PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

BSc DEGREE EXAMINATION MAY 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 analytic a function. - ,

2 - Find f (z) where $f(z) = z^2$.

3 Define critical point of f(z).

4 What are fixed points of the mapping f(z) = az.

5 # Find $\int_c \frac{dz}{z}$ where_C is |z| = 1.

6 Define simply corrected region.

7 Find all the zeros of Cos Z.

8 Define singularity of f(z).

9 What is the residue at z = a for $f(z) = \frac{\quad}{(z - a)^m}$?

10 Find the residue of cot z at z = 0.

SECTION - B (25 Marks)
Answer ALL Questions
ALL Questions Carry EQUAL Marks (5 x 5 = 25)

11 a Prove that f(z) = Re z are nowhere differentiable.

OR

b Show that an analytic function in a region with constant modules is constant.

12 a Find the image of the circle |Z - 3i| = 3 under the map w = -. z -

OR

b Derive the Jacobian of a transformation.

13 a Evaluate $\int_c z|z\, dz$ where C is the closed curve consisting of the upper semicircle \z\ = 1 and the segment -1 < x < 1.

OR

b State and prove maximum modulus theorem.

Cont...

14 a State and prove Liouville's theorem.

OR

b Expand —r- as Laurent's series about z = 0 in powers of z.
.... z(z-l)

15 a Evaluate $\int_0^{2\pi} \frac{d\theta}{2 + \cos\theta}$

OR

Find the residue of $\frac{z}{z^2(z^2+q)}$ at its poles.

SECTION - C (30 Marks!

Answer any THREE Questions

ALL Questions Carry EQUAL Marks (3 x 1 0 = 30)

16 State and prove Cauchy - Riemann equations in polar form.

17 Let f be an analytic function defined in a region D. Let Z_Q e D if f' (Z_Q) * 0 then show f is conformal at Z_Q.'

18 State and prove Cauchy's integral formula.

19 State and prove Laurent's theorem.

20 Use residue theorem to evaluate $\int \frac{3z^z + z - 1}{(z^2 - l)(z-3)} dz$ around the circle |z| = 2.

Z-Z-Z END