**AIEEE Previous Years Papers Solutions**

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| http://www.askiitians.com/images/image_40.jpg |
| [AIEEE Paper](http://www.askiitians.com/aieee/AIEEE-Past-Papers) > 2008-Chemistry Solutions  **AIEEE 2008 Chemistry Answers and Solutions**  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  **ANSWERS**   |  |  |  |  | | --- | --- | --- | --- | | 1) 4 | 2) 3 | 3) none | 4) 2 | | 5) 4 | 6) 2 | 7) 2 | 8) 1 | | 9) 1 | 10) 3 | 11) 3 | 12) 1 | | 13) 4 | 14) 2 | 15) 2 | 16) 3 | | 17) 1 | 18) 3 | 19) 1 | 20) 3 | | 21) 1 | 22) 3 | 23) 1 | 24) 1 | | 25) 1 | 26) 1 | 27) 2 | 28) 3 | | 29) 4 | 30) 4 | 31) 4 | 32) 3 | | 33) 4 | 34) 2 | 35) 4 |  |     **1.**  Momentum = mass x velocity  Momentum = 3.513 x 5.00 = 17.565 kg m sec-1  Momentum in three significant digit = 17.6 kg m sec-1    **2.**  Moment of Inertia of a body is the inertia of a rotating body with respect to the axis of rotation.  Moment of Inertia of the square plate at the center of the axis (vertical axis) = ma2/6  Moment Inertia at the axis passing through corner = Icenter + m d2 = ma2 + m(a/√2)2 = 2/3 ma2    **3.**          Speed of the sound in gas          V = √(γRT/m)          R = gas constant(8.314 J/mol K)  T = the absolute temperature  M = the molecular weight of the gas (kg/mol)  g = adiabatic constant = cp/cv  gO2 = 7/5  gHe = 5/3  MO2 = 32  MHe = 4  460 = √(7RT/5x32)                       ...... (i)  VHe = √(5RT/3x4)                         ...... (ii)  By solving (i) and (ii) VHe = 1419 m sec-1 |

**6****.**

Two full turns of the circular scale of a screw gauge cover a distance of 1 mm.

Therefore one full turns of the circular scale of a screw gauge cover a distance of 0.5 mm.

Reading = MSR + CSR x LC - error L.C (least count) = 0.5/50 = 0.01

So the diameter of wire = 3mm + 35 x L.C - (-0.03)

the diameter of wire = 3mm + 35 x 0.01 mm + 0.03mm

the diameter of wire = 3.38

**7****.**

Internal energy of ideal gas (U) = cvnRT

Assume the final temperature = T

Internal energy of first gas before removing the partition = cvn1RT1

Internal energy of second gas before removing the partition = cvn2RT2

Internal energy of first gas after removing the partition = cvn1RT

Internal energy of second gas after removing the partition = cvn2RT

Change in energy of first gas = cvn1RT - cvn1RT1

Change in energy of second gas = cvn2RT - cvn2RT2

As the container is insulated, so total change of energy = 0

(cvn1RT - cvn1RT1 ) + (cvn2RT - cvn2RT2 ) = 0

n1R(T - T1) + n2R(T - T2 ) = 0                                .........(i)

n1R= P1V1/T1                                                       .........(ii)

n2R= P2V2/T2 .........(iii)

By solving (i),(ii) and (iii) you get the answer as = T1T2 (P1V1 + P2V2) / P1V1T2 + P2V2T1

**8.**

Mutual inductance of two solenoid two long thin solenoids, one wound on top of the other

M = m0N1N2LA

N1 = total number of turns per unit length for first solenoid

N2 = number of turns per unit length for second solenoid

A = cross-sectional area

L = length of the solenoid.

A = 10cm2 = 10/10000 = 0.001m2

L = 20cm = 0.2 m

N1 (turns per unit length) = 300/0.2 = 1500

N2 (turns per unit length) = 400/0.2 = 2000

M = 4p x 10-7 x 1500 x 2000 x 0.001 x 0.2

M = 2.4p x 10-4 H

**9.**

Soap solution has less surface tension than water.

Soap solution and water have almost same density.

As water has more surface tension so it has more height.

Refer following formula

The height to which the liquid can be lifted is given by

h = height of the liquid lifted

T = surface tension

r = radius of capillary tube

        h = 2T / ρrg

**10****.**

**As per Bragg's law**

nl = 2d sinθ

where

θ = angle between the surface and the ray = 90-30=60°

nl = 2 . 10-10 . sin30°

(nl)2 = 3 x 10-20

**As per Davisson and Germer experiment**

λ = h/√2meV

2meV = (h/l)2

29.12 x 10-50 V = ((6.6 x 10-34)/ l)2

Vl2 = 1.496 x 10-18

V x 3 x 10-20 = 1.496 x 10-18 n2

V = 50 n2

n → it is integer value (it can 1,2,3,4,...)

If we replace n=1 then we get V = 50.

**11.**

**As per Bragg's law**

nλ = 2d sinθ

where

n = integer (based upon order)

λ = wavelength

d = distance between the planes

θ = angle between the surface and the ray

So,

θ = 90° - i

nλ = 2d sin(90°-i)

nλ = 2d cosi

**13.**

**Escape velocity**

Escape velocity from a body of mass M and radius r is

So escape velocity is directly proportional to root of mass and inversely proportional to root of radius

So the escape velocity from the surface of the planet would be

Ve = 11 x √10 x √10

Ve = 110 km s-1

**15.**

ρ2 has the maximum density as it is at the bottom

ρ1 has the least density as it is at the top

Therefore, ρ1 < ρ3 < ρ2

**20.**

Surface area of hemisphere = 2pr2

E = r j = r(I/2pr2)

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By solving equation

VB - VC due to current I at point A will be

 ρI / 2πa -  ρI / 2πa(a + b)                     ...... (i)

In the sanme way, VC-VB due to current I at point D will be

    ρI / 2πa +  ρI / 2πa(a + b)                   ...... (ii)

By adding (i) and (ii)

VB - VC =  ρI / πa +  ρI / πa(a + b)

**21.**

        Surface area of temperature = 2pr2

        r(I/2pr2) VB - VC due to current I at point A will be

        j = I/2πr2

        Therefore, E = rj = ρI/2πr2

**22.**

        A vernier scale provided on the microscope

**23.**

        Magnetic Field around a wire (B)

        B = μ0I/2πr2

      where

        I = current

        r = distance from wire

        B = (4 π X 10-7 x 100) / (2 x π x 4) =  5 x 10-6 southward

Direction is southward: Try to do cross product between the direction of current and radius. You will get the direction as southward.

**25.**

Magnetic field is a vector field in a space that exert force on a moving electric charge. Init of magnetic field strength is Tesla.

One Tesla is a strength measured as force (Newton) on a wire of unit length (meter) with unit electric current (Ampere). Nm-1A-1

MT-1C-1

**26.**

        Parallel to Plate Capacitor

        C = 9pF = κ ε0 A/d

        where

C = [Farad (F)]

κ = dielectric constant

A = Area of plate

d = distance between the plate

ε0 = permittivity of free space (8.85 X 10-12 C2/N m2)

Initially there was no dielectric, so κ = 1, so

C = 9pF =  ε0 A/d                          ............ (i)

After applying the dielectric, assume that the equivalent capacitance is = C

1/C = 1/C1 + 1/C2 = (d/3) / Aε0κ1 + (2d/3) / Aε0κ2 ................(ii)

Replace κ1=3 and κ1=6 and solve (i) and (ii)

The equivalent capacitance C = 40.5 pF

**27.**

        Kinetic Energy (K) = 1/2 mv2

Mass of athlete is between 45 to 90 kg.

Assume mass of athlete is between 70 kg.

velocity of athlete 100/10 = 10 m/sec

K = 1/2 x 70 x 10 x 10 = 3500 J

So answer is 2,000 J - 5,000 J

**31.**

        er is greater than one for any type of material

Value of mr is between 1 and 0 for diamagnetic material.

**34.**

The current will flow into the resistor if any of the input (A or B) has the value as 1 (i.e. TRUE).

The current will NOT flow into the resistor if both the input (A or B) has the value as 0 (i.e. FALSE).

A(true) OR B(true) : current will flow into the resistor

A(true) OR B(false) : current will flow into the resistor

A(false) OR B(true) : current will flow into the resistor

A(false) OR B(false) : current will NOT flow into the resistor

So the circuit is OR.

**35.**

Electron is attracted towards the origin by a force k/r where 'k' is a constant and 'r' is the distance

Therefore,

k/r = mv2/r

Kinetic Energy = 1/2 mv2 = k/2 = constant. So Tn independent of n

**As per Bohr's model**

L = (angular momentum) = nh/2π

mvr = nh/2π

√k/m = nh/2π So r is proportional to n (h is constant (Planck's constant))