Avinashilingam Institute for Home Science and Higher Education for Women
Deemed to be University Estd. u/s 3 of UGC Act 1956, Category A by MHRD (now MoE)
Re-accredited with A++ Grade by NAAC. CGPA 3.65/4, Category I by UGC
Coimbatore - 641 043, Tamil Nadu, India

Continuous Internal Assessment Test I –August 2025

Semester I

Class :I UG **Time : 2 Hours**

Branch: Mathematics **Max.Marks: 60**

23BMAC02 –Algebra and Geometry

Course Outcomes:

1. Understand the importance of roots of real and complex polynomials and learn various methods of obtaining roots.
2. Familiarise with relations, equivalence relations and partitions.
3. Employ De Moivre's theorem in a number of applications to solve numerical problems.
4. Recognize consistent and inconsistent systems of linear equations by the row echelon form ofthe augmented matrix, using rank.
5. Find eigenvalues and corresponding eigenvectors for a square matrix.
6. Explain the properties of three dimensional shapes.

Part A **6 x 1 = 6**

Choose the Correct Answer

1.If 3 and 5 are the roots of the equation $f(x) = x^2 - 8x + 15 = 0$,then factors of $f(x)$ are CO1K2

a. $(x-3)(x-5)$ b. $(x+3)(x-5)$ c. $(x-3)(x+5)$ d. $(x+3)(x+5)$

2. If $f(x) = 0$ is an equation of degree 4 is called CO1K2

a. quartic b. quadratic c. cubic d. linear

3. R= {(x,y) ∈ R^2 : $x^2+y^2=1$} is an _____ CO2K1

a.symmetric b.anti symmetric c. equivalence d. not reflexive

4. If f,g: R →R defined by $f(x) = 3x + 2$and $g(x) = x^2$then $(f \circ g)(x) =$ CO2K2

a.$3x^2 - 2$ b.$3x^2 + 2$ c.$(3x+2)^2$ d.$(3x-2)^2$

5. 2+i0 is a point on CO2K1

a. x-axis b.y-axis c. z-axis d . any axis

6. The linear equation $\boldsymbol{6x - 12y = 0}$ has CO3K2

a.unique solution b. two solutions c. infinite solutions d. no solution

Part B **3 x 6 = 18**

Answer ALL questions

7. a.Solve $x^4 - 2x^3 - 21x^2 + 22x + 40 = 0$ whose roots are in arithmetical progression. CO1K3

(or)

7. b. Compute $\frac{z=(1-i)^{10}\left(\sqrt{3}+i\right)^5}{\left(-1-i\sqrt{3}\right)^{10}}$. CO1K3

8.a. Let $\sim$ be an equivalence relation on A. For $a \in A$, show that $x \sim a$ if and only if $\bar{x} = \bar{a}$. CO2K3

(or)

8. b.Evaluate gcd of 420,150. CO2K3

9. a.Find the polar representation of the complex number$z = 1 + cosa + isina, a \in (0,2\pi)$. CO2K3

(or)

9. b. Determine if the following system is consistent. CO3K3

i) $y - 4z = 8$,
ii)$2x - 3y + 2z = 1$,
iii)$5x - 8y + 7z = 1$

Part C **3 x 12 = 36**

Answer ALL questions

10. a. If $\propto_1, \propto_2, \ldots, \propto_n$ are the roots of equation$f(x) = a_0x^n + a_1x^{n-1} + \cdots + a_n = 0, (a_0 \neq 0)$ Prove that the sum of the roots is equal to $-\frac{a_1}{a_0}$, the sum of the products of the roots taken two at a time is equal to $\frac{a_2}{a_0}$ and the sum of the products of the roots taken three at a time is equal to $\frac{-a_3}{a_0}$,finally the product of all the roots is equal to $\frac{(-1)^a n}{a_0}$. CO1K4

(or)

10.b.Find the polar representation of the following complex numbers and determine their extended arguments:i)$z_1 = -1 - i$, ii)$z_2 = 2 + 2i$, iii)$z_3 = -1 + i\sqrt{3}$, iv) $z_4 = 1 - i\sqrt{3}$.

CO1K4

11.a. State and Prove division algorithm. CO2K4

(or)

11.b. Show that the set R^+ of positive real number has the same cardinality as the open interval $(0,1) = \{x \in R | 0 < x < 1\}$. CO2K4

12.a.Prove that for any natural number $n \geq 1, 1^2 + 2^2 + 3^2 + \cdots + n^2 = \frac{n(n+1)(2n+1)}{6}$ by mathematical induction method. CO2K4

(or)

12. b. Row reduce the following matrix to echelon form and locate the pivot columns. CO3K4

$$\begin{bmatrix} 0 & -3 & -6 & 4 & 9 \\ -1 & -2 & -1 & 3 & 1 \\ -2 & -3 & 0 & 3 & -1 \\ 1 & 4 & 5 & -9 & -7 \end{bmatrix}$$

No. of copies: 22