



U7395

Reg. No.:

Name:.....



University of Kerala
 First Semester Degree Examination, November 2024
 Four Year Under Graduate Programme
 Discipline Specific Course
CHEMISTRY
UK1DSCCHE104- GENERAL INORGANIC CHEMISTRY
 Academic Level: 100-199

Time: 1½ Hours

Max.Marks:42

Part A.

Answer All Questions, Objective Type. 1 Mark Each.
(Cognitive Level: Remember/Understand) 6 Marks. Time: 6 Minutes

Qn. No.	Question	Cognitive Level	Course Outcome (CO)
1.	What is the oxidation number of cobalt in $[\text{Co}(\text{NH}_3)_6]^{3+}$?	Remember	CO-4
2.	Draw the shape of p orbital.	Remember	CO-1,2,3
3.	Expression for half-life of a radioactive substance is	Understand	CO-7
4.	State Beer-Lambert's law.	Understand	CO-5,6
5.	Write the number of nodal surfaces exhibited by 3s orbital	Understand	CO-1,2,3
6.	Which among the molecules – NH_3 , SO_2 , CO_2 , XeF_2 has a bond angle closest to 109.5° ?	Understand	CO-1,2,3

Part B.

Answer All Questions, Short Answer. 2 Marks Each.
(Cognitive Level: Understand/Apply) 8 Marks. Time: 24 Minutes

Qn. No.	Question	Cognitive Level	Course Outcome (CO)
7.	How the coordination number and geometry of $[\text{Fe}(\text{H}_2\text{O})_6]^{3+}$ can be determined using VB theory?	Understand	CO-4
8.	The molecule SO_2 has a dipole moment. Is the molecule linear or bent? Explain the reason.	Understand	CO-1,2,3
9.	Apply the concept of binding energy to explain the stability of a nucleus, and what role does it play in nuclear reactions such as fission and fusion?	Apply	CO-7
10.	If 85 mL of 0.45 Normal NaOH solution neutralizes a 235 mL HCl solution. Calculate the Normality and weight per litre of the HCl solution.	Apply	CO-5,6

Part C.

**Answer all 4 Questions choosing among options within each question, Long Answer. 7 marks each.
(Cognitive Level: Understand/Apply/Analyze) 28 Marks. Time: 60 Minutes**

Qn. No.	Question	Cognitive Level	Course Outcome (CO)
11.	a. Describe crystal field theory to explain the banding in coordination complexes. How it enhances the understanding of high-spin and low-spin complexes. OR b. Apply the understanding of ligand types to determine how they influence the geometry and stability of coordination complexes. Provide specific examples from both octahedral and tetrahedral complexes to support your analysis.	Understand	CO-4
12.	a. (I) The electron configuration of an element is $1s^2 2s^2 2p^6 3s^2 3p^4$. i) What is the principal quantum number (n) and azimuthal quantum number (l) for the last electron added? ii) How many unpaired electrons are present in this element? iii) Based on the quantum numbers, determine the group number and period of this element in the periodic table. (II) Draw the shapes of s, p, d orbitals. OR b. Apply concept of hydrogen bonding to discuss why i. o-nitrophenol is steam volatile whereas p-nitrophenol is non volatile ii. Ice floats on water iii. H_2O is liquid while H_2S is gas.	Apply	CO-1,2,3
13.	a. How radioactivity is applied for estimating age of a fossil? A fresh sample of wood gives a radioactivity of 10 disintegrations per minute. An old sample of wood gives one disintegration per minute. Calculate the age of the sample. Half-life period of ^{14}C is 5570 years. OR b. Illustrate the differences between natural and artificial radioactivity Explain the radioactive disintegration series. Use specific examples to support your explanation.	Apply	CO-7
14.	a. Illustrate the titration curves and pH change for the titration of i) A strong acid with a strong base ii) A strong acid with a weak base iii) A weak acid with a strong base OR b. Analyze the theory of acid-base titrations to discuss why phenolphthalein is a suitable indicator for titration of HCl x $NaOH$ and CH_3COOH x $NaOH$	Analyze	CO-5,6