



KERALA AGRICULTURAL UNIVERSITY
B.Tech (Food Engineering) 2018 Admission
I Semester Final Examination-January 2019

Basc.1102

Engineering Mathematics I (3+0)

Marks: 50

Time : 2 hours

I Fill in the blanks:

(10x1=10)

- 1 If λ is the Eigen value of A, then Eigen value of A^2 is _____
- 2 A matrix is diagonalizable, if its Eigen vectors are linearly _____
- 3 If $x = r \cos \theta$, $y = r \sin \theta$, then $\frac{\partial(r,\theta)}{\partial(x,y)}$ is _____
- 4 $\beta\left(\frac{1}{2}, \frac{1}{2}\right) =$ _____
- 5 $\lim_{x \rightarrow 0} \frac{x - \sin x}{x^3} =$ _____
- 6 If $\sqrt{x} + \sqrt{y} = 0$, then $\frac{dy}{dx} =$ _____
- 7 If $u = x^2 + y^2$, then $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} =$ _____
- 8 Vertical asymptote of $\frac{x^2+2x-1}{x}$ is _____
- 9 $\int_0^{\frac{\pi}{2}} \sin^4 \theta d\theta =$ _____
- 10 Curvature of $y = ax + b$ at (x, y) is _____

II Write Short notes on ANY FIVE of the following

(5x2=10)

- 1 Find the Eigen values of $\begin{bmatrix} 1 & -4 \\ -2 & 3 \end{bmatrix}$
- 2 If $u = x^y$ find $\frac{\partial^2 u}{\partial x \partial y}$
- 3 Find rank of $\begin{bmatrix} 1 & 2 & 3 \\ 2 & 4 & 6 \end{bmatrix}$
- 4 Write Maclaurin's series expansion of $\cos x$
- 5 Find $\lim_{x \rightarrow 0} x \ln x$
- 6 Find the matrix corresponding to the Quadratic form.
 $5x_1^2 - 4x_2^2 + 7x_3^2 + 4x_2x_3 + 2x_3x_1 - 6x_1x_2$
- 7 Evaluate $\int_0^{\infty} e^{-x^2} dx$

P.T.O

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

- 1 Find the values of 'a' and 'b' for which the system of equations $x + 2y + 3z = 4, x + 3y + 4z = 5, x + 3y + az = b$ have no solution
- 2 Find the radius of curvature at any point (x, y) on the rectangular hyperbola $xy = c^2$.
- 3 If $u = \tan^{-1}(x + y)$, show that $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} = \frac{\sin 2u}{2}$
- 4 Evaluate $\iint xy \, dx \, dy$ over the region bounded by $x = 0, y = 0, x + y = 1$.
- 5 Evaluate $\lim_{x \rightarrow \frac{\pi}{2}} (\sin x)^{\tan x}$
- 6 Find the percentage error in calculating area of a rectangle due to an error of 1% made in measuring sides?
- 7 Evaluate $\int_0^{\infty} e^{-\sqrt{x}} x^{\frac{1}{4}} \, dx$

IV Answer ANY ONE of the following**(1x10=10)**

- 1 Show that the system of equations $x + y + z = 4$
- 2 If $V = \frac{1}{r}$, where $r^2 = x^2 + y^2$, show that $\frac{\partial^2 v}{\partial x^2} + \frac{\partial^2 v}{\partial y^2} = \frac{1}{r^3}$
