

MATHEMATICS

- The quadratic equation x²-6x+1=0 and x²-cx+6=0 have one root in common. The other roots of the first and second equations are integers in the ratio 4:3 then the common root is
- (A) 3 (B) 2 (C) 1 (D) 4 2. Let $\cos(\alpha + \beta) = \frac{4}{5}$ and let $\sin(\alpha - \beta) = \frac{5}{13}$, where $0 \le \alpha, \beta \le \frac{\pi}{4}$, then $\tan 2\alpha =$ (A) $\frac{56}{33}$ (B) $\frac{19}{12}$ (C) $\frac{13}{12}$ (D) $\frac{33}{56}$ 3. The value of $\int_{0}^{1} \frac{8\log(1+x)}{1+x^2} dx$ is (A) $\frac{\pi}{8}\log 2$ (B) $\frac{\pi}{2}\log 2$ (C) log 2 (D) $\pi \log 2$
- 4. If $X = \{4^n 3n 1: n \in N\}$ and $Y = \{9(n-1): n \in N\}$, Where N is the set of natural numbers, then XUY is equal to
 - (A) X
 - (B) Y
 - (C) N
 - (D) Y-X



- 5. The area of the region described by A={(x,y): $x^2 + y^2 \le 1$ and $y^2 \le 1-x$ } is:
- (A) $\frac{\pi}{2} \frac{2}{3}$ (B) $\frac{\pi}{2} + \frac{2}{3}$ (C) $\frac{\pi}{2} + \frac{4}{3}$ (D) $\frac{\pi}{2} - \frac{4}{3}$

PHYSICS

1. An object is immersed in a fluid. In order that the object becomes invisible, it should

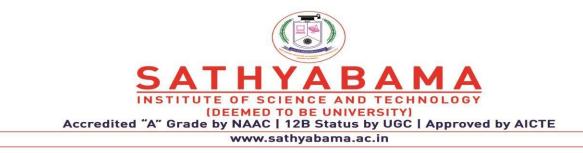
- (A) behave as perfect reflector
- (B) have refractive index one
- (C) absorb all light falling on it
- (D) have refractive index matching with that of the surrounding liquid

2. If the rms velocity of the hydrogen molecules at NTP is 1.84 km/s, calculate the rms velocity of the oxygen molecules at NTP. Molecular weight of hydrogen and oxygen are 2 and 32 respectively.

- (A) 1.47 km/s
- (B) 0.94 km/s
- (C) 1.84 km/s
- (D)0.47 km/s

3. Using an AC voltmeter, the potential difference in the electrical line in a house is read to be 234V. If the line frequency is 50Hz, the equation of the line voltage is

- (A) 220 Sin 100 πt
- (B) 165 Sin 100 πt
- (C) 440 Sin 100 πt
- (D) 331 Sin 100 πt



- 4. The fact that light of transverse wave derive its evidence by the support from the observation that
 - (A) light wave undergo reflection
 - (B) light can be diffracted
 - (C) light travels in waves
 - (D) light shows polarizing effects

5. Refractive index of material is equal to tangent of polarizing angle. It is called

- (A) Brewster's law
- (B) Lambert's law
- (C) Malu's law
- (D) Bragg's law

CHEMISTRY

1. In the standardization of $Na_2S_2O_3$ using $K_2Cr_2O_7$ by iodometry, the equivalent weight of $K_2Cr_2O_7$ is

- (A) Molecular weight / 2
- (B) Molecular weight / 6
- (C) Molecular weight / 3
- (D) Same as molecular weight

2. What product are expected from the disproportionation reaction of hypochlorous acid ?

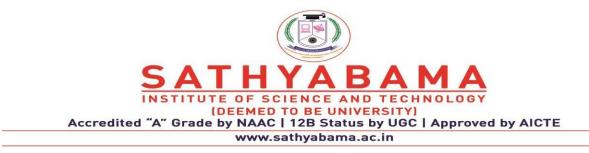
- (A) $HCIO_3$ and CI_2O
- (B) HClO₂ and HClO₄
- (C) HCl and Cl₂O
- (D) HCl and HClO₃

3. Native silver metal forms a water soluble complex with a dilute aqueous solution of NaCN in presence of

- (A) Nitrogen
- (B) Oxygen
- (C) Carbon dioxide
- (D) Argon

4. The number and types of bonds between two carbon atoms in calcium carbide are

- (A) One sigma, one pi
- (B) One sigma, two pi
- (C) Two sigma, one pi
- (D) Two sigma, two pi



5. Identify the incorrect statement among the following

- (A) Ozone reacts with SO₂ to give SO₃
- (B) Silicon reacts with NaOH(aq) in the presence of air to give Na_2SiO_3 and H_2O
- (C) Cl_2 reacts with excess of NH_3 to give N_2 and NH_4Cl
- (D) Br_2 reacts with hot and strong NaOH solution to give NaBr, NaBrO₄ and H₂O