

**Gandhi Institute of Engineering and Technology University, Odisha, Gunupur
(GIET University)**

B.C.A. (First Semester - Regular) Examinations, January - 2026
BCA251004 : Mathematical Foundations



Time: 3 hrs

Maximum: 60 Marks

(The figures in the right-hand margin indicate marks)

PART – A

(2 x 5 = 10 Marks)

Q.1. Answer *ALL* questions

- | | CO # | Blooms Level |
|---|------|--------------|
| a. Find the Adjoint matrix of $\begin{bmatrix} a & b \\ c & d \end{bmatrix}$. | CO2 | K2 |
| b. If $\cos\theta = \frac{5}{6}$, then find all trigonometric ratio. | CO1 | K1 |
| c. Find the equation of circle with radius 4 and centre $(-2,3)$. | CO1 | K1 |
| d. Find the limit of $\lim_{x \rightarrow 0} \frac{\sqrt{5+x} - \sqrt{5-x}}{x}$. | CO2 | K2 |
| e. Find the Integration of $\int (e^{3x} + \frac{3}{x} + a^x) dx$ | CO1 | K1 |

PART – B

(10 x5=50 Marks)

Answer *ALL* questions

- | | Marks | CO # | Blooms Level |
|--|-------|------|--------------|
| 2. a. Given $A = \begin{bmatrix} 1 & 2 & 3 \\ 3 & -2 & 1 \\ 4 & 2 & 1 \end{bmatrix}$ then Find $A^3 - 23A - 40I$. | 5 | CO2 | K2 |
| b. Find n if $P(n, 3) : P(n + 2, 3) = 6 : 11$.
(OR) | 5 | CO3 | K3 |
| c. Write as the sum of symmetric and skew-symmetric matrix of
$A = \begin{bmatrix} 2 & -1 & 3 \\ 5 & 7 & -2 \\ 1 & 4 & 6 \end{bmatrix}$ | 5 | CO3 | K3 |
| d. Solve by Cramer's rule $x + y + z = 4, 2x - y + 3z = 1, 3x + 2y - z = 1$ | 5 | CO2 | K2 |
| 3.a. Find $\tan 2A, \cos 2A, \sin 2A$. | 5 | CO2 | K2 |
| b. Prove that $\sec A(1 - \sin A)(\sec A + \tan A) = 1$
(OR) | 5 | CO3 | K3 |
| c. If $\cot\theta = \frac{a}{b}$ then find $\frac{a \cos\theta - b \sin\theta}{a \cos\theta + b \sin\theta}$. | 5 | CO3 | K3 |
| d. Prove that $(\sec\theta - \cos\theta)(\operatorname{cosec}\theta - \sin\theta) = \frac{1}{\tan\theta + \cot\theta}$ | 5 | CO3 | K3 |
| 4.a. Show that $A(-2,7) B(1,1) C(3,-3)$ are collinear. | 5 | CO3 | K3 |
| b. Find the distance from $(-3, -4)$ to the line $2x - 5y + 65 = 0$
(OR) | 5 | CO3 | K3 |
| c. Find the point by using section formula of points $(3,4), (5,2)$ with ratio 3:2. | 5 | CO2 | K2 |

- d. Find the equation of straight-line passing through the points (3,4) and having sum of intercept is 14. 5 CO2 K2
- 5.a. Find the Derivative of i. $e^{\sqrt{\sin x}} + e^{\sqrt{\cos x}}$ ii. $\log \sqrt{\sin x} + \log \cos x$ iii. $e^{\sqrt{\cos x}}$ 5 CO3 K3
- b. Find the Maxima and Minima of $y = x^2 + 2x + 3$. 5 CO3 K3

(OR)

- c. Find $f_{xx} + f_{yy} + f_{zz}$. where the functions are i. $x^2 y^2 z^2$ ii. $x^2 + y^2 + z^2$ 5 CO2 K2
- d. Prove that the function $f(x) = x^2 + 2x + 1$ is continuous at $x = 3$ 5 CO3 K3
- 6.a. Find the integration of i. $\int \sin^5 x \cos x \, dx$ ii. $\int \frac{2-3\sin x}{\cos^2 x} \, dx$ iii. $\int \frac{\sec^2 x}{\operatorname{cosec}^2 x} \, dx$ 5 CO3 K3
- b. Find the area under the curve $f(x) = x^2 + 3x + 5$ from $a=1$ to $b=2$ 5 CO2 K2

(OR)

- c. Find the integral of i. $\int_1^2 \frac{1}{\sqrt{x}} \, dx$ ii. $\int_{-1}^2 (x^2 + 2x + 5) \, dx$ 5 CO2 K2
- d. Find the Integration of i. $\int 2x\sqrt{1+x^2} \, dx$ ii. $\int \frac{\sin \sqrt{x}}{\sqrt{x}} \, dx$ iii. $\int \frac{\cos \sqrt{x}}{\sqrt{x}} \, dx$ 5 CO3 K3

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