AIPMT 2013

Q.1 In an experiment four quantities a, b, c and d are measured with percentage error 1%, 2%, 3% and 4% respectively. Quantity P is calculated as follows : $P = a^3b^3/cd$ % error in P is –

1. 14%
2. 10%
3. 7%
4. 4%

Ans. 1

Q.3 A stone falls freely under gravity. It covers distances h1, h2 and h3 in the first 5 seconds, the next 5 seconds and the next 5 seconds respectively. The relation between h1, h2 and h3 is –

1. $h_1=2h_2=3h_3$
2. $h_1=h_2/3=h_3/5$
3. $h_2=3h_1$ and $h_3=3h_2$
4. $h_1=h_2=h_3$

Ans. 2

Q.5 The upper half of an inclined plane of inclination θ is perfectly smooth while lower half is rough. A block starting from rest at the top of the plane will again come to rest at the bottom, if the coefficient of friction between the block and lower half of the plane is given by –

1. $\mu = 1/\tan\theta$
2. $\mu = 2/\tan\theta$
3. $\mu = 2\tan\theta$
4. $\mu = \tan\theta$

Ans. 3

Q.6 A uniform force of $(3\hat{i} + \hat{j})$ newton acts on a particle of mass 2 kg. Hence the particle is displaced from position $(2\hat{i} + \hat{k})$meter to position $(4\hat{i} + 3\hat{j} - \hat{k})$ meter. The work done by the force on the particle is -

1. 9 J
2. 6 J
3. 13 J
4. 15 J

Ans. 1

Q.7 An explosion breaks a rock into three parts in a horizontal plane. Two of them go off at right angles to each other. The first part of mass 1 kg moves with a speed of 12 ms–1 and the second part of mass 2 kg moves with 8 ms–1 speed. If the third part files off with 4 ms–1 speed, then its mass is -

1. 3 kg
2. 5 kg
3. 7 kg
4. 17 kg

Ans. 2

Q.9 A small object of uniform density rolls up a curved surface with an initially velocity 'v'. It reaches up to a maximum height of $3v^2/4g$ with respect to the initial position. The object is -

1. Ring
2. Solid sphere
3. Hollow sphere
4. Disc

Ans. 4

Q.10 A body of mass 'm' is taken from the earth's surface to the height equal to twice the radius (R) of the earth.
The change in potential energy of body will be –

1. Mg 2R
2. 2/3mgR
3. 3 mgR
4. 1/3 mgR

Ans. 2

Q.11 Infinite number of bodies, each of mass 2 kg are situated on x-axis at distances 1m, 2m, 4m, 8m, …,respectively, from the origin. The resulting gravitational potential due to this system at the origin will be -

1. -G
2. -8/3 G
3. -4/3 G
4. -4 G

Ans. 4

Q.12 The following four wires are made of the same material. Which of these will have the largest extension when the same tension is applied ?

(1) length = 50 cm, diameter = 0.5 mm
(2) length = 100 cm, diameter = 1 mm
(3) length = 200 cm, diameter = 2 mm
(4) length = 300 cm, diameter = 3 mm

Ans. 1

Q.13 The wet ability of a surface by a liquid depends primarily on -

(1) viscosity
(2) surface tension
(3) density
(4) angle of contact between the surface and the liquid

Ans. 4

Q.14 The molar specific heats of an ideal gas at constant pressure and volume are denoted by Cp and Cv, respectively. If $\gamma = C_P/C_V$ and R is the universal gas constant, then Cv is equal to –

(1) $1+\gamma/1-\gamma$
(2) $R/(\gamma-1)$
(3) $(\gamma-1)R$
(4) γR

Ans. 2

Q.15 A piece of iron is heated in a flame. It first becomes dull red then becomes reddish yellow and finally turns to white hot. The correct explanation for the above observation is possible by using -

(1) Stefan's law
(2) Wien's displacement law
(3) Kirchhoff's law
(4) Newton's law of cooling

Ans. 2

Q.17 During an adiabatic process, the pressure of a gas is found to be proportional to the cube of its temperature. The ratio of C_P/C_V for gas is –

(1) 4/3
(2) 2
(3) 5/3
(4) 3/2

Ans. 4

Q.19 The amount of heat energy required to raise the temperature of 1 g of Helium at NTP, from T1 K to T2 K is –

(1) 3/8 NaKB(T_2-T_1)
(2) 3/2 NaKB(T_2-T_1)
(3) 3/4 NaKB(T_2-T_1)
(4) 3/2 NaKB(T_2/T_1)

Ans. 1

Q.20 A wave travelling in the +ve x-direction having displacement along y-direction as 1m, wavelength 2π m and $1/\pi$ Hz frequency of is represented by–

(1) Y=sin (x-2t)
(2) Y=sin(2π x-2π t)
(3) Y=sin(10π x-20π t)
(4) Y=sin(2π x+2π t)

Ans. 1

Q.21 It we study the vibration of a pipe open at both ends, then the following statement is not true -

(1) Open end will be antinode
(2) Odd harmonics of the fundamental frequency will be generated
(3) All harmonics of the fundamental frequency will be generated
(4) Pressure change will be maximum at both ends

Ans.4

Q.22 A source of unknown frequency gives 4 beats/s, when sounded with a source of known frequency 250 Hz. The second harmonic of the source of unknown frequency gives five beats per second, when sounded with a source of frequency 513 Hz. The unknown frequency is -

(1) 254 Hz
(2) 246 Hz
(3) 240 Hz
(4) 260 Hz

Ans. 1

Q.25 A wire of resistance 4 Ω is stretched to twice its original length. The resistance of stretched wire would be -

(1) 2 Ω
(2) 4 Ω
(3) 8 Ω
(4) 16 Ω

Ans. 4

Q.26 The internal resistance of a 2.1 V cell which gives a current of 0.2A through a resistance of 10 Ω is -

(1) 0.2 Ω
(2) 0.5 Ω
(3) 0.8 Ω
(4) 1.0 Ω

Ans. 2

Q.27 The resistances of the four arms P, Q, R and S in a Wheatstone's bridge are 10 ohm, 30 ohm, 30 ohm and 90 ohm, respectively. The e.m.f. and internal resistance of the cell are 7 volt and 5 ohm respectively. If the galvanometer resistance is 50 ohm, the current drawn from the cell will be -

(1)1.0 A
(2)0.2 A
(3)0.1 A
(4)2.0 A

Ans. 2

Q.28 When a proton is released from rest in a room, it starts with an initial acceleration a0 towards west. When it is
projected towards north with a speed v_0 it moves with an initial acceleration $3a_0$ toward west. The electric and magnetic fields in the room are –

1. ma_0/e west, $2ma_0/ev_0$ up
2. ma_0/e west, $2ma_0/ev_0$ down
3. ma_0/e west, $3ma_0/ev_0$ up
4. ma_0/e west, $3ma_0/ev_0$ down

Ans. 2

Q.29 A current loop in a magnetic field -

1. experiences a torque whether the field is uniform or non-uniform in all orientations
2. can be in equilibrium in one orientation
3. can be in equilibrium in two orientations, both the equilibrium states are unstable
4. can be in equilibrium in two orientations, one stable while the other is unstable

Ans. 4

Q.32 A coil of self-inductance L is connected in series with a bulb B and an AC source. Brightness of the bulb
decreases when -

(1) frequency of the AC source is decreased
(2) number of turns in the coil is reduced
(3) a capacitance of reactance XC = XL is included in the same circuit
(4) an iron rod is inserted in the coil

Ans. 4

Q.33 The condition under which a microwave oven heats up a food item containing water molecules most efficiently is -

(1) The frequency of the microwaves must match the resonant frequency of water molecules
(2) The frequency of the microwaves has no relation with natural frequency of water molecules
(3) Microwaves are heat waves, so always produce heating
(4) Infra-red waves produce heating in a microwave oven

Ans. 1

Sol. In the presence of microwave water molecules oscillates the frequency of microwave and large heat is developed.

Q.34 Ratio of longest wave lengths corresponding to Lyman and Balmer series in hydrogen spectrum is –

1. 5/27
2. 3/23
3. 7/29
4. 9/31

Ans. 1

Q.35 The half-life of a radioactive isotope 'X' is 20 years. It decays to another element 'Y' which is stable. The
two elements 'X' and 'Y' were found to be in the ratio 1 : 7 in a sample of a given rock. The age of the rock
is estimated to be -

(1) 40 years
(2) 60 years
(3) 80 years
(4) 100 years

Ans. 2

Q.36 A certain mass of Hydrogen is changed to Helium by the process of fusion. The mass defect in fusion reaction is 0.02866 u. The energy liberated per u is – (Given 1 u = 931 MeV)

(1) 2.67 MeV
(2) 26.7 MeV
(3) 6.675 MeV
(4) 13.35 MeV

Ans. 3

Q.37 For photoelectric emission from certain metal the cutoff frequency is ν . If radiation of frequency 2ν impinges on the metal plate, the maximum possible velocity of the emitted electron will be (m is the electron mass)–

(1) $\sqrt{hv/(2m)}$
(2) $\sqrt{hv/m}$
(3) $\sqrt{2hv/m}$
(4) $2\sqrt{hv/m}$

Ans. 3

Q.39 A plano convex lens fits exactly into a plano concave lens. Their plane surfaces are parallel to each other. If lenses are made of different materials of refractive indices μ 1 and μ 2 and R is the radius of curvature of the curved surface of the lenses, then the focal length of the combination is –

(1) $R/2(\mu_1+\mu_2)$
(2) $R/2(\mu_1-\mu_2)$
(3) $R/2(\mu_1-\mu_2)$
(4) $2R(\mu_1-\mu_2)$

Ans. 3

Q.40 For a normal eye, the cornea of eye provides a converging power of 40D and the least converging power of the eye lens behind the cornea is 20D. Using this information, the distance between the retina and the cornea eye lens can be estimated to be –

(1) 5 cm
(2) 2.5 cm
(3) 1.67 cm
(4) 1.5 cm

Ans. 3

Q.41 In Young's double slit experiment, the slits are 2mm apart and are illuminated by photons of two wavelengths λ 1 = 12000 Å and λ 2 = 10000 Å. At what minimum distance from the common central bright
fringe on the screen 2m from the slit will a bright fringe from one interference pattern coincide with a bright
fringe from the other ?

(1) 8 mm
(2) 6 mm
(3) 4 mm
(4) 3 mm

Ans. 2

Q.42 A parallel beam of fast moving electrons is incident normally on a narrow slit. A fluorescent screen is placed at a large distance from the slit. If the speed of the electrons is increased, which of the following statements is correct ?

(1) Diffraction pattern is not observed on the screen in the case of electrons
(2) The angular width of the central maximum of the diffraction pattern will increase
(3) The angular width of the central maximum will decrease
(4) The angular width of the central maximum will be unaffected

Ans. 3

Q.43 In a n-type semiconductor, which of the following statements is true -

(1) Electrons are majority carriers and trivalent atoms are dopants
(2) Electrons are minority carriers and pentavalent atoms are dopants
(3) Holes are minority carriers and pentavalent atoms are dopants
(4) Holes are majority carriers and trivalent atoms are dopants

Ans. 3

Q.44 In a common emitter (CE) amplifier having a voltage gain G, the transistor used has transconductance 0.03 mho and current gain 25. If the above transistor is replaced with another one with transconductance 0.02 mho and current gain 20, the voltage gain will be –

(1) 2/3G
(2) 1.5G
(3) 1/3G
(4) 5/4G

Ans. 1

Q.46 The value of Planck's constant is 6.63×10^{-34} Js. The speed of light is 3×10^{17} nm s^{-1}. Which value is closest
to the wavelength in nanometer of a quantum of light with frequency of 6×10^{15} s^{-1} ?

(1) 10
(2) 25
(3) 50
(4) 75

Ans. 3

Q.47 What is the maximum numbers of electrons that can be associated with the following set of quantum numbers ? n=3, ℓ=1 and m= -1

(1) 10
(2) 6
(3) 4
(4) 2

Ans. 4

Q.49 A hydrogen gas electrode is made by dipping platinum wire in a solution of HCl of pH = 10 and by passing hydrogen gas around the platinum wire at one atm pressure. The oxidation potential of electrode would be ?

(1) 0.059 V
(2) 0.59 V
(3) 0.118 V
(4) 1.18 V

Ans. 2

Q.50 A reaction having equal energies of activation for forward and reverse reactions has –

(1) $\Delta S = 0$
(2) $\Delta G = 0$
(3) $\Delta H = 0$
(4) $\Delta H = \Delta G = \Delta S = 0$

Ans. 3

Q.51 At 25ºC molar conductance of 0.1 molar aqueous solution of ammonium hydroxide is 9.54 ohm^{-1} cm^2 mol^{-1} and at infinite dilution its molar conductance is 238 ohm^{-1} cm2 mol^{-1}. The degree of ionisation of ammonium hydroxide at the same concentration and temperature is –

(1) 2.080 %
(2) 20.800 %
(3) 4.008 %
(4) 40.800 %

Ans. 3

Q.52 Based on equation $E= -2.178\times10^{-18} J(Z^2/n^2)$, certain conclusions are written. Which of them is not correct ?

(1) The negative sign in equation simply means that the energy of electron bound to the nucleus is lower than it would be if the electrons were at the infinite distance from the nucleus.
(2) Larger the value of n, the larger is the orbit radius.
(3) Equation can be used to calculate the change in energy when the electron changes orbit.
(4) For n = 1, the electron has a more negative energy that it does for n = 6 which means that the electron is more loosely bound in the smallest allowed orbit.

Ans. 4

Q.54 How many grams of concentrated nitric acid solution should be used to prepare 250 mL of 2.0 M HNO_3 ? The concentrated acid is 70 % HNO_3.

(1) 45.0g conc. HNO_3
(2) 90.0g conc. HNO_3
(3) 70. 0g conc. HNO_3
(4) 54. 0g conc. HNO_3

Ans. 1

Q.55 The number of carbon atoms per unit cell of diamond unit cell is –

(1) 4
(2) 8
(3) 6
(4) 1

Ans. 2

Q.56 Maximum deviation from ideal gas is expected from :

(1) $H_2(g)$
(2) $N_2(g)$
(3) $CH_4(g)$
(4) $NH_3(g)$

Ans. 4

Q.58 Dipole - induced dipole interactions are present in which of the following pairs :

(1) H_2O and alcohol
(2) Cl_2 and CCl_4
(3) HCl and He atoms
(4) SiF_4 and He atoms

Ans. 3

Q.59 A magnetic moment of 1.73 BM will be shown by one among the following –

(1) $[Cu(NH_3)_4]^{2+}$
(2) $[Ni(CN)_4]^{2+}$
(3) TiCl4
(4) $[CoCl_6]^{4-}$

Ans. 1

Q.60 Roasting of sulphides gives the gas X as a byproduct. This is colorless gas with choking smell of burnt sulphur and causes great damage to respiratory organs as a result of acid rain. Its aqueous solution is acidic, acts as a reducing agent and its acid has never been isolated. The gas X is –

(1) H_2S
(2) SO_2
(3) CO_2
(4) SO_3

Ans. 2

Q.62 Which of the following is paramagnetic ?

(1) CO
(2) O_2^-
(3) CN^-
(4) NO^+

Ans. 2

Q.63 Which of the following structure is similar to graphite ?

(1) BN
(2) B
(3) B_4C
(4) B_2H_6

Ans. 1

Q.64 The basic structural unit of silicates is –

(1) S_1O
(2) $S_1O_4^{4}$
(3) $S_1O_3^{2}$
(4) $S_1O_4^{2}$

Ans. 2

Q.66 Which of the following does not give oxygen on heating?

(1) $KClO_3$
(2) $Zn(ClO_3)_2$
(3) $K_2Cr_2O_7$
(4) $(NH_4)_4Cr_4O_7$

ANS. 4

Q.67 Which of the following lanthanoid ions is diamagnetic ? (At. No. Ce = 58, Sm = 62, Eu = 63, Yb = 70)

(1) Ce^{2+}
(2) Sm^{2+}
(3) Eu^{2+}
(4) Yb^{2+}

Ans. 4

Q.68 Identify the correct order of solubility in aqueous medium

(1) CuS>ZnS>Na2S
(2) ZnS>Na2S> CuS
(3) Na2S> CuS> ZnS
(4) Na2S> ZnS> CuS

Ans. 4

Q.69 XeF_2 is isostructural with-

(1) TeF_2
(2) ICl_2
(3) $SbCl_3$
(4) $BaCl_2$

Ans. 2

Q.70 An excess of $AgNO_3$ is added to 100 mL of a 0.01 M solution of dichlorotetraaquachrominum (III) chloride. The number of moles of AgCl precipitated would be-

(1) 0.001
(2) 0.002
(3) 0.003
(4) 0.01

Ans. 1

Q.71 Which of these is least likely to act as a Lewis base?

(1) CO
(2) F^-
(3) BF^3
(4) PF^3

Ans. 3

Q.73 Which of the following is electron-deficient ?

(1) $(CH_3)_2$
(2) $(SiH_3)_2$
(3) $(EH_3)_2$
(4) PH_3

Ans. 3

Q.75 Which of these is not a monomer for a high molecular mass silicone polymer ?

(1) $MeSiCl_3$
(2) Me_2SiCl_2
(3) Me_3SiCl
(4) $PhSiCl_3$

Ans. 3

Q.76 Which of the following statements about the interstitial compounds is incorrect ?

(1) They retain metallic conductivity
(2) They are chemically reactive
(3) They are much harder than the pure metal
(4) They have higher melting points than the pure metal

Ans. 2

Q.77 Which one of the following molecules contains no πbond ?

(1) CO_2
(2) H_2O
(3) SO_2
(4) NO_2

Ans. 2

Q.78 Antiseptics and disinfectants either kill or prevent growth of microrganisms. Identify which of the following statements is not true-

(1) A 0.2 % solution of phenol is an antiseptic while 1 % solution acts as a disinfectant
(2) Chlorine and Iodine are used as strong disinfectants
(3) Dilute solutions of boric acid and hydrogen peroxide are strong antiseptics
(4) Disinfectants harm the living tissues

Ans. 2

Q.82 Nitrobenzene on reaction with conc. HNO_3/H_2SO_4 at 80 – 100ºC forms which one of the following products?

(1) 1,2-Dinitrobenzene
(2) 1,3-Dinitrobenzene
(3) 1,4-Dinitrobenzene
(4) 1,2,4-Trinitrobenzene

Ans. 2

Q.84 6.02 × 1020 molecules of urea are present in 100 mL of its solution. The concentration of solution is-

(1) 0.02 M
(2) 0.01 M
(3) 0.001 M
(4) 0.1 M

Ans. 2

Q.90 Which of the following compounds will not undergo Friedal-Craft reaction easily-

(1) Cumene
(2) Xylene
(3) Nitrobenzene
(4) Toluene

Ans. 3

Q.91 Select the wrong statement :

(1) Isogametes are similar in structure, function and behavior
(2) Anisogametes differ either in structure, function of behavior
(3) In Oomycetes female gamete is smaller and motile, while male gamete is larger and non-motile
(4) *Chlamydomonas* exhibits both isogamy and anisogamy and Fucus shows oogamy

Ans. 3

Q.92 Which one of the following is not a correct statement ?

(1) Herbarium houses dried, pressed and preserved plant specimens
(2) Botanical gardens have collection of living plants for reference
(3) A museum has collection of photographs of plants and animals
(4) Key is a taxonomic aid for identification of specimens

Ans. 3

Q.93 Isogamous condition with non-flagellated gametes is found in:

(1) Chlamydomonas
(2) Spirogyra
(3) Volvox
(4) Fucus

Ans. 2

Q.94 Besides paddy fields, cyanobacteria are also found inside vegetative part of :

(1) Pinus
(2) Cycus
(3) Equisetum
(4) Psilotum

Ans. 2

Q.95 Megasporangium is equivalent to :

(1) Embryo sac
(2) Fruit
(3) Nucellus
(4) Ovule

Ans. 4

Q.96 Read the following statements (A– E) and answer the question which follows them :
(A) In liverworts, mosses and ferns gametophytes are free-living
(B) Gymnosperms and some ferns are heterosporous
(C) Sexual reproduction in Fucus, Volvox and Albugo is oogameous
(D) The sporophytes in liverworts is more elaborate than that in mosses
(E) Both, Pinus and Marchentia are dioecious How many of the above statements are correct ?

(1) One
(2) Two
(3) Three
(4) Four

Ans. 3

Q.97 Among bitter gourd, mustard, brinjal, pumpkin, china rose, lupin, cucumber, sunnhemp, gram, guava, bean, chilli, plum, petunia, tomato, rose, withania, potato, onion, aloe and tulip how many plants have hypogynous flower?

(1) Six
(2) Ten
(3) Fifteen
(4) Eighteen

Ans. 3

Q.98 Interfascicular cambium develops from the cells of :

(1) Medullary rays
(2) Xylem parenchyma
(3) Endodermis
(4) Pericycle

Ans. 1

Q.99 In china rose the flowers are :

(1) Actinomorphic, hypogynous with twisted aestivation
(2) Actinomorphic, epigynous with valvate aestivation
(3) Zygomorphic, hypogynous with imbricate aestivation
(4) Zygomorphic, epigynous with twisted aestivation

Ans. 1

Q.101 Age of a tree can be estimated by :

(1) Its height and girth
(2) Biomass
(3) Number of annual rings
(4) Diameter of its heartwood

Ans. 3