Seat
No.

B.Sc. (Part-III) (Semester-V) (CBCS) Examination, October - 2023
ENGLISH (Compulsory)
Ability Enhancement Compulsory Course English for
Communication (Paper-III)
Sub. Code : 79671

Day and Date : Tuesday, 31 -10 - 2023   **Total Marks :40**
Time :10.30 a.m. to 12.30 p.m.

Instructions :   1)   **All questions are compulsory.**
                     2)   **Figures to the right indicate full marks.**

Q1) A)   Rewrite the following, choosing the correct alternative: **[3]**

   a)   The poem 'Enterprise' describes a _____ journey towards a specific goal.

   i)   Strange   ii)   Happy

   iii)   Metaphorical   iv)   Adventurous

   b)   In the fable 'The Ant and the Grasshopper', the ant stands for_____

   i)   Hard work   ii)   Idleness

   ii)   Enjoyment   iv)   kindness

   c)   William Morris studied _____ for more than thirty years.

   i)   Science fiction   ii)   Detective fiction

   iii)   Historical fiction   iv)   Mystery fiction

   B)   Answer the following questions in one word/ phrase /sentence each. **[3]**

   a)   Which award did Sudha Murty receive from Bhopal?

   b)   What did the butterfly cover under its wings?

   c)   How does, according to the poet Faiz Ahmad Faiz, the devotee go to the Pilgrims?

P.T.O.

Q2) **A)** Answer the following questions in 3 to 4 Sentences each. (2 out of 3)**[4]**

    a) How was the end of the journey in the poem 'Enterprise?

    b) What was the cause of George's worry in the story?

    c) How did William Morris work closely with Miss. Suskind and Mr. Regnier to solve the problem?

    B) Write a short note on the following in about 7 to 8 sentences. (1 out of 2)

        [4]

    a) Significance of the title ' Forgeting Our Own History'.

    b) Theme of the poem, 'For Your Lanes, My Country'.

    C) Do as directed. **[2]**

    a) Write Noun form of the following word.

<div align="center">Exalt</div>

    b) Give the synonyms of the following word.

<div align="center">Pleasure</div>

Q3) a) Imagine that you are going to attend the interview for the post of a sales manager in a well reputed company. Prepare a mock interview of it. **[8]**

<div align="center">OR</div>

Write a note on different stages of preparation for the interview.

    b) Write an email to the municipal corporation complaining about the bad condition of the roads in your area. **[8]**

<div align="center">OR</div>

Share your experiences about participation in a NSS residential camp.

Q4) Write a well organized paragraph on "My first experience of Voting".**[8]**

<div align="center">OR</div>

Write a report about your participation in a cultural event.

<div align="center">● ● ●</div>

Seat No.

B.Sc. (Part-III) (Semester-V) (CBCS) Examination, October - 2023
CHEMISTRY
Inorganic chemistry (Paper-IX)
Sub. Code : 79682

Day and Date :Monday 23 - 10- 2023   Total Marks : 40
Time : 10.30 a.m. to 12.30 p.m.

Instructions :   1)   All questions are compulsory.
2)   Figures to the right indicate full marks.
3)   Neat diagrams should be drawn wherever necessary.
4)   Use of scientific calculator and logarithmic table is allowed.

Q1) A)   Answer the following questions in one sentence.   **[4]**

a)   What is John-Teller distortion?

b)   Which impurity is doped to silicon crystal to form p-type semiconductor?

c)   What are metal carbonyls?

d)   Define the term Heterogeneous catalysis.

B)   Select the most correct alternative among the following and rewrite the sentence.   **[4]**

a)   According to Lux-Flood concept, bases are those species which can ____.

i)   donate oxide ion   ii)   accept oxide ion

iii)   donate proton   iv)   accept proton

b)   In enzyme catalysis, for the fermentation of sugar to ethanol ____ enzyme is used as a catalyst.

i)   maltase   ii)   urease

iii)   amylase   iv)   zymase

P.T.O.

c) An octahedral complex $[Co(NH_3)_6]^{3+}$ is a _____ type of complex.

    i)   high-spin   ii)   low-spin

    iii)   moderate spin   iv)   spin-paired

d) According to band theory, a solid having maximum energy gap between valence band and conduction band is called _____.

    i)   conductor   ii)   semiconductor

    iii)   insulator   iv)   superconductor

Q2) Answer the following (Any two).   **[20]**

    a)   What is catalysis? Explain types of catalysis with suitable examples.

    b)   State the basic assumptions of crystal field theory (CFT) and elaborate factors affecting the magnitude of crystal field splitting in corrdination complexes.

    c)   What is semiconductor? On the basis of Band theory, explain intrinsic and extrinsic semiconductors and give its applications.

Q3) Answer the following (Any three).   **[12]**

    a)   Write a note on structure and bonding in $Ni(CO)_4$.

    b)   Define and explain with suitable examples Arrhenius acids and bases.

    c)   Write a short note on superconductivity.

    d)   Write a brief account on types of solvents.

    e)   Draw molecular orbital (MO) energy level diagram of $[Co(NH_3)_6]^{3+}$ complex.

Seat
No.

B.Sc. (Part-III) (Semester-V) (CBCS) Examination, October - 2023
CHEMISTRY
Organic Chemistry (Paper-X)
Sub. Code : 79683

Day and Date : Wednesday, 25- 10 - 2023   **Total Marks :40**
Time :10.30 a.m. to 12.30 p.m.

Instructions :   1)   **All questions are compulsory.**
                              2)   **Figures to the right indicate full marks.**
                              3)   **Spectroscopic chart is allowed.**

Q1) Select most correct alternative among those given below and rewrite the
sentences.   **[8]**

   a)   In the electromagnetic spectrum, which region has the longest wavelength?

   i)   Ultraviolet   ii)   Infrared

   iii)   Visible   iv)   X-ray

   b)   Which type of Spectroscopy is particularly useful for studying molecular
vibrations?

   i)   UV-Vis Spectroscopy   ii)   X-ray Spectroscopy

   iii)   IR Spectroscopy   iv)   NMR Spectroscopy

   c)   In UV-Visible spectroscopy, which type of electronic transition is
responsible for the absorption of visible light?

   i) $n \rightarrow \sigma *$ ii) $n \rightarrow \pi *$

   iii) $\sigma \rightarrow \sigma *$ iv) $\pi \rightarrow \pi *$

   d)   The shift of absorption band to shorter wavelength is called as _____

   i)   bathochromic shift   ii)   hypochromic shift

   iii)   hyperchromic shift   iv)   hypsochromic shift

   e)   Which nucleus is commonly used in NMR spectroscopy?

   i)   Hydrogen (^{1}H)   ii)   Carbon (^{12}C)

   iii)   Oxygen (^{16}O)   iv)   Nitrogen (^{14}N)

   f)   In a proton NMR spectrum, how many signals would you expect for a
compound with the molecular formula C_4H_{10}?

   i)   3   ii)   2

   iii)   4   iv)   *5*

                                                                                                      P.T.O.

g) In mass spectrometry, ions are separated based on their_____
   i) Charge-to-mass ratio   ii) Charge alone
   iii) Mass alone   iv) Size

h) Molecular weight is determined by using_____
   i) NMR Spectroscopy   ii) IR Spectroscopy
   iii) UV Spectroscopy   iv) Mass Spectroscopy

Q2) Attempt any two of the following: **[20]**

a) Explain the fundamental modes of vibrations in IR Spectroscopy.

b) i) Explain the terms:
   1) Bathochromic shift
   2) Hypsochromic shift
   ii) Explain the phenomenon of spin-spin coupling, with examples.

c) i) State and explain Beer Lambert Law and name the terms involved in its expression.
   ii) Draw a neat labeled diagram of Mass Spectrometer and explain its working.

Q3) Attempt any four of the following: **[12]**

a) Calculate the λ_{max} value of following compounds by using Woodward fieser rule

   i)

   ii)
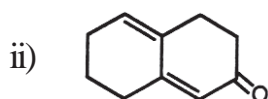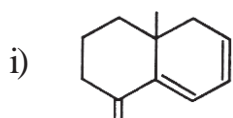
b) Write a note on McLafferty rearrangement.

c) Deduce the structure of the compound using following spectral data
   MF: C_2H_6O
   IR : 3300 cm^{-1}
   PMR : δ 1.2 (triplet,3H); δ 3.7 (quartet,2H); δ 5.2 (singlet, 1H)

d) Applications of Mass Spectroscopy.

e) Write a note on Chemical Shift.

SPECTROSCOPIC VALUES

A] Woodward and fieser rules for Dienes and Enones

Nature of Dienes	λmax
Acyclic and Heteroannular dienes	214 nm
Homoannular dienes	253nm
Addition of each substituents	
-R(alkl, including part of carbocyclic ring)	+ 5 nm
-OR (alkoxy)	+ 6 nm
-Cl, -Br	+ 5 nm
-OCOR (acyloxy)	--
-CH=CH- additional conjugation	+ 30 nm
If one double bond is exocclic to one ring	+ 5 nm
If exocyclic to two rings simultaneously	+10 nm

B] Rules for α, β unsaturated aldehydes and ketones:

	λmax
Ketones $\quad \overset{B}{-}\overset{}{C}=\overset{}{C}-\overset{\alpha}{C}=O$	
Acyclic or 6-ring cyclic	215 nm
5- ring cyclic	202 nm
Aldehydes $-C=C-\overset{}{\underset{H}{C}}=O$	207 nm
Acid/Ester $-CH-O-\overset{}{\underset{O}{C}}-R$	197 nm

CHEMICAL SHIFTS OF PROTONS δ in ppm			
Proton	**δppm**	**Proton**	**δppm**
H₃C—R	0.9	—C–CH₂—C	1.4
H₃C—C=C	1.7	—C–CH₂–C—OR (||O)	2.2
H₃C—C=O (R)	2-2.7	—C–CH₂–C=C	2.3
H₃C—S—	2.1	—C–CH₂–S—	2.5
H₃C——Ar	2.3	—C–CH₂–N—	2.5
H₃C—N—R	2.3	—C–CH₂—Ar	2.7
H₃C—C—Ar (||O)	2.6	—C–CH₂—OR	3.4
H₃C—N—Ar	3.0	—C–CH₂—I	3.2
H₃C—O—R	3.3	—C–CH₂—Br	3.5
H₃C—O—C–R (||O)	3.7	—C–CH₂—Cl	3.6
H₃C—O–Ar	3.8	—C–CH₂—OH	3.6
▬	▬	▬	▬
Ar——H	7.3	—C–CH—C	1.5
R—C–H (||O)	9.0-10.0	—C–CH–C–R (||O)	2.5
R—C–OH (||O)	10.5-12	—C–CH—N—	2.8
R—OH	0.5-4.5	—C–CH—Ar	3.0

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Seat No.

B.Sc. (Part - III) (Semester - V) (CBCS)
Examination, October - 2023
CHEMISTRY
Physical Chemistry (Paper - XI)
Sub. Code : 79684

Day and Date : Friday, 27 - 10 - 2023   **Total Marks : 40**
Time : 10.30 a.m. to 12.30 p.m.

Instructions : 1) **All questions are compulsory.**
            2) **Figures to the right indicate full marks.**
            3) **Draw neat labelled diagrams and give equations wherever necessary.**
            4) **Use of scientific calculator and logarithmic table is allowed.**

Q1) A) Answer the following in one sentence only.   **[4]**

    i)   Define single electrode potential.

    ii) Define Rayleigh or elastic Scattering.

    iii) Define critical solution temperature or CST.

    iv) Define the Quantum yield ($\varnothing$).

   B) Select the most correct alternative from the following.   **[4]**

    i)   In Concentration cells, emf is produced due to decrease in _____ accompanying the cell reaction.

        a) enthalpy   b) free energy

        c) entropy   d) kinetic energy

    ii) When the temperature coefficient of the cell becomes zero, the free energy change of the cell reaction is equal to _____.

        a) zero   b) enthalpy change

        c) entropy change   d) internal energy

P.T.O.

iii) de-Broglie equation is given as _____.

    a) $E = hv$ b) $\lambda = h / c$

    c) $\lambda = h / mv$ d) $\lambda = h / m$

iv) Homogenous mixture of two or more chemical components is known as _____.

    a)   solution   b)   solute

    c)   solvent   d)   dilute solution

Q2) Attempt any Two of the following.   **[20]**

    a)   Derive an expression for emf of an electrolyte concentration cell without transference.

    b)   What are ideal solutions? Draw liquid-vapor composition curves for an ideal solution. Show with the help of this diagram that vapour is always richer in more volatile component.

    c)   Discuss in detail Jablonski diagram.

Q3) Attempt any three of the following.   **[12]**

    a)   Explain metal - metal ion electrode.

    b)   Calculate the emf of the cell at 298K,

$$Al_{(s)} \left| Al^{3+}_{(aq)} (a{=}0.1) \right\| Ni^{2+}_{(aq)} (a{=}1) \left| Ni_{(s)} \right.$$

$$E^{o}_{Al\ 3+|Al} = -1.66V,\ E^{o}_{Ni2+/Ni} = -0.236V$$

    c)   Explain the factours affecting on quantum yield.

    d)   State and explain Raoult's law.

    e)   Discuss Nicotine water system.

                               ❧   ❧   ❧

Seat No.

B.Sc. (Part-III) (Semester-V) (CBCS) Examination, October - 2023
CHEMISTRY
Analytical Chemistry (Paper-XII)
Sub. Code : 79685

Day and Date :Monday 30 - 10- 2023   **Total Marks : 40**
Time : 10.30 a.m. to 12.30 p.m.

Instructions :   1)   **All questions are compulsory.**
                     2)   **Figures to the right indicate full marks.**
                     3)   **Draw neat labeled diagrams wherever necessary.**

Q1) Select most correct alternative among those given below and rewrite the sentence.   **[8]**

    a)   An eluent releases the most strongly held bands on a column at _____

       i)   in between   ii)   end

       iii)   beginning   iv)   any way

    b)   For pH determination, the quinhydrone electrode works satisfactorily at _____pH values.

       i)   zero   ii)   high

       iii)   low   iv)   both i and ii

    c)   If ultraviolet light is used in the colorimetric measurement, the vessels or other optical parts of the system must be made of _____

       i)   quartz   ii)   corning glass

       iii)   borosil   iv)   glass

    d)   In good flame photometers _____detectors are used which produce an electrical signal from the radiation falling on them.

       i)   photomultiplier   ii)   photocell

       iii)   both i and ii   iv)   photoframe

P.T.O.

e) The amount of substance in its saturated solution in any solvent at given temperature is called as _____ in that solvent.

   i) molarity   ii) solubility

   iii) solubility product   iv) pH

f) Water present on the surface of principate is called as _____

   i) water of hydration   ii) sorbed water

   iii) occluded water   iv) adsorbed water

g) Linear or cross linked polystyrene resin having - SO_3H group is used as _____

   i) Strong cation exchanger   ii) adsorbent

   iii) anion exchanger   iv) cation reducer

h) _____burner is not used in flame photometry.

   i) total consumption   ii) Laminar flow

   iii) spirit   iv) Lundergarph

Q2) Attempt any two of following. **[20]**

a) Describe construction and working of quinhydrone electrode. Explain its use in determination of pH of solution.

b) What is gravimetric analysis? Explain in detail the process of precipitation, filtration, drying, ignition and weighing.

c) What is column chromatography? Explain the types of column chromatography. Give four applications of ion exchange chromatography.

Q3) Attempt any three of following. **[12]**

a) Applications of Flame photometry in real sample analysis.

b) Applications of spectrophotometry

c) Deviation from Beer's law.

d) Interference in flame photometry

e) Optimum conditions for good precipitation.