

**BACHELOR OF SCIENCE (APPLIED
SCIENCE-ENERGY) (BSCAEY)
Term-End Examination
June, 2026**

BEY-018 : LINEAR ALGEBRA AND CALCULUS

Time : 3 Hours

Maximum Marks : 70

Note : (i) Attempt any **seven** questions.

(ii) All questions carry equal marks.

(iii) Use of calculator is permitted.

1. If

$$\begin{bmatrix} a+5 & -2a & b+6 \\ 2c & 3b+2 & x \\ y+1 & z+3 & x+2 \end{bmatrix} = \begin{bmatrix} 2 & a+9 & 11 \\ c+4 & -b+22 & 3-x \\ 2 & 2z+3 & 5-z \end{bmatrix}$$

find a, b, c, x, y and z . 10

2. Find the cofactors of each element of matrix

$$A = \begin{bmatrix} -3 & 4 & -2 \\ 6 & 5 & 7 \\ -8 & 9 & 1 \end{bmatrix}. \quad 10$$

3. Answer the following : 2×5=10

(i) Find the constant λ so that the vectors $a = 2\hat{i} - \hat{j} + \hat{k}, b = \hat{i} + 2\hat{j} - 3\hat{k}, c = 3\hat{i} + \lambda\hat{j} + 5\hat{k}$ are coplanar.

(ii) Determine the dot product and cross-product of vectors $u = 3\hat{i} + \hat{j} - 2\hat{k}$ and $v = 2\hat{i} - \hat{j} + \hat{k}$.

4. Find the points where the tangent to the circle $x^2 + y^2 = 25$ is parallel to the line $2x - y + 7 = 0$. 10

5. Find the equation of the tangent and normal at any point of the ellipse $\frac{x^2}{25} + \frac{y^2}{16} = 1$. 10

6. Write the Taylor's formula for the function $y = e^x$ about the point $x = 0$ with remainder $R_n(x)$. 10

7. Test the continuity at the origin for the

$$\text{function } f(x, y) = \begin{cases} \frac{xy}{x^2 + y^2} & \text{if } (x, y) \neq (0, 0) \\ 1 & \text{if } (x, y) = (0, 0) \end{cases}$$

10

8. Find all local maxima and minima of 10

$$f(x, y) = xy - x^3 - y^3.$$

9. Show that the differential equation
 $(e^x \sin y - 2y \sin x)dx + (e^x \cos y + 2 \cos x)dy = 0$
 is exact and hence find its general solution.

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