FINAL ANSWER KEY

Question Paper Code:	137/2023/OL
Category Code:	034/2022
Exam:	Junior Research Officer (SR for ST)
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Department	Food Safety

Question1:-The pairs of sulfur - Nitrogen Compounds/species with 10 π electrons

A:-$[S_4N_4]^{2+},[S_2N_2]$

B:-$[S_4N_4]^{2+},[S_3N_3]^-$

C:-$[S_4N_4],[S_2N_2]$

D:-$[S_3N_3]^-,[S_2N_2]$

Correct Answer:- Option-B

Question2:-Which of the following organometallic compound has a 4c-2e bond if the bonding is purely covalent?

A:-$Al_2(CH_3)_6$

B:-$Al_2CH_3(t-Bu)_5$

C:-Li_4Me_4

D:-Be_2Me_2

Correct Answer:- Option-C

Question3:-Which of the following adopts inverse spinel structure?

A:-$MgAl_2O_4$

B:-$MgTi_2O_4$

C:-$CoAl_2O_4$

D:-$MgIn_2O_4$

Correct Answer:- Option-D

Question4:-NH_4Cl react with BCl_3 produces a compound P, which on reduction with $NaBH_4$ gives Q. Q on reaction with HCl gives R. Identify P. Q and R in the correct order

A:-$B_3N_3Cl_3H_9,B_3N_3H_6,B_3N_3Cl_3H_3$

B:-$B_3N_3Cl_3H_9,B_3N_3Cl_3H_3,B_3N_3H_3$

C:-$B_3N_3Cl_3H_3,B_3N_3H_6,B_3N_3Cl_3H_9$

D:-$B_3N_3Cl_3H_3,B_3N_3Cl_3H_9,B_3N_3H_6$

Correct Answer:- Option-C

Question5:-Which one of the following is not a zeolite?

A:-Crocidolite

B:-Sodalite

C:-Faujasite

D:-Mordenite

Correct Answer:- Option-A

Question6:-Which is a p-type semiconductor among the following?

A:-Fe_2O_3

B:-MnO_2

C:-Cr_2O_3

D:-ZnO

Correct Answer:- Option-C

Question7:-The auto ionization products of ICl_3 are

A:-ICl^+ and ICl_2^-

B:-ICl_2^+ and ICl_4^-

C:-ICl_2^+ and ICl^-

D:-ICl_4^+ and ICl_2^-

Correct Answer:- Option-B

Question8:-The ^{31}P spectrum of facial isomer of the complex $\left[RhCl_3(PPh_3)_3\right]$($^1J_{P-Rh}$>$^2K_{(p-p)}$ and I value of Rh=1/2) consists of

A:-Two doublets and two triplets

B:-Two triplets and one singlet

C:-One doublet

D:-One doublet and one triplet

Correct Answer:- Option-C

Question9:-The correct match for radioisotopes in column A with its medical application in column B

	Column A	Column B
(a)	^{18}F	(i) Mechanism of bone fracture healing
(b)	^{131}I	(ii) Defects in blood circulation
(c)	^{24}Na	(iii) Dopamine pathway in Brain
(d)	^{35}S	(iv) Brain Tumour Location

A:-(a)-(iv), (b)-(iii), (c)-(ii), (d)-(i)

B:-(a)-(i), (b)-(iv), (c)-(ii), (d)-(iii)

C:-(a)-(ii), (b)-(i), (c)-(iv), (d)-(iii)

D:-(a)-(iii), (b)-(iv), (c)-(ii), (d)-(i)

Correct Answer:- Option-D

Question10:-The highest M-C bond length exhibited by $\left[M(\eta^5-Cp)_2\right]$ complex is

A:-$\left[Ni(\eta^5-Cp)_2\right]$

B:-$\left[Co(\eta^5-Cp)_2\right]$

C:-$\left[V(\eta^5-Cp)_2\right]$

D:-$\left[Cr(\eta^5-Cp)_2\right]$

Correct Answer:- Option-C

Question11:-The correct order of isomeric shift in Sn compounds

A:-$\left[Me_4Sn\right]>\left[Me_3SnCl\right]>\left[Me_2SnCl_2\right]$

B:-$\left[Me_2SnCl_2\right]>\left[Me_4Sn\right]>\left[Me_3SnCl\right]$

C:-$\left[Me_3SnCl\right]>\left[Me_2SnCl_2\right]>\left[Me_4Sn\right]$

D:-$\left[Me_2SnCl_2\right]>\left[Me_3SnCl\right]>\left[Me_4Sn\right]$

Correct Answer:- Option-D

Question12:-Estimate the radius of ^{234}Th nucleus

A:-$2.29\times10^{-14}m$

B:-$9.24\times10^{-15}m$

C:-$1.51\times10^{-15}m$

D:-$5.30\times10^{-15}m$

Correct Answer:- Option-B

Question13:-The X-S-X bond angle in SO_2X_2 for different X is the order when X=F, Cl, OH or CF_3

A:-$SO_2(CF_3)_2>SO_2(OH)_2>SO_2Cl_2>SO_2F_2$

B:-$SO_2(CF_3)_2>SO_2Cl_2>SO_2(OH)_2>SO_2F_2$

C:-$SO_2Cl_2>SO_2(OH)_2>SO_2(CF_3)_2>SO_2F_2$

D:-$SO_2F_2>SO_2(OH)_2>SO_2(Cl_2)>SO_2(CF_3)_2$

Correct Answer:- Option-A

Question14:-The correct combination of catalyst and its application is

A:-$\left[HFe(CO)_4\right]^-$ Hydroformylation

B:-$\left[HCo(CO)_4\right]$ - Alkene hydrogenation

C:-Cis - $\left[Rh(CO)_2I_2\right]^-$ - Monsanto acetic acid synthesis

D:-$\left[Ru(CO)_2I_3\right]^-$ - Water gas shift reaction

Correct Answer:- Option-C

Question15:-The one-dimensional metal Pt complex is

A:-$K_2Pt(CN)_4Br_{0.3}.3H_2O$

B:-$PtCl_2(NH_3)_2Br_{0.3}$

C:-$K_2PtCl_4Br_{0.3}.3H_2O$

D:-$K_2Pt(NO_2)_4Br_{0.3}.3H_2O$

Correct Answer:- Option-A

Question16:-The STYX number of B_6H_{10} is

A:-4120

B:-4220

C:-4012

D:-4210

Correct Answer:- Option-B

Question17:-The correct match for metalloprotein in column A with its biological function in column B.

Column A	Column B
(a) Cytochrome P450	(i) O_2 transport
(b) Vitamin B_{12}	(ii) O_2 Storage
(c) Rubredoxin	(iii) Group transfer
(d) Hemocyanin	(iv) Electron transport
	(v) Iron storage
	(vi) Insertion of oxygen into C-H bond

A:-(a)-(vi), (b)-(iii), (c)-(iv), (d)-(i)

B:-(a)-(i), (b)-(ii), (c)-(iii), (d)-(vi)

C:-(a)-(iii), (b)-(vi), (c)-(iv), (d)-(i)

D:-(a)-(iv), (b)-(iii), (c)-(i), (d)-(iv)

Correct Answer:- Option-A

Question18:-Which one of the following is/are a single molecular magnet?

A:-$\left[Fe\left(\eta^5-C_5Me_5\right)_2\left(C_2(CN)_4\right)\right]$

B:-$\left[Mn\left(\eta^5-C_5Me_5\right)_2\left(C_2(CN)_4\right)\right]$

C:-$Mn_{12}O_{12}(O_2CMe)_{16}(H_2O)_4.2MeCO_2H.4H_2O$

D:-All the above

Correct Answer:- Option-D

Question19:-The ground state term symbols for Tm^{3+} and Tb^{3+} are

A:-$^3H_6$ and $^7F_6$

B:-$^3H_4$ and $^5I_8$

C:-$^5I_4$ and $^7F_0$

D:-$^7F_6$ and $^6H_{\frac{5}{2}}$

Correct Answer:- Option-A

Question20:-$Au(PPh_3)$ is isolobal with

A:-$Fe(CO)_4$ and $CpCo(CO)$

B:-$Mn(CO)_5$ and $CpFe(CO)_2$

C:-$Co(CO)_3$ and $\left[Ni(CO)_3\right]^+$

D:-$Fe(CO)_5$ and $Ni(CO)_4$

Correct Answer:- Option-B

Question21:-Which of the following statement is/are correct about Ferro, Piezo- and Pyroelectric materials

(i) The crystal of Ferro-, Piezo- and Pyroelectric crystals are non-centrasymmetric

(ii) All piezoelectric materials are pyroelectric
(iii) Ferroelectric materials are also pyroelectric and piezoelectric

A:-Only (ii) and (iii)

B:-Only (i) and (iii)

C:-All of the above (i, ii and iii)

D:-Only (i) and (ii)

Correct Answer:- Option-B

Question22:-The correct order of ligand reactivity for substitution of Cl on trans-$\left[Pt(Py)_2Cl_2\right]$ by the ligand Y in methanol (where the ligand Y is PR_3, SCN^-, Br^- and NH_3) is

A:-$NH_3 > PR_3 > Br^- > SCN^-$

B:-$PR_3 > NH_3 > SCN^- > Br^-$

C:-$PR_3 > SCN^- > Br^- > NH_3$

D:-$SCN^- > Br^- > NH_3 > PR_3$

Correct Answer:- Option-C

Question23:-The electronic spectrum of $Ni(H_2O)_6]^{2+}$ appears at 8500, 13800 and 25300 cm^{-1} . The energy transition corresponding to 8500 cm^{-1} is

A:-$^3A_2g(F) \rightarrow {}^3T_2g(F)$

B:-$^3A_2g(F) \rightarrow {}^3T_1g(F)$

C:-$^3T_2g(F) \rightarrow {}^3A_2g(F)$

D:-$^3T_2g(F) \rightarrow {}^3T_1g(F)$

Correct Answer:- Option-A

Question24:-Which one of the following is Scherrer formula to determine the crystallite size of a material from XRD?

A:-$t = \frac{0.9\lambda}{B\cos\theta_B}$

B:-$t = \frac{B\cos\theta_B}{0.9\lambda}$

C:-$t = \frac{0.9\lambda}{B\sin\theta_B}$

D:-$t = \frac{B\sin\theta_B}{0.9\lambda}$

Correct Answer:- Option-A

Question25:-The Lande g-factor for Pr^{3+} is

A:-0.6

B:-1.25

C:-1

D:-0.8

Correct Answer:- Option-D

Question26:-Which of the following pairs have Arachno structures?

A:-Sb_4^{2-} and $Co_4(CO)_{12}$

B:-$Co_6(CO)_{16}$ and Pb_5^{2-}

C:-$\left[Ni_5(Co)_{12}\right]^{2-}$ and Sb_4^{2-}

D:-$\left[Ni_5(Co)_{12}\right]^{2-}$ and Pb_5^{2-}

Correct Answer:- Option-C

Question27:-Which is the most commonly used activator ion for use in red phosphors for colour television screens?

A:-Mn^{2+}

B:-Cu^{2+}

C:-Eu^{3+}

D:-Ag^{+}

Correct Answer:- Option-C

Question28:-Identify the end product B is the following reaction sequence:
$\left[PtCl_4\right]^{2-} \overset{NH_3}{\rightarrow} A \overset{NO_2^-}{\rightarrow} B$

A:-trans - $\left[PtCl_2(NH_3)(NO_2)\right]^-$

B:-Cis - $\left[PtCl_2(NH_3)(NO_2)\right]^-$

C:-Cis - $\left[PtCl_2(NH_3)_2\right]$

D:-trans- $\left[PtCl_2(NO_2)_2\right]^{2-}$

Correct Answer:- Option-B

Question29:-The correct order of basicity of phosphines is

A:-$PF_3 > P(OPh)_3 > PPh_3 > PEt_3$

B:-$PPh_3 > P(OPh)_3 > PEt_3 > PF_3$

C:-$P(OPh)_3 > PEt_3 > PF_3 > PPh_3$

D:-$PEt_3 > PPh_3 > P(OPh)_3 > PF_3$

Correct Answer:- Option-D

Question30:-Which is the correct option about the type of intrinsic defect observed in (i) MgO and (ii) CdTe?

A:-i-Frenkel Defect, ii-Schottky Defect

B:-i- Schottky Defect, ii- Frenkel Defect

C:-Schottky Defects in both (i) and (ii)

D:-Frenkel Defects in both (i) and (ii)

Correct Answer:- Option-B

Question31:-The IUPAC name of the following compound is

A:-Spiro [5.4] deca-2,7-diene

B:-Spiro [4.5] deca-1,6-diene

C:-Spiro [4.5] hepta-1,6-diene

D:-Spiro [5.4] hepta-2,7-diene

Correct Answer:- Option-B

Question32:-Which is the same compound as the following?

A:-

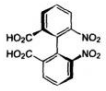
B:-

C:-

D:-

Correct Answer:- Option-D

Question33:-Which statement about the following compound is correct?



A:-Optically active due to the presence of asymmetric carbon

B:-Optically inactive due to the absence of asymmetric carbon

C:-Optically active due to restricted rotation

D:-Optically inactive due to plane of symmetry

Correct Answer:- Option-C

Question34:-Which of the following is incorrect for sydnones?

A:-Aromatic compound

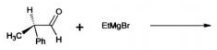
B:-Mesoionic compound

C:-Heterocyclic compound

D:-None of the above

Correct Answer:- Option-D

Question35:-The major product of the following reaction will be



A:-

B:-

C:-Equal mixture of 1 and 2

D:-None of the above

Correct Answer:- Option-A

Question36:-Which among the following alkyl chlorides has the highest rate of hydrolysis through unimolcular mechanism?

A:-

B:-

C:-

D:-

Correct Answer:- Option-C

Question37:-Addition of bromine to alkene is

A:-Stereoselective

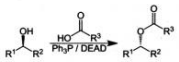
B:-Stereospecific

C:-Regioselective

D:-None of the above

Correct Answer:- Option-B

Question38:-Identify the following reaction



A:-Reimer-Tiemann reaction

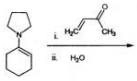
B:-Chichibabin reaction

C:-Mitsunobu reaction

D:-None of the above

Correct Answer:- Option-C

Question39:-Product of the following reaction is



A:-

B:-

C:-

D:-

Correct Answer:- Option-A

Question40:-Witting reaction is used for the conversion of

A:-Aldehyde or ketone to carboxylic acid

B:-Aldehyde or ketone to alcohol

C:-Ketone to alkene

D:-Alcohol to ether

Correct Answer:- Option-C

Question41:-Which among the following rearrangement proceeds through nitrene intermediate?

A:-Schmidt rearrangement

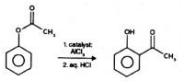
B:-Lossen rearrangement

C:-Curtius rearrangement

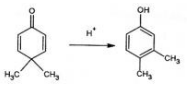
D:-All the above

Correct Answer:- Option-D

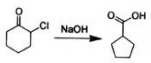
Question42:-Identify Favorskii rearrangement in the following



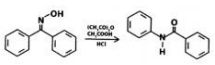
A:-



B:-



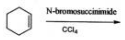
C:-



D:-

Correct Answer:- Option-C

Question43:-Product of the following reaction is



A:-

B:-

C:-

D:-

Correct Answer:- Option-A

Question44:-Lithium aluminium hydride reduces a nitrile to

A:-Amide

B:-Amine

C:-Isonitrile

D:-Alcohol

Correct Answer:- Option-B

Question45:-What is Jones reagent?

A:-Aqueous $KMnO_4$

B:-CrO_3 is aqueous H_2SO_4

C:-Chromium (VI) oxide with pryidine in CH_2Cl_2

D:-SeO_2

Correct Answer:- Option-B

Question46:-Which of the following reaction proceeds through umpolung?

A:-Aldol condensation

B:-Stobbe condensation

C:-Darzens condensation

D:-Benzoin condensation

Correct Answer:- Option-D

Question47:-The catalyst for Suzuki coupling is

A:-Nickel(0) complex

B:-Nickel (II) complex

C:-Palladium (0) complex

D:-Platinum (0) complex

Correct Answer:- Option-C

Question48:-Lithium dialkyl cuprate is known as

A:-Grignard reagent

B:-Frankland reagent

C:-Gilman reagent

D:-Adam's catalyst

Correct Answer:- Option-C

Question49:-Which is the protecting group used for amino protection in peptide synthesis?

A:-Benzyloxycarbonyl

B:-t-butoxycarbonyl

C:-9-Fluorenylmethoxycarbonyl

D:-All the above

Correct Answer:- Option-D

Question50:-Which among the following is not using as phase transfer catalyst?

A:-Organic phosphonium salts

B:-Crown ethers

C:-Quaternary ammonium salts

D:-None of the above

Correct Answer:- Option-D

Question51:-Which among the following is a cause of high quantum yield of photochemical reactions

A:-Deactivation of reacting molecules

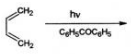
B:-Occurrence of reverse of primary reaction

C:-Occurrence of chain reaction per photon absorption

D:-None of the above

Correct Answer:- Option-C

Question52:-What is the product of photoreaction of 1,3-butadiene?



A:-

B:-

C:-

D:-All the above

Correct Answer:- Option-D

Question53:-Which among the following statements is incorrect for Patterno-Buchi reaction

A:-It is 2+2 photo cycloaddition reaction between an alkene and a carbonyl compound

B:-Reaction is between an excited an alkene reacting with the ground state carbonyl group

C:-The product of the reaction is an oxetane

D:-None of these

Correct Answer:- Option-B

Question54:-Rhodospin is a combination of _____ and protein opsin

A:-11-cis-retinal

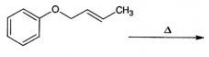
B:-11-trans-retinal

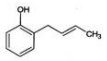
C:-10-cis-retinal

D:-10-trans-retinal

Correct Answer:- Option-A

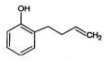
Question55:-Which the main product of the following rearrangement?





A:-

B:-



C:-

D:-

Correct Answer:- Option-B

Question56:-Which one is correct as per selection rule of Electrocyclic reactions

A:-$4n\pi$system, thermally $\rightarrow$ Disrotatory

B:-$4n\pi$system, thermally $\rightarrow$ conrotatory

C:-$(4n+2)\pi$ system, thermally $\rightarrow$ conrotatory

D:-$(4n+2)\pi$ system, photochemically$\rightarrow$ disrotatory

Correct Answer:- Option-B

Question57:-Edman's reagent for protein sequencing is

A:-Phenyl isothiocyanate

B:-Benzyl thiocyanate

C:-1-fluoro-2, 4-dinitrobenzene

D:-2,4- dinitrobenzene

Correct Answer:- Option-A

Question58:-Which is not stereoregular?

A:-Syndiotactic

B:-Isotactic

C:-Atactic

D:-None of the above

Correct Answer:- Option-C

Question59:-What is the name used to refer to the type of ion represented by: $M^{+\cdot}$

A:-molecular radical cation

B:-cation

C:-radical

D:-molecule

Correct Answer:- Option-A

Question60:-Suggest the structural formula of the compound that gives two doublets with J =3 Hz in its proton NMR spectrum

A:-

B:-

C:-

D:-

Correct Answer:- Option-A

Question61:-The volume of gas at 0°C is 27s. mL. Its volume at 50°C is

A:-273+50 mL

B:-$273+\frac{273}{50}$

C:-273-50 mL

D:-$273-\frac{273}{50}$

Correct Answer:- Option-A

Question62:-For a Van der waals gas, the Boyle temperature, T_B =

A:-$\frac{b}{Ra}$

B:-$\frac{a}{Rb}$

C:-$\frac{2a}{Rb}$

D:-$\frac{2b}{Ra}$

Correct Answer:- Option-B

Question63:-An ionic compound A_xB_y occurs in FCC type crystal structure with B ions at the centre of each face and A ions occupy the corners of the cube, give the formula of A_xB_y

A:-A_2B_2

B:-AB_2

C:-A_2B_3

D:-AB_3

Correct Answer:- Option-D

Question64:-The kerosene oil rises up in the wick of lantern because of

A:-Buoyant force of air

B:-Gravitational pull of air

C:-Surface tension

D:-Diffusion of oil through the wick

Correct Answer:- Option-C

Question65:-The liquid crystal phase show coloured effect is

A:-Nematic

B:-Smectic

C:-Cholesteric

D:-Discotic

Correct Answer:- Option-C

Question66:-Which one of the following thermodynamic processes approximate the steaming of food in pressure cooker?

A:-Isothermal

B:-Isochoric

C:-Isobaric

D:-Isenthalpic

Correct Answer:- Option-B

Question67:-The number of component (C), phase (P) and degree of freedom (F) are related by Gibbs phase rule as

A:-F-P=C+2

B:-F-C=P+2

C:-F+C=P+2

D:-F+P=C+2

Correct Answer:- Option-D

Question68:-Four distinguishable molecules are distributed in energy levels E_1 and E_2 with degeneracy of 2 and 3 respectively. Find the number of microstates with three molecules in E_1 and one molecule in E_2

A:-32

B:-96

C:-108

D:-16

Correct Answer:- Option-B

Question69:-The mean total energy of a classical three-dimensional harmonic oscillator in equilibrium with a heat reservoir at temperature T is

A:-1/2 kT

B:-kT

C:-2 kT

D:-3 kT

Correct Answer:- Option-D

Question70:-In any reversible reaction, A is in equilibrium with B. If concentration of each substance is doubled, then its equilibrium constant will be

A:-Remains same

B:-Half

C:-Doubled

D:-Quadrupled

Correct Answer:- Option-A

Question71:-According to Freundlich adsorption isotherm, at high pressure value of x/m will be

A:-Inversely proportional to pressure

B:-Directly proportional to pressure

C:-Directly proportional to square of pressure

D:-Independent of pressure

Correct Answer:- Option-D

Question72:-Where do we obtain the magnified image of the specimen in SEM?

A:-Cathode ray tube

B:-Fluorescent screen

C:-Phophorescent screen

D:-Screening generator

Correct Answer:- Option-A

Question73:-The electrolytic solution that is having smallest debye length at 298 K

A:-NaCl

B:-$MgCl_2$

C:-$LaCl_3$

D:-Na_2SO_4

Correct Answer:- Option-C

Question74:-In polarography to get true diffusion current the polarographic maxima can be eliminated by

A:-Giving mechanical stirring to test solution

B:-KCl like supporting electrolyte is added

C:-Oxygen is removed from the test solution

D:-Addition of small amount of surface active agents

Correct Answer:- Option-D

Question75:-The potential developed by the liquid being forced to flow through a plug or diaphragm is called

A:-Electrode potential

B:-Streaming potential

C:-Sedimentation potential

D:-Electrophoretic potential

Correct Answer:- Option-B

Question76:-The reduction potential of saturated calomel electrode at 25°C is 0.2415 V, it indicates

A:-$Hg_2Cl_2+2e^-\rightarrow 2Hg+2Cl^-$

B:-$2Hg+2Cl_-\rightarrow Hg_2Cl_2+2e^-$

C:-$Hg_2Cl_2\rightarrow 2Hg+2Cl^-+2e^-$

D:-$2Hg+2Cl^-+2e^-\rightarrow Hg_2Cl_2$

Correct Answer:- Option-A

Question77:-For a reaction, the rate constant k at 27°C is 5.0 × $10^{10}e^{-20}$. The activation energy of the reaction is

A:-500000 $Jmol^{-1}$

B:-$50Jmol^{-1}$

C:-$20Jmol^{-1}$

D:-2000 $Jmol^{-1}$

Correct Answer:- Option-A

Question78:-Consider a second order reaction, if 'a' is the initial concentration of the reactants. Then, the half-life period of the reaction is directly proportional to

A:-a

B:-$a^{\frac{1}{2}}$

C:-1/a

D:-a^2

Correct Answer:- Option-C

Question79:-For a given ionic strength I, rate of reaction is given by $In\left(\frac{R}{R_0}\right)=-4\times0.5\times I^{\frac{1}{2}}$ Which of the following reaction show the above rate equation

A:-$S_2U_2^{2-}+I_2$

B:-$CH_3COOH+C_2H_5OH$

C:-$\left[Cr\left(NH_3\right)_5Br\right]^{2+}+OH^-$

D:-$H^++Br^-+H_2O$

Correct Answer:- Option-C

Question80:-When oxalic acid is oxidised by acidified potassium permanganate, the compound produced during the reaction acts as auto-catalyst is

A:-$KMnO_4$

B:-CO_2

C:-K_2SO_4

D:-$MnSO_4$

Correct Answer:- Option-D

Question81:-We have $H\psi=a\psi$, where H is Hamiltonian operator and a is eigen value, the 'a' will have dimension of

A:-Energy

B:-Momentum

C:-Angular momentum

D:-Force

Correct Answer:- Option-A

Question82:-What will be the zero point energy of particle confirned in one dimensional box of length '2a'?

A:-$\frac{h^2}{8ma^2}$

B:-$\frac{h^2}{16ma^2}$

C:-$\frac{h^2}{32ma^2}$

D:-$\frac{h^2}{64ma^2}$

Correct Answer:- Option-C

Question83:-According to Planck's theory the average energy per oscillator is

A:-$\frac{h^2v^2}{e^{\frac{hv}{kT}}-1}$

B:-$\frac{hv}{e^{-\left(\frac{hv}{kT}-1\right)}}$

C:-$\frac{h^2v^2}{e^{\frac{hv}{kT}}+1}$

D:-$\frac{hv}{e^{\frac{hv}{kT}}-1}$

Correct Answer:- Option-D

Question84:-If the momentum of a particle is increased to four times, then the de-brogle wavelength will become

A:-Two times

B:-Half times

C:-One fourth times

D:-four times

Correct Answer:- Option-C

Question85:-The point group symmetry of $[PtCl_4]^{2-}$ is

A:-C_{2v}

B:-D_{4h}

C:-D_{2h}

D:-C_{4v}

Correct Answer:- Option-B

Question86:-Which among the following molecule is expected the smallest rotational partition function

A:-H_2

B:-O_2

C:-B_2

D:-He_2

Correct Answer:- Option-A

Question87:-When external magnetic field is applied to an odd mass number species, it spins on its own axis and magnetic moment produces, it creates

A:-Lorentz frequency

B:-Vibrational frequency

C:-Oscillation frequency

D:-Larmor frequency

Correct Answer:- Option-D

Question88:-Which computational method is used to solve the Schrondinger equation for systems with a large number of atoms?

A:-Valence bond method

B:-Semi-empirical method

C:-Density functional theory

D:-Coupled bluster method

Correct Answer:- Option-C

Question89:-Which law states that product of specific heat capacity and atomic weight of an element is always a constant

A:-Hardy-Schultz law

B:-Dulong-Petit law

C:-Fermi-Dirac law

D:-Maxwell -Boltzmann law

Correct Answer:- Option-B

Question90:-How many vibrational modes can have water molecule?

A:-3

B:-4

C:-6

D:-1

Correct Answer:- Option-A

Question91:-If the experimental value is close to the true value, then the experimental value is

A:-accurate

B:-precise

C:-suitable

D:-error

Correct Answer:- Option-A

Question92:-How many significant figures are there in the numbers 0.001023 and 0.001023000 respectively?

A:-4, 6

B:-4, 7

C:-5, 6

D:-5, 7

Correct Answer:- Option-B

Question93:-Which statement is true for a primary standard?

A:-Should be extra pure

B:-Should be stable

C:-Should be soluble in titration medium

D:-All of these

Correct Answer:- Option-D

Question94:-Which parameter is measured using differential thermal analysis?

A:-Change in mass

B:-ΔT

C:-dH

D:-Volume

Correct Answer:- Option-B

Question95:-In gas chromatography, which is not used as a carrier gas?

A:-Argon

B:-Helium

C:-Oxygen

D:-Nitrogen

Correct Answer:- Option-C

Question96:-An example for piezoelectric material is

A:-Barium titanate

B:-Iron-Aluminium alloy

C:-Gallium nitride

D:-Lead telluride

Correct Answer:- Option-A

Question97:-The chemical species responsible for the ozone layer depletion is

A:-Fullerene

B:-Ferrocene

C:-DDT

D:-Freon

Correct Answer:- Option-D

Question98:-Which of the following synthetic method is a bottom-up approach for the synthesis of nanomaterials?

A:-Ball-milling

B:-Electron beam lithography

C:-Sol-gel synthesis

D:-None of these

Correct Answer:- Option-C

Question99:-The first talk on nanotechnology entitled 'There is plenty of room at the bottom in 1959 was delivered by

A:-V Vogel

B:-S J Fonash

C:-K E Drexler

D:-Richard Feynman

Correct Answer:- Option-D

Question100:-The repeating unit in the structure of 18-crown-6 is

A:-$-N-CH_2-CH_2-$

B:-$-S-CH_2-CH_2-$

C:-$-O-CH_2-CH_2-$

D:-$-CH_2-CH_2-$

Correct Answer:- Option-C