

JEE-MAIN & AIEEE

ONLINE EXAM TEST PAPERS OF 2014 (PAPER-2)

Q.1 A radioactive nuclei with decay constant $0.5/s$ is being produced at a constant rate of 100 nuclei/s. If at $t = 0$ there were no nuclei, the time when there are 50 nuclei is :

- (A) $\ln\left(\frac{4}{3}\right)s$ (B) $\ln 2s$ (C) $2\ln\left(\frac{4}{3}\right)s$ (D) $1s$

Q.2 Match the List- I (Phenomenon associated with electromagnetic radiation) with List - II (Part of electromagnetic spectrum) and select the correct code from the choices given below the lists :

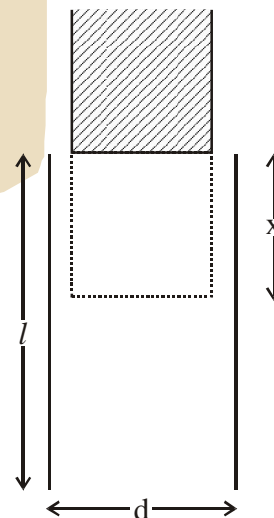
List-I

List-II

- | | | | |
|-----|---|---|-------------------|
| I | Double of sodium | A | Visible radiation |
| II | Wavelength corresponding to temperature associated with the isotropic radiation filling all space | B | Microwave |
| III | Wavelength emitted by atomic hydrogen in intersellar space | C | Short radiowave |
| IV | Wavelength of radiation arising from two close energy levels in hydrogen | D | X-rays |

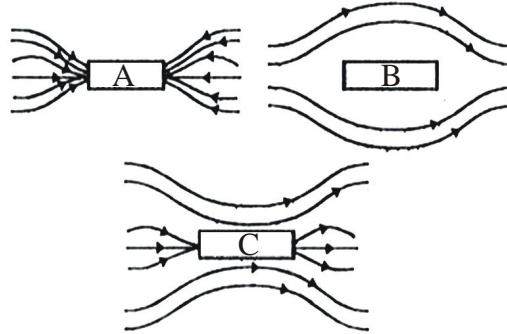
- (A) (I)-(A), (II)-(B), (III)-(B), (IV)-(C)
 (B) (I)-(D), (II)-(C), (III)-(A), (IV)-(B)
 (C) (I)-(A), (II)-(B), (III)-(C), (IV)-(C)
 (D) (I)-(B), (II)-(A), (III) (D), (IV)-(A)

Q.3 A parallel plate capacitor is made of two plates of length l , width ω and separated by distance d . A dielectric slab (dielectric constant K) that fits exactly between the plates is held near the edge of the plates. It is pulled into the capacitor by a force $F = \frac{\partial U}{\partial x}$ where U is the energy of the capacitor when dielectric is inside the capacitor up to distance x (See figure). If the charge on the capacitor is Q then the force on the dielectric when it is near the edge is



- (A) $\frac{Q^2 d}{2\omega l^2 \epsilon_0} K$ (B) $\frac{Q^2 \omega}{2dl^2 \epsilon_0} (K - 1)$
 (C) $\frac{Q^2 d}{2\omega l^2 \epsilon_0} (K - 1)$ (D) $\frac{Q^2 \omega}{2dl^2 \epsilon_0} K$

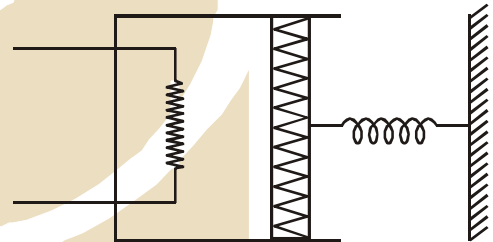
- Q.4 A cone of base radius R and height h is located in a uniform electric field \vec{E} parallel to its base. The electric flux entering the cone is :-
 (A) $4EhR$ (B) $\frac{1}{2} EhR$ (C) EhR (D) $2EhR$
- Q.5 Three identical bars A, B and C are made of different magnetic materials. When kept in a uniform magnetic field, the field lines around them look as follows :



- Make the correspondence of these bars with their material being diamagnetic (D) ferromagnetic (F) and paramagnetic (P)
 (A) $A \leftrightarrow P, B \leftrightarrow F, C \leftrightarrow D$ (B) $A \leftrightarrow F, B \leftrightarrow P, C \leftrightarrow D$
 (C) $A \leftrightarrow D, B \leftrightarrow P, C \leftrightarrow F$ (D) $A \leftrightarrow F, B \leftrightarrow D, C \leftrightarrow P$

- Q.6 The average mass of rain drops is 3.0×10^{-5} kg and their average terminal velocity is 9 m/s. Calculate the energy transferred by rain to each square metre of the surface at a place which receives 100 cm of rain in a year.
 (A) 9.0×10^4 J (B) 4.05×10^4 J (C) 3.5×10^5 J (D) 3.0×10^5 J

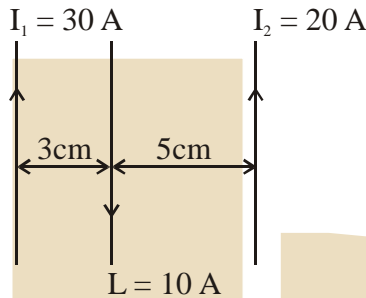
- Q.7 An ideal monoatomic gas is confined in a cylinder by a spring loaded piston of cross section 8.0×10^{-3} m². Initially the gas is at 300K and occupies a volume of 2.4×10^{-3} m³ and the spring is in its relaxed state as shown in figure.



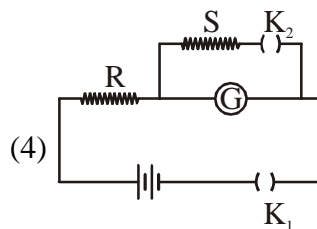
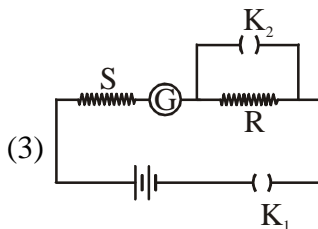
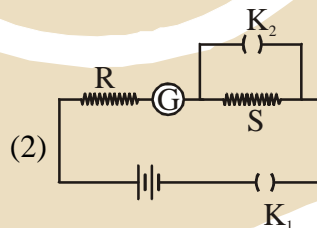
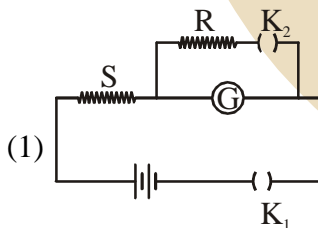
- The gas is heated by a small heater until the piston moves out slowly by 0.1 m. The force constant of the spring is 8000 N/m and the atmospheric pressure is 1.0×10^5 N/m². The cylinder and the piston are thermally insulated. The piston and the spring are massless and there is no friction between the piston and the cylinder. The final temperature of the gas will be : (Neglect the: heat loss through the lead wires of the heater. The heat capacity of the heater coil is also negligible) :-
 (A) 500 K (B) 300 K (C) 800 K (D) 1000 K

- Q.8 The angular frequency of the damped oscillator is given by $\omega = \sqrt{\left(\frac{k}{m} - \frac{r^2}{4m^2}\right)}$ where k is the spring constant, m is the mass of the oscillator and r is the damping constant. If the ratio $\frac{r^2}{mk}$ is 8%, the change in time period compared to the undamped oscillator is approximately as follows :-
 (A) Decreases by 1% (B) Increases by 8% (C) Increases by 1% (D) Decreases by 8%

- Q.9 A coil of circular cross-section having 1000 turns and 4 cm^2 face area is placed with its axis parallel to a magnetic field which decreases by $10^{-2} \text{ Wb m}^{-2}$ in 0.01 s. The e.m.f. induced in the coil is :
 (A) 200mV (B) 0.4 mV (C) 4mV (D) 400 111V
- Q.10 Three straight parallel current carrying conductors are shown in the figure. The force experienced by the middle conductor of length 25 cm is :

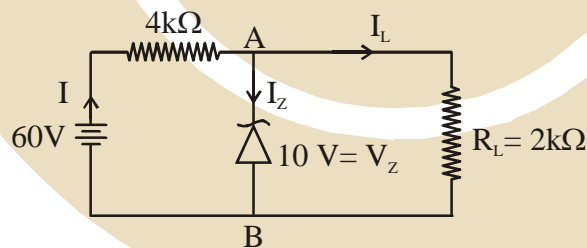


- (A) 9×10^{-4} toward left (B) Zero
 (C) $6 \times 10^{-4} \text{ N}$ toward left (D) 3×10^{-4} toward right
- Q.11 A body of mass 5 kg under the action of constant force $\vec{F} = F_x \hat{i} + F_y \hat{j}$ has velocity at $t = 0 \text{ s}$ as $\vec{v} = (6\hat{i} - 2\hat{j}) \text{ m/s}$ and at $t = 10 \text{ s}$ as $\vec{v} = 6\hat{j} \text{ m/s}$. The force \vec{F} is :-
- (A) $\left(\frac{3}{5}\hat{i} - \frac{4}{5}\hat{j}\right) \text{ N}$ (B) $(-3\hat{i} + 4\hat{j}) \text{ N}$ (C) $(3\hat{i} - 4\hat{j}) \text{ N}$ (D) $\left(-\frac{3}{5}\hat{i} + \frac{4}{5}\hat{j}\right) \text{ N}$
- Q.12 In the circuit diagrams (1, 2, 3 and 4) shown below, R is a high resistance and S is a resistance the order of galvanometer G. The correct circuit, corresponding to the half deflection method for finding the resistance and figure of merit of the galvanometer, is the circuit labelled as :-



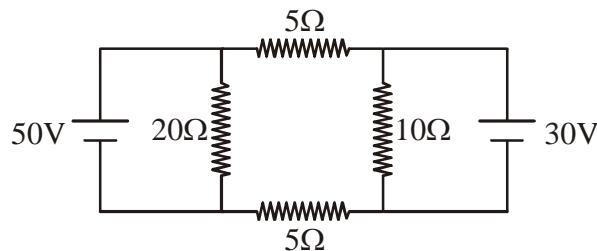
- (A) Circuit C with $G = S$ (B) Circuit B with $G = S$
 (C) Circuit A with $G = \frac{RS}{(R - S)}$ (D) Circuit D with $G = \frac{RS}{R - S}$

- Q.13 A tank with a small hole at the bottom has been filled with water and kerosene (specific gravity 0.8). The height of water is 3 m and that of kerosene 2 m. When the hole is opened the velocity of fluid coming out from it is nearly : (take $g = 10 \text{ ms}^{-2}$ and density of water = 10^3 kg m^{-3})
 (A) 7.6 ms^{-1} (B) 9.6 ms^{-1} (C) 10.7 ms^{-1} (D) 8.5 ms^{-1}
- Q.14 A photon of wavelength λ is scattered from an electron, which was at rest. The wavelength shift $\Delta\lambda$ is three times of λ and the angle of scattering θ is 60° . The angle at which the electron recoiled is ϕ . The value of $\tan \phi$ is (electron speed is much smaller than the speed of light)
 (A) 0.28 (B) 0.22 (C) 0.25 (D) 0.16
- Q.15 The Bulk moduli of Ethanol, Mercury and Water are given as 0.9, 25 and 2.2 respectively in units of 10^9 Nm^{-2} . For a given value pressure, the fractional compression in volume is $\frac{\Delta V}{V}$. Which of the following statements about $\frac{\Delta V}{V}$ for these three liquids is correct?
 (A) Water > Ethanol > Mercury (B) Ethanol > Mercury > Water
 (C) Ethanol > Water > Mercury (D) Mercury > Ethanol > Water
- Q.16 A hot body, obeying Newton's law of cooling is cooling down from its peak value 80°C to an ambient temperature of 30°C . It takes 5 minutes in cooling down from 80°C to 40°C . How much time will it take to cool down from 62°C to 32°C ? (Given $\ln 2 = 0.693$, $\ln 5 = 1.609$)
 (A) 9.6 minutes (B) 6.5 minutes (C) 8.6 minutes (D) 3.75 minutes
- Q.17 A Zener diode is connected to a battery and a load as shown below :-
 The currents I , I_z and I_L , are respectively.



- (A) 12.5 mA, 5 mA, 7.5 mA (B) 15 mA, 7.5 mA, 7.5 mA
 (C) 12.5 mA, 7.5 mA, 5 mA (D) 15 mA, 5 mA, 10 mA
- Q.18 An air bubble of radius 0.1 cm is in a liquid having surface tension 0.06 N/m and density 10^3 kg/m^3 . The pressure inside the bubble is 1100 Nm^{-2} greater than the atmospheric pressure. At what depth is the bubble below the surface of the liquid? ($g = 9.8 \text{ ms}^{-2}$):-
 (A) 0.1 m (B) 0.20 m (C) 0.15 m (D) 0.25 m

Q.19 In the circuit shown, current (in A) through the 50 V and 30 V batteries are, respectively :-

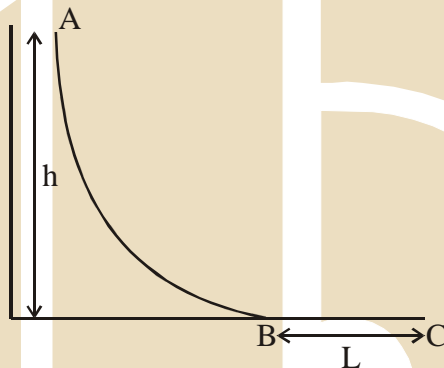


- (A) 3 and 2.5 (B) 3.5 and 2 (C) 4.5 and 1 (D) 2.5 and 3

Q.20 During an adiabatic compression, 830 J of work is done on 2 moles of a diatomic ideal gas to reduce its volume by 50%. The change in its temperature is nearly : ($R = 8.3 \text{ JK}^{-1}\text{mol}^{-1}$)

- (A) 40K (B) 20K (C) 33 K (D) 14 K

Q.21 A small ball of mass m starts at a point A with speed v_0 and moves along a frictionless track AB as shown. The track BC has coefficient of friction μ . The ball comes to stop at C after travelling a distance L which is :



- (A) $\frac{h}{2\mu} + \frac{v_0^2}{2\mu g}$ (B) $\frac{2h}{\mu} + \frac{v_0^2}{2\mu g}$ (C) $\frac{h}{\mu} + \frac{v_0^2}{2\mu g}$ (D) $\frac{h}{2\mu} + \frac{v_0^2}{\mu g}$

Q.22 In a compound microscope the focal length of objective lens is 1.2 cm and focal length of eye piece is 3.0 cm. When object is kept at 1.25 cm in front of objective, final image is formed at infinity. Magnifying power of the compound microscope should be :

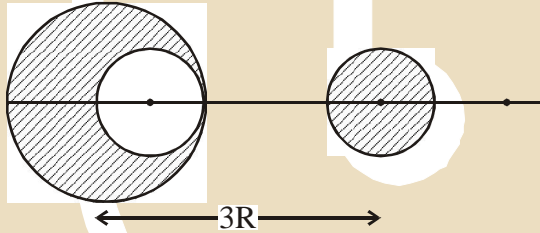
- (1) 400 (B) 200 (C) 100 (D) 150

Q.23 A thin bar of length L has a mass per unit length λ , that increases linearly with distance from one end. If its total mass is M and its mass per unit length at the lighter end is λ_0 , then the distance of the centre of mass from the lighter end is :

- (A) $\frac{2L}{3} - \frac{\lambda_0 L^2}{6M}$ (B) $\frac{L}{2} - \frac{\lambda_0 L^2}{4M}$ (C) $\frac{L}{3} + \frac{\lambda_0 L^2}{4M}$ (D) $\frac{L}{3} + \frac{\lambda_0 L^2}{8M}$

Q.24 In terms of resistance R and time T , the dimensions of ratio $\frac{\mu}{\epsilon}$ of the permeability μ and permittivity ϵ is :-

- (A) $[R^2]$ (B) $[R^2T^2]$ (C) $[RT^{-2}]$ (D) $[R^2T^{-1}]$

- Q.25 The initial speed of a bullet fired from a rifle is 630 m/s. The rifle is fired at the centre of a target 700 m away at the same level as the target. How far above the centre of the target the rifle must be aimed in order to hit the target
 (A) 4.2 m (B) 6.1 m (C) 1.0 m (D) 9.8 m
- Q.26 An object is located in a fixed position in front of a screen. Sharp image is obtained on the screen for two positions of a thin lens separated by 10 cm. The size of the images in two situations are in the ratio 3 : 2. What is the distance between the screen and the object ?
 (A) 99.0 cm (B) 124.5 cm (C) 144.5 cm (D) 65.0 cm
- Q.27 Two monochromatic light beams of intensity 16 and 9 units are interfering. The ratio of intensities of bright and dark parts of the resultant pattern is :
 (A) $\frac{4}{3}$ (B) $\frac{49}{1}$ (C) $\frac{16}{9}$ (D) $\frac{7}{1}$
- Q.28 From a sphere of mass M and radius R , a smaller sphere of radius $R/2$ is carved out such that the cavity made in the original sphere is between its centre and the periphery. (See figure). For the configuration in the figure where the distance between the centre of the original sphere and the removed sphere is $3R$, the gravitational force between the two spheres is :

 (A) $\frac{59GM^2}{450 R^2}$ (B) $\frac{GM^2}{225 R^2}$ (C) $\frac{41GM^2}{450 R^2}$ (D) $\frac{41GM^2}{3600 R^2}$
- Q.29 An electromagnetic wave of frequency 1×10^{14} hertz is propagating along z-axis. The amplitude of electric field is 4 V/m. If $\epsilon_0 = 8.8 \times 10^{-12} \text{ C}^2/\text{N}\cdot\text{m}^2$, then average energy density of electric field will be :
 (A) $35.2 \times 10^{-12} \text{ J/m}^3$ (B) $35.2 \times 10^{-13} \text{ J/m}^3$ (C) $35.2 \times 10^{-11} \text{ J/m}^3$ (D) $35.2 \times 10^{-10} \text{ J/m}^3$
- Q.30 Two factories are sounding their sirens at 800 Hz, A man goes from one factory to other at a speed of 2 m/s. The velocity of sound is 320 m/s. The number of beats heard by the person in one second will be :
 (A) 8 (B) 4 (C) 10 (D) 2

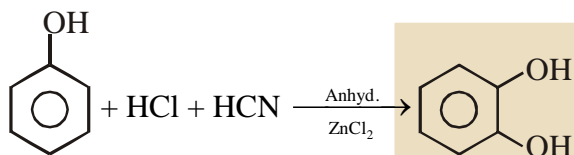
- Q.31 The appearance of colour in solid alkali metal halides is generally due to :
 (A) Frenkel defect (B) F-centres (C) Schottky defect (D) Interstitial position
- Q.32 Complete reduction of benzene-diazonium chloride with Zn/HCl gives :
 (A) Aniline (B) Phenylhydrazine (C) Hydrazobenzene (D) Azobenzene
- Q.33 Which of the following statements about Na_2O_2 is not correct ?
 (A) Na_2O_2 oxidises Cr^{3+} to CrO_4^{2-} in acid medium
 (B) It is diamagnetic in nature
 (C) It is the super oxide of sodium
 (D) It is a derivative of H_2O_2
- Q.34 In allene (C_3H_4), the type(s) of hybridization of the carbon atoms is (are):
 (A) only sp^2 (B) sp^2 and sp (C) sp and sp^3 (D) sp^2 and sp^3
- Q.35 In the reaction of formation of sulphur trioxide by contact process $2\text{SO}_2 + \text{O}_2 \rightleftharpoons 2\text{SO}_3$ the of reaction was measured as $\frac{d[\text{O}_2]}{dt} = -2.5 \times 10^{-4} \text{ mol L}^{-1} \text{ s}^{-1}$. The rate of reaction in terms of $[\text{SO}_2]$ in $\text{mol L}^{-1} \text{ s}^{-1}$ will be
 (A) -2.5×10^{-4} (B) -5.00×10^{-4} (C) -1.25×10^{-4} (D) -3.75×10^{-4}
- Q.36 Based on the equation

$$\Delta E = -2.0 \times 10^{-18} \text{ J} \left(\frac{1}{n_2^2} - \frac{1}{n_1^2} \right)$$
 the wavelength of the light that must be absorbed to excite hydrogen electron from level $n = 1$ to level $n = 2$ will be ($h = 6.625 \times 10^{-34} \text{ Js}$, $C = 3 \times 10^8 \text{ ms}^{-1}$)
 (A) $2.650 \times 10^{-7} \text{ m}$ (B) $1.325 \times 10^{-7} \text{ m}$ (C) $1.325 \times 10^{-10} \text{ m}$ (D) $5.300 \times 10^{-10} \text{ m}$
- Q.37 Given :-
 $\text{Fe}^{3+}(\text{aq}) + \text{e}^- \rightarrow \text{Fe}^{2+}(\text{aq}) ; E^\circ = +0.77 \text{ V}$
 $\text{Al}^{3+}(\text{aq}) + 3\text{e}^- \rightarrow \text{Al}(\text{s}) ; E^\circ = -1.66 \text{ V}$
 $\text{Br}_2(\text{aq}) + 2\text{e}^- \rightarrow 2\text{Br}^- ; E^\circ = +1.09 \text{ V}$
 Considering the electrode potentials, which of the following represents the correct order of reducing power?
 (A) $\text{Al} < \text{Fe}^{2+} < \text{Br}^-$ (B) $\text{Al} < \text{Br}^- < \text{Fe}^{2+}$ (C) $\text{Fe}^{2+} < \text{Al} < \text{Br}^-$ (D) $\text{Br}^- < \text{Fe}^{2+} < \text{Al}$
- Q.38 Consider the following equilibrium
 $\text{AgCl} \downarrow + 2\text{NH}_3 \rightleftharpoons [\text{Ag}(\text{NH}_3)_2]^+ + \text{Cl}^-$
 White precipitate of AgCl appears on adding which of the following?
 (A) NH_3 (B) Aqueous NaCl (C) Aqueous NH_4Cl (D) Aqueous HNO_3

- Q.39 Tischenko reaction is a modification of
 (A) Cannizzaro reaction (B) Claisen condensation
 (C) Pinacol-pinacolone reaction (D) Aldol condensation

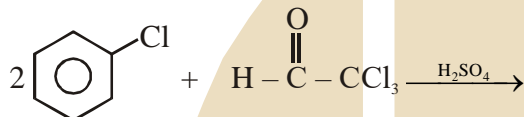
- Q.40 Which one of the following does not have a pyramidal shape?
 (A) $P(CH_3)_3$ (B) $(SiH_3)_3N$ (C) $(CH_3)_3N$ (D) $P(SiH_3)_3$

- Q.41 The following reaction



is known as

- (A) Perkin reaction (B) Kolbe's reaction
 (C) Gattermann reaction (D) Gattermann-Koch Formylation
- Q.42 Chlorobenzene reacts with trichloro acetaldehyde in the presence of H_2SO_4



The major product formed is

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

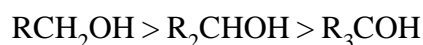
- Q.43 Shapes of certain interhalogen compounds are stated below. Which one of them is not correctly stated?
 (A) IF_7 : Pentagonal bipyramid (B) BrF_5 : Trigonal bipyramid
 (C) ICl_3 : Planar dimeric (D) BrF_3 : Planar T-shaped

- Q.44 Which one of the following statements is not correct?

(A) Alcohols are weaker acids than water

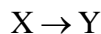
(B) The bond angle in methanol is 108.9°

(C) Acid strength of alcohols decreases in the following order



(D) Carbon-oxygen bond length in methanol, CH_3OH is shorter than that of C-O bond length in phenol

Q.45 Which of the following series correctly represents relations between the elements from X to Y?



- (A) ${}_{18}\text{Ar} \rightarrow {}_{54}\text{Xe}$ Noble character increases
 (B) ${}_{3}\text{Li} \rightarrow {}_{19}\text{K}$ Ionization enthalpy increases
 (C) ${}_{6}\text{C} \rightarrow {}_{19}\text{K}$ Atomic radii increases
 (D) ${}_{9}\text{F} \rightarrow {}_{35}\text{K}$ Electron gain enthalpy with negative sign increases

Q.46 Which of the following statements about the depletion of ozone layer is correct?

- (A) The problem of ozone depletion is more serious at poles because ice crystals in the clouds over poles act as catalyst for photochemical reactions involving the decomposition of ozone by Cl^\bullet and ClO^\bullet radicals
 (B) The problem of ozone depletion is less serious at poles because NO_2 solidifies and is not available for consuming ClO^\bullet radicals
 (C) Oxides of nitrogen also do not react with ozone in stratosphere
 (D) Freons, chlorofluorocarbons, are inert chemically, they do not react with ozone in stratosphere

Q.47 The initial volume of a gas cylinder is 750.0 mL. If the pressure of gas inside the cylinder changes from 840.0 mm Hg to 360.0 mm Hg, the final volume the gas will be

- (A) 1.750 L (B) 7.50 L (C) 3.60 L (D) 4.032 L

Q.48 If λ_0 and λ be the threshold wavelength and wavelength of incident light, the velocity of photoelectron ejected from the metal surface is

- (A) $\sqrt{\frac{2hc}{m} \left(\frac{\lambda_0 - \lambda}{\lambda \lambda_0} \right)}$ (B) $\sqrt{\frac{2h}{m} \left(\frac{1}{\lambda_0} - \frac{1}{\lambda} \right)}$ (C) $\sqrt{\frac{2h}{m} (\lambda_0 - \lambda)}$ (D) $\sqrt{\frac{2hc}{m} (\lambda_0 - \lambda)}$

Q.49 Which one of the following is used as an Antihistamine?

- (A) Diphenhydramine (B) Norethindrone (C) Omeprazole (D) Chloranphenicol

Q.50 The molar heat capacity (C_p) of CD_2O is 10 cal at 1000 K. The change in entropy associated with cooling of 32 g of CD_2O vapour from 1000 K to 100 K at constant pressure will be (D = deuterium, at. mass = 2u)

- (A) $-23.03 \text{ cal deg}^{-1}$ (B) $2.303 \text{ cal deg}^{-1}$ (C) $23.03 \text{ cal deg}^{-1}$ (D) $-2.303 \text{ cal deg}^{-1}$

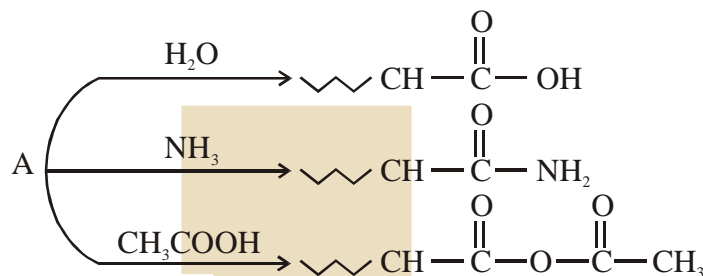
Q.51 The gas liberated by the electrolysis of Dipotassium succinate solution is

- (A) Ethyne (B) Ethene (C) Propene (D) Ethane

Q.52 Which of the following name formula combinations is not correct?

- | Formula | Name |
|---|--|
| (A) $\text{K}[\text{Cr}(\text{NH}_3)_2\text{Cl}_4]$ | Potassium diammine Tetrachlorochromate (III) |
| (B) $[\text{CO}(\text{NH}_3)_4(\text{H}_2\text{O})\text{I}]\text{SO}_4$ | Tetraammine aquaiodo cobalt (III) sulphate |
| (C) $[\text{Mn}(\text{CN})_5]^{2-}$ | Pentacyanomagnate (II) ion |
| (D) $\text{K}_2[\text{Pt}(\text{CN})_4]$ | Potassium tetracyanoplatinate(II) |

- Q.53 For the reaction, $2\text{N}_2\text{O}_5 \rightarrow 4\text{NO}_2 + \text{O}_2$, the rate equation can be expressed in two ways $-\frac{d[\text{N}_2\text{O}_5]}{dt} = k[\text{N}_2\text{O}_5]$ and $+\frac{d[\text{NO}_2]}{dt} = k'[\text{N}_2\text{O}_5]$ k and k' are related as
 (A) $k = k'$ (B) $k = 4k'$ (C) $2k = k'$ (D) $k = 2k'$
- Q.54 An organic compound A, $\text{C}_5\text{H}_8\text{O}$; reacts with H_2O , NH_3 and CH_3COOH as described below:



A is

- (A) $\text{CH}_3-\text{CH}_2-\underset{\text{CH}_3}{\text{C}}=\text{C}=\text{O}$ (B) $\text{CH}_2=\text{CH}\underset{\text{CH}_3}{\text{CH}}-\text{CHO}$
 (C) $\text{CH}_3-\text{CH}_2-\underset{\text{CH}_2}{\text{C}}-\underset{\text{H}}{\text{C}}=\text{O}$ (D) $\text{CH}_3\text{CH}=\underset{\text{CH}_3}{\text{C}}-\text{CHO}$
- Q.55 A gaseous compound of nitrogen and hydrogen contains 12.5% (by mass) of hydrogen. The density of the compound relative to hydrogen is 16. The molecular formula of the compound is :
 (A) NH_2 (B) NH_3 (C) N_3H (D) N_2H_4
- Q.56. Assuming that the degree of hydrolysis is small, the pH of 0.1 M solution of sodium acetate ($K_a = 1.0 \times 10^{-5}$) will be
 (A) 5.0 (B) 8.0 (C) 6.0 (D) 9.0
- Q.57 The reagent needed for converting
 $\text{Ph}-\text{C}\equiv\text{C}-\text{Ph} \longrightarrow \begin{array}{c} \text{Ph} \quad \text{H} \\ \diagdown \quad / \\ \text{C}=\text{C} \\ / \quad \diagdown \\ \text{H} \quad \text{Ph} \end{array}$
 is
 (A) $\text{H}_2/\text{Lindlar Cat.}$ (B) Cat. Hydrogenation
 (C) LiAlH_4 (D) Li/NH_3
- Q.58 Consider the coordination compound, $[\text{Co}(\text{NH}_3)_6]\text{Cl}_3$. In the formation of this complex, the species which acts as the Lewis acid is :
 (A) $[\text{Co}(\text{NH}_3)_6]^{3+}$ (B) NH_3 (C) Co^{3+} (D) Cl^-
- Q.59 The correct order of bond dissociation energy among N_2 , O_2 , O_2^- is shown in which of the following arrangements?
 (A) $\text{N}_2 > \text{O}_2 > \text{O}_2^-$ (B) $\text{O}_2 > \text{O}_2^- > \text{N}_2$ (C) $\text{N}_2 > \text{O}_2^- > \text{O}_2$ (D) $\text{O}_2^- > \text{O}_2 > \text{N}_2$
- Q.60 In some solutions, the concentration of H_3O^+ remains constant even when small amounts of strong acid or strong base are added to them. These solutions are known as :-
 (A) Colloidal solutions (B) True solutions (C) Ideal solutions (D) Buffer solutions

- Q.61 If X has a binomial distribution, $B(n, p)$ with parameters n and p such that $P(X = 2) = P(X = 3)$, then $E(X)$, the mean of variable X , is
- (A) $3 - p$ (B) $\frac{p}{3}$ (C) $\frac{p}{2}$ (D) $2 - p$
- Q.62 The integral $\int x \cos^{-1}\left(\frac{1-x^2}{1+x^2}\right) dx (x > 0)$ is equal to
- (1) $-x + (1+x^2) \tan^{-1} x + c$ (B) $x - (1+x^2) \tan^{-1} x + c$
 (C) $x - (1+x^2) \cot^{-1} x + c$ (D) $-x + (1+x^2) \cot^{-1} x + c$
- Q.63 Let f be an odd function defined on the set of real numbers such that for $x \geq 0$, $f(x) = 3\sin x + 4\cos x$. Then $f(x)$ at $x = -\frac{11\pi}{6}$ is equal to
- (A) $\frac{3}{2} - 2\sqrt{3}$ (B) $-\frac{3}{2} - 2\sqrt{3}$ (C) $-\frac{3}{2} + 2\sqrt{3}$ (D) $\frac{3}{2} + 2\sqrt{3}$
- Q.64 The plane containing the line $\frac{x-1}{1} = \frac{y-2}{2} = \frac{z-3}{3}$ and parallel to the line $\frac{x}{1} = \frac{y}{1} = \frac{z}{4}$ passes through the point
- (A) $(1, 0, 5)$ (B) $(0, 3, -5)$ (C) $(-1, -3, 0)$ (D) $(1, -2, 5)$
- Q.65 The volume of the largest possible right circular cylinder that can be inscribed in a sphere of radius $= \sqrt{3}$ is
- (A) 4π (B) $\frac{4}{3}\sqrt{3}\pi$ (C) $\frac{8}{3}\sqrt{3}\pi$ (D) 2π
- Q.66 The proposition $\sim(pv\sim q)v\sim(pvq)$ is logically equivalent to
- (A) $\sim p$ (B) $\sim q$ (C) p (D) q
- Q.67 If the general solution of the differential equation $y' = \frac{y}{x} + \Phi\left(\frac{x}{y}\right)$, for some function Φ , is given by $y \ln |cx| = x$, where c is an arbitrary constant, then $\Phi(2)$ is equal to
- (A) 4 (B) -4 (C) $\frac{1}{4}$ (D) $-\frac{1}{4}$
- Q.68 For the curve $y = 3 \sin\theta \cos\theta$, $x = e^\theta \sin\theta$, $0 \leq \theta \leq \pi$, the tangent is parallel to x -axis when θ is
- (A) $\frac{\pi}{2}$ (B) $\frac{3\pi}{4}$ (C) $\frac{\pi}{4}$ (D) $\frac{\pi}{6}$

- Q.69 If for $n \geq 1$, $P_n = \int_1^e (\log x)^n dx$, then $P_{10} - 90P_8$ is equal to
 (A) $10e$ (B) 10 (C) -9 (D) $-9e$
- Q.70 Let $f(x) = x|x|$, $g(x) = \sin x$ and $h(x) = (g \circ f)(x)$. Then
 (A) $h'(x)$ is differentiable at $x = 0$
 (B) $h'(x)$ is continuous at $x = 0$ but is not differentiable at $x = 0$
 (C) $h(x)$ is differentiable at $x = 0$ but $h'(x)$ is not continuous at $x = 0$
 (D) $h(x)$ is not differentiable at $x = 0$
- Q.71 A set S contains 7 elements. A non-empty subset A of S and an element x of S are chosen at random. Then the probability that $x \in A$ is
 (A) $\frac{64}{127}$ (B) $\frac{63}{128}$ (C) $\frac{1}{2}$ (D) $\frac{31}{128}$
- Q.72 If $\lim_{x \rightarrow 2} \frac{\tan(x-2)\{x^2 + (k-2)x - 2k\}}{x^2 - 4x + 4} = 5$ then k is equal to
 (A) 3 (B) 1 (C) 0 (D) 2
- Q.73 Let $P(3\sec\theta, 2\tan\theta)$ and $Q(3\sec\phi, 2\tan\phi)$ where $\theta + \phi = \pi/2$, be two distinct points on the hyperbola $\frac{x^2}{9} - \frac{y^2}{4} = 1$. Then the ordinate of the point of intersection of the normals at P and Q is
 (A) $-\frac{11}{3}$ (B) $-\frac{13}{2}$ (C) $\frac{13}{2}$ (D) $\frac{11}{3}$
- Q.74 In a geometric progression, if the ratio of the sum of first 5 terms to the sum of their reciprocals is 49, and the sum of the first and the third term is 35. Then the first term of this geometric progression is
 (A) 42 (B) 28 (C) 21 (D) 7
- Q.75 Let $A\{2, 3, 5\}$, $B(-1, 3, 2)$ and $C(\lambda, 5, \mu)$ be the vertices of a ΔABC . If the median through A is equally inclined to the coordinate axes, then
 (A) $8\lambda - 5\mu = 0$ (B) $10\lambda - 7\mu = 0$ (C) $5\lambda - 8\mu = 0$ (D) $7\lambda - 10\mu = 0$
- Q.76 The set of all real values of λ for which exactly two common tangents can be drawn to the circles $x^2 + y^2 - 4x - 4y + 6 = 0$ and $x^2 + y^2 - 10x - 10y + \lambda = 0$ is the interval
 (A) (18, 48) (B) (12, 24) (C) (18, 42) (D) (12, 32)

- Q.77 If z_1, z_2 and z_3, z_4 are 2 pairs of complex conjugate numbers, then $\arg\left(\frac{z_1}{z_4}\right) + \arg\left(\frac{z_2}{z_3}\right)$ equals
- (A) 0 (B) $\frac{\pi}{2}$ (C) $\frac{3\pi}{2}$ (D) π
- Q.78 If $2\cos\theta + \sin\theta = 1$ $\left(\theta \neq \frac{\pi}{2}\right)$, then $7\cos\theta + 6\sin\theta$ is equal to
- (A) $\frac{1}{2}$ (B) $\frac{46}{5}$ (C) 2 (D) $\frac{11}{2}$
- Q.79 An eight digit number divisible by 9 is to be formed using digits from 0 to 9 without repeating the digits. The number of ways in which this can be done is :
- (A) 18 (7!) (B) 40 (7!) (C) 36 (7!) (D) 72 (7!)
- Q.80 The coefficient of x^{50} in the binomial expansion of $(1+x)^{1000} + x(1+x)^{999} + x^2(1+x)^{998} + \dots + x^{1000}$ is
- (A) $\frac{(1000)!}{(50)!(950)!}$ (B) $\frac{(1001)!}{(50)!(951)!}$ (C) $\frac{(1000)!}{(49)!(951)!}$ (D) $\frac{(1001)!}{(51)!(950)!}$
- Q.81 Let L_1 be the length of the common chord of the curves $x^2 + y^2 = 9$ and $y^2 = 8x$, and L_2 be the length of the latus rectum of $y^2 = 8x$ then
- (A) $L_1 < L_2$ (B) $L_1 > L_2$ (C) $\frac{L_1}{L_2} = \sqrt{2}$ (D) $L_1 = L_2$
- Q.82 The angle of elevation of the top of a vertical tower from a point P on the horizontal ground was observed to be α . After moving a distance 2 metres from P towards the foot of the tower, the angle of elevation changes to β . Then the height (in metres) of the tower is
- (A) $\frac{\cos(\beta - \alpha)}{\sin\alpha \sin\beta}$ (B) $\frac{2\sin\alpha \sin\beta}{\sin(\beta - \alpha)}$ (C) $\frac{2\sin(\beta - \alpha)}{\sin\alpha \sin\beta}$ (D) $\frac{\sin\alpha \sin\beta}{\cos(\beta - \alpha)}$
- Q.83 Two ships A and B are sailing straight away from a fixed point O along routes such that $\angle AOB$ is always 120° . At a certain instance, $OA = 8$ km, $OB = 6$ km and the ship A is sailing at the rate of 20 km/hr while the ship B sailing at the rate of 30 km/hr. Then the distance between A and B is changing at the rate (in km/hr)
- (A) $\frac{260}{37}$ (B) $\frac{80}{37}$ (C) $\frac{80}{\sqrt{37}}$ (D) $\frac{260}{\sqrt{37}}$

- Q.84 If α and β are roots of the equation $x^2 - 4\sqrt{2}kx + 2e^{4\ln k} - 1 = 0$ for some k , and $\alpha^2 + \beta^2 = 66$, then $\alpha^3 + \beta^3$ is equal to
 (A) $248\sqrt{2}$ (B) $280\sqrt{2}$ (C) $-32\sqrt{2}$ (D) $-280\sqrt{2}$
- Q.85 Let for $i = 1, 2, 3$ $p_i(x)$ be a polynomial of degree 2 in x , $p_i'(x)$ and $p_i''(x)$ be the first and second order derivatives of $p_i(x)$ respectively.

$$\text{Let, } A(x) = \begin{bmatrix} p_1(x) & p_1'(x) & p_1''(x) \\ p_2(x) & p_2'(x) & p_2''(x) \\ p_3(x) & p_3'(x) & p_3''(x) \end{bmatrix}$$

and $B(x) = [A(x)]^T A(x)$. Then determinant of $B(x)$

- (A) Does not depend on x (B) Is a polynomial of degree 6 in x
 (C) Is a polynomial of degree 3 in x (D) Is a polynomial of degree 2 in x
- Q.86 The sum of the first 20 terms common between the series $3 + 7 + 11 + 15 + \dots$ and $1 + 6 + 11 + 16 + \dots$, is :
 (A) 4220 (B) 4020 (C) 4000 (D) 4200
- Q.87 If $|\vec{c}|^2 = 60$ and $\vec{c} \times (\hat{i} + 2\hat{j} + 5\hat{k}) = \vec{0}$. then a value of $\vec{c} \cdot (-7\hat{i} + 2\hat{j} + 3\hat{k})$ is
 (A) $4\sqrt{2}$ (B) 24 (C) $12\sqrt{2}$ (D) 12
- Q.88 Let A be a 3×3 matrix such that

$$A \begin{bmatrix} 1 & 2 & 3 \\ 0 & 2 & 3 \\ 0 & 1 & 1 \end{bmatrix} = \begin{bmatrix} 0 & 0 & 1 \\ 1 & 0 & 0 \\ 0 & 1 & 0 \end{bmatrix}$$

Then A^{-1} is

(A) $\begin{bmatrix} 3 & 2 & 1 \\ 3 & 2 & 0 \\ 1 & 1 & 0 \end{bmatrix}$ (B) $\begin{bmatrix} 3 & 1 & 2 \\ 3 & 0 & 2 \\ 1 & 0 & 1 \end{bmatrix}$ (C) $\begin{bmatrix} 0 & 1 & 3 \\ 0 & 2 & 3 \\ 1 & 1 & 1 \end{bmatrix}$ (D) $\begin{bmatrix} 1 & 2 & 3 \\ 0 & 1 & 1 \\ 0 & 2 & 3 \end{bmatrix}$

Q.89 A stair-case of length l rests against a vertical wall and a floor of a room,. Let P be a point on the stair-case, nearer to its end on the wall, that divides its length in the ratio 1 : 2. If the stair-case begins to slide on the floor, then the locus of P is :

(A) An ellipse of eccentricity $\frac{\sqrt{3}}{2}$

(B) A circle of radius $\frac{l}{2}$

(C) An ellipse of eccentricity $\frac{1}{2}$

(D) A circle of radius $\frac{\sqrt{3}}{2}l$

Q.90 The base of an equilateral triangle is along the line given by $3x + 4y = 9$. If a vertex of the triangle is $(1, 2)$, then the length of a side of the triangle is :

(A) $\frac{4\sqrt{3}}{15}$

(B) $\frac{4\sqrt{3}}{5}$

(C) $\frac{2\sqrt{3}}{15}$

(D) $\frac{2\sqrt{3}}{5}$

| JEE MAIN & AIEEE-2014 QUESTION OF ON LINE EXAMINATION | | | | | | | | | | |
|---|----|----|----|----|----|----|----|----|----|---------|
| ANSWER KEY | | | | | | | | | | PAPER-2 |
| Q. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| A. | C | C | C | C | D | B | C | C | D | D |
| Q. | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| A. | B | D | B | C | C | C | A | A | C | B |
| Q. | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 |
| A. | C | B | A | A | B | A | B | D | A | C |
| Q. | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 |
| A. | B | A | C | B | B | B | D | D | A | B |
| Q. | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 |
| A. | C | D | B | D | C | A | A | A | A | A |
| Q. | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 |
| A. | B | C | C | A | D | D | D | C | A | D |
| Q. | 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 | 70 |
| A. | A | A | A | A | A | A | D | C | D | B |
| Q. | 71 | 72 | 73 | 74 | 75 | 76 | 77 | 78 | 79 | 80 |
| A. | A | A | B | B | B | C | A | C | C | B |
| Q. | 81 | 82 | 83 | 84 | 85 | 86 | 87 | 88 | 89 | 90 |
| A. | A | B | D | B | A | B | C | B | A | A |