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KERALA AGRICULTURAL UNIVERSITY
B. Tech. (Food Technology) 2023 & Previous Admission
II Semester Re - Examination – August 2026

Beas.1207

Engineering Mathematics II (2+0)

Marks: 50
Time: 2 hours

I Fill in the blanks

(10x1=10)

1. The sum of the eigen values of $A = \begin{bmatrix} 8 & -4 \\ 2 & 2 \end{bmatrix}$ is
2. $\lim_{z \rightarrow \infty} \frac{2z + i}{z + 1} = \dots \dots \dots$
3. A real valued function $u(x, y)$ is said to be harmonic if
4. The function $\sin x + \sin 2x + \sin 3x$ is periodic with period
5. The complete solution of the PDE $p^2 - q^2 = 0$ is

State True or False

6. Let $A = \begin{bmatrix} 2 & 0 & -1 \\ 0 & 1 & 2 \\ 3 & 1 & 1 \end{bmatrix}$. Then the inverse of A exists.
7. If 0 is an eigen value of a matrix A , then A is invertible.
8. The function $u(x, y) = 2xy + 3xy^2 - 2y^3$ is not harmonic.
9. $2x^3 + 4\sin x$ is an even function.
10. The order of the PDE $\left(\frac{\partial^2 u}{\partial x^2}\right)^2 + u^2 \left(\frac{\partial u}{\partial y}\right) = f(x, y)$ is 4.

II Write short notes on ANY FIVE of the following

(5x2=10)

1. Find the rank of $A = \begin{bmatrix} 4 & 2 & 3 \\ 8 & 4 & 6 \\ -2 & -1 & -1.5 \end{bmatrix}$.
2. Find a real symmetric matrix C of the quadratic form
 $Q = x_1^2 + 3x_2^2 + 2x_3^2 + 2x_1x_2 + 6x_2x_3$.
3. Whether $\lim_{z \rightarrow 0} \frac{z}{\bar{z}}$ exist or not.
4. Define derivative of a complex function $f(z)$ at a point z_0 .
5. Define periodic function and give an example.
6. Write down the Fourier cosine series for even function $f(x)$ with period 2π .
7. Form PDE by eliminating arbitrary constants $z = axy + b$.

III Answer ANY FIVE of the following

(5x4=20)

1. Solve the system $x + y - z = 0$; $2x - y + z = 2$; $4x + 2y - 2z = 2$.
2. Find the eigen values and eigen vectors of $A = \begin{bmatrix} 1 & 2 \\ 3 & 2 \end{bmatrix}$.
3. Prove that $f(z) = \frac{\text{Im}(z)}{|z|}$, $z \neq 0$ and $f(0) = 0$ is not continuous at $z = 0$.
4. Discuss the analyticity of $f(z) = xy + iy$.
5. Find the Fourier series expansion of odd function $f(x) = x$ with period 2π .
6. Find the Fourier series of $f(x) = (\pi - x)/2$ in the interval $(0, 2\pi)$.
7. Solve the PDE; $yzp - xzq = xy$.

IV

Write an essay on ANY ONE of the following

(1x10=10)

1. Let $A = \begin{bmatrix} 2 & 1 & 1 \\ 1 & 2 & 1 \\ 0 & 0 & 1 \end{bmatrix}$.

Then determine eigen values of A and the corresponding eigen vectors.

2. Find the Fourier Series $f(x)$ defined $f(x) = \begin{cases} 0 & \text{if } -c < x < 0 \\ 1 & \text{if } 0 < x < c \end{cases}$

Find the value of $f(x)$ at the point of discontinuity $x = 0$.
