Vidyamandir Classes
Gurukul for IITJEE Preparation

I.P. PRACTICE TEST – 1/2010

SECTION : 1 (PHYSICS)

1. The height of the building is 50*ft*. The same in millimeter is :

(A) 560 *mm* **(B)** 285 *mm* **(C)** 1786.8 *mm* **(D)** 1524 *mm*

2. The dimensions of heat capacity is :

(A) $\left[L^2T^{-2}\theta^{-1}\right]$ **(B)** $\left[ML^2T^{-2}\theta^{-1}\right]$ **(C)** $\left[M^{-1}L^2T^{-2}\theta^{-1}\right]$ **(D)** None of these

3. Mark correct option

(A) $|\vec{a}-\vec{b}|=|\vec{a}|-|\vec{b}|$ **(B)** $|\vec{a}-\vec{b}|\le|\vec{a}|-|\vec{b}|$

(C) $|\vec{a}-\vec{b}|\ge|\vec{a}|-|\vec{b}|$ **(D)** $|\vec{a}-\vec{b}|>|\vec{a}|-|\vec{b}|$

4. A body starts from rest and moves with a constant acceleration. The ratio of distance covered in the *n*th second to the distance covered in *n* second is :

(A) $\frac{2}{n}-\frac{1}{n^2}$ **(B)** $\frac{1}{n^2}-\frac{1}{n}$ **(C)** $\frac{2}{n^2}-\frac{1}{n}$ **(D)** $\frac{2}{n}-\frac{1}{n^2}$

5. Two particles are projected vertically upwards with the same velocity on two different planes with accelerations due to gravities g_1 and g_2 respectively. If they fall back to their initial points of projection after lapse of time t_1 and t_2 respectively. Then

(A) $t_1t_2=g_1g_2$ **(B)** $t_1g_1=t_2g_2$ **(C)** $\frac{t_1g_2}{t_2g_1}=2$ **(D)** $t_1^2+t_2^2=g_1+g_2$

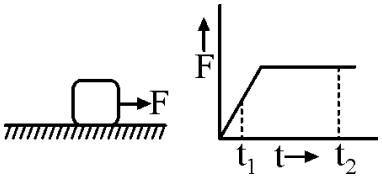
6. A particle is on a smooth horizontal plane. A force *F* is applied whose *F*-*t* graph is given. Then

(A) at t_1 acceleration is constant

(B) initially body must be in rest

(C) at t_2 acceleration is constant

(D) initially acceleration is non zero



7. A person wants to drive on the vertical surface of a large cylindrical wooden well commonly known as death well in a circus. The radius of well is *R* and the coefficient of friction between the tyres of the motorcycle and the wall of the well is μ_s. The minimum speed, the motorcyclist must have in order to prevent slipping should be

(A) $\sqrt{\left(\frac{Rg}{\mu_s}\right)}$ **(B)** $\sqrt{\left(\frac{\mu_s}{Rg}\right)}$ **(C)** $\sqrt{\left(\frac{\mu_s g}{R}\right)}$ **(D)** $\sqrt{\left(\frac{R}{\mu_s g}\right)}$

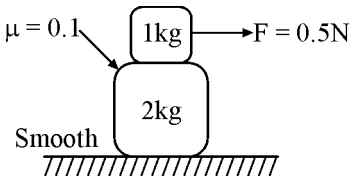
8. A particle of mass m is moving in a horizontal circle of radius r under a centripetal force given by $\left(\frac{-k}{r^2}\right)$, where k is a constant, then

(A) the total energy of the particle is $\left(\frac{-k}{2r}\right)$ **(B)** the kinetic energy of the particle is $\left(\frac{k}{r}\right)$

(C) the potential energy of the particle is $\left(\frac{k}{2r}\right)$

(D) the kinetic energy of the particle is $\left(-\frac{k}{r}\right)$

9. A force of 0.5 N is applied on upper block as shown in figure. Find the work done by lower block on upper for a displacement 3 m of the upper block (Take $g = 10\ m/s^2$)



(A) 1 joule **(B)** −1 joule

(C) 2 joule **(D)** − 2 joule

10. Two bodies of masses m and 4 m are moving with equal linear momentum. The ratio of their kinetic energies is :

(A) 1 : 4 **(B)** 4 : 1 **(C)** 1 : 1 **(D)** 1 : 2

11. Four particles of masses 1 kg, 2 kg, 3 kg and 4 kg are placed at the corners A, B, C and D respectively of a square $ABCD$ of edge 1 m. If point A is taken as origin, edge AB is taken along X – axis and edge AD is taken along Y – axis. Find the co-ordinates of centre of mass in $S.I.$

(A) (1, 1) **(B)** (5, 7) **(C)** (0.5, 0.7) **(D)** None of these

12. A particle of mass m rotates in a circle of radius a with a uniform angular speed ω_0. It is viewed from a frame rotating about the z-axis with a uniform angular speed ω. The centrifugal force on the particles is :

(A) $m\omega^2 a$ **(B)** $m\omega_0^2 a$ **(C)** $m\left(\frac{\omega+\omega_0}{2}\right)^2 a$ **(D)** $m\omega\omega_0$

13. If the distance between the two particles is increased by 2%, then the force of attraction between them will

(A) decrease 6% **(B)** decrease 4% **(C)** increase 4% **(D)** increase 6%

14. The work done in shifting a particle of a mass m from centre of earth to the surface of earth is :

(A) $-mgR$ **(B)** $+\frac{mgR}{2}$ **(C)** zero **(D)** None of these

15. The motion of a particle varies with time according to the relation $y = \sin \omega t + a \cos \omega t$. Then

(A) the motion is oscillatory but not S.H.M.

(B) the motion is S.H.M. with amplitude a

(C) the motion is S.H.M. with amplitude $\sqrt{2a}$

(D) None of these

16. A block of wood float with 1 / 4 of its volume under water. What is the density of the wood ? (Density of water = 1000 kg/m^3)

(A) 750 kg/m^3 **(B)** 250 kg/m^3 **(C)** 300 kg/m^3 **(D)** 260 kg/m^3

17. Bernoulli's equation is applicable to points

(A) in a steadily flowing liquid

(B) in a stream line

(C) in a straight line perpendicular to a stream line

(D) in any non-viscous liquid

18. One end of a wire 2 *m* long and diameter 2*mm* is fixed in a ceiling. A naughty boy of mass 10 kg jumps to catch the free end and stays there. The change in length of wire is (Take $g = 10\ m/s^2$, $Y = 2 \times 10^{11} N/m^2$)

(A) 31.85×10^{-5} *m* **(B)** 2 *mm* **(C)** 3 *mm* **(D)** 4 *m*

19. The equation of a wave traveling on a stretched string along the x-axis is $y = ae^{-(bx + ct)}$. The direction of propagation of wave is

(A) along negative y – axis **(B)** along positive y – axis

(C) along negative x – axis **(D)** along positive x – axis

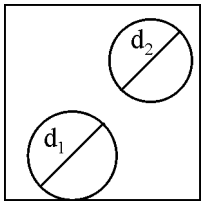
20. Along a stretched wire a transverse wave passes with speed 3000 *m/s*. If the tension in the wire increased four times, then the velocity of the wave is

(A) 1500 *m/s* **(B)** 300 *m/s* **(C)** 6000 *m/s* **(D)** 9000 *m/s*

21. The velocity of sound is not affected by change in

(A) temperature **(B)** medium **(C)** pressure **(D)** wavelength

22. The metal sheet shown in figure, with two holes cut of unequal diameters d_1 and $d_2 (d_1 > d_2)$ If the sheet is heated



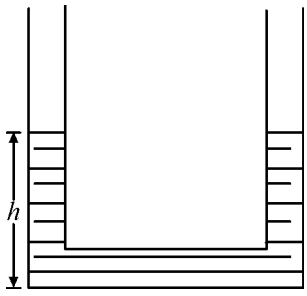
(A) both d_1, and d_2 will decrease

(B) both d_1, and d_2 will increase.

(C) d_1 will increase, d_2 will decrease

(D) d_1 will decrease d_2 will increase

23. In a U-tube, a liquid is poured to a height '*h*' in each arm. When left and right arms of the tube is heated to temperature T_1 and T_2 respectively, the height in each arm changes to h_1 and h_2 respectively. What is the relation between coefficients of volume expansion of liquid and heights, h_1 and h_2?



(A) $\gamma = \dfrac{h_1 - h_2}{T_1 h_2 - T_2 h_1}$ **(B)** $\gamma = \dfrac{h_1 + h_2}{T_1 h_2 - T_2 h_1}$

(C) $\gamma = \dfrac{h_1 + h_2}{T_1 h_2 + T_2 h_1}$ **(D)** $\gamma = \dfrac{h_1 - h_2}{T_1 h_1 - T_2 h_2}$

24. A gas behaves more closely as an ideal gas at

(A) low pressure and low temperature **(B)** low pressure and high temperature

(C) high pressure and low temperature **(D)** high pressure and high temperature

25. The molar heat capacity of oxygen gas at STP is nearly 2.5R. As the temperature is increased, it gradually increases and approaches 3.5R. The most appropriate reason for this behaviour is that at high temperature

(A) oxygen does not behave as an ideal gas **(B)** oxygen molecules dissociate in atoms

(C) the molecules collide more frequently

(D) molecular vibrations gradually become effective

26. A given quantity of an ideal gas is at the pressure P and the absolute temperature T. The isothermal bulk modulus of the gas is :

(A) $\frac{2}{3}P$ **(B)** P **(C)** $\frac{3}{2}P$ **(D)** $2P$

27. One end of a metal rod is kept in steam. In steady state, the temperature gradient $\left(\frac{d\theta}{dx}\right)$

(A) may be variable **(B)** must be constant **(C)** must be variable **(D)** None of these

28. If two adjacent walls and the ceiling of a rectangular room are mirror surfaced, then how many images of himself, a man can see

(A) 3 **(B)** 5 **(C)** 6 **(D)** 9

29. A concave mirror with its optic axis vertical and mirror facing upward is placed at the bottom of the water tank. The radius of curvature of mirror is 40 *cm* and refractive index for water $\mu = 4/3$. The tank is 20 *cm* deep and if a bird is flying over the tank at a height 60 cm above the surface of water, find the position of image of a bird

(A) 3.75 *cm* **(B)** 4.23 *cm* **(C)** 5.2 *cm* **(D)** 3.2 *cm*

30. In a double slit experiment, 5^{th} dark fringe is formed opposite to one of the slits. The wavelength of light is

(A) $\frac{d^2}{6D}$ **(B)** $\frac{d^2}{5D}$ **(C)** $\frac{d^2}{15D}$ **(D)** $\frac{d^2}{9D}$

31. If σ = surface charge density, ε = electric permittivity, the dimension of $\frac{\sigma}{\varepsilon}$ are same as

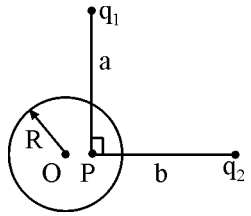
(A) electric force **(B)** electric field intensity

(C) pressure **(D)** electric charge

32. A point charge is projected along the axis of circular ring of charge Q and radius $10\sqrt{2}cm$. The distance of the point charge from centre of ring, where acceleration of charged particle is maximum, will be

(A) 10 *cm* **(B)** 20 *cm* **(C)** at infinity **(D)** None of these

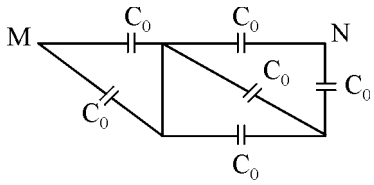
33. In the given figure, two point charges q_1 and q_2 are placed distance a and b from centre of a metallic sphere having charge Q. Find electric field due to the metallic sphere at the point P.



(A) $\frac{1}{4\pi\varepsilon_0}\sqrt{\left(\frac{q_1}{a^2}\right)^2+\left(\frac{q_2}{b^2}\right)^2}$ **(B)** $\frac{1}{4\pi\varepsilon_0}\frac{Q}{R^2}$

(C) $\frac{1}{4\pi\varepsilon_0}\sqrt{\left(\frac{Q}{R^2}\right)^2+\left(\frac{q_1}{a^2}+\frac{q_2}{b^2}\right)^2}$ **(D)** None of these

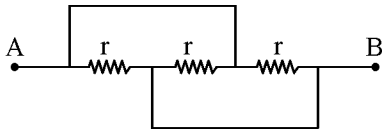
34. Find equivalent capacitance between points M and N



(A) $\frac{10}{11}C_0$ **(B)** $2C_0$

(C) C_0 **(D)** None of these

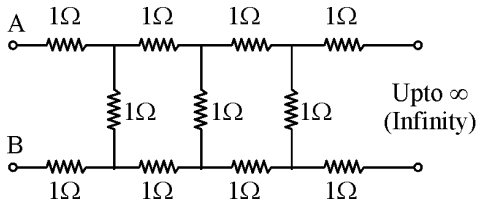
35. Three equal resistors, each equals to r are connected as shown in figure. Then the equivalent resistance between points A and B is



(A) r **(B** $3r$

(C) $\frac{r}{3}$ **(D)** $\frac{2r}{3}$

36. The resistance between terminal points A and B of the given circuit will be :



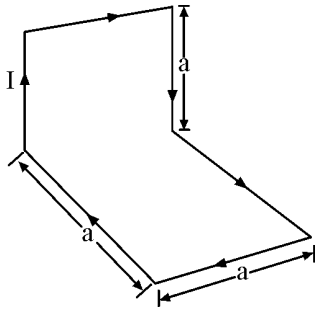
(A) $\left(\sqrt{3}-1\right)\Omega$ **(B)** $\left(1-\sqrt{3}\right)\Omega$

(C) $\left(1+\sqrt{3}\right)\Omega$ **(D)** $\left(2+\sqrt{3}\right)\Omega$

37. Three circular concentric wires of radii a, $2a$ and $3a$ are carrying current $3I$, $2I$ and I in same manner. Find the magnetic field at the common centre.

(A) $\frac{13\mu_0 I}{6a}$ **(B)** $\frac{\mu_0 I}{6a}$ **(C)** $\frac{\mu_0 I}{a}$ **(D)** None of these

38. The magnitude of magnetic moment of the current loop in the figure is :



(A) Ia^2

(B $\sqrt{2}Ia^2$

(C) zero

(D) None of these

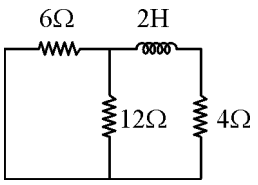
39. The flux of $\vec{B}$ through any closed surface is :

(A) >0 **(B)** <0 **(C)** $=0$ **(D)** ≥ 0

40. When the current changes from $+2A$ to $-2A$ in 0.05 s, an emf of 8 V is induced in a coil. The coefficient of self-induction of the coil is :

(A) 0.1 H **(B)** 0.2 H **(C)** 0.4 H **(D)** 0.8 H

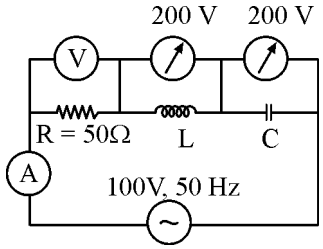
41. The time constant for the given circuit is :



(A) 4 s **(B)** $\frac{1}{4}s$

(C) 2 s **(D)** $\frac{1}{2}s$

42. In the series LCR circuit, calculate the voltmeter and ammeter readings.



(A) $V = 250\ V, I = 4\ A$ **(B)** $V = 150\ V, I = 2\ A$

(C) $V = 1000\ V, I = 5\ A$ **(D)** $V = 100\ V, I = 2\ A$

43. The stopping potentials are V_1 and V_2. Calculate the $(V_1 - V_2)$, if the λ_1 and λ_2 are wavelength of incident lights, respectively.

(A) $\frac{hc}{e}\left(\frac{1}{\lambda_1}-\frac{1}{\lambda_2}\right)$ **(B)** $\frac{hc}{e}\left(\frac{1}{\lambda_1}+\frac{1}{\lambda_2}\right)$ **(C)** $\frac{e}{hc}\left(\frac{1}{\lambda_1}+\frac{1}{\lambda_2}\right)$ **(D)** $\frac{e}{hc}\left(\frac{1}{\lambda_1}-\frac{1}{\lambda_2}\right)$

44. The circumference of the second orbit of an atom or ion having single electron, is $4\times10^{-9}\,m$. The de Broglie wavelength of electron revolving in this orbit should be :

(A) $2\times10^{-9}m$ **(B)** $4\times10^{-9}\ m$ **(C)** $8\times10^{-9}m$ **(D)** $1\times10^{-9}m$

45. The wavelength of the emitted radiation, if electron in hydrogen atom jumps from the third orbit to second orbit is :

(A) $\lambda = \frac{36}{5R}$ **(B)** $\lambda = \frac{5R}{36}$ **(C)** $\lambda = \frac{5}{R}$ **(D)** $\lambda = \frac{R}{6}$

46. The nucleus $^{242}Pu_{94}$ decays to $^{206}Pb_{82}$ by emitting

(A) 9α and $12\beta-$particles **(B)** 6α and $9\beta-$particles

(C) 9α and $6\beta-$particles **(D)** 6α and $12\beta-$particles

47. Calculate the energy released per nucleon of the reactant, in the thermonuclear reaction

$3_1H^2 \longrightarrow {}_2He^4 + {}_1H^1 + {}_0n^1 + 21.6\ MeV$

(A) 21.6 *MeV* **(B)** 7.2 *MeV* **(C)** 3.6 *MeV* **(D)** 1.8 *MeV*

48. In a zener diode :

(A) forward voltage rating is high

(B) negative resistance characteristics exists

(C) breakdown occurs at a high reverse voltage

(D) sharp breakdown occurs at low reverse voltage

49. In intrinsic semiconductors, current is carried by :

(A) electrons **(B)** holes

(C) ions **(D)** electrons and holes

50. Which of the following theories is the most satisfactory about the origin of the universe?

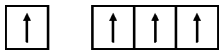
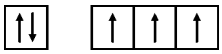
(A) Big-Bang theory **(B)** Pulsating theory

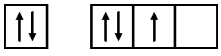
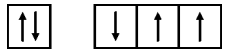
(C) Steady state theory **(D)** None of these

I.P. PRACTICE TEST – 1/2010

SECTION : 2 (CHEMISTRY)

1. In which of the following orbital diagram Aufbau principle is violated ?

(A)  **(B)** 

(C)  **(D)** 

2. The orbital is a space where the probability of finding on electron is

(A) 95 – 98% **(B)** 50% **(C)** 0% **(D)** 100%

3. The one which has smallest number of molecules :

(A) 0.1 mole of CO_2 gas **(B)** 11.2 L of CO_2 gas at NTP

(C) 22 g of CO_2 gas **(D)** 22.4×10^3 ml of CO_2 gas

4. A temperature of $-40°C$ shall be equal to :

(A) 243 K **(B)** $-40°F$ **(C)** $-32°F$ **(D)** Both a and b

5. The vapour pressure of water at 100°C is :

(A) 76 cm **(B)** 760 cm **(C)** 0.1 atm **(D)** zero cm

6. The heat of neutralization of four acids, a, b, c and d, against a common base are -13.7, -9.4, -11.2 and -12.4 kcal respectively. The weakest among these acids, is :

(A) a **(B)** b **(C)** c **(D)** d

7. For the following reaction in gaseous phase, $CO + \frac{1}{2}O_2 \rightleftharpoons CO_2$ K_p / K_c is :

(A) $(RT)^{1/2}$ **(B)** $(RT)^{-1/2}$ **(C)** (RT) **(D)** $(RT)^{-1}$

8. Conjugate base of OH^- is :

(A) H_2O **(B)** H_3O^+ **(C)** H^+ **(D)** O^{2-}

9. In the Arrhenius equation, $k=A.\ \exp^{(-E_a/RT)}$, the rate constant :

(A) decreases with increasing activation energy and increases with temperature

(B) increases with activation energy and temperature

(C) decreases with activation energy and temperature

(D) increases with activation energy and decreasing temperature

10. For determination of molecular mass, Raoult's law is applicable only to :

(A) dilute solutions of electrolytes

(B) concentrated solutions of electrolytes

(C) dilute solutions of non-electrolytes

(D) concentrated solutions of non-electrolytes

11. The solubility of a gas in water depends upon :

(A) nature of the gas **(B)** temperature

(C) pressure of the gas **(D)** None of these

12. Which of the following represents homogeneous catalysis ?

(A) $Oil + H_2 \xrightarrow{Ni} saturated\,fat$ **(B)** $N_2 + 3H_2 \xrightarrow{Fe} 2NH_3$

(C) $CH_3COOH + C_2H_5OH \xrightarrow{H^+} CH_3COOC_2H_5 + H_2O$

(D) None of these

13. The brown-ring complex compound of iron is formulated as $[Fe(H_2O)_5(NO)]SO_4$. The oxidation state of iron is :

(A) 1 **(B)** 2 **(C)** 3 **(D)** 0

14. For the redox reaction, $MnO_4^- + C_2O_4^{2-} + H^+ \longrightarrow Mn^{2+} + CO_2 + H_2O$ correct stoichiometric coefficients of MnO_4^-, $C_2O_4^{2-}$ and H^+ are

(A) 2, 5, 16 **(B)** 16, 5, 2 **(C)** 5, 16, 2 **(D)** 2, 16, 5

15. What is the value of E^0 cell?

$Cr\,|\,Cr^{3+}(0.1M)||Fe^{2+}(0.01M)|\,Fe$ Given $E^0_{Cr^{3+}/Cr} = -0.74V,\ E^0_{Fe^{2+}/Fe} = -0.44V$

(A) $+0.26V$ **(B)** $0.52\ V$ **(C)** $+0.13V$ **(D)** $-0.26V$

16. What will be the product, if $_{92}U^{235}$ emits two α and one β particle ?

(A) $_{87}Ac^{211}$ **(B)** $_{89}Ac^{235}$ **(C)** $_{89}Ac^{225}$ **(D)** $_{89}Ac^{227}$

17. In the reaction, $Po \xrightarrow{-\alpha} Pb \xrightarrow{-\beta} Bi$, if Bi belongs to group 15, to which Po belongs ?

(A) 14 **(B)** 15 **(C)** 13 **(D)** 16

18. Effective overlapping will be shown by :

(A) $\oplus\ominus + \oplus\ominus$ **(B)** $\begin{matrix}\oplus & + & \ominus \\ \ominus & & \oplus\end{matrix}$ **(C)** $\oplus\ominus + \ominus\oplus$ **(D)** None of these

19. The least stable hydride is :

(A) BiH_3 **(B)** SbH_3 **(C)** AsH_3 **(D)** PH_3

20. The increasing order of size of atoms or ions Ar, K^+, S^{2-}, Cl^- and Ca^{2+}, is :

(A) $S^{2-} < Ca^{2+} < Cl^- < Ar < K^+$ **(B)** $K^+ < Ca^{2+} < Ar < S^{2-} < Cl^-$

(C) $Ca^{2+} < K^+ < Ar < Cl^- < S^{2-}$ **(C)** $S^{2-} < Cl^- < Ar < K^+ < Ca^{2+}$

21. Which of the following is known as "Pearl ash"?

(A) K_2O_3 **(B)** KOH **(C)** K_2CO_3 **(D)** $KMnO_4$

22. Cassiterite is an ore of :

(A) mercury **(B)** tin **(C)** lead **(D)** iron

23. In solid $CuSO_4 . 5H_2O$, copper is co-ordinated to:

(A) five water molecules **(B)** one sulphate ion

(C) one water molecule **(D)** four water molecules

24. Which of the following is Tollen's reagent?

(A) $\left[Ag(NH_3)_2\right]^+$ **(B)** Ag_2O **(C)** $\left[Cu(OH_4)\right]^{2-}$ **(D)** Cu_2O

25. Ammonia gas can be dried using :

(A) conc. H_2SO_4 **(B)** conc. HCl **(C)** CaO **(D)** P_2O_5

26. Silicon carbide is used as a / an :

(A) solvent **(B)** abrassive **(C)** catalyst **(D)** dehydrating agent

27. The catalyst used in the manufacture of sulphuric acid by contact process is :

(A) finely divided iron **(B)** molybdenum

(C) nitrous oxide **(D)** vanadium pentoxide

28. Bessemerisation is involved in the extraction of :

(A) Ag **(B)** Cu **(C)** Fe **(D)** Al

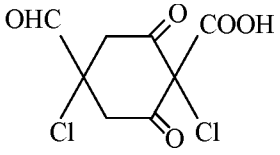
29. The slag obtained during extraction of copper from copper pyrites is composed mainly of :

(A) $FeSiO_3$ **(B)** $CuSiO_3$ **(C)** SiO_2 **(D)** Cu_2S

30. The reagent NH_4Cl and aqueous NH_3 will precipitate :

(A) Ca^{2+} **(B)** Al^{3+} **(C)** Mg^{2+} **(D)** Zn^{2+}

31. The IUPAC name of the compound :



(A) 1,4-dichloro-2,6-dioxo-4-carbamoly-1-oic acid

(B) 1,4-dichloro-2, 4, 6-dioxocyclohexane-1-carboxylic acid

(C) 1,4-dichloro-4-formyl-2, 6-dioxocyclohexane-1-carboxylic acid

(D) 2,4-dioxo-1,4-dichlorohexane-1-carboxylic acid

32. Which of the following is the correct order of stability of different conformations of butane ?

(A) Gauche > staggered > partially eclipsed > fully eclipsed

(B) Staggered > gauche > partially eclipsed > fully eclipsed

(C) Staggered > fully eclipsed > partially eclipsed > gauche

(D) None of these

33. A substance is found to contain 7% nitrogen. The minimum molecular weight of it is :

(A) 700 **(B)** 100 **(C)** 200 **(D)** 70

34. In C_6H_6 molecule, the carbon atoms are :

(A) sp-hybridised **(B)** sp^2-hybridised

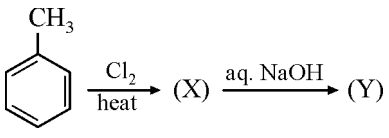
(C) sp^3-hybridised **(D)** both sp and sp^2 hybridised alternately

35. The compound, which on reductive ozonolysis gives one mole of $O = CH(CH_2)_3 . CH = O$ is :

(A) 1-methyl but-1 – ene **(B)** 1, 2-dimethyl propene

(C) 3-methyl but-1-ene **(D)** cyclopentene

36. In the reaction, the product (Y) is :



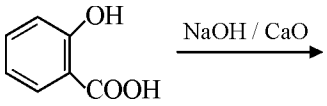
(A) o-cresol **(B)** p-cresol

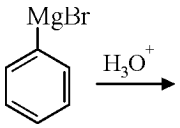
(C) 2, 4-dihydroxytoluene **(D)** benzoic acid

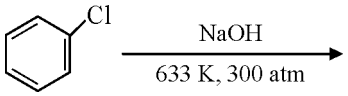
37. Which alcohol will have the highest value of $_pK_a$?

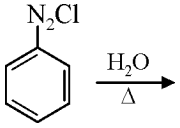
(A) Ethanol **(B)** 2-propanol **(C)** tert-butyl alcohol **(D)** Methanol

38. In which of the following reactions, reactions, phenol is not obtained ?

(A) 

(B) 

(C) 

(D) 

39. Cannizzaro reaction is not given by :

(A) triethyl acetaldehyde **(B)** acetaldehyde

(C) benzaldehyde **(D)** formaldehyde

40. $A \xleftarrow{CH_3COOH_3} NH_2 \,.\, NH_2 \xrightarrow{CH_2COCI} B$ A and B respectively are :

(A) $(CH_3)_2C = N - NH_2$, CH_3CONH_2 **(B)** $(CH_3)_2C = N - NH_2$, $CH_3CONH \,.\, NH_2$

(C) $(CH_3)_2C = N - N = C(CH_3)_2$, CH_3CONH_2 **(D)** None of these

41. Pyruvic acid is :

(A) α – keto acid **(B)** β – keto acid **(C)** γ – keto acid **(D)** δ – keto acid

42. Carbyl amine test is used in the detection of :

(A) aliphatic 2° amine **(B)** aromatic1° amine

(C) aliphatic 1° amine **(D)** both aliphatic and aromatic 1° amines

43. Natural polymer is :

(A) Polyester **(B)** Glyptal **(C)** Starch **(D)** Nylon-6

44. Formalin is :

(A) 40% aq solution of methanal **(B)** methanoic acid

(C) 100% methanal **(D)** methyl methanoate

45. Arsenic drugs are mainly used in the treatment of :

(A) jaundice **(B)** typhoid **(C)** syphilis **(D)** cholera

46. The product of which of the following reactions on heating gives crotonaldehyde ?

(A) Acetone + acetaldehyde $\xrightarrow{\text{dil. NaOH}}$ **(B)** Acetaldeyde $\xrightarrow{\text{dil. NaOH}}$

(C) Formaldehyde + acetaldehyde $\xrightarrow{\text{dil. NaOH}}$ **(D)** None of these

47. $CH_3COCl \xrightarrow[[H_2]]{Pd/BaSO_4} (A)$ The isomers of CH_3COCl and (A) will respectively :

(A) $CH_2ClClCHO$, oxirane **(B)** chloral, vinyl alcohol

(C) α – chlorethyl alcohol, epoxyethane **(D)** None of these

48. The unit of conductivity is :

(A) ohm cm^{-1} **(B)** ohm cm^{-2} **(C)** $ohm^{-1}cm^{-1}$ **(D)** $ohm^{-1}cm^{-2}$

49. Which of the following represents hexadentate ligand ?

(A) 2, 2-bipyridyl **(B)** DMG **(C)** Ethylenediammine **(D)** None of these

50. Ordinary white phosphorus consists of phosphorus molecules of formula

(A) P_{10} **(B)** P_2 **(C)** P_4 **(D)** P_5

I.P. PRACTICE TEST – 1/2010

SECTION : 3 (MATHEMATICS)

1. $X = \{8^n - 7n - 1 : n \in N\}$ and $Y = \{49(n-1) : n \in N\}$ then :

(A) $X \subset Y$ **(B)** $Y \subset X$ **(C)** $X = Y$ **(D)** None of these

2. The degree of the polynomial $\left[x + \left(x^3 - 1\right)^{1/2}\right]^6 + \left[x - \left(x^3 - 1\right)^{1/2}\right]^6$ is equal to :

(A) 9 **(B)** 8 **(C)** 10 **(D)** None of these

3. If $i = \sqrt{-1}$, then $4 + 5\left(-\frac{1}{2} + \frac{i\sqrt{3}}{2}\right)^{334} + 3\left(-\frac{1}{2} + \frac{i\sqrt{3}}{2}\right)^{335}$ equal to :

(A) $1 - i\sqrt{3}$ **(B)** $-1 + i\sqrt{3}$ **(C)** $i\sqrt{3}$ **(D)** $-i\sqrt{3}$

4. The value of

$\left[\sqrt{2}\{cos(56°\,15') + sin(56°15')\}\right]^8$ is :

(A) $4i$ **(B)** $8i$ **(C)** $16i$ **(D)** $-16i$

5. If the equation

$x^2 - (2+m)x + (m^2 - 4m + 4) = 0$ has coincident roots, then :

(A) $m = 0, m = 1$ **(B)** $m = 0, m = 2$ **(C)** $m = \frac{2}{3}, m = 6$ **(D)** $m = \frac{2}{3}, m = 1$

6. The number of real solution if $x^2 - 3|x| + 2 = 0$ is :

(A) 1 **(B)** 2 **(C)** 3 **(D)** 4

7. If the *A.M.* and *G.M.* between two numbers are in the ratio $m : n$, then the numbers are in the ratio :

(A) $m + \sqrt{n^2 - m^2} : m - \sqrt{n^2 - m^2}$ **(B)** $m + \sqrt{m^2 + n^2} : m - \sqrt{m^2 + n^2}$

(C) $m + \sqrt{m^2 - n^2} : m - \sqrt{m^2 - n^2}$ **(D)** None of these

8. If a, b, c are in *G.P.* where $b - c, c - a, a - b$ are in *H.P.* then the value of $a + b + c$ is :

(A) 0 **(B)** $-2ac$ **(C)** $-3\sqrt{ac}$ **(D)** None of these

9. The sum of all five digit numbers that can be formed using the digits 1, 2, 3, 4, 5, when repetition of digits is not allowed is :

(A) 366000 **(B)** 660000 **(C)** 360000 **(D)** 3999960

10. The number of ways in which a team of eleven players can be selected from 22 players including 2 of them and excluding 4 of them is :

(A) ${}^{16}C_{11}$ **(B)** ${}^{16}C_5$ **(C)** ${}^{16}C_9$ **(D)** ${}^{20}C_9$

11. The value of $\frac{1}{1!(n-1)!} + \frac{1}{3!(n-3)!} + \frac{1}{5!(n-5)!} + ... + \frac{1}{n!}$ if n is odd is :

(A) $2n - 1$ **(B)** $\frac{2^{n-1}}{(n-1)!}$ **(C)** $\frac{2^{n-1}}{n!}$ **(D)** None of these

12. The expression $n^3 + 3n^2 + 5n + 3, n \in N$ is divisible by

(A) 3 **(B)** 4 **(C)** 5 **(D)** 6

13. The value of the determinant $\begin{vmatrix} b+c & a-b & a \\ c+a & b-c & b \\ a+b & c-a & c \end{vmatrix}$ is equal to :

(A) $a^3+b^3+c^3-3abc$ **(B)** $3abc-a^3-b^3-c^3$

(C) $3abc+a^3+b^3+c^3$ **(B)** None of these

14. If $1, \omega, \omega^2$ are the cube roots of unity, then $\Delta = \begin{vmatrix} 1 & \omega^n & \omega^{2n} \\ \omega^{2n} & 1 & \omega^n \\ \omega^n & \omega^{2n} & 1 \end{vmatrix}$ has the value:

(A) zero **(B)** ω **(B)** ω^2 **(D)** 1

15. The coefficient of x^n in the series $1 + \frac{a+bx}{1!} + \frac{(a+bx)^2}{2!} + \frac{(a+bx)^3}{3!} + \ldots + \frac{(a+bx)^n}{n!} + \ldots + \infty$

(A) b^n **(B)** a^n **(C)** $e^a \cdot b^n$ **(D)** None of these

16. If $\frac{e^{5x}+e^x}{e^{3x}}$ is expanded in a series of ascending power of x and n is an odd natural number, then the coefficient of x^n is :

(A) $\frac{2^n}{n!}$ **(B)** $\frac{2^{n+1}}{(2n)!}$ **(C)** $\frac{2^{2n}}{(2n)!}$ **(D)** None of these

17. If $A = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$ then $A^2 + 2A$ equals :

(A) A **(B)** $2A$ **(C)** $3A$ **(D)** $4A$

18. A square matrix can always be expressed as a :

(A) sum of diagonal matrix and a symmetric matrix

(B) Difference of a symmetric and a skew symmetric matrix

(C) sum of a symmetric and a skew symmetric matrix

(D) None of these

19. The value of $\lim_{x \to 0} \frac{(1+x)^{1/x} - e}{x}$ is equal to :

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

20. The set of all point where the function $f(x) = \frac{x}{1+|x|}$, is differentiable is :

(A) $(-\infty, \infty)$ **(B)** $(0,\infty) - \{0\}$ **(C)** $(-\infty, 0) \cup (0, \infty)$ **(D)** $(0, \infty)$

21. Let $f(x) = \cot^{-1}\left(\frac{x^x - x^{-x}}{2}\right)$, then $f'(1)$ equals to :

(A) -1 **(B)** 1 **(C)** $\log 2$ **(D)** $-\log 2$

22. If $y = tan^{-1}\left[\dfrac{\sqrt{1+x^2}+\sqrt{1-x^2}}{\sqrt{1+x^2}-\sqrt{1-x^2}}\right]$, then $\dfrac{dy}{dx}$ equals :

(A) $\dfrac{1}{\sqrt{1-x^4}}$ **(B)** $\dfrac{-1}{\sqrt{1-x^4}}$ **(C)** $\dfrac{x}{\sqrt{1-x^4}}$ **(D)** $\dfrac{-x}{\sqrt{1-x^4}}$

23. Let $f(x) = \int e^x (x-1)(x-2)dx$. Then f decreases in the interval :

(A) $(-\infty, -2)$ **(B)** $(-2, -1)$ **(C)** $(1,2)$ **(D)** $(2, \infty)$

24. The resistance R of a circuit having a battery with an e.m.f. E is given by the formula $R = E / I$ where I is the current in the circuit. If possible errors in E and I are 20% and 10% respectively, the percentage error in R is :

(A) 5% **(B)** 10% **(C)** 15% **(D)** None of these

25. $\int \dfrac{dx}{x^2(x^4+1)^{3/4}}$ is equal to :

(A) $\left[1+\dfrac{1}{x^4}\right]^{1/4}+c$ **(B)** $(x^4+1)^{1/4}+c$ **(C)** $\left[1-\dfrac{1}{x^4}\right]^{1/4}+c$ **(D)** $-\left[1+\dfrac{1}{x^4}\right]^{1/4}+c$

26. If $\int \dfrac{4e^x + 6e^{-x}}{9e^x - 4e^{-x}}dx = Ax + B\log(9e^{2x} - 4) + c$ then :

(A) $A = \dfrac{-3}{2}, B = \dfrac{35}{36}, c \in 0$ **(B)** $A = \dfrac{35}{36}, B = \dfrac{-3}{2}, c \in R$

(C) $A = \dfrac{3}{2}, B = \dfrac{35}{36}, c \in R$ **(D)** None of these

27. For any functions $f(x)$ and $g(x)$, integrable over the interval (a, b) $\left|\int_a^b f(x)g(x)\,dx\right|$ is :

(A) $< \sqrt{\int_a^b f^2(x)dx \int_a^b g^2(x)dx}$ **(B)** $\geq \sqrt{\int_a^b f^2(x)dx + \int_a^b g^2(x)dx}$

(C) $\leq \sqrt{\int_a^b f^2(x)dx \int_a^b g^2(x)dx}$ **(D)** None of these

28. $\lim\limits_{n\to\infty}\left[\dfrac{1^m + 2^m + 3^m + ... + n^m}{n^{m+1}}\right]$ equal to :

(A) $\dfrac{1}{m+1}$ **(B)** $\dfrac{1}{m+2}$ **(C)** $\dfrac{1}{m}$ **(D)** $\dfrac{1}{m+3}$

29. The solution of the differential equation $\dfrac{dy}{dx} = (x^2 + xy + y^2)/x^2$ is :

(A) $tan^{-1}\dfrac{x}{y} = \log y + c$ **(B)** $tan^{-1}\dfrac{y}{x} = \log x + c$

(C) $tan^{-1}\dfrac{x}{y} = \log x + c$ **(D)** $tan^{-1}\dfrac{y}{x} = \log y + c$

30. The solution of the differential equation $(1+y^2)\,dx + (x - e^{-\tan^{-1}y})dy = 0$ is :

(A) $ye^{\tan^{-1}x} = \tan^{-1}x + c$ **(B)** $xe^{\tan^{-1}y} = \tan^{-1}y + c$

(C) $y = \tan^{-1}x \,.\, e^{\tan^{-1}x} + c$ **(C)** $y = xe^{\tan^{-1}x} + c$

31. If $P(1,2)$, $Q(4,6)$, $R(5,7)$ and $S(a,b)$ are the vertices of a parallelogram $PQRS$, then :

(A) $a = 2, b = 4$ **(B)** $a = 3, b = 4$ **(C)** $a = 2, b = 3$ **(D)** $a = 3, b = 5$

32. If $\frac{x}{c} + \frac{y}{d} = 1$ be any line through the intersection of $\frac{x}{a} + \frac{y}{b} = 1$ and $\frac{x}{b} + \frac{y}{a} = 1$ then :

(A) $\frac{1}{c} + \frac{1}{d} = \frac{1}{a} + \frac{1}{b}$ **(B)** $\frac{1}{d} + \frac{1}{a} = \frac{1}{b} + \frac{1}{c}$ **(C)** $\frac{1}{b} + \frac{1}{d} = \frac{1}{c} + \frac{1}{a}$ **(D)** None of these

33. If $2x - 4y = 9$ and $6x - 12y + 7 = 0$ are common tangents to a circle, then radius of the circle is :

(A) $\frac{\sqrt{3}}{5}$ **(B)** $\frac{17}{6\sqrt{5}}$ **(C)** $\frac{\sqrt{2}}{3}$ **(D)** $\frac{17}{3\sqrt{5}}$

34. The angle between the tangents from (α,β) to the circle $x^2 + y^2 = a^2$ is :

(A) $\tan^{-1}\left(\frac{a}{\sqrt{S_1}}\right)$ **(B)** $2\tan^{-1}\left(\frac{a}{\sqrt{S_1}}\right)$ **(C)** $2\tan^{-1}\left(\frac{\sqrt{S_1}}{a}\right)$ **(D)** None of these

35. If the normal at $(ct, c/t)$ on the curve $xy = c^2$ meets the curve again in t' then :

(A) $t' = -\frac{1}{t^3}$ **(B)** $t' = -\frac{1}{t}$ **(C)** $t' = \frac{1}{t^2}$ **(D)** $t'^2 = -\frac{1}{t^2}$

36. A rectangular hyperbola whose centre is C is cut by any circle of radius r, in four points P, Q, R and S. Then $CP^2 + CQ^2 + CR^2 + CS^2$ is equal to :

(A) r^2 **(B)** $2r^2$ **(C)** $3r^2$ **(D)** $4r^2$

37. In a triangle ABC, $a = 2$, $b = 1 + \sqrt{3}$, $\angle C = 60°$ then the side c is equal to :

(A) $\sqrt{3} - 1$ **(B)** $\sqrt{2} + 1$ **(C)** $\sqrt{6}$ **(D)** None of these

38. The smallest angle of triangle whose side are $6 + \sqrt{12}$, $\sqrt{48}$, $\sqrt{24}$ is :

(A) $\pi/3$ **(B)** $\pi/4$ **(C)** $\pi/6$ **(D)** None of these

39. The value of $\left(\vec{a} - \vec{b}\right).\left[\left(\vec{b} - \vec{c}\right) \times \left(\vec{c} - \vec{a}\right)\right]$ is :

(A) 0 **(B)** $2\left[\vec{a}\,\vec{b}\,\vec{c}\right]$ **(C)** $3\left[\vec{a}\,\vec{b}\,\vec{c}\right]$ **(D)** None of these

40. If $\vec{b}$ and $\vec{c}$ are any two perpendicular unit vectors and $\vec{a}$ is any vector, then

$\left(\vec{a}\,.\,\vec{b}\right)\vec{b} + \left(\vec{a}\,.\,\vec{c}\right)\vec{c} + \frac{\vec{a}\,.\left(\vec{b}\times\vec{c}\right)}{|\vec{b}\times\vec{c}|^2}\left(\vec{b}\times\vec{c}\right)$ equal to :

(A) $\vec{b}$ **(B)** $\vec{a}$ **(C)** $\vec{c}$ **(D)** None of these

41. The centre of the circle given by $\vec{r}\left(\hat{i} + 2j + 2k\right) = 15$ and $|\vec{r} - \left(j + 2k\right)| = 4$ is equal to :

(A) (0, 1, 2, 3) **(B)** (1, 3, 4) **(C)** (–1, 3, 4) **(D)** None of these

42. The plane through the point (1, 2, −1) and perpendicular to the line of intersection of the planes $\vec{r}.\left(\hat{i}+4j-2k\right)=2$ and $\vec{r}.\left(3\hat{i}-j+k\right)=1$ is equal to :

(A) $\vec{r}.\left(-2\hat{i}+7j+13k\right)=0$ **(B)** $\vec{r}.\left(-2\hat{i}+7j+13k\right)+1=0$

(C) $\vec{r}.\left(-2\hat{i}+7j+13k\right)=1$ **(D)** $\vec{r}.\left(2\hat{i}+7j+13k\right)=0$

43. Let $f(x)$ be a polynomial. Then if $f(x_1)\ f(x_2)<0$, $f(x)=0$ has :

(A) atleast one or an odd number of roots in (x_1, x_2)

(B) any number of roots in (x_1, x_2)

(C) no roots or an even number of roots in (x_1, x_2)

(D) None of these

44. The maximum number of real roots of the equation $x^{2n}-1=0$

(A) 2 **(B)** 3 **(C)** n **(D)** $2n$

45. The maximum and minimum values of $z=5x+2y$, subject to the constraints $2x+3y\ge 6$; $x-2y\ge 2$; $6x+4y\le 24$; $-3x+2y\le 3$; $x, y\ge 0$ are respectively :

(A) $\frac{18}{7}, \frac{2}{7}$ **(B)** $19, \frac{63}{13}$ **(C)** 19, 63 **(D)** 19, 13

46. By graphical methods, the solution of linear programming problem (L.P.P.)
Maximize subject to : $z=3x_1+5x_2$, $3x_1+2x_2\le 18$, $x_1\le 4$, $x_2\le 6$, $x_1\ge 0$, $x_2\ge 0$ is :

(A) $x_1=2, x_2=0, z=6$ **(B)** $x_1=2, x_2=6, z=36$

(C) $x_1=4, x_2=3, z=27$ **(D)** $x_1=4, x_2=6, z=42$

47. What is the standard deviation of the following series

(A) 81 **(B)** 7.6

(C) 9 **(D)** 2.26

Measurement	0 – 10	10 – 20	20 – 30	30 – 40
Frequency	1	3	4	2

48. A sample of 35 observations has the mean 80 and *S.D* as 4. A second sample of 65 observations from the same population has mean 70 and *S.D.* 3. Then the *S.D.* of the combined sample is :

(A) 5.85 **(B)** 5.58 **(C)** 34.2 **(D)** None of these

49. A single letter is selected at random from the word "PROBABILITY". The probability that it is a vowel is :

(A) $\frac{3}{11}$ **(B)** $\frac{4}{11}$ **(C)** $\frac{2}{11}$ **(D)** 0

50. Four persons are selected at random from a group of 3 men, 2 women and 4 children. What is the chance that exactly two of them are children ?

(A) 9 / 21 **(B)** 10 / 23 **(C)** 11 / 24 **(D)** 10 / 21

ANSWERS FOR I.P. PRACTICE TEST – 1

PHYSICS

1	2	3	4	5	6	7	8	9	10
D	**B**	**C**	**A**	**B**	**C**	**A**	**A**	**B**	**B**
11	12	13	14	15	16	17	18	19	20
C	**B**	**A**	**B**	**C**	**B**	**D**	**A**	**C**	**C**
21	22	23	24	25	26	27	28	29	30
C	**B**	**A**	**B**	**B**	**B**	**B**	**C**	**A**	**D**
31	32	33	34	35	36	37	38	39	40
B	**A**	**A**	**A**	**C**	**C**	**A**	**B**	**C**	**A**
41	42	43	44	45	46	47	48	49	50
B	**D**	**A**	**A**	**A**	**C**	**C**	**D**	**D**	**A**

CHEMISTRY

1	2	3	4	5	6	7	8	9	10
A	**A**	**A**	**D**	**A**	**B**	**B**	**D**	**A**	**C**
11	12	13	14	15	16	17	18	19	20
D	**C**	**A**	**A**	**A**	**D**	**D**	**C**	**B**	**C**
21	22	23	24	25	26	27	28	29	30
A	**B**	**D**	A	**C**	**B**	**D**	**B**	**A**	**B**
31	32	33	34	35	36	37	38	39	40
C	**B**	**C**	**B**	**D**	**D**	**C**	**B**	**B**	**B**
41	42	43	44	45	46	47	48	49	50
A	**D**	**C**	**A**	**C**	**B**	**A**	**C**	**D**	**C**

MATHEMATICS

1	2	3	4	5	6	7	8	9	10
A	**A**	**C**	**C**	**C**	**D**	**C**	**C**	**D**	**C**
11	12	13	14	15	16	17	18	19	20
C	**A**	**B**	**D**	**D**	**D**	**C**	**C**	**C**	**A**
21	22	23	24	25	26	27	28	29	30
A	**D**	**C**	**B**	**D**	**C**	**C**	**A**	**B**	**B**
31	32	33	34	35	36	37	38	39	40
C	**B**	**B**	**B**	**A**	**D**	**C**	**C**	**A**	**B**
41	42	43	44	45	46	47	48	49	50
B	**B**	**A**	**A**	**B**	**B**	**C**	**A**	**B**	**D**