

Applied Mathematics -I

Q1. (i) Solve $(1 - i)^{\frac{4}{3}}$ (ii) Solve $(1 + i)^{\frac{2}{3}}$.

Q2 Find values of a, b, c and d if

$$\cos(6\theta) = a\cos^6(\theta) + b\cos^4(\theta)\sin^2(\theta) + c\cos^2(\theta)\sin^4(\theta) + d\sin^6(\theta)$$

Q3. If $5\sinh(x) - \cosh(x) = 5$ find $\tanh(x)$.

Q4. Solve the following equations by Gauss-Seidel Method (Perform Two Iterations only)

$$28x + 4y - z = 32$$

$$2x + 17y + 4z = 35$$

$$x + 3y + 10z = 24$$

Q5 Solve the following equations by Gauss-Seidel Method (Perform Two Iterations only)

$$3x - 0.1y - 0.2z = 7.85$$

$$0.1x + 7y - 0.3z = -19.3$$

$$0.3x - 0.2y + 10z = 71.4$$

Q6 Show that

$$\cos^6 \theta + \sin^6 \theta = \frac{1}{8}[3\cos(4\theta) + 5]$$

Q7 Show that

$$\cos^8 \theta + \sin^8 \theta = \frac{1}{64}[\cos 8\theta + 28\cos 4\theta + 35]$$

Q8. If $\sin(\theta + i\phi) = \tan \alpha + i \sec \alpha$, then Prove that $\cos 2\theta \cosh 2\phi = 3$

Q9 Prove that If $\sin(\theta + i\phi) = r(\cos(\alpha) + i \sin(\alpha))$, then

$$r^2 = \frac{1}{2}[\cosh(2\phi) - \cos(2\theta)]$$

Q10. Find a root of $e^{-x} - \sin(x) = 0$ by Newton- Raphson Method (Perform THREE Iterations only)

Q11 Find a root of $3x - \cos x - 1 = 0$ by Regula Falsi Method (Perform THREE Iterations only)

Q12 Solve $x^4 - x^3 + x^2 - x + 1 = 0$

Q13 Solve $(\frac{1}{2} + i\frac{\sqrt{3}}{2})^{3/4}$ and Show that their continued product is 1.

Q14 If $\cosh(x) = \sec(\theta)$, Prove that

(i) $x = \log(\sec(\theta) + \tan(\theta))$

(ii) $\theta = \frac{\pi}{2} - 2 \tan^{-1}(e^{-x})$