

KERALA AGRICULTURAL UNIVERSITY

B.Tech (Food. Engg) 2014 Admission
IIIrd Semester Final Examination-December -2015

Cat. No: Basc.2108

Title: Engineering Mathematics III (2+1)

Marks: 50.00

Time: 2 hours

I Fill up the blanks

(10 x 1=10)

1. Gradient vector field of $x^2 + y^2 + z - xy + 1$ at the point (1, -1, 2)

2. $\nabla x R =$ _____

3. The Cauchy Reimann equations are _____

4. The general value of $\log(-i)$

5. Write down convolution theorem.

6. Cauchy residue theorem is given by _____

7. Bilinear transformation transforms circle in to _____ and it preserves _____ of four points.

8. What is an analytic function

9. The poles of $\frac{1}{1-e^z}$ are _____

10. $\nabla.R =$ _____

II Write the answer of any FIVE questions

(5 x 2=10)

1. What is harmonic function? Find out the harmonic conjugate of a function whose real part is $x^3 - 3xy^2$

2. A particle move along the curve $x = t^3 + 1, y = t^2, z = 2t + 3$ where t is the time. find the velocity at $t = 1$

3. Find out the singular point of $\frac{z^2}{(z-1)(z-2)^2}$

4. Obtain the half range sine series of $f(x) = e^x$ in $0 < x < 1$

5. State Gauss Divergence Theorem

6. Expand $\tan z$ using maclaurin's series expansion

7. Find the Fourier series representationalary $f(x) = \begin{cases} x & \text{in } (0, \pi) \\ 2\pi - x & \text{in } (\pi, 2\pi) \end{cases}$

III Write answer of any FIVE questions

(5 x 4=20)

1. Find the Fourier series of expansion of $f(x) = x, -1 \leq x \leq 1$
2. Expand $f(z) = \frac{1}{(z-1)(z-2)}$ in the region $1 < |z| < 2$
3. Find the $\text{div } \vec{F}$ and $\text{curl } \vec{F}$ where $\vec{F} = \text{grad } (x^3 + y^3 + z^3 - 3xy)$
4. If $f(z) = u + iv$ is an analytic function with constant modulus, then prove that u is constant
5. Find the Taylor series expansion of $\cos z$ about $z = \frac{\pi}{2}$
6. Evaluate $\int_c \frac{e^z}{(z-1)(z-2)} dz$, where c is the circle $|z| = 3$
7. Find Fourier Sine Series and Cosine series for the function given by $f(x)$
 $0 \leq x \leq 1$

IV Write answer of any ONE

(1 x 10=10)

1. a) Define Bilinear transformation
b) Find bilinear transformation which maps the points $z = 1, i, -1$ in to the $w = i, 0, -i$ Hence, find the image of $|z| < 1$
2. a) State Cauchy's residue theorem
b) By integrating around the a unit circle, evaluate $\int_0^{2\pi} \frac{\cos \theta}{5 - 4 \cos \theta} d\theta$