Progressive Education Society's
Modern College of Arts, Science & Commerce Ganeshkhind, Pune – 16
(Autonomous)
End Semester Examination: MAR / APR 2025
Faculty: Science and Technology

Program: B.Sc	**Semester:VI**	**SET: A**
Program (Specific): B.Sc. Chemistry		**Course Type:DSEC**
Class: T.Y.B.Sc		**Max.Marks: 35**
Name of the Course:Physical Chemistry-II		**Course Code: 24-CH-601**
Time: 2Hr		**Paper: I**

Instructions to the candidate:

1) *There are 4 sections in the question paper. Write each section on a separate page.*
2) *All Sections are compulsory.*
3) *Figures to the right indicate full marks.*
4) *Draw a well labelled diagram wherever necessary.*

Q1) Multiple Choice Question: **5**

a) The Bragg's equation is given by_____.
   i. 2λ= nd Sin Θ ii. $n\lambda$= 2d Sin Θ iii. λ= nd Sin Θ iv. $n\lambda$= 4d Sin Θ

b) The daughter formed on α emission is displaced in the periodic table_____.
   i. one place to the left of parent   ii. one place to the right of the parent
   iii. Two places to the left of parent   iv. Two places to the right of parent

c) The standard hydrogen electrode at 25°C provides_____.
   i. 0 volts   ii.1.872 volts   iii. 1.01807 volts   iv. 0.0591 volts

d) The thin glass tube in the glass electrode is filled with_____.
   i. 0.1 M KCl saturated with AgCl. ii) 0.1 M KCl saturated with Hg_2Cl_2
   iii. 0.1 M KCl saturated with AgCl iv. 0.1 M HCl saturated with Hg_2Cl_2

e) $^{226}_{88}Ra$ is a radioactive element and passes spontaneously to $^{226}_{89}Ac$ due to_____.
   i. Alpha decay   ii. electron capture   iii. positron emission   iv. beta decay

Q2) Answer the following questions (Attempt any 4/6) **4**

   a) Define: standard electrode potential.
   b) What are different particles emitted by radioactive nuclides?
   c) What are electrochemical cells?
   d) What is a reference electrode?
   e) Write the net cell reaction for a given cell : $Cu/Cu^{2+}// Cd^{2+}/Cd$.
   f) Define: Radioactivity.

Q3) Answer the following questions (Attempt any 4/6) **8**

   a) What is the use of salt bridges?
   b) What is a concentration cell?
   c) What is a plane of symmetry?

d) Define isotopes and give an example.
e) Draw and label a Daniel cell.
f) Show with a diagram how many atoms are present in a BCC lattice unit cell.

Q4) Answer the following questions (Attempt any 4/6)   **8**

a) Write a difference between amorphous and crystalline compounds.
b) Write the characteristics of alpha particles.
c) What are different types of nuclides on the basis of stability?
d) Which two electrodes are attached in a cell for potentiometric measurements?
e) What are primary batteries?
f) Write the different applications of potentiometric titrations.

Q5) Attempt any two of the following (2/4)   **10**

a) The Cell $Zn/ZnCl_2//AgCl/Ag$ shows a E_{cell} value of 1.240 at 25°C. Calculate the ΔG for the reaction and predict if it is spontaneous or non-spontaneous.
b) Draw and explain the weston standard cell.
c) Calculate half life and Average life for a radioactive decay of an element having decay constant $\lambda = 0.04682$ min⁻¹.
d) Explain with the help of a diagram the Laue method of X-Ray analysis.