# KERALA AGRICULTURAL UNIVERSITY

B.Tech (Agrl.Engg) 2011 Admission

II[nd] Semester Special Re- Examination-June -2015

Cat. No: Math.1202 Marks: 80.00

Title: Engineering Mathematics -II (3+0) Time: 3 hours

## PART – I

**Answer all the questions:** **5 x 4 = 20 marks**

1. Using Cauchy's root test, test the convergence of a series $\sum 1/(\log n)^n$
2. Find the half – range Fourier series for $f(x) = x$ in the interval $0 < x < 2$.
3. Form the partial differential equation by eliminating the arbitrary constants from the equation $z = x^2/a^2 + y^2/b^2$
4. Find the analytic function whose imaginary part is $e^{-x}(x\cos y + y\sin y)$.
5. Evaluate $\int f(z)\,dz$ over the circle C is $|z+1+i| = 2$, where $f(z) = (z-3)/(z^2+2z+5)$.

## PART – II

**Answer any 5 the questions:** **5 x 6 = 30marks**

1. Find the Fourier series expansion of $f(x) = (\pi^2 - x^2)$, in the interval $(-\pi, \pi)$.
2. Find the half – range Fourier series for $f(x) = |x|$, in the interval $(-l, l)$.
3. Discuss the transformation $w = \cos hz$.
4. Using Cauchy's theorem and Cauchy's integral formula, evaluate $\int (z^2-z+1)dz/(z-1)$ over the circle C is (a) $|z| = 1$, (b) $|z| = \frac{1}{2}$
5. Solve: $(mz-ny)p + (nx-lz)q = (ly-mx)$
6. Solve the equation $u_t = \alpha^2 u_{xx}$ subject to the boundary conditions $u(0,t) = 0$, $u(l,t) = 0$, and $u(x,0) = x$.

7. Expand $f(z) = 1/[(z-1)(z-2)]$ in the region $1 < |z| < 2$.

**PART – III**

**Answer all the questions:** **2 x 15 = 30 marks**

1. (a) Find the Fourier series expansion of $f(x)$ defined in $(0, 2\pi)$ from the following table up to first harmonic.

| x | 0 | $\pi/3$ | $2\pi/3$ | $\pi$ | $4\pi/3$ | $5\pi/3$ | $2\pi$ |
|---|---|---|---|---|---|---|---|
| y | 1.0 | 1.4 | 1.9 | 1.7 | 1.5 | 1.2 | 1.0 |

(b) Solve: $(p^2 + q^2)y = qz$ by Charpit's method.

(**or**)

(a) Show that the function $f(x) = x - iy$ is nowhere differentiable.

(b) Convert $\int d\theta/(5+4\cos\theta)$ with limits 0 to $2\pi$ into contour integral.

2. (a) Find the complex form of the Fourier series of $f(x) = e^{k+x}$ in the interval $(-\pi,\pi)$.

(b) Discuss the transformation $w = cz$.

(**or**)

(a) Solve $(D^2 - DD' - 6D'^2)z = \cos(2x+y)$

(b) Evaluate $\int \log z\, dz$, over the circle C is $|z| = 1$.