PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

BSc DEGREE EXAMINATION DECEMBER 2017
(Sixth Semester)

Branch – **MATHEMATICS**

COMPLEX ANALYSIS

Time : Three Hours Maximum : 75 Marks

SECTION-A (20 Marks)

Answer **ALL** questions
ALL questions carry **EQUAL** marks (10 x 2 = 20)

1 Define continuity of f(z) at z_0.

2 Show that f(z) = $\bar{z}$ is no where differentiable.

3 Define conformal mapping.

4 Find the fixed points of $\omega = \frac{1}{z}$.

5 Evaluate $\int_c \frac{dz}{z-3}$ where c is circle $|z-2| = 5$.

6 What is the length l of curve c.

7 Define simple pole.

8 Define isolated singularity for f(Z).

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

10 Evaluate $\int \frac{dz}{2z+3}$ where C is $|Z| = 2$.

SECTION - B (25 Marks)

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

11 a Find the constants a and b so that the function $f(z) = a(x^2 - y^2) + bxy + c$ is differentiable at every point.

OR

b Prove that the function f (z) and $\overline{f(\bar{z})}$ are simultaneously analytic.

12 a Determine the angle of rotation and scale factor at the point Z = 1 + i under the mapping $\omega = Z^2$.

OR

b Find the points where the following mappings are conformal
(i) $w = e^z$ (ii) w = az + b and a ≠ 0.

13 a Show that when f is analytic within and on a simple closed curve c and z_o is not on c then $\int \frac{f^1(z)dz}{z-z_0} = \int \frac{f(z)dz}{z-z_o}$ z.

OR

b State and prove Mocera's theorem.

14 a Find the Lawrents series for $\frac{z}{(z+1)(z+2)}$ about z = -2.

OR

b State and prove Liouville's theorem.

Cont ...

15 a Evaluate $\int_0^{2\pi} \frac{d\theta}{5+4scin\theta}$.

OR

b Clasity the singularities of $f^{(z)}$. and give example.

SECTION - C (30 Marks)

Answer any **THREE** Questions

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

16 State and prove Cauchy – Riemann equations.

17 Find the image of the strip 2,< x < 3 under $\omega = \frac{1}{z}$.

18 State and prove Cauchy's theorem.

19 Find the Taylor's series to represent $\frac{Z^2-1}{(z+2)(z+3)}$ in $|Z| < 2$.

20 State and prove Cauchy's residue theorem.

Z-Z-Z .END