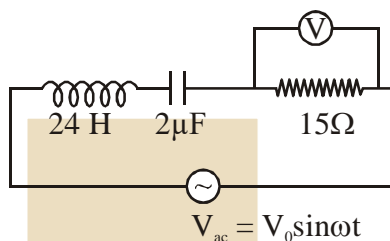


ONLINE EXAM TEST PAPERS OF 2013 (PAPER-2)

- Q.1 An LCR circuit as shown in the figure is connected to a voltage source V_{ac} whose frequency can be varied.



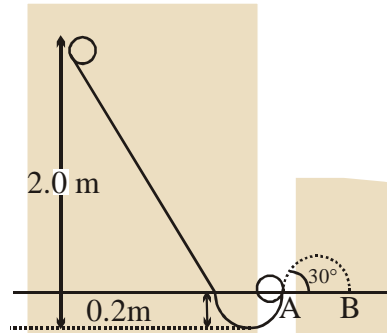
The frequency, at which the voltage across the resistor is maximum, is:

- (A) 345 Hz (B) 902 Hz (C) 143 Hz (D) 23 Hz
- Q.2 **Statement-1:** In Young's double slit experiment, the number of fringes observed in the field of view is small with longer wavelength of light and is large with shorter wave length of light.
Statement-2: In the double slit experiment the fringe width depends directly on the wave length of light.
- (A) Statement-1 is true, statement-2 is true and statement-2 is NOT the correct explanation for statement-1.
(B) Statement-1 is true, statement-2 is true and statement-2 is correct explanation for statement-1.
(C) Statement-1 is false, statement-2 is true.
(D) Statement-1 is true, statement-2 is false.
- Q.3 A uniform wire (Young's modulus $2 \times 10^{11} \text{ m}^{-2}$) is subjected to longitudinal tensile stress of $5 \times 10^7 \text{ Nm}^{-2}$. If the overall volume change in the wire is 0.02%, the fractional decrease in the radius of the wire is close to:
- (A) 1.5×10^{-4} (B) 0.25×10^{-4} (C) 5×10^{-4} (D) 1.0×10^{-4}
- Q.4 A body starts from rest on a long inclined plane of slope 45° . The coefficient of friction between the body and the plane varies as $m = 0.3x$, where x is distance travelled down the plane. The body will have maximum speed (for $g = 10 \text{ m/s}^2$) when $x =$
- (A) 3.33 m (B) 12 m (C) 27 m (D) 9.8 m
- Q.5 An ideal gas at atmospheric pressure is adiabatically compressed so that its density becomes 32 times of its initial value. If the final pressure of gas is 128 atmospheres, the value of ' γ ' of the gas is:
- (A) 1.5 (B) 1.6 (C) 1.3 (D) 1.4
- Q.6 **Statement-1:** Short wave transmission is achieved due to the total internal reflection of the e-m wave from an appropriate height in the ionosphere.
Statement-2: Refractive index of a plasma is independent of the frequency of e-m waves.
- (A) Statement-1 is true, statement-2 is false. (B) Statement-1 is false, statement-2 is true.
(C) Statement-1 is true, statement-2 is true and statement-2 is NOT the correct explanation for statement-1.
(D) Statement-1 is true, statement-2 is true and statement-2 is correct explanation for statement-1.

Q.7 The focal length of the objective and the eyepiece of a telescope are 50 cm and 5 cm respectively. If the telescope is focussed for distinct vision on a scale distant 2m from its objective, then its magnifying power will be

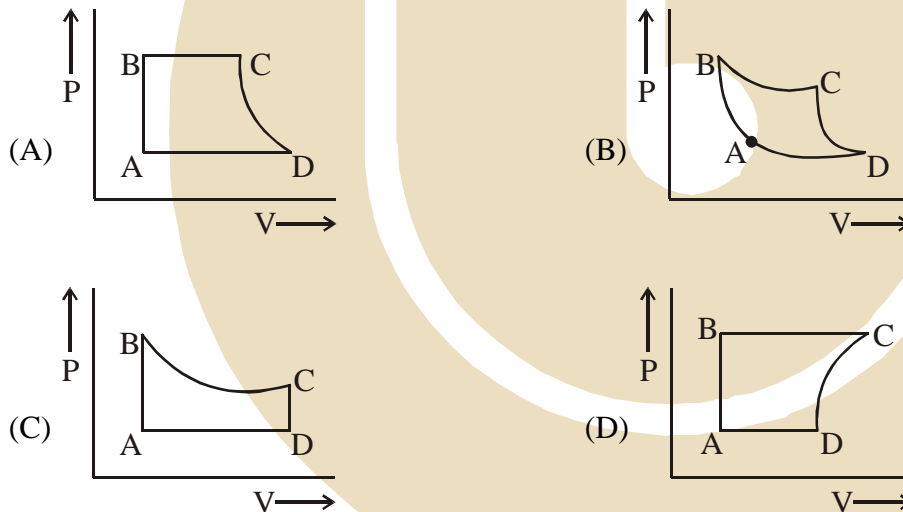
- (A) -8 (B) -4 (C) +8 (D) -2

Q.8 A tennis ball (treated as hollow spherical shell) starting from O rolls down a hill. At point A the ball becomes air borne leaving at an angle of 30° with the horizontal. The ball strikes the ground at B. What is the value of the distance AB? (Moment of inertia of a spherical shell of mass m and radius R about its diameter = $\frac{2}{3} mR^2$)



- (A) 2.08 m (B) 1.87 m (C) 1.57 m (D) 1.77 m

Q.9 A certain amount of gas is taken through a cyclic process (ABCD) that has two isobars, one isochore and one isothermal. The cycle can be represented on a P-V indicator diagram as



Q.10 A and B are two sources generating sound waves. A listener is situated at C. The frequency of the source at the A is 500 Hz. A now, moves towards C with a speed 4m/s. The number of beats heard at C is 6. When A moves away from C with speed 4m/s, the number of beats heard at C is 18. The speed of sound is 340 m/s. The frequency of the source at B is:



- (A) 506 Hz (B) 512 Hz (C) 500 Hz (D) 494 Hz

Q.11 A current i is flowing in a straight conductor of length L . The magnetic induction at a point on its axis at a distance $L/4$ from its centre will be:

- (A) zero (B) $\frac{4\mu_0 i}{\sqrt{5\pi\pi}}$ (C) $\frac{\mu_0 i}{2\pi L}$ (D) $\frac{\mu_0 i}{\sqrt{2}L}$

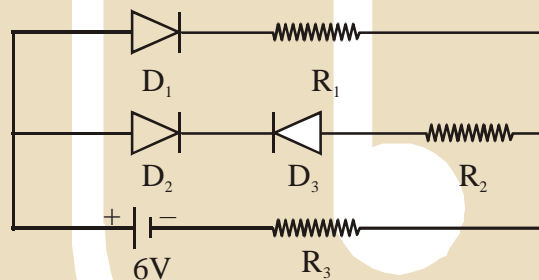
Q.12 A point charge of magnitude $+1\text{mC}$ is fixed at $(0, 0, 0)$. An isolated uncharged spherical conductor is fixed with its centre at $(4, 0, 0)$. The potential and the induced electric field at the centre of the sphere is

- (A) $1.8 \times 10^5 \text{ V}$ and $-5.625 \times 10^6 \text{ V/m}$ (B) 0 V and 0 V/m
(C) $2.25 \times 10^5 \text{ V}$ and 0 V/m (D) $2.25 \times 10^5 \text{ V}$ and $-5.625 \times 10^6 \text{ V/m}$

Q.13 The change in the value of acceleration of earth towards the sun, when the moon comes from the position of solar eclipse to the position on the other side of earth in line with sun, is

- (mass of the moon = $7.36 \times 10^{22} \text{ kg}$, radius of the moon's orbit = $3.8 \times 10^8 \text{ m}$)
(A) $6.73 \times 10^{-4} \text{ m/s}^2$ (B) $6.73 \times 10^{-2} \text{ m/s}^2$ (C) $6.73 \times 10^{-5} \text{ m/s}^2$ (D) $6.73 \times 10^{-3} \text{ m/s}^2$

Q.14 Figure shows a circuit in which three identical diodes are used. Each diode has forward resistance of 20Ω and infinite backward resistance. Resistors $R_1 = R_2 = R_3 = 50\Omega$. Battery voltage is 6V . The current through R_3 is



- (A) 50 mA (B) 100 mA (C) 25 mA (D) 60 mA

Q.15 Air of density 1.2 kgm^{-3} is blowing across the horizontal wings of an aeroplane in such a way that its speed above and below the wings are 150 ms^{-1} and 100 ms^{-1} , respectively. The pressure difference between the upper and lower sides of the wings is

- (A) 60 Nm^{-2} (B) 180 Nm^{-2} (C) 12500 Nm^{-2} (D) 7500 Nm^{-2}

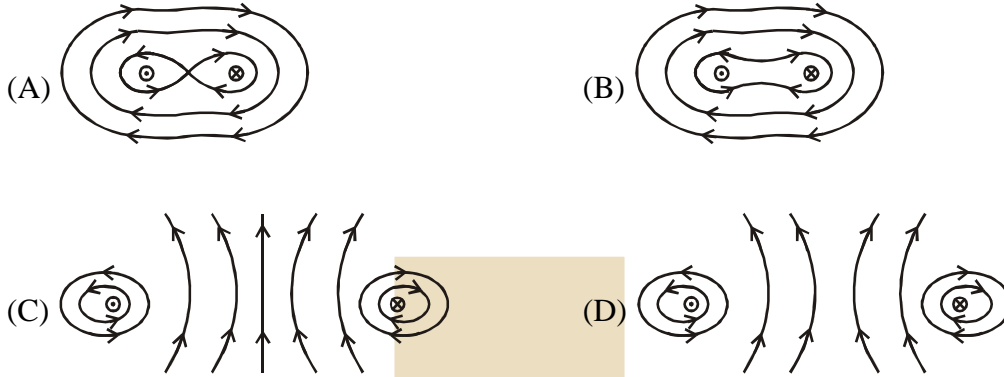
Q.16 The dimensions of angular momentum, latent heat and capacitance are, respectively

- (A) $\text{ML}^2\text{T}^1\text{A}^2$, L^2T^{-2} , $\text{M}^{-1}\text{L}^{-2}\text{T}^2$ (B) ML^2T^2 , L^2T^2 , $\text{M}^{-1}\text{L}^{-2}\text{T}^4\text{A}^2$
(C) ML^2T^{-1} , L^2T^{-2} , $\text{M}^{-1}\text{L}^{-2}\text{T}^4\text{A}^2$ (D) ML^2T^{-1} , L^2T^{-2} , ML^2TA^2

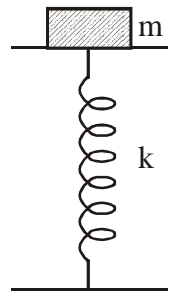
Q.17 Given that 1 g of water in liquid phase has volume 1 cm^3 and in vapour phase 1671 cm^3 at atmospheric pressure and the latent heat of vaporisation of water is 2256 J/g . The change in the internal energy in Joules for 1 g of water at 373 K when it changes from liquid phase to vapour phase at the same temperature is

- (A) 2089 (B) 167 (C) 1 (D) 2256

Q.18 Choose the correct sketch of the magnetic field lines of a circular current loop shown by the dot \odot and the cross \otimes



Q.19 A mass $m = 1.0 \text{ kg}$ is put on a flat pan attached to a vertical spring fixed on the ground. The mass of the spring and the pan is negligible. When pressed slightly and released, the mass executes simple harmonic motion. The spring constant is 500 N/m . What is the amplitude A of the motion, so that the mass m tends to get detached from the pan? (Take $g = 10 \text{ m/s}^2$)

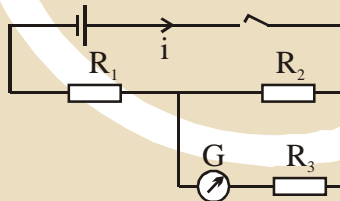


The spring is stiff enough so that it does not get distorted during the motion.

- (A) $A = 2.0 \text{ cm}$ (B) $A < 2.0 \text{ cm}$ (C) $A = 1.5 \text{ cm}$ (D) $A > 2.0 \text{ cm}$

Q.20 To find the the resistance of a galvanometre by the half deflection method the following circuit is used with resistances $R_1 = 9970\Omega$, $R_2 = 30\Omega$ and $R_3 = 0$. The deflection in the galvanometre is d .

With $R_3 = 107\Omega$ the deflection changed to $\frac{d}{2}$. The galvanometre resistance is approximately:

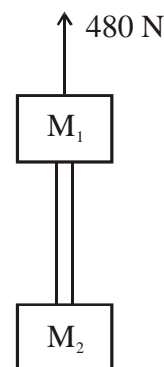


- (A) $107/2 \Omega$ (B) 137Ω (C) 77Ω (D) 107Ω

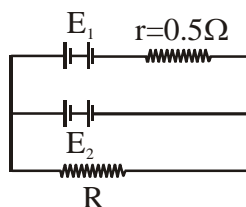
Q.21 Two establish an instantaneous current of 2A through a 1mF capacitor, the potential difference across the capacitor plates should be changed at the rate of

- (A) $4 \times 10^6 \text{ V/s}$ (B) $4 \times 10^4 \text{ V/s}$ (C) $2 \times 10^6 \text{ V/s}$ (D) $2 \times 10^4 \text{ V/s}$

- Q.22 A ball projected from ground at an angle of 45° just clears a wall in front. If point of projection is 4m from the foot of wall and ball strikes the ground at a distance of 6m on the other side of the wall, the height of the wall is :
- (A) 4.4 m (B) 2.4 m (C) 1.6 m (D) 3.6 m
- Q.23 Two small equal point charges of magnitude q are suspended from a common point on the ceiling by insulating massless strings of equal lengths. They come to equilibrium with each string making angle θ from the vertical. If the mass of each charge is m , then the electrostatic potential at the centre of line joining them will be $\left(\frac{1}{4\pi\epsilon_0} = k\right)$.
- (A) $2\sqrt{kmg \tan\theta}$ (B) $4\sqrt{kmg / \tan\theta}$ (C) $\sqrt{kmg \tan\theta}$ (D) $4\sqrt{kmg \tan\theta}$
- Q.24 Orbits of a particle moving in a circle are such that the perimeter of the orbit equals an integer number of de-Broglie wavelengths of the particle. For a charged particle moving in a plane perpendicular to a magnetic field, the radius of the n^{th} orbital will therefore be proportional to
- (A) n^2 (B) $n^{1/2}$ (C) $n^{1/4}$ (D) n
- Q.25 A plane electromagnetic wave in a non-magnetic dielectric medium is given $\vec{E} = \vec{E}_0(4 \times 10^{-7} \times -50t)$ by with distance being in meter and time in seconds. The dielectric constant of the medium is
- (A) 2.4 (B) 4.8 (C) 5.8 (D) 8.2
- Q.26 In a series L-C-R circuit, $C = 10^{-11}$ Farad, $L = 10^{-5}$ Henry and $R = 100$ Ohm, when a constant D.C. voltage E is applied to the circuit, the capacitor acquires a charge 10^{-9} C. The D.C. source is replaced by a sinusoidal voltage source in which the peak voltage E_0 is equal to the constant D.C. voltage E . At resonance the peak value of the charge acquired by the capacitor will be:
- (A) 10^{-6} C (B) 10^{-15} C (C) 10^{-10} C (D) 10^{-8} C
- Q.27 Two blocks of mass $M_1 = 20$ kg and $M_2 = 12$ kg are connected by a metal rod of mass 8 kg. The system is pulled vertically up by applying a force of 480 N as shown. The tension at the mid-point of the rod is
- (A) 240 N
(B) 144 N
(C) 96 N
(D) 192 N

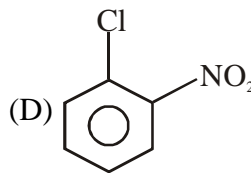
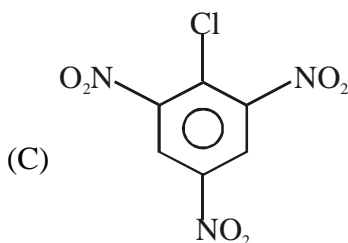
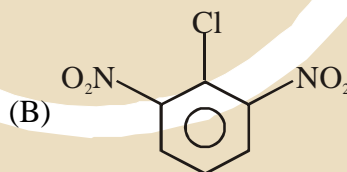
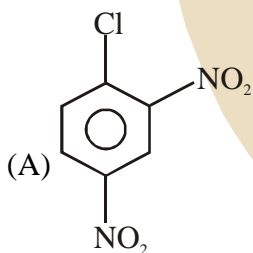


- Q.28 A dc source of emf $E_1 = 100 \text{ V}$ and internal resistance $r = 0.5 \text{ } \Omega$, a storage battery of emf $E_2 = 90 \text{ V}$ and an external resistance R are connected as shown in the figure. For what value of R no current will pass through the battery?



- (A) $5.5 \text{ } \Omega$ (B) $4.5 \text{ } \Omega$ (C) $2.5 \text{ } \Omega$ (D) $3.5 \text{ } \Omega$
- Q.29 The image of an illuminated square is obtained on a screen with the help of a converging lens. The distance of the square from the lens is 40 cm . The area of the image is 9 times that of the square. The focal length of the lens is
- (A) 36 cm (B) 27 cm (C) 30 cm (D) 60 cm
- Q.30 The half-life of a radioactive element A is the same as the mean-life of another radioactive element B. Initially both substances have the same number of atoms, then
- (A) B will decay at a faster rate than A initially
(B) A and B both decay at the same rate always
(C) A will decay at a faster rate than B initially
(D) A & B will decay at the same rate initially

- Q.31 Flocculation value of BaCl_2 is much less than that of KCl for sol A and flocculation value of Na_2SO_4 is much less than that of NaBr for sol B. The correct statement among the following is:
- (A) Both the sols A and B are negatively charged and sol B is positively charged
 (B) Sol A is negatively charged and sol B is positively charged
 (C) Both the sols A and B are positively charged
 (D) Sol A is positively charged and sol B is negatively charged
- Q.32 Which of the following is diamagnetic?
- (A) $[\text{Co}(\text{F}_6)]^{3-}$ (B) $[\text{FeF}_6]^{3-}$ (C) $[\text{Fe}(\text{CN})_6]^{3-}$ (D) $[\text{Co}(\text{OX})]^{3-}$
- Q.33 Oxidation state of sulphur in anions SO_3^{2-} , $\text{S}_2\text{O}_4^{2-}$ and $\text{S}_2\text{O}_6^{2-}$ increases in the orders
- (A) $\text{S}_2\text{O}_6^{2-} < \text{S}_2\text{O}_4^{2-} < \text{SO}_3^{2-}$ (B) $\text{SO}_3^{2-} < \text{S}_2\text{O}_4^{2-} < \text{S}_2\text{O}_6^{2-}$
 (C) $\text{S}_2\text{O}_4^{2-} < \text{SO}_3^{2-} < \text{S}_2\text{O}_6^{2-}$ (D) $\text{S}_2\text{O}_4^{2-} < \text{S}_2\text{O}_6^{2-} < \text{SO}_3^{2-}$
- Q.34 In Goldschmidt aluminothermic process which of the following reducing agents is used:
- (A) Calcium (B) Coke (C) Sodium (D) Al-powder
- Q.35 Which one of the following statements about packing in solids is incorrect?
- (A) Void space in ccp mode of packing is 26%
 (B) Coordination number in hcp mode of packing is 12
 (C) Void space in hcp mode of packing is 32%
 (D) Coordination number in bcc mode of packing is 8
- Q.36 A major component of Borsche reagent is obtained by reacting hydrazine hydrate with which of the following



- Q.37 Clemmensen reduction of a ketone carried out in the presence of
 (A) LiAlH_4 (B) H_2 with Pt as catalyst
 (C) Glycol with KOH (D) Zn–Hg with HCl
- Q.38 Given
- | Reaction | Energy Change (in kJ) |
|---|--------------------------|
| $\text{Li(s)} \rightarrow \frac{3}{4} \text{Li(g)}$ | 161 |
| $\text{Li(g)} \rightarrow \frac{3}{4} \text{Li}^+(\text{g})$ | 520 |
| $\frac{1}{2} \text{F}_2(\text{g}) \rightarrow \frac{3}{4} \text{F(g)}$ | 77 |
| $\text{F(g)} + \text{e}^- \rightarrow \text{F}^-(\text{g})$ | (Electron gain enthalpy) |
| $\text{Li}^+(\text{g}) + \text{F}^-(\text{g}) \rightarrow \frac{3}{4} \text{LiF(s)}$ | – 1047 |
| $\text{Li(s)} + \frac{1}{2} \text{F}_2(\text{g}) \rightarrow \frac{3}{4} \text{LiF(s)}$ | – 617 |
- Based on data provided, the value of electron gain enthalpy of fluorine would be
 (A) -300 kJ mol^{-1} (B) -328 kJ mol^{-1} (C) -350 kJ mol^{-1} (D) -228 kJ mol^{-1}
- Q.39 Which of the following would not give 2-phenylbutane as the major product in a Friedel–Crafts alkylation reaction?
 (A) Butanoylchloride + AlCl_3 then Zn, HCl
 (B) Butyl chloride + AlCl_3
 (C) 2-butanol + H_2SO_4
 (D) 1-butene + HF
- Q.40 Bond order normally gives idea of stability of a molecular species. All the molecules viz. H_2 , Li_2 and B_2 have the same bond order yet they are not equally stable. Their stability order is
 (A) $\text{Li}_2 > \text{H}_2 > \text{B}_2$ (B) $\text{H}_2 > \text{B}_2 > \text{Li}_2$ (C) $\text{B}_2 > \text{H}_2 > \text{Li}_2$ (D) $\text{Li}_2 > \text{B}_2 > \text{H}_2$
- Q.41 In Williamson synthesis of mixed ether having a primary and a tertiary alkyl group if tertiary halide is used, then:
 (A) Expected mixed ether will be formed
 (B) Simple ether will form instead of mixed ether
 (C) Alkene will be the main product
 (D) Rate of reaction will be slow due to slow cleavage of carbon–halogen bond
- Q.42 Which of the following statement is incorrect?
 (A) Fe^{2+} ion also gives blood red colour with SCN^- ion
 (B) Cupric ion reacts with excess of ammonia solution to give deep blue color of $[\text{Cu}(\text{NH}_3)_4]^{2+}$ ion
 (C) Fe^{3+} ion gives blood red colour with SCN^- ion
 (D) On passing H_2S into Na_2ZnO_2 solution a white ppt. of ZnS is formed

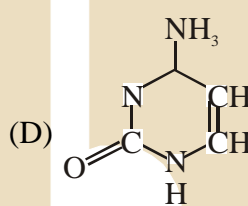
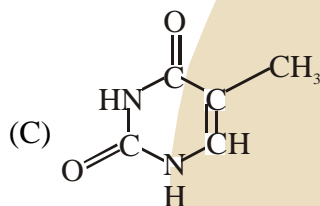
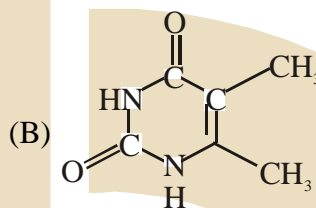
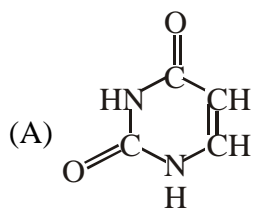
Q.43 The wave number of the first emission line in the Balmer series of H-spectrum is
(R = Rydberg constant)

- (A) $\frac{3}{4}R$ (B) $\frac{9}{400}R$ (C) $\frac{5}{36}R$ (D) $\frac{7}{6}R$

Q.44 A molecule M associates in a given solvent according to the equation $M \rightleftharpoons (M)_n$. For a certain concentration of M, the van't Hoff factor was found to be 0.9 and the fraction of associated molecules was 0.2. The value of n is

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

Q.45 Which of the following structures represent thymine?



Q.46 The solubility order for alkali metal fluoride in water is

- (A) $\text{LiF} < \text{NaF} < \text{KF} < \text{RbF}$ (B) $\text{LiF} > \text{NaF} > \text{KF} > \text{RbF}$
(C) $\text{RbF} < \text{KF} < \text{NaF} < \text{LiF}$ (D) $\text{LiF} < \text{RbF} < \text{KF} < \text{NaF}$

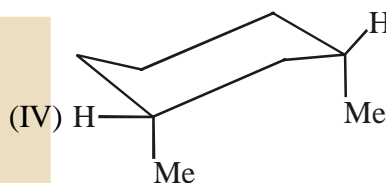
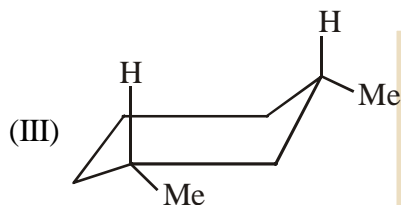
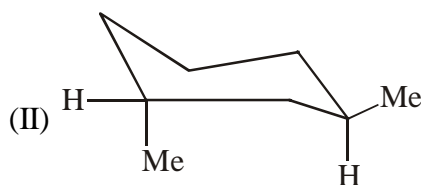
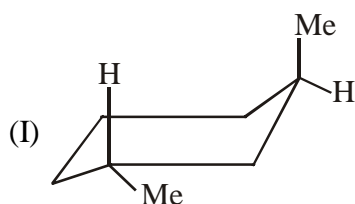
Q.47 The Wurtz-Fittig reaction involves condensation of

- (A) two molecules of aralkyl-halides
(B) one molecule of each aryl-halide and phenol
(C) two molecules of aryl halides
(D) one molecule of each of aryl - halide and alkyl halide

Q.48 The order of increasing sizes of atomic radii among the elements O, S, Se and As is

- (A) $\text{As} < \text{S} < \text{O} < \text{Se}$ (B) $\text{O} < \text{S} < \text{As} < \text{Se}$
(C) $\text{Se} < \text{S} < \text{As} < \text{O}$ (D) $\text{O} < \text{S} < \text{Se} < \text{As}$

Q.49 Arrange in the correct order of stability (decreasing order) for the following molecules



(A) (I) > (II) > (III) > (IV)

(B) (IV) > (III) > (II) ≈ (I)

(C) (III) > (I) ≈ (II) > (IV)

(D) (I) > (II) ≈ (III) > (IV)

Q.50 The polymer used for optical lenses is

(A) poly methyl methacrylate

(B) polythene

(C) poly vinyl chloride

(D) polypropylene

Q.51 NaOH is a strong base. What will be pH of 5.0×10^{-2} M NaOH solution? ($\log 2 = 0.3$)

(A) 13.70

(B) 13.00

(C) 14.00

(D) 12.70

Q.52 Values of dissociation constant, K_a are given as follows:

Acid

K_a

HCN

6.2×10^{-10}

HF

7.2×10^{-4}

HNO_2

6.2×10^{-4}

Correct order of increasing base strength of the base CN^- , F^- and NO_2^- will be:

(A) $\text{NO}_2^- < \text{CN}^- < \text{F}^-$ (B) $\text{F}^- < \text{CN}^- < \text{NO}_2^-$ (C) $\text{NO}_2^- < \text{F}^- < \text{CN}^-$ (D) $\text{F}^- < \text{NO}_2^- < \text{CN}^-$

Q.53 The density of 3M solution of sodium chloride is 1.252 g mL^{-1} . The molality of the solution will be:

(molar mass, $\text{NaCl} = 58.5 \text{ g mol}^{-1}$)

(A) 2.18 m

(B) 3.00 m

(C) 2.60 m

(D) 2.79 m

Q.54 For which of the following compounds Kjeldahl method can be used to determine the percentage of Nitrogen?

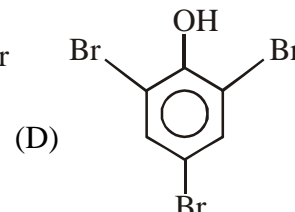
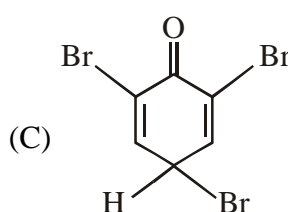
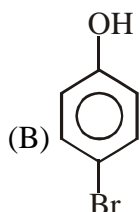
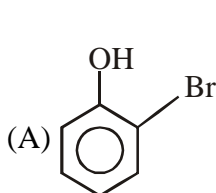
(A) Nitrobenzene

(B) Pyridine

(C) Diazomethane

(D) Alanine

- Q.55 Amongst the following alcohols which would react fastest with conc. HCl and ZnCl₂?
 (A) 2-methylbutanol (B) 2-pentanol (C) pentanol (D) 2-methylbutan-2-ol
- Q.56 The reaction X→Y is an exothermic reaction. Activation energy of the reaction for X into Y is 150 kJ mol⁻¹. Enthalpy of reaction is 135 kJ mol⁻¹. The activation energy for the reverse reaction, Y→X will be:
 (A) 15 kJ mol⁻¹ (B) 285 kJ mol⁻¹ (C) 270 kJ mol⁻¹ (D) 280 kJ mol⁻¹
- Q.57 XeO₄ molecule is tetrahedral having:
 (A) Two pπ-dπ bonds (B) Four pπ-dπ bonds (C) One pπ-dπ bond (D) Three pπ-dπ bonds
- Q.58 Which one of the following arrangements represents the correct order of solubilities of sparingly soluble salts Hg₂Cl₂, Cr₂(SO₄)₃, BaSO₄ and CrCl₃ respectively?
 (A) $\left(\frac{K_{sp}}{4}\right)^{\frac{1}{3}}$, $\left(\frac{K_{sp}}{106}\right)^{\frac{1}{3}}$, $(K_{sp})^{\frac{1}{2}}$, $\left(\frac{K_{sp}}{27}\right)^{\frac{1}{4}}$
 (B) $(K_{sp})^{\frac{1}{2}}$, $\left(\frac{K_{sp}}{4}\right)^{\frac{1}{3}}$, $\left(\frac{K_{sp}}{27}\right)^{\frac{1}{4}}$, $\left(\frac{K_{sp}}{108}\right)^{\frac{1}{3}}$
 (C) $(K_{sp})^{\frac{1}{2}}$, $\left(\frac{K_{sp}}{108}\right)^{\frac{1}{3}}$, $\left(\frac{K_{sp}}{27}\right)^{\frac{1}{4}}$, $\left(\frac{K_{sp}}{4}\right)^{\frac{1}{3}}$
 (D) $\left(\frac{K_{sp}}{108}\right)^{\frac{1}{3}}$, $\left(\frac{K_{sp}}{27}\right)^{\frac{1}{4}}$, $(K_{sp})^{\frac{1}{2}}$, $\left(\frac{K_{sp}}{4}\right)^{\frac{1}{3}}$
- Q.59 Which of the following statements about aspirin is not true?
 (A) It has antiblood clotting action
 (B) It is effective in relieving pain
 (C) It belongs to narcotic analgesics
 (D) It is a neurologically active drug
- Q.60 What is the structure of the major product when phenol is treated with bromine water?



- Q.61 If \hat{a} , \hat{b} and \hat{c} are unit vectors satisfying $\hat{a} - \sqrt{3}\hat{b} + \hat{c} = \vec{0}$, then the angle between the vectors \hat{a} and \hat{c} is :-
 (A) $\pi/4$ (B) $\pi/6$ (C) $\pi/3$ (D) $\pi/2$
- Q.62 If α and β are roots of the equation $x^2 + px + \frac{3p}{4} = 0$, such that $|\alpha - \beta| = \sqrt{10}$, then p belongs to the set :
 (A) $\{2, -5\}$ (B) $\{-3, 2\}$ (C) $\{3, -5\}$ (D) $\{-2, 5\}$
- Q.63 Given two independent events, if the probability that exactly one of them occurs is $\frac{26}{49}$ and the probability that none of them occurs is $\frac{15}{49}$, then the probability of more probable of the two events is:-
 (A) $4/7$ (B) $3/7$ (C) $5/7$ (D) $6/7$
- Q.64 **Statement 1:** The number of common solutions of the trigonometric equations $2\sin^2\theta - \cos^2\theta = 0$ and $2\cos^2\theta - 3\sin\theta = 0$ in the interval $[0, 2\pi]$ is two.
Statement 2: The number of solutions of the equation, $2\cos^2\theta - 3\sin\theta = 0$ in the interval $[0, 2\pi]$ is two :-
 (A) Statement 1 is true; Statement 2 is true ; Statement 2 is a correct explanation for Statement 1.
 (B) Statement 1 is true; Statement 2 is false.
 (C) Statement 1 is false; Statement 2 is true.
 (D) Statement 1 is true; Statement 2 is true; Statement 2 is not a correct explanation for Statement 1.
- Q.65 If the 7th term in the binomial expansion of $\left(\frac{3}{\sqrt[3]{84}} + \sqrt{3} \ln x\right)^9$, $x > 0$, is equal; to 729, then x can be:
 (A) e (B) 2e (C) e/2 (D) e²
- Q.66 If a complex number z satisfies the equation $z + \sqrt{2}|z + 1| + i = 0$, then |z| is equal to:-
 (A) $\sqrt{5}$ (B) $\sqrt{3}$ (C) 1 (D) 2
- Q.67 The acute angle between two lines such that the direction cosines l, m, n of each of them satisfy the equations $l + m + n = 0$ and $l^2 + m^2 - n^2 = 0$ is :-
 (A) 30° (B) 45° (C) 60° (D) 15°

Q.68 For $a > 0$, $t \in \left(0, \frac{\pi}{2}\right)$, let $x = \sqrt{a^{\sin^{-1}t}}$ and $y = \sqrt{a^{\cos^{-1}t}}$. Then, $1 + \left(\frac{dy}{dx}\right)^2$ equals:-

- (A) $\frac{y^2}{x^2}$ (B) $\frac{x^2 + y^2}{x^2}$ (C) $\frac{x^2}{y^2}$ (D) $\frac{x^2 + y^2}{y^2}$

Q.69 Let $f(x) = -1 + |x - 2|$, and $g(x) = 1 - |x|$; then the set of all points where $f \circ g$ is discontinuous is:-
 (A) an empty set (B) $\{0\}$ (C) $\{0, 2\}$ (D) $\{0, 1, 2\}$

Q.70 If the system of linear equations

$$x_1 + 2x_2 + 3x_3 = 6$$

$$x_1 + 3x_2 + 5x_3 = 9$$

$$2x_2 + 5x_3 + ax_3 = b$$

is consistent and has infinite number of solutions, then :-

- (A) $a \in \mathbb{R} - \{8\}$ and $b \in \mathbb{R} - \{15\}$
 (B) $a = 8$, b can be any real number
 (C) $a = 8$, $b = 15$
 (D) $b = 15$, a can be any real number

Q.71 Let Q be the foot of perpendicular from the origin to the plane $4x - 3y + z + 13 = 0$ and R be a point $(-1, 1, -6)$ on the plane. Then length QR is:-

- (A) $2\sqrt{\frac{7}{2}}$ (B) $\sqrt{14}$ (C) $2\sqrt{\frac{19}{2}}$ (D) $\frac{3}{\sqrt{2}}$

Q.72 Let the equations of two ellipses be $E_1 : \frac{x^2}{3} + \frac{y^2}{2} = 1$ and $E_2 : \frac{x^2}{16} + \frac{y^2}{b^2} = 1$. If the product of their eccentricities is $\frac{1}{2}$ then the length of the minor axis of ellipse E_2 is :-

- (A) 9 (B) 8 (C) 2 (D) 4

Q.73 The number of solutions of the equation, $\sin^{-1}x = 2\tan^{-1}x$ (in principal values) is:-
 (A) 3 (B) 1 (C) 2 (D) 4

Q.74 The area of the region (in sq. units), in the first quadrant, bounded by the parabola $y = 9x^2$ and the lines $x = 0$, $y = 1$ and $y = 4$, is:-
 (A) $7/9$ (B) $14/3$ (C) $14/9$ (D) $7/3$

Q.75 Statement 1 : The line $x - 2y = 2$ meets the parabola, $y^2 + 2x = 0$ only at the point $(-2, -2)$

Statement 2 : The line $y = mx - \frac{1}{2m}$ ($m \neq 0$) is tangent to the parabola, $y^2 = -2x$ at the point

$$\left(\frac{1}{2m^2} - \frac{1}{m} \right).$$

(A) Statement 1 is false; Statement 2 is true.

(B) Statement 1 is true; Statement 2 is true Statement 2 is not a correct explanation for Statement 1.

(C) Statement 1 is true; Statement 2 is false.

(D) Statement 1 is true; Statement 2 is true; Statement 2 is a correct explanation for Statement 1.

Q.76 Given sum of the first n terms of an A. P is $2n + 3n^2$. Another A. P. is formed with the same first term and double of the common difference, the sum of n terms of the new A. P. is :-

(A) $n + 4n^2$

(B) $n^2 + 4n$

(C) $3n + 2n^2$

(D) $6n^2 - n$

Q.77 The integral $\int_{7\pi/4}^{7\pi/3} \sqrt{\tan^2 x} dx$ is equal to :

(A) $\log 2 \sqrt{2}$

(B) $2\log 2$

(C) $\log 2$

(D) $\log \sqrt{2}$

Q.78 Consider the differential equation $\frac{dy}{dx} = \frac{y^3}{2(xy^2 - x^2)}$:

Statement 1: The substitution $z = y^2$ transforms the above equation into a first order homogenous differential equation.

Statement 2 : The solution of this differential equation is $y^2 e^{-y^2/x} = C$.

(A) Statement 1 is false and statement 2 is true.

(B) Both statements are true.

(C) Statement 1 is true and statement 2 is false.

(D) Both statements are false.

Q.79 The number of ways in which an examiner can assign 30 marks to 8 questions, giving not less than 2 marks to any question, is:-

(A) ${}^{30}C_8$

(B) ${}^{21}C_7$

(C) ${}^{21}C_8$

(D) ${}^{30}C_7$

Q.80 If the x-intercept of some line L is double as that of the line, $3x + 4y = 12$ and the y-intercept of L is half as that of the same line, then the slope of L is:-

(A) -3

(B) $-3/2$

(C) $-3/8$

(D) $-3/16$

Q.81 If $\int \frac{x^2 - x + 1}{x^2 + 1} e^{\cot^{-1} x} dx = A(x) e^{\cot^{-1} x} + C$, then $A(x)$ is equal to:-

- (A) x (B) $\sqrt{1+x}$ (C) $-x$ (D) $\sqrt{1-x}$

Q.82 The maximum area of a right angled triangle with hypotenuse h is:-

- (A) $\frac{h^2}{\sqrt{2}}$ (B) $\frac{h^2}{2}$ (C) $\frac{h^2}{4}$ (D) $\frac{h^2}{2\sqrt{2}}$

Q.83 If two vertices of an equilateral triangle are $A(-a, 0)$ and $B(a, 0)$, $a > 0$, and the third vertex C lies above x -axis then the equation of the circumcircle of ΔABC is:-

- (A) $a^2 + y^2 - \sqrt{3} ay = a^2$ (B) $3x^2 + 3y^2 - 2ay = 3a^2$
 (C) $3x^2 + 3y^2 - 2\sqrt{3} ay = 3a^2$ (D) $x^2 + y^2 - 2ay = a^2$

Q.84 The sum $\frac{3}{1^2} + \frac{5}{1^2 + 2^2} + \frac{7}{1^2 + 2^2 + 3^2} + \dots$ upto 11 terms is

- (A) $11/4$ (B) $60/11$ (C) $7/2$ (D) $11/2$

Q.85 Let $R = \{(3, 3), (5, 5), (9, 9), (12, 12), (5, 12), (3, 9), (3, 12), (3, 5)\}$ be a relation on the set $A = \{3, 5, 9, 12\}$. Then, R is:-

- (A) reflexive, transitive but not symmetric.
 (B) symmetric, transitive but not reflexive.
 (C) an equivalence relation
 (D) reflexive, symmetric but not transitive.

Q.86 The statement $p \rightarrow (q \rightarrow p)$ is equivalent to :-

- (A) $p \rightarrow q$ (B) $p \rightarrow (p \rightarrow q)$ (C) $p \rightarrow (p \wedge q)$ (D) $p \rightarrow (p \vee q)$

Q.87 Statement 1 : The function $x^2(e^x + e^{-x})$ is increasing for all $x > 0$.

Statement 2 : The functions x^2e^x and x^2e^{-x} are increasing for all $x > 0$ and the sum of two increasing functions in any interval (a, b) is an increasing function in (a, b) .

- (A) Statement 1 is false; Statement 2 is true.
 (B) Statement 1 is true; Statement 2 is false.
 (C) Statement 1 is true; Statement 2 is true; Statement 2 is a correct explanation for Statement 1.
 (D) Statement 1 is true ; Statement 2 is true; Statement 2 is not a correct explanation for Statement 1.

- Q.88 Mean of 5 observations is 7. If four of these observations are 6, 7, 8, 10 and one is missing then the variance of all the five observations is:-
(A) 8 (B) 4 (C) 6 (D) 2
- Q.89 If a circle C passing through (4, 0) touches the circle $x^2 + y^2 + 4x - 6y - 12 = 0$ externally at a point (1, -1), then the radius of the circle C is:-
(A) $\sqrt{57}$ (B) $2\sqrt{5}$ (C) 4 (D) 5
- Q.90 If p, q, r are 3 real number satisfying the matrix equation, $[p \ q \ r] \begin{bmatrix} 3 & 4 & 1 \\ 3 & 2 & 3 \\ 2 & 0 & 2 \end{bmatrix} = [3 \ 0 \ 1]$, then $2p + q - r$ equals :-
(A) -1 (B) 4 (C) -3 (D) 2



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