

B.PRINTING ENGG. Examination, 2019 (old)

(1ST YR, 2ND SEM)

MATHEMATICS

PAPER - II R

Full Marks : 100

Time: Three hours

Answer any ten questions.

$$10 \times 10 = 100$$

1 Prove that if $\frac{z-i}{z-1}$ is purely imaginary then z lies on a circle.

2. If z_1, z_2, z_3 be the vertices of an equilateral triangle, show that

$$\frac{1}{z_1 - z_2} + \frac{1}{z_2 - z_3} + \frac{1}{z_3 - z_1} = 0$$

3. If

$$(x + iy)^{\frac{1}{3}} = a + ib,$$

then show that

$$4(a^2 - b^2) = \frac{x}{a} + \frac{y}{b}$$

4. Expand by Laplace's method to prove that

$$\begin{vmatrix} a & -b & -a & b \\ b & a & -b & -a \\ c & -d & c & -d \\ d & c & d & c \end{vmatrix} = 4(a^2 + b^2)(c^2 + d^2).$$

5. Solve by Cramer's rule

$$x + y - z = 6, \quad 2x - 3y + z = -1, \quad 3x - 4y + 2z = -1$$

6. Find the analytic function $f(z) = u + iv$ of which the real part

$$u = e^x(x \cos y - y \sin x).$$

7. If two curves

$$ax^2 + by^2 = 1, \quad a^1x^2 + b^1y^2 = 1$$

cut orthogonally, prove that

$$\frac{1}{b} - \frac{1}{b^1} = \frac{1}{a} - \frac{1}{a^1}.$$

8. Find the range of values of x for which

$$y = x^4 - 6x^3 + 12x^2 + 5x + 7$$

concave upwards or downwards and also find the point of inflexion.

9. Define with examples of regular point, singular point, isolated singularity and removal singularity.

10. Evaluate

$$\int_0^{\infty} \frac{x^2 dx}{x^4 + 16}$$

11. Find the eigen values and eigen vectors of

$$A = \begin{bmatrix} 1 & -6 & -4 \\ 0 & 4 & 2 \\ 0 & -6 & -3 \end{bmatrix}$$

12. Define mean and median. find the mean and median of the following distribution: (10)

Class:	2000-3000	3000-4000	4000-5000	5000-6000	6000-7000
Frequency :	3	5	20	10	5

13. Let A and B are two independent events. Show that (6+6+3)

(i) A^c and B

(ii) A and B^c

are also independent.

[B^c is complement of B]