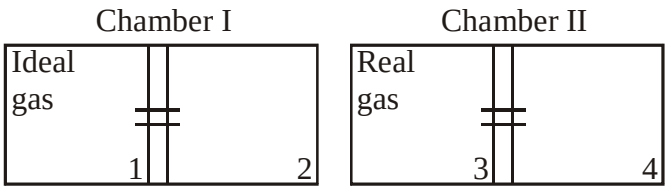
JEE-MAIN & AIEEE

ONLINE EXAM TEST PAPERS OF 2013 (PAPER-1)

Q.1



There are two identical chambers, completely thermally insulated from surroundings. Both chanbers have a partition wall dividing the chambers in two compartments. Compartment 1 is filled with an ideal gas and Compartment 3 is filled with a real gas. Compartments 2 and 4 are vaccum. A small hole (orifice) is made in the partition walls and the gases are allowed to expand in vaccum.

Statement-1: No change in the temperature of the gas takes place when ideal gas expands in vaccum. However, the temperature of real gas goes down (cooling) when it expands in vaccum.

Statement-2: The internal energy of an ideal gas is only kinetic. The internal energy of a real gas is kinetic as well as potential.

(A) Statement-1 is true, statement-2 is false.

(B) Statement-1 is true, statement-2 is true and statement-2 is correct explanation for statement-1.

(C) Statement-1 is true, statement-2 is true and statement-2 is NOT the correct explanation for statement-1.

(D) Statement-1 is false, statement-2 is true.

Q.2 When Uranium is bombarded with neutrons, it undergoes fission. The fission reaction can be written as:

$$_{92}U^{235} + {}_{0}n^{1} \rightarrow {}_{56}Ba^{141} + {}_{36}Kr^{92} + 3x + Q \text{ (energy)}$$

where three particles names x are produced and energy Q is released. What is the name of the particle x?

(A) neutrino (B) α–particle (C) electron (D) neutron

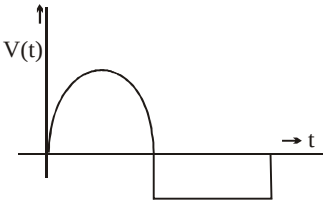
Q.3 An engine approaches a hill with a constant speed. When it is at a distance of 0.9 km, it blows a whistle whose echo is heard by the driver after 5 seconds. If the speed of sound in air is 330 m/s, then the speed of the engine is

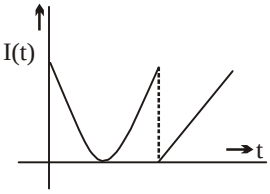
(A) 60 m/s (B) 32 m/s (C) 30 m/s (D) 27.5 m/s

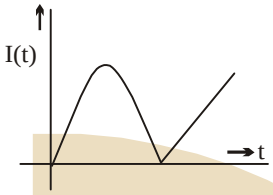
Q.4 An electric current is flowing through a circular coil of radius R. The ratio of the magnetic field at the centre of the coil and that at a distance $2\sqrt{2}$ R from the centre of the coil on its axis is

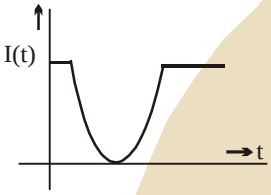
(A) 8 (B) 27 (C) $2\sqrt{2}$ (D) 36

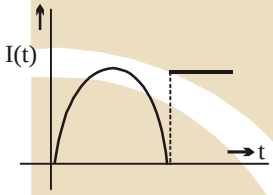
Q.5 Two coils, X and Y, are kept in close vicinity of each other. When a varying current, I(t), flows through coil X, the induced emf (V(t)) in coil Y, varies in the manner shown here. The variation of I(t), with time, can then be the represented by the graph labelled as graph:



(A) 

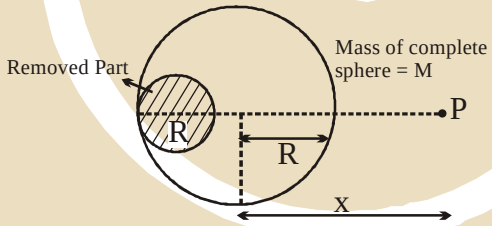
(B) 

(C) 

(D) 

(A) D (B) C (C) B (D) A

Q.6 The gravitational field, due to the 'left over part' of a uniform sphere (from which a part as shown, has been 'removed out'), at a very far off point P, located as shown, would be nearly:

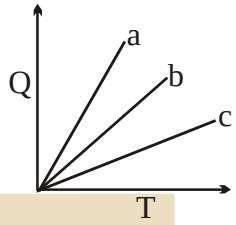


(A) $\frac{5}{6}\frac{GM}{x^2}$ (B) $\frac{6}{7}\frac{GM}{x^2}$ (C) $\frac{7}{8}\frac{GM}{x^2}$ (D) $\frac{8}{9}\frac{GM}{x^2}$

Q.7 A uniform electric field $\vec{E}$ exists between the plates of a charged condenser. A charged particle enters the space between the plates and perpendicular to $\vec{E}$. The path of the particle between the plates is a:

(A) parabola (B) straight line (C) hyperbola (D) circle

Q.8 Figure shows the variation in temperature (ΔT) with the amount of heat supplied (Q) in an isobaric process corresponding to a monoatomic (M), diatomic (D) and a polyatomic (P) gas. The initial state of all the gases are the same and the scales for the two axes coincide. Ignoring vibrational degrees of freedom, the lines a, b and c respectively correspond to :

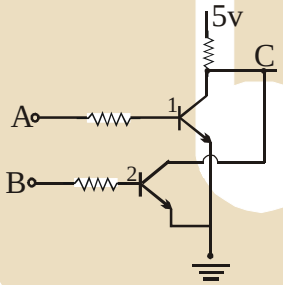


(A) M, D and P (B) D, M and P (C) P, D and M (D) P, M and D

Q.9 In the Bohr Model an electron moves in a circular orbit around the proton. Considering the orbiting electron to be a circular current loop, the magnetic moment of the hydrogen atom, when the electron is in nth excited state, is:

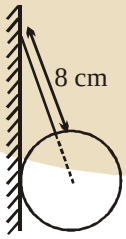
(A) $\left(\frac{e}{m}\right)\frac{n^2h}{2\pi}$ (B) $\left(\frac{e}{2m}\right)\frac{nh}{2\pi}$ (C) $\left(\frac{e}{m}\right)\frac{nh}{2\pi}$ (D) $\left(\frac{e}{2m}\right)\frac{n^2h}{2\pi}$

Q.10 Consider the npn transistors as shown in figure. If 0 volts corresponds to false and 5 volts correspond to true then the output at C corresponds to:



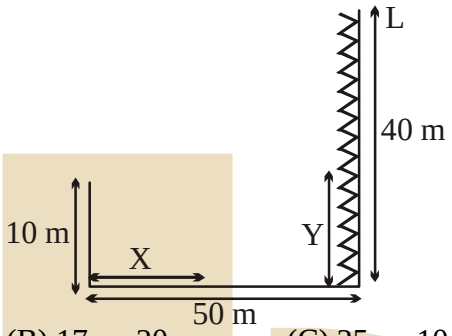
(A) A NOR B (B) A OR B (C) A AND B (D) A NAND B

Q.11 A uniform sphere of weight W and radius 5 cm is being held by a string as shown in the figure. The tension in the string will be:



(A) $5\frac{W}{12}$ (B) $13\frac{W}{12}$ (C) $12\frac{W}{5}$ (D) $13\frac{W}{5}$

Q.12 A person lives in a high-rise building on the bank of a river 50 m wide. Across the river is a well lit tower of height of 10 m, looks through a polarizer at an appropriate angle at light of the tower reflecting from the river surface, he notes that intensity of light coming from distance X from his building is the least and this corresponds to the light coming from light bulbs at height 'Y' on the tower. The values of X and Y are respectively close to (refractive index of water $\simeq$ 4/3)



(A) 22 m, 13 m (B) 17 m, 20 m (C) 25 m, 10 m (D) 13 m, 27 m

Q.13 On a linear temperature scale Y, water freezes at –160º Y and boils at –50º Y. On this Y scale, a temperature of 340 K would be read as: (water freezes at 273 K and boils at 373 K)

(A) – 86.3º Y (B) –73.7º Y (C) –233.7º Y (D) –106.3º Y

Q.14 Two simple pendulums of length 1 m and 4m respectively are both given small displacement in the same direction at the same instant. They will be again in phase after the shorter pendulum has completed number of oscillations equal to :

(A) 3 (B) 7 (C) 5 (D) 2

Q.15 In a metre bridge experiment null point is obtained at 40cm from one end of the wire when resistance X is balanced against another resistance Y. If X < Y, then the new position of the null point from the same end, if one decides to balance a resistance of 3X against Y will be close to:

(A) 50 cm (B) 67 cm (C) 75 cm (D) 80 cm

Q.16 When two sound waves travel in the same direction in a medium, the displacements of a particle located at 'x' at time 't' is given by

$y_1 = 0.05 \cos (0.50 \pi x - 100 \pi t)$

$y_2 = 0.05 \cos (0.46 \pi x - 92 \pi t)$

where y_1, y_2 and x are in metres and t in seconds. The speed of sound in the medium is

(A) 332 m/s (B) 200 m/s (C) 92 m/s (D) 100 m/s

Q.17 A letter 'A" is constructed of a uniform wire with resistance 1.0 Ω per cm. The sides of the letter are 20 cm and the cross piece in the middle is 10 cm long. The apex angle is 60º. The resistance between the ends of the legs is close to

(A) 10 Ω (B) 50.0 Ω (C) 26.7 Ω (D) 36.7 Ω

Q.18 A bullet of mass 10 g and speed 500 m/s is fired into a door and gets embedded exatcly at the centre of the door. The door is 1.0 m wide and weighs 12 kg. It is hinged at one end and rotates about a vertical axis practically without friction. The angular speed of the door just after the bullet embeds into it will be:

(A) 6.25 rad/sec (B) 0.625 rad/sec (C) 3.35 rad/sec. (D) 0.335 rad/sec.

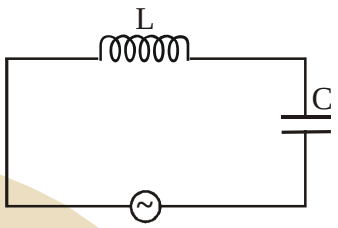
PHYSICS

Q.19 From the following, the quantity (constructed from the basic constants of nature), that has the dimensions, as well as correct order of magnitude, vis-a-vis typical atomic size, is

(A) $\frac{4\pi \in_0 me^2}{e^2}$ (B) $\frac{me^2}{4\pi \in_0 h^2}$ (C) $\frac{e^2}{4\pi \in_0 me^2}$ (D)

$\frac{4\pi \in_0 h^2}{me^2}$

Q.20 If a carrier wave c(t) = A sin $\omega_c t$, were to be amplitude modulated by a modulating signal m(t) = A sin$\omega_m t$, the equation representing the modulated signal [$C_m(t)$], and its modulation index, would be respectively:



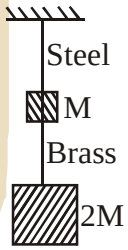
(A) $C_m(t) = A(1 + \sin\omega_m t)\sin\omega_c t$ and 1
(B) $C_m(t) = A(1 + \sin\omega_m t)\sin\omega_c t$ and 2
(C) $C_m(t) = A(1 + \sin\omega_c t)\sin\omega_m t$ and 2
(D) $C_m(t) = A(1 + \sin\omega_c t)\sin\omega_m t$ and 1

Q.21 In the circuit shown here, the voltage across L and C are respectively
(A) 500 Volt (B) 400 Volt (C) 100 Volt (D) 700 Volt

Q.22 Two springs of force constants 300 N/m (spring A) and 400 N/m (spring B) are joined together in series. The combination is compressed by 8.75 cm. The ratio of energy stored in A and B is $\frac{E_A}{E_B}$. Then $\frac{E_A}{E_B}$ is equal to:

(A) $\frac{9}{16}$ (B) $\frac{3}{4}$ (C) $\frac{4}{3}$ (D) $\frac{16}{9}$

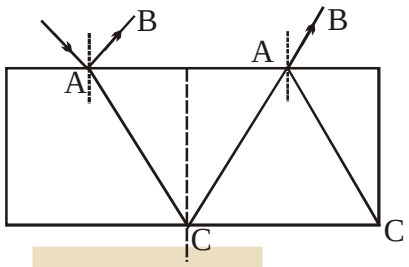
Q.23 If the ratio of lengths, radii and Young's moduli of steel and brass wires in the figure are a, b and c respectively, then the corresponding ratio of increase in their lengths is:



(A) $\frac{3e}{2ab^2}$ (B) $\frac{3a}{2b^2c}$

(C) $\frac{2ac}{b^2}$ (D) $\frac{2a^2c}{b}$

Q.24 A ray of light of intensity I is incident on a parallel glass slab at point A as shown in diagram. It undergoes partial reflection and refraction. At each reflection, 25% of incident energy is reflected. The rays AB and A′B′ undergo interference. The ratio of I_{max} and I_{min} is:



(A) 4 : 1 (B) 8 : 1 (C) 7 : 1 (D) 49 : 1

Q.25 Light is incident from a medium into air at two possible angles of incidence (a) 20º and (b) 40º. In the medium light travels 3.0 cm in 0.2 ns. The ray will

(A) Suffer total internal reflection in both cases (a) and (b)

(B) Suffer total internal reflection in case (b) only

(C) have partial reflection and partial transmission in case (b)

(D) have 100% transmission in case (a)

Q.26 A shunt of resistance 1Ω is connected across a galvanometer of 120 W resistance. A current of 5.5 ampere gives full scale deflection in the galvanometer. The current that will give full scale deflection in the absence of the shunt is nearly:

(A) 0.045 ampere (B) 5.5 ampere

(C) 0.5 ampere (D) 0.004 ampere

Q.27 Photons of an electromagnetic radiation has an energy 11 keV each. To which region of electromagnetic spectrum does it belong?

(A) Ultra violet region (B) Infrared region

(C) visible region (D) X-ray region

Q.28 Two balls of same mass and carrying equal charge are hung from a fixed support of length *l*. At electrostatic equilibrium, assuming that angles made by each thread is small, the separation, x between the balls is proportional to

(A) l (B) $l^{2/3}$ (C) l^2 (D) $l^{1/3}$

Q.29 Two point dipoles of dipole moment $\vec{p}_1$ and $\vec{p}_2$ are at a distance x from each other and $\vec{p}_1 || \vec{p}_2$. The force between the dipoles is

(A) $\frac{1}{4\pi\in_0}\frac{8P_1P_2}{x^4}$ (B) $\frac{1}{4\pi\in_0}\frac{3P_1P_2}{x^3}$ (C) $\frac{1}{4\pi\in_0}\frac{4P_1P_2}{x^4}$ (D) $\frac{1}{4\pi\in_0}\frac{6P_1P_2}{x^4}$

Q.30 This question has Statement-1 and Statement–2 of the four choices given after the statements, choose the one that best describes the two statements

Statement 1: A capillary is dipped in a liquid and liquid risesto a height h in it. As the temperature of the liquid is raised, the height h increases (if the density of the liquid and the amd the angle of contact remain the same)

Statement 2: Surface tension of a liquid decreases with the rise in its temperature.

(A) Statement-1 is false, statement-2 is true.

(B) Statement-1 is true, statement-2 is true and statement-2 is NOT the correct explanation for statement-1.

(C) Statement-1 is true, statement-2 is false.

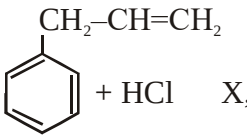
(D) Statement-1 is true, statement-2 is true and statement-2 is correct explanation for statement-1.

Q.31 By how many folds the temperature of a gas would increase when the root mean square velocity of the gas molecles in a container of fixed volume is increased from 5×10^4 cm/s to 10×10^4 cm/s?
(A) Four (B) Three (C) Two (D) Six

Q.32 In an atom how many orbital (s) will have the quantum numbers; n = 3, l = 2 and m_l = +2 ?
(A) 1 (B) 5 (C) 3 (D) 7

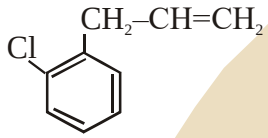
Q.33 Aryl fluoride may be prepared from arene diazonium chloride using
(A) CuF/HF (B) Cu/HF (C) HBF_4/Δ (D) $HBF_4/NaNO_2$, Cu, Δ

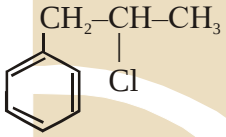
Q.34 Given

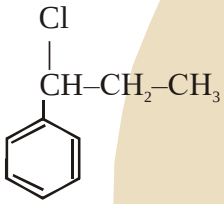


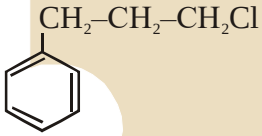
+ HCl X,

X is:

(A) 

(B) 

(C) 

(D) 

Q.35 Formaldehyde can be distinguished from acetaldehyde by the use of
(A) I_2/Alkali (B) Schiff's reagent (C) Tollen's reagent (D) Fehling's solution

Q.36 If a polythene sample contains two monodisperse fractions in the ratio 2 : 3 with degree of polymerisation 100 and 200, respectively, then its weight average molecular weight will be
(A) 5200 (B) 4300 (C) 4900 (D) 4600

Q.37 An element having an atomic radius of 0.14 nm crystallises in an fcc unit cell. What is the length of a side of the cell?
(A) 0.96 nm (B) 0.4 nm (C) 0.24 nm (D) 0.56 nm

Q.38 Trigonal bipyramidal geometry is shown by
(A) XeO_3F_2 (B) $XeOF_2$ (C) $[XeF_8]^{2-}$ (D) $FXeOSO_2F$

Q.39 Electrode potentials (E^o) are given below:
Cu^+/Cu = + 0.52 V,
Fe^{3+}/Fe^{2+} = +0.77 V,
$\frac{1}{2} I_2$ (s) / I^- = + 0.54 V,
Ag^+/Ag = + 0.88 V
Based on the above potentials, strongest oxidizing agent will be
(A) Cu^+ (B) Fe^{3+} (C) Ag^+ (D) I_2

Q.40 Given :
(a) $H_2(g) + \frac{1}{2}O_2(g) \rightarrow H_2O\ (l)$;
$\Delta H^o_{298\ K} = -285.9\ kJ\ mol^{-1}$
(b) $H_2(g) + \frac{1}{2}O_2(g) \rightarrow H_2O\ (l)$;
$\Delta H^o_{298\ K} = -241.8\ kJ\ mol^{-1}$
The molar enthalpy of vapourization of water will be:
(A) 241.8 kJ mol^{-1} (B) 527.7 kJ mol^{-1} (C) 44.1 kJ mol^{-1} (D) 22.0 kJ mol^{-1}

Q.41 Calcination is the process in which:
(A) Ore is heated strongly below its melting point in the presence of excess of air and is used for the conversion of carbonates and hydrated oxide ores to their respective oxides.
(B) Ore is heated strongly below its melting point in the absence or limited supply of air and is used for the conversion of sulphide ores to their respective oxides.
(C) Ore is heated strongly below its melting point either in the limited or absence of air and is used to convert carbonates and hydrated oxide ores to their respective oxides.
(D) Ore is heated strongly above its melting point in the limited supply of air to convert sulphide ores to their respective oxides.

Q.42 Which of the following enzyme converts starch into maltose?
(A) Maltase (B) Invertase (C) Diastase (D) Zymase

Q.43 Potassium dichromate when heated with concentrated sulphuric acid and a soluble chloride, gives brown–red vapours of
(A) CrO_3 (B) Cr_2O_3 (C) $CrCl_3$ (D) CrO_2Cl_2

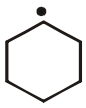
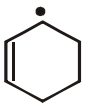
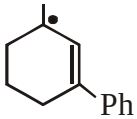
Q.44 Solid $Ba(NO_3)_2$ is gradually dissolved in a 1.0×10^{-4} M Na_2CO_3 solution. At which concentration of Ba^{2+}, precipitate of $BaCO_3$ begins to form? (K_{sp} for $BaCO_3 = 5.1 \times 10^{-9}$)
(A) 5.1×10^{-5} M (B) 8.1×10^{-7} M (C) 4.1×10^{5} M (D) 7.1×10^{-8} M

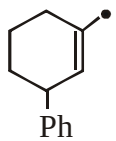
Q.45 In which of the following ionization processes the bond energy has increased and also the magnetic behaviour has changed from paramagnetic to diamagnetic?
(A) $NO \rightarrow NO^+$ (B) $O_2 \rightarrow O$ (C) $N_2 \rightarrow N_2^+$ (D) $C_2 \rightarrow C_2^+$

Q.46 12g of a non volatile solute dissolved in 108 g of water produces the relative lowering of vapour pressure of 0.1. The molecular mass of the solute is
(A) 60 (B) 80 (C) 40 (D) 20

Q.47 Electron gain enthalpy with negative sign of fluorine is less than that of chlorine due to
(A) smaller size of chlorine atom (B) bigger size of 2p orbital of fluorine
(C) high ionization enthalpy of fluorine (D) smaller size of fluorine atom

Q.48 Which one of the following is most stable?

(A) 
(B) 
(C) 

(D) 

Q.49 Which one of the following molecules is polar?
(A) CF_4 (B) SbF_5 (C) IF_5 (D) XeF_4

Q.50 The element with which of the following outer electron configuration may exhibit the largest number of oxidation states in its compounds:
(A) $3d^7 4s^2$ (B) $3d^8 4s^2$ (C) $3d^5 4s^2$ (D) $3d^6 4s^2$

Q.51 Given:
$X\ Na_2HASO_3 + Y\ NaBrO_3 + ZHCl \rightarrow NaBr + H_3AsO_4 + NaCl$
The values of X, Y and Z in the above redox reaction are respectively:
(A) 2, 1, 3 (B) 3, 1, 6 (C) 2, 1, 2 (D) 3, 1, 4

Q.52 Which of the following compounds is not expected to show Lassaignes' test for nitrogen?
(A) Propanenitrile (B) Hydroxylamine hydrochloride
(C) Nitromethane (D) Ethanamine

Q.53 The migration of dispersion medium under the influence of a electric potential is called:
(A) Electrophoresis (B) Cataphoresis (C) Electroosmosis (D) Sedimentation

Q.54 An ether (A), $C_5H_{12}O$, when heated with excess of hot concentrated HI produced two alkyl halides which when treated with NaOH yielded compounds (B) and (C). Oxidation of (B) and (C) gave a propanone and an ethanoic acid respectively. The IUPAC name of the ether (A) is:
(A) ethoxypropane (B) 2–methoxybutane (C) methoxybutane (D) 2–ethoxypropane

Q.55 Sodium Carbonate cannot be used in place of $(NH_4)_2CO_3$ for the identification of Ca^{2+}, Ba^{2+} and Sr^{2+} ions (in group V) during mixture analysis becuase
(A) Sodium ions will react with acid radicals
(B) Concentration of CO_3^{2-} ions is very low
(C) Mg^{2+} ions will also be precipitated
(D) Na^+ ions will interfere with the detection of Ca^{2+}, Ba^{2+}, Sr^{2+} ions

Q.56 Rate of dehydration of alcohols follows the order
(A) $2^o > 3^o > 1^o > CH_3OH$ (B) $3^o > 2^o > 1^o > CH_3OH$
(C) $CH_3OH > 1^o > 2^o > 3^o$ (D) $2^o > 1^o > CH_3OH > 3^o$

Q.57 The addition of HI in the presence of peroxide catalyst does not follow anti-Markovnikov's rule becuase
(A) I atom combines with H atom atom to give back III
(B) H–I bond is too strong to be broken homolytically
(C) HI is a strong reducing agent
(D) Iodine atom is not reactive enough to add across a double bond.

Q.58 The instantaneous rate of disappearance of MnO_4^- ion in the following reaction is $4.56 \times 10^{-3}\ Ms^{-1}$
$2MnO_4^- + 10I^- + 16\ H^+ \rightarrow 2Mn^{2+} + 5I_2 + 8H_2O$
The rate of appearance I_2 is:
(A) $1.14 \times 10^{-2}\ Ms^{-1}$ (B) $5.7 \times 10^{-3}\ Ms^{-1}$
(C) $4.56 \times 10^{-4}\ Ms^{-1}$ (D) $1.14 \times 10^{-3}\ Ms^{-1}$

Q.59 In reaction $A + 2B \rightleftharpoons 2C + D$, initial concentration of B was 1.5 times of |A|, but at equilibrium the concentrations of A and B became equal. The equilibrium constant for the reaction is:
(A) 4 (B) 6 (C) 12 (D) 8

Q.60 Type of isomerism which exists between
$[Pd(C_6H_5)_2(SCN)_2]$ and $[Pd(C_6H_5)_2(NCS)_2]$ is
(A) Solvate isomerism (B) Ionisation isomerism
(C) Linkage isomerism (D) Coordination isomerism

Q.61 The probability of a man hitting a target is $\frac{2}{5}$. He fires at the target k times (k, a given number). Then the minimum k, so that the probability of hitting the target at least once is more than $\frac{7}{10}$, is:

(A) 2 (B) 5 (C) 4 (D) 3

Q.62 The mean of a data set consisting of 20 observations is 40. If one observation 53 was wrongly recorded as 33, then the correct mean will be:

(A) 40.5 (B) 42.5 (C) 41 (D) 49

Q.63 If $x = \int_0^y \frac{dt}{\sqrt{1+t^2}}$, then $\frac{d^2y}{dx^2}$ is equal to

(A) y^2 (B) $\frac{y}{\sqrt{1+y^2}}$ (C) y (D) $\sqrt{1+y^2}$

Q.64 If a and c are positive real numbers and the ellipse $\frac{x^2}{4c^2}+\frac{y^2}{c^2}=1$, has four distinct points in common with the circle $x^2 + y^2 = 9a$; then

(A) $6ac + 9a^2 - 2c^2 > 0$ (B) $6ac + 9a^2 - 2c^2 < 0$

(C) $9ac - 9a^2 - 2c^2 < 0$ (D) $9ac - 9a^2 - 2c^2 > 0$

Q.65 If the surface area of a sphere of radius r is increasing uniformly at the rate 8 cm^2/s, then the rate of change of its volume is:

(A) Proportional to r^2 (B) constant

(C) proportional to r (D) proportional to $\sqrt{r}$

Q.66 The vector

$(\hat{i}\times\vec{a}.\vec{b})\hat{i}+(\hat{j}\times\vec{a}.\vec{b})\hat{j}+(\hat{k}+\vec{a}.\vec{b})\hat{k}$ is equal to

(A) $\vec{b}$ (B) $\vec{b} \times \vec{a}$ (C) $\vec{a}$ (D) $\vec{a} \times \vec{b}$

Q.67 A light ray emerging from the point source placed at P(1, 3) is reflected at apoint Q in the axis of x. If the reflected ray passes through the point R(6, 7), then the abscissa of Q is:

(A) 3 (B) 7/2 (C) 1 (D) 5/2

Q.68 If the three lines $x - 3y = p$, $ax + 2y = q$ and $ax + y = r$ from a right angled triangle then:

(A) $a^2 - 6a - 12 = 0$ (B) $a^2 - 9a + 12 = 0$ (C) $a^2 - 9a + 18 = 0$ (D) $a^2 - 6a - 18 = 0$

Q.69 A value of x for which

$\sin(\cot^{-1}(1 + x)) = \cos(\tan^{-1}x)$ is

(A) ½ (B) 0 (C) 1 (D) –½

Q.70 Let $\vec{a} = 2\hat{i} - \hat{j} + \hat{k}$, $\vec{b} = \hat{i} + 2\hat{j} - \hat{k}$ and $\vec{c} = \hat{i} + \hat{j} - 2\hat{k}$ be three vectors. A vectors of the type $\vec{b} + \lambda\vec{c}$ for some scalar λ, whose projection on $\vec{a}$ is of magnitude $\sqrt{\frac{2}{3}}$, is:

(A) $2\hat{i} + 3\hat{j} - 3\hat{k}$ (B) $2\hat{i} + \hat{j} + 5\hat{k}$ (C) $2\hat{i} - \hat{j} + 5\hat{k}$ (D) $2\hat{i} + 3\hat{j} + 3\hat{k}$

Q.71 Statement 1: The statement A ® (B ® A) is equivalent to A ® (A $\vee$ B)
Statement 2: The statement ~[(A $\wedge$ B) ® (~A $\vee$ B)] is a Tautology
(A) Statement-1 is true, statement-2 is true and statement-2 is correct explanation for statement-1.
(B) Statement-1 is false, statement-2 is true.
(C) Statement-1 is true, statement-2 is false.
(D) Statement-1 is true, statement-2 is true and statement-2 is NOT the correct explanation for statement-1.

Q.72 If each of the lines $5x + 8y = 13$ and $4x - y = 3$ contains a diameter of the circle $x^2 + y^2 - 2(a^2 - 7a + 11)x - 2(a^2 - 6a + 6)y + b^3 + 1 = 0$, then:
(A) a = 5 and b Î (–¥, 1) (B) a = 1 and b Ï (–1, 1)
(C) a = 5 and b Ï (–1, 1) (D) a = 5 and b Î (–¥, 1)

Q.73 A vector $\vec{n}$ is inclined to x-axis at 45º, to y-axis at 60º and at an acute angle to z-axis. If $\vec{n}$ is a normal to a plane passing through the point $(\sqrt{2}, -1, 1)$, then the equation of the plane is

(A) $\sqrt{2}x - y - z = 2$ (B) $\sqrt{2}x + y + z = 2$
(C) $3\sqrt{2}x - 4y - 3z = 7$ (D) $4\sqrt{2}x + 7y + z = 2$

Q.74 Statement 1: The slope of the tangent at any point P on a parabola, whose axis is the axis of x and vertex is at the origin, is inversely proportional to the ordinate of the point P.
Statement 2: The system of parabolas $y^2 = 4ax$ satisfies a differential equation of degree 1 and order 1.
(A) Statement-1 is true, statement-2 is true and statement-2 is correct explanation for statement-1.
(B) Statement-1 is true, statement-2 is false.
(C) Statement-1 is true, statement-2 is true and statement-2 is NOT the correct explanation for statement-1.
(D) Statement-1 is false, statement-2 is true.

Q.75 If a, b, c are sides of a scalene triangle, then the value of $\begin{vmatrix} a & b & c \\ b & c & a \\ c & a & b \end{vmatrix}$ is:

(A) non-negative (B) negative (C) positive (D) non-positive

Q.76 Let $f(x) \frac{x^2 - x}{x^2 + 2x}$, $x \neq 0, -2$. Then $\frac{d}{dx}\left[f^{-1}(x)\right]$ (wherever it is defined) is equal to

(A) $\frac{3}{(1-x)^2}$ (B) $\frac{-1}{(1-x)^2}$ (C) $\frac{1}{(1-x)^2}$ (D) $\frac{-3}{(1-x)^2}$

Q.77 Equation of the line passing through the points of intersection of the parabola $x^2 = 8y$ and the ellipse $\frac{x^2}{3} + y^2 = 1$ is

(A) $y + 3 = 0$ (B) $3y + 1 = 0$ (C) $3y - 1 = 0$ (D) $y - 3 = 0$

Q.78 The area bounded by the curve $y = \ln(x)$ and lines $y = 0$, $y = \ln(3)$ and $x = 0$ is equal to

(A) $3 \ln (3) - 2$ (B) 3 (C) 2 (D) $3 \ln (3) + 2$

Q.79 The matrix $A^2 + 4A - 5I$, where I is identity matrix and $A = \begin{bmatrix} 1 & 2 \\ 4 & -3 \end{bmatrix}$ equals

(A) $32\begin{bmatrix} 1 & 1 \\ 1 & 0 \end{bmatrix}$ (B) $4\begin{bmatrix} 2 & 1 \\ 2 & 0 \end{bmatrix}$ (C) $4\begin{bmatrix} 0 & -1 \\ 2 & 2 \end{bmatrix}$ (D) $32\begin{bmatrix} 2 & 1 \\ 2 & 0 \end{bmatrix}$

Q.80 A committee of 4 persons is to be formed from 2 ladies, 2 old men, and 4 young men such that it includes at least 1 lady, at least 1 old man and at most 2 young men. Then the total number of ways in which this committee can be formed is:

(A) 41 (B) 40 (C) 16 (D) 32

Q.81 If $\int \frac{dx}{x + x} = p(x)$ then, $\int \frac{x^6}{x + x^7} dx$ is equal to

(A) $x + p(x) + c$ (B) $\ln |x| - p(x) + c$ (C) $\ln |x| + p(x) + c$ (D) $x - p(x) + c$

Q.82 The values of 'a' for which one root of the equation $x^2 - (a + 1) x + a^2 + a - 8 = 0$ exceeds 2 and the other is lesser then 2, are given by

(A) $-2 < a < 3$ (B) $3 < a < 10$ (C) $a \geq 10$ (D) $a \leq -2$

Q.83 If $Z_1 \neq 0$ and Z_2 be two complex numbers such that $\frac{Z_2}{Z_1}$ is a purely imaginary number, then $\left|\frac{2Z_1 + 3Z_2}{2Z_1 - 3Z_2}\right|$ is equal to

(A) 1 (B) 5 (C) 3 (D) 2

Q.84 The value

$$\lim_{x\to 0}\frac{1}{x}\left[\tan^{-1}\left(\frac{x+1}{2x+1}\right)-\frac{\pi}{4}\right] \text{ is:}$$

(A) $-\frac{1}{2}$ (B) 1 (C) 0 (D) 2

Q.85 The ratio of the coefficient of x^{15} to the term independent of x in the expansion of $\left(x^2+\frac{2}{x}\right)^{15}$ is:

(A) 1 : 32 (B) 1 : 4 (C) 7 : 16 (D) 7 : 64

Q.86 If the lines $\frac{x+1}{2}=\frac{y-1}{1}=\frac{z+1}{3}$ and $\frac{x+2}{2}=\frac{y-k}{3}=\frac{z}{4}$ are coplanar, then the value of k is :

(A) $\frac{-9}{2}$ (B) $\frac{11}{2}$ (C) $\frac{-11}{2}$ (D) $\frac{9}{2}$

Q.87 Let A = {1, 2, 3, 4} and R : A ® A be the relation defined by
R = {(1, 1), (2, 3), (3, 4), (4, 2)}. The correct statement is:
(A) R is an onto function (B) R is not a function
(C) R is not a one to one function (D) R does not have an inverse

Q.88 The sum of the series:

$$1+\frac{1}{1+2}+\frac{1}{1+2+3}+\text{..... upto 10 terms, is:}$$

(A) $\frac{22}{13}$ (B) $\frac{18}{11}$ (C) $\frac{20}{11}$ (D) $\frac{16}{9}$

Q.89 Statement 1: The equation xlogx = 2 – x is satisfied by at least one value of x lying between 1 and 2.
Statement 2: The function f(x) = x log x is an increasing function is [1, 2] and g(x) = 2 – x is a decreasing function in [1, 2] and the graphs represented by these functions intersect at a point in [1, 2].
(A) Statement-1 is true, statement-2 is true and statement-2 is NOT the correct explanation for statement-1.
(B) Statement-1 is false, statement-2 is true.
(D) Statement-1 is true, statement-2 is true and statement-2 is correct explanation for statement-1.
(C) Statement-1 is true, statement-2 is false.

Q.90 Let $a_1, a_2, a_3, \ldots\ldots\ldots$ be an A.P. such that $\frac{a_1 + a_2 + \ldots\ldots\ldots + a_p}{a_1 + a_2 + a_3 + \ldots\ldots\ldots + a_q} = \frac{p^3}{q^3}$; $p \neq q$. Then $\frac{a_6}{a_{21}}$ is equal to

(A) $\frac{121}{1861}$ (B) $\frac{11}{41}$ (C) $\frac{121}{1681}$ (D) $\frac{41}{11}$

JEE MAIN & AIEEE-2013 QUESTION OF ON LINE EXAMINATION										
ANSWER KEY										PAPER-1
Q.	1	2	3	4	5	6	7	8	9	10
A.	B	D	C	B	D	C	A	C	B	D
Q.	11	12	13	14	15	16	17	18	19	20
A.	B	D	A	D	B	B	C	B	D	A
Q.	21	22	23	24	25	26	27	28	29	30
A.	C	C	B	D	B	A	D	D	D	A
Q.	31	32	33	34	35	36	37	38	39	40
A.	A	A	C	C	A	C	B	A	C	C
Q.	41	42	43	44	45	46	47	48	49	50
A.	B	C	D	A	A	D	D	C	C	C
Q.	51	52	53	54	55	56	57	58	59	60
A.	B	B	C	D	C	B	D	A	A	C
Q.	61	62	63	64	65	66	67	68	69	70
A.	D	C	C	D	C	D	D	C	D	A
Q.	71	72	73	74	75	76	77	78	79	80
A.	C	A	B	A	B	A	C	C	B	A
Q.	81	82	83	84	85	86	87	88	89	90
A.	A	B	A	A	A	B	A	C	D	C