

GUJARAT TECHNOLOGICAL UNIVERSITY

Diploma Engineering – SEMESTER – 1(CtoD) New – EXAMINATION – Winter-2023

Subject Code: C4300001

Date: 02-02-2024

Subject Name: Mathematics

Time: 10:30 AM TO 12:00 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 programmable & Communication aids are strictly prohibited.
5. Use of non-programmable scientific calculator is permitted.
6. English version is authentic.

No. Question Text and Option. યશ્ચ અર્થે વિગતવાર.

1. $\begin{vmatrix} 1 & 1 \\ -1 & 1 \end{vmatrix} = \text{-----}$
 A. -1 B. 1
 C. 2 D. -2
 $\log_2 8 = \text{-----}$
2. A. 1 B. 2
 C. 3 D. 4
 $5^{\log_5 25} = \text{-----}$
3. A. 5 B. 25
 C. 125 D. 625
 $\log_6 3 + \log_6 2 = \text{-----}$
4. A. 1 B. 2
 C. 3 D. 6
 If (જલ) $\begin{vmatrix} x & 1 \\ 1 & x \end{vmatrix} = 0$ then (ઢલ) $x = \text{-----}$
5. A. 0 B. 1
 C. -1 D. ± 1
 If $\begin{vmatrix} a & b \\ -3 & 3 \end{vmatrix} = 9$ then $a + b = \text{-----}$
6. A. -3 B. 3
 C. 6 D. -6
 જલ $\begin{vmatrix} a & b \\ -3 & 3 \end{vmatrix} = 9$ ઢલ $a + b = \text{-----}$
૬. A. -3 B. 3
 C. 6 D. -6
 If (જલ) $f(x) = \log_{10} x$ then (ઢલ) $f(100) = \text{-----}$
7. A. 1 B. 2
 C. 10 D. 100
 $\log 1 \times \log 2 \times \log 3 = \text{-----}$
8. A. 0 B. 1
 C. 2 D. 3
 If $f(x) = e^x$ then $f(x + y) = \text{-----}$
9. A. $F(x+y)$ B. $F(x-y)$
 C. $F(x/y)$ D. $F(x).f(y)$
 જલ $f(x) = e^x$ ઢલ $f(x + y) = \text{-----}$
૯. A. $F(x+y)$ B. $F(x-y)$
 C. $F(x/y)$ D. $F(x).f(y)$

- If $f(x) = \frac{1}{x}$ then $f\left(\frac{1}{x}\right) = \dots\dots\dots$
10. A. $\frac{1}{x}$ B. $-\frac{1}{x}$
C. $-x$ D. x
- જો $f(x) = \frac{1}{x}$ તો $f\left(\frac{1}{x}\right) = \dots\dots\dots$
૧૦. A. $\frac{1}{x}$ B. $-\frac{1}{x}$
C. $-x$ D. x
- $\log_4 5 \times \log_5 4 = \dots\dots\dots$
11. A. 1 B. 2
C. 9 D. 20
- $\log_2 4 + \log_2 8 = \dots\dots\dots$
12. A. 2 B. 4
C. 5 D. 32
- If $\log_2 X = 3$ then $x = \dots\dots\dots$
13. A. 2 B. 3
C. 4 D. 8
- જો $\log_2 X = 3$ તો $x = \dots\dots\dots$
૧૩. A. 2 B. 3
C. 4 D. 8
- For which value of x, $\begin{vmatrix} 1 & 0 \\ 2 & x \end{vmatrix} = 2$?
14. A. 0 B. 1
C. 2 D. -2
- $\sin 27^\circ \cos 18^\circ + \cos 27^\circ \sin 18^\circ = \dots\dots\dots$
15. A. 1 B. -1
C. $\frac{1}{\sqrt{2}}$ D. $-\frac{1}{\sqrt{2}}$
- $\sin 2x = \dots\dots\dots$
- A. $\frac{1 - \tan^2 x}{1 + \tan^2 x}$ B. $\frac{1 + \tan^2 x}{1 - \tan^2 x}$
16. C. $\frac{2 \tan x}{1 + \tan^2 x}$ D. $\frac{2 \tan x}{1 - \tan^2 x}$
- If $(\text{જો}) \theta = \frac{7\pi}{4}$ (હોયતો) then θ (કયા ચરણ માં હોય?) lies in _____ quadrant.
17. A. 4 B. 3
C. 2 D. 1
- $\tan^{-1} \frac{1}{2} + \tan^{-1} \frac{1}{3} = \dots\dots\dots$
18. A. π B. $\frac{\pi}{2}$
C. 2π D. $\frac{\pi}{4}$
- If $\sin \theta = \frac{3}{5}$ then $\cos 2\theta = \dots\dots\dots$
19. A. $\frac{25}{16}$ B. $\frac{16}{25}$
C. $\frac{7}{25}$ D. $\frac{25}{7}$
- $\sin^2 21^\circ + \sin^2 69^\circ = \dots\dots\dots$
20. A. 0 B. 1
C. 21 D. 69

- If $(\text{જો}) \sin \theta = \frac{3}{5}$ then $(\text{તો}) \sin 2\theta = \underline{\hspace{2cm}}$
21. A. $\frac{25}{24}$ B. $\frac{24}{25}$
 C. $\frac{7}{25}$ D. $\frac{25}{7}$
 $\sin^{-1}(\sin \frac{\pi}{5}) = \underline{\hspace{2cm}}$
22. A. $-\frac{\pi}{5}$ B. $\frac{\pi}{5}$
 C. $\frac{3\pi}{5}$ D. $\frac{3\pi}{10}$
 $\tan(22\frac{1}{2}^\circ) = \underline{\hspace{2cm}}$
23. A. $\sqrt{1-\sqrt{2}}$ B. $\sqrt{\sqrt{2}-1}$
 C. $\sqrt{2}$ D. 1
 $\sin^2(37\frac{1}{2}^\circ) - \sin^2(7\frac{1}{2}^\circ) = \underline{\hspace{2cm}}$
24. A. $\frac{1}{\sqrt{2}}$ B. $-\frac{1}{\sqrt{2}}$
 C. $\frac{1}{2\sqrt{2}}$ D. $-\frac{1}{2\sqrt{2}}$
 $\sin 8\theta + \sin 6\theta = \underline{\hspace{2cm}}$
25. A. $2 \sin 7\theta \cdot \cos \theta$ B. $2 \cos 7\theta \sin \theta$
 C. $2 \sin 8\theta \cdot \cos 6\theta$ D. $2 \cos 8\theta \sin 6\theta$
 $\sin^{-1}(\frac{2x}{1+x^2}) = \underline{\hspace{2cm}}$
26. A. $2\sin^{-1} x$ B. $2\tan^{-1} x$
 C. $2\cos^{-1} x$ D. $4\sin^{-1} x$
 the principal period of $3 \sin 2x$ ----- (3 sin 2x નું મુખ્ય ચક્રીય મહત્ત્વ -----)
27. A. π B. $\frac{\pi}{2}$
 C. 2π D. 0
 $\tan^{-1} \frac{5}{7} + \tan^{-1} \frac{1}{6} = \underline{\hspace{2cm}}$
28. A. $\frac{\pi}{4}$ B. $\frac{\pi}{2}$
 C. $-\frac{\pi}{4}$ D. $-\frac{\pi}{2}$
 $\cot(\pi - \theta) = \underline{\hspace{2cm}}$
29. A. $\tan \theta$ B. $\cot(\theta)$
 C. $-\tan \theta$ D. $-\cot(\theta)$
 $\sec \theta \cdot \cos \theta = \underline{\hspace{2cm}}$
30. A. -1 B. 0
 C. 1 D. 2
 $\underline{\hspace{2cm}}$ is not a unit vector.
31. A. $(1,0,0)$ B. $(0,1,0)$
 C. $(1,1,1)$ D. $(0,0,1)$
 $\underline{\hspace{2cm}}$ એ એકમ સદિશ નથી.
32. A. $(1,0,0)$ B. $(0,1,0)$
 C. $(1,1,1)$ D. $(0,0,1)$
 If vector (જો સદિશ) $\vec{x} = 3i - \sqrt{3}j + 2k$ then (તો) $|\vec{x}| = \underline{\hspace{2cm}}$
32. A. 3 B. 4
 C. 5 D. 6
33. For unit vectors (એકમ સદિશો માટે) i, j, k $i \cdot (j \times k) = \underline{\hspace{2cm}}$

- A. i B. j
C. k D. 1
for two vectors, $\vec{x} \cdot (\vec{x} \times \vec{y}) =$ _____
34. A. 0 B. 1
C. $x^2 \times xy$ D. x^2y
If $\vec{a}$ is a non-zero vector then $\frac{\vec{a}}{|\vec{a}|}$ is a _____
35. A. scalar B. perpendicular vector
C. parallel vector D. unit vector
જો $\vec{a}$ શૂન્ય સિવાય નો સદીસ હોય તો $\frac{\vec{a}}{|\vec{a}|} =$ _____
36. A. અદીશ B. લંબ સદીશ
C. સમાંતર સદીશ D. એકમ સદીશ
If Force $F=4k$ is acted on a body whose displacement vector is $j-k$, then the work done is _____
37. A. 4 B. -4
C. 5 D. -5
એક કણ પર $4k$ બળ લગાડતાં તેનું સ્થાનાંતર સદીશ $j-k$ હોય તો થતું કાર્ય-----
38. A. 4 B. -4
C. 5 D. -5
If $\vec{x} = (1, 2, 3)$, $\vec{y} = (1, -2, 2)$ and $\vec{z} = (3, -2, -2)$ then $\vec{x} \cdot (\vec{y} \times \vec{z}) =$ _____
39. A. 26 B. 36
C. 46 D. 56
The unit vector in the direction of vector $\vec{a}=3i-4k$ is =
_____ (સદીશ $\vec{a}=3i-4k$ નો એકમ સદીશ-----)
40. A. $(\frac{-3}{5}, \frac{4}{5}, 0)$ B. $(\frac{-3}{5}, 0, \frac{4}{5})$
C. $(\frac{3}{5}, 0, \frac{-4}{5})$ D. $(\frac{-3}{5}, \frac{-4}{5}, 0)$
dot product of $(1, 2, -1) \cdot (1, 0, 1) =$ - - - -
41. A. 0 B. 1
C. 2 D. -2
cross product (સદીશ ગુણન) of vectors $(1, 2, 3)$ and $(2, 4, 6)$ is - - -
42. A. $(0, 0, 0)$ B. $(0, 0, 1)$
C. $(0, 1, 0)$ D. $(1, 0, 0)$
For non-zero vector $\vec{x}$, $\vec{x} \cdot \vec{x} =$ - - - -
43. A. 0 B. $\vec{x}$,
C. $2|\vec{x}|$ D. $|\vec{x}|^2$
 $\vec{y} \cdot (\vec{x} \times \vec{y}) =$ - - - -
44. A. -1 B. 0
C. 1 D. None
Which of the following is a scalar quantity?
45. A. force B. acceleration
C. velocity D. area
નીચેના માપો -----એ આદિશ રાશી છે?
46. A. બળ B. પ્રવેગ
C. વેગ D. ક્ષેત્રફળ
If (જો) $|\vec{a}| = 1$ then (તો) $4|\vec{a}| =$ - - -
47. A. 1 B. 2
C. 3 D. 4
Distance between two points $(0, 0)$ and $(3, 4)$ is -----
48. A. 3 B. 4
C. 5 D. 6
બે બિંદુઓ $(0, 0)$ અને $(3, 4)$ વચ્ચે નું અંતર -----
49. A. 3 B. 4

- C. 5 D. 6
Slope of line passing through points A(5,7) and B(2,1) is _____
46. A. 1/2 B. 2
C. 3 D. 4
બિંદુઓ A(5,7) અને B(2,1) માંથી પસાર થતી રેખા નો ઢાળ _____
૪૬. A. 1/2 B. 2
C. 3 D. 4
Radius of circle(વર્તુળ ની ત્રિજ્યા) $x^2 + y^2 = 9$ is _____
47. A. 1 B. 2
C. 3 D. 4
Equation of circle having centre (0,0) and radius 3 unit is _____
48. A. $x^2 + y^2 = 0$ B. $x^2 + y^2 = 1$
C. $x^2 + y^2 = 9$ D. $x^2 + y^2 = 25$
ઊગમબિંદુ કેન્દ્રવાળા અને 3 એકમ ત્રિજ્યાવાળા વર્તુળા નું સમીકરણ _____
૪૮. A. $x^2 + y^2 = 0$ B. $x^2 + y^2 = 1$
C. $x^2 + y^2 = 9$ D. $x^2 + y^2 = 25$
X-intercept of line $2x + 3y - 4 = 0$ is _____
49. A. -2 B. 2
C. 4/3 D. 1/2
રેખા $2x + 3y - 4 = 0$ નો x - અક્ષ પરનો અંતર્ખંડ _____
૪૯. A. -2 B. 2
C. 4/3 D. 1/2
Slope of line parallel to the line $3x + 4y + 7 = 0$ is _____
50. A. 4/3 B. -7/4
C. 4/7 D. -3/4
રેખા $3x + 4y + 7 = 0$ ને સમાંતર હોય એવી રેખાનો ઢાળ _____
૫૦. A. 4/3 B. -7/4
C. 4/7 D. -3/4
Centre of circle $x^2 + y^2 = 16$ is ($x^2 + y^2 = 16$ નું કેન્દ્ર) -----
51. A. (0,0) B. (1,1)
C. (4,4) D. (4,0)
Slope of line making an angle $\frac{\pi}{3}$ with positive direction of X- axis is _____
52. A. $\sqrt{3}$ B. $\frac{1}{\sqrt{3}}$
C. 1 D. $\frac{1}{\sqrt{2}}$
જો કોઈ રેખા x-અક્ષ ની સાથે $\frac{\pi}{3}$ ના માપ નો ખૂણો બનાવે તો તેનો ઢાળ _____
૫૨. A. $\sqrt{3}$ B. $\frac{1}{\sqrt{3}}$
C. 1 D. $\frac{1}{\sqrt{2}}$
Slope of line perpendicular to the line $5x - 7y + 3 = 0$ is _____
53. A. 5/7 B. -7/5
C. 7/5 D. 7/4
રેખા $5x - 7y + 3 = 0$ ને લંબ રેખા નો ઢાળ _____
૫૩. A. 5/7 B. -7/5
C. 7/5 D. 7/4
If the slope of the line $kx - 5y = 7$ is 4 then find k= _____
54. A. 12 B. 20
C. -12 D. -20

- જો રેખા $kx - 5y = 7$ નો ઢાળ 4 હોય તો $k =$ _____
૫૪. A. 12 B. 20
C. -12 D. -20
- equation of line passing through the origin and having slope $\frac{1}{2}$ is _____
55. A. $2y=x$ B. $x=2y$
C. $2y=-x$ D. $x=-2y$
- ઉગમબિંદુ માથી પસાર થતી અને ઢાળ $\frac{1}{2}$ હોય એવી રેખા નું સમીકરણ-----
૫૫. A. $2y=x$ B. $x=2y$
C. $2y=-x$ D. $x=-2y$
- Y-intercept of line $3x - 5y + 8 = 0$ is _____
56. A. $-8/5$ B. $5/8$
C. $8/5$ D. $3/5$
- રેખા $3x - 5y + 8 = 0$ નો y - અક્ષ પરનો અંતર્ખંડ _____
૫૬. A. $-8/3$ B. $5/8$
C. $8/5$ D. $3/5$
- For circle $x^2 + y^2 - 2x - 2y - 2 = 0$ radius is -----
57. A. 1 B. 3
C. 2 D. 4
- વર્તુળ $x^2 + y^2 - 2x - 2y - 2 = 0$ ની ત્રિજ્યા -----
૫૭. A. 1 B. 3
C. 2 D. 4
- For circle $x^2 + y^2 - 2x - 2y - 2 = 0$ centre -----
58. A. (0,0) B. (1,-1)
C. (1,1) D. (-1,-1)
- વર્તુળ $x^2 + y^2 - 2x - 2y - 2 = 0$ નું કેન્દ્ર -----
૫૮. A. (0,0) B. (1,-1)
C. (1,1) D. (-1,-1)
- $\lim_{n \rightarrow \infty} \frac{2n+9}{n+7} =$ _____
59. A. $\frac{1}{2}$ B. 2
C. 1 D. 0
- $\lim_{n \rightarrow \infty} \left(1 + \frac{1}{n}\right)^n =$ -----
60. A. 0 B. 1
C. e D. $1/e$
- $\lim_{x \rightarrow 0} \frac{\sin 5x}{x} =$ -----.
61. A. $1/5$ B. 1
C. 5 D. 0
- $\lim_{h \rightarrow 0} \frac{e^h - 1}{h} =$ -----
62. A. 0 B. 1
C. e D. h
- $\lim_{x \rightarrow 1} \frac{2x+1}{x+1} =$ -----.
63. A. -1 B. $-3/2$
C. 1 D. $3/2$
64. $\lim_{x \rightarrow 0} (1+x)^{\frac{1}{x}} =$ _____

- A. 0
 C. e
 65. $\lim_{x \rightarrow 0} \frac{\tan 3x}{x} = \underline{\hspace{2cm}}$
 B. 1
 D. $1/e$
- A. 0
 C. 3
 66. $\lim_{x \rightarrow 0} \frac{2x}{\sin x} = \underline{\hspace{2cm}}$
 B. 1
 D. $1/3$
- A. $1/2$
 67. $\lim_{x \rightarrow 2} \frac{x^5 - 32}{x^3 - 8} = \underline{\hspace{2cm}}$
 B. $32/8$
 D. $20/3$
- C. $23/8$
 68. $\lim_{x \rightarrow 0} \frac{\sqrt{9+x} - 3}{x} = \underline{\hspace{2cm}}$
 B. 1
 D. $1/6$
- A. 0
 C. $1/3$
 69. $\lim_{x \rightarrow 1} \frac{x^3 - x^2 + x - 1}{x^2 - 1} = \underline{\hspace{2cm}}$
 B. -1
 D. 0
- A. 1
 70. $\lim_{x \rightarrow 0} (1 + \frac{x}{3})^{\frac{3}{x}} = \underline{\hspace{2cm}}$
 B. 1
 D. 3
- C. 2
