PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

BSc DEGREE EXAMINATION MAY 2018
(Sixth Semester)

Branch – **MATHEMATICS WITH COMPUTER APPLICATIONS**

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 uniformly continuous in a domain.

2　Define an isolated singularity.

3　Define transformation on conformal mappings.

4　Define critical points.

5　Define a contour.

6　State Cauchy Goursat theorem.

7　Define an integral function.

8　Define an isolated essential singularity.

9　Find the residue of $\frac{1}{(z^2+1)^3}$ at $z = i$.

10　State Cauchy's residue theorem.

SECTION - B (25 Marks)

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

11 a　Find the analytic function whose real part is $e^{-x}\{(x^2 - y^2)\cos y + 2xy \sin y\}$.

OR

b　Show that an analytic function with constant modulus is constant.

12 a　Consider the transformation $w = z + (1 - i)$. Determine the region D' of the w-plane corresponding to the rectangular region D in the z-plane bounded by $x = 0$, $y = 0$, $x = 1$, $y = 2$.

OR

b　Consider the transformation $w = (e^{i\pi/4})z$. Determine the region in the w-plane corresponding to the triangular region bounded by the lines $x = 0$, $y = 0$ and $x + y = 1$ in the z-plane.

13 a　Using the definition of an integral as the limit of a sum, evaluate the following integrals (i) $\int_L dz$ (ii) $\int_L |dz|$ where L is any rectifiable arc joining the points $z = \alpha$ and $z = \beta$.

OR

b　Let D be a doubly connected region bounded by two simple closed curves C and C_1 such C_1 is contained in C. Then prove that $\int_c f(z).dz = \int_{c_1} f(z)dz$. where C and C_1 are both traversed in the positive sense.

Cont ...

14 a State and prove Cauchy's inequality theorem.

OR

b Expand $\frac{1}{z(z^2-3z+2)}$ for the region $1<|z|<2$.

15 a Show that $\int_0^{2\pi}\frac{d\theta}{2+\cos\theta}=\frac{2\pi}{\sqrt{3}}$.

OR

b State and prove Jordan's Lemma.

SECTION - C (30 Marks)

Answer any **THREE** Questions

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

16 Derive the polar form of Cauchy – Riemann equations.

17 Find the image of the infinite strips (i) $\frac{1}{4}<y<\frac{1}{2}$ (ii) $0<y<\frac{1}{2}$ under the transformation $w=\frac{1}{z}$. Show the regions graphically.

18 State and prove Cauchy's theorem.

19 State and prove Taylor's theorem.

20 State and prove Cauchy's residue theorem.

Z-Z-Z END