UNIVERSITY OF THE PUNJAB

Roll No. .....

First Semester 2017

Examination: B.S. 4 Years Programme

(Special Examination)

PAPER: Chemistry-I (Physical Chemistry) **TIME ALLOWED: 30 mins.**

Course Code: CHEM-101 / CHM-11020/11304 **MAX. MARKS: 10**

Attempt this Paper on this Question Sheet only.

OBJECTIVE

Q1. Each question has FOUR possible answers, encircle the right one: **(1×10=10)**

I Isothermal process is one in which
A temperature of system remains constant B no heat enters or leaves the system
C no change in volume takes place D All

II Bragg's equation can be written as
A $n\lambda=2dSin\theta$ B $nd= 2\lambda Sin\theta$
C $2\lambda= ndSin\theta$ D $2\lambda d=nSin\theta$

III "Gouys Balance" is used to measure
A Magnetic polarization B Magnetic susceptibility
C Dipole moment D Ebullioscopic constant

IV ----------is/are example/s of colligative property/properties
A Lowering of vapor pressure B Elevation of boiling point
C Depression of freezing point D all

V According to Freundlich adsorption isotherm for gas on solid, at very high pressure of gas, extent of adsorption, x/m, _____, where x is mass of gas adsorbed on mass m of the adsorbent.
A Independent of pressure B Directly related to pressure
C Inversely related to pressure D none

VI Units of surface tension are _____
A Nm B Nm^2
C Nm^{-2} D Nm^{-1}

VII Solutions with same _____ are called isotonic solution.
A Osmotic pressure B Vapor pressure
C Partial molar volume D none

VIII Critical temperature is the temperature for a gas _____of which gas can never be liqufied.
A Below B Above
C Both a & b D none

IX Coagulation of a given sol can be brought about by _____.
A Addition of electrolyte B Electrophoresis
C Both a & b D none

X Coordination number of Na^{+1} as well as Cl^{-1} ions in NaCl is
A 6 B 8
C 4 D 1

UNIVERSITY OF THE PUNJAB

Roll No. .....

First Semester 2018

Examination: B.S. 4 Years Programme

PAPER: Chemistry-I (Physical Chemistry) **TIME ALLOWED: 30 mins.**

Course Code: CHEM-101 / CHM-11020 **MAX. MARKS: 10**

Attempt this Paper on this Question Sheet only.

OBJECTIVE

Q1. Each question has four possible answers, encircle the right one. (1×10=10)

(i) The solution is always

(a) Homogenous (b) heterogeneous (c) Colloid (d) None of these

(ii) The units of zero order rate constant are

(a) $mmol^{-1}$ (b) $mol\ dm^{-3}sec^{-1}$ (c) $m^2\ mol^{-2}$ (d) $mol\ m^{-2}$

(iii) The values of Michaelis-Menten constant (K_M) are expressed in

(a) $kg\ mol^{-1}$ (b) kg mol (c) $mol\ dm^{-3}$ (d) dm^{-3}

(iv) The value of Gibbs energy at constant pressure

(a) Increases with temperature (c) Decreases with increase in temperature

(b) Remains constant (d) None of these

(v) The Langmuir adsorption isotherm for adsorption of a gas on solid is $\theta = \frac{ap_A}{1+ap_A}$.

It can be expressed as

(a) $p_A = \frac{\theta}{a(1-\theta)}$ (b) $p_A = \frac{\theta}{a(1+\theta)}$ (c) $p_A = \frac{a\theta}{(1+\theta)}$ (d)None of these

(vi) The Freundlich adsorption isotherm $(x/m) = kp^{1/n}$ in term of equation of straight line in intercept form can be written as:

(a) $\log(x/m) = (1/n) \log p + \log k$ (b) $\log(x/m) = \log p + (1/n) \log k$

(b) $\log(x/m) = \log n + (1/k) \log p$ (d) $\log(x/m) = n \log p + (1/n) \log k$

(vii) The SI units of pre-exponential factor A in equation $k = Ae^{\frac{E_a}{RT}}$ for 2nd order reaction are

(a) $M^{-1}S^{-1}$ (b) $M^{-2}S^{-1}$ (c) MS^{-1} (d) None of these

(viii) The phenomenon of scattering of light by colloidal particles is called

(a) Compton Effect (b) Doppler Effect (c) Electrophoresis effect (d) Tyndall Effect

(ix) The units of molal freezing point constant (k_f) are

(a) $K\ kg\ mol^{-1}$ (b) $K\ kg\ mol^{-2}$ (c) K kg mol (d) $K\ kg^{-1}\ mol$

(x) The movement of colloidal particles under an applied electric potential is called

(a) Electrophoresis (b) Electro-osmosis (c) Cataphoresis (d) A and C

UNIVERSITY OF THE PUNJAB

First Semester 2017
Examination: B.S. 4 Years Programme
(Special Examination)

Roll No. .....

PAPER: Chemistry-I (Physical Chemistry) **TIME ALLOWED: 2 hrs. & 30 mins.**
Course Code: CHEM-101 / CHM-11020/11304 **MAX. MARKS: 50**

Attempt this Paper on Separate Answer Sheet provided.

SUBJECTIVE

Q2. Write the short and concise answer for each question: **(2×10=20)**

a) Define "Collision number"

b) What is reheochor?

c) Differentiate between surface tension and viscosity.

d) Define " Heat capacity at constant volume".

e) Describe second law of thermodynamics.

f) What is meant by adiabatic process?

g) Give expression of rate constant of 1^{st} order reaction with units of 1^{st} order rate constant.

h) What are colligative properties?

i) Describe "Tyndal Cone Effect".

j) Differentiate between Physical and Chemical adsorption.

Questions with Brief Answers **(3 X 10 = 30)**

Q. 3 What is meant by Carnot cycle? Derive expression for efficiency of heat engine.

Q. 4 What is osmotic pressure and how it can be determined?

Q. 5 What is magnetic susceptibility and how it can be determine by Gouys balance?

UNIVERSITY OF THE PUNJAB

Roll No. .....

First Semester 2018

Examination: B.S. 4 Years Programme

PAPER: Chemistry-I (Physical Chemistry) **TIME ALLOWED: 30 mins.**

Course Code: CHEM-101 / CHM-11020 **MAX. MARKS: 10**

Attempt this Paper on this Question Sheet only.

OBJECTIVE

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(a) $kg\ mol^{-1}$ (b) kg mol (c) $mol\ dm^{-3}$ (d) dm^{-3}

(iv) The value of Gibbs energy at constant pressure

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It can be expressed as

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(a) log(x/m) = (1/n) log p + log k (b) log(x/m) = log p + (1/n) log k

(b) log(x/m) = log n + (1/k) log p (d) log(x/m) = n log p + (1/n) log k

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(a) $M^{-1}S^{-1}$ (b) $M^{-2}S^{-1}$ (c) MS^{-1} (d) None of these

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(a) $K\ kg\ mol^{-1}$ (b) $K\ kg\ mol^{-2}$ (c) K kg mol (d) $K\ kg^{-1}\ mol$

(x) The movement of colloidal particles under an applied electric potential is called

(a) Electrophoresis (b) Electro-osmosis (c) Cataphoresis (d) A and C

UNIVERSITY OF THE PUNJAB

First Semester 2018
Examination: B.S. 4 Years Programme

Roll No. .....

PAPER: Chemistry-I (Physical Chemistry) **TIME ALLOWED: 2 hrs. & 30 mins.**
Course Code: CHEM-101 / CHM-11020 **MAX. MARKS: 50**

Attempt this Paper on Separate Answer Sheet provided.

SUBJECTIVE

Q. 2 Answers the following short questions: (2×10=20)

(a) Define the term colloids.

(b) What is 1st order reaction? Give units of 1st order rate constant.

(c) What is refractive index? Has it any units?

(d) Give a mathematical relation between standard Gibbs energy change and equilibrium constant.

(e) What is adsorption isotherm?

(f) Describe term osmotic pressure.

(g) Write two conditions of ideal solution.

(h) What is difference between Gibbs energy and Helholtz energy?

(i) Give two applications of adsorption.

(j) What do you understand by association in solution?

Questions with brief answers

Q.3 (a) Discuss critical phenomena in gases. (5)

(b) What is heat capacity? Derive relation between C_p and C_v. (5)

Q.4 (a) Derive kinetic equation for 1st order reaction. (5)

(b) Briefly describe the classification of colloids. (5)

Q.5 (a) What is adsorption isotherm? Derive Langmuir adsorption isotherm. (5)

(b) Derive Clausius-Clapeyron equation to discuss the effect of temperature on vapor pressure. (5)

UNIVERSITY OF THE PUNJAB

Roll No. .....

First Semester 2018

Examination: B.S. 4 Years Programme

PAPER: Fundamentals of Chemistry (Basic Chemistry) **TIME ALLOWED: 30 mins.**

Course Code: CHEM-111 **MAX. MARKS: 10**

Attempt this Paper on this Question Sheet only.

Q. No. 1 Encircle the most appropriate choice.

i. The contact angle for the rising liquid in a capillary tube is;

(a) Equal to 90° **(b)** Less than 90°
(c) Greater than 90° **(d)** Always 120°

ii. The wave number of the light emitted by a certain sourse is $2x10^6$m the wave length of this light will be

a- 500nm b-500m c-200nm d-$5x10^7$m

iii. The molar volume of CO_2 is maximum at

a-STP b-127°C and 1atm c-0°C and 2 atm d-273°C and 2atm

iv. Which one of the following elements belongs to d-block?

(a) Sr **(b)** Ni **(c)** Al **(d)** Ga

v. What are the units of rate constant of a second order reaction.

(a) $dm^6 mol^{-2}$ 5 **(b)** S^{-1} **(c)** $dm^3 mol S^{-1}$ (d) $mol S^{-2}$

vi. Which is more electronegative?

(a) Sp **(b)** Sp^2 **(c)** Sp^3 **(d)** dSp^3

vii. Election donating groups on phenol increases

(a) Acidity **(b)** Basicity **(c)** Neutral **(d)** All

viii) Which one of the followings is strongest acid?

(a) CH_3COOH **(b)** $F\text{-}CH_2COOH$

(c) $Cl\text{-}CH_2COOH$ **(d)** $Br\text{-}CH_2COOH$

ix) Wavelength range of visible spectrum is;

(a) 450 —— 700 nm **(b)** 450 —— 750 nm

(c) 400 —— 750 nm **(d)** 450 —— 800 nm

x) Which of the followings is an alpha particle?

(a) $_1H^1$ **(b)** $_2He^4$

(c) $_1e^0$ **(d)** $_0n$

UNIVERSITY OF THE PUNJAB

Roll No. .....

First Semester 2018

Examination: B.S. 4 Years Programme

PAPER: Fundamentals of Chemistry (Basic Chemistry) **TIME ALLOWED: 30 mins.**

Course Code: CHEM-111 **MAX. MARKS: 10**

Attempt this Paper on this Question Sheet only.

Q. No. 1 Encircle the most appropriate choice.

i. The contact angle for the rising liquid in a capillary tube is;

(a) Equal to 90^{o} **(b)** Less than 90^{o}

(c) Greater than 90^{o} **(d)** Always 120^{o}

ii. The wave number of the light emitted by a certain sourse is $2x10^{6}$m the wave length of this light will be

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(a) $_{1}H^{1}$ **(b)** $_{2}He^{4}$

(c) $_{1}e^{0}$ **(d)** $_{0}n$

UNIVERSITY OF THE PUNJAB

First Semester 2018
Examination: B.S. 4 Years Programme

Roll No. .....

PAPER: Fundamentals of Chemistry (Basic Chemistry) **TIME ALLOWED: 2 hrs. & 30 mins.**
Course Code: CHEM-111 **MAX. MARKS: 50**

Attempt this Paper on Separate Answer Sheet provided.

SECTION-1

Q. No.2 Give answers to the following short questions. **2×10 = 20**

i. Justify that Rheochor is an additive and Constitutive property?
ii. Explain delocalized bonding in 1, 3- butadiene.
iii. Define and illustrate bonding and antibonding molecular orbitals in O_2^{+2}.
iv. What are Radioisotopes? Give their three applications.
v. Why phenol is acidic and alcohol is neutral?
vi. Why Ammonia is more basic than Aniline? Explain briefly.
vii. Justify that the viscosity of gases increases with increase in temperature but reverse is true for liquids
viii. Why the Transition Elements show variable valence?
ix. Explain the structure of benzene on the basis of Hybridization.
x. What is Einstein theory of photoelectric effect?

SECTION-II

Q. No. 3 Attempt all the following long questions. **5×6=30**

a) Derive expression for radioactive decay rate constant of a radioactive substance.
b) Explain the structure of,PCL_5, NH_3 , BF_3 and $BeCl_2$ on the basis of Hybridization.
c) Write mechanism of reaction of 1-Butanoic acid with Propanol, Ammonia, Thionyl chloride and PCl_5.
d) Define term hybridization. Explain d^2sp^3,dsp^3,$sp^2$and sp hybridization with at least one example.
e) Write rules for Nomenclature of Carboxylic Acids. Give example of each rule.
f) Derive the equation for First order reaction in which the initial concentrations is 'a' moles dm^{-3}.Also calculate half life and unit of first order reaction.

UNIVERSITY OF THE PUNJAB

Second Semester - 2018

Examination: B.S. 4 Years Programme

Roll No. .....

PAPER: Chemistry-II (Inorganic Chemistry) **TIME ALLOWED: 15 Mints.**

Course Code: CHEM-103, CHM-12304 Part – I (Compulsory) **MAX. MARKS: 10**

Attempt this Paper on this Question Sheet only.

Please encircle the correct option. Each MCQ carries 1 Mark. This Paper will be collected back after expiry of time limit mentioned above.

Q.1 Each question has four possible answers. Choose the correct answer and encircle it. $1 \times 10 =$ **10)**

i. Which of the following theory/model explain splitting of d-orbital?

a) VBT b) VSEPR c) CFT d) all a, b, c

ii. Aluminium hydride shows---- structure

a) polymeric b) monomeric c) dimeric d) none of these

iii. A source of greater stability of pi-bonds between the smaller atoms could be the better overlap of

a) 4p orbital b) 5p orbital c) 2p orbital d) 6p orbital

iv. According to LUX-FLOOD acid-base concept, base is a

(a) OH^{-1} ion donor (b) electron pair donor (c) oxide ion donor (d) all

v. BF_3 is a Lewis

(a) base (b) acid (c) salt (d) none of these

vi. Which of the following is a soft acid

(a) Na (b) K (c) Ni (d) Bi

vii. Which of the following orbitals of metal ions have almost same energy and same shape

a) atomic orbital b) hybrid orbital c) a and b d) none of these

viii. Which of the following anion has higher polarizability

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

ix. Which of the following is not used for detection and measurement of radioactivity?

(a) cyclotron (b) cloud Chamber (c) bubble Chamber (d) electrometer

x. Which of the following is the valence shell configuration of chromium?

a) $4s^2, 3d^4$ b) $4s^2, 3d^3$ c) $4s^1, 3d^5$ d) $4s^2, 3d^5$

UNIVERSITY OF THE PUNJAB

Second Semester - 2018

Examination: B.S. 4 Years Programme

Roll No. .....

PAPER: Chemistry-II (Inorganic Chemistry) **TIME ALLOWED: 2 Hrs. & 45 Mints.**

Course Code: CHEM-103, CHM-12304 Part – II **MAX. MARKS: 50**

Attempt this Paper on Separate Answer Sheet provided.

Q.2 Attempt all short questions **(2 × 10 = 20)**

i. Which of the following possess more ionization potential and why?

a) Be b) B

ii. O_2 molecule is paramagnetic in nature. Justify the statement.

iii. Bi-S bond is relatively more stable than Bi-N bond. Give reason on the basis of HSAB concept.

iv. What is the main failure of CFT?.

v. How methyl orange changes color when pH is changed?

vi. Sketch the structures of benzoid and quinonoid forms of methyl orange in different pH media.

vii. What are ionization isomers? Give two examples

viii. Justify that emission of a α-particles by a radioactive isotope shifts its two positions to the left in the periodic table.

ix. Why HF is weaker acid than HCl in aqeous solution?

x. Why color of anhydrous copper sulphate is white?

Note: Attempt all questions.

Q.3 Compare the structures of following on the basis of VBT, MOT and CFT.

i. $[Fe(H_2O)_6]^{2+}$ ii. $[Fe(CN)_6]^{4-}$ (5+5=10)

Q.4 a). Explain Mullikan's scale of Electroneagativity. **05**

b). Write a brief note on natural radioactivity **05**

Q.5 What is Diagonal relationship? Explain this concept with suitable examples. **10**

UNIVERSITY OF THE PUNJAB

Second Semester - 2018

Examination: B.S. 4 Years

Roll No. .....

PAPER: Biochemistry **TIME ALLOWED: 15 Min.**

Course Code: CHEM-121 Part – I (Compulsory) **MAX. MARKS: 10**

Attempt this Paper on this Question Sheet only.

Please encircle the correct option. Each MCQ carries 1 Mark. This Paper will be collected back after expiry of time limit mentioned above.

Q.1. Encircle the correct item. **(10x1=10)**

i. Amino acids give birth to which of the following family?
   a) Fats and oils b) Nucleic acids
   c) Proteins d) Carbohydrates

ii. How many amino acids cannot be prepare by human body:
   a) 10 b) 18
   c) 5 d) 15

iii. Which is common test for amino acids?
   a) Lucas b) Ninhydrin
   c) Iodine + Starch d) Baeyer's

iv. Which carbonhydrate cannot be hydralysed to give simple sugars?
   a) Monosaccharides b) Disaccharides
   c) Polysaccharides d) Oligosaccharides

v. Which of the following is a hexose?
   a) Sucrose b) Fructose
   c) Mannose d) Maltose

vi. Which is most important source of carbohydrates is human diet?
   a) Sucrose b) Cellulose
   c) Glycogen d) Starch

vii. Which is not soluble in water?
   a) Fructose b) Amylose
   c) Sucrose d) Glucose

viii. Which factor can denature egg white protein?
   a) Temperature Increase b) pH change
   c) Oxidizing condition d) Dissolving in water

ix. Which acts as an insulator for animals?
   a) Proteins b) Fats
   c) Carbohydrates d) Enzymes

x. What is true about solubility of lipids in water?
   a) Partially soluble in water b) Soluble in water
   c) Insoluble in water d) None of above

UNIVERSITY OF THE PUNJAB

Second Semester - 2018

Examination: B.S. 4 Years

Roll No. .....

PAPER: Biochemistry **TIME ALLOWED: 2 Hrs. & 45 Min.**

Course Code: CHEM-121 Part – II **MAX. MARKS: 50**

Attempt this Paper on Separate Answer Sheet provided.

Q.2. Give short answers to the following questions. **(10x2=20)**

i. What is peptide bond? Write down formula of dipeptide?

ii. What is a Zwitter ion? Write down structural formula of a general Zwitter ion?

iii. What are essential and non-essential amino acids?

iv. What is difference between fats and oils?

v. What is difference between a glycosidic linkage and a peptide linkage?

vi. What is meant by rancidity of fats and oils?

vii. What is meant by acidic, basic and neutral amino acids?

viii. Write down structural formula of glycine and alinine?

ix. What is meant by the term reducing and non reducing sugars?

x. Write down classification of proteins.

Q.3. What are carbohydrates. Write down classification of carbohydrates by quoting suitable examples and structural formulas? **(10)**

Q.4. Write down a detailed note on "GLYCOLYSIS"? **(10)**

Q.5. What are lipids? Discuss their structure and composition. What is their biochemical role in body? **(10)**

UNIVERSITY OF THE PUNJAB

Third Semester 2018
Examination: B.S. 4 Years Programme

Roll No. .....

PAPER: Chemistry-III (Organic Chemistry) **TIME ALLOWED: 2 hrs. & 30 mins.**
Course Code: CHEM-201/CHM-21304 **MAX. MARKS: 50**

Attempt this Paper on Separate Answer Sheet provided.

SUBJECTIVE TYPE

Q2. Give short answers to the following questions.

(a) Differentiate between localized bonding and delocalized bonding. (2)

(b) Why aniline is less basic than cyclohexylamine. (2)

(c) Why *ter*-carbocation is more stable than *sec*-carbocation. (2)

(d) How could you differentiate between nonaromatic and antiaromatic compoundsby huckel rule. (2)

(e) How will you convert C_2H_5Br into Propane. (2)

(f) Differentaite between terms enatiomers, diastereomers and epimers with examples. (4)

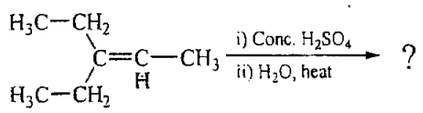
(g) Explain why a chloro group is deactivating but o,p-directing. (2)

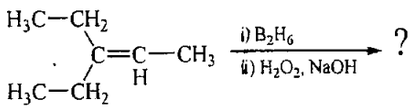
(h) Explain why esters have low boiling point than that of corresponding carboxylix acid. (2)

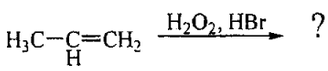
(i) Why cis-1,2-dichloroethene is polar (μ=1.0D), while trans-1,2-dichloroethene is non-polar (μ=1.0D), explain. (2)

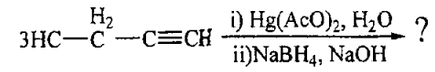
Q3.(a) what are E1 and E2 mechanisms of elimination reaction and also discuss Hoffmann and Sytzeff rules during elimination reaction with examples. (6)

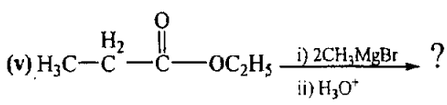
(b) Give the principal products of the following reaction with the mechanism involved in each case. (10)

(i) 

(ii) 

(iii) 

(iv) 

(v) 

(c) Design suitable syntheses of the following compounds starting from benzene? (8)

(i) Naphthalene (ii) 1,3,5-tribromobenzene (iii) Phenol (iv) 3-nitrobenzoic acid

(d) Draw all structural (constitutional) isomers of C_5H_{10} which contain a C=C double bond and label them with IUPAC systematic names. (6)

UNIVERSITY OF THE PUNJAB

Roll No. .....

Third Semester 2018

Examination: B.S. 4 Years Programme

PAPER: Chemistry-III (Organic Chemistry) **TIME ALLOWED: 30 mins.**

Course Code: CHEM-201/CHM-21304 **MAX. MARKS: 10**

Attempt this Paper on this Question Sheet only.

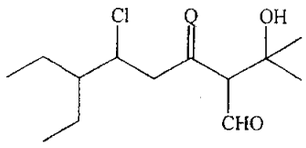
OBJECTIVE TYPE

Q1. Choose a suitable answer.

1. Which of the following group would not have inductive effect (+I).

a. $-NO_2$ b. -CHO c. $-CMe_3$ d. F^-

2. How many stereo centers are present in a compound shown below?



(a) 2 (b) 3 (c) 4 (d) 5

3. Which of the following compound would give hydrogen bonding?

a. Chlorine gas b. Methane c. Propane d. Propanol

4. Which of the following mixture is known as Jones reagent?

a. CrO_3 in Pyridine b. $CrO3 + H_2SO_4$ in acetone

c. Alkaline KMnO4 d. $K_2Cr_2O_7$

5. Appropriate hybridization schemes for the C atoms in molecular CH_3CO_2H are:

a. sp^2 and sp^2 b. sp^2 and sp^3 c. sp^3 and sp^2 d. sp^3 and sp^3

6. What is correct order of increasing acid strength of **(1)** Acetic acid **(2)** Ethanol **(3)** Phenol

a. 1>2>3 b. 2>1>3 c. 1>3>2 d.3>1>2

7. How many resonance structures are possible for anthracene? .

a. 2 b. 3 c. 4 d. 5

8. Grignard reagent reacts readily with solid Carbon dioxide to give:

a. Ketone b. Alcohol c. Carboxylic Acid d. Aldehyde

9. Which of the following compound would not give an alkene on dehydrohalogenation.

a. $C_6H_5CH_2Br$ b. $C_6H_5CH_2CH_2Br$ c. $CH_3CHBrCH_3$ d. $C_6H_5CHBrCH_3$

10. Which of the following alkyl halides would give SN1 most readily.

a. $(CH_3)_3CCH_2Br$ b. $(CH_3)_3CBr$ c. $(CH_3)_3CCH_2CH_2Br$ d. $(CH_3)_2CHCH_2Br$

UNIVERSITY OF THE PUNJAB

Fourth Semester - 2018

Examination: B.S. 4 Years Programme

Roll No. .....

PAPER: Chemistry-IV (General Chemistry) **TIME ALLOWED: 15 Mints.**

Course Code: CHEM-203 / CHM-22304 Part – I (Compulsory) **MAX. MARKS: 10**

Attempt this Paper on this Question Sheet only.

Please encircle the correct option. Each MCQ carries 1 Mark. This Paper will be collected back after expiry of time limit mentioned above.

Q.1 **(1x10=10)**

i) 2,2-dimethylpropanal can undergo
   a) Cannizarro's Reaction
   b) Disproportionation reaction
   c) Aldol condensation
   d) Both (a) and (b)

ii) Which of the following can be used to transfer the energy
   a) Light
   b) Heat
   c) Both a and b
   d) None of these

iii) Order of reactivity of the functional derivatives of carboxylic acids is
   a) Acid chlorides > acid anhydride > esters > amides
   b) Acid anhydride > acid chloride > amides > esters
   c) Acid Chlorides > esters > amides > acid anhydrides
   d) Estes > amides > acid chlorides > acid anhydrides

iv) Kochi Synthesis involves conversion of _____ to _____
   a) Carboxylic acids to anhydrides
   b) Carboxylic acids to alkyl halides
   c) Carboxylic acids to Acid amides
   d) Carboxylic acids to esters

v) The Space orientation of electron is explained by _____ quantum number
   a) Principal
   b) Azimuthal
   c) Magnetic
   d) Spin

vi) Quantum Mechanics is branch of science that deals with
   a) Motion of micro-particles
   b) Stability of Micro-particles
   c) Both a and b
   d) None of these

vii) Electrode potential depends upon
   a) Temperature
   b) Pressure
   c) Concentration
   d) All of these

viii) The correct increasing Energy order of Electromagnetic radiation is
   a) UV>IR>Visible>Microwaves
   b) Microwaves>UV>Visible>IR
   c) UV>Microwaves>Visible>IR
   d) UV>Visible>IR>Microwaves

ix) IR radiations cause
   a) Emission
   b) Vibration
   c) Excitation
   d) None of these

x) Which of the following species can be satisfactorily explained by Bohr's theory
   a) H
   b) He^{+}
   c) Li^{+2}
   d) All of these

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Fourth Semester - 2018

Examination: B.S. 4 Years Programme

Roll No. .....

PAPER: Chemistry-IV (General Chemistry) **TIME ALLOWED: 2 Hrs. & 45 Mints.**

Course Code: CHEM-203 / CHM-22304 Part – II **MAX. MARKS: 50**

Attempt this Paper on Separate Answer Sheet provided.

Q.2 Short Questions **2x10 = 20**

i. Give the general mechanism of Acetoacetic ester systhesis.

ii. What are Acidic and Basic buffers?

iii. Differentiate between Co-precipitation and fractional precipitation

iv. How Principle of UV and IR spectroscopy differs from each other?

v. Discuss the construction and working of Calomel Electrode.

vi. Write down Hittort's rule for migration of ions.

vii. Give Postulates of Quantum Mechanics.

viii. Convert propanoic acid in methane.

ix. How α,β-unsaturated aldehydes are formed by aldol condensation of aldehydes?

x. What is Standard deviation and Relative standard deviation? Which is preferred and why?

Q.3 Extensive Questions

a) Derive Schrodinger wave equation in terms of Polar Coordinates. (5)

b) Briefly describe various types of errors. Give their significance in chemistry. (5)

c) Give and two Nucleophilic Substitution reactions of carbonyl compound along mechanism(s) involved (5)

d) Explain the working and efficiency of Flame emission Spectrophotometry. (5)

e) Compare Hunsdeicker and Kochi reactions. (5)

f) Give four applications if UV Spectroscopy. (5)

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Roll No. .....

Fifth Semester - 2018
Examination: B.S. 4 Years Programme

PAPER: Physical Chemistry | **TIME ALLOWED: 30 mins.**
Course Code: CHEM-301 | **MAX. MARKS: 10**

Attempt this Paper on this Question Sheet only.

OBJECTIVE TYPE

1. The integrated rate equation for zero order reaction is $x = kt$. The half life period of the reaction is:

A. Independent of initial concentration of reactant
B. Directly proportional to the initial concentration of reactant
C. Inversely proportional to the initial concentration of reactant
D. None of these

2. The integrated rate equation for zero order reaction is $x = kt$. The units of rate constant are:

A. S^{-1}
B. MS^{-1}
C. MS
D. $M^{-1}S$

3. The Arrhenius equation is $k = A\, e^{-(Ea/RT)}$. The slope of a plot of ln k vs. 1/T is equal to

A. -k.
B. k.
C. Ea.
D. -Ea /R.

4. A mathematical instruction or a mathematical procedure which is carried out on a function to get another function is called

A. Eigen function
B. Eigen value
C. Laplacian operator
D. Operator

5. $E\Psi = H\Psi$ is the simplest form of Schrodinger Wave equation, where E is the energy and Ψ is the wavefunction. In this equation, what does the H represent?

A. de Broglie relation
B. Hamiltonian operator
C. Avogadro's number
D. Planck's constant

P.T.O.

6. The energy transition between two rotational levels in rigid rotators can be calculated by following expression

A. B(J+1)

B. 2B(J+1)

C. 2J+1

D. Non

7. The Schrodinger Wave equation is a differential equation relates the wave function of electron with its

A. Kinetic Energy

B. Potential energy

C. Vibrational energy

D. Rotational Energy

8. The specific resistance of 0.1N KCl solution was found to 93.6Ωat room temperature.Its specific conductance will be

A. 6.4 mhos B. 0.936mhos C. 9.360 mhos D. 0.11mhos

9. A quantity of 20000 coloumbs is equal to how many Faradays?

a. $3.2x\ 10^{23}$ B. $3.2x10^{22}$ C. $3.2x10^{20}$ D. $3.2x10^{19}$

10.what is the relationship of free energy change and e.m.f of cell:

A. $\Delta G=nEF$ B. $\Delta G=-nEF$ C. $\Delta G^0=nEF$ D. $\Delta G^0=nEF$

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Fifth Semester - 2018

Examination: B.S. 4 Years Programme

Roll No. .....

PAPER: Physical Chemistry | **TIME ALLOWED: 2 hrs. & 30 mins.**

Course Code: CHEM-301 | **MAX. MARKS: 50**

Attempt this Paper on Separate Answer Sheet provided.

SUBJECTIVE TYPE

Section 1 (2 × 10 = 20)

(i) What are Eigen function and Eigen values for a particle moving in 1- D box?

(ii) Write Schrodinger wave equation in term of polar co-ordinate.

(iii) What is Physical significance of Normalization?

(iv) Justify that energy of particle moving in 3-D box is greater than energy of particle moving in 1-D box.

(v) How do you determine specific conductivity of solution?

(vi) State Kohlrausch law?

(vii) Write Nernst equation for Daniel cell?

(viii) What is physical significance of Arrhenius factor A?

(ix) Calculate half life of third order reaction?

(x) What is Ostwald dilution law?

Section II

Q.1 (i) What is equivalent conductance? Derive its units. Discuss the effect of temperature and concentration on equivalent conductance. **04**

(ii) The resistance of a decinormal solution of a salt occupying a volume between the two platinum electrodes 1.80cm apart and 5.4cm^2 in area was found to be 32 ohms. Calculate the equivalent conductance of solution. **03**

(iii) Derive a relation for Debye Huckel Theory for weak electrolyte. **03**

Q.2 (a): Systematically apply Schrodinger wave equation on H-atom and derive Azimuthal quantum number by considering $A_\theta = P_Z$ **05**

(b) : What are rigid rotors. Prove that $E_J = BJ(J+1)$. Also derive zero point energy of Rigid Rotators (05)

P.T.O.

Q.3 Kinetic equation of a certain order reaction is

$$\ln\left(\frac{a}{a-x}\right) = kt \qquad \textbf{(A)}$$

(i) Derive an expression for available concentration of reactant as a function of time and discuss its time dependence with the help of this expression. Give sketch of the following curves: **03**

(a) a-x vs t

(b) x vs t

(ii) What is the extent of reaction? Under what conditions it will be unity? How can you find the value of rate constant graphically using equation A when initial concentration of reactant is unknown? Give Units of k in equation A and predict the order of reaction. **03**

(iii) Concentration of reactant of a reaction following kinetic equation A was determined at two different times during the progress of reaction. 0.05M and 0.025M reactant was found in reaction mixture after 5 and 10 minutes of start of reaction. Calculate the value of k in SI units. **02**

(iv) Prove that the half life period of the reaction following equation A is independent of initial concentration of reactants. If the reaction has a rate constant of 1.00 s^{-1} what is the half life of the reaction? **02**

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Fifth Semester - 2018

Examination: B.S. 4 Years Programme

PAPER: Inorganic Chemistry | **TIME ALLOWED: 30 mins.**

Course Code: CHEM-303 | **MAX. MARKS: 10**

Attempt this Paper on this Question Sheet only.

OBJECTIVE TYPE **(10x1=10)**

NOTE: No mark on question paper except your roll number. Cutting, Overwriting, use of ink removers and Blanko are not allowed.

(1 x 10 = 10)

Choose the correct answer

ii) In the formation of K_4 [Fe $(CN)_6$], the hybridization involved in

a) Sp^2 b) d^2Sp^3 c) d^3Sp^2 d) dSp^2

ii) The octahedral shape is associated with;

a) PF_5 b) SF_4

c) TeF_6 d) ClF_3

iv) In octahedral complexs the *eg* orbitals are called _____.

a) Nonbondoning orbitals **b)** Bonding orbitals

c) Antibonding orbitals **d)** Noneof these

iv) Which one of the following does not obey effective atomic number rule?

a) Co $(Co)_4$ **b)** Ni $(CO)_4$

c) $[CoF_6]^{-3}$ **d)** $Mn_2(CO)_{10}$

v) A conductor has energy bands that are:

a) Completely filled **b)** completely empty

c) Partially filled **d)** none of the above

vi) Ethylenediamine (en) is,

a) Tridentate ligand **b)** Bidentate ligand

c) Hexadentate ligand **d)** Quadridentate ligand

vii) Transition metal in a complex act as

a) Neutral atom b) Lewis acid c) Lewis base d) Electron donor

viii) According to CFT, the metal ligand bond is considered to be;

a) Ionic **b)** Coordinate **c)** Covalent **d)** metallic

x) According to VSEPR theory, the geometry of I_3^- is;

a) Trigonal Planar **b)** Tetrahedral **c)** Pyramidal **d)** Linear

x) For the reaction, the product is 2 Fe $(Co)_5$ $\xrightarrow{hv}$?

a) $Fe_2(Co)_a$ **b)** $Fe_2(CO)_9 + CO$

c) $Fe_2(CO)_{10}$ **d)** $Fe_2(CO)_8 + 2\ CO$

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Fifth Semester - 2018
Examination: B.S. 4 Years Programme

Roll No. .....

PAPER: Inorganic Chemistry | **TIME ALLOWED: 2 hrs. & 30 mins.**
Course Code: CHEM-303 | **MAX. MARKS: 50**

Attempt this Paper on Separate Answer Sheet provided.
SUBJECTIVE TYPE

NOTE:- Attempt all the questions on a separate sheet. No mark on question paper except your Roll Number. Cutting, overwriting or use of remover is not allowed.

SECTION-1

SHORT QUESTIONS **(2 x 10 = 20)**

i) What are intrinsic semiconductors? Explain with the help of N(E) Curves

ii) Show the hybridization of $Fe(CO)_5$ with structure.

iii) Calculate the CFSE(Crystal Field Stabilization Energy) for each of the following system:

b) d^4 (high spin octahedral) **b)** d^6 (low spin octahedral)

iv) Draw the structure of $[CoF_6]^{-3}$ on the basis of MOT.

v) Draw the splitting of d-orbitals in Tetrahedral complexes according to CFT.

vi) $Ni(CO)_4$ is diamagnetic and has Tetrahedral structure. Explain.

vii) Differentiate between n-type and p-type semiconductors.

viii) What are Outer orbital complexes? Give one example?

ix) O_2 is paramagnetic while O_2^{2-} is diamagnetic. Explain on the basis of MOT.

x) Give an account of two factors which influence the magnitude of Δ_o or 10 Dq

SECTION-II

SUBJECTIVE **(5 x 6 = 30)**

i) Draw the structures of the following molecules on the basis of MOT;

a) $[Co(NH_3)_6]^{3+}$ **b)** $[CoF_6]^{3-}$

ii) Discuss the essentials of Crystal Field Theory (CFT).

iii) Discuss Metallic bond on the basis of band theory.

iv) Discuss the chemistry of $Cr(CO)_6$.

v) Explain the application of coordination compounds in Analytical chemistry and industry.

vi) Predict the shape of the following molecules / ions on the basis of VSEPR model.

a) IF_5 **b)** SF_4 **c)** $SnCl_2$ **d)** I_3^- **e)** ClF_3

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Roll No. .....

Fifth Semester - 2018

Examination: B.S. 4 Years Programme

PAPER: Organic Chemistry **TIME ALLOWED: 30 mins.**

Course Code: CHEM-305 **MAX. MARKS: 10**

Attempt this Paper on this Question Sheet only.

OBJECTIVE TYPE

Q.No.1 Tick the right option. **(10)**

i). How many sp hybridized atoms are there in CO_2?
(a).1 (b).2 (c).3 (d).0

ii). The basic strength of 2,6,N,N – Tetramethylaniline as compared to aniline is ---------- by Steric hindrance:
(a). decreased (b). increased (c). not affected (d). equalized

iii). The conjugate base of which of following acid is more stabilized by the resonance:
(a). 2 – Nitrophenol (b). 2,4 – Dnitrophenol (c). 2,4,6 – Trinitrophenol (d). 2,6 – Dinitropehnol

iv). Enol content of acetylacetone is maximum in the presence of:
(a). Water (b). Acetonitrile (c). Acetic acid (d). Hexane

v).An organic compound that possesses acidic hydrogen is:
(a). 2,4 - Pentandione (b).1,3 - Butadiene (c). 2 - Butyne (d). Neopentane

vi). Lithium diisopropylamide is a good?
(a). Very strong nucleophile (b). Base (c). Electrophile (d). Acid

vii). How many equatorial hydrogen atoms are there in the chair form of cyclohexane?
(a). Six (b).Three (c).Four (d).Five

viii). Which carboxylic acid possesses chiral carbon centre?
(a). Oxalic acid (b). Lactic acid (c). Formic acid (d). Malonic acid

ix). 4 - Methyl - 2 - hexene shows:
(a). Only geometrical isomerism (b). Only optical isomers
(c).Both geometrical and optical isomerisms (d). Only conformational isomerism

x). Conversion of an optically active compound (either enantiomer) into an equimolar mixture of the enantiomers is known as:
(a). Asymmetric synthesis (b). Racemization
(c). Resolution of racemic mixture (d). Selective adsorption

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Fifth Semester - 2018
Examination: B.S. 4 Years Programme

Roll No. .....

PAPER: Organic Chemistry | **TIME ALLOWED: 2 hrs. & 30 mins.**
Course Code: CHEM-305 | **MAX. MARKS: 50**

Attempt this Paper on Separate Answer Sheet provided.

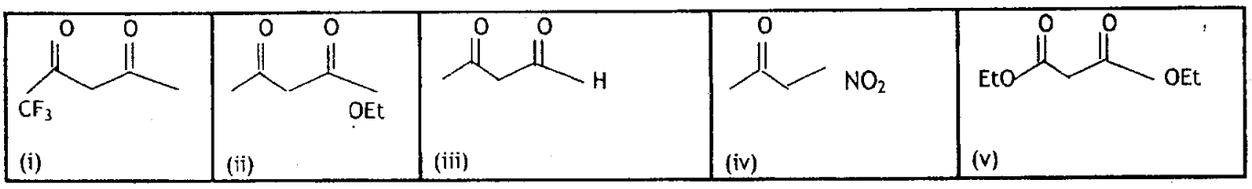
SUBJECTIVE TYPE

Q.No.2 Answer the following short questions. **(2,10=20)**

a). Why 2,4,6 – Trinitrophenol decomposes $NaHCO_3$ while simple phenol does not?
b). Justify why Tributylamine is a stronger base than Dibutylamine when Chlorobenzene is used as solvent?
c). Give reason for the zero value of dipole moment of Benzene and 0.4D for Toluene.
d). What do you mean by Meso form and Asymmetric carbon atom?
e). Throw light on the stability of the different conformations of cyclohexane.
f). Why mixed aldol condensations of aliphatic aldehydes are not useful?
g). The internal alkene 2 – Butene is more stable than 1 – Butene. Justify this statement
h). Why ethyl bromide undergoes S_N2 reaction whereas ter – butylbromide through S_N1 mechanism.
i). D – Glyceraldehyde upon addition of HCN yields a pair of stereoisomers instead of a pure compound. Give reason.
j). What do you mean by Asymmetric Synthesis?

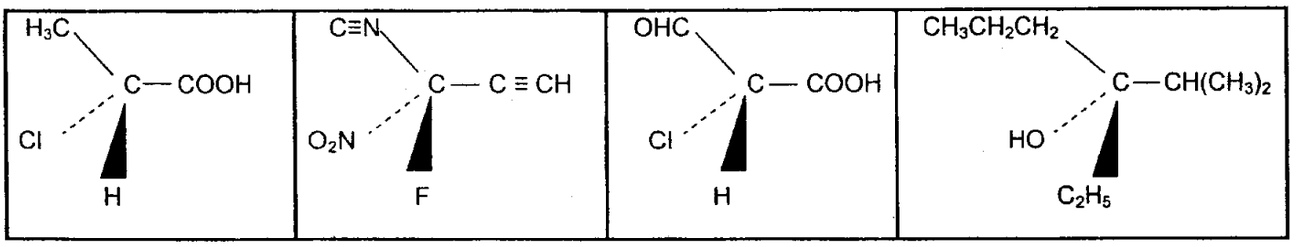
Q.No.3 Briefly answer the following questions. **(30)**

a). Arrange the following compounds according to the increasing order of acidity. Provide suitbable reasoning for your arrangement. **(2x5=10)**



(i) (ii) (iii) (iv) (v)

b). i). Label the following structure as R or S. **(5)**



ii). What is chiral carbon? Certain compounds that do not have Chiral carbon show optical activity. Give three examples of different classes of compounds with reasons. **(5)**

c). Describe the mechanism and two synthetic application of the followings: **(5,5)**
(i). Stobbe's condensation. (ii). Reformatsky reaction.

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Fifth Semester 2018

Examination: B.S. 4 Years Programme

PAPER: Analytical Chemistry **TIME ALLOWED: 30 mins.**

Course Code: CHEM-307 **MAX. MARKS: 10**

Attempt this Paper on this Question Sheet only.

OBJECTIVE TYPE

Q.1 **MCQS** (1x10=10)

(i) Both hydrogen and deuterium lamp produce outputs in the range

(a) 160-800 nm (b)10-700 nm

(c) 200-400 nm (d) 400-750 nm

(ii) Comparison of standard deviations is done by

(a) F-Test (b) T-Test (c) Dixon's Q –test d) None

(iii) Real limitations to Beer's law are due to

(a) High concentration of solute (b) Polychromatic radiation

(c) Stray radiation (d) Dissociation of solute

(iv) What is the maximum value of absorbance?

(a)2 (b) 1 (c) 100 (d) 10

(v) The stationary phase in reverse phase chromatography is

(a) ion exchange resin (b) polar (c) nonpolar (d) All a,b,c

(vi) Which of the following is continuum source for UV molecular absorption?

(a) Globar (b) Deuterium lamp

(c) Nernst glower (d) Tungsten filament

(vii) 10 ppm is equal to

(a) 100 mg/lit (b) 10 mg/mL

(c) 10 mg/lit (d) 100 mg/kg

(viii) According to Beer's law absorbance does not depend upon

(a) Solution concentration.(b) Extinction coefficient of the sample.

(c) Colour of the solution. (d) all

(ix) The maximum Rf value for any substance in paper chromatography is _____

(a) 1.0 (b) 10.0 (c) 0.90 (d) 100

(x) Which statement is wrong about TLC

(a) Stationary phase is silica

(b) Polar compounds will spend more time in the moving phase

(c) Non polar compound will move faster

(d) Polar compound will appear lower in plate

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Fifth Semester 2018
Examination: B.S. 4 Years Programme

Roll No. .....

PAPER: Analytical Chemistry **TIME ALLOWED: 2 hrs. & 30 mins.**
Course Code: CHEM-307 **MAX. MARKS: 50**

Attempt this Paper on Separate Answer Sheet provided.

SUBJECTIVE TYPE

Section I

Q.2- Attempt all Short questions (2x10=20)

i. What are the advantages of double beam spectrophotometer over single beam spectrophotometer?
ii. What is the diference between normal phase and reverse phase chromatography?
iii. Calculate the amount of NaCl dissolved per 100 cm^3 needed to prepare 1000 ppm solution of Na^+ ions.
iv. What are the advantages and disadvantages of TLC?
v. What is the difference between one tailed and two tailed significance test?
vi. Give some characteristics of adsorbents in column chromatography.
vii. What do you know about charge transfer absorption in UV/Visible spectroscopy?
viii. What is the difference between filter and monochromator as wavelength selector?
ix. What is the difference between absolute error and relative standard deviation?
x. How does the percentage transmittance of a solution vary with
(a) increasing concentration (b) increasing path length

Section II

Attempt all questions

Q.3 (a) Discuss the methods for the detection of colorless spots in paper chromatography. (5)

(b) Discuss the factors affecting solute separation in column chromatography. (5)

Q.4 (a) Explain instrumental deviations from Beer's law. (5)

(b) How do Electromagnetic radiations interact with matter? (5)

Q.5 (a) How can you compare two means using student T-test? (5)

(b) Explain the following units of concentration i.e. molarity and ppm and their inter conversion, with the help of examples. (5)

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Roll No. .....

Fifth Semester 2018
Examination: B.S. 4 Years Programme

PAPER: Applied Chemistry **TIME ALLOWED: 30 mins.**
Course Code: CHEM-309 **MAX. MARKS: 10**

Attempt this Paper on this Question Sheet only.

OBJECTIVE TYPE

Q.1 Encircle the most suitable answer from the given options. 10

i) Use of sodium hexametaphosphate to avoid boiler scaling can be classified as
a) Mechanical treatment
b) Internal Treatment
c) External Treatment
d) None of these

ii) The basic raw material used in cement manufacturing are
a) Lime stone
b) Shale
c) Gypsum
d) All of these

iii) Soda Lime process is used to prepare
a) Caustic Soda
b) Soda Ash
c) Hydrochloric Acid
d) Baking Soda

iv) Laser Diffraction analysis is used to measure the

a) Particle Size
b) Quantity of material
c) Quality of material
d) None of these

v) During evaporation, heating is done at reduced pressure, this is important
a) To evaporate water at a high rate
b) To avoid thermal degradation of substance
c) To minimize the consumption of steam
d) None of these

vi) In Modified Lime Soda process which chemical is used
a) Barium hydroxide
b) Calcium hydroxide
c) Zinc hydroxide
d) Magnesium hydroxide

vii) In manufacturing of sodium hydroxide hydrogen gas liberates at
a) Anode
b) Cathode
c) Both anode and cathode
d) None of these

viii) The optimum conditions for the conversion of SO_2 to SO_3 in contact process are
a) V_2O_5, 1atm, 650°C
b) V_2O_5, 1atm, 450°C
c) V_2O_5, 2atm, 500°C
d) V_2O_5, 5atm, 450°C

ix) During setting of cement, Hydration and hydrolysis occurs in which order?
a) Hydration followed by hydrolysis
b) Hydrolysis followed by hydration
c) Hydration and hydrolysis occur simultaneously
d) Can't judge

x) Cation exchange resins replaces _____ with metal ions in water
a) Sodium metal
b) Sodium ions
c) Hydroxyl ions
d) Hydrogen ions

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Fifth Semester 2018
Examination: B.S. 4 Years Programme

Roll No. .....

PAPER: Applied Chemistry | **TIME ALLOWED: 2 hrs. & 30 mins.**
Course Code: CHEM-309 | **MAX. MARKS: 50**

Attempt this Paper on Separate Answer Sheet provided.

SUBJECTIVE TYPE

Q.2 Short Questions **2x10 = 20**

i. Why MULTIPLE EFFECT EVAPORATORS are superior then single effect?
ii. How AMMONIA is recovered in Solvay process?
iii. How BOILER SCALES are formed?
iv. Differentiate between REGULAR PORTLAND and WHITE PORTLAND cements.
v. Differentiate between OSMOSIS and REVERSE OSMOSIS?
vi. Discuss the principle and applications of EVAPORATIOIN in industry?
vii. Differentiate between SCREENING and SIZE REDUCTION.
viii. Discuss CONVECTION as a mode of heat transfer.
ix. Differentiate between CARBONATE and NON-CARBONATE hardness.
x. Describe MODIFIED SODA LIME PROCESS.

Q.3 Extensive Questions **30**

a) Discuss the manufacturing of HYDROCHLORIC ACID. Give flow sheet. (5)
b) How NaOH is prepared by ELECTROLYTIC PROCESS? Give flow sheet. (5)
c) Discuss the role of ION EXCHANGE PROCESS in water softening. (5)
d) Discuss the importance of DISTILLATION as a unit operation in industry. (5)
e) Differentiate between WET and DRY process of cement manufacturing. (5)
f) Discuss the role of REVERSE OSMOSIS in water treatment. (5)

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Roll No. .....

Fifth Semester 2018

Examination: B.S. 4 Years Programme

PAPER: Bio Chemistry **TIME ALLOWED: 30 mins.**

Course Code: CHEM-311 **MAX. MARKS: 10**

Attempt this Paper on this Question Sheet only.

OBJECTIVE TYPE

(1) Encircle the most suitable answer from the given options. **10**

1. Water molecules in ice form an open lattice which is :
   (A) Rhombic
   (B) Monoclinic
   (C) Hexagonal
   (D) Cubic

2. Which enzyme is required for the synthesis of Glutamine :
   (A) Glutamase
   (B) Virus
   (C) Amylase
   (D) Glutamine synthetase

3. Micelles are stabilized in water by :
   (A) Hydrophobic interaction
   (B) Hydrogen bonding
   (C) Vander waal forces
   (D) Charge-charge interaction

4. Xanthine on oxidation forms :
   (A) Saccharic acid
   (B) Lactic acid
   (C) Acetic acid
   (D) Uric acid

5. Adenine and Guanine are the examples of:
   (A) Purine
   (B) Pyramidine
   (C) Protein
   (D) Peptide

P.T.O.

6. pKa value of Uracil ranges from :
   (A) 7.0 to 8.0
   (B) 9.0 to 10.0
   (C) 11.0 to 12.0
   (D) 12.0 to 14.0

7. mRNA is largely found in:
   (A) Mitochondria
   (B) Lysosomes
   (C) Nucleus
   (D) Ribosomes

8. In cyclization of Glucose, bridging occurs between carbon:
   (A) 1-4
   (B) 2-3
   (C) 3-5
   (D) 1-6

9. In ATP, the adenine moiety is linked by a glycosidic bond to
   (A) Galactose
   (B) Raffinose
   (C) Arabinose
   (D) Ribose

10. Which of the following belongs to Algal polysaccharide :
   (A) Heprin
   (B) Agar
   (C) Chondroitin sulphate
   (D) Both A & B

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Fifth Semester 2018
Examination: B.S. 4 Years Programme

Roll No. .....

PAPER: Bio Chemistry **TIME ALLOWED: 2 hrs. & 30 mins.**
Course Code: CHEM-311 **MAX. MARKS: 50**

Attempt this Paper on Separate Answer Sheet provided.
SUBJECTIVE TYPE

Q.2 Short Questions **2x10 = 20**

Attempt all questions. Each carries 2 marks:

1. Define cell fractionation.
2. Differentiate between endocytosis and phagocytosis.
3. Interpret the working of CO_2 buffering system in blood.
4. Why biopolymers are not readily degraded to their components in the aqueous environment of the living cell .
5. Explain the term invert sugar.
6. Justify the statement that fructose is a reducing sugar.
7. How denaturation of DNA occurs..
8. Give functions of smooth Endoplasmic reticulum.
9. Differentiate between Proteoglycans and Glycoproteins.
10. Discuss briefly about different types of RNA.

Q.3 Attempt all Questions. Each carries 5 Marks: **5×6= 30**

1. Describe the sensory properties of monosaccharides.
2. Provide sufficient evidences to consider Glucose as a cyclic compound.
3. Write structure and functions of DNA.
4. Derive Henderson-Hasselbalch equation and give its significance.
5. Explain in detail the structure of plastids.
6. Explain in detail the cell wall composition.

UNIVERSITY OF THE PUNJAB

Roll No. .....

Fifth Semester 2018

Examination: B.S. 4 Years Programme

PAPER: Bio Chemistry **TIME ALLOWED: 30 mins.**

Course Code: CHEM-311 **MAX. MARKS: 10**

Attempt this Paper on this Question Sheet only.

OBJECTIVE TYPE

(1) Encircle the most suitable answer from the given options. **10**

1. Water molecules in ice form an open lattice which is :
   (A) Rhombic
   (B) Monoclinic
   (C) Hexagonal
   (D) Cubic

2. Which enzyme is required for the synthesis of Glutamine :
   (A) Glutamase
   (B) Virus
   (C) Amylase
   (D) Glutamine synthetase

3. Micelles are stabilized in water by :
   (A) Hydrophobic interaction
   (B) Hydrogen bonding
   (C) Vander waal forces
   (D) Charge-charge interaction

4. Xanthine on oxidation forms :
   (A) Saccharic acid
   (B) Lactic acid
   (C) Acetic acid
   (D) Uric acid

5. Adenine and Guanine are the examples of:
   (A) Purine
   (B) Pyramidine
   (C) Protein
   (D) Peptide

P.T.O.

6. pKa value of Uracil ranges from :
   (A) 7.0 to 8.0
   (B) 9.0 to 10.0
   (C) 11.0 to 12.0
   (D) 12.0 to 14.0

7. mRNA is largely found in:
   (A) Mitochondria
   (B) Lysosomes
   (C) Nucleus
   (D) Ribosomes

8. In cyclization of Glucose, bridging occurs between carbon:
   (A) 1-4
   (B) 2-3
   (C) 3-5
   (D) 1-6

9. In ATP, the adenine moiety is linked by a glycosidic bond to
   (A) Galactose
   (B) Raffinose
   (C) Arabinose
   (D) Ribose

10. Which of the following belongs to Algal polysaccharide :
   (A) Heprin
   (B) Agar
   (C) Chondroitin sulphate
   (D) Both A & B

UNIVERSITY OF THE PUNJAB

Fifth Semester 2018
Examination: B.S. 4 Years Programme

Roll No. .....

PAPER: Bio Chemistry **TIME ALLOWED: 2 hrs. & 30 mins.**
Course Code: CHEM-311 **MAX. MARKS: 50**

Attempt this Paper on Separate Answer Sheet provided.
SUBJECTIVE TYPE

Q.2 Short Questions **2x10 = 20**

Attempt all questions. Each carries 2 marks:

1. Define cell fractionation.
2. Differentiate between endocytosis and phagocytosis.
3. Interpret the working of CO_2 buffering system in blood.
4. Why biopolymers are not readily degraded to their components in the aqueous environment of the living cell .
5. Explain the term invert sugar.
6. Justify the statement that fructose is a reducing sugar.
7. How denaturation of DNA occurs..
8. Give functions of smooth Endoplasmic reticulum.
9. Differentiate between Proteoglycans and Glycoproteins.
10. Discuss briefly about different types of RNA.

Q.3 Attempt all Questions. Each carries 5 Marks: **5×6= 30**

1. Describe the sensory properties of monosaccharides.
2. Provide sufficient evidences to consider Glucose as a cyclic compound.
3. Write structure and functions of DNA.
4. Derive Henderson-Hasselbalch equation and give its significance.
5. Explain in detail the structure of plastids.
6. Explain in detail the cell wall composition.

UNIVERSITY OF THE PUNJAB

Sixth Semester - 2018

Examination: B.S. 4 Years Programme

Roll No. .....

PAPER: Physical Chemistry **TIME ALLOWED: 15 Mints.**

Course Code: CHEM-313 Part – I (Compulsory) **MAX. MARKS: 10**

Attempt this Paper on this Question Sheet only.

Please encircle the correct option. Each MCQ carries 1 Mark. This Paper will be collected back after expiry of time limit mentioned above.

Q. 1 Select correct choice from given four options. (1×10=10)

(i) The positive value of Gibbs energy of a process indicates that the process is

(a) Endothermic

(b) Exothermic

(c) Non Spontaneous

(d) Spontaneous

(ii) According to equation $\ln k = \ln k_o + 1.018 Z_A Z_B \sqrt{I}$, rate of the reaction

$CH_3COOC_2H_5 + OH^- \xrightarrow{k} products$

(a) Increases with increase in ionic strength

(b) Decreases with increase in ionic strength

(c) Remains constant

(d) None of these

(iii) Pre-exponential factor in Arrhenius equation is the value of rate constant at

(a) Absolute temperature

(b) Zero temperature

(c) Infinite temperature

(d) None of these

(iv) The SI units of Gibbs energy of a process are

(a) $Kmol^{-1}$ (b) $Jmol^{-1}K^{-1}$ (c) $m^2 mol^{-2}$ (d) $Jmol^{-1}$

(v) The mathematical relation between Gibbs energy and Equilibrium constant is

(a) $\Delta G = RT\ln K$ (b) $\Delta G = -RT\ln K$ (c) $\Delta G = R\ln K$ (d) $\Delta G = T\ln K$

(vi) Which of the following conditions is necessary for a reaction to be spontaneous?

(a) $\Delta S_{sur} > 0$ (b) $\Delta S_{sys} > 0$ (c) $\Delta S_{sur} + \Delta S_{sys} > 0$ (d) $\Delta S_{sur} + \Delta S_{sys} < 0$

(vii) Free energy change for a spontaneous process generally is

(a) zero (b) +ve (c) –ve (d) maximum

(viii) The mathematical formulation of Sterling's approximation is

(a) $\ln x! = x\ln x - x$ (b) $x = x\ln x$ (c) $\ln x! = \ln x^2$ (d) None of these

(ix) The units of rate constant for zero order reaction are

(a) $MSec^{-1}$ (b) $K\ kg\ mol^{-2}$ (c) K kg mol (d) $mold\ m^{-3}\ Sec^{-1}$

(x) The Eyring equation is based on

(a) Collision theory (b) Arrhenius Theory

(c) Transition State Theory (d) Langmuir theory

UNIVERSITY OF THE PUNJAB

Sixth Semester - 2018

Examination: B.S. 4 Years Programme

Roll No. .....

PAPER: Inorganic Chemistry **TIME ALLOWED: 2 Hrs. & 45 Mints.**

Course Code: CHEM-315 Part – II **MAX. MARKS: 50**

Attempt this Paper on Separate Answer Sheet provided.

Short Questions

2 x 10 = 20

1. Why hybrid orbital exhibit better overlap than simple atomic orbitals?
2. Differentiate inner and outer transition elements.
3. What is Jahn Teller distortion theorem?
4. Differentiate between polarizing power and polarizability?
5. What is Fajjan rule?
6. What are post transition elements? Give examples
7. Calculate Z_{eff} for 4s electrons in Cobalt (Z=27).
8. What are hydrate isomers? Give examples.
9. Can lanthanum ion exist in + 4 oxidation state? If yes then how, if no then why?
10. What is 4c-3e bond? Give example

Q.3. What is isomerism? Discuss its different types exhibited by coordination Compounds. 10

Q.4. What is lanthanide contraction? Discuss the phenomenon in detail along with its consequences? **10**

Q.5. What are main postulates of VSEPR theory? Discuss shapes of AB_4, AB_3E, AB_2E_2 molecules on the basis of it. 10

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Sixth Semester - 2018

Examination: B.S. 4 Years Programme

Roll No. .....

PAPER: Inorganic Chemistry **TIME ALLOWED: 15 Mints.**

Course Code: CHEM-315 Part – I (Compulsory) **MAX. MARKS: 10**

Attempt this Paper on this Question Sheet only.

Please encircle the correct option. Each MCQ carries 1 Mark. This Paper will be collected back after expiry of time limit mentioned above.

Q.1 Each question has four possible answers. Choose the correct answer and encircle it. **(1 × 10 = 10)**

1. The formula of bauxite is

   a) $Al_2O_3.2SiO_2.2H_2O$ b) $Al_2O_3.2H_2O$ c) Na_3AlF_6
   d) both a and b

2. Which of the following is the stable valence shell configuration of chromium?

   a) $4s^2, 3d^4$ b) $4s^2, 3d^3$ c) $4s^1, 3d^5$ d) $4s^2, 3d^5$

3 Which of the following ligands are neutral

   a) CO b) NO c) H_2O d) all of these

4. The structure of $[Cu(H_2O)_4]^{2+}$ is

   (a) Square planar (b) Tetrahedral (c) Distorted rectangle (d) Octahedral

5. pH of 1N HCl is

   a) 1 b) zero c) 0.1 d) none of the above

6. Which of the following series contains *only* paramagnetic metal ions?

   a) $La^{3+}, Ce^{3+}, Sm^{3+}$ b) $Sm^{3+}, Ho^{3+}, Lu^{3+}$

   c) $Ce^{3+}, Eu^{3+}, Yb^{3+}$ d) $La^{3+}, Gd^{3+}, Eu^{3+}$

7. The %age of U^{235} in naturally occurring uranium is,

   a. 0.50% b. 0.71%
   c. 2.0% d. 5.0%

8. Which of the following is not a representative element

   a) Fe b) K c) Ba d) N

9. What type of hybrid orbitals are used by chlorine in ClO_2^-

   a) dsp^3 b) sp^3 c) sp^2 d) d^2sp^3

10. According to VSEPR theory, the shape of SO_3 molecule is

    a) Pyramidal b) Tetrahedral c) Plane triangular d) Square planar

UNIVERSITY OF THE PUNJAB

Sixth Semester - 2018

Examination: B.S. 4 Years Programme

Roll No. .....

PAPER: Organic Chemistry **TIME ALLOWED: 2 Hrs. & 45 Mints.**

Course Code: CHEM-317 Part – II **MAX. MARKS: 50**

Attempt this Paper on Separate Answer Sheet provided.

Q. No. 2. Give the short answers of the following questions. (4 × 5 = 20)

I. What is Beers-Lambert law?
II. What is the effect of ring size on IR absorptions in cyclic ketones?
III. Describe Clemmensen reduction with example and mechanism?
IV. Describe epoxidation of alkenes with example and mechanism?
V. Describe two factors affecting the stability of free radicals?

Q. No. 3. Describe two different methods for the following conversions with mechanism?

(i) Alkene to *Cis*-diol (ii) Acid chloride to aldehyde **(5+5=10)**

Q. No. 4. Write a note on the followings with example.

a)- Infrared Spectrophotometer (Instrumentation) **(5)**

b)- Hypochromic effect and Hyperchromic Effect **(5)**

Q. No. 5. Write a note on the followings?

a)- Applications of UV/Vis. Spectroscopy? **(5)**

b)- Applications of free radical reactions? **(5)**

UNIVERSITY OF THE PUNJAB

Sixth Semester - 2018

Examination: B.S. 4 Years Programme

Roll No. .....

PAPER: Organic Chemistry **TIME ALLOWED: 15 Mints.**

Course Code: CHEM-317 Part – I (Compulsory) **MAX. MARKS: 10**

Attempt this Paper on this Question Sheet only.

Please encircle the correct option. Each MCQ carries 1 Mark. This Paper will be collected back after expiry of time limit mentioned above.

Q. NO. 1. Tick the most suitable option. (10)

I. Which of the followings is weakest peracid?

a) Perbenzoic acid b) m-Chloroperbenzoic acid
c) Peracetic acid d) Trifluoroperacetic acid

II. Oppenauer oxidation would convert primary alcohol to?

a) Aldehyde b) Ketone
c) Carboxylic acid d) Alkene

III. Lindlar's catalyst would converted alkyne to?

a) *Trans*-alkene b) *Cis*-alkene
c) Alkane d) Cycloalkane

IV. Clemmensen reduction would convert an aldehyde to?

a) Alcohol b) Alkane
c) Acid d) Amide

V. Which of the followings would be used aromatization of cyclic compounds?

a) Benzoquinone b) DDQ
c) Chloranil d) All of a,b,c

VI. 1-Propene on reaction with borane (BH_3) and AcOH would produce?

a) n-Propane b) 1-Propanol
c) 2-Propanol d) None of a,b,c

VII. IR spectrum showing intense peak at 1720 cm^{-1} indicate the functional group?

a) Amide b) Ester
c) Cyanide d) Ketone

VIII. Highest energy excitation of electrons in UV/Vis. Spectroscopy are referred to?

a) Sigma to sigma star b) Pi to pi star
c) n to sigma star d) n to pi star

IX. Sonn-Muller reaction would convert an amide to?

a) Carboxylic acid b) Ester
c) Aldehyde d) Ketone

X. Which of the followings is used as radical initiator in free radical reactions?

a) Benzoyl peroxide b) Azo-bis-isobutyronitrile (AIBN)
c) N-bromosuccinamide (NBS) d) All of a and b

UNIVERSITY OF THE PUNJAB

Sixth Semester - 2018

Examination: B.S. 4 Years Programme

Roll No. .....

PAPER: Analytical Chemistry **TIME ALLOWED: 2 Hrs. & 45 Mints.**

Course Code: CHEM-319 Part – II **MAX. MARKS: 50**

Attempt this Paper on Separate Answer Sheet provided.

SUBJECTIVE

Section I

Q.2- Attempt all Short questions **(2x10=20)**

(i) How do Doppler Effect and pressure broadening affect the transitions in atomic spectroscopy?

(ii) What are the characteristics and advantages of weak base anion resins?

(iii) How are samples introduced in capillary electrophoresis system?

(iv) Describe the term percent extraction and separation factor in solvent extraction.

(v) How electro-osmotic flow can be altered in capillary electrophoresis?

(vi) Describe the role of masking and oxidation state in increasing the selectivity of metal extractions in solvent extraction.

(vii) Compare air-acetylene and nitrous oxide-acetylene flames in AAS.

(viii) What do you know about chemical interferences in atomic spectroscopy?

(ix) Write down the principle of solid phase extraction

(x) Describe nebulization in flame emission spectroscopy.

Section II

Attempt all questions **(3 x 10 = 30)**

Q.3 (a) Explain the construction and working of graphite furnace. (5)

(b) Discuss different components of flow injection analysis. (5)

Q.4 (a) Discuss the factors affecting ion exchange separations. (5)

(b) Give an account of capillary zone electrophoresis. (5)

Q.5 (a) Discuss strong acid cation exchange resins and weak acid cation exchange resin. (5)

(b) What is basis of flame emission spectroscopy? Explain various events taking place during this process. (5)

UNIVERSITY OF THE PUNJAB

Sixth Semester - 2018

Examination: B.S. 4 Years Programme

Roll No. .....

PAPER: Analytical Chemistry **TIME ALLOWED: 15 Mints.**

Course Code: CHEM-319 Part – I (Compulsory) **MAX. MARKS: 10**

Attempt this Paper on this Question Sheet only.

Please encircle the correct option. Each MCQ carries 1 Mark. This Paper will be collected back after expiry of time limit mentioned above.

OBJECTIVE

Q.1 MCQS (1x10=10)

(i)- Which type of liquid-liquid extraction is efficient?

a) Multistage counter current b) Multistage cross current

c) Multistage co current d) Single stage

(ii) A typical weak acid resin has a limited capacity below pH

a) 10 b) 8 c) 6 d) 12

(iii) Which is the correct order of events in FES?

a) desolvation →vapourization, →atomization, →excitation →emission

(b) vapourization, → desolvation →atomization, →excitation →emission

(c) desolvation → atomization → vapourization, →excitation →emission

(d) None

(iv) Which statement is wrong about size exclusion chromatography?

(a)Larger molecules elute first (b) It is adsorption chromatography

(c)Called gel filtration in aqueous system (d) Called gel permeation in organic solvent

(v)- What is the pressure of gases in hollow cathode lamp?

a) 40 to 50 torr b) 20 to 30 torr c) 1 to 5 torr d) 50 to 55 torr

(vi)- Flame photometry cannot be used for

a) Ca (b) Na c) Cu (d) Li

(vii) Which of the following ions possesses the highest exchange capacity in ion exchange chromatography

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

(viii) Combined action of two complexing reagents in solvent extraction is called

(a) Batch extraction (b) Continuous extraction

(c)Countercurrent extraction (d)Synergic extraction

(ix) The direction of electroosmotic flow in capillary electrophoresis can be reversed by the addition of

(a) Sulfonic acid (b)Carboxylic acid (c)Phenol (d) Alkyl ammonium salt

(x-) Which zone of flame is used for flame photometry?

(a)preheating zone (b) interconal zone

(c) primary reaction zone (d)secondary reaction zone

UNIVERSITY OF THE PUNJAB

Sixth Semester - 2018

Examination: B.S. 4 Years Programme

Roll No. .....

PAPER: Applied Chemistry **TIME ALLOWED: 2 Hrs. & 45 Mints.**

Course Code: CHEM-321 Part – II **MAX. MARKS: 50**

Attempt this Paper on Separate Answer Sheet provided.

Q.2 **Short Questions** 2x10 = 20

i. What is FUSED SILICA glass? Where is it used?

ii. Differentiate between SOAP & DETERGENT

iii. Describe the structure of ANIONIC surfactants.

iv. What are heterogeneous CATALYSTS?

v. Describe any two SULFONATING agents.

vi. Draw the flowsheet diagram for manufacturing of ACETIC ACID.

vii. What is ANNEALING in glass industry?

viii. Write down important constituents for OPTICAL GLASS.

ix. What is CUMENE process?

x. Enlist uses of PHENOL.

Q.3 **Extensive Questions** 6 x 5 = 30

a) How GLYCERIN is recovered in soap industry?

b) Enlist raw materials and their role in glass industry.

c) How NITRATION of BENZENE is carried out in industry?

d) How STYRENE is manufactured in industry?

e) Discuss the principle of REGENERATIVE FURNACE used for manufacturing of glass.

f) Explain industrial applications of HYDRATION in chemical industry.

UNIVERSITY OF THE PUNJAB

Sixth Semester - 2018

Examination: B.S. 4 Years Programme

Roll No. .....

PAPER: Applied Chemistry **TIME ALLOWED: 15 Mints.**

Course Code: CHEM-321 Part – I (Compulsory) **MAX. MARKS: 10**

Attempt this Paper on this Question Sheet only.

Please encircle the correct option. Each MCQ carries 1 Mark. This Paper will be collected back after expiry of time limit mentioned above.

I Encircle the most suitable answer from the given options. 10

i) In high Silica glass, percentage of Silica is
a) 96
b) 90
c) 95
d) 92

ii) Which of the following can be used as fabric softeners?
a) Cationic surfactants
b) Anionic surfactants
c) Amphoteric surfactants
d) Non-ionic surfactants

iii) Cullet is
a) Crushed glass
b) Crushed ceramic
c) Sand particles
d) None of the above

iv) Glass is
a) Undercooled liquid
b) A union of nonvolatile inorganic oxides
c) Amorphous solid
d) All above

v) An index of progressive growth of a country is utilization of
a) HNO_3
b) H_2SO_4
c) HCl
d) Organic solvents

vi) ---------- can work in hard water
a) Hard soaps
b) Soft soaps
c) Detergents
d) a & c

vii) The soaps made with caustic potash are
a) Hard soaps
b) Soft soaps
c) Both of these
d) None of these

viii) Glycerin is produced during production of
a) Soaps
b) Detergents
c) Both of these
d) None of these

ix) Safety glass can be
e) Physically tempered
f) Chemically tempered
g) Both of above
h) None of above

x) Chlorination of unsaturated hydrocarbons can be controlled by
e) Free radical procedure
f) Substitution procedure
g) Addition procedure
h) Ionic procedure

UNIVERSITY OF THE PUNJAB

Sixth Semester - 2018

Examination: B.S. 4 Years Programme

Roll No. .....

PAPER: Bio Chemistry **TIME ALLOWED: 2 Hrs. & 45 Mints.**

Course Code: CHEM-323 Part – II **MAX. MARKS: 50**

Attempt this Paper on Separate Answer Sheet provided.

(SUBJECTIVE TYPE)

Q.2 Short Questions **2x10 = 20**

i. Define PHOSPHOLIPIDS. Give their General Structure.

ii. Write two roles of PROSTAGLANDINS.

iii. Explain RANCIDIFICATION with an example.

iv. What are LIPID AGGREGATES?

v. Differentiate between COENZYME and PROSTHETIC GROUP.

vi. What are ISOENZYMES? Give Example.

vii. What are AROMATIC Amino Acids? Give example.

viii. Why Amino Acids are Optically Active?

ix. What do you mean by a PEPTIDE LINKAGE?

x. What is the main source and form of energy?

Q.3 Extensive Questions **6 x 5 = 30**

a) Write a note on LECITHINS and CEPHALINS.

b) What is the Biological importance of lipids?

c) What do you mean by THERMOGENIC EFFECT of food?

d) What are STRUCTURES of PROTEINS? Explain SECONDARY STRUCTURE of PROTEIN in detail.

e) Explain different FACTORS effecting ENZYME ACTIVITY.

f) Explain the Structure and Function of HEMOGLOBIN.

UNIVERSITY OF THE PUNJAB

Sixth Semester - 2018

Examination: B.S. 4 Years Programme

Roll No. .....

PAPER: Bio Chemistry **TIME ALLOWED: 15 Mints.**

Course Code: CHEM-323 Part – I (Compulsory) **MAX. MARKS: 10**

Attempt this Paper on this Question Sheet only.

Please encircle the correct option. Each MCQ carries 1 Mark. This Paper will be collected back after expiry of time limit mentioned above.

(OBJECTIVE TYPE)

.1 Encircle the most suitable answer from the given options. 10

i) Which one of the following is an Unsaturated Fatty Acid
   a) Stearic acid
   b) Lignoceric acid
   c) Oleic acid
   d) None of these

ii) NAD are present in liver cell
   a) 40%
   b) 60%
   c) 80%
   d) 88%

iii) Which one of the following is a Plant Sterol?
   a) Lanosterol
   b) Egnosterol
   c) Desmosterol
   d) None of these

iv) Enzyme without its Non-Protein part is known as
   a) Holoenzyme
   b) Prosthetic group
   c) Apoenzyme
   d) Coenzyme

v) LECITHINS are also known as
   a) Phosphatidylinositol
   b) Phosphatidylcholine
   c) Phosphatidylethanolamine
   d) None of these

vi) Proteins contain
   a) Only L- α - amino acids
   b) Only D-amino acids
   c) DL-Amino acids
   d) Both (a) and (b)

vii) The Optically inactive Amino Acid is
   a) Glycine
   b) Serine
   c) Valine
   d) Threonine

viii) Which one of the following is an Essential Fatty Acid?
   a) Linoleic acid
   b) Linolenic acid
   c) Arachidonic acid
   d) All of these

ix) Which one of the following is a Plant Protein?
   a) Glutelin
   b) Protamines
   c) Sclaro
   d) Prolamine

x) Protein present in milk is
   a) Sericin
   b) Oryzenin
   c) Glutalin
   d) Casein

UNIVERSITY OF THE PUNJAB

Seventh Semester 2018
Examination: B.S. 4 Years Programme

Roll No. .....

PAPER: Environmental Chemistry | **TIME ALLOWED: 2 hrs. & 30 mins.**
Course Code: CHEM-401 | **MAX. MARKS: 50**

Attempt this Paper on Separate Answer Sheet provided.

(SUBJECTIVE TYPE)

Q.2 Short Questions **2x10 = 20**

i. What do you mean by the term Coagulation?
ii. What is the natural source of CH_4?
iii. What is the significance of COD value?
iv. Explain physical and chemical effects of aerosols.
v. Describe some adverse effects of fertilizers in water ways.
vi. Briefly describe Green Chemistry.
vii. Discuss Ozone cycle in stratosphere.
viii. Discuss any RADON as indoor pollutant.
ix. What do you mean by the term bio-amplification?
x. How Acid Rain affects the agricultural land?

Q.3 Extensive Questions **6 x 5 = 30**

a) Give the Potential Impact of Global Warming on the Environment?
b) How Lead and Mercury contribute water pollution?
c) How Oxygen Circulates in the Environment?
d) What is Photochemical Smog? How it is formed? Give its detrimental effects
e) What are Pesticides? Give their classification and harmful effects.
f) How concept of green chemistry helps to protect our environment?

UNIVERSITY OF THE PUNJAB

Roll No. .....

Seventh Semester 2018

Examination: B.S. 4 Years Programme

PAPER: Environmental Chemistry **TIME ALLOWED: 30 mins.**

Course Code: CHEM-401 **MAX. MARKS: 10**

Attempt this Paper on this Question Sheet only.

(OBJECTIVE TYPE)

Q.1 Encircle the most suitable answer from the given options. 10

i) Oil spillage is the cause of
   a) Air Pollution
   b) Soil Pollution
   c) Water Pollution
   d) None of these

ii) The major ingredient of the LONDON smog was
   a) SO_2
   b) NO_x
   c) O_3
   d) All of these

iii) Which method is used to remove permanent hardness of water?
   a) Aeration
   b) Chlorination
   c) Ion Exchange method
   d) Coagulation

iv) The temperature in the TROPOSHERE with altitude
   a) Deceases
   b) Increases
   c) Increases and then decrease
   d) Decreases and then increase

v) As suggested by EPA, permissible value of BOD in wastewater is
   a) Upto 80ppm
   b) Upto 100ppm
   c) Upto 150ppm
   d) Upto 180ppm

vi) Detergents contain the
   a) Surfactant
   b) Additive
   c) Builder
   d) All of these

P.T.O.

vii) Temporary acid rain due to the release of _____ by volcanic eruption.

a) H_2SO_4
b) HCl
c) HNO_3
d) H_2CO_3

viii) The most effective greenhouse gas in our atmosphere is

a) Carbon dioxide
b) Methane
c) CFCs
d) Nitrous oxide

ix) Pesticides have been used to eradicate following diseases except

a) Malaria
b) Tuberculosis
c) Sleeping Sickness
d) Yellow Fever

x) Which of the following cannot be classified under heavy metals?

a) Magnesium
b) Cobalt
c) Copper
d) lead

UNIVERSITY OF THE PUNJAB

Seventh Semester 2018
Examination: B.S. 4 Years Programme

Roll No. .....

PAPER: Physical Chemistry (Sp. Theory-I) **TIME ALLOWED: 2 hrs. & 30 mins.**
Course Code: CEHM-403 **MAX. MARKS: 50**

Attempt this Paper on Separate Answer Sheet provided.

Q. 2 Attempt all questions: **(2x10=20)**

a) What is meant by enzyme inhibition?
b) What do you mean by critical micelle concentration (CMC).
c) What is emulsification? Explain.
d) Write two points of difference between colloid and sols.
e) Name different types of sols.
f) Define electropersis with examples.
g) Define autocatalysis.
h) Differentiate between gels and emulsions.
i) What do you mean by colloidal dispersion?
j) What is the effect of surface area on adsorption?

Q. 3 (a) Explain Langmuir-Hinshelwood mechanism to study inorganic reactions. (6)

(b) Discuss heterogeneous kinetics of single system reactions. (4)

Q. 4 (a) How the particle size of sols is determined? Explain. (5)

(b) What are Adsorption Isotherms? Explain. (5)

Q. 5 (a) Discuss peroperties of suspensions in detail. (6)

(b) Explain Michaelis menion mechanism for enzyme catalysis. (4)

UNIVERSITY OF THE PUNJAB

Roll No. .....

Seventh Semester 2018
Examination: B.S. 4 Years Programme

PAPER: Physical Chemistry (Sp. Theory-I) **TIME ALLOWED: 30 mins.**
Course Code: CEHM-403 **MAX. MARKS: 10**

Attempt this Paper on this Question Sheet only.

Q.1, Select the correct answer from the given options. (1x10=10)

i. The lyophillic sols are

(a) reversible in nature (b) irreversible in nature

(c) sometimes reversible sometimes nonreversible (d) none of the above

ii. The dispersal of a precipitated material into colloidal solution by the action of an electrolyte in solution

(a) coagulation (b) dialysis

(c) peptization (d) ultra-filtration

iii. The precipitating effect of an ion on dispersed phase increase with the valence of the precipitating ions. This rule in known as

(a) Flocculation value rule (b) Hardy-Schulze rule

(c) Brownian rule (d) gold number rule

iv. Fog is an example of colloidal system of

(a) liquid dispersed in a liquid (b) solid dispersed in a solid

(c) gas dispersed in a liquid (d) liquid dispersed in a gas

v. Which of the following does not show Tyndall effect?

(a) colloidal solution (b) isotonic solution

(c) both of these (d) none of these

vi. Physical adsorption occurs rapidly at _____temperature

(a) low (b) high

(c) absolute zero (d) none of these

vii. Multi-molecular layers are formed in

(a) adsorption (b) physical adsorption

(c) chemisorption (d) reversible adsorption

viii. Freundich isotherms is not applicable at

(a) high pressure (b) low pressure

(c) 273 K (d) room temperature

ix. Heat of adsorption is defined as the energy liberated when_____of a gas is adsorbed on the solid surface.

(a) 1 molecule (b) 1 gram

(c) 1 gm mole (d) 1 kg

x. In chromatographic analysis, the principle used is

(a) absorption (b) adsorption

(c) distribution (d) evaporation

UNIVERSITY OF THE PUNJAB

Seventh Semester 2018
Examination: B.S. 4 Years Programme

Roll No. .....

PAPER: Physical Chemistry (Sp. Theory-II) **TIME ALLOWED: 2 hrs. & 30 mins.**
Course Code: CEHM-404 **MAX. MARKS: 50**

Attempt this Paper on Separate Answer Sheet provided.

Subjective Part

SHORT QUESTIONS

Q. 2 Answer the following short questions: (2 X 10)

a) What is meant by association in solution?
b) Write two conditions of ideal solution.
c) What is molecular spectrum?
d) Define Fermi Resonance.
e) What is meant by photochemical reaction?
f) Describe Quantum Yield.
g) Describe Grotthuss-Draper Law.
h) Define the term Stark effect.
i) What is meant by LASERS?
j) Explain the term "rigid linear molecule".

Answer the following questions in detail (Long Questions)

3. Drive the classical and quantum mechanical expression of Harmonic oscillator? (10)
4. Explain the following terms with suitable example/s (5+5)
   a) Chemilumiscence
   b) Photosensitized reactions
5. Describe in detail separation of solid solutions. (10)

UNIVERSITY OF THE PUNJAB

Roll No. .....

Seventh Semester 2018

Examination: B.S. 4 Years Programme

PAPER: Physical Chemistry (Sp. Theory-II) **TIME ALLOWED: 30 mins.**

Course Code: CEHM-404 **MAX. MARKS: 10**

Attempt this Paper on this Question Sheet only.

Objective Part

Q No. 1. Attempt all multiple choice questions **1x10=10**

I. Sugar dissolves in water due to formation of
a) Covalent bond b) ionic bond c) Co-ordinate bond d) Hydrogen bond

II. The energy of photon is equal
(a) $E = h\nu$ (b) $E = hc/\lambda$ (c) $E = h\lambda$ (d) both a & b

III. IR is example of which type of spectroscopy
(a) NMR (b)Rotational c) Electronic d) Vibrational

IV. Which of the following molecule is microwave active?
a) HCl (b) CH_4 (c) O_2 (d) none

V. Rotational degree of freedom for nono-linear molecule is
a) 2 (b) 3 (c) 5 (d) none of these

VI. The Henry's law give the relationship between:
a) Pressure and solubility of a gas in particular solvent
b) The temperature and solubility of a gas in particular solvent
c) The composition of mixture and solubility of a gas in particular solvent
d) None of these

VII. What is the effect of hydrogen bonding on the position and shape of an O-H stretch?
a) Shifted to lower wave numbers and remains sharp
b) Stays at the same wave numbers and broadens
c) Shifted to lower wavenumbers and broadens
d) Shifted to higher wavenumbers and broadens

VIII. A molecule can be excited to only the next higher rotational level by
a) Absorption of energy b) Release of energy c) The electric current d) Applying magnetic field

XI. Internal Energy of a molecule is
a) Roational energy b) Vibrational energy c) Translational energy d) All of these

X. Emission of light as result of chemical reaction is called
a) Phosphorescence b) Fluorescence c) Chemiluminescence d) None

UNIVERSITY OF THE PUNJAB

Roll No. .....

Seventh Semester 2018

Examination: B.S. 4 Years Programme

PAPER: Inorganic Chemistry (Sp. Theory-I) **TIME ALLOWED: 30 mins.**

Course Code: CHEM-406 **MAX. MARKS: 10**

Attempt this Paper on this Question Sheet only.

Objective **(1 × 10 = 10)**

Note: Cutting, overwriting, use of pencil, ink removers and Blanko are not allowed.

Q. 1. Select the suitable option. **(10)**

i. Which is a bent molecule

(a) H_2O (b) CO_2 (c) CS_2 (d) Cl_2

ii. Which of the following Halogens is a solid at room temperature?

(a) F_2 (b) Cl_2 (c) Br_2 (d) I_2

iii. Which is a bidentate ligand

(a) Chloro (b) Aqua (c) Oxime (d) Ammine

iv. Aluminium oxide is _____

(a) Acidic (b) Basic (c) Amphoteric (d) none of these.

v. Nickel in steel is determined by _____

(a) Ammonia (b) Dimethyl glyoxime (c) Cupferron (d) Nessler's reagent.

vi. Which has $d\pi - p\pi$ bond

(a) $(CH_3)_3PO$ (b) PCl_5 (c) $(CH_3)_3NO$ (d) SF_4

vii. The mode of hybridization of "P" atom in H_3PO_4 is _____

(a) sp (b) sp^2 (c) sp^3 (d) dsp^2

viii. Which theory fails to show unpaired electrons in the O_2

(a) Valance Bond theory (b) Molecular Orbital Theory (c) Crystal Field Theory (d) None of these

ix. Diborane cannot be methylated beyond_____

(a) $(CH_3)_4B_2H_2$ (b) $(CH_3)_3B_2H_3$ (c) $(CH_3)_2B_2H_4$ (d) $(CH_3)B_2H_5$

x. An Advantage of organic reagent in inorganic analysis is _____

(a) Volatility (b) Presence of Impurity (c) High molecular weight (d) None of these

UNIVERSITY OF THE PUNJAB

Seventh Semester 2018
Examination: B.S. 4 Years Programme

Roll No. .....

PAPER: Inorganic Chemistry (Sp. Theory-I) **TIME ALLOWED: 2 hrs. & 30 mins.**
Course Code: CHEM-406 **MAX. MARKS: 50**

Attempt this Paper on Separate Answer Sheet provided.

Q. 2. Answer following short questions. **(2 × 10 = 20)**

i. What are Chelates?
ii. Mention four points of similarity between VBT and MOT?
iii. What is 's – inert pair effect'?
iv. Give two uses of 8-Hydroxyquinoline in inorganic analysis.
v. What is 3c – 2e (three center t
vi. wo electron) bond? Give one example.
vii. Why does Fluorine show peculiar behavior in group VIIA?
viii. Explain why PF_5 exist but NF_5 does not exist?
ix. Write two advantages and two drawbacks of VSPER theory?
x. Name factors that can affect sensitivity, selectivity, and specificity of an organic reagent?

Q. 3. Answer following questions. **(3 × 10 = 30)**

i. Explain use of "d" orbital in bonding by non-metals with some examples. (10)
ii. Write a note on the EDTA titrations. (10)
iii. How correlation diagram approach is applied for triatomic molecule to determine the shape of the molecules? (10)

UNIVERSITY OF THE PUNJAB

Seventh Semester 2018
Examination: B.S. 4 Years Programme

Roll No. .....

PAPER: Inorganic Chemistry (Sp. Theory-II) **TIME ALLOWED: 2 hrs. & 30 mins.**
Course Code: CHEM-407 **MAX. MARKS: 50**

Attempt this Paper on Separate Answer Sheet provided.

Short Questions

Q. 2 Write down short answers for the following questions: **(2 x 10=20)**

(i) How the radioactivity can be measured by Geiger Muller Counter?
(ii) Define electromotive force. How electrode potential is measured?
(iii) Give examples of molten salt system that can be used at room temperature.
(iv)What are the precautionary measures to use Liq. SO_2 as solvent?
(v) Describe the role of metal oxides as high temperature super conductors.
(vi)Give the classification of solvents on the basis of polarity.
(vii) Discuss the chemistry of complex formation reactions occurring in liq. BrF_3.
(viii) What are the limitations of using water as solvent?
(ix)What is relationship between decay constant and half life of radioactive compound?
(x) What is the role of artificial transmutation reactions in daily life?

Long Questions

Q. 3 Answer the following: **(6x 5=30)**

(i) How reaction occurring in molten salts can be monitored?
(ii) Discuss the chemistry of acid base and complex formation reactions occurring in liq. NH_3.
(iii)What are projectile accelerators? Give examples.
(iv)What is group displacement law?
(v) What are the hazardous effects of volatile oxides on environment?

UNIVERSITY OF THE PUNJAB

Roll No. .....

Seventh Semester 2018

Examination: B.S. 4 Years Programme

PAPER: Inorganic Chemistry (Sp. Theory-II) **TIME ALLOWED: 30 mins.**

Course Code: CHEM-407 **MAX. MARKS: 10**

Attempt this Paper on this Question Sheet only.

OBJECTIVE TYPE

Q. 1 Tick the correct answer **(1 x 10)**

(i) Purification of an impure copper is made by electrolytic cell, in which impure copper is anode and pure copper is cathode and electrolyte is

(a) H_2SO_4 (b) $CuSO_4$

(c) $ZnSO_4$ (d) Na_2SO_3

(ii) Passage of electric current through the metals is due to

(a) Oxidation reaction (b) Reduction reaction

(c) Electrolysis (d) Free movement of electrons

(iii) Using graphite electrode the electrolysis of aqueous solution of NaCl produces at anode

(a) H_2 gas (b) Cl_2 gas

(c) NaOH (d) Na metal

(iv) Which isotope is produced by an (n, γ) reaction starting from 230Th?

a) ^{229}Th c) ^{229}Ac

b) ^{231}Th d) ^{231}Pa

(v) An amido ligand is:

(a) $[NH_2]^-$ (c) $[NH]^{2-}$

(b) NH_3 (d) N^{3-}

(vi) Liquid HF undergoes self ionization to give a liquid that contains:

(a) $[H_2F]^-$ (c) H^+

(b) $[HF_2]^-$ (d) F^-

(vii) BF_3 reacts in liquid HF to give:

(a) HBF_4 (c) $[H_2F]^+$

(b) $[BF_2]^+$ (d) $[HF_2]^-$

(viii) Which statement about the critical point of H_2O and supercritical H_2O is *true*?

(e) Supercritical H_2O behaves like a non-polar solvent

(f) Supercritical H_2O behaves as a polar solvent

(g) At its critical point, the density of water is 1.0 g cm^{-3}

(h) Supercritical H_2O is a good solvent for inorganic salts

(ix) In BrF_3, which reaction does *not* occur?

(a) $BrF_3 + CsF \rightarrow Cs^+ + [BrF_4]^-$

(b) $BrF_3 + AsF_5 \rightarrow [BrF_2]^+ + [AsF_6]^-$

(c) $BrF_3 + BrF_3 \rightarrow [BrF_2]^+ + [BrF_4]^-$

(d) $BrF_3 + AuF_3 \rightarrow [AuF_2]^+ + [BrF_4]^-$

(x) Species in an alkali metal-Al_2Cl_6 molten salt include:

(a) $[AlCl_4]^-$ and $[Al_2Cl_7]^-$

(b) $[AlCl_4]^-$ and $AlCl_3$

(c) $AlCl_3$ and $[AlCl_2]^+$

(d) $[AlCl_4]^-$ and $[AlCl_2]^+$

UNIVERSITY OF THE PUNJAB

Seventh Semester 2018
Examination: B.S. 4 Years Programme

Roll No. .....

PAPER: Organic Chemistry (Sp. Theory-I) **TIME ALLOWED: 2 hrs. & 30 mins.**
Course Code: CHEM-409 **MAX. MARKS: 50**

Attempt this Paper on Separate Answer Sheet provided.

Q. NO. 2. Give the short answer of the following questions. [4 x 5 = 20]

I. How can you explain the fact that an increase in temperature will favor elimination more than the substitution?

II. Describe the stereochemical evidences for S_N1 reaction.

III. Why elimination of HBr from 2-bromobutane gives 2-butene as major product?

IV. Describe the kinetic evidences of E1cB reaction. Give one example?

V. How can you explain that the polarity of solvent affects the rate of S_N1 reaction?

Q. NO. 3.

I. How the deuterium isotope effects can be used for determination of reaction mechanism? [5]

II. What are pyrolytic elimination reactions? Give two examples with mechanism. [5]

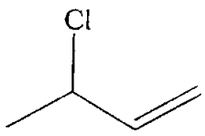
III. Explain with the suitable example that aromatic rings at β position can participate as neighbouring group in aliphatic nucleophilic substitution reactions. [5]

Q. NO. 4

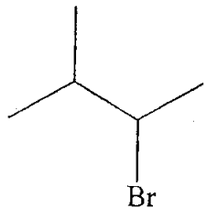
Complete the following reactions and draw the mechanisms for all steps involved.
In case if there is possibility of more than one product, indicate which product is major?

[3 x 5 =15]

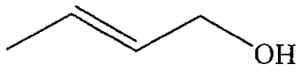
I) $n\text{-}C_{18}H_{37}Br + (CH_3)_3COK \xrightarrow{(CH_3)_3COH} ?$

II) 

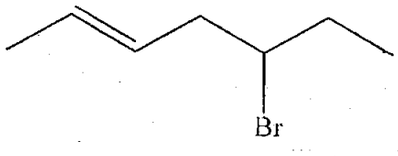
$+ NaOH \longrightarrow ?$

III) 

$+ H_2O \xrightarrow{S_N1\ Conditions} ?$

IV) 

$\xrightarrow[Ether]{SOCl_2} ?$

V) 

$\xrightarrow[E1\ Conditions]{CH_3OH} ?$

UNIVERSITY OF THE PUNJAB

Roll No. .....

Seventh Semester 2018
Examination: B.S. 4 Years Programme

PAPER: Organic Chemistry (Sp. Theory-I) **TIME ALLOWED: 30 mins.**
Course Code: CHEM-409 **MAX. MARKS: 10**

Attempt this Paper on this Question Sheet only.

Attempt question 1 on this question paper.

Q. NO. 1: Encircle the most suitable option. **[10]**

1. Among the following which is the best leaving group?
   a) Fluoride ion
   b) Chloride ion
   c) Bromide ion
   d) Iodide ion
2. In which solvent rate of S_N1 reaction will be highest?
   a) Water
   b) Benzene
   c) Hexane
   d) Toluene
3. S_N1 reaction is a
   a) Zero order reaction
   b) First order reaction
   c) Second order reaction
   d) Third order reaction
4. Which of the following alkyl halide is most reactive in S_N2 reactions?
   a) Methyl chloride
   b) n-Butyl chloride
   c) Isobutyl chloride
   d) n- hexyl chloride
5. Which of the following reaction takes place with inversion of configuration?
   a) E1 reaction
   b) E2 reaction
   c) S_N1 reaction
   d) S_N2 reaction

P.T.O.

6. Neighbouring group mechanism operates with

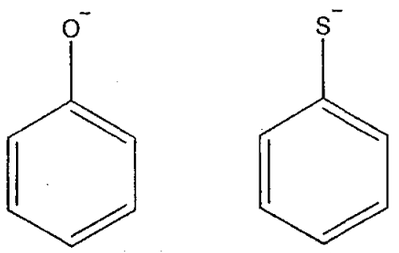
   a) Retention of configuration at chiral carbon

   b) Inversion of configuration at chiral carbon

   c) Racemization at chiral carbon

   d) Walden inversion at chiral carbon

7. Consider the following two anions. Which of the following statement is TRUE for them?



I II

   a) I is more basic and more nucleophilic than II.

   b) I is less basic and less nucleophilic than II.

   c) I is more basic but less nucleophilic than II.

   d) I is less basic but more nucleophilic than II.

8. Which of the following alcohol would undergo dehydration the fastest?

   a) 2-Phenyl-2-butanol

   b) Ethanol

   c) 2-Butanol

   d) 1-Butanol

9. How many alkenes are formed by E2 elimination of HCl from 2-chloro-2,3-dimethylhexane using a strong base such as sodium methoxide?

   a) 1

   b) 2

   c) 3

   d) 4

10. Aryl halides and Vinylic halides

   a) Do not undergo S_N1 reactions but undergo S_N2 reactions

   b) Do not undergo S_N2 reactions but undergo S_N1 reactions

   c) Do not undergo neither S_N1 nor S_N2 reactions

   d) Undergo both S_N1 and S_N2 reactions

UNIVERSITY OF THE PUNJAB

Seventh Semester 2018
Examination: B.S. 4 Years Programme

Roll No. .....

PAPER: Organic Chemistry (Sp. Theory-II) **TIME ALLOWED: 2 hrs. & 30 mins.**
Course Code: CHEM-410 **MAX. MARKS: 50**

Attempt this Paper on Separate Answer Sheet provided.

Note: All Questions are compulsory

Question No. 2. Provide short answers for the following questions? (5 × 4 = 20)

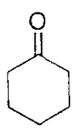
I) What is Favorskii rearrangement? Describe with mechanism and example?
II) Differentiate between aromatic and anti-aromatic compounds with example?
III) Explain the orientation of ortho/para and meta groups in E^+ aromatic substitutions?
IV) Give two evidences of benzyne mechanism?
V) Provide structures of Piperidine, Pyrimidine, Indole and Imidazole?

Question No. 3. Write a brief note on the followings? (3 × 5 = 15)

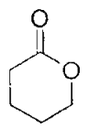
I) Paul-Knorr synthesis of pyrrole
II) Electrophilic and Nucleophilic substitutions of Furan
III) Friedel-Crafts acylation of bromobenzene and nitrobenzene

Question No. 4. Answer the followings with necessary details? (15)

I) Preparation of halo benzenes from aniline with mechanism and examples? **(3)**
II) Spectroscopic evidence of aromatic sulfonation reaction? **(3)**
III) How would you prepare the followings from cyclopentanone? **(9)**



i



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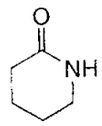

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UNIVERSITY OF THE PUNJAB

Roll No. .....

Seventh Semester 2018
Examination: B.S. 4 Years Programme

PAPER: Organic Chemistry (Sp. Theory-II) **TIME ALLOWED: 30 mins.**
Course Code: CHEM-410 **MAX. MARKS: 10**

Attempt this Paper on this Question Sheet only.

Note: All Questions are compulsory

Question No. 1. Select the most appropriate option in the given MCQs

I) Which aromatic compound will be least reactive for electrophilic aromatic substitutions?
a) Benzene
b) Chlorobenzene
c) Nitrobenzene
d) Phenol

II) Which aromatic compound will be least reactive for nucleophilic aromatic substitutions?
a) Benzene
b) Phenol
c) Chlorobenzene
d) Nitrobenzene

III) Which rearrangement is used to prepare amines from carboxylic acids?
a) Curtius rearrangement
b) Bechmann rearrangement
c) Favorskii rearrangement
d) Baeyer-Villiger rearrangement

IV) Which rearrangement converts ketones to esters?
a) Curtius rearrangement
b) Bechmann rearrangement
c) Favorskii rearrangement
d) Baeyer-Villiger rearrangement

V) 4-Hydroxybenzaldehyde on reaction with Br_2 would yield?
a) 2,6-Dibromo-4-hydroxybenzaldehyde
b) 3-Bromo-4-hydroxybenzaldehyde
c) 2,3-Dibromo-4-hydroxybenzaldehyde
d) None of the above

P.T.O.

VI) Cyclohexanone on reaction with NH_2OH followed by acid treatment would yield?

a) Cyclopentane carboxylic acid
b) Cyclohexylamine
c) Lactone
d) Lactam

VII) Addition of a nucleophile (NH_2) to pyridine ring would yield?

a) 2-Aminopyridine
b) 3-Aminopyridine
c) 4-Aminopyridine
d) None of the above

VIII) Which of the followings is most reactive as diene for Diels-Alder reaction?

a) Benzene
b) Thiophene
c) Furan
d) Pyrrole

IX) 1,4-Dicarbonyl compounds on reaction with ammonia would yield?

a) Pyridine
b) Pyrrole
c) Thiophene
d) Furan

X) Reaction of furan with DMF and $POCl_3$ would yield?

a) 2-Chloro furan
b) 3-Chloro furan
c) Furan-2-carboxaldehyde
d) Furan-3-carboxaldehyde

UNIVERSITY OF THE PUNJAB

Seventh Semester 2018
Examination: B.S. 4 Years Programme

Roll No. .....

PAPER: Analytical Chemistry (Sp. Theory-I) **TIME ALLOWED: 2 hrs. & 30 mins.**
Course Code: CHEM-412 **MAX. MARKS: 50**

Attempt this Paper on Separate Answer Sheet provided.

Short Questions

Q 2. Attempt all these short questions. **(2*10)**

1. What is a thermocouple?
2. Give two differences between DSC and DTA.
3. Explain electrode potential.
4. What is composition of glass membrane in glass electrode?
5. Give three types of open tubular column in G.C.
6. Differentiate between GSC and GLC.
7. What is Eddy Diffusion?
8. Give Van Deemter equation.
9. Give adsorbents used in HPLC columns.
10. What is pre- column in Chromatography?

Long Questions

Q 3. Give instrumentation and principle of DTA. (10)

Q 4. Give construction and working of any one reference electrode. (10)

Q 5. What is meant by multicolumn systems in G.C? (10)

UNIVERSITY OF THE PUNJAB

Roll No. .....

Seventh Semester 2018

Examination: B.S. 4 Years Programme

PAPER: Analytical Chemistry (Sp. Theory-I) **TIME ALLOWED: 30 mins.**

Course Code: CHEM-412 **MAX. MARKS: 10**

Attempt this Paper on this Question Sheet only.

MCQs

1. Curie point is the temperature at which a ferromagnetic material becomes
   a. Diamagnetic b. Paramagnetic c. Non- magnetic
2. The units of CP specific heat capacity are
   a. $J^{-1} K^{-1} mol^{-1}$ b. $J K^{-1} mol^{-1}$ c. $JK mol^{-1}$
3. In DTA the change in temperature is equal to
   a. Tr-Tsb. Ts-Tr c. Ts-Tt
4. TGA measures
   a. Pressure change b. Mass change c. Volume change
5. Which detector in GC is called universal detector
   a. FID b. Thermal Conductivity Detector c. TED
6. What is diameter of packed column in G.C
   a. 3m b. 2-9 mm c. 5m
7. Flame Photometric Detector is used for determination of
   a. Nitrogen compoundsc. Sulfur and Phosphorus compounds
   b. Halogen compounds
8. Reversed phase HPLC is used to separate
   a. Ionic compounds c. Organic compounds
   b. Co- ordination compounds
9. The solvents used in HPLC must be pure and
   a. Immiscible b. Degassed c. Dense
10. Which stationary phases are more stable in HPLC?
    a. Inert c. Chemically bonded
    b. Chemically non- bonded

UNIVERSITY OF THE PUNJAB

Seventh Semester 2018
Examination: B.S. 4 Years Programme

Roll No. .....

PAPER: Analytical Chemistry (Sp. Theory-II) **TIME ALLOWED: 2 hrs. & 30 mins.**
Course Code: CHEM-413 **MAX. MARKS: 50**

Attempt this Paper on Separate Answer Sheet provided.

SUBJECTIVE

Section I

Q.2- Attempt all Short questions (2x10=20)

(i Write down the selection rule for infrared absorption.

(ii)-.Distinguish between internal conversion and fluorescence.

(iii) -. Define overtones and combination bands.

(iv)- What are radiationless deactivation processes ?

(v)- What are the advantages and disadvantages of photodiode detector?

(vi) Describe the basic principle of ICP-AES.

(vii)- What is difference between Anti-Stokes transition and Stokes transition in Raman spectroscopy?

(viii) What is the role of beam splitter in FT-IR?

(ix) What is resonance fluorescence? Give an example.

(x) What are the advantages of grating over prism?

Section II

Attempt all questions

Q.3(a)-Discuss the two types of gratings being used in UV/Visible spectroscopy. (5)

(b)-Discuss different vibrational modes in infrared spectroscopy. (5)

Q.(4)-(a) Discuss Laser sources in Raman spectroscopy. (5)

(b). Discuss the sampling techniques in FT-IR spectroscopy. (5)

Q.5- (a) Explain pumps and spray chambers for sample introduction in ICP-AES (5)

(b)- Write down the applications of atomic fluorescence spectroscopy. (5)

UNIVERSITY OF THE PUNJAB

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Seventh Semester 2018

Examination: B.S. 4 Years Programme

PAPER: Analytical Chemistry (Sp. Theory-II) **TIME ALLOWED: 30 mins.**

Course Code: CHEM-413 **MAX. MARKS: 10**

Attempt this Paper on this Question Sheet only.

OBJECTIVE

(i)- which of the following expression is wrong about absorbance

(a) A = log (1/T) (b) A= -log T (c) A = 2.000 – log %T (d) 100- log %T

(ii)- How many Raman active vibrations CO_2 possesses?

(a) 01 (b) 02 (c) 03 (d)None

(iii)- Which of the following component of ICP is used to introduce Solid samples

a) Nebulizer b) Cuvette having glass windows c) Probe d) Laser ablation system

(iv)- Which material is suitable for cuvette in UV spectroscopy

(a) Glass (b) Plastic (c)Quartz (d) All a,b,c

(v)- Which of the following processes is not radiationless deactivation?

(a) Intersystem crossing (b) Internal conversion

(c) vibrational relaxation (d) Phosphorescence

(vi)- The time required for fluorescence to take place is

(a) 10^{-9} to 10^{-7} s (b) 10^{-4} to 10 s (c 10^{-12} s or less (d) none

(vii) What type of information is obtained from IR

(a) Molecular mass (b) Conjugation (c) Functional group (d) All

(viii)- Which type of degrees of freedom are equal for linear and non linear molecules

(a) Vibrational (b)Translational (c) rotational (d) None

(ix)- The purge gas being used in ICP-AES is

(a) Argon (b) Oxygen (c) CO_2 (d) H_2

(x)- . Globar is made up of

(a) SiC (b) SiO_2 (c) ZrO (d) ThO

UNIVERSITY OF THE PUNJAB

Seventh Semester 2018
Examination: B.S. 4 Years Programme

Roll No. .....

PAPER: Applied Chemistry (Sp. Theory-I) **TIME ALLOWED: 2 hrs. & 30 mins.**
Course Code: CHEM-415 **MAX. MARKS: 50**

Attempt this Paper on Separate Answer Sheet provided.

Short Questions

Q. 1 Briefly answer following question? $10 \times 2 = 20$

1. What are products of refining?
2. What are raw materials for normal superphosphate fertilizers?
3. Name few natural organic fertilizers.
4. What is soda pulping?
5. What is beating process of paper production?
6. Write down the action of calcium cyanide as fertilizer.
7. Name four processes in chemical treatment of petroleum products.
8. What is reforming?
9. Describe catalytic cracking.
10. Give examples of phosphate fertilizers?

Subjective Part

$10 \times 3 = 30$

Q 2.	(a)	Briefly explain fractional distillation of petroleum.	5
	(b)	What is catalytic reforming and why it is used.	5
Q 3.	(a)	Describe wet process in paper manufacturing.	5
	(b)	Discuss the environmental aspects of paper industry.	5
Q 4.	(a)	Describe manufacturing of ammonia by Haber's process.	5
	(b)	What are triple superphosphates, write down their important properties.	5

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Seventh Semester 2018

Examination: B.S. 4 Years Programme

PAPER: Applied Chemistry (Sp. Theory-I) **TIME ALLOWED: 30 mins.**

Course Code: CHEM-415 **MAX. MARKS: 10**

Attempt this Paper on this Question Sheet only.

Objective Part

$10 \times 1 = 10$

1. The excess of nitrogen fertilizers leads to

(a) Growth problems (b) Dehydration problems

(c) Pest problems (d) None of these

2. Which of the following fertilizer is injected in top soil?

(a) Urea (b) Ammonia

(c) Calcium cyanide (d) Triple phosphate

3. Superphosphate is manufactured by reacting phosphate rock with

(a) Hydrochloric acid (b) Formic acid

(c) Acetic acid (d) Sulphuric acid

4. Essential mineral for plants other than ammonia is

(a) Phosphorus (b) Sodium

(c) Potassium (d) Lithium

5. Kraft process of pulp manufacturing is also known as

(a) Sulphonation process (b) Sulphamation process

(c) Sulfate process (d) Sulfite process

6. Origin of petroleum is due to underground hydrolysis of metal carbides is known as

(a) Biogenic theory (b) Abiogenic theory

(c) Carbide theory (d) Both b and c

7. Which process converts n-paraffins to i-paraffins?

(a) Alkylation (b) Polymerization

(c) Acylation (d) Isomerization

8. Which of the following has the lowest viscosity of all at given temperature?

(a) Naphtha (b) Diesel

(c) Kerosene (d) Engine Oil

9. Which is the most undesirable product in kerosene?

(a) i-paraffins (b) Naphthenes

(c) n-paraffins (d) Aromatics

10. Ammonia fertilizers are usually made by two components, they are

(a) Ammonia and hydrogen (b) Ammonia and nitric acid

(c) Ammonia and water (d) Ammonia and carbon dioxide

UNIVERSITY OF THE PUNJAB

Seventh Semester 2018
Examination: B.S. 4 Years Programme

Roll No. .....

PAPER: Applied Chemistry (Sp. Theory-II) **TIME ALLOWED: 2 hrs. & 30 mins.**
Course Code: CHEM-416 **MAX. MARKS: 50**

Attempt this Paper on Separate Answer Sheet provided.

SUBJECTIVE TYPE

Q No. 2:- Give short answers to the following questions:- **(2 x10 = 20 marks)**

(a) What are CHROMOPHORES and AUXOCHROMES?
(b) What are ACID AZO DYES?
(c) What is HEAT TREATMENT of STEEL?
(d) What is the effect of different IMPURITIES on STEEL?
(e) Give different uses of THIN LAYER CHROMATOGRAPHY.
(f) Draw the structure of ALIZARIN?
(g) How can the percentage of impurities in STEEL be determined?
(h) How is FLAME SPECTROMETRY used to determine TEL in GASOLINE?
(i) What is meant by PASSIVITY of IRON?
(j) What are RED SHIFT and BLUE SHIFT?

LONG QUESTIONS

Q No. 3:- **(a)** What are the different applications of AAS? **(4)**
(b) Write a note on hollow cathode lamp. **(6)**

Q No. 4:- **(a)** Explain the DUPLEX process for the manufacture of STEEL? **(5)**
(b) How is CHROME PLATING carried out? **(5)**

Q No. 5:- **(a)** Give the different applications of TLC? **(4)**
(b) Differentiate between DISCRETE and CONTINUOUS ANALYSERS? **(6)**

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Seventh Semester 2018

Examination: B.S. 4 Years Programme

PAPER: Applied Chemistry (Sp. Theory-II) **TIME ALLOWED: 30 mins.**

Course Code: CHEM-416 **MAX. MARKS: 10**

Attempt this Paper on this Question Sheet only.

OBJECTIVE TYPE

1. Which of the following has no CHROMOPHORE and is usually COLOURLESS?
   (a) Hydrobenzene (b) Turkey red (c) Mauve (d) Magenta

2. SILICA as an impurity of ORES should not exceed in flux:-
   (a) 1-2% (b) 2-3% (c) 3-4% (d) 4-5%

3. Which of the following is also known as "FOOL'S GOLD"?
   (a) Magnetite (b) Red Hematite (c) Pyrite (d) Limonite

4. The average composition of CAST IRON has the following percentage of IRON:-
   (a) 85-87 (b) 87-89 (c) 91-93 (d) 93-95

5. GALVANISED IRON is protected by a layer of
   (a) Cr (b) Zn (c) Sn (d) Pb

6. Iron is mostly obtained from the ORE
   (a) Fe_2O_3 (b) $2Fe_2O_3$ (c) Fe_3O_4 (d) FeS_2

7. Steel is an ALLOY of IRON. It has a composition of Fe with
   (a) Ni and Cr (b) Cu and Cr (c) Cu and Ni (d) None

8. The temperature at the zone of absorption in °C is:-
   (a) 800 – 1000 (b) 300 – 700 (c) 800 - 900 (d) 1000 - 1300

9. ACID DYES usually contain SALTS of SODIUM
   (a) sulphonic acid (b) phenolic compound (c) amino compounds (d) both a & b

10. POLYMER RESIN produced by coating of glass beads for separation of CATION in HPLC is:-
    (a) Melamine resin (b) Acetal Resin (c) Zipax resin (d) Polyurethane resin

UNIVERSITY OF THE PUNJAB

Seventh Semester - 2018
Examination: B.S. 4 Years Programme

Roll No. .....

PAPER: Bio Chemistry (Sp. Theory-I) **TIME ALLOWED: 2 hrs. & 30 mins.**
Course Code: CHEM-418 **MAX. MARKS: 50**

Attempt this Paper on Separate Answer Sheet provided.

[Subjective Type]

Q.2 Short Questions 2X10=20

i. Differentiate between hormones and pheromones?
ii. What is the Neuro-transmitter?
iii. Give any two important roles that prostaglandins play?
iv. Name the steps involve in biosynthesis of fatty acids?
v. Define oxidative phosphorylation?
vi. Differentiate between glycogenesis and gluconeogenesis?
vii. Name the syndrome associated with HMP shunt?
viii. What are the functions of parathyroid gland?
ix. Define the tissue slice technique?
x. Differentiate between aerobic glycolysis and anaerobic glycolysis?

Q.3 Extensive Questions (30)

1. (a) Describe oxidative phosphorylation in details. 6

   (b) Give biological function of pituitary gland? 4

2. (a) Draw and explain the Citric Acid Cycle. 7

   (b) Define and explain the term hormone? 3

3. (a) Elaborate the β-oxidation of fatty acid synthesis. 7

   (b) Discuss the Lipolysis in few lines? 3

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Seventh Semester - 2018

Examination: B.S. 4 Years Programme

PAPER: Bio Chemistry (Sp. Theory-I) **TIME ALLOWED: 30 mins.**

Course Code: CHEM-418 **MAX. MARKS: 10**

Attempt this Paper on this Question Sheet only.

Q.1 Multiple Choice Question.

i. Pyruvate Kinase deficiency leads to
a) Cirrhosis b) Renal failure c) cardiac failure d) Hemolytic Anemia

ii. The optimum PH of salivary α-amylase is...
a) 5.6 b) 6.7 c) 8.0 d) 9.6

iii. The energy expenditure for formation of glucose from pyruvate is.
a) 2 ATP b) 4 ATP c) 6ATP d) 12 ATP

iv. What is the normal level of Ketone bodies in blood?
a) 5-7mg/dl b) 7-9mg/dl c) less than 2mg/dl d) 9-11mg/dl

v. β-oxidation of fatty Acids occurs in the following Tissues, Except.
a) Brain b) Liver c) Kidney d) Heart

vi. Epinephrine inhibits one of the following.
a) Glycogenolysis b) Glycogenesis c) Lipolysis d) Gluconeogenesis

vii. The Enzymes of HMP shunt are located.
a) Cytosol b) Liver c) Both a and b d) none

viii. Bile Acid Synthesis requires.
a) Vitamin C b) Co ASH c) $NADPH + H^+$ d) All of the above

ix. Secretion of Androgen are Stimulated by.
a) CRF b) FSH c) LH d) ACTH

x. The metal present in the composition of insulin
a) Na b) Ni c) Zn d) none

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Seventh Semester 2018
Examination: B.S. 4 Years Programme

Roll No. .....

PAPER: Bio Chemistry (Sp. Theory-II) **TIME ALLOWED: 2 hrs. & 30 mins.**
Course Code: CHEM-419 **MAX. MARKS: 50**

Attempt this Paper on Separate Answer Sheet provided.

Q-2. Questions with short answers: **(10x2)**

1. Define Central, Peripheral and whole blood?
2. Write down abnormal composition of Urine?
3. Define Complement system and inflammatory process?
4. Name Fat soluble Vitamins?
5. What are Adjuvant?
6. Write down the requirements of Vitamin D, E and C?
7. What do you understand by Electrofocussing?
8. Any four applications of HPLC?
9. Write down Deficiency symptoms of Vitamin K?
10. Briefly write Gaseous transport?

Q-3. Questions with Brief answers? **(10x3)**

1. Write a detailed note on ELISA?
2. How the complement System works in an immune system?
3. Write down the occurrence, chemistry and deficiency symptoms of Vitamin E?

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Seventh Semester 2018
Examination: B.S. 4 Years Programme

PAPER: Bio Chemistry (Sp. Theory-II) **TIME ALLOWED: 30 mins.**
Course Code: CHEM-419 **MAX. MARKS: 10**

Attempt this Paper on this Question Sheet only.

Q-1. Multiple Choice Questions: **(1x10)**

1. Vitamin D can also be called:

a. ascorbic acid b. Calciferol c. Phytomenadione d. Absisic acid

2. Antibodies are defense substances produced by the ----------cells

a. T- Lymphocytes b. Monocytes c. B-cells d. Leukocytes

3. In which of these compartments is Na+ concentration the lowest:

a. Interstitial Fluid b. Plasma c. Intracellular fluid d. lymph

4. Which fluid compartment contains about 67% (by volume) of all body Water?

a. Intracellular fluid b. Plasma c. Lymph d. Extracellular fluid

5. Light and heavy chains in antibodies are joined by:

a. Covalent bond b. Hydrogen bond c. Di-sulphide bond d. Ionic bond

6. Best Sources of Vitamin C are:

a. Oranges b. Chili peppers c. Strawberries d. Pineapple

7. Deficiency of Vitamin B Complex causes:

a. Dermatitis b. Pellagra c. Rickets d. Scurvy

8. Deficiency of Vitamin K can cause the risk of:

a. Night blindness b. Beri Beri c. Color blindness d. uncontrolled bleeding

9. Scanning Electron Microscopy (SEM) is best used to study:

a. Small Internal cell structure b. Surface Morphology

c. Crystallinity d. All of the above

10. The Eluent strength is a measure of:

a. Solvent adsorption energy b. Solvent absorption energy

c. Solvent diffusivity d. Solvent mixing index