KERALA AGRICULTURAL UNIVERSITY
B.Tech.(Food Engg.) 2018 Admission
III Semester Final Examination-December 2019

Basc.2108 **Engineering Mathematics III (2+1)** **Marks:50**
Time: 2 hours

I Choose the Correct answer (10x1=10)

1. Stokes theorem convers______________
   a) Line integral into surface integral b) Surface integral to volume integral
   c) Line integral to volume integral d) None of these
2. If C is the triangle with vertices (0,0,0), (1,0,0), (1,1,0) then $\int_C y^2 dx + x^2 dy =$ ______
   a) 0 b) 1 c) ½ d) 1/3
3. $\int (udx + vdy) =$ ________
   a) $\iint_R \left(\frac{\partial u}{\partial x} - \frac{\partial v}{\partial y}\right) dxdy$ b) $\iint_R \left(\frac{\partial u}{\partial x} + \frac{\partial v}{\partial y}\right) dxdy$ c) $\iint_R \left(\frac{\partial v}{\partial x} - \frac{\partial u}{\partial y}\right) dxdy$ d) $\iint_R \left(\frac{\partial v}{\partial x} + \frac{\partial u}{\partial y}\right) dxdy$
4. What is the period of tan(x)
   a) π b) 2π c) $\pi/2$ d) None of these
5. Which function cannot be expanded in Fourier series?
   a) sin(x) b) cos(x) c) tan(x) d) None of these
6. If ______________, then f(x) is self reciprocal under Fourier transform.
   a) F[f(x)]=f(s) b) $F[f(x)] \neq f(s)$ c) $F[f(x)] \geq f(s)$ d) None of these
7. The real and imaginary parts of an analytic function are____________.
8. The complex function w=az when 'a' is a complex constant geometrically implies
   a) Rotation b) Rotation and Magnification
   c) Rotation and Reflection d) None of these

Define

9. What is invariant point in a mapping?
10. State Cauchy's Integral Theorem.

II Write Short notes on ANY FIVE of the following (5x2=10)

1. Find an analytic function whose imaginary part is $3x^2y-y^3$.
2. Find the residue at z=0 of the function $f(z) = \frac{1+e^z}{z\cos z + \sin z}$.
3. Expand f(x) =1 in a sine series in $0 < x < \pi$.
4. What do you mean by Harmonic Analysis?
5. Grad($3y^2z-x^3z+4xz=10$) at (-1,2,1)?
6. If $\bar{r} = x\bar{i} + y\bar{j} + z\bar{k}$, then find $\nabla f(r)$?
7. If V is the volume of the region enclosed by the cube 0<x,y,z<1 and $\bar{F} = x^2\,\bar{i} + y^2\,\bar{j} + z^2\,\bar{k}$ then find $\iiint_V \nabla \bullet \bar{F} dV$.

P T O

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

1. If $\overline{F} = x^2\overline{i} + y^2\overline{j} + z^2\overline{k}$, then find $\nabla \bullet \overline{F}$ and $\nabla \times \overline{F}$.
2. Evaluate by Stoke's Theorem $\int_C (e^x dx + 2y dy - dz)$, where C is the curve $x^2 + y^2 = 4, z = 2$.
3. Find the complex form of the Fourier Series $f(x) = \cos(ax); -\pi < x < \pi$.
4. Compute the first two harmonics of the Fourier Series for f(x) from the following data

x	0	30	60	90	120	150	180
f(x)	0	5224	8097	7850	5499	2626	0

5. Prove that both the real and the imaginary parts of an analytic function $f(z) = u+iv$ satisfy Laplace's equation.
6. Evaluate $\int_C \frac{e^{2z}}{(z-1)(z-2)} dz$, where C is the circle |z|=3.
7. Find the residues of $f(z) = \frac{ze^z}{(z-a)^3}$ at pole.

IV **Write an essay on ANY ONE of the following** **(1x10=10)**

1. Evaluate using Cauchy's integral formula for $\int_C \frac{z+1}{z^3 - 2z^2} dz$, where C is the unit circle |z|=1.
2. Obtain the Fourier series of period 2L for the function f(x) =| x| in –L<x<L. Hence find the value of $1^{-2} + 3^{-2} + 5^{-2} + ...$

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