KERALA AGRICULTURAL UNIVERSITY
B.Tech (Food.Engg.) 2016 Admission
Ist Semester Final Examination-February-2017

Cat. No: Basc.1102.   Marks: 50.00
Title: Engineering Mathematics I (3+0)   Time: 2 hours

I   Fill in the blanks/State True or False   (10x1=10)

1. The product of the eigenvalues of a matrix A= $\begin{bmatrix} 2 & -3 \\ 4 & -2 \end{bmatrix}$ is -----------

2. Bending of a curve at a point is termed as ----------- of a curve at that point.

3. If the rank of A ≠ rank of augmented matrix K, then the system of linear equations are -----------

4. Define the chain rule for Jacobians.

5. Write the reduction formula for $\int sin^n x dx$

6. If y=0 to 1 and x=0 to 3, then evaluate $\iint (x^2 + 3y^2) dy dx$

7. Find the value of $\Gamma(1/2)$.

8. Write the parametric equation of a curve cycloid.

9. Write the condition for f(x,y) to be maximum.

10. If u= F(x-y, y-z,z-x), then find the value of $\frac{\partial u}{\partial x} + \frac{\partial u}{\partial y} + \frac{\partial u}{\partial z}$=-----------

II Write short notes/answers on any FIVE of the following   (5x2=10)

1. Find the A^{-1} of a matrix A= $\begin{bmatrix} 1 & 4 \\ 2 & 3 \end{bmatrix}$

2. How to test the consistency of a system of equations in 'n' unknowns.

3. Using Cayley-Hamilton theorem, find the A^{-1} of A= $\begin{bmatrix} 1 & 4 \\ 2 & 3 \end{bmatrix}$

4. Expand e^{sinx} by Maclaurin's series up to terms containing x^4.

5. Find the maximum and minimum values of $3x^4 - 2x^3 - 6x^2 + 6x + 1$ in the interval (0,2).

6. If u =$x^3 + y^3 - 3axy$, then prove that $\frac{\partial^2 u}{\partial x \partial y} = \frac{\partial^2 u}{\partial y \partial x}$.

7. Change the order of integration of $\iint f(x,y) dy dx$, if the limits are y=x to a and x=0 to a.

III Write short answers on any FIVE   (5x4=20)

1. Test whether the following system of equations has the trivial solution or not: x+2y+3z=0, 3x+4y+4z=0, 7x+10y+12z=0.

2. Let A be the square matrix of order 3 and $\lambda_1, \lambda_2, \lambda_3$ be its eigen values with eigen vectors X_1, X_2, X_3 respectively. Find its diagonal form D=P^{-1} AP.

3. Reduce the quadratic form Q = 2xy+2yz+2zx into canonical form.

4. Expand e^x by Taylor's series in powers of (x-1) up to 4th term.

5. Change the order of integration of $\iint f(x,y) dy dx$, if the limits are y=x to $\sqrt{x}$ and x=0 to 1.

6. Find the radius of curvature at the point (3a/2,3a/2) of the Folium x^3+y^3=3axy.

7. Verify Euler's theorem for $u = x^2yz - 4y^2z^2 + 2xz^3$.

IV Write essay on any ONE

1. Reduce the quadratic form $Q = 2x^2 + 2y^2 + 2z^2 - 2zx$ into canonical from by orthogonal transformation.

2. Change the order of integration and evaluate $\iint xy\,dx\,dy$, if the limits are y=0 to 1 and $x = x^2$ to (2-x).

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