W—45—2018

FACULTY OF SCIENCE

B.Sc. (Second Year) (Third Semester) EXAMINATION

OCTOBER/NOVEMBER, 2018

(CBCS/CGPA Pattern)

CHEMISTRY

Paper VI

(Organic and Inorganic Chemistry)

(MCQ+Theory)

(Friday, 12-10-2018) Time : 10.00 a.m. to 12.00 noon

Time—2 Hours *Maximum Marks—40*

N.B. :— (i) Attempt *All* questions.

(ii) *All* questions carry equal marks.

(iii) Use separate answer sheet (OMR sheet) for MCQ Q. No. 1.

(MCQ)

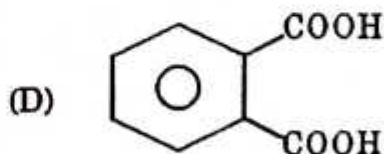1. Select the *correct* answer for each of the following Multiple Choice Questions :
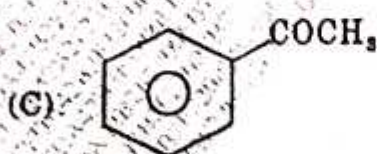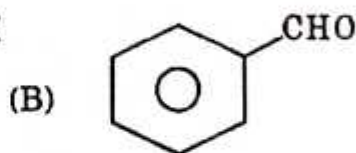
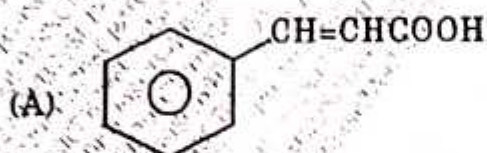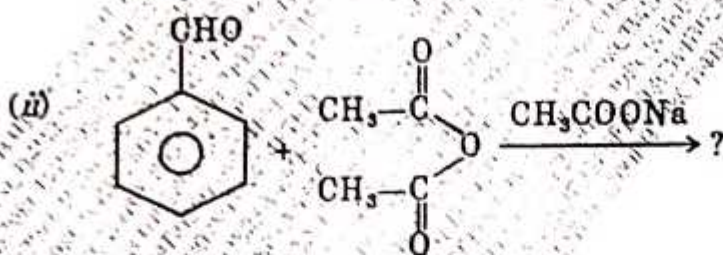(i) When secondary alcohol reacts with cyclohexanone in presence of aluminium tertiary butoxide gives ....

(A) ketone and aldehyde

(B) aldehyde and carboxylic acid

(C) ketone and alcohol

(D) none of the above

(ii)

P.T.O.

(iii) Salicylic acid when heated with sodalime it gives :

(A) Methyl salicylate   (B) Aspirin

(C) Salol   (D) Phenol

(iv)

$CHO - SOCl_2 \longrightarrow ?$

(A)   (B)

(C)   (D)
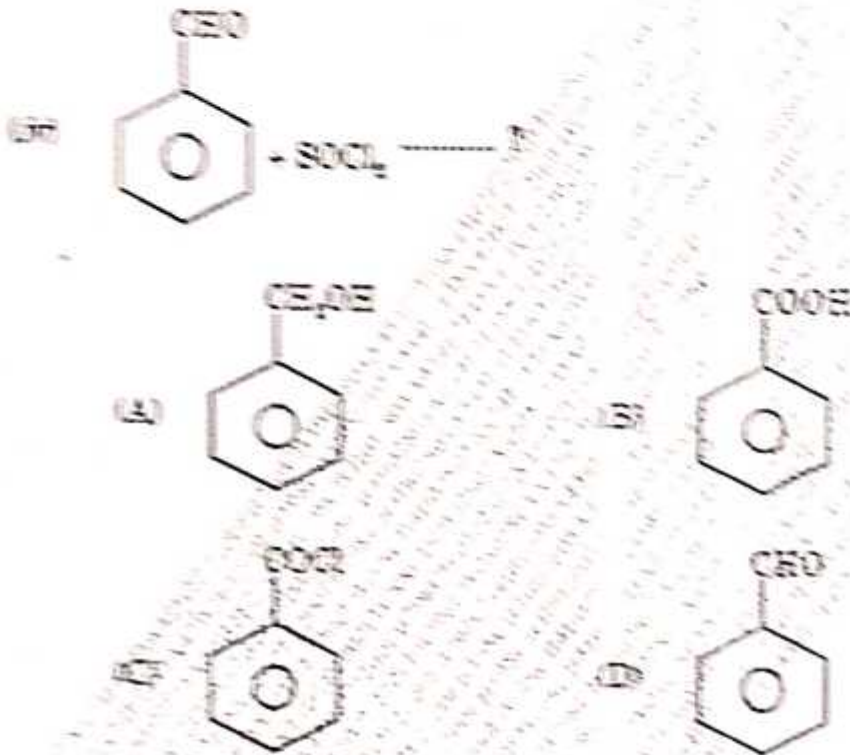
(v) When methyl magnesium bromide reacts with carbon dioxide it gives _____

(A) Methanoic acid   (B) Ethanoic acid

(C) Propanoic acid   (D) None of these

(vi) $CH_3COCH_2COOC_2H_5 \xrightarrow[HCl]{NaOH} ?$

(A) $CH_3—CH_2—COOH$ (B) $CH_3—CO—CH_3$

(C) CH_3COOH (D) $CH_3—CO—C_2H_5$

(vii) The alkaline hydrolysis of fats or oil is called as _____

(A) hydrogenation   (B) trans esterification

(C) acid number   (D) saponification

(*viii*) Dipole moment of sulphur dioxide (SO_2) is :
- (A) less than NH_3 and greater than water
- (B) less than NH_3 and water
- (C) greater than NH_3 and water
- (D) less than water and greater than NH_3

(*ix*) In II group analysis of basic radical the presence of HCl will :
- (A) increase dissociation of H_2S
- (B) does not affect dissociation of H_2S
- (C) supresses the dissociation of H_2S
- (D) change acidic medium to basic medium
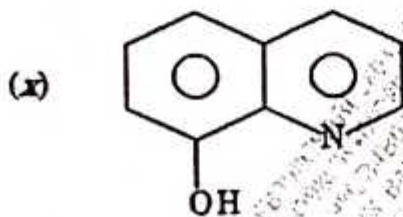
(*x*) reagent is used for qualitative analysis of :
- (A) Cobalt
- (B) Nickel
- (C) Iron
- (D) Aluminium

(Theory)

Section A : (Organic Chemistry)

2. Solve any *two* of the following :

(*a*) Explain Reformatsky reaction with mechanism.

(*b*) What is the action of the following on salicyclic acid ?

    (*i*) HNO_3

    (*ii*) Br_2.

(*c*) What are organomagnesium compounds ? How will you obtain the following from methyl magnesium bromide ?

    (*i*) 2-methyl-2-propanol

    (*ii*) Methanamine.

(*d*) Explain the Hydrogenation of oil and detergents.

P.T.O.

3.   Solve any *two* of the following :

   (a)   Explain Baeyer-Villiger oxidation reaction with mechanism.

   (b)   (i)   What is action of PCl_5 on phthalic acid ?

         (ii) Explain the trans esterification of oil and fats.

   (c)   Explain the keto enol tautomerism phenomens of ethyl acetoacetate.

   (d)   Explain the reduction of ketone to secondary alcohol by using $LiAlH_4$ with mechanism.

                    Section B : (Inorganic Chemistry)

4.   Solve any *two* of the following :

   (a)   Explain the separation of Ni^{+2} and Co^{+2} with necessary chemical reactions.

   (b)   What is common ion effect ? Explain its importance in the analysis of basic radicals.

   (c)   (i)   Write a note on use of Dimethyl Glyoxime as organic reagent.

         (ii) What are ionising and non-ionising solvents.

   (d)   Explain the following reactions in liq. ammonia :

         (i)   Autoionisation

         (ii) Acid-base reaction

         (iii) Ammoniation.

This question paper contains 2 printed pages]

X—30—2019

FACULTY OF SCIENCE

B.Sc. (Third Semester) (Regular) EXAMINATION

OCTOBER/NOVEMBER, 2019

CHEMISTRY

Paper-VI

(Organic and Inorganic Chemistry)

(Wednesday, 16-10-2019)　　　　　**Time : 2.00 p.m. to 4.00 p.m.**

Time—2 Hours　　　　　　　　　　　*Maximum Marks—40*

N.B. :— Attempt *all* questions.

$3 \times 5 = 15$

1. Solve any *three* of the following :

　(a)　Explain the separation of $2n^{++}$ and Mn^{++} with necessary chemical reaction.

　(b)　Why is water known as universal solvent ? Explain viscosity property of solvent.

　(c)　How is sodium carbonate extract prepared ? Explain its role in qualitative analysis.

　(d)　Explain neutralisation reaction in liq NH_3 and liq SO_2.

　(e)　Explain the use of 1, 10-phenonthroline and dimethyl glyoxime reagents in qualitative analysis.

15

2. Solve any *three* of the following :

　(a)　Explain knoevenagel reaction with mechanism.

　(b)　Explain Gattermann Koch reaction for the preparation of benzaldehyde with mechanism.

P.T.O.

B64902348B618CA0ED044791ACF53B96

(c)   How will you synthesise Anthranilic acid by :

      (i)   Phthalimide

      (ii)   O-nitro Toluene.

(d)   What are organolithlium compounds ? How will you obtain the following from methyl lithium :

      (i)   Methane

      (ii)   Ethanol.

(e)   How will you convert :

      (i)   Fats and oils to Alcohol

      (ii)   Fats and oils to Ester.

3.   Solve any *two* of the following :   10

   (a)   Explain Baeyer Villiger oxidation with mechanism.

   (b)   What is the action of the following on Benzoic acid :

       (i) $LiAlH_4$

       (ii)   Conc. HNO_3 + Conc. H_2SO_4.

   (c)   Give any *three* synthetic applications of Ethyl Acetoacetate.

   (d)   What are Soaps ? Explain manufacture of soaps by Kettles process.

This question paper contains 4 printed pages]

Y—52—2019

FACULTY OF SCIENCE

B.Sc. (Second Year) (Third Semester) (Backlog) EXAMINATION

OCTOBER/NOVEMBER, 2019

CHEMISTRY

Paper VI

(Organic and Inorganic Chemistry)

(MCQ & Theory)

(Wednesday, 16-10-2019)   Time : 2.00 p.m. to 4.00 p.m.

Time—2 Hours   *Maximum Marks—40*

N.B. :— (i)   Attempt *All* questions.

(ii) *All* questions carry equal marks.

(iii) Use separate answer sheet (OMR sheet) for MCQ Question No. **1.**

MCQ

1.   Select the *correct* answer for each of the following Multiple Choice Questions :   10

(i)   Reformatsky reaction involves the preparation of :

(a)   β-hydroxy alcohol   (b)   β-hydroxy acid

(c)   β-hydroxy ester   (d)   β-hydroxy ketone

(ii)   The $CN^{\ominus}$ anion in Benzoin condensation is :

(a)   Good nucleophile   (b)   Strong base

(c)   Best leaving group   (d)   Both (a) and (c)

(iii) $CH_3Li + H_2O \rightarrow A$, where A is :

(a) CH_3OH (b) CH_4

(c) CH_3OCH_3 (d) $CH_3—CH_3$

P.T.O.

(iv) The structural isomer which differs in the relative position of atom is called :

(a) Tautomerism

(b) Stereoisomerism

(c) Conformers

(d) Rotamers

(v)

$\xrightarrow{\Delta}$?

(a)

(b)

(c)

(d)
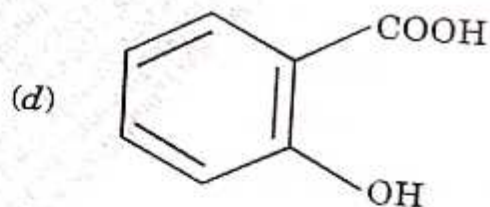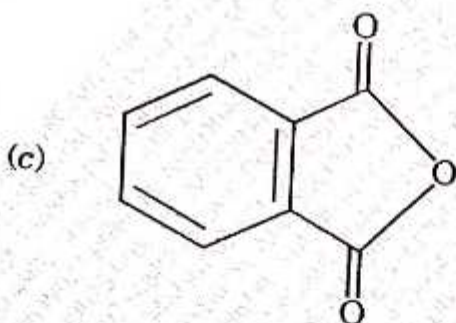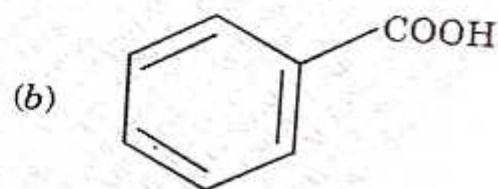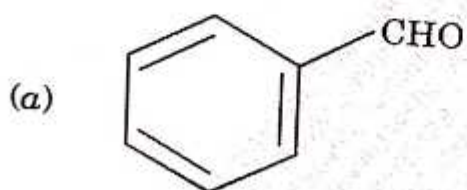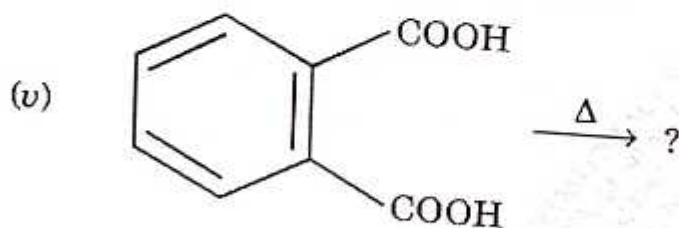
(vi) Aniline is obtained by heating :

(a) Salicylic Acid

(b) Benzoic Acid

(c) Anthranilic Acid

(d) Phthalic Acid

(vii) The alkaline hydrolysis of fats or oils is called :

(a) Saponification value

(b) Acid value

(c) Iodine value

(d) None of these

(viii) In qualitative analysis .... organic reagent is used for copper.

(a) 1, 10-phenanthroline

(b) α-benzoin oxime

(c) Dimethyl glyoxime

(d) 8-hydroxyquinoline

(ix)   The positively charged part of a salt is called as :

     (a)   Acidic radical   (b)   Basic radical

     (c)   Neutral radical   (d)   Amphoteric radical

(x)   .... acts as a universal solvent.

     (a)   Liquid SO_2 (b)   Liquid NH_3

     (c)   Water   (d)   None of these

Theory

Section 'A' : Organic Chemistry

2.   Solve any *two* of the following :   10

   (a)   Explain Knoevenagel reaction with mechanism.

   (b)   How will you synthesize salicylic acid by :

      (i)   Kolbe's reaction

      (ii)   Reimer-Tiemann reaction.

   (c)   What are organozinc compounds ? How will you obtain the following from dimethyl zinc :

      (i)   2-propanone

      (ii)   Ethanol.

   (d)   Explain Saponification value and cleaning action of soaps.

3.   Solve any *two* of the following :   10

   (a)   Explain Gattermann reaction with mechanism.

   (b)   (i)   How will you prepare benzoic acid from phenyl cyanide ?

      (ii)   What are detergents ? Give the classification of detergents.

   (c)   Explain reduction of ketones to secondary alcohol by $LiAlH_4$ with mechanism.

   (d)   How will you synthesize cyclohexanone pyrrolidine enamine from pyrrolidine and cyclohexanone morpholine enamine from morpholine ?

P.T.O.

Section 'B' : Inorganic Chemistry

4. Solve any *two* of the following :

    10

    (a) (i) What are interfering radicals ? Which acidic radical interfere in the analysis of basic radicals ?

         (ii) Discuss the autoionization of liquid ammonia as a solvent.

    (b) Discuss the term solubility product. Give the role of solubility product in separation of II and III B group basic radical in qualitative analysis.

    (c) Explain the role of the following organic reagent in qualitative analysis :

         (i) 8-hydroxyquinoline

         (ii) α-nitroso-β-naphthol.

    (d) Describe the following reactions in liquid sulphur dioxide with suitable examples :

         (i) Precipitation

         (ii) Solvolysis.

CG-11-2020
WINTER EXAM 2020
Subject Name : RB-05_CHEMISTRY - Physical Chem+ Inorganic Chemistry -XIII (Regular)(CBCS) GR_V

Date : 17/03/2021

Instruction / सुचना / :-

* Follow the detail instructions given on OMR Sheet
* ओ एम आर दरील सर्व सूचनांचे पालन करावे.

Q.1

IUPAC Nomenclature of $Fe(C_5H_5)_2$ is _____
A) Bis (η^5 - cyclopentadienyl) iron
B) Bis (η^5 - cyclopentadienyl) ferrate
C) Di (η^5 - cyclopentadienyl) iron
D) Di (η^5 - cyclopentadienyl) ferrate

A]a   C]c
B]b   D]d

Q.2

The dimethyl tin chloride, [$(CH_3)_2 Sn Cl_2$] has a tendency to polymerise thorugh _____
A) Sn - C bond
B) Sn - Cl bond
C) C- Cl bond
D) All of the above

A]a   C]c
B]b   D]d

.... is ionic organometallir compound.
A) $(CH_3)_4 Si$
B) $Al_2 (CH_3)_6$
C) $Na C_6H_5$
D) $Fe (C_5H_5)_2$

Q3

A]a   C]c
B]b   D]d

Q4

$2 R - x + 2 Hg \xrightarrow{A} R_2H_y + H_gX_z$. is the above reaction 'A' is...........
A) K / Hg
B) Zn / Hg
C) Hg Cl$_2$
D) Na / Hg

A]a   C]c
B]b   D]d

Q.5 Alkyl tin cmopounds are prepared by treating tin halides with alkyl halktes in presence of sodium. This reaction is known as ....
A]Kolbe's reaction   C]Wurtz reaction
B]Witting reaction   D]None of the above

Q.6 Oranoaluminium compounds are used as ....
A]Polymerisation catalyst   C]Both (A) & (D)
B]Anti-cancer drug   D]None of the above

Q.7 .... organometallic conpound includes three centra - two electron bond
A]Li   C]Ti
B]Al   D]Sn

Liph + →Diethylether→ Li + C_6H_6
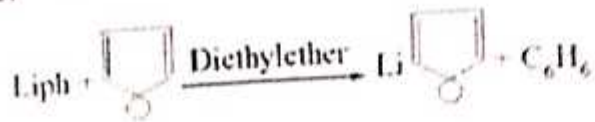
The above reaction is a type of.

A) Metal hydrogen exchange
B) Metal halogen exchange
C) Metal metal exchange
D) None of the above

Q.8
A]a
B]b
C]c
D]d

In the reaction.

LiR + $>C-C<$ → A. Where 'A' is ....
      | |
      H   OR

A) $-\overset{|}{\underset{|}{C}}-\overset{|}{\underset{|}{C}}-$

B) $-C = C -$

C) $-C \equiv C -$
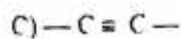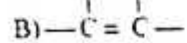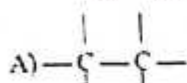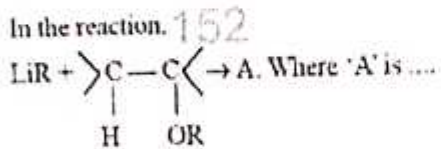
D) All of the above

Q.9
A]a
B]b
C]c
D]d

$Ni(CO)_4$ is ....

A) Diamagnetic
B) Paramagnetic
C) Ferromagnetic
D) None of the above

Q.10
A]a
B]b
C]c
D]d

Q.11
Number of metal-metal bond in $Ir_4(CO)_{12}$ are ....

A) 2
B) 4
C) 6
D) 8

A]a
B]b
C]c
D]d

Q.12
Which one of the following exist in two isomeric forms ?

A) $Fe_2(CO)_9$
B) $Fe_3(CO)_{12}$
C) $CO_2(CO)_8$
D) $Mn_2(CO)_{10}$

A]a
B]b
C]c
D]d

$Fe_2(CO)_9$ has .... CO groups
A) Two bridging & Seven terminal
B) Three bridging & Six terminal
C) Five bridging & Seven terminal
D) None of the above

Q.13
A]a   C]c
B]b   D]d

Q.14 In EMR electric and magnetic waves are .... to each other.
A]Perpendicular   C]Spherical
B]Parallel   D]Eliptical

Q.15

Equation of M.I. for diamagnetic rigid rotatory is ....
A) $I = mr^2$
B) $I = \mu r^2$
C) $I = \sqrt{\mu r}$
D) $I = Mr$

A]a   C]c
B]b   D]d

Q.16 2B is constant distance between .... spectra.
A]Raman   C]Rotational
B]Vibrational   D]Electronic

The value of reduced mass μ is ....
A) $\mu = \dfrac{M_1 M_2}{M_1 - M_2}$

B) $\mu = \dfrac{M_1 - M_2}{M_1 + M_2}$

C) $\mu = \dfrac{M_1 M_2}{M_1 + M_2^2}$

D) $\mu = \dfrac{M_1 M_2}{M_1 + M_2}$

Q.17
A]a   C]c
B]b   D]d

Q.18

In the equation $E_v = \left(V + \dfrac{1}{2}\right)$ w. 'v' is called ....
A) Vibrational quantum number
B) Rotational quantum number
C) Velocity
D) Volume

A]a
B]b
                                                                            C]c
                                                                            D]d
Q.19

Give the relation between bond energy and force constant
A) Bond energy $\propto$ Force constant
B) Bond energy $\propto$ $\sqrt{\text{Force constant}}$
C) Bond energy $\propto$ $\dfrac{1}{\text{Force constant}}$
D) Bond energy = Force constant

A]a

                                                                            C]c

E]b

Q.20 Selection rule for simple harmonic oscillator is ---------
A]$\Delta V = \pm 1$
B]$\Delta J = \pm 1$

C]Both A and B
D]None of these

Q.21 Frank condon principal is stated as -------
A]Electric transition takes place so rapidly
B]During electronic transition internuclear distance not changes.

C]Both A and B
D]None of these

Q.22 According to molecular orbital theory electrons can be classified into --------
A]δ - electrons
B]π = electrons

C]n(non bonding) electrons
D]All of the above

Q.23 $\sigma \rightarrow \sigma$ transitoin occurs in --------
A]visible region
E]UV region

C]X-ray
D]Gamma ray

Q.24 Raman shift in case of stokes lines is ---------
A]Negative
B]Positive

C]Unknown
D]Zero

Q.25 The lines having lower frequency than that of the incident light is called >---------
A]Stokes lines
B]Antistokes line

C]Rayleigh line
D]All of the above

Q.26 In the equation $\mu = \propto E$, where 'α' is ---------
A]α- ray
B]Dissociation constant

C]Polarizibility
D]Constant

Q.27 In pure rotational Raman spectra the first stoke line obtained at distance -------
A]2 B
B]4 B

C]6 B
D]B

Equation for Nernst's distribution law is -----

1) $Kd = \dfrac{C_1}{C_2}$

B) $Kd = \sqrt{\dfrac{C_1}{C_2}}$

C) $Kd = C_1^2 / C_2^2$

D) $Kd = \dfrac{C_1}{C_2}$

Q.28
A]a
B]b

C]c
D]d

Henry's law equation is --------
A) $k = C \times P$
B) $C = K \times P$
C) $P = C \times K$
D) $C = K \times \sqrt{P}$

Q.29
A]a
B]b

C]c
D]d

Q.30 The more efficient solvent extraction method is -------
A]Single extraction
B]Double extraction

C]Multiple extraction
D]Heating

Q.31 For study of distribution law the two solvent are in contact should be -------
A]Volatile
B]Reacting with each ether

C]Miscible
D]Non-miscible

Q.32

If solute 'A' dimerize in one of the solvent then following expression is applicable ....

A) $Kd = \dfrac{C_1}{C_2}$

B) $Kd = \dfrac{C_2}{2\sqrt{C_2}}$

C) $Kd = \dfrac{C^1}{3\sqrt{C^2}}$

D) $Kd = \dfrac{C_1}{C_2^2}$

A]a   C]c
B]b   D]d

Q.33 By using distribution law we can determine ....
A]Solubility of solute
B]Association of solute
C]Dissociation of solute
D]All of these

$$Kd = \frac{C_1}{C_2(I-x)} \text{ is used for ....}$$

A) Association of solute
B) Dissociation of solute
C) Energy of solute
D) None of these

Q.34
A]a   C]c
B]b   D]d

Q.35 The reaction in which formed product gives back the reactant is called .....
A]Parallel reaction
B]Consecutive reaction
C]Opposing reaction
D]Reaction mechanism

Q.36
The integrated rate equation for third order reaction is ....

A) $K = \dfrac{1}{t} \times \dfrac{x(2a-x)}{2a^2(a-x)^2}$

B) $k = \dfrac{1}{t} \times \dfrac{x}{a(a-x)}$

C) $K = \dfrac{1}{t} \, \ell n \dfrac{x}{(a-x)}$

D) $k = \dfrac{d[A]}{dt}$

A]a   C]c
B]b   D]d

Q.37 The reaction which takes place in more than two steps is called ....
A]Parallel reaction
B]Consecutive reaction
C]Opposing reaction
D]Reaction mechanism

$$T_{1/2} \propto \frac{1}{a^2} \text{ for ......}$$

A) First order reaction
B) Second order reaction
C) Third order reaction
D) Zero order reaction

Q.38
A]a   C]c
B]b   D]d

Q.39 Dimerization of anthracine is an example of
A]Photochemical reactoin
C]Both A and B

FACULTY OF SCIENCE
Winter -2020
Class- B.Sc. (Second Year) (Third Semester)
CHEMISTRY
Paper-VI
Organic and Inorganic Chemistry (New)
(MCQ Pattern)
Cluster Code: SD

Date : 09/03/2021   Time : 1 Hours   Maximum Marks : 40
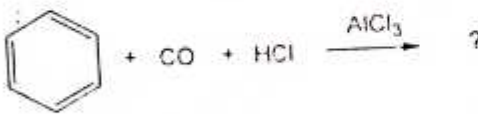
N.B. :-   (i) Attempt All questions.   (ii) All questions carry equal marks.
           (iii) No Negative Marking system   (iv) Use OMR answer sheet.

MCQ

1. Sodium or potassium salts of fatty acids are called as ....

    (a) Oils   (b) Fats

    (c) Detergents   (d) Soaps

2. The alkaline hydrolysis of fats or oil is called ....

    (a) Hydrogenation   (b) Saponification

    (c) Transesterification   (d) Rancidity

3. The degree of unsaturation of fat or oil is measured by its ......

    (a) Iodine value   (b) Saponification value

    (c) Acid value   (d) None of these

4. Synthetic detergents called as ......

    (a) Hard soap   (b) Soft soap

    (c) Syndets   (d) None of these

5. The number of milligrams of potassium hydroxide (KOH) required to completely saponify 1 gram
    of fat or oil is called ......

    (a) Acid value   (b) Saponification value

    (c) Iodine value   (d) None of these

6.   + CO + HCl $\xrightarrow{\text{AlCl}_3}$?

    (a) Benzaldehyde   (b) Formaldehyde

    (c) ....   (d) Acetophenone

7. .... and ...... ds having same general formula ....

    (a) C_nH_{2n} (b) $C_nH_{2n+1}O$

    (c) $C_nH_{2n+2}O$ (d) $C_nH_{2n}O$

8. In carbonyl group, one of the valency of the carbonyl carbon can be satisfied by hydrogen are called ....

    (a) Acids   (b) Ketones   (c) Aldehydes   (d) Alcohols

9. Benzaldehyde react with acetic anhydride in the presence of sodium acetate to give ---

    (a) Cinnamic acid   (b) Phthalic acid

    (c) Anthranilic acid   (d) Benzoic acid

10. Toluene on oxidation with $KMnO_4$ to form ....

    (a) Phthalic acid   (b) Benzoic acid

    (c) Anthranilic acid   (d) Salicylic acid

11. o-xylene on oxidation with $KMnO_4$ gives ....

    (a) Salicylic acid   (b) Anthranilic acid

    (c) Benzoic acid   (d) Phthalic acid

12. o-nitro benzoic acid on reduction with Sn/HCl gives ....

    (a) Benzoic acid   (b) Phthalic acid

    (c) Anthranilic acid   (d) Salicylic acid

13. When Salicylic acid on heating with soda-lime, it gives ....

    (a) Phenol   (b) Phthalic acid

    (c) Benzoic acid   (d) Anthranilic acid

14. .... is also called salicylic acid.

    (a) o-amino benzoic acid   (b) o-hydroxy benzoic acid

    (c) Benzoic acid   (d) Aniline

15. Methyl magnesium bromide is commonly known as ....

    (a) Grignards reagent   (b) Organozinc compounds

    (c) Organolithium compounds   (d) None of these

16. Methyl lithium reacts with water to give ....

    (a) Methanol   (b) Methane

    (c) Ethane   (d) Ethanol

17. Which of the following is not organometallic compound ....

    (a) CH_3MgBr (b) $(CH_3)_2Zn$

    (c) $(C_2H_5)_2Zn$ (d) CH_3Cl

18. Action of acetone on methyl magnesium bromide gives ....

    (a) Ethanoic acid   (b) Ethanal

    (c) 2-methyl-2-propanol   (d) Ethanol

19. Organo metallic compound are those which having atleast .... bond.

   (a) Carbon-carbon

   (b) Carbon-metal

   (c) Carbon-hydrogen

   (d) Carbon-nitrogen

20. Action of solid CO_2 on $CH_3.Mg$-l gives ....

   (a) Ethanoic acid

   (b) Ethanal

   (c) Propanone

   (d) Ethanol

21. Dimethyl zinc reacts with acetaldehyde to give ....

   (a) Propanone

   (b) 1-propanol

   (c) Ethanol

   (d) 2-propanol

22. Ethanol can be prepared by the action of .... on CH_3-Mg-l

   (a) H-CHO

   (b) CH_3-CHO

   (c) CH_3CN

   (d) HCN

23. In ketones, carbonyl carbon is .... hybridized.

   (a) SP

   (b) SP^2

   (c) SP^3

   (d) SP^2d

24. Benzene react with .... gives acetophenone.

   (a) Acetic acid

   (b) Acetone

   (c) Acetyl chloride

   (d) Carbon monoxide

25. Benzaldehyde on reduction with $LiAlH_4$ gives ....

   (a) Benzyl alcohol

   (b) Phenol

   (c) Ethyl alcohol

   (d) Benzene

26

$$C_6H_5COCH_3 \xrightarrow{\text{Per acids}} ?$$
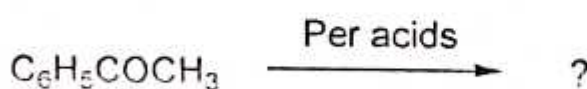
30. Comparing H_2O and NH_3 as solvents leads to analogies between which pair of species ?

    (a) NH_3 and OH^-

    (b) $[NH_2]^-$ and H_2O

    (c) $[NH_2]^-$ and $[OH]^-$

    (d) $[NH_4]^+$ and H_2O

31. Which of the following solvents has the longest liquid range ?

    (a) HF

    (b) SO_2

    (c) H_2O

    (d) NH_3

32. The alkali metal solutions in ammonia are .... In colour.

    (a) Red

    (b) Yellow

    (c) Blue

    (d) Green

33. On heating, the salt with conc. H_2SO_4 gives colourless gas with pungent smell indicate the presence of following acidic radical.

    (a) F^- (b) Cl^- (c) Br^- (d) I^-

34. In qualitative analysis, dimethyl glyoxime reagent is used for .... cation.

    (a) Al^{+3}

    (b) Zn^{+2}

    (c) Ni^{+2}

    (d) Fe^{+2}

35. Which of the following reagent is used for separation of IIA and IIB group ?

    (a) Sodium bismuthate

    (b) Nesslers reagent

    (c) Yellow ammonium sulphide

    (d) None of these

36. .... acts an acid in liquid NH_3

    (a) NH_4Cl (b) KNH_2 (c) $SOCl_2$ (d) $AlCl_3$

37. SO^{+2} ion in liq. SO_2 is analogous to .... ion in H_2O.

    (a) NH_4^+ (b) H_3O^+ (c) SO_3^{-2} (d) OH^-

38. The positively charged part of a salt is called ....

    (a) Acidic radical   (b) Basic radical

SB—14—2022

FACULTY OF SCIENCE

B.Sc. (Second Year) (Third Semester) EXAMINATION

MAY/JUNE, 2022

(New Pattern)

CHEMISTRY

Paper–VI

(Organic & Inorganic Chemistry)

(Tuesday, 7-6-2022)   Time : 2.00 p.m. to 4.30 p.m.

                                 Maximum Marks—60

Time— 2½ Hours

N.B. :— (i) Use Separate answer book for each paper.

    (ii) Attempt *All* questions.

1. Solve any *three* of the following :   15

    (a) Define the following terms :

        (i) Micro qualitative analysis;

        (ii) Solubility product;

        (iii) Acidic radical.

    (b) Explain the role of sodium carbonate extract in qualitative analysis.

    (c) Explain the acid base reactions in liq. ammonia and in liq. SO_2.

    (d) Write a short note on separation of IIA and IIB basic group radicals.

    (e) Why water is called as universal solvent ?

2. Solve any *three* of following :   15

    (a) Explain Aldol condensation reaction with mechanism.

    (b) How will you prepare benzoic acid from ?

        (i) Toluene;

        (ii) Phenyl Cyanide.

    What is the action of PCl_5 on benzoic acid ?

                                                    P.T.O.

(c) How will you prepare methyl lithium ? What is the action of methyl lithium on acetone and acetaldehyde ?

(d) Write a note on Baeyer—Villiger oxidation reaction with mechanism.

(e) How will you synthesized succinic acid from ethyl acetoacetate ?

3. Solve any *two* of following :   10

(a) What is the action of the following on benzene sulphonic acid ?

    (i) NaOH;

    (ii) PCl_5;

    (iii) Ethanol;

    (iv) H_2O;

    (v) $SOCl_2$.

(b) Write notes on :

    (i) Hydrogenation of oil;

    (ii) Reformatsky reaction;

(c) What happens when benzalidehyde is heated with alcoholic KCN solution ?

(d) What are Soap ? How is soap manufactured by Kettles process ?

SB—20—2022

FACULTY OF SCIENCE

B.Sc. (Second Year) (Fourth Semester) EXAMINATION

MAY/JUNE, 2022

(New/CBCS Course)

CHEMISTRY

Paper–VIII

(Organic and Inorganic Chemistry)

(Wednesday, 8-6-2022)

Time : 2.00 p.m. to 4.30 p.m.

Time— 2½ Hours

Maximum Marks—40

1. Solve any *three* of the following :

   (a) Give the electronic configuration of 2nd transition series elements.

   (b) What is Lanthanide contraction ? Give consequences of Lanthanide Contraction.

   (c) How Uranium is extracted from Pitchblend by acid digestion method ?

   (d) Explain the following properties of first transition series elements :

      (i) Complex formation

      (ii) Magnetic properties.

   (e) What are the applications of Lanthanides ?

2. Solve any *three* of the following :

   (a) What is stereoisomerism ? Write R and S forms of :

      (i) 3-chloro 2-methyl pentane

      (ii) 2-chlorobutane.

   (b) How will you convert Glucose to Mannose ?

(c) How will you prepare Urea by Wohler's method ? What is the action of the following on Urea ?

(i) Heat;

(ii) $SOCl_2$;

(iii) Acetyl chloride;

(iv) Nitrous Acid.

(d) What is Isomerism ? Explain types of structural isomerism.

(e) Predict the product :

(i)

 $\xrightarrow{SeO_2}$

(ii) $CH_3—COOH + CH_2 = CH_2 \xrightarrow{BF_3}$

(iii) $CH_3 = CH—CHO \xrightarrow[H_2O]{OsO_4}$

(iv) $R—COOH + R'OH \xrightarrow{BF_3}$

(v) $CH_3—CH = CH—CH_3 \xrightarrow[H_2]{O_3}$
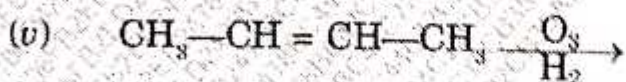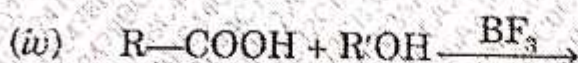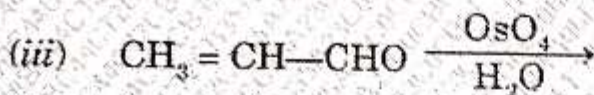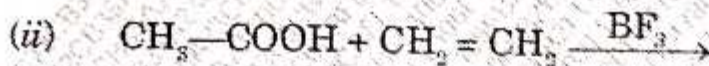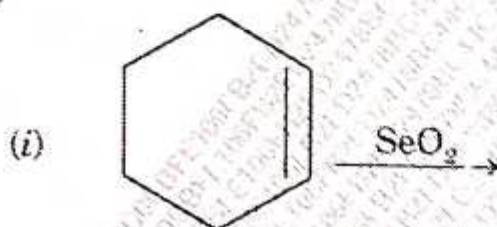
3. Solve any *two* of the following :

(a) How will you convert :

(i) Aniline to phenyl isocyanide;

(ii) Phenol to Aniline;

(iii) Nitrobenzene to Aniline;

(iv) Glucose to Glucosazone;

(v) Glucose to Sorbitol.

(c) How will you prepare Urea by Wohler's method ? What is the action of the following on Urea ?

    (i) Heat;

    (ii) $SOCl_2$;

    (iii) Acetyl chloride;

    (iv) Nitrous Acid.

(d) What is Isomerism ? Explain types of structural isomerism.

(e) Predict the product :

    (i)

$\xrightarrow{SeO_2}$

    (ii) $CH_3-COOH + CH_2 = CH_2 \xrightarrow{BF_3}$

    (iii) $CH_3 = CH-CHO \xrightarrow[H_2O]{OsO_4}$

    (iv) $R-COOH + R'OH \xrightarrow{BF_3}$

    (v) $CH_3-CH = CH-CH_3 \xrightarrow[H_2]{O_3}$.
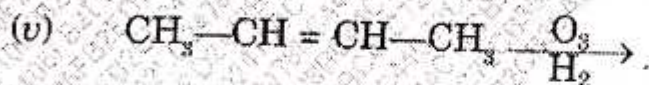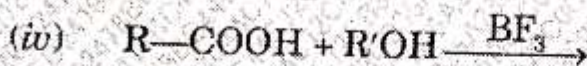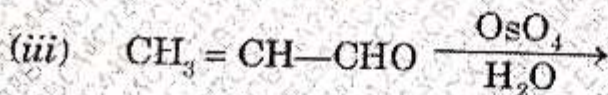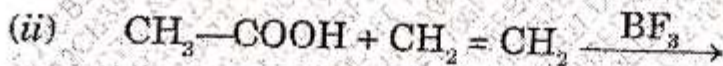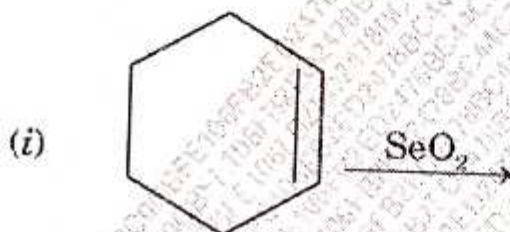
3. Solve any *two* of the following :

(a) How will you convert :

    (i) Aniline to phenyl isocyanide;

    (ii) Phenol to Aniline;

    (iii) Nitrobenzene to Aniline;

    (iv) Glucose to Glucosazone;

    (v) Glucose to Sorbitol.

(b) Define the following terms :

    (i)   Asymmetric carbon atom;

    (ii)   Rocemic Mixture;

    (iii)   Resolution;

    (iv)   Plane of Symmetry;

    (v)   Optical Isomerism.

(c) What is mutarotation ? Give its mechanism.

(d) Predict the product :

    (i)

$$2H + \xrightarrow{Fe/H_2O} ?$$

    (ii)

$$\xrightarrow[\text{Conc.}H_2SO_4]{\text{Electrolytic Reduction}} ?$$

    (iii)

$$\text{Conc. } HNO_3 \xrightarrow{\text{Conc.}H_2SO_4} ?$$
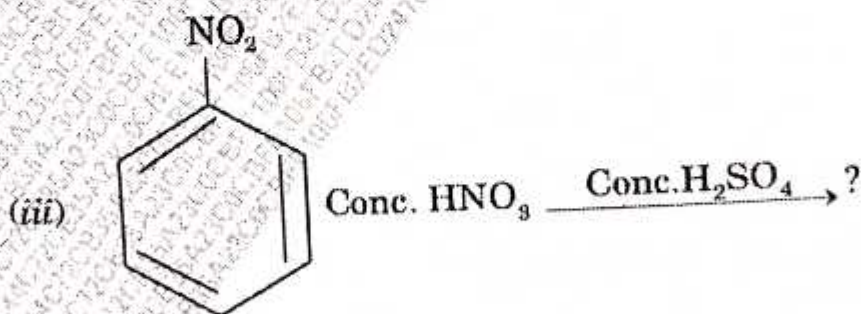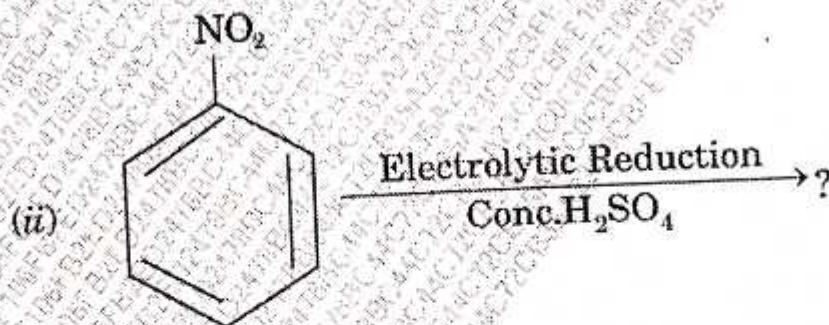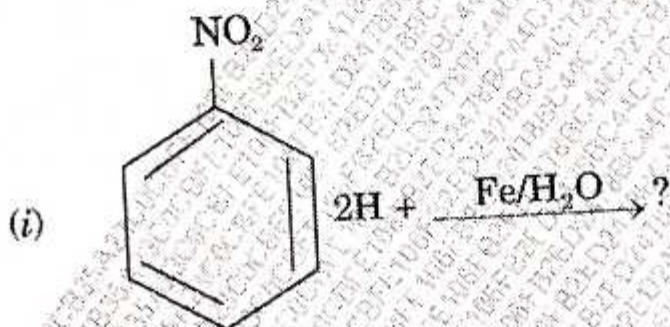
AO—46—2018

FACULTY OF SCIENCE

B.Sc. (Second Year) (Fourth Semester) EXAMINATION

MARCH/APRIL, 2018

(CBCS/CGPA Pattern)

CHEMISTRY

Paper IX

(Physical and Inorganic Chemistry)

(MCQ & Theory)

(Thursday, 22-3-2018)   Time : 2.00 p.m. to 4.00 p.m.

Time—2 Hours   *Maximum Marks—40*

N.B. :— (i) Attempt *All* questions.

(ii) *All* questions carry equal marks.

(iii) Use of logarithmic table and calculator is allowed.

(iv) Use separate answer-sheet for MCQ Q. No. 1.

(v) Use black point pen to darken the circle of correct choice in OMR sheet.

(vi) Use only one answer-book for both Sections A and B.

MCQ

1.   Select the *correct* answer for each of the following Multiple Choice Questions :   10

     ·(i)   Petrol on water in rainy days exhibit the phenomenon of :

         (a)   Fluorescence   (b)   Delayed fluorescence

         (c)   Phosphorescence   (d)   Both (a) and (b)

P.T.O

(*ii*) Kohlrausch's law is used to determine :

  (*a*) Absolute ionic mobilities

  (*b*) λ_∞ for weak electrolytes

  (*c*) Solubility of sparingly soluble salts

  (*d*) All of the above

(*iii*) According to Debye and Huckel, strong electrolytes in solution gets completely broken into :

  (*a*) Electrons

  (*b*) Charged particles that conduct electricity

  (*c*) Light and heat

  (*d*) Salt and water that more with current

(*iv*) If the rate expression for a chemical reaction is Rate = $K[A][B]^n$, then the order of reaction is :

  (*a*) 1   (*b*) n

  (*c*) K is independent of T   (*d*) $1 + n$

(*v*) The half life of a first order reaction is :

  (*a*) Directly proportional to initial concentration

  (*b*) Inversely proportional to initial concentration

  (*c*) Independent of initial concentration

  (*d*) None of the above

(*vi*) In some photochemical reactions low quantum field is obtained. It is due to :

  (*a*) Occurrence of reverse primary reaction

  (*b*) Recombination of dissociated fragments

  (*c*) Deactivation of reacting molecules

  (*d*) All of the above

(*vii*) The specific conductance of a solution is given by :

(*a*) $K = \dfrac{1}{R} \times \dfrac{A}{l}$ (*b*) $K = \dfrac{1}{R} \times \dfrac{l}{A}$

(*c*) $K = R \times \dfrac{l}{A}$ (*d*) $K = R \times \dfrac{A}{l}$

(*viii*) The IF_5 has .... geometry.

     (*a*)   Square planar   (*b*)   Linear

     (*c*)   Octahedral   (*d*)   None of these

(*ix*) The No. of lone pairs and bond pairs present in BrF_5 molecules are :

     (*a*)   0 and 3   (*b*)   1 and 3

     (*c*)   5 and 1   (*d*)   1 and 5

(*x*) CaC_2 is an example of :

     (*a*)   Covalent carbide   (*b*)   Ionic carbide

     (*c*)   Metallic carbide   (*d*)   None of these

Theory

Section A

(Physical Chemistry)

2.   Solve any *two* of the following :   2×5=10

    (*i*)   Explain the half-life and graphical method for the determination of order of a reaction.

    (*ii*)   Explain the Arrhenius theory of electrolytic dissociation. Give its limitations.

(*ii*) Kohlrausch's law is used to determine :

    (*a*)   Absolute ionic mobilities

    (*b*) λ_∞ for weak electrolytes

    (*c*)   Solubility of sparingly soluble salts

    (*d*)   All of the above

(*iii*) According to Debye and Huckel, strong electrolytes in solution gets completely broken into :

    (*a*)   Electrons

    (*b*)   Charged particles that conduct electricity

    (*c*)   Light and heat

    (*d*)   Salt and water that more with current

(*iv*) If the rate expression for a chemical reaction is Rate = $K[A][B]^n$, then the order of reaction is :

    (*a*)   1   (*b*) n

    (*c*)   K is independent of T   (*d*) $1 + n$

(*v*) The half life of a first order reaction is :

    (*a*)   Directly proportional to initial concentration

    (*b*)   Inversely proportional to initial concentration

    (*c*)   Independent of initial concentration

    (*d*)   None of the above

(*vi*) In some photochemical reactions low quantum field is obtained. It is due to :

    (*a*)   Occurrence of reverse primary reaction

    (*b*)   Recombination of dissociated fragments

    (*c*)   Deactivation of reacting molecules

    (*d*)   All of the above

(vii) The specific conductance of a solution is given by :

(a) $K = \dfrac{1}{R} \times \dfrac{\Lambda}{l}$

(b) $K = \dfrac{1}{R} \times \dfrac{l}{\Lambda}$

(c) $K = R \times \dfrac{l}{\Lambda}$

(d) $K = R \times \dfrac{\Lambda}{l}$

(viii) The IF_5 has .... geometry.

(a)   Square planar

(b)   Linear

(c)   Octahedral

(d)   None of these

(ix) The No. of lone pairs and bond pairs present in BrF_5 molecules are :

(a)   0 and 3

(b)   1 and 3

(c)   5 and 1

(d)   1 and 5

(x) CaC_2 is an example of :

(a)   Covalent carbide

(b)   Ionic carbide

(c)   Metallic carbide

(d)   None of these

Theory

Section A

(Physical Chemistry)

2. Solve any *two* of the following :

2×5=10

(i) Explain the half-life and graphical method for the determination of order of a reaction.

(ii) Explain the Arrhenius theory of electrolytic dissociation. Give its limitations.

P.T.O.

(iii) (a) Differentiate between photochemical and thermochemical reactions.

2

(b) A system absorbs 3×10^{16} quanta of light per second. On irradiation for 20 minutes, 3×10^{-3} moles of reactant was found to have reacted. Calculate the quantum yield of the reaction.

3

(iv) Derive the equation for rate constant of first order reaction. Show that the time taken for the completion of same fraction of change is independent of initial concentration.

3. Answer any *two* of the following :

2×5=10

(i) State and explain the Kohlrausch's law.

The transport number of H^+ ion in HCl and CH_3COO^- ion in CH_3COONa are 0.81 and 0.47 respectively. The equivalent conductances at infinite dilution of HCl and CH_3COONa are 426 ohm^{-1} cm^2 $equt^{-1}$ and 91 ohm^{-1} cm^2 $equt^{-1}$. Calculate the equivalent conductance of acetic acid at infinite dilution.

(ii) What is quantum yield ? Give the experimental determination of quantum yield.

(iii) The resistance of 0.5 N solution of an electrolyte in a cell was found to be 50 ohms. The electrodes of the cells are 2 cm apart having cross-sectional area of 4 cm^2. Find the equivalent conductivity of solution.

(iv) (a) Derive the rate constant expression for a zero order reaction. 3

(b) Calculate the energy of a photon in Joules associated with wavelength of 3600 Å.

2

FACULTY OF SCIENCE
Winter - 2020
Class- B.Sc. (Second Year) (Fourth Semester)
CHEMISTRY
Paper- IX
Paper Name : Physical and Inorganic Chemistry (Old)
(MCQ Pattern)
Cluster Code: SD

Date : 09/03/2021   Time : 1 Hours   Maximum Marks : 40

N.B. :-   (i) Attempt All questions.   (ii) Each question carry one mark
       (iii) No Negative Marking system   (iv) Use OMR answer sheet

1. For first order reactions the rate constant k has the unit _____

   a) Lit mol^{-1} b) time^{-1} c) mol^{-1} time^{-1} d) mol time Lit^{-1}

2. The reaction $A \rightarrow B$ is a second order reaction. When the conc. of A is 0.50 M, the half life is 8 minute. What is the half life if initial conc. of A is 0.10 M ?

   a) 80 min   b) 8 min   c) 40 min   d) 4 min

3. Which of the following does not affect the rate of a chemical reaction ?

   a) Enthalpy of a reaction   b) concentration of reactants   c) temperature   d) pressure

4. Rate constant of first order reaction is given by _____

   a) $K = \frac{2.303}{t} \log \frac{a-x}{a}$ b) $K = \frac{2.303}{t} \log \frac{a}{a-x}$ c) $K = \frac{t}{2.303} \log \frac{a}{a-x}$ d) $K = \frac{2.303}{at} \log \frac{a}{a-x}$

5. Kohlrausch's law can be expressed as _____

   a) $\lambda_\infty = \lambda a - \lambda c$ b) $\lambda_\infty = \lambda a + \lambda c$ c) $\lambda_\infty = \lambda c - \lambda a$ d) $\lambda_\infty = \lambda a \times \lambda c$

6. The transport number of the anion is given by _____

   a) $t_a = \frac{V_a}{V_a + V_c}$ b) $t_a = \frac{V_a}{V_a - V_c}$ c) $t_a = \frac{V_c}{V_a + V_c}$ d) $t_a = \frac{V_c}{V_a - V_c}$

7. A strong electrolyte is a substance which dissociates _____

   a) poorly   b) completely   c) both a & b   d) None of these

8. The transport number of the K$^+$ is 0.492 in KCl solution, the transport number of Cl$^-$ is _____

   a) 0.492   b) 0.502   c) 0.580   d) 0.508

9. Arhenius equation is given by _____

   a) $K = AT e^{-Ea/RT}$ b) $K = A e^{-EaT/R}$ c) $K = A e^{-RT/Ea}$ d) $K = A e^{-Ea/RT}$

10. Rate constant of second order reaction is given by _____

   a) $K = \frac{2.303}{t} \frac{x}{a-x}$ b) $K = \frac{1}{t} \frac{x}{a-x}$ c) $K = \frac{1}{t} \frac{x}{a(a-x)}$ d) $K = \frac{1}{t} \frac{a(a-x)}{x}$

1

11. Unit of zero order reaction is given by ....

a) mol Lit^{-1} sec^{-1} b) mol Lit sec^{-1} c) mol^{-1} Lit^{-1} sec^{-1} d) None of these

12. Half life of second order reaction is given by ....

a) $t_{1/2} = \frac{K}{a}$ b) $t_{1/2} = \frac{a}{K}$ c) $t_{1/2} = \frac{1}{Ka}$ d) None of these

13. Powers in the rate law are determined by ....

a) the principle of detailed balance   b) physical states of reactants & products

c) Experiment   d) coefficients in balanced chemical reaction

14. The specific conductance is .... specific resistance

a) equal to   b) directly proportional to   c) reciprocal of   d) None of these

15. On dilution specific conductivity ....

a) decreases   b) increases   c) remains same   d) None of these

16. The unit of equivalent conductance is ....

a) Ohm^{-1} cm^1 equt^{-1} b) Ohm^{-1} cm^{-2} equt^{-1} c) Ohm^{-1} cm^{-1} equt^{-1} d) Ohm^{-1} cm^2 equt^{-1}

17. The equivalent conductance .... with increase in temperature.

a) decreases   b) increases   c) remains same   d) None of these

18. Cell constant is equal to ....

a) $\frac{length}{Area}$ b) length X Area   c) $\frac{Area}{length}$ d) Length + Area

19. What is the cell constant of the cell, if the distance between two electrode is 6.0 cm and area of electrode is 5.0 cm^2 ?

a) 1.2 cm   b) 12 cm   c) 1.2 cm^{-1} d) 12 cm^{-1}

20. As temperature increases, the reaction rate ....

a) decreases   b) decreses then increases   c) increases   d) remains the same

21. The wavelength of ultraviolet & visible light of electromagnetic spectrum lies bet^n................................

a) 1000 – 2000 A   b) more than 8000 A^0 c) 2000 – 8000 A^0 d) None of these

22. .... stops as soon as the incident radiation is cut off.

a) Fluorescence   b) Phosphorescence   c) chemiluminescence   d) None of these

23. The electronic spins are expressed in terms of spin multiplicity which is given by ....

a) S + 2   b) 2S + 2   c) 2S + 1   d) 2S – 1

24. The quantum efficiency of the reaction $H_2 + Cl_2 \rightarrow 2HCl$ is ....

a) 10 to 10^2 b) 10^{-2} to 10^2 c) 10^2 to 10^4 d) 10^4 to 10^6

25. In a photochemical reaction 75 molecules are reacted to give products by absorption of 25 photons of suitable radiation. The quantum yield is _____

a) 2

b) 3

c) 25

d) 1

26. Reaction $2NO + O_2 \rightarrow 2NO_2$ is

a) unimolecular

b) bimolecular

c) termolecular

d) None of these

27. Reaction rates can change with _____

a) Temperature

b) Addition of catalyst

c) Reaction concentration

d) All of these

28. The empirical formula of double chain silicates is:

a) SiO_4^{4-}

b) $Si_3O_9^{2-}$

c) $Si_2O_7^{6-}$

d) $(Si_4O_{11})_n^{6n-}$

29. The Geometry of IF_7 is

a) Pentagonal Bipyramidal

b) Linear

c) Tetrahedral

d) Square planar

30. $(CN)_2$ is ------

a) Cyanide

b) Cyanogens

c) Thiocyanogen

d) none of the above

31. The Oxy acids having the formula HXO_3 known as

a) Hypohalous acid

b) Halic acid

c) Halous acid

d) Perhalic acid

32. The chemical formula of Zeolite is ....

a) $FeSO_4.7H_2O$

b) $Al_2(SO_4)_3.18H_2O$

c) $Na_2O.Al_2O_3.xSiO_2.yH_2O$

d) Na_2Al_2O

33. The most likely geometry for a silicate unit is:

a) square planar

b) square pyramidal

c) octahedral

d) tetrahedral

34. The shape of C_{60} is :

a) Soccer ball

b) Cricket ball

c) Tenis ball

d) Hocky ball

35. Interhalogens are more reactive than halogen because

a) X-Y bond weaker than X-X bond in halogen

b) X-Y bond stonger than X-X bond in halogen

c) Both a and b

d) None of the above

36. Hybridisation of XY_7 type of interhalogen compound is

a) sp^3

b) sp^3d

c) sp^3d^2

d) sp^3d^3

37. Hybridisation of SiO_4^{-4} unit is :

a) sp

b) sp^2

c) sp^3

d) dsp^2

3

38. C_6F_{12}, CCl_2F_2 and $(CF_2= CF_2)_n$ are example of

a) Pseudohalogen   b) Polyhalide   c) Halogen   d) Flurocarbon

39. The Oxy acids of halogens having the formula HXO known as

a) Hypohalus acid   b) Halic acid   c) Halus acid   d) Perhalic acid

40. Natural zeolites are........

a) Porous   b) Amorphous   c) Non-durable   d) Possess gel structure

AO—53—2018

FACULTY OF SCIENCE

B.Sc. (Second Year) (Third Semester) EXAMINATION

MARCH/APRIL, 2018

(CBCS/CGPA)

CHEMISTRY

Paper VII

(Physical and Inorganic Chemistry)

(MCQ + Theory)

(Friday, 23-3-2018)   Time : 2.00 p.m. to 4.00 p.m.

Time—Two Hours   *Maximum Marks—40*

N.B. :— (i)   Attempt *All* questions.

(ii) *All* questions carry equal marks.

(iii) Use of logarithmic table and calculator is allowed.

(iv) Use separate answer sheet (OMR sheet) for MCQ (Q. No. 1).

MCQ

10

1.   Select the *correct* answer for each of the following multiple choice questions :

(1)   The uncertainty of measurements is practically nil, in case of :

(A)   Large object   (B)   Electron

(C)   Small particle   (D)   Microscopic object

(2)   .... is a second degree differential equation.

(A)   Albert Einstein equation

(B)   Planck's equation

(C)   Heisenberg's uncertainty equation

(D)   Schrödinger's wave equation

P.T.O.

(3) A mixture of three gases O_2, N_2, CO_2 is ....

(A) 1-phase, 1-component system

(B) 2-phase, 3-component system

(C) 3-phase, 3-component system

(D) 1-phase, 3-component system

(4) The number of components present in the system

$$KCl + Water \rightleftharpoons KCl \ Hydrate$$

is :

(A) One

(B) Two

(C) Three

(D) Four

(5) The efficiency of a heat engine operating between 400 K and 300 K is :

(A) 0.25

(B) 0.50

(C) 0.75

(D) 1.00

(6) The increase in entropy is maximum in :

(A) $H_{2(g)} + I_{2(g)} \longrightarrow 2HI_{(g)}$

(B) $CO_{(g)} + \dfrac{1}{2} O_{2(g)} \longrightarrow CO_{2(g)}$

(C) $N_{2(g)} + 3H_{2(g)} \longrightarrow 2NH_{3(g)}$

(D) $CaCO_{3(s)} \longrightarrow CaO_{(s)} + CO_{2(g)}$

(7) "It is impossible to take heat from a hotter reservoir and convert it completely into work by a cyclic process without transferring a part of heat to a cooler reservoir." It is the statement of :

(A) First law of thermodynamics

(B) Second law of thermodynamics

(C) Third law of thermodynamics

(D) Carnot heat theorem

(8) Which of the following elements having odd number of neutrons and protons is stable ?

(A) $_3Li^6$

(B) $_5B^{10}$

(C) $_7N^{14}$

(D) All of these

(9) Highest penetrating power is shown by :

(A) α-Particle

(B) β-Particle

(C) γ-Rays

(D) None of these

(10) $Fe(OH)_3$ is an example of :

(A) Crystalline Precipitate

(B) Gelatinous Precipitate

(C) Curdy Precipitate

(D) None of the above

Theory

Section A : Physical Chemistry

2. Attempt any *two* of the following :

(a) State and discuss Heisenberg's uncertainty principle.

(b) Describe KI-H_2O system on the basis of phase rule.

(c) Define entropy. Give mathematical expression and unit. Explain physical significance of entropy.

(d) A tennis ball weighing 25 g is to be located within 0.02Å. What is the uncertainty in its velocity ? Comment on your result.

$$(h = 6.626 \times 10^{-34} Js)$$

3. Attempt any *two* of the following :

(a) (i) Write a note on Compton effect.

(ii) Define critical solution temperature. What is the effect of impurities on critical solution temperature ?

P.T.O.

(b) Draw a well labelled phase diagram of water system and discuss its salient features.

(c) Describe Carnot's cycle.

(d) (i) Calculate the entropy change involved in the thermodynamic expansion of 2.5 moles of a gas from a volume of 9 litres to 90 litres at 301 K.

$(R = 8.314 \ J \ K^{-1} \ mol^{-1})$

(ii) Calculate the entropy change, when one mole of ethanol is evoporated at 78°C. The molar heat of vaporisation of ethanol is 38.76 k.Jmol⁻¹.

Section B : Inorganic Chemistry

4. Attempt any *two* of the following :

(a) (i) Define Isotopes and Isobars with suitable examples.

(ii) Explain the effect of Temparature on Precipitation.

(b) Explain the conditions for completeness of Preciptitation.

(c) What is Nuclear Fission reaction ? Explain Plutonium bomb.

(d) Define Binding energy. Calculate the binding energy per nucleon of $_2He^4$ which has Isotopic mass 4.00260 amu.

Given : Mass of neutron = 1.008665 amu

Mass of proton = 1.007277 amu

Mass of electron = 0.0005486 amu.

W—58—2018

FACULTY OF SCIENCE

B.Sc. (Second Year) (Third Semester) EXAMINATION

OCTOBER/NOVEMBER, 2018

(CBCS/CGPA Pattern)

CHEMISTRY

Paper VII

(Physical and Inorganic Chemistry)

(MCQ+Theory)

(Monday, 15-10-2018)   Time : 2.00 p.m. to 4.00 p.m.

Time—2 Hours   Maximum Marks—40

N.B. :— (i) Attempt *All* questions.

(ii) *All* questions carry equal marks.

(iii) Use of logarithmic table and calculator is allowed.

(iv) Use separate answer sheet (OMR sheet) for MCQ (Q. No. 1).

(MCQ)

1. Select the *correct* answer for each of the following multiple choice questions :

(i) First experimental support to de Broglie concept of matter waves was provided by :

(A) Albert Einstein   (B) Davisson and Germer

(C) Heisenberg   (D) J.J. Thomson

(ii) In photoelectric effect, the kinetic energy of the photoelectron is proportional to :

(A) Frequency of the incident light

(B) Intensity of incident light

(C) Velocity of the incident light

(D) All of the above

P.T.O.

(*iii*) In phase diagram of phenol-water system, the area enclosed by curve is .... system.

    (A) one phase   (B) two phase

    (C) three phase   (D) four phase

(*iv*) At a triple point :

    (A) there are three components in equilibrium

    (B) there are three points co-exist

    (C) there are three degrees of freedom

    (D) there are three phases co-exist in equilibrium

(*v*) The change in entropy of a reaction is given by :

    (A) $\Delta S = \Sigma S_{product} - \Sigma S_{reactant}$

    (B) $\Delta S = \Sigma S_{reactant} - \Sigma S_{product}$

    (C) $\Delta S = \Sigma S_{reactant} + \Sigma S_{product}$

    (D) $\Delta S = \Sigma S_{product} + \Sigma S_{reactant}$

(*vi*) Every perfect engine working reversible between same temperature limits has the ....

    (A) efficiency equal to one

    (B) efficiency greater than one

    (C) efficiency less than one

    (D) same efficiency

(*vii*) The inversion temperature of H_2 gas is :

    (A) + 80°C   (B) – 80°C

    (C) – 240°C   (D) + 240°C

(*viii*) Stable nuclei have :

    (A) low mass defect

    (B) low binding energy

    (C) high binding energy

    (D) high positive packing fraction value

(ix) Lowest velocity is observed in :

   (A) α-particle

   (B) β-particle

   (C) γ-rays

   (D) all have equal velocity

(x) During ignition and incineration, PPt is converted into :

   (A) its hygroscopic form

   (B) its volatile form

   (C) compound of definite composition

   (D) compound of variable composition

(Theory)

Section A : Physical Chemistry

2. Attempt any *two* of the following :

  (a) A photon of wavelength 6000 Å strikes a metal surface. The work function is 1.7 eV. Calculate the kinetic energy of photoelectron. (1 eV = 1.602×10^{-19} J) ($h = 6.626 \times 10^{-34}$ Js)

  (b) Discuss the application of phase rule to sulphur system.

  (c) State de Broglie's hypothesis. Derive de Broglie's equation.

  (d) Derive an expression of entropy change for an ideal gas as a function of temperature and pressure.

3. Answer any *two* of the following :

  (a) (i) Explain physical significance of ψ and ψ^2.

     (ii) Draw well-labelled diagram of Ag-Pb system.

  (b) What is phase rule equation ? Explain the terms phase, degree of freedom and component with suitable examples.

  (c) State Joule's law and Joule-Thomson effect. Give any *three* statements of second law of thermodynamics.

  (d) (i) Calculate entropy change in transformation of 24 g of ice into water at 0°C. Molar heat of fusion = 6009 J mol^{-1}.

     (ii) Calculate entropy change when one mole of an ideal gas is allowed to expand isothermally at 300 K from pressure 40 atmosphere to 4 atmosphere. (R = 8.314 JK^{-1} mol^{-1})

X—31—2019

FACULTY OF SCIENCE

B.Sc. (Second Year) (Third Semester) (Regular) EXAMINATION

OCTOBER/NOVEMBER, 2019

CHEMISTRY

Paper-VII

(Physical and Inorganic Chemistry)

(Wednesday, 16-10-2019)   **Time : 2.00 p.m. to 4.00 p.m.**

Time—2 Hours

Maximum Marks—40

N.B. :— (i)   Use separate answer book for paper number-II.

      (ii)   Use of calculator and logarithmic table is allowed.

      (iii)   Attempt *all* questions.

1. Solve any *three* of the following :   15

    (a)   Explain the effect of neutron to proton (N/P) ratio on nuclear stability.

    (b)   What is radioactivity ? Give the characteristics of α-particles.

    (c)   Give the applications of radioisotopes in medicine and agriculture field.

    (d)   What do you mean by gravimetric analysis ? Discuss different conditions for precipitation.

    (e)   Explain the following steps involved in gravimetric analysis :

       (i)   Digestion

       (ii)   Ignition

       (iii)   Incineration.

2. Solve any *three* of the following :

15

(a) What do you understand by dual character of matter ? Derive de-Broglie's equation. How was it verified ?

(b) State Heisenberg's uncertainty principle. Calculate the uncertainty in the velocity of bullet of mass 10 gms whose position at time 't' is known with uncertainty equal to 1.0×10^{-5} m.

(c) Explain the terms phase, components and degree of freedom with example.

(d) Derive an expression for entropy change (ΔS) of an ideal gas as a function of volume and temperature and calculate entropy change when 2 moles of gas is allowed to expand from 5 litres to 50 litres at 303 K. (Given R = 8.314 joules).

(e) What is Joule-Thomson coefficient ? Derive expression for inversion temperature.

3. Solve any *two* of the following :

10

(a) Write a note on Compton effect.

(b) Describe silver-lead (Ag-Pb) system on the basis of phase rule.

(c) Describe in brief entropy change (ΔS) in :

(i) Fusion of solid

(ii) Vapourisation of liquid.

(d) Write a note on Carnot cycle.

Faculty of science
Winter-2020
Class- B.Sc. Second year (Third Semester)
Subject- Chemistry
Paper -Physical and Inorganic Chemistry-VII (NEW)
Cluster code : SD

Date : 09/03/2021   Time: 1 Hour   Marks : 40

Note - 1. Attempt all Questions
      2. Each question carries one mark
      3. No negative marking system
      4. Use OMR answer sheet.

1] The first use of Planck's quantum theory to explain the structure of Atom was made by
   a) Heisenberg   b) Bohr   c) Planck   d) Einstein

2] Photoelectric effect can be explained by assuming that light:
   a) Is a form of transverse wave
   b) Is a form of longitudinal wave
   c) Is polarised
   d) Consist of quanta or photons

3] When X-rays of wavelength λ stuck a sample of graphite, an electron is ejected and the X-rays scattered at an angle θ has:
   a) Shorter wavelength   b) Longer wavelength
   c) Same wavelength   d) Zero wavelength

4] Momentum of photon of wavelength λ is:
   a) h / λ b) Zero
   c) $h\lambda / c^2$ d) $h\lambda / c$

5] What is uncertainty in position of an electron if the uncertainty in velocity is 5.7×10^5 m/sec? ($h= 6.6\times10^{-34}$ kg m^2 sec^{-1}, m$= 9.1\times10^{-31}$ kg)
   a) 10^{-10} m   b) 10^{10} m   c) 10^{-100} m   d) 10^{100} m

6] If the potential difference of 150 volts be applied, the wavelength of electrons emerging out λ is:
   a) 0.1 Å   b) 1 Å
   c) 10 Å   d) -10 Å

7] Which of the following condition's is incorrect for a well behaved wave function ψ ?
   a) ψ must be finite   b) ψ must be single valued
   c) must be infinite   d) ψ must be continuous

8] According to de Broglie, matter exhibit:
   a) Particle nature   (b) Wave nature
   c) Either a or b   (d) Both a and b

9] The relation $\Delta x \times \Delta p \geq h/ 4\pi$ Represents: -
   a) d Broglie's equation
   b) Heisenberg's uncertainty equation
   c) Schrodinger's wave equation
   d) Pauli's exclusion principle

10] According to first law of thermodynamics:
   a) Total energy of an isolated system remains constant
   b) Total energy of a Universe remains constant
      c) Whenever energy of one type disappear equivalent amount of another type appear
   d) all of the above

11] For an ideal gas the value of the value of $(dU/dV)T$ is:-
   a) Positive   b) zero
   c) Negative   d) none of the above

12] The phenomena of lowering of temperature when gas is made to expand adiabatically from a region of high pressure to a region of low pressure is known as:
   a) First law of thermodynamics
   b) Joule-Thomson effect
   c) Compton effect
   d) second law of thermodynamics

13] Heat energy cannot be completely transformed into to work without producing some change somewhere is this statement of:
   a) First law of thermodynamics
   b) Second law of thermodynamics
   c) Third law of thermodynamics
   d) Hess law

14] The entropy is measured in:
   a) JK^{-1} b) entropy unit
   c) u   d) all of the above

15] The maximum efficiency of an engine operating between 373 K and 298 K is:
   a) 10.1   b) -10.1   c) 20.1   d) -20.1

16] For natural process entropy of universe:
   a) Decrease   b) increase   c) Remains constant   d) is zero

17] In Carnot cycle during isothermal reversible expansion at temperature T_2 and volume increase from V_1 to V_2 then the work done w_1 during process is:
   a) $-w_1 = RT_2 ln(\frac{V_2}{V_1})$ b) $w_1 = RT_2 ln(\frac{V_2}{V_1})$
   c) $-w_1 = R^2 T_2 ln(\frac{V_2}{V_1})$ d) $-w_1 = R^2 T_2^2 ln(\frac{V_2}{V_1})$

18] In an Irreversible process the entropy of the system and surrounding taken together is:
   a) $(\Delta S \text{ system} + \Delta S \text{ surrounding}) = 0$
   b) $(\Delta S \text{ system} + \Delta S \text{ surrounding}) > 0$
   c) $(\Delta S \text{ system} + \Delta S \text{ surrounding}) -ve$
   d) None of the above

19] Every perfect Engine working reversible has efficiency:
   a) Less than one   b) Greater than one
   c) Equal to one   d) Equal to zero

20] The reduced Phase rule is given by expression:
   a) F= C - P + 1   b) F= C + P + 1
   c) F= C - P + 2   d) F= C + P + 2

21] A mixture of two gases Oxygen and nitrogen is:
   a) 4- phase system
   c) 2- phase system   b) 3- phase system
                          d) 1- phase system

22] NH_4Cl is heated in a closed vessel it shows the following equilibrium:

$$NH_4Cl_{(s)} \leftrightarrow NH_3(g) + HCl(g)$$

The number of phases and components are respectively

a) 2 and 3   b) 2 and 1   c) 2 and 2   d) 1 and 2

23] At triple point :

a) Both the temperature and pressure are fixed

b) Only the temperature is fixed

c) Only the pressure is fixed

d) Sometimes pressure and sometimes temperature is fixed

24] Temperature of triple point of CO2 system is :

a) -57 K   b) -57 C

c) 57 C   d) 57 K

25] In phase diagram of KI water system has shown in the above figure the curve AB shows that:

a) The freezing point of water decreases with addition of solid KI

b) The freezing point of water increases with addition of solid KI

c) The freezing point it remains constant with addition of solid KI

d) None of the above

26] A pair of partially miscible liquids becomes miscible in all proportion above a temperature, is called:

a) Upper critical solution temperature

b) Lower critical solution temperature

c) Critical temperature

d) None of the above

27] In phase diagram of phenol water system, the area enclosed by curve is a .... system.

a) one phase   b) two phase

c) three phase   d) single phase

28] The heaviest particle is ......

a) Electron   b) Alpha particle

c) Proton   d) Neutron

29) $^{14}C\ ^{15}N\ ^{16}O$ are the examples of......

a) isotope   b) isobar

c) isotone   d) isomer

30] The nuclides having different mass number and same atomic number are called

a) Isobars   b) Isotopes

c) Isotones   d) nuclear Isomers

31] Which of the following factors affect the stability of nucleons?

a) N/Z ratio   b) Magic number

c) Packing fraction   d) All of the above

32] Plutonium bomb is based on----------

a) Nuclear Fission reaction b) Nuclear fusion reaction

c) Both a and b   d) None of the above

33] Which type of radiation is the Highest penetrating power?

    a) alpha   b) beta   c) gamma   d) x-ray

34] Group displacement law was given by.....
    a) Soddy   b) Rutherford
    c) Curie   d) Otto Hann

35] The radioactive isotope used in the treatment of thyroid cancer

    a) ^{131}I b) ^{226}Ra c) ^{35}P d) ^{69}Co

36] The first step in gravimetric analysis is
    a) Precipitation   b) Drying
    c) Ignition   d) Filtration

37] The precipitation should be carried in
    a) Dilute solution   b) concentrated solution
    c) both   d) none of the above

38] The actual mass of a ^{37}Cl atom is 36.966 amu. Calculate the mass defect (amu/atom) for a ^{37}Cl atom.

    a) 0.623 amu   b) 0.388 amu

    c) 0.263 amu   d) 0.341 amu

39] The types of precipitate are....
    a) Curdy precipitate   b) crystalline precipitate

    c) gelatinous precipitate   d) all of the above

40] As solubility increases precipitation....

    a) Unaffected   b) Increases

    c) Decreases   d) None of the above

i) Attempt all questions.

ii) All question carry equal marks.

iii) Chose most appropriate answer from given alternatives.

iv) Negative marking system is not applicable.

1)The movement of solute particles from a region of higher concentration to a region of their lower concentration is called:

a)Plasmolysis   b)Diffusion

C)Endosmosis   d) Exosmosis

2) The absorption of water by hydrophilic colloids is called:

a) Osmosis   b) Diffusion

c)Plasmolysis   d) Imbibition

3)The membrane does not allow the passage of any substance in or out is the:

a) Permeable   b) Semipermeable

c) Impermeable   d)All the above

4) Dry wood piece when placed in a water they absorbs water and then swells is due to:

a)Exosmosis   b)Endosmosis

c) Imbibition   d)Plasmolysis

5) The excess loss of water through aerial parts in the form of water vapours is called as:

a) Transpiration   b) Guttation

c)Imbibition   d) Evaporation

6)Themost common type of transpiration is the:

a)Cuticular   b) Stomatal

c)Lenticular   d) None of these

7) The movement of plants which occur in response to the gravity is the:
a)Geotropism
b) Chemotropism
c)Phototropism
d)Thgmotropism

8) The element which is required for the plant growth in less amount is
a) Molybdenum
b) Phosphorus
c)Potassium
d)Nitrogen

9)The plants absorbs nitrogen from the soil in the form of:
a) Nitrous acid
b) Nitrates
c) Nitric acid
d) Phosphoric acid

10)The translocation of organic solutes takes place through:
a) Xylem
b) Phloem
c) Collenchyma
d) Parenchyma

11) Translocation of sugar in higher plants occurs in the form of:
a) Glucose
b) Fructose
c)Sucrose
d)Lactose

12) The third phase of the growth in plant is:
a) Cell division
b)Cell Enlargement
c) Cell Maturation
d) None of these

13)The plant growth can be measured by:
a)Ganong's photometer
b) Arc indicator
c) Both a) and b)
d)Farmer's photometer

14)The plant growth hormone Indole acetic acid is also known as:
a)2,4D
b) ABA
c) Auxin
d) Cytokinin

15) The fruit ripening hormone in plant is:
a) Auxin
b) Gibberllins
c) Cytokinin
d) Ethylene

16)The main practical application of the cytokinin is the:
a) Control flowering
b)Breaking dormancy
c)Promote cell division
d) fruit ripening

17) The process of rupturing the seed coat to break dormancy is called as:
a)Germination
b)Scarification
c) Vernalization
d) Pigmentation

18)During seed germination cotyledons pushed above the soil is called:
a) Epigeal germination
b) Hypogeal germination
c) Vivipary germination
d) None of these

19) Tobacco is the example of:
a) SDP
c) DNP
b) LDP
d) None of these

20) The germination start when fruit attached to parent plant is known as:
a) Epigeal germination
c) Hypogeal germination
b) Viviparous germination
d) None of these

21) The conversion of seedling by chilling treatment in order to accelerate flowerin
called as:
a) Dormancy
c) Vernalization
b) Photoperiod
d) Germination

22) Which of the following is not a sugar:
a) Starch
c) Fructose
b) Glucose
d) Sucrose

23) The chief constituent of cell wall is;
a) Starch
c) Chitin
b) Cellulose
d) Carbohydrates

24) The lipids are soluble in:
a) Alcohol
c) Both a) and b)
b) Water
d) None of these

25) The proteins are the building block of:
a) Carbohydrates
c) Lipids
b) Starch
d) Amino acids

26) Which of the following is not a secondary metabolites?
a) Amino acids
c) Flavonoids
b) Tannins
d) Organic acids

27) The main function of flavonoids in plant is:
a) Flowering
c) Pigmentation
b) Defence
d) To break seed dormancy

28) The phenomenon of photoperiodismwas firstly discovered by:
a) Dixson and Jolley
c) Flint and Alister
b) Garner and Allard
d) Kogl and Smith

29) The Polysaccharide is made up of large no. of .... units:
a) Monosaccharides
c) Oligosaccharides
b) Disaccharides
d) Protein

30) Haemoglobin has a .... structure:
a) Primary
c) Tertiary
b) Secondary
d) Quaternary

31) C, H and O are ------------------------------
a) Minor elements
b) Major elements
c) Micro elements
d) Non-essential elements.

32) Tannins are abundant in the fruit of ---------------
a) Apple
b) Emblica
c) Banana
d) Mango

33) Ellagic acid is obtained from bark of
a) Apple
b) Pomogranate
c) Mango
d) Emblica

34) Alkaloid are produced in plants as -----------------------
a) Food substances
b) Tanins
c) Secondary Metabolites
d) None of the above

35) Morphine is a -----------------------
a) Alkaloid
b) Resin
c) Tanin
d) None of the above

36) ---------------- alkaloids are obtained from a fungus *clavicepspurpurea*
a) Morphine
b) Ergot
c) Nicotine
d) None of The Above

37) Lactic acid is formed as a fermentation product of -------------
a) Animal
b) viruses
c) Bacteria
d) None of the above

38) Lipids are organic compounds that include
a) Fats and waxes
b) phospholipids glucolipids and sterols
c) Both a and b
d) None of the above

39) Fats serve as reserve food in --------------
a) Algae
b) Fungi
c) Seeds
d) None of the above

40) ---------------- give a protective covering on the upper surface of leaves, stems and fruits.
A) Tanins
b) Resins
c) waxes
d) Proteins

ClusterCode :- SD
Sem:-IIIrd
Paper No:-VIIth (New)
Paper Name :-Biochemistry

Class:- B.Sc. (Second Year)
Subject :- Zoology
Date:- 12/03/2021
Time :-1Hrs
Max. Marks:- 40

I. All Question are compulsory
II. All Question are equal Marks.
III. One marks to each correct answer MCQ

Q. 1. Carbohydrates are classified into main .... groups.
    a. One   b. Two   c. Three   d. Four

Q. 2. The main sources of Carbohydrates are ....
    a. Rice   b. Wheat   c. Roots   d. All of the above

Q. 3. Amino Acids are the basic units of ....
    a. Proteins   b. Carbohydrate   c. Lipids   d. None of these

Q. 4. Proteins containing lipids are called ....
    a. Lipoproteins   b. Phospholipids   c. Both A & B   d.None of these

Q. 5. Fatty Acids are the basic unit of .... and most lipids.
    a. Proteins   b. Fats   c. Carbohydrates   d. All of the above

Q. 6. Fats provide support for the organs in the body ....
    a. Stomach   b. Liver   c. Heart   d. Brain

Q. 7. The term enzyme was First introduced by ....
    a. Mulder   b. Porter   c. Kreb's   d. Kuhno

Q. 8. Lock & Key hypothesis was proposed by ....
    a. Emil fisher   b. Lands Teiner   c. Cori   d. Cannon

Q. 9. E-S Complex is also called as ....
    a. Michaelis Complex   b. Lewis Complex   c. Villiam Complex   d. None of these

Q. 10. Which among the following is the nature of enzyme ....
    a. Carbohydrates   b. Proteins   c. Lipid   d. Vitamine

Q. 11. Akoshlandproposed which model ....
    a. Fluid Mosaic Model   b. Induced fit Model
    c. Lock & Key Model   dReflactive index Model

Q. 12. Which of the following statement is incorrect?
    a. Enzymes are protein in nature   b. Enzymes are Colloidal in nature
    c. Enzymes are pherolabile in nature   d. Enzymes are inorganic catalyst

Q. 13. The biosynthesis of Glycogen from Glucose is called ....
    a. Gluconeogenesis   b. Glucogenesis   c. Glycolysis   d. Glucogenolysis

Q. 14. The Glycolysis is also called as ....
    a. EMP   b. EMB   c. ATP d. NAD

Q. 15. The end product of Glycolysis is ....
    a. One molecule of pyruvic acid   b. Two Molecule of pyruvic acid
    c. Three Molecule of pyruvic acid   d. All of the above

Q. 16. The synthesis of carbohydrates from proteins & fats is called ....
    a. Glucogenesis   b. Glucogenolysis   c. Gluconeogenesis   d. None of the above

Q. 17. The breakdowon of Glycogen to Glucose is called ....
    a. Glycogenesis   b. Glycogenolysis   c. Glyconeogenesis   d. None of the above

Q. 18. The kreb's cycle is also known as ....
    a. ETS   b. Glycolysis   c. TCA d. EMP

Q. 19. How many reactions that occur in the ECA Cycle transfer electron from a substrate to an electron accepting enzymes?
    a. 1   b. 2   c. 3   d. 4

Q. 20. Acetyl CoA is a .... Carbon compound.
    a. 1   b. 2   c. 3   d. 4

Q. 21. In the TCSA Cycle, which of the following combines with acetyl CoA to form a 6 carbon compound?
    a. Oxaloacetate   b. Glucose   c. Pyruvate   d. Thiamine

Q. 22. β – Oxidation was first proposed by ....
    a. F-knoop   b. W. Harpey   c. A. Bucner   d. None of these

Q. 23. The base source of trans fatty Acid in diet is ....
    a. Vegetables b. Groundnut   c. Dairy product   d. Fruit

Q. 24. The acidification of Blood due to the build up of ketones is called ....
    a. Ketoacidosis   b. Alkalinity   c. Ketogenesis   d. Ketones

Q. 25. What is the location of Ketogenesis?
    a. Aytosol   b. Plasma membrane   c. Mitochondria   d. Ribosomes

Q. 26. In wchich cell, Ketogenesis takes place?
    a. Brain cell   b. Liver cell   c. Nerve cell   d. None of the above

Q. 27. Where do designation of protein takes place?
    a. Small intestine   b. Stomach   c. Both A & B   d. All of the above

Q. 28. Which reaction is required for the removal of Alpha Amino group to form Ammonia?
    a. Transamination   b. Transcription   c. Deamination   d. Boath A & C

Q. 29. What happens during transamination reaction?
a. Ammonia is liberated   b. Amino group is transferred
c. Amino group is converted   d. All of the above

Q. 30. Which of the following is the only amino acid which can be removed through oxidative Deamination?
a. Glycine   b. Alanine   c. Aspartate   d. Glutamate

Q. 31. Which of the following amino acid do not participate in the transamination reaction?
a. Lysine   b. valine   c. Threonine   d. BoathA& C

Q. 32. The removal of amino group from the amino acid is called ....
a. Deamination   b. Transamination   c. Decarboxylation   d. Transmethylation

Q. 33. In which form ammonia is disposed in the leaver?
a. Urea   b. Uric acid   c. Bile   d. All of the above

Q. 34. Urea is synthesized in ....
a. Cytoplasm   b. Mitochondria   c. Boath A & B   d. Lysosomes

Q. 35. The ammonia acid that undergoes oxidative deamination at the highest rate is ....
a. Glutamine   b. Glutamaate   c, Aspartate   d. Alanine

Q. 36. Urea production occurs almost exclusively in ....
a. Kidney   b. Liver   c. Blood   d. Urine

Q. 37. Which is the first amino group entering into urea cycle?
a. Uric acid   b. fatty acids   c. Amino acid   d. None of these

Q. 38. Nitrogen atoms of urea produced in the urea cycle are derived from ....
a. Amonia& Aspartic – Acid   b. Nitrate   c. Nitrite   d. Ammonia

Q. 39. Urea cycle converts ....
a. Keto Acids into amino acids   b. Amini acid in to keto acids
c. Ammonia into a less toxic form   d. Ammonia into a Moretoxic form

Q. 40. The carbon atom source while producing urea in the urea cycle is ....
a. CO_2 b. Glucose   c. Aspartic Acid   d. Arginine

SB—34—2022

FACULTY OF SCIENCE

B.Sc. (Third Semester) EXAMINATION

MAY/JUNE, 2022

(CBCS/New Pattern)

CHEMISTRY

Paper-VII

(Physical and Inorganic Chemistry)

(Thursday, 9-06-2022)   **Time : 2.00 p.m. to 4.30 p.m.**

Time— 2½ Hours   *Maximum Marks—40*

N.B. :—   (i)   *All* questions are compulsory.

      (ii)   Use of logarithmic table and simple calculator is allowed.

1.   Solve any *three* of the following :   15

    (i)   What is Radioactivity ? Give the characteristic properties of α-particle.

    (ii)   Define the following terms :

       (a)   Isotopes

       (b)   Isobars

       (c)   Isotones

       (d)   Isomers

       (e)   Nuclear fission

    (iii)   Explain the stability of Nucleus on the basis of Neutron/Proton ratio and Magic Numbers.

    (iv)   What is gravimetric analysis ? Explain the steps involved in Gravimetric analysis.

P.T.O.

(v) Define Precipitation. Explain different types of precipitation with suitable example.

2. Solve any *three* of the following : 3×5=15

(i) State and explain photoelectric effect.

(ii) Write a note on Planck's quantum theory. Calculate the de-Broglie wavelength of electron moving with a velocity of 3×10^8 m/s (Given mass of electron $= 9.11 \times 10^{-31}$ kg & $h = 6.626 \times 10^{-34}$ Js).

(iii) Write any *four* statements of first law of thermodynamics and give its mathematical expansion.

(iv) Derive an expression for entropy change of an ideal gas as a function of temperature and volume.

(v) Describe the phase diagram of Water system.

3. Solve any *two* of the following : 2×5=10

(i) Derive Schrodinger wave equation.

(ii) Give the statement of Third Law of Thermodynamics. Explain Nernst heat theorem.

(iii) Define entropy and give its unit. Calculate the entropy change when one mole of ethanol is evaporated at 351 K. The molar heat of vaporisation of ethanol is 39840 J mol^{-1}.

(iv) Explain upper critical solution temperature with suitable example.

AO—38—2018

FACULTY OF SCIENCE

B.Sc. (Second Year) (Fourth Semester) EXAMINATION

MARCH/APRIL, 2018

(CBCS/CGPA Pattern)

CHEMISTRY

Paper VIII

(Organic + Inorganic)

(MCQ & Theory)

(Tuesday, 20-03-2018)　　　　　Time : 2.00 p.m. to 4.00 p.m.

Time—2 Hours　　　　　　　　Maximum Marks—40

N.B. :— (i)　Attempt *All* questions.

(ii)　All questions carry equal marks.

(iii)　Use separate answer sheet (OMR sheet) for MCQ question No. 1.

(iv)　Use black ball point pen to darken the circle of correct choice in OMR sheet.

(v)　Use only *one* answer book for Section A and B.

MCQ

1.　Select the correct answer for each of the following multiple choice questions :

(i)　The process of converting an optically active compound into Racemic modification is known as :

　　(a)　Resolution　　　　　(b)　Isomerism

　　(c)　Crystallisation　　　(d)　Racemisation

(ii)　Which of the following compounds is optically inactive ?

　　(a)　Glyceraldehyde　　　(b)　Lactic acid

　　(c)　Meso-tartaric acid　　(d)　None of these

P.T.O.

(iii) Pick out the odd one from the following :
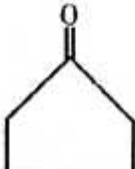
    (a) Glucose   (b) Maltose

    (c) Mannose   (d) Galactose

(iv) Reduction of glucose with HI and Red P yields :

    (a) *n*-Hexane   (b) Sorbitol

    (c) Glucaric acid   (d) Glucosazone

(v) Commercially urea is prepared from :

    (a) CO and NH_3 (b) CH_3COOH and NH_3

    (c) CO_2 and NH_3 (d) $HCHO$ and NH_3

(vi)

 $+ CH_2N_2 \longrightarrow A + N_2$ where A is :

(a)

(b)

(c)

(d)
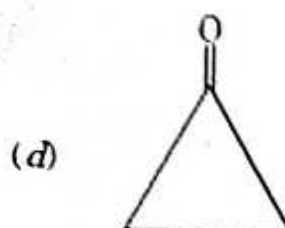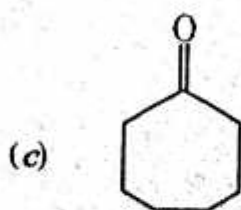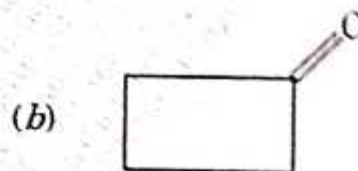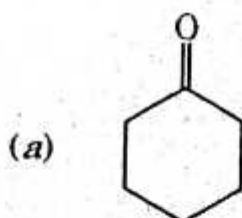
(vii) Which of the following is ozone ?

    (a) [O]   (b) O_3

    (c) O_2 (d) All of these

(viii) The formula of Vsaka's compound is :

    (a) $[Ir(PF_3)_4]$ (b) $[Ir_4(CO)_{12}]$

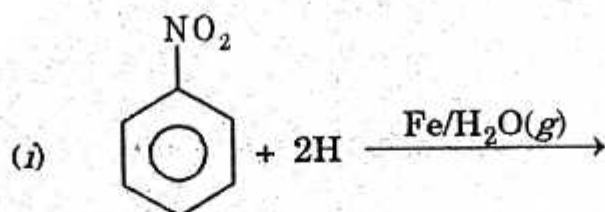   (c) $[IrCl(CO)(PPh_3)_2]$ (d) $[Ir(PCl_3)_4]$

(*ix*) Which of the following is naturally occurring actinide ?

(*a*) CF (*b*) Pu

(*c*) No (*d*) Th

(*x*) Which of the Lanthanides has configuration $4f^{7}5d^{1}6s^{2}$?

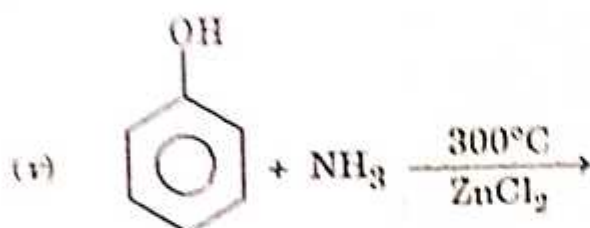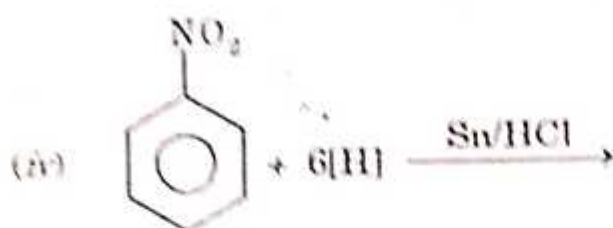(*a*) Sm (*b*) Gd

(*c*) Eu (*d*) Tb

Theory

Section A : Organic Chemistry

2. Answer any *two* of the following :

(*a*) Discuss the conformational analysis of *n*-butane.

(*b*) How will you convert glucose into mannose ?

(*c*) What is reagent ? Give any *one* preparation method of each of th following :

(*i*) SeO_2 (*ii*) O_3

(*iii*) O_sO_4 (*iv*) BF_3

(*d*) Predict the products :

(*i*) $C_6H_5NO_2$ + 2H $\xrightarrow{Fe/H_2O(g)}$

(*ii*) $C_6H_5NO_2$ $\xrightarrow[\text{Conc. } H_2SO_4]{\text{Electrolytic reduction}}$

(*iii*) $C_6H_5NO_2$ + conc. HNO_3 $\xrightarrow{\text{Conc. } H_2SO_4}$

(iv)

NO_2 + 6[H] $\xrightarrow{Sn/HCl}$

(v)

OH + NH_3 $\xrightarrow[ZnCl_2]{300°C}$
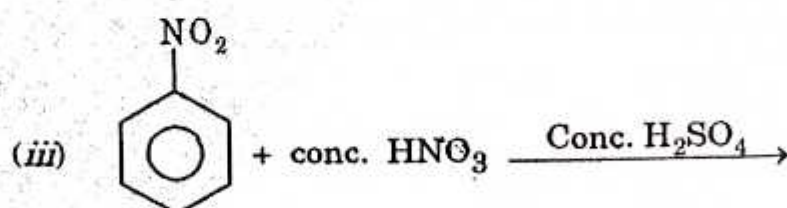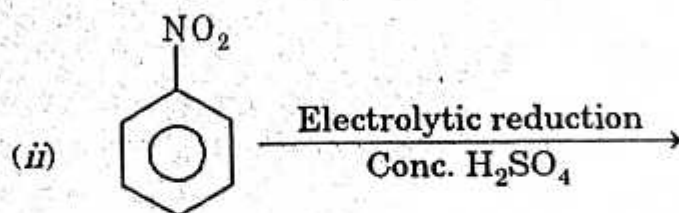
3. Answer any *two* of the following :

   (a) What is asymmetric carbon ? Give R and S forms of :

      (i) Lactic acid

      (ii) 2-Bromobutane

   (b) Explain open chain structure of glucose.

   (c) What is the effect of —CH_3, —OCH_3 and —NO_2 groups on basicity of Aniline ?

   (d) (i) Explain structural isomerism and stereoisomerism.

      (ii) Give any *three* synthetic applications of BF_3.

Section B : Inorganic Chemistry

4. Answer any *two* of the following :

   (a) Write the applications of Lanthanides.

   (b) Describe in brief the extraction of uranium from pitchblend by acid digestion method.

   (c) Give the general characteristics of '*d*' block elements.

   (d) (i) Give *two* examples of complexes of Pt(IV).

      (ii) 'Ions of Actinides are coloured.' Explain.

This question paper contains **4 printed pages]**

W—41—2018

FACULTY OF SCIENCE

B.Sc. (Second Year) (Fourth Semester) EXAMINATION
OCTOBER/NOVEMBER, 2018
(CBCS/CGPA Pattern)
CHEMISTRY
Paper VIII (CCC IV)
(Organic and Inorganic Chemistry)
(MCQ+Theory)

(Thursday, 11-10-2018)   Time : 2.00 p.m. to 4.00 p.m.

Time—2 Hours   *Maximum Marks—40*

N.B. :— (i)   Attempt *All* questions.

(ii)   *All* questions carry equal marks.

(iii)   Use separate answer-sheet (OMR sheet) for MCQ Q. No. 1.

(iv)   Use of black ball point pen to darken the circle of correct choice in OMR-sheet.

(v)   Use only one answer-book for Section A and B.

(MCQ)

1.   Select the correct answer for each of the following multiple choice questions :

(i)   The separation of Racemic mixture into its two optically active compounds is known as ....
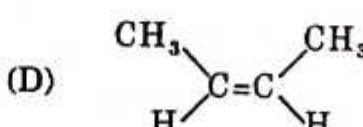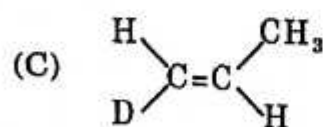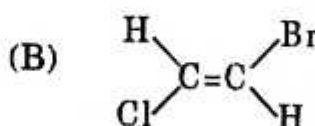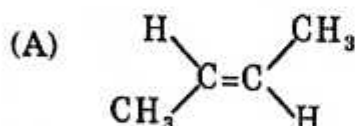
(A)   Racemisation   (B)   Resolution

(C)   Crystallisation   (D)   Enantiomerism

(ii)   Which of the following compounds is Z form of geometrical isomer ?

(A)

(B)

(C)

(D)

P.T.O.

(iii) Fructose is ....

(A) Ketose   (B) Aldose

(C) Glycose   (D) All of these

(iv) Anomers of glucose (α form and β form) differ in the stereochemistry at ....

(A) C—1   (B) C—2

(C) C—3   (D) C—4

(v) Aniline + Aldehyde $\xrightarrow{\text{Warm}}$ A + H_2O; where A is ....

(A) carbyl amine   (B) acetanilide

(C) schiff base   (D) benzoyl chloride

(vi) Which of the following compounds is least basic ?

(A) p-methoxy aniline   (B) p-nitro aniline

(C) Aniline   (D) p-methyl aniline

(vii) A + $2O_2$ (air) $\xrightarrow{\text{Strong heat}}$ OsO_4; where A is :

(A) Se   (B) Pb

(C) Os   (D) Fe

(viii) Which of the following trivalent Lanthanide ion is diamagnetic ?

(A) Tm^{+3} (B) Pr^{+3}

(C) Lu^{+3} (D) Nd^{+3}

(ix) Which of the following ions is colourless in its aqueous solution ?

(A) Th^{+4} (B) Np^{+3}

(C) Am^{+3} (D) Cm^{+3}

(x) Which of the following do not belong to the same group ?

(A) Cr, Mo, W   (B) Ni, Pd, Pt

(C) Cu, Ag, Au   (D) Mn, Ru, Re

(Theory)

Section A

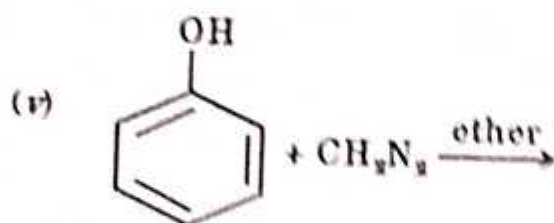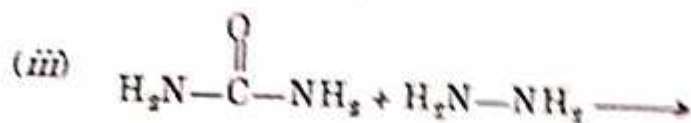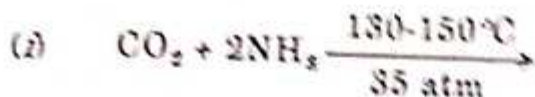(Organic Chemistry)

2. Solve any *two* of the following :

(a) Discuss enantiomers and diastereoisomers with suitable example.

(b) Give reduction reactions of nitrobenzene under alkaline medium in detail.

(c) Explain osazone formation of glucose with mechanism.

(d) Give *two* methods for the synthesis of BF_3. What happens when :

    (i) OsO_4 reacts with alkene

    (ii) SeO_2 reacts with cyclohexanone

    (iii) CH_3OH reacts with CO in the presence of BF_3 ?

3. Solve any *two* of the following :

(a) Explain with suitable example :

    (i) Plane of symmetry and centre of symmetry.

    (ii) Walden inversion.

(b) Predict the products :

    (i) $CO_2 + 2NH_3 \xrightarrow[\text{85 atm}]{\text{130-150°C}}$

    (ii) $H_2N-\overset{\overset{\displaystyle O}{\|}}{C}-NH_2 \xrightarrow{H^+/H_2O}$

    (iii) $H_2N-\overset{\overset{\displaystyle O}{\|}}{C}-NH_2 + H_2N-NH_2 \longrightarrow$

    (iv) $H_2N-\overset{\overset{\displaystyle O}{\|}}{C}-NH_2 + SOCl_2 \longrightarrow$

    (v) Phenol (OH) $+ CH_2N_2 \xrightarrow{\text{ether}}$

(c) How will you prepare Selenium dioxide ? Give its any *four* synthetic applications.

(d) Explain cyclic structure of glucose.

Section B

(Inorganic Chemistry)

4. Answer any *two* of the following :

(a) What is Lanthanide contraction ? Give its cause and consequences.

(b) Compare the properties of actinides with that of lanthanides.

(c) Write the electronic configuration of third transition series.

(d) (i) Give *three* ores of uranium with formulae.

    (ii) Write a note on Fulmunating gold.

FACULTY OF SCIENCE
Winter -2020
Class- B.Sc. (Second Year) (Fourth Semester)
CHEMISTRY
Paper-VIII
Paper Name : Organic and Inorganic Chemistry (OLD)
(MCQ Pattern)
Cluster Code: SD

Date : 09/03/2021   Time : 1 Hours   Maximum Marks : 40

N.B. :- (i) Attempt All questions.
(ii) Each question carry one mark .
(iii) No Negative Marking system
(iv) Use OMR answer sheet.

1. Biuret is obtained by heating.........

a) Benzene diazonium salt   b) Aniline   c) Urea   d) Nitrobenzene

2. Maleic acid on cis hydroxylation using OsO_4 gives ....

a) Glycol   b) Tartaric acid   c) Glyceraldehydes   d) Ethanol

3. $CH_3CHO \xrightarrow{SeO_2}$ A; Where A is ----

a) CH_3OH b) $OHC.CHO$ c) CH_3CH_2OH d) CH_5COOH

4. $Os + O_2 \xrightarrow{Heat}$ A; Where A is ----

a) OsO_2 b) OsO_3 c) O_2 d) OsO_4

5. $HCOOH \xrightarrow{SeO_2}$ A + B; Where A & B are ----

a) $HCHO$ b) CH_3OH c) CO_2 & H_2O d) Both (a) and (b)

6. Which of the following conversion is an example of Ruff degradation ?

a) Glucose to Arabinose   b) Arabinose to glucose

c) Glucose to fructose   d) Fructose to Glucose

7. Glucose contains ----- asymmetric (Chiral) carbons.

a) Two   b) Four   c) Six   d) Eight

8. Conversion of glucose into mannose is an example of ----

a) Mutarotation   b) Epimerisation

c) Hydrolysis   d) Fermentation

9. Reduction of nitrobenzene with H_2/Ni gives ....

a) Benzene   b) Phenol   c) Aniline   d) Toluene

1

10. Phenol react with ammonia in presence of $AlCl_3$ gives ....

a) Chlorobenzene   b) Aniline   c) Benzene   d) Anisole

11. Aniline react with chloroform and alco. KOH gives ....

a) Benzene   b) Phenol   c) Toluene   d) Carbylamine

12. Diazomethane on heated to give ....

a) Carbocation   b) Carbene   c) Nitrene   d) Carbanion

13. Commercially urea is prepared from ....

a) CO & NH_3 b) CH_3COOH & NH_3

c) CO_2 & NH_3 d) $HCHO$ & NH_3

14. Urea is the most important derivative of ....

a) carbolic acid   b) carbonic acid   c) carboxylic acid   d) phenol

15. The compounds having same molecular formula but differ from each other in physical or chemical properties are called -----

a) Alkoxides   b) Iso compounds   c) Isomers   d) None of these

16. The compounds having same molecular formula and structural formulas but differ in arrangement of atoms or groups in space are called as ----

a) Stereoisomers   b) Structural isomers

c) Optical isomers   d) None of these

17. The optical isomers which rotate plane polarised light towards clockwise direction, such compounds are called as----

a) Dextro rotatory   b) Laevo rotatory   c) Both a & b   d) None of these

18. A carbon atom which is bonded to four different groups is called as

a) Asymmetric carbon   b) Chiral carbon

c) Dissymmetric carbon   d) All of these

19. A compound with two or more asymmetric carbon atoms and having plane of symmetry is called ---

a) Meso compound   b) Tautomeric compound

c) Racemic mixture   d) Diastereomeric compound

20. How many optical isomers are possible for 2- butanol ?

a)   2   b)   4   c)   6   d)   8

21. Optical isomers that are mirror images of each other are called as ---

a) Distereoisomers   b) Enantiomers

c) Metamers   d) Tautomers

22. Urea is called as ....

    a) carbolic acid   b) carboxylic acid

    c) carbamide   d) None of these

23. An equimolar mixture of two enantiomers is called ....

    a) Enantiomeric compounds   b) diastereomeric compounds

    c) Racemic mixture   c) Resolution

24. Which of the following is an example of monosaccharides ?

    a) Sucrose   b) Raffinose   c) Starch   d) Glucose

25. Which of the following is an example of polysaccharides ?

    a) Sucrose   b) Raffinose   c) Starch   d) Glucose

26. Glucose contains ....

    a) an aldehyde group   b) a ketonic group

    c) six hydroxyl group   d) a cyanide group

27. Sucrose is an example of ....

    a) monosaccharides   b) disaccharides

    c) trisaccharides   d) polysaccharides

28. Which of the following trivalent lanthanide ions is not coloured

    a) Er^{3+} b) Yb^{3+} c) Pm^{3+} d) Sm^{3+}

29. The Separation of lanthanides in ion-exchange method is based on

    a) basicity of lanthanides   b) oxidation state of the ion

    c) solubility of their nitrates   d) size of the ions

30. Which of the following does not belong to First Transition Series

    a) Silver   b) Cobalt   c) Chromium   d) Vanadium

31. Mo and W belong to group of

    a) Cu   b) Mn   c) Fe   d) Cr

32. Atomic radii of third transition series, along the period

    a) increases regularly   b) decreases regularly

    c) first increases and then decreases   d) first decreases and then increases

3

33. Which of the following does not belong to lanthanides

a) Nd   b) Tm   c) Cm   d) Ce

34. The principal oxidation state of lanthanides is

a)+2   b)+3   c) +4   d) zero

35. Which lanthanide has the configuration $4f^7 5d^1 6s^2$

a) Sm   b) Gd   c) Eu   d) Tb

36. Which of the following has smallest ionic size

a) La^{3+} b) Cd^{3+} c) Dy^{3+} d) Lu^{3+}

37. The number of unpaired electrons in Cr^{+2} (Z=24)

a) 4   b) 2   c) 3   d) 1

38. In the first transition series, the highest oxidation state is exhibited by

a) Mn   b) Cr   c) Co   d) Cu

39. The First Transition series comprisesof elements from

a) scandium to zinc

b) lanthanium to hafnium

c) yttrium to cadmium

d) none of these

40. The Expected magnetic moment of Ti^{3+} ion is

a) 4.90   b) 2.84   c) 1.73   d) 0