PaperCode: 2009 **Paper Name:** 2009-M.Sc. (SET-VI) M.SC.(CHEMISTRY) **Set Name:** Original

Q-1 When CH_3MgBr is added to Crotonaldehyde, the product formed is

A Ethylene oxide
B Pent-3-en-2-ol
C 2,3-dimethyl pent-4-en-2-ol
D Crotonic acid

Correct Answer : B

Q-2 Which of the following is not a mirror image of either of active forms of tartaric acid?

A d-tartaric acid
B l-tartaric acid
C meso-tartaric acid
D dl- tartaric acid

Correct Answer : C

Q-3 The parachor values for hexane and heptane are 27.01 and 309.3 respectively. The parachor value for n-CH_2 group is

A 39.2
B 6.5
C 78.4
D 5.6

Correct Answer : A

Q-4 Which of the following reaction does not produce amine?

A Gabriel's synthesis
B Hoffmann bromoamide reaction
C Carbylamine reaction
D Mendius reaction

Correct Answer : C

Q-5 To predict the orientation of benzene derivatives, the following rule is made use of

A Crum Brown-Gibson rule
B Markonikoff's rule
C Fries rearrangement
D Hammick-Illingworth rule

Correct Answer : D

Q-6 Wurtz reaction is used for

A producing isomers
B Ascent of series
C Descent of series
D Producing aromatic compounds

Correct Answer : B

Q-7 Wilkinson's catalyst is selectively used for reduction of

A Alkene
B NO_2
C C=O
D None of these

Correct Answer : A

Q-8 The oxidation of phenol by potassium per sulphate in alkaline medium results in

A p-Quinol
B p-benzoquinone

C Benzyl alcohol

D Salicylic acid

Correct Answer : A

Q-9 The dihedral angle HCH in staggered conformation of C_2H_6 is

A 120°

B 60°

C 0°

D 90°

Correct Answer : B

Q-10 The reduction of ester with sodium and alcohol to form alcohol s is called

A Rosenmund reaction

B Mendius reaction

C Bouveault-Blanc reduction

D Clemensen's reduction

Correct Answer : C

Q-11 An aqueous solution containing 1gm of urea boils at 100.25°C. The aqueous solution containing 3 gm of glucose in the same volume will boil at:

A 100.75°C

B 100.5°C

C 100°C

D 100.25°C

Correct Answer : D

Q-12 Which pair will not form an ideal solution?

A C_2H_5 Br and C_2H_5 I

B C_2H_6 and C_6H_5 CH3

C C_6H_5 Br and C_2H_5 I

D C_2H_5 Br and C_2H_5 OH

Correct Answer : D

Q-13 With increase in temperature, the fluidity of liquids

A increases

B decreases

C remains constant

D may increase or decrease

Correct Answer : A

Q-14 The critical temperature and reduced temperature of a gas are 150K and 3, respectively. The temperature of the gas is

A 50K

B 150K

C 300K

D 450K

Correct Answer : D

Q-15 The SI units of the van der Waals parameter 'a' are

A $Pa\ m^3\ mol^{-2}$

B Nm^6mol^{-2}

C Jm^6mol^{-2}

D $Pa\ m^6mol^{-2}$

Correct Answer : A

Q-16 Which of the following compounds would be suitable as a solvent for use in recording UV spectra of organic compounds?

A isooctane

B Benzene

C iodobenzene

D all the above

Correct Answer : A

Q-17 The stretching frequency of C-H bond is higher in case of Carbon having

A sp^3 hybridization
B sp^2
C sp
D π -π

Correct Answer : C

Q-18 Arrange the following in increasing order of shielding of the methyl protons

A $CH_3F>CH_3OCH_3>(CH_3)_3N>CH_3CH_3$
B CH_3F
C $CH_3F>CH_3OCH_3<(CH_3)_3N>CH_3CH_3$
D $CH_3F(CH_3)_3N$

Correct Answer : A

Q-19 Which of the following will not reduce Tollens' Reagent?

A Glucose
B sucrose
C Fructose
D Maltose

Correct Answer : B

Q-20 The isoelectric point of neutral amino acid is

A less than 7
B above 11
C between 7-10
D 7

Correct Answer : A

Q-21 Pair of diastereomeric aldoses that differ only in configuration about C-2 are called

A Enantiomers
B Epimers
C Anomers
D Stereo isomers

Correct Answer : B

Q-22 Which of the following organo-metallic compound, was one of the first pharmaceuticals, and earned a Nobel Prize in Medicine for Paul Ehrlich in 1908?

A Cadet's fuming liquid
B $(CH_3)_4As_2$
C Salvarsan
D $(C_6H_5)_2Cr$

Correct Answer : C

Q-23 Which of the following complexes is achiral?

A $[Cr(ox)_3]^{3-}$
B $[Ru(bipy)_3]^{4+}$
C cis-$[RhCl_2(NH_3)4]^+$
D None of these

Correct Answer : C

Q-24 The number of unpaired electrons present, according to crystal field theory, in complex ion $[Mn(CN)_6]^{3-}$ is

A 2
B 3
C 4
D 5

Correct Answer : A

Q-25 What will be amount of work done when 50 g iron reacts with hydrochloric acid to produce hydrogen gas in a closed vessel of fixed volume at 25°C?

A -2.2 kJ
B 2.2 kJ
C 0
D None of these

Correct Answer : C

Q-26 The standard molar enthalpy of vaporization of Br_2 (if Br_2 boils at 59.2°C) as Trouton' rule is

A 2.8 kJ/mol
B 29.2 kJ/mol
C 1.8 kJ/mol
D 3.8 kJ/mol

Correct Answer : B

Q-27 Trisilylamine $(SiH_3)_3N$ has …….. structure

A tetrahedral
B plane triangular
C pyramidal
D octahedral

Correct Answer : B

Q-28 Which of the following is expected to be paramagnetic complex?

A $[Ni(H_2O)_6]^{2+}$
B $[Ni(CO)_4]$
C $[Zn(NH_3)_4]^{2+}$
D $[Co(NH_3)_6]^{3+}$

Correct Answer : A

Q-29 The spin-only magnetic moment for high spin complex of $[Cr(NH_3)_6]^{2+}$ at 25°C will be

A 4.90 μB
B 2.83 μB
C 1.73 μB
D zero

Correct Answer : A

Q-30 The catalytic oxidation of NH_3 in presence of Pt-Rh catalyst at 850°C gives

A NO
B N_2O
C N_2O_3
D N_2O_5

Correct Answer : A

Q-31 [18]-crown-6 specifically binds ……. ions

A Li^+
B K^+
C Na^+
D Ca^{2+}

Correct Answer : B

Q-32 The specific rotation of a pure enantiomer is + 12.0°. What will be its observed rotation if it is isolated from a reaction with 20% racemization and 80% retention?

A +12.0°
B 0°
C + 1.26°
D +9.60°

Correct Answer : D

Q-33 Wien-Displacement law is

$T\lambda_{max} = \frac{1}{5}c_2$, where c_2 is

A velocity of light

B Second radiation constant

C First radiation constant

D None of these

Correct Answer : B

Q-34 The centre of the ESR spectrum of the methyl radical occurred at 329.40 mT in spectrometer operating at 9.2330 GHz (the radiation belonging to the X band of the microwave region). Its g-value is

A 2.0027

B 20.027

C 200.27

D none of these

Correct Answer : A

Q-35 A reaction between reactants A and B is second order. Which of the following rate law expressions apply to the reaction?

A Rate = k[A][B]

B Rate = k[A]²

C Rate = k[B]²

D All of these

Correct Answer : D

Q-36 The precessional frequency of a proton in a magnetic field of 14.1 T is.

A 200 MHz

B 400 MHz

C 600 Hz

D 600 MHz

Correct Answer : D

Q-37 The molar absorption coefficient of a solute at 270 nm is 855 L mol^{-1} cm^{-1}. The intensity reduction in percentage, when light passes through a 2.5 mm thick film of 3.25 mmol/L solution, will be

A 40%

B 60%

C 80%

D None of these

Correct Answer : C

Q-38 All the three normal vibrational modes of water are

A Raman active

B IR active

C None of (A) & (B)

D both (A) & (B)

Correct Answer : D

Q-39 Calcium pyrophosphate is given by the formula $Ca_2P_2O_7$. The molecular formula of ferric pyrophosphate is

A $Fe_2P_2O_7$

B FeP_2O_7

C $Fe(P_2O_7)_3$

D $Fe4(P_2O_7)_3$

Correct Answer : D

Q-40 An electron is accelerated from rest, between two points at which the potentials are 20 V and 40 V respectively. The De Broglie wavelength associated with the electron will be –

A 0.75 A°

B 7.5 A°

C 2.75 m

D 2.75 A°

Correct Answer : D

Q-41 The molar ionic conductance at infinite dilution of lithium halide (LiX) is found to be 89.2 x 10^{-4} S m^2 mol^{-1}. If the molar ionic conductance of the Li^+ ion is 38.7 x 10^{-4} S m^2 mol^{-1},the molar ionic conductance of the halide ion will be

A 127.9 x 10^{-4} S m^2 mol^{-1}

B 50.5 x 10^{-4} S m^2 mol^{-1}

C 50.5 x 10^{-8} S m^2 mol^{-1}

D 5.05 x 10^{-4} S m^2 mol^{-1}

Correct Answer : B

Q-42 The absorbance of an iron thiocyanate solution containing 0.00500 mg Fe/mL was reported as 0.4900 at 540 nm. The specific absorptivity of iron thyocyanate is 98.0 $cm^{-1}(mg/mL)^{-1}$, when a 1.00 cm cuvette was used. What will be the absorbance if the solution is diluted to twice its original volume?

A 0.5116

B 0.2450

C 1.2250

D none of these

Correct Answer : B

Q-43 The speed ratio of Ag^+ and NO_3^- ions in a solution of $AgNO_3$ electrolyzed between Ag electrodes is 0.916. Transport number of Ag^+ will be

A 0.478

B 0.522

C 1.478

D 1.522

Correct Answer : A

Q-44 Colour of oxidized form of diphenylamine indicator is

A Colourless

B blue

C violet

D yellow

Correct Answer : C

Q-45 In the standardization of $Na_2S_2O_3$ using $K_2Cr_2O_7$ by iodometry, the equivalent weight (Eq. wt.) of $K_2Cr_2O_7$ is

A Mol. wt./2

B Mol. wt./3

C Mol. wt./6

D same as Mol. Wt.

Correct Answer : C

Q-46 A substance A, on heating gives a colourless gas. The residue is dissolved in water to form B. When excess CO_2 is bubbled through a solution of B, C is formed which on gentle heating reforms A. The substance A is

A calcium carbonate

B calcium nitrate

C sodium carbonate

D sodium bicarbonate

Correct Answer : A

Q-47 Which of the following pentafluoride does not exist?

A NF_5

B PF_5

C AsF_5

D SbF_5

Correct Answer : A

Q-48 Among the following which statement about the trans-effect and the trans-influence of any square-planar complex is correct?

A The trans-effect is a ground-state effect, whereas the trans-influence has a kinetic origin

B The trans-influence is a ground-state effect, whereas the trans-effect has a kinetic origin

C Both the trans-effect and trans-influence are ground-state effects

D none of these

Correct Answer : B

Q-49 The effective nuclear charge in the periphery of cobalt atom is

A 7.25

B 6.90

C 5.25

D 5.90

Correct Answer : B

Q-50 Which of the following transition element has maximum first ionization potential?

A Sc

B Mn

C Cu

D Zn

Correct Answer : D

Q-51 A train overtakes two persons who are walking in the same direction in which the train is going, at the rate of 2 kmph and 4 kmph and passes them completely in 9 and 10 seconds respectively. The length of the train is

A 40 m

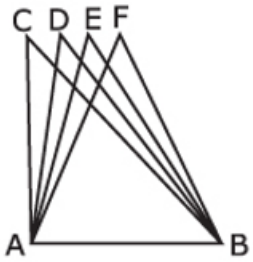
B 45 m

C 50 m

D 55 m

Correct Answer : C

Q-52 Which of the following is the shortest route for travelling from A to B in the figure given below?



A ACB

B ADB

C AEB

D AFB

Correct Answer : D

Q-53 Speed of a boat in still water is 9 km/hr. It goes 12 km down- stream and comes back to the starting point in three hours. What is the speed of water in the stream?

A 3 km/hr

B 3.5 km/hr

C 5 km/hr

D 5.5 km/hr

Correct Answer : A

Q-54 A bucket containing water is tied to one end of a rope of length 2.5 m and rotated about the other end in a vertical circle. What should be the minimum velocity of the bucket at the highest point, so that the water in the bucket will not spill? ($g = 10\ m/s^2$)?

A 2.5 m/s

B 4 m/s

C **5 m/s**

D 7 m/s

Correct Answer : C

Q-55 A, B, C, D, E, F and G are members of a family consisting of four adults and three children, two of whom, F and G are girls. A and D are brothers and A is a doctor. E is an engineer married to one of the brothers and has two children. B is married to D and G is their child. Who is C?

A E's daughter

B F's father

C G's Brother

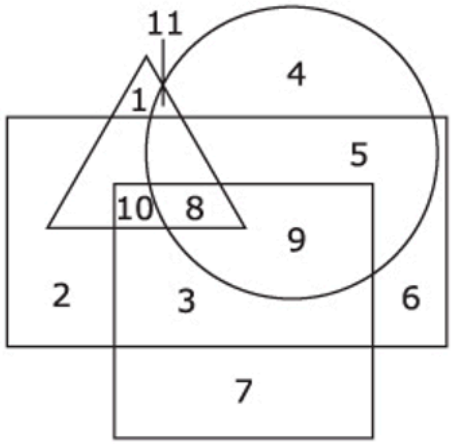
D A's son

Correct Answer : D

Q-56 In the figure given below:

(a) Rectangle represents Males,
(b) Circle represents the urbans
(c) Square represents the educated and
(d) Triangle represents the civil servants.

The number indicating the educated urban males who are not civil servants is



A 8

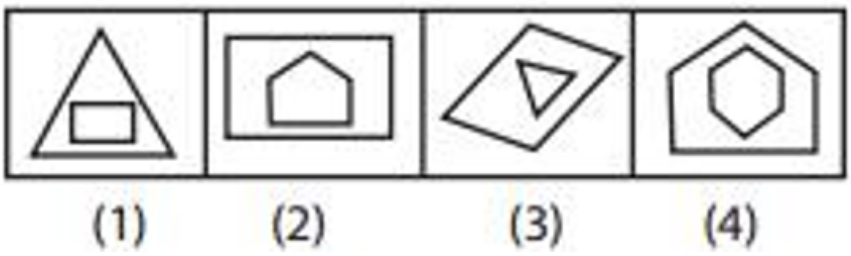
B 9

C 10

D 11

Correct Answer : B

Q-57 Which of the following figures is different?



A 1

B 2

C 3

D 4

Correct Answer : C

Q-58 In covering a distance of 30 km, A takes 2 hours more than B. If A doubles his speed, then he would take 1 hour less than B. A's speed is:

A 5 km/h

B 7 km/h

C 9 km/h

D 10 km/h

Correct Answer : A

Q-59 Which of the following parts of the sun is easily visible only during a total solar eclipse?

A Core

B Photosphere

C Sunspots

D Corona

Correct Answer : D

Q-60 Sickle Cell Anemia is a

A Genetic Disorder

B Virus Disease

C Bacterial Disease

D None of these

Correct Answer : A