14MAU20

PSG COLLEGE OF ARTS & SCIENCE

(AUTONOMOUS)

BSc DEGREE EXAMINATION DECEMBER 2018

(Sixth Semester)

Branch - **MATHEMATICS**

COMPLEX ANALYSIS

Time : Three Hours Maximum : 75 Marks

SECTION-A (20 Marks)

Answer **ALL** questions

ALL questions carry **EQUAL** marks (1 0 x 2 = 20)

1 Define a continuous function in the bounded closed domain D.

2 Show that /(z) = *z* is no where differentiable.

3 Define Jacobian of a transformation.

4 Define inverse points with respect to a circle.

Evaluate I$\frac{c\ dz}{}$ wljere c is circle \z - 2| = 5.

6 State Cauchy's fundamental theorem.

7 Define Primitive.

8 State fundamental theorem of algebra.

9 Find the residue of $\frac{£^{Z}}{z^{e}}$ at z=0.

10 Write Jordan's inequality.

SECTION - B (25 Marks)

Answer **ALL** Questions

ALL Questions Carry **EQUAL** Marks (5 x 5 = 25)

11 a Prove that continuity is a necessary but not a sufficient condition for existence of a finite derivative.

OR

Show that the function u=x^{T} -3xy^{9} is harmonic and find the corresponding analytic function.

12 a Prove that for the transformation w = $Jx^2 + y^2 -iy,$ determine the region D^1 of the w-plane corresponding to the region D of the z-plane given circular disc x^2+y^2<l.

OR

Prove that the superficial magnification of the conformal transformation w=f(z) is |/'(z)|^2.

13 a Let f(x) be continuous on a contour L of length 1 and let |/(z)j < *M* on L, show that |J/|< *Ml.*

OR

State and prove Cauchy's integral formula.

14 a Show that 0 < Izl < 4,- $\frac{1}{4\,z - z_{n}=0}$ - S $\frac{£\ z^{n\_1}}{4^{\,i\,n+1}}$

OR

b State and prove Maximum modulus principle.

15 a Fine the residue for the function /(z) = $\frac{}{(z^2+1)^3}$ at its poles.

<u>SECTION - C (30 Marks)</u>

Answer any **THREE** Questions

ALL Questions Carry **EQUAL** Marks (3 x 10 = 30)

16 Derive polar form of Cauchy-Riemann equation.

17 Find the image of the infinite strips $/_4 < y < /_2$ under the transformation $w = \pm$ show the region graphically.

18 State and prove Morera's theorem.

19 Find the Taylor's series to represent $\frac{\quad}{(z+2)(z+3)}$ in. z <2.

20 State and prove Cauchy's residue theorem.

Z-Z-Z END