



Basc.1102

KERALA AGRICULTURAL UNIVERSITY
B.Tech.(Food Engg.) 2017 Admission
I Semester Final Examination-January-2018
Engineering Mathematics I (3+0)

Marks: 50

Time: 2 hours

I Fill in the blanks

(10x1=10)

- 1 If λ is an eigen value of a matrix A , then ----- is an eigen value of A^{-1} .
- 2 The sum of the eigen values of a matrix A is equal to -----
- 3 If $|A| > 0$, then the quadratic form X^TAX is -----
- 4 $\lim_{x \rightarrow 0} \frac{\sin x}{x} =$ -----
- 5 If u is a composite function of t defined by $u = f(x,y)$, $x = \phi(t)$, $y = \psi(t)$, then the total derivative $\frac{du}{dt} =$ -----
- 6 If δX is the error in X , then the relative error is-----

Define the following

- 7 Define symmetric matrix.
- 8 Define rank of a matrix.
- 9 State L'Hospital's rule for the indeterminate form $\frac{0}{0}$.
- 10 Write the formula for radius of curvature in Cartesian form.

II Answer any FIVE of the following

(5x2=10)

- 1 If u and v are functions of two independent variables x and y , then define the Jacobian of u, v with respect to x, y .
- 2 State Cayley Hamilton Theorem.
- 3 Define homogeneous function.
- 4 Define a quadratic form.
- 5 Find the eigen values of the matrix $\begin{bmatrix} 1 & -2 \\ -5 & 4 \end{bmatrix}$.
- 6 Write the formula for Taylor series expansion of a function about the point X_0 .
- 7 Define Gamma function.

P T O

III Answer any FIVE of the following.

(5x4=20)

- 1 Derive the reduction formula for $\int \sin^n x \, dx$.
- 2 Using the formula for volumes of revolution, derive the volume of a sphere of radius a .
- 3 Verify Cayley Hamilton Theorem for the matrix $A = \begin{bmatrix} 1 & 4 \\ 2 & 3 \end{bmatrix}$ and hence find its inverse.
- 4 Find the rank of the matrix $A = \begin{bmatrix} 1 & 1 & 2 \\ 1 & 2 & 3 \\ 0 & -1 & -1 \end{bmatrix}$ by reducing to its normal form.
- 5 Find the eigen values and eigen vectors of the matrix $\begin{bmatrix} 1 & 1 & 3 \\ 1 & 5 & 1 \\ 3 & 1 & 1 \end{bmatrix}$.
- 6 Evaluate $\frac{\partial z}{\partial x}$ and $\frac{\partial z}{\partial y}$ if $z = x^3 + y^3 - 3axy$.
- 7 Evaluate $\Gamma\left(\frac{1}{2}\right)$

IV Answer any ONE of the following

(1x10=10)

- 1 Reduce the quadratic form $3x^2 + 5y^2 + 3z^2 - 2yz + 2zx - 2xy$ to its canonical form and specify the matrix of the transformation.
- 2 Find the area enclosed between the curves $y^2 = 4ax$ and $x^2 = 4ay$ using double integral.
