MATHS:

1. If A, B, C are acute positive angles then

sin A sinBsinC

sin A sinB sinB sinC sinC sin Ais

(A) < 8 (B) 8

(C) 2 (D) none of these

2. The value of cos n+ cos n2+ cos n3+ ……+ cos nn 1

(A) 0 (B) n

(C) n (D) none of these

3. The number of values of x satisfying the condition sinx + sin 5x = sin 3x in the interval [0,] is

(A) 6 (B) 2

(C) 10 (D) 0

4. If 2cos x + 2 cos 3x = cos y, 2 sin x + 2sin 3x = sin y, then the value of cos 2x is

(A) –87

(B) 81

(C) –81

(D) 87

5. If = sin2+ cos4

, then for all real values of

(A) 3/4 4/3 (B) 4/3 2

(C) 3/4 1 (D) 1 2

6. If the angles A and B of the triangle ABC satisfy the equation

sin A + sin B = 3(cos B – cos A), then they differ by

(A) 6

(B) 3(C) 4(D) 2

7. If the radii of the circumcircle and incircle of an equilateral triangle are respectively 12cm and

8cm, each side is equal to

(A) 20 cm (B) 28 cm

(C) 24 cm (D) 32 cm

8. The expression ( )( )( )( )c a b a b ca b c b c a

is equal to

(A) cos2(A/2) (B) sin2(A/2)

(C) cot2(A/2) (D) tan2(A/2)

40. In a triangle ABC if cCacos A tan

, then sin(B + C) is equal to 21. For the reaction C(s) + CO2 (g) 2CO (g) , the partial pressure of CO2 and CO are 4 and 8 atm. respectively. Kp for the reaction is:

(A) 16 (B) 2

(C) 0.5 (D) 4

CHEMISTRY:

1. The equilibrium constant for the reaction Br2 2Br at 500K and 700K are

1 10-10 and 1 10-5respectively. The reaction is:

(A) endothermic (B) exothermic

(C) Fast (D) slow

2 1 mL of 0.01N HCl is added to 999 mL solution 0.1 N Na2SO4 .The pH of the resulting

solution will

(A) 2 (B) 7

(C) 5 (D) 1

3. When equal volumes of the following solution are mixed, precipitation of AgCl

(Ksp = 2.8 10-10) will occur only with:

(A) 10-4 M(Ag+) and 10-4 M (Cl-) (B) 10-4 M(Ag+) and 10-5 M (Cl-)

(C) 10-5 M(Ag+) and 10-5 M (Cl-) (D) in all cases

4. If the pkb for the fluoride ion at 25o C is 10.83. The ionization constant of the HF in water at

this temperature is :

(A) 1.74 10-5

(B) 3.52 10-3

(C) 6.75 10-4

(D) 5.38 10-2

6. Which of the following is most acidic:

(A) H2O (B) H2S

(C) H2Se (D) H2Te

7. Which one is correct?

(A) G H T S

(B) G H T S

(C) T SHG

(D) G H T S

8. Maximum stable carbocation is:

(A) CH3 CH2C(OH) CH3 (B) CH3 CH2CH CH3

(C) CH3 CH2CH2 (D) CH3 CH2 CH2CH2

9. Maximum heat of hydrogenation:

(A) H2C = CH – CH3 (B) H3C – CH = CH – CH3(C) H3C –CH3C|= CH2 (D) H2C = CH2

30. Major product in the chlorination of isobutane is:

(A) isobutyl chloride (B) t-butyl chloride

(C) n-butyl chloride (D) none of these

(A) cos B cos C (B) cosA cos C

(C) cosA cos B (D) sinB sinC

PHYSICS:

1. There are 4 1024 gas molecules in vessel at 50 K temperature. The pressure of the gas in the vessel is 0.03 atmosphere. The volume of the vessel is

(A) 0.1 m3

(B) 2.0 m3

(C) 0.45 m3

(D) 0.98 m3

2. A gas mixture consists of two moles of oxygen and 4 moles of argon at temperature T. Neglecting all vibrational modes, the total internal energy of the system is

(A) 4RT (B) 15RT

(C) 3RT (D) 11RT

3. A clock keeps correct time at 250C has a pendulum made of a metal. The temperature falls to 00C. If the coefficient of linear expansion of the metal is 1.9 10-5 / 0C, then the number of seconds the clock gains per day is

(A) 10.12 sec (B) 20.52 sec

(C) 30.75 sec (D) 41 sec

4. A body in a room cools from 850C to 800C in 5 minutes. The time taken to cool from 800C to 750C is

(A) 5 minutes

(B) less than 5 minutes

(C) more 5 minute

(D) less or more than 5 minutes depending on the nature.

5. A carnot engine works between temperature 7270C and 270C. The efficiency of the engine is

(A) 0 % (B) 30 %

(C) 70 % (D) 100 %

6. P – V graphs for two gases during adiabatic process are shown in the adjoining diagram plots 1 and 2 should correspond respectively to

(A) He and O2 (B) O2 and He

(C) He and Ar (D) O2 and N2PV12

7. There are two identical vessels filled with equal amount of ice. The vessels are of different metals. If the ice melts in the two vessels in 20 and 35 minutes respectively, the ratio of the thermal conductivities of two metals is (A) 1: 2

(B) 49:16

(C) 4 : 7 (D) 7 : 4

8. A small hole is made in the window shutter of a 6m wide room. The height of the image of a tree 30 m from the window formed on the opposite wall is 1m. Then the actual height of the tree is

(A) 5 m (B) 10 m

(C) 15 m (D) 2.5 m

9. There is a prism of refractive index equal to 2and the refracting angle equal to 300one of the refracting surfaces of the prism is polished. A beam of monochromatic light will retrace its path if its angle of incidence over the refracting surface of the prism

(A) 00

(B) 300

(C) 450

(D) 600

10. The focal length of a lens does not depend upon

(A) radius of curvature of the surfaces (B) material of the lens

(C) refractive index of the outer medium (D) the circumference of the lens