19P156 (Pages: 2) Name: ……….……………

Reg. No………….………...

FIRST SEMESTER M.Sc. DEGREE EXAMINATION, NOVEMBER 2019

(CUCSS PG)

CC19P MST1 C01 – ANALYTICAL TOOLS FOR STATISTICS – I

(Statistics)

(2019 Admission Regular)

Time: Three Hours Maximum: 30 Weightage

PART A

Answer any ***four*** questions. Each question carries 2 weightage.

1. Verify the Cauchy-Reimann equations of the complex function $f(z) = \frac{\bar{z}}{|z|^2}$
2. Show that the real and imaginary parts of the analytic function satisfies Laplace equation.
3. Find the complex function where the real part is given by $u_x = e^x(\cos(y) - ysin(y))$ given that the function is analytic.
4. Evaluate $\int_C Z^2 dz$ where C the straight line is joining the origin to the point.
5. State and prove Cauchy's integral formula.
6. Find

   a). $\int_C \frac{3Z^2+7Z+1}{Z+1} dz$, where C: $|Z+1| = 1$

   b). $\int_C \frac{5Z-2}{Z(Z-1)} dz$, where C: $|Z| = 2$
7. Show that $\lim\limits_{(x,y)\to(0,0)} f(x,y)$ does not exist, where $f(x,y) = \begin{cases} \frac{x^2-y^2}{x^2+y^2}, & (x,y) \neq 0 \\ 0 & (x,y) = 0 \end{cases}$

(4 x 2 = 8 Weightage)

PART B

Answer any ***four*** questions. Each question carries 3 weightage.

8. Explain the method of Lagrangian multiplier.
9. Find the inverse Laplace transform of $\frac{2s+7}{3s^2+5}$ and $\frac{1}{s(1+2s)}$
10. Derive the polar form of Cauchy Reimann equations.
11. Find the Taylor series expansion of

    a). $\frac{1}{Z^2-3Z+2}$ in $0 < |Z| < 1$ b). $\frac{5z+7}{(Z+2)(Z+3)}$ in $|Z| < 2$
12. Find the Fourier transform of $f(x) = e^{-|x|}, -\infty < x < \infty$
13. State and prove Laurent's theorem.
14. Find the Laplace transform of the following functions:

a) $t\ sin(\beta t)$ b) $\cos(at)$ c) $te^t + \cosh(t)$

(4 x 3 = 12 Weightage)

PART C

Answer any ***two*** questions. Each question carries 5 weightage.

15. Solve the initial value problem using Laplace transform

$y'' - y' - 6y = 0,\ y(0) = 6, y'(0) = 13.$

16. Evaluate $\int_0^{\pi} \frac{d\theta}{1+\cos(\theta)}$

17. State and prove Poisson's Integral formula.

18. Find the Fourier series corresponding to the function

$f(x) = \begin{cases} -k, & when\ -\pi < x < 0 \\ k, & when\quad 0 < x < \pi \end{cases}$ and $f(x + 2\pi) = f(x)$.

(2 x 5 = 10 Weightage)

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