PHYSICS

BOOKS - CAREER POINT

MOCK TEST 5

Part A Physics

1. By what percent the energy of the satellite has to be increased to shift it from an orbit of radius r to $\dfrac{3r}{2}$.

A. 66.7 %

B. 33.3 %

C. 75 %

D. 20.3 %

Answer: B

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2. The potential energy of a particle of mass $1kg$ in motion along the x- axis is given by:

$U = 4(1 - \cos 2x)$, where x in meters. The period

of small oscillation (in sec) is

A. 2π

B. π

C. $\dfrac{\pi}{2}$

D. $\sqrt{2}\pi$

Answer: C

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3. The bulk modulus of water is $2.0 \times 10^9 \, N/m^2$. The pressure required to increase the density of water by 0.1% is

    A. 2×10^9 newton /metre^2

    B. 2×10^8 newton /metre^2
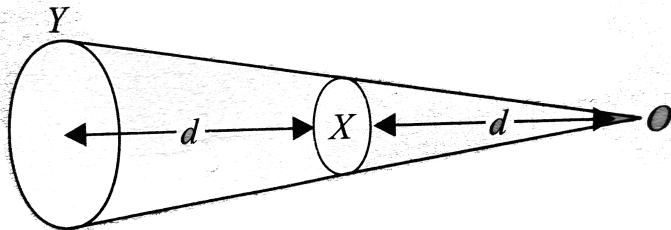
    C. 2×10^6 newton /metre^2

    D. 2×10^4 newton /metre^2

Answer: C

4. Two circular coils X and Y, having equal number of turns and carrying currents in the same sense, subtend same solid angle at point O. If the smaller coil X is midway between O and Y and if we represent the magnetic induction due to bigger coil Y at O as B_y and the due to smaller coil X at O as B_x,then find the ratio B_x / B_y.

A. $\dfrac{B_Y}{B_X} = 1$

B. $\dfrac{B_Y}{B_X} = 2$

C. $\dfrac{B_Y}{B_X} = \dfrac{1}{2}$

D. $\dfrac{B_Y}{B_X} = \dfrac{1}{4}$

Answer: C

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5. A short magnet porduces a deflection of $30°$ when placed at certain distance in tanA position of magnetometer. If another short magnet of double the length and thrice the pole strength is placed at the same distance in tan B position of

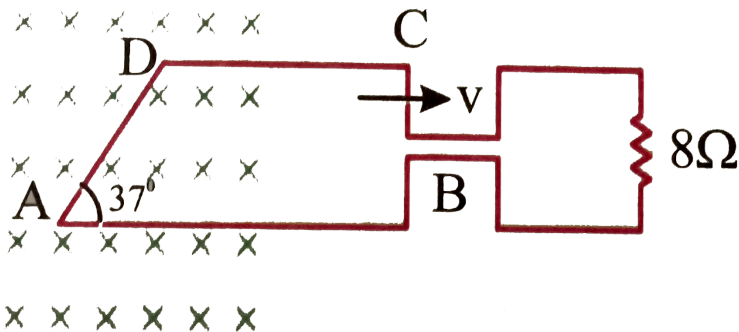the magnetometer, the deflection produced will be-

A. $60°$

B. $30°$

C. $45°$

D. None

Answer: A

6. The loop $ABCD$ is moving with velocity $'v'$ towards right. The magnetic field is $4T$. The loop is connected to a resistance of 8Ω. If steady current of $2A$ flows in the loop then value of $'v'$ if loop has a resistance of 4Ω, is : (Given $AB = 30cm$, $AD = 30cm$)

A. $\dfrac{50}{3} m/s$

B. 20 m/s

C. 10 m/s

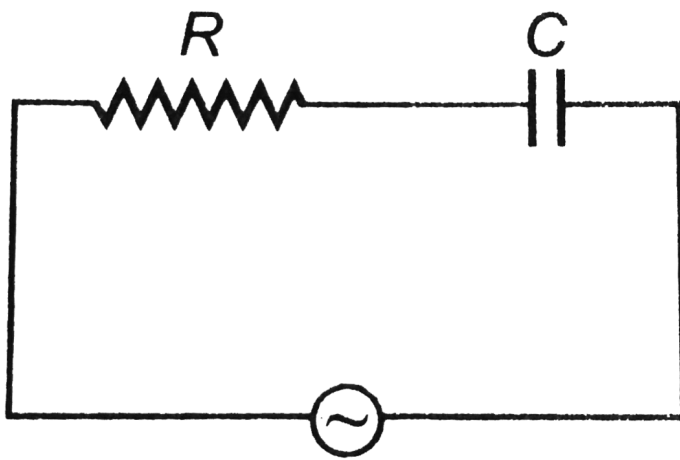D. $\dfrac{100}{3} m/s$

Answer: D

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7. A $50 Hz AC$ source of $20V$ is connected across

R and C as shown in figureure.

The voltage across R is $12V$. The voltage across C is

A. 8 V

B. 16 V

C. 10 V

D. not possible to determine unless values of R

and C are given

Answer: B

8. In a adiabatic process pressure is increased by $2/3\,\%$ if $C_P/C_V = 3/2$. Then the volume decreases by about

A. $\dfrac{4}{9}\,\%$

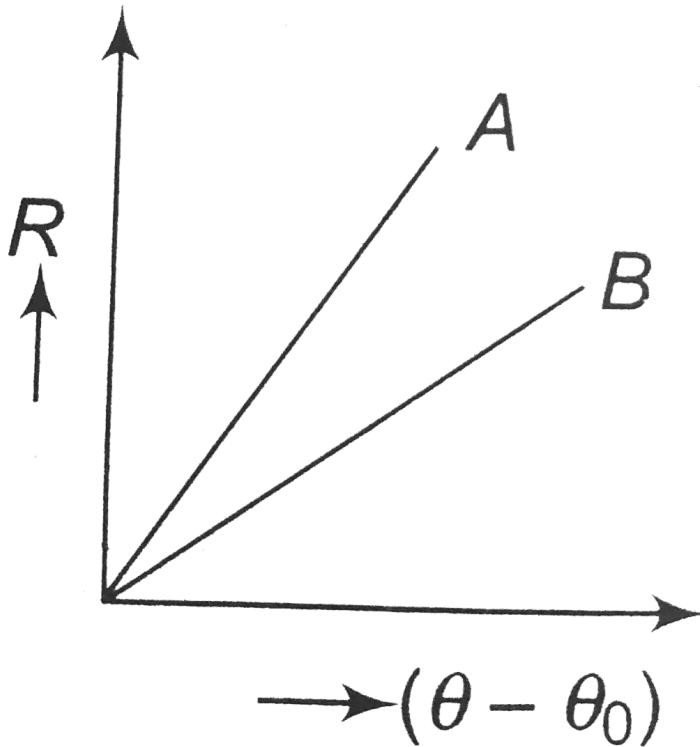B. $\dfrac{2}{3}\,\%$

C. $4\,\%$

D. $\dfrac{9}{4}\,\%$

Answer: A

9. Two circular disc A and B with equal radii are blackened. They are heated to same temperature and are cooled under identical conditions. What

inference do your draw from their cooling curves?

Graph with vertical axis labeled R and horizontal axis labeled $(\theta - \theta_0)$, showing two straight lines from the origin labeled A (steeper) and B (less steep).

A. A and B have same specific beats

B. specifice heat of A is less

C. specific heat of B is less

D. nothing came be said.

Answer: B

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10. Pitch of a screw gauge is 0.5 mm and its least count is .01 mm, Calculate no. of divisons on its circular scale.

A. 100

B. 25

C. 50

D. None of these

Answer: C

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11. $p - n$ junction diode can be used as

A. Rectification

B. Amplification

C. Obtaining light radiation

D. Detecting light intensity

Answer: B

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12. When a wave travels in a medium, the particle displacement is given by the equation

$y = a \sin 2\pi(bt - cx)$, where a, b and c are constants. The maximum particle velocity will be twice the wave velocity. If

A. $c = \dfrac{1}{\pi a}$

B. $c = \pi a$

C. b=ac

D. $b = \dfrac{1}{ac}$

Answer: A

13. A source of sound is travelling towards a stationary observer. The frequency of sound heard by the observer is of three times the original frequency. The velocity of sound is v m / sec . The speed of source will be

A. $\dfrac{2}{3}v$

B. v

C. $\dfrac{3}{2}v$

D. 3v

Answer: A

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14. A vessel is partitioned in two equal halves by a fixed diathermic separator. Two different ideal gases ae filled in left (L) and right (R) halves the rms speed of the molecules in L part is equal to the mean speed of moleucles in the R equal to

the ratio of the mass of a molecules in L part to that of a molecules in R part is

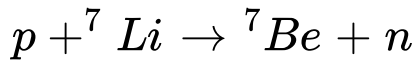A. $\sqrt{\dfrac{3}{2}}$

B. $\sqrt{\pi/4}$

C. $\sqrt{2/3}$

D. $3\pi/8$

Answer: D

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15. The minimum (threshold) KE of the proton to initiate the nulear reaction

$$p +^7 Li \rightarrow {}^7Be + n$$

Given $m_p = 1.0073$ amu, $m_1 = 7.0144$ amu, $m_{Be} = 7.0147$ amu, $m_0 = 1.0087$ amu.

A. $2 \times 10^{-15} J$

B. $4 \times 10^{-14} J$

C. $2.5 \times 10^{-13} J$

D. $8 \times 10^{-6} J$

Answer: C

16. A Photo sensitive material would emit electrons if excited by photons beyond a threshold. To overcome the threshold, one would increases -

A. Voltage applied to the light source

B. Intensity of light

C. Wavelength of light

D. The frequency of light

Answer: D

17. what should be the velocity of an electron so that its momentum becomes equal to that of a photon of wavelength 5200Å

A. 700m/s

B. 1000 m/s

C. 1400 m/s

D. 2800 m/s

Answer: C

18. Two long wires each oflength I are placed on a smooth horizontal table. Wires have equal but opposite charges. Magnitude oflinear charge density on each wire is λ. Calculate the work required to increase the separation between the wires from a to 2a:

A. $\dfrac{\lambda^2}{2\pi\varepsilon_0}\ln 2$

B. $\dfrac{\lambda}{2\pi\varepsilon_0}\ln 2$

C. $\dfrac{\lambda}{2\pi\varepsilon_0}$

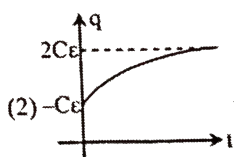D. $\dfrac{\lambda^2}{2\pi\varepsilon_0 a}$

Answer: A

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19. In the circuit shown in figure-3.311, the switch is shifted from position I to 2 at time t = 0. The switch was initially in position I for a long time. The graph between charge on capacitor C and

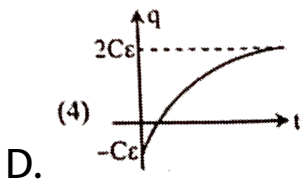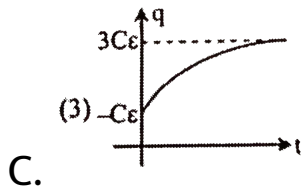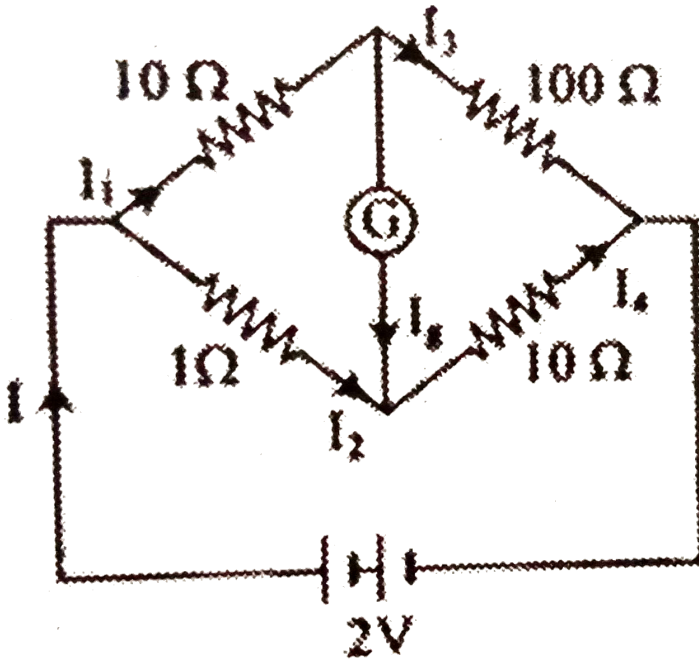time tis best represented as

A.
(1)

$2C\varepsilon$

$-C\varepsilon$

q

t

B.
(2) $-C\varepsilon$

$2C\varepsilon$

q

t

C.

D.
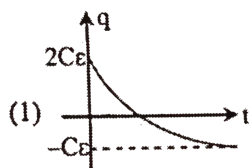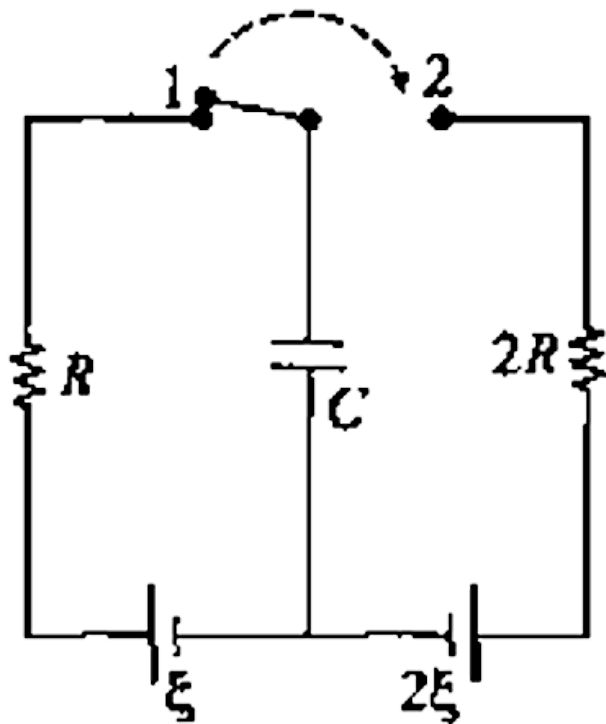
Answer: D

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20. In figure, the resistance of galvanometer G is 50 ohm and the battery is ideal. Of the following alternatives, in which case, are the currents arranged strictly in the order of decreasing

magnitudes with the larger coming earlier-

A. I, I_1, I_g, I_2

B. I, I_g, I_1, I_2

C. I, I_2, I_1, I_g

D. I_g, I_1, I_2, I

Answer: C

21. Null point in the galvanometer is obtained when a cell of emf E and internal resisance r is connncted across the length of 22 cm wire of the potentiometer . Now a resistane of 10Ω is connected across the terminals of the cell (by closing the key K) and null point is obtained against the length of cm. The internal resistance r

of the cell is -

E_0

r_0

22cm

20cm Ⓖ

E

r K

$R = 10\,\Omega$

A. 0.5Ω

B. 1Ω

C. 1.5Ω

D. 2Ω
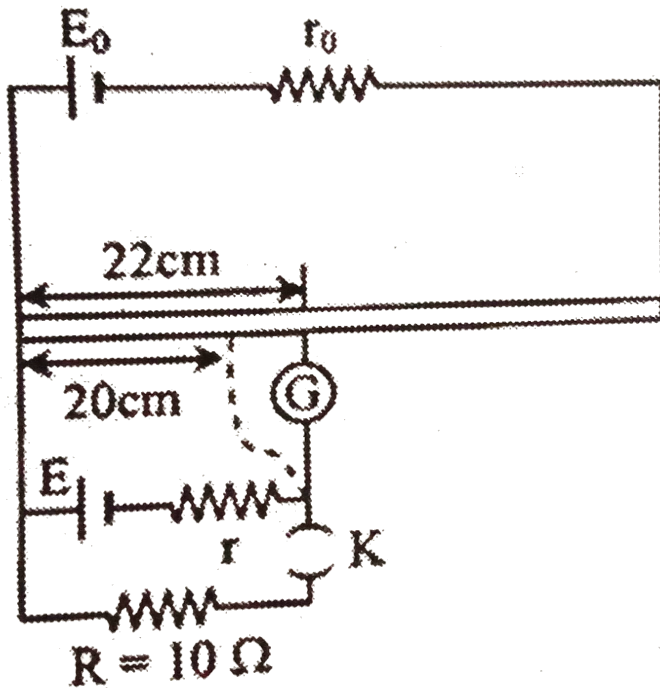
Answer: B

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22. An open knife of mass m is dropped from a height h on a wooden floor. If the blade penetrates up to the depth d into the wood. The average resistance offered by the wood to the knife edge is .

A. mg

B. $mg\left(1 - \dfrac{h}{d}\right)$

C. $mg\left(1 + \dfrac{h}{d}\right)$

D. $mg\left(1 + \dfrac{h}{d}\right)^2$

Answer: C

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23. Portion AB of the wedge shown in figure is rough and BC is smooth. A solid cylinder rolld without slipping from A to B. Find the ratio of translational kinetic energy to rotationa linetic

energy, when the cylinder reaches point C.
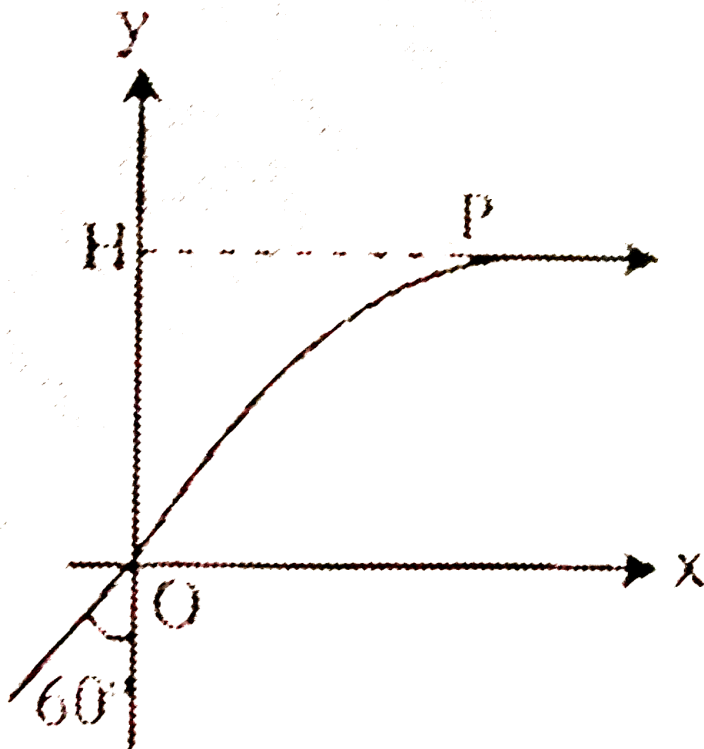

AB=BC
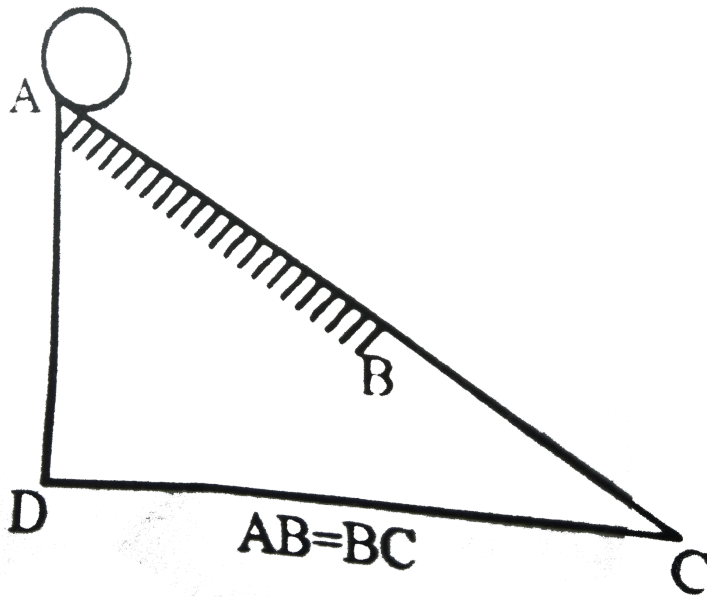
A. $3/5$

B. 5

C. $7/5$

D. $8/3$

Answer: B

24. A system of coordinatees is drawn in a medium whose refractive index vaires as $\mu = \dfrac{2}{1+Y^2}$ where $0 \le y \le 1$. A ray of light is incident at origin at an angle $60°$ with y-axis as shown in figure. At point P, the ray becomes

parallel to x-axis, the volue of H is -

A. $\left\{ \left(\dfrac{2}{\sqrt{3}} - 1 \right) \right\}^{1/2}$

B. $\left\{ \dfrac{2}{\sqrt{3}} \right\}^{1/2}$

C. $\left\{ \left(\sqrt{3} - 1 \right) \right\}^{1/2}$

D. $\left\{ \sqrt{(3)} + 1 \right\}^{1/2}$

Answer: A

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25. In YDSE, let A and B be two slits. Films of thickness t_A and t_B and refractive μ_A and μ_B are placed in front of A and B, respectively. If $\mu_A t_A = \mu_A t_B$, then the central maxima will

A. not shift

B. shift towards A

C. shift towares B

D. None of these

Answer: A

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26. When an unpolarized light of intensity I_0 is incident on a polarizing sheet, the intensity of the light which does not get transmitted is

A. I_0

B. O

C. $I_0/2$

D. $I_0 \cos^2 \theta$

Answer: C

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27. The heat dissipated in a resistance can be obtained by the measurement of resistance, current and time. If the maximum precentage error in the mesurement of these quanties is $\%$, 2% and 1% respectively. The maximum

percentage error in the determination of the dissipated heat is -

A. 4%

B. 6%

C. $4/3\%$

D. 2%

Answer: B

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28. Resultant of which of the following may be equal to zero ?

    A. 10N, 10N, 30N

    B. 10N, 20N, 30N, 40N

    C. 5N, 10N, 20N, 40N

    D. none of these

Answer: B

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29. The initial velocity of a particle is u and the accelertion at time t later is given by at, then its velocity is given by-

A. $u + \dfrac{at^2}{2}$

B. $u^2 + \dfrac{at^2}{2}$

C. $\dfrac{u + at^2}{2}$

D. none of these

Answer: A

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30. Two trolleys A and B are moving with accelerations a and 2a, respectively, in the same direction. To an observer in trolley A. Find the magnitude of the pseudo force acting on a block of mass m on trolley B.
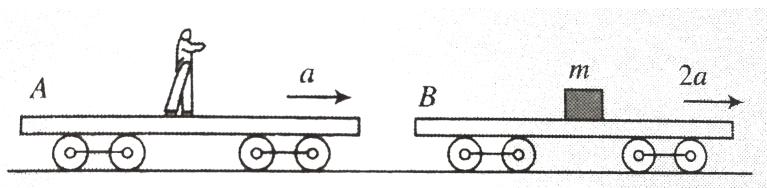
A. ma

B. 2ma

C. $\dfrac{ma}{2}$

D. none of these

Answer: A

Part B Chemistry

1. Which of the following is incorrect processes ?

A. $Fe + Al_2O_3 \rightarrow 2Al + Fe_2O_3$

B. $ZnO + C \rightarrow Zn + CO$

C. $Cr_2O_3 2Al \rightarrow 2Cr + Al_2O_3$

D.

$$2[Ag(CN)_2]^- + Zn \rightarrow 2Ag + [Zn(CN)_4]^{2-}$$
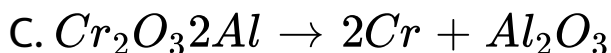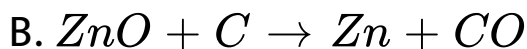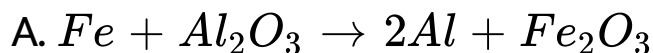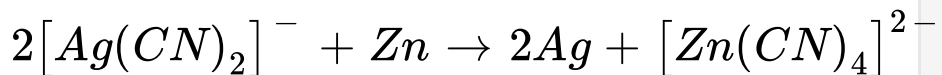
Answer: A

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2. When zeolite, which is hydrated sodium aluminium silicate, is treated with hard water, the sodium ions are are exchanged with

A. H^+ ions

B. Ca^{++} ions

C. SO_4^- ions

D. OH^- ions

Answer: B

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3. Sodium sulphate is soluble in water,whereas barium sulphate is sparingly soluble because

A. The hydration energy of sodium sulphate is more than its lattice energy

B. The lattice energy of barium sulphate is less than its by hydration energy

C. The lattice energy hs no role to play in solubiliy

D. The hydration energy of sodium sulphate is less than its lattice energy

Answer: A

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4. The number of P-O-P bonds present in P_4O_6 and P_4O_{10} are respectively

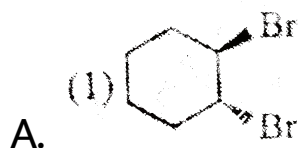   A. 5,5

    B. 5,6

    C. 6,6

    D. 6,5

Answer: C

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5. Identify (Z) in the following transformation

$$\xrightarrow[\text{(PhCO}_2\text{)}_2\text{O}_2]{\text{NBS}} \quad (Z)$$

A.

(1)

B.

(2)

C.

(3)

D.

(4)
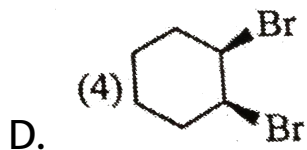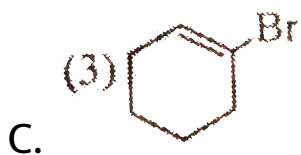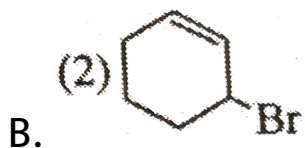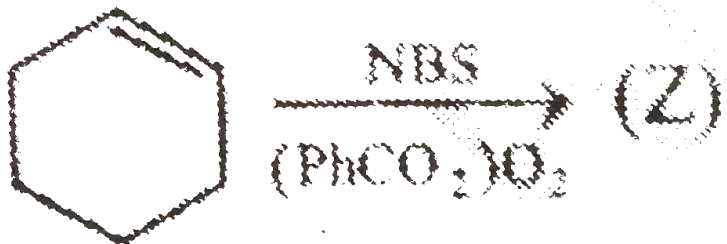
6. Consider the following compounds I to IV with respect to their S_N2 reacrtivity with a given nucelophile

$$CH_3CH_2Br$$
$$I$$

$$CH_3CH_2CH_2Br$$
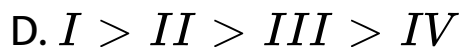$$II$$

$$(CH_3)_2CHCH_2Br$$
$$III$$
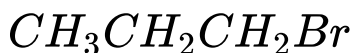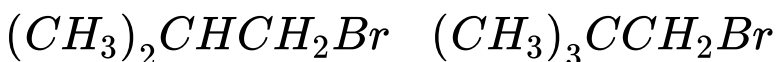
$$(CH_3)_3CCH_2Br$$
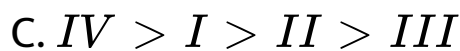$$IV$$

A. $IV > III > II > I$

B. $I > IV > III > II$

C. $IV > I > II > III$

D. $I > II > III > IV$

Answer: D

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7. Consider the following reaction

 $+ HI$ (1 mol) $\xrightarrow{\text{heat}}$ product
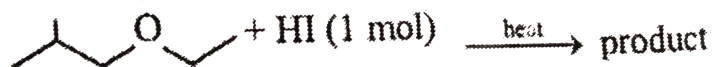
The major products formed in the reaction are

A. $(CH_3)_2CHCH_2OH$ and CH_3CH_2I

B. $(CH_3)_2CHCH_2I$ and CH_3CH_2OH

C. $CH_3 - CH - CH_3$ and CH_3CH_2OH
$$\overset{|}{CH_3}$$

D. $CH_3 - CH - CH_2OH$ and $CH_3 - CH_3$
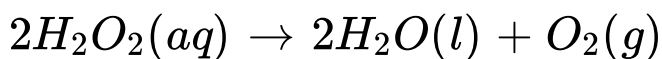$$\overset{|}{CH_3}$$
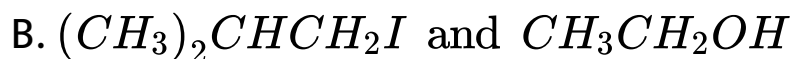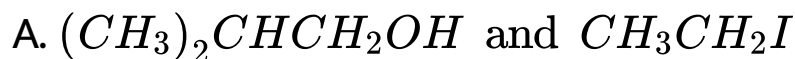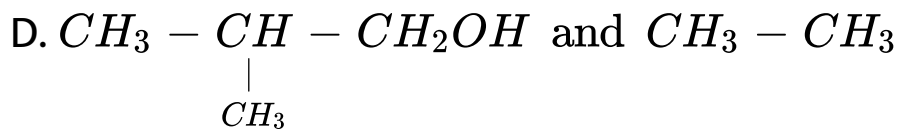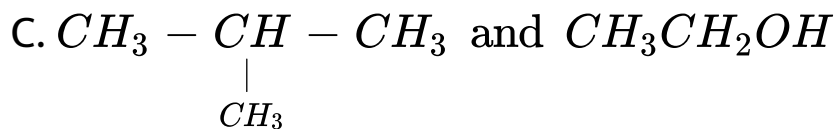
Answer: A

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8. The standard free energy change free energy for the following reaction is -210 KJ. What is the standard cell potential ?

$$2H_2O_2(aq) \rightarrow 2H_2O(l) + O_2(g)$$

A. $+0.752$

B. $+1.09$

C. $+0.420$

D. $+0.640$

Answer: B

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9. $100cm^3$ of a solution of an acid (Molar mass $= 98$) containing $29.4g$ of the acid per litre were completely neutralized by $90.0cm^3$ of aq. $NaOH$ containing $20g$ of $NaOH$ per $500cm^3$. The basicity of the acid is :

A. 3

B. 2

C. 1

D. data insufficient

Answer: A

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10. For a complex $[Co(NH_3)_3CI_3]$ pick up true statements ?

A. The co-ordination number and oxidation number of coablt is 6

B. The complex can show fac and mer isomerism

C. The complex can show optical isomerism

D. This complex can from whitwe precipitate of AgCI with $AgNO_3$

Answer: B

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11. Select incorrect statement :

A. Ferrous sulphate on heating gives both SO_2 and SO_3 gas

B. CrO_3 from CrO_4^{-2} with $NaOH$
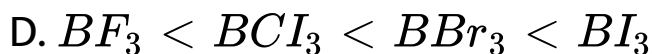
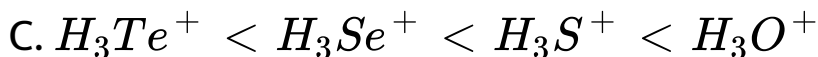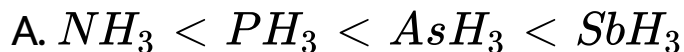C. $KMnO_4$ acts as an oxidizing in acidic medium only

D. Mn_2O_7 is an acidic oxide

Answer: C

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12. Which of the following is the correct order for increasing bond angle ?

A. $NH_3 < PH_3 < AsH_3 < SbH_3$

B. $H_2O < OF_2 < CI_2O$

C. $H_3Te^+ < H_3Se^+ < H_3S^+ < H_3O^+$

D. $BF_3 < BCI_3 < BBr_3 < BI_3$

Answer: C

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13. Among the halogens, fluorine differs considerably form the other members. The hydrides of halogens also differ in their properties.

Which of the following halogens do not form polyhalide ?

    A. Electronegativity

    B. Atomic radius
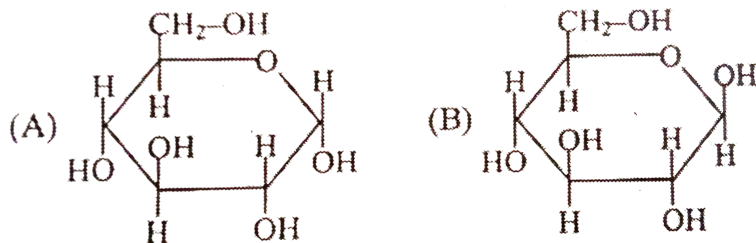
    C. Ionisation energy

    D. Oxidising power

Answer: B

14. Relation between (A) and (B) is :

A. Anomers

B. Positional

C. Functional isomer

D. Enantiomer

Answer: A

15. Both ionic and covalent bond is present in the following

A. CH_4

B. KCl

C. SO_4

D. NaOH
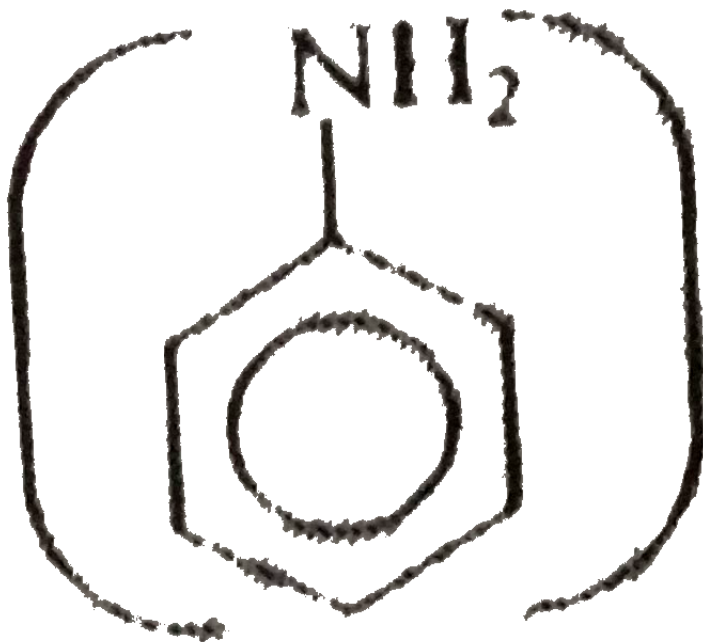
Answer: D

16. Which of the following statements wrong about aniline

A. Positive isocyanide test

B. 2,4, DNP (Positive -test)

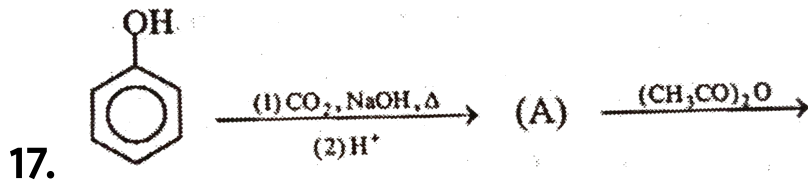C. Reacts with CH_3MgBr and evole CH_4 gas

D. Give diazotization product by

$NaNO_2 + HCIon0°Cto5°C$

Answer: B

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17.

Product (B) is -

A. Antibiotic

B. Analgesic

C. Anta Acid

D. None of these

Answer: B

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18. In an atom , an electron is moving with a speed of 600 m/s with an accuracy of 0.05% . The certainty with which the position of the electron can be located is (h = $6.6 \times 10^{-34} kgm^2 s^{-1}$, mass of electron , $e_m = 9.1 \times 10^{-31}$ kg):

A. $1.52 \times 10^{-4} m$

B. $5.10 \times 10^{-3} m$

C. $1.92 \times 10^{-3} m$

D. $3.84 \times 10^{-3} m$

Answer: C

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19. Xenon crystallizes in the face-centred cubic lattice and the edge of the unit cell is 620 pm.

What is the nearest neighbour distance and what is the redius of xenon atom?

A. 219.20pm

B. 438.5 pm

C. 265.5 pm

D. 536.94 pm

Answer: A

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20. The standard enthalpy of formation of octane (C_8H_{18}) is $-250kJ/mol$. Calculate the enthalpy of combustion of C_8H_{18}. The enthalpy of formation of $CO_2(g)$ and $H_2O(l)$ are $-394kJ/mol$ and $-286kJ/mol$ respectively.

A. -5200 KJ/mol

B. -5726 KJ/mol

C. -5476 KJ/mol

D. -5310 KJ/mol

Answer: C

21. What is the maximum value of van't Hoff factor

for $AlCl_3$?

A. 3

B. 4

C. 1

D. 2

Answer: B

22. In a reversible reaction ,

$K_e < K_p$ and $\Delta H = +40$ kca. The product will

be obtained in less amount on

A. Decreasing pressure and temperature

B. Increasing pressure and temprature

C. Deceasing   pressure   and   increasing

temperature .

D. Decreasing temperature and increasing

pressure

Answer: A

23. Which of the following factors will be favourbale for higher yields of NO in the reaction given below ?

$$N_2 + O_2 \Leftrightarrow 2NO(g)(\Delta H = +ve)$$
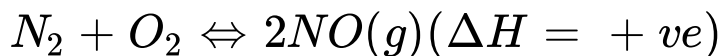
A. Low temperature, high pressure and high conentration of N_2 and O_2

B. High temperature, and high concentrations of N_2 and O_2 . The reaction remains unaffected by pressure.

C. High temperature , law pressure and low

concentration, of N_2 and O_2

D. Law temperature, low pressure and high

concentraion of N_2 and O_2

Answer: B

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24. Equal volumes of three acid solutions of

$pH3$, 4 and 5 are mixed in a vessel. What will be

the H^+ ion concentration in the mixture?

A. $3.7 \times 10^{-3} M$

B. $1.11 \times 10^{-3} M$
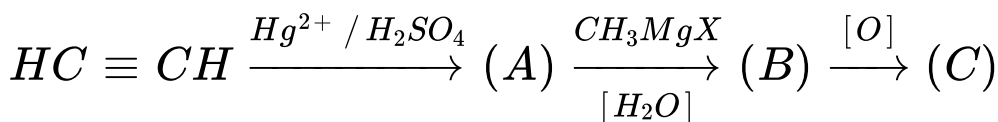
C. $1.11 \times 10^{-4} M$

D. $3.7 \times 10^{-4} M$

Answer: D

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25. In the following sequence of reaction, the end product is :

$$HC \equiv CH \xrightarrow{Hg^{2+}/H_2SO_4} (A) \xrightarrow[{[H_2O]}]{CH_3MgX} (B) \xrightarrow{[O]} (C)$$

A. acetaldehyde
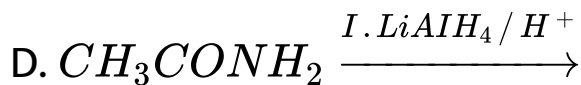
B. isopropyl alcohol

C. acetone

D. ethyl alcohol

Answer: C

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26. Which of the following reaction will not give

primary amine ?

A. $CH_3CONH_2 \xrightarrow{Br_2KOH}$

B. $CH_3CN \xrightarrow{I.LiAlH_4/H^+}$

C. $CH_3NC \xrightarrow{I.LiAlH_4/H^+}$
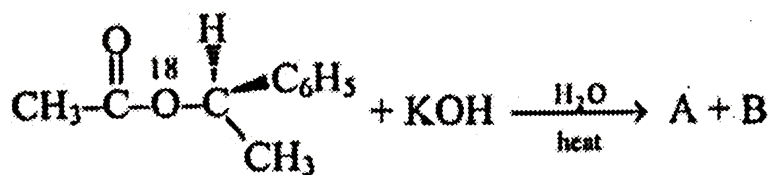
D. $CH_3CONH_2 \xrightarrow{I.LiAlH_4/H^+}$
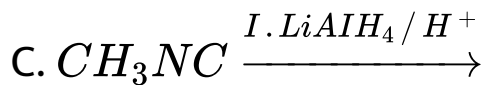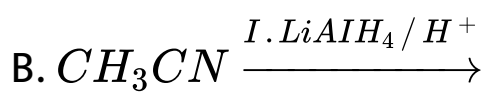
Answer: C

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27. In the reaction

the products (A) and (B) are-

A. (1) $CH_3-\overset{O}{\overset{\|}{C}}-\overset{18}{O}K$ and $HO-\overset{\overset{H}{|}}{\underset{CH_3}{C}}-C_6H_5$

B. (2) $CH_3-\overset{O}{\overset{\|}{C}}-\overset{18}{O}K$ and $HO-\overset{\overset{H}{|}}{\underset{CH_3}{C}}-C_6H_5$

C. (3) $CH_3-\overset{O}{\overset{\|}{C}}-OK$ and $C_6H_5-\overset{\overset{H}{\,}}{\underset{CH_3}{C}}-\overset{18}{O}H$

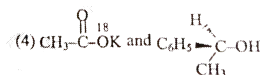D. (4) $CH_3-\overset{O}{\overset{\|}{C}}-\overset{18}{O}K$ and $C_6H_5-\overset{\overset{H}{\,}}{\underset{CH_3}{C}}-OH$
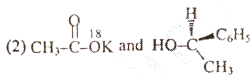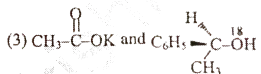
Answer: A

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28. Decreasing order of stability of given carbocatons is as :

(i)

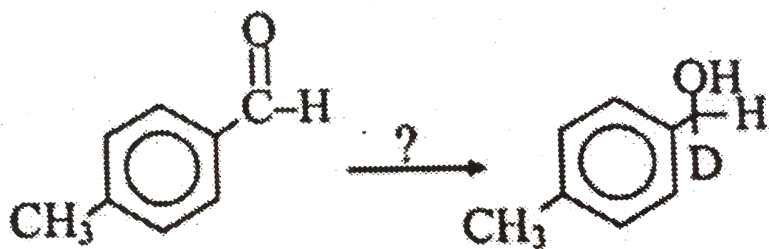(ii) $CH_2 = CH - \overset{\oplus}{C}H_2$
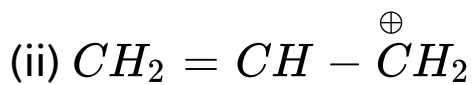
A. $iii > ii > iv > i$

B. $i > iii > iv > ii$

C. $i > iii > ii > iv$

D. $iii > ii > i > iv$

Answer: C

29. Which of the following reagents is best used

for the conversion shown below ?

A. 1. $NaBH_4 / 2D_3O^+$

B. 1. $NaBD_4 / 2. H_3O^+$

C. 1. $LiAIH_4 / 2. D_3O^+$

D. 1. $H_2\,/\,Pt\,/\,2.\ D_2O$

Answer: B

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