

B.Sc. CHEMISTRY
First Semester
TRIGONOMETRY
(BSC – 103 A)

Duration: 1 Hr. 30 mins.

Full Marks: 35

PART A (Objective)=10
PART-B (Descriptive)=25

PART-B (Descriptive)

Duration: 1 hrs. 20 mins.

Marks: 25

1. Answer any two questions from the following: (2×10=20)

a) Find the square root of $x^2 + \frac{1}{x^2} - \frac{4}{i} \left(x + \frac{1}{x}\right) - 2$. If $\sqrt{a + ib} = x + iy$,

then show that $\sqrt{a - ib} = x - iy$ (5+5=10)

b) Write the properties of cube roots of unity. Find all the values of $(1 + i)^{\frac{1}{2}}$

(6+4=10)

c) Explain Amplitude of $z = x + iy$. Derive DeMoivre's Theorem. (2+8=10)

d) Expand $\cos^2 \theta$ in powers of θ . Find the limiting value of $\frac{\tan 2\theta - 2 \sin \theta}{\theta^2}$, when θ tends

to zero (5+5=10)

2. If $m = u - e \sin u$ and if e be so small that its powers above the second may be neglected, then show that (5)

$$u = m + e \sin m + \frac{1}{2} e^2 \sin 2m.$$

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Duration: 10 minutes

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(PART A - Objective Type)

I. Choose the correct answer:

1×10=10

- The sum of the three cube roots of unity is
(i) One (ii) zero
(iii) three (iv) two
- The product of two imaginary cube roots of unity is
(i) Unity (ii) Null
(iii) two (iv) None of these
- Eachcube root of unity is the square of the other.
(i) real (ii) imaginary
(iii) sum of (iv) None of these
- The amplitude can evidently have an infinite number of values differing from each other by complete multiples of
(i) π (ii) 3π
(iii) 2π (iv) None of these
- If $z=x+iy$ then the relation $z+\bar{z}$ gives
(i) $2I(z)$ (ii) $2\text{Re}(z)$
(iii) $2Q(z)$ (iv) None of these
- If $x^n + \frac{1}{x^n} = 2 \cos n\epsilon$, then $x + \frac{1}{x} = 2 \cos \epsilon$,
(i) $x + \frac{1}{x} = 2 \cos \epsilon$ (ii) $x - \frac{1}{x} = 2 \cos \epsilon$
(iii) $x + \frac{1}{x} = 2 \sin \epsilon$ (iv) None of these
- The series expansion $1 - \frac{\alpha^2}{2!} + \frac{\alpha^4}{4!} - \dots + (-1)^n \frac{\alpha^{2n}}{(2n)!} + \dots$ is the expansion of
(i) $\sin \alpha$ (ii) $\cos \alpha$
(iii) $\tan \alpha$ (iv) None of these

8. The value of $\cos x$ is

(i) $\frac{1}{2}(e^{ix} + e^{-ix})$

(ii) e^{ix}

(iii) $\frac{1}{2}(e^{ix} - e^{-ix})$

(iv) None of these

9. Any positive integral power of ω is equal to

(i) $1, \omega, \omega^2$

(ii) $1, \omega, \omega^2$

(iii) $1, -\omega, -\omega^2$

(iv) 0

10. The square root of $-i$ is

(i) $\pm \frac{(1-i)}{\sqrt{2}}$

(ii) $\pm \frac{(1+i)}{\sqrt{2}}$

(iii) $1+i$

(iv) Cannot be defined
