



PETRODICE ACADEMY

Head office: Hyderabad branch

Topic: Complex Numbers

Time Allowed: 45 Min

Maximum Marks:25

Read the following instructions carefully.

01. (i) Question Numbers 01 to 05 (05 questions) will carry one mark each.

(ii) Question Numbers 06 to 15 (10 questions) will carry two marks each.

02. Wrong answers carry 33% negative marks. In Q. 01 to Q.05, 1/3 mark will be deducted for each wrong answer and in Q. 06 to Q.15, 2/3 mark will be deducted for each wrong answer. However, there is no negative marking for numerical answer Type questions.

GROUP – I

Each question carries ONE mark

$$5 \times 1 = 5$$

1. For the function of a complex variable $W = \ln Z$ (where, $W = u + jv$ and $Z = x + jy$), the $u = \text{constant}$ lines get mapped in Z -plane as

- a) Set of radial straight lines
- b) Set of concentric circles
- c) Set of confocal hyperbolas
- d) Set of confocal ellipses

2. i^i , where $i^2 = -1$, is given by

- a) 0
- b) $e^{-\pi/2}$
- c) $\pi/2$
- d) 1

3. Assuming $i^2 = -1$, and t is a real number

$$\int_0^{\pi/3} e^{it} dt$$
 is

- a) $\frac{\sqrt{3}}{2} + i\frac{1}{2}$
- b) $\frac{\sqrt{3}}{2} - i\frac{1}{2}$
- c) $\frac{1}{2} + i\frac{\sqrt{3}}{2}$
- d) $\frac{1}{2} - i\frac{\sqrt{3}}{2}$

4. The modulus of the complex number $\left[\frac{3+4i}{1-2i} \right]$ is

- a) 5
- b) $\sqrt{5}$
- c) $1/\sqrt{5}$
- d) 1/5

5. Which one of the following is NOT true for complex number Z_1 and Z_2 ?

Z^* represents conjugate of Z

- a) $\frac{Z_1}{Z_2} = \frac{Z_1 Z_2^*}{|Z_2|^2}$
- b) $|Z_1 + Z_2| \leq |Z_1| + |Z_2|$
- c) $|Z_1 - Z_2| \leq |Z_1| - |Z_2|$
- d) $|Z_1 + Z_2|^2 = 2|Z_1|^2 + 2|Z_2|^2$

GROUP – II

Each question carries TWO mark

$$10 \times 2 = 20$$

1. Roots of the algebraic equation $x^3 + x^2 + x + 1 = 0$ are

- a) +1,+i,-1
- b) +1,-1,+1
- c) 0,0,0
- d) -1,+i,-i

2. Consider the circle $|z - 5 - 5i| = 2$ in the complex plane (x, y) with $z = x + iy$. The minimum distance from the origin to the circle is

- a) $5\sqrt{2} - 2$ b) $\sqrt{54}$
 c) $\sqrt{34}$ d) $5\sqrt{2}$

3. Let $z^3 = z^*$, where z is a complex number not equal to zero. Then z is a solution of

Z^* represents conjugate of Z

- a) $z^2 = 1$ b) $z^3 = 1$
 c) $z^4 = 1$ d) $z^9 = 1$

4. If $z = x + iy$, where x and y are real, the value of $|e^{iz}|$ is

- a) 1 b) $e\sqrt{x^2 + y^2}$
 c) e^y d) e^{-y}

5. e^z is a periodic with a period of

- a) 2π b) $2\pi i$
 c) π d) πi

6. The product of two complex numbers $1+i$ & $2-5i$ is

- a) $7 - 3i$ b) $3 - 4i$
 c) $-3 - 4i$ d) $7 + 3i$

7. The Equation $\sin(z) = 10$ has

- a) No real (or) complex solution
 b) Exactly two distinct complex solutions
 c) A unique Solution
 d) An infinite number of complex solutions

8. The function $f(z) = \frac{z^2+1}{z^2+4}$ is singular at

- a) $z = \pm 2$ b) $z = \pm 1$
 c) $z = \pm i$ d) $z = \pm 2i$

9. For complex number z

$\lim_{z \rightarrow i} \frac{z^2+1}{z^3+2z-i(z^2+2)}$ is

- a) $-2i$ b) $-i$
 c) i d) $2i$

10. For $f(z) = \frac{\sin(z)}{z^2}$, the residue of the pole at $z=0$

Is _____