

KERALA AGRICULTURAL UNIVERSITY

B.Tech (Food. Engg) 2015 Admission
Ist Semester Final - Examination-January -2016

Cat. No: Basc.1102

Marks: 50.00

Title: Engineering Mathematics I (3+0)

Time: 2 hours

I Answer all questions

(10 x 1=10)

1. Elementary transformation do not change the order and also the _____
2. _____ of a matrix is interchanging rows and columns
3. When the system of equations has a solution it is said to be _____
4. A square matrix A and its trans pose A^T have the same _____
5. A homogenous polynomial of the second degree in any number of variables is called _____
6. Define $J\left(\frac{u,v}{x,y}\right)$
7. $\int \sin(2x + 3) dx =$ _____
8. $\beta(m, n) = \beta(n, m)$ (True /False)
9. State Cayley Hamilton theorem
10. Define inverse of a matrix

II Write answers on any FIVE questions

(5 x 2=10)

1. Reduce $\begin{pmatrix} 2 & 6 & 5 \\ 2 & 5 & 4 \\ 5 & 16 & 13 \end{pmatrix}$ to an equivalent upper triangular matrix through row transformation
2. If the rank of $\begin{bmatrix} 2 & 1 & -1 \\ 1 & 4 & 2 \\ 3 & 5 & k \end{bmatrix}$ is 2. Find the value of k
3. Test for the consistency of $x - y + 2z = 2$, $2x + y + 4z = 7$, $4x - y + z = 4$
4. Define Eigen values of a matrix
5. When two matrices are said to be similar? Give a property of similar matrices
6. Define curvature and radius of curvature
7. Evaluate $\int_1^2 \int_0^1 (x^2 + y^2) dx dy$

III Write the answer of any FIVE questions

(5 x 4=20)

1. Show that the vectors $(2,3,0)$, $(1,2,0)$ and $(8,13,0)$ are linearly dependent
2. Find the non-trivial solution of the equation $x+2y+3z=0$, $3x+4y+4z=0$, $7x+10y+11z=0$ if it exists
3. How the nature of the quadratic form can be determined without reducing to canonical form
4. If $u = f(x, y)$ where $x = r \cos \theta$ and $y = r \sin \theta$, find $\left(\frac{\partial u}{\partial x}\right)^2 + \left(\frac{\partial u}{\partial y}\right)^2$
5. Using Taylor's series, verify that $\log(1+x+y) = x+y - \frac{1}{2}(x+y)^2 + \frac{1}{3}(x+y)^3 \dots$
6. Evaluate $\int_0^1 \int_0^{1-z} \int_0^{1-y-z} xyz \, dx \, dy \, dz$
7. Find the area between the circle $x^2+y^2=a^2$ and the line $x+y=a$ lying in the first quadrant, by double integration

IV Write the answer of any ONE

(1 x 10=10)

1. Verify Cayley-Hamilton theorem for the matrix $\begin{pmatrix} 2 & 0 & -1 \\ 0 & 2 & 0 \\ 1 & 0 & 2 \end{pmatrix}$ and hence find A^{-1} and A^4
2. Evaluate $\iiint_V dx \, dy \, dz$, where V is the finite region of the space (tetrahedron) formed by the planes $x=0$, $y=0$, $z=0$ and $2x+3y+4z=12$