SATHYABAMA
INSTITUTE OF SCIENCE AND TECHNOLOGY
(DEEMED TO BE UNIVERSITY)
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SATHYABAMA ALL INDIA ENTRANCE EXAMINATION
SAMPLE QUESTION PAPER

MATHEMATICS

1. The quadratic equation x^2-6x+1=0 and x^2-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) π 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

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5. The area of the region described by A={(x,y): $x^2 + y^2 \leq 1$ and $y^2 \leq 1-x$} 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

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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) $HClO_3$ and Cl_2O
(B) $HClO_2$ and $HClO_4$
(C) HCl and Cl_2O
(D) HCl and $HClO_3$

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

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5. Identify the incorrect statement among the following

(A) Ozone reacts with SO_2 to give SO_3

(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, $NaBrO_4$ and H_2O