KERALA AGRICULTURAL UNIVERSITY

B.Tech (Agrl.Engg.) 2016 Admission

II Semester Final Examination-August-2017

Sacs.1206 **Engineering Mathematics-II (2+1)** **Marks: 50**

Time: 2 hours

I **Answer the following** **(10x1=10)**

1 The p −series $\frac{1}{1^9}+\frac{1}{2^p}+\frac{1}{3^p}+\ldots$. Converges if ----------

2 $\lim_{n\to\infty}\left(1+\frac{1}{n}\right)^n$ = ----------

3 $f(x)=\tan x$ is an even function (T/F)

4 Fourier expansion of an odd function has only ---------- terms.

5 The complementary function of $\left(D^2-4DD^1+4D^{1^2}\right)z=x+y$ is ----------

6 $\left(\frac{\partial z}{\partial x}\right)\left(\frac{\partial z}{\partial y}\right)=0$ is quasi-linear (T/F)

7 Define analytic function.

8 $\sin x, \cos x$ are periodic functions of period ----------

9 State Cauchy-Riemann equation in Cartesian co-ordinates.

10 What is essential singularity?

II **Write short notes on any FIVE** **(5x2=10)**

1 Define absolutely convergent series. Test $\sum_2^\infty \frac{(-1)^n}{n(logn)^2}$ for convergence and absolute convergence.

2 Test for convergence the series $\sum \frac{4.7\ldots(3n+1)}{1.2\ldots n}x^n$

3 Expand $f(x)=f(x)=\begin{cases}\frac{1}{4}-x, & if\ 0<x<\frac{1}{2}\\ x-\frac{3}{4}, & if\ \frac{1}{2}<x<1\end{cases}$ as the Fourier series of sine terms.

4 Form a partial differential equation from $f(x^2+y^2, z-xy)=0$

5 Solve $\frac{\partial^2 z}{\partial x^2}-\frac{\partial^2 z}{\partial x\partial y}=\cos x\ cos\ 2y$

6 What type of singularity have the function $(z+1)\sin\left(\frac{1}{z-2}\right)$

7 Evaluate $\int_c (z^2+3z+2)dz$ where c is the arc of the cycloid $x=a(\theta+\sin\theta), y=a(1-\cos\theta)$ between the points $(0,0)$ and $(\pi a, 2a)$

III **Answer any FIVE** **(5x4=20)**

1 Show that the series is divergent.

2 Find the Fourier cosine integral of

3 Find the radius of convergence of the series

4 Show that $u(x,t)=f(x+ct)+g(x-ct)$is a solution of $u_{tt}=c^2u_{xx}$

5 a) State Cauchy's integral formula.

b) Evaluate $\int_c \frac{\cos\pi z}{z^2-1}dz$ around a rectangle with vertices $2\mp i, -2\mp i$

6 Find the Fourier transform of $f(x)=\begin{cases}1-x^2, |x|\le 1\\ 0, |x|>1\end{cases}$. Hence evaluate $\int_0^\infty \frac{x\cos x-\sin x}{x^2}\cos\left(\frac{x}{2}\right)dx$

7 Solve $\frac{\partial^2 z}{\partial x^2}+\frac{\partial^2 z}{\partial x\partial y}-6\frac{\partial^2 z}{\partial y^2}=\cos(2x+y)$

IV **Write essay on any ONE** (1x10=1

1 Evaluate $\int_{-\infty}^{\infty} \frac{e^{ax}}{e^{x}+1} dx$

2 a) Find the half range cosine series of the function

$$f(x) = 4, 0 < x < \pi/2$$
$$= 0, \pi/2 < x < \pi$$

b) Find the bilinear transformation which maps $z = l, i, -1$ respectively onto $w = i, 0, -i$. For this transformation find the image of $|z| \leq 1$

c) Find the Taylor's series expansion of the function $f(z) = \frac{1}{(z-1)(z-3)}$ about the point $z = 2$

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