21. A One of the roots of the equation $3x^5-4x^4-42x^3+56x^2+27x-36=0$ is $\sqrt{2}+\sqrt{5}$. Calculate the other roots.

OR

B Identify the equation whose roots are the roots of the equation $x^4-x^3-10x^2+4x+24=0$ increased by 2 and hence solve the equation.

22. A Use Cayley-Hamilton theorem to calculate the characteristic equation of A and show that the matrix satisfies the equation. $A=\begin{bmatrix}1 & 1 & 3\\ 5 & 2 & 6\\ -2 & -1 & -3\end{bmatrix}$;

OR

B Estimate the eigenvalues and eigenvectors of the matrix A. $A=\begin{bmatrix}8 & -6 & 2\\ -6 & 7 & -4\\ 2 & -4 & 3\end{bmatrix}$;

23. A Calculate the Radius of curvature at x=y=3a/2 to the curve $x^3+y^3=3axy$.

OR

B Calculate the radius of curvature at the point Θon the curve x=a(Θ+sinΘ), y=a(1-cosΘ).

24. A Formulate the partial differential equations by eliminating the arbitrary function in f(x+y+z,xyz)=0.

OR

B Solve the pde (1+y)p+(1+x)q=z by using Lagrange Method.

25. A Derive reduction formula for $\int_0^{\pi/2} \sin^n x \ dx$

OR

B Evaluate the integral $\int x^3 e^x dx$

8-12-2023

Four Pages
S. No. 31317

23UMAAT01

Reg. No.								

END SEMESTER EXAMINATION NOV/DEC-2023

First Semester

B.Sc CHEMISTRY/ B.Sc PHYSICS

ALLIED MATHEMATICS I – ALGEBRA AND CALCULUS

Time: Three Hours **Maximum: 75 marks**

SECTION A – (15 x 1 = 15 marks)
ANSWER ALL QUESTIONS

1. What is the sum of roots of the equation $x^4-18x^2-3x+2=0$?
   A 0 B -18
   C 1 D 18
2. What are the root of the equation $x^4+3x-1=0$?
   A One real and 3 imaginary B Two real and 2 imaginary
   C 3 real and 1 imaginary D No real roots
3. Select the possible roots of a third degree polynomial.
   A 0 B 2
   C 3 D 1
4. What is the characteristic root of the orthogonal matrix?
   A 0 B unit
   C Unit modulus D real
5. If zero is the eigen value then relate the matrix with the following
   A Non-singular matrix B Singular matrix

C Zero matrix D Unit Matrix

6. Roots of the matrix A are 1,5,10, then choose the eigen values of $10A^{-1}$ is
   A 1,1/5,1/10 B 10,2,1
   C 1,5,10 D 5,10,1
7. If the curves cut at right angles then tell the value of Φ=?
   A 45^0 B 0^0
   C 180^0 D 90^0
8. If the tangents are perpendicular then find m1.m2=?
   A -1 B 0
   C 1 D 45^0
9. Curvature at P is equal to
   A The radius of curvature B The square of radius of curvature
   C The reciprocal of radius of curvature D The square root of radius of curvature
10. Calculate the pde of all spheres with centres on the z axis?
    A py=qx B py=qxy
    C Px=qy D pxy=qy
11. Represent the complete solution of z=px+qy-pq.
    A z=ax+by-pq B z=ax+by-ab
    C z=ax-by-pq D Cannot be deermined
12. Represent the complete solution of pq=1.
    A z=ax+y/a+c B z=ax+a/y+c
    C z=axy+c D z=px+qy+c
13. Evaluate the value of the integral $\int_0^{\frac{\pi}{4}} tanx\, dx$
    A logv2 B log1
    C Log(π/2) D 0

14. Evaluate the integral value of odd function from –a to +a.
    A 1 B 2 * integral from 0 to a
    C 0 D Data insufficiency
15. Evaluate the value of the integral $\int_0^{\pi/2} \sin^n x \ \ dx$ at n=7.
    A 63/512 B 0
    C 48/105 D 105/48

SECTION B – (2 x 5 = 10 marks)
ANSWER ANY TWO QUESTIONS

16. Transform the equation $x^4-4x^3-18x^2-3x+2=0$ into an equation with the third term absent.

17. Show that the Matrices A, B and C given below have the same eigenvalues. $A=\begin{bmatrix}0 & a & b\\ a & 0 & c\\ b & c & 0\end{bmatrix}; B=\begin{bmatrix}0 & b & a\\ b & 0 & c\\ a & c & 0\end{bmatrix}; C=\begin{bmatrix}0 & c & b\\ c & 0 & a\\ b & c & 0\end{bmatrix}$

18. Estimate the radius of curvature of the curve $xy^2=a^3-x^3$ at the point (a,0).

19. Form a partial differential equation of any sphere of radius r having its centre in the xoy plane by eliminating constants.

20. Estimate the value of integral $\int e^x sinx\, dx$.

SECTION C – (5 x 10 = 50 marks)
ANSWER ALL QUESTIONS