 \ldots\ldots x_n$ અને મધ્યક $\bar{x}$ માટે પ્રમાણિત વિચલન _____થશે.
(અ) $\frac{\sum(x_i-\bar{x})^2}{n}$ (બ) $\sqrt{\frac{\sum(x_i-\bar{x})^2}{n}}$
(ક)$\sqrt{\frac{\sum|x_i-\bar{x}|}{n}}$ (ડ)આમાંથી એકેય નહીં

Q.2 (A) Attempt any two. (કોઈપણબેનાજવાબ આપો): 06

1. $For\ A=\begin{bmatrix}1&3&5\\-1&0&2\\4&3&6\end{bmatrix}\ and\ B=\begin{bmatrix}3&4&5\\5&4&3\\3&5&4\end{bmatrix}\ Find\ B+4A$

૧.શ્રેણીકો $A=\begin{bmatrix}1&3&5\\-1&0&2\\4&3&6\end{bmatrix}$ અને $B=\begin{bmatrix}3&4&5\\5&4&3\\3&5&4\end{bmatrix}$ માટે $B+4A$ મેળવો .

2.If A = $\begin{bmatrix}1&2\\0&1\end{bmatrix}\ and\ B=\begin{bmatrix}2&3\\-2&3\end{bmatrix}$ then verify that $(A+B)^T=A^T+B^T$

૨ .જો A = $\begin{bmatrix}1&2\\0&1\end{bmatrix}$ અને$B=\begin{bmatrix}2&3\\-2&3\end{bmatrix}$ હોય તો $(A+B)^T=A^T+B^T$ચકાસો

3. $solve:\ xdy+ydx=xydy$
૩.ઉકેલો : $xdy+ydx=xydy$

Q.2 (B) Attempt any two. (કોઈપણબેનાજવાબ આપો): 08

1.For $A=\begin{bmatrix}1&2&1\\3&2&3\\1&1&2\end{bmatrix}\ find\ A^{-1}$.

૧. $A=\begin{bmatrix}1&2&1\\3&2&3\\1&1&2\end{bmatrix}$ માટેA^{-1}શોધો.

2.If A = $\begin{bmatrix}2&1&2\\1&3&0\\4&1&2\end{bmatrix}$then find A^2.

૨.જો A = $\begin{bmatrix}2&1&2\\1&3&0\\4&1&2\end{bmatrix}$ તોA^2 શોધો.

3.Solve 3x+y = 9 and 2x-3y = -5 using matrices.
૩. શ્રેણિકની મદદથી સમીકરણ સંહતિ 3x+y = 9 **અને** 2x-3y = -5 **ઉકેલો.**

Q.3 (A) Attempt any two. (કોઈપણબેનાજવાબ આપો): 06

1. With the definition find derivative of y=e^x.

૧. વ્યાખ્યાની મદદથી વિધેય $y=e^x$ નું વિકલન શોધો.

2. Find $\frac{dy}{dx}$ for $y = \log(x^2 + 2x + 4)$

૨. વિધેય $y = \log(x^2 + 2x + 4)$માટે $\frac{dy}{dx}$ શોધો.

3. $Integrate$: $\int_2^4 (x^2 + 3x - 1)dx$

૩ સંકલન કરો. :$\int_2^4 (x^2 + 3x - 1)dx$

Q.3 (B) Attempt any two. (કોઈપણબેનાજવાબ આપો) 08

1. If $y=3e^{2x} + 4e^{-2x}$ prove that $\frac{d^2y}{dx^2} = 4y$

૨ . જો $y=3e^{2x} + 4e^{-2x}$ હોય તો સાબિત કારોકે $\frac{d^2y}{dx^2} = 4y$

2. If the equation of motion of a particle is $s = t^3 + 3t$ (t >0) then Find the velocity and acceleration at t=3

૨. પદાર્થનીગતિનુસમીકરણ $s = t^3 + 3t$ (t > 0) હોયતો, t=3 આગળવેગ અને પ્રવેગ શોધો.

3.Find the maxima and minima at the function $f(x)=x^3 - 4x^2 + 5x + 7$

૩. વિધેય $f(x)=x^3 - 4x^2 + 5x + 7$માટે મહત્તમ અને ન્યુનત્તમ શોધો.

Q.4 (A) Attempt any two. (કોઈપણબેનાજવાબ આપો): 06

1.Integrate : $\int \left(\sqrt{x} + \frac{1}{\sqrt{x}}\right)^2 dx$

૧.સંકલન કરો : $\int \left(\sqrt{x} + \frac{1}{\sqrt{x}}\right)^2 dx$

2.Integrate: $\int \frac{\sin x \cos x}{1 + sin^2 x} dx$

૨.સંકલન કરો:$\int \frac{\sin x \cos x}{1+sin^2 x} dx$

3.Find Mean for the following data.

x_i	17	20	23	26	29	32	35
f_i	6	8	15	17	10	7	4

૩. નીચે આપેલી માહિતી માટે મધ્યક શોધો.

x_i	17	20	23	26	29	32	35
f_i	6	8	15	17	10	7	4

Q.4 (B) Attempt any two. (કોઈપણબેનાજવાબ આપો) 08

1.Integrate: $\int_0^{\frac{\pi}{2}} \frac{\sqrt{cotx}}{\sqrt{tanx} + \sqrt{cotx}} dx$

૧.સંકલન કરો :$\int_0^{\frac{\pi}{2}} \frac{\sqrt{cotx}}{\sqrt{tanx}+\sqrt{cotx}} dx$

2.Integrate: $\int x \bullet cosx\, dx$

૨. સંકલન કરો:$\int x \bullet cosx\, dx$

3. Find Mean deviation about mean for the following data.
30,35,39,41,36,37,43,40,32

૩. નીચે આપેલી માહિતી માટે મધ્યકથી શરેરાશ વિચલન શોધો.
30,35,39,41,36,37,43,40,32

Q.5 (A) Attempt any two. (કોઈપણબેનાજવાબ આપો): 06

1.Find the mean for the following group data

Class	30-40	40-50	50-60	60-70	70-80	80-90	90-100
Frequency	3	7	12	*15*	8	3	2

2.Find the standard deviation for the following data

x_i	4	8	11	17	29	23	30
f_i	2	5	8	4	3	2	1

૨ .નીચે આપેલી માહિતી માટે પ્રમાણિત વિચલન શોધો.

x_i	4	8	11	17	29	23	30
f_i	2	5	8	4	3	2	1

.3.Calculate the mean deviation of the data:

Class	0-10	10-20	20-30	30-40	40-50
Frequency	5	8	15	16	6

૩. આપેલ માહિતી માટે શરેરાશ વિચલન ગણો

Class	0-10	10-20	20-30	30-40	40-50
Frequency	5	8	15	16	6

Q.5 (B) Attempt any two. (કોઈપણબેનાજવાબ આપો) 08

1. $solve\ the\ Differential\ Equation: \frac{dy}{dx} = 1 + x + y + xy.$

૧. વિકલ સમીકરણ ઉકેલો: $\frac{dy}{dx} = 1 + x + y + xy.$

2. $solve\ the\ Differential\ Equation: x\frac{dy}{dx} - y = x^2$

૨. વિકલ સમીકરણ ઉકેલો : $x\frac{dy}{dx} - y = x^2$

3. $solve\ the\ Differential\ Equation: \frac{dy}{dx} - \frac{2xy}{1+x^2} = 1 + x^2$

3. વિકલ સમીકરણ ઉકેલો : $\frac{dy}{dx} - \frac{2xy}{1+x^2} = 1 + x^2$