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 $x+ 2y + 3z=0$,$3x+ 4y + 4z =0$, $7x +10 y + 11z =0$ if it exists

3. How the nature of the quadratic form can be determined without reducing to cannonical form

4. If $u = f(x,y)$ where $x = r \cos\theta$ and $y = r \sin\theta$, find $\left(\dfrac{\partial u}{\partial x}\right)^2 + \left(\dfrac{\partial u}{\partial y}\right)^2$

5. Using Taylors series, verify that $\log(1+ x+ y) = x + y - \dfrac{1}{2}(x+y)^2 + \dfrac{1}{3}(x+y)^3 \ldots$

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 $\iiint\limits_v dx\, dy\, dz$, where v is the finite region of the space (tetra –hedron) formed by the planes x=0, y= 0, z=0 and $2x + 3y + 4z =12$