

PDUAM, Tulungia
Sessional Examination 2023
Subject: Science (Mathematics)
Class: B.Sc. 1st Semester
Paper: Classical Algebra

Full Marks: 20

Time: 1 hour

1. Find the values of i^{2023} 1
2. Show that, In general $\arg(Z_1 Z_2) \neq \arg(Z_1) + \arg(Z_2)$ 2
3. State and Prove De Moivre's theorem. 4
(or)

Expand $\cos n\theta$, $\sin n\theta$, and $\tan n\theta$ when n is positive integer and θ is real.

4. Find an upper limit of the real roots of the equation $x^4 - 2x^3 + 3x^2 - 2x + 2 = 0$. 2
5. Apply Descartes' rule of signs to examine the nature of the roots of the equation $x^4 + 2x^2 + 3x - 1 = 0$. 2
6. Solve the equation $2x^3 - x^2 - 18x + 9 = 0$ if two of the roots are equal in magnitude but opposite in sign. 2
7. Answer the following questions (**any two**) 1 × 2 = 2

i) If $A = \begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix}$ and $B = [1 \ -1 \ 0]$, find AB .

ii) Construct a matrix A which is Hermitian but not symmetric.

iii) Determine x , y if

$$2 \begin{pmatrix} x+2 & y+3 \\ 3 & 0 \end{pmatrix} = \begin{pmatrix} 3 & 6 \\ y & 0 \end{pmatrix}^T.$$

8. Find the matrix X such that $X = AX + B$, where $A = \begin{bmatrix} 0 & -1 & 0 \\ 0 & 0 & -1 \\ 0 & 0 & 0 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & 2 \\ 2 & 1 \\ 3 & 3 \end{bmatrix}$.

OR

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9. Find the inverse of the following matrix by Gauss-Jordan elimination method

$$A = \begin{bmatrix} 4 & -8 & 5 \\ 4 & -7 & 4 \\ 3 & -4 & 2 \end{bmatrix}.$$
