



KERALA AGRICULTURAL UNIVERSITY
B.Tech.(Food Technology) 2021 Admission
II Semester Final Examination - September 2022

Beas.1207

Engineering Mathematics II (2+0)

Marks: 50
Time: 2 hours

I Fill in the blanks **(10x1=10)**

1. A function $f(x)$ is said to be an even function if $f(-x) = \dots\dots\dots$
2. If λ is the Eigen value of A then the Eigen value of A^{-1} is $\dots\dots\dots$
3. A matrix is said to be diagonalizable if its Eigen vectors are linearly $\dots\dots\dots$
4. The sum of Eigen values of a matrix A is equal to $\dots\dots\dots$ of matrix A.
5. If $u(x, y)$ satisfy Laplace equation $u_{xx} + u_{yy} = 0$ then $u(x, y)$ is said to be $\dots\dots\dots$
6. The product of Eigen values of a matrix $A = \begin{bmatrix} 1 & 5 & 1 \\ 3 & 2 & 4 \\ 0 & 0 & 0 \end{bmatrix}$ is $\dots\dots\dots$
7. Equivalent matrices have same $\dots\dots\dots$
8. An partial differential equation of the form $Pp + Qq = R$ where P, Q, R are functions of x, y, z is called $\dots\dots\dots$

Choose the correct answer

9. A homogenous system is always a $\dots\dots\dots$ system.
(a) Consistent
(b) Inconsistent

Define

10. Define the rank of a matrix.

II Write short notes on ANY FIVE of the following **(5x2=10)**

1. Define Eigen values and Eigen vectors of a matrix.
2. Check whether the function $u = x^2 - y^2 - 2xy - 2x + 3y$ is harmonic.
3. Find the Eigen values of the matrix $A = \begin{bmatrix} 1 & -2 \\ -5 & 4 \end{bmatrix}$
4. Find a symmetric matrix corresponding to Quadratic form
 $Q = 3x^2 + 3z^2 + 4xy + 8xz + 8yz$
5. State the Dirichlets condition.
6. Form a Partial differential equation by eliminating the arbitrary constants from
 $z = (x+a)(y+b)$
7. Solve the Lagrange linear PDE $xp + yq = z$ where $p = \frac{\partial z}{\partial x}$ and $q = \frac{\partial z}{\partial y}$

III Answer ANY FIVE of the following **(5x4=20)**

1. Check whether the function $f(z) = z^2$ is analytic or not.
2. Obtain the half range Fourier sine series of the function $f(x) = x$ in the interval
 $0 < x < \pi$

3. Find the value of λ and μ so that the system of equations $x + y + z = 6$, $x + 2y + 3z = 10$, $x + 2y + \lambda z = \mu$ has infinite solution.
4. Reduce the matrix to normal form $A = \begin{bmatrix} 1 & 1 & 2 \\ 1 & 2 & 3 \\ 0 & -1 & -1 \end{bmatrix}$
5. Write the equation of one dimensional heat equation and state the possible solutions of heat equation.
6. Find the inverse of a matrix by Gauss Jordan method ,if $A = \begin{bmatrix} 2 & -1 \\ -1 & 2 \end{bmatrix}$
7. Form a Partial differential equation by eliminating arbitrary function $z = f(x^2 - y^2)$

IV Write an essay on ANY ONE of the following (1x10=10)

1. Obtain the Fourier series for the function $f(x) = x^2$, $-\pi < x < \pi$
2. Find all the Eigen values and Eigen vectors of the matrix $A = \begin{bmatrix} 8 & -6 & 2 \\ -6 & 7 & -4 \\ 2 & -4 & 3 \end{bmatrix}$
