This question paper contains **8** printed pages]

Your Roll No. .....

2372

B.El.Ed. **D**

Paper O-2.5

CHEMISTRY

Time : 3 *Hours* *Maximum Marks* : 70

(Write your Roll No. on the top immediately on receipt of this question paper.)

Graph papers to be provided. Question No. **1** is compulsory.

Apart from Q. No. **1**, attempt *two* questions

from each of Sections A, B and C.

Attempt *seven* questions in all.

1. Answer any **10** out of the following 10×1=10

(*a*) Why are gases more compressible than liquids ?

(*b*) What do you understand by dynamic equilibrium ?

P.T.O.

(*c*) Is phenolphthalein indicator suitable for the titration of a strong acid against a weak base ? Explain.

(*d*) Why does the equivalent conductance of weak electrolyte increase exponentially with dilution ?

(*e*) Which is more stable N_2 or O_2 ? Why ?

(*f*) Why does *o*-nitrophenol have lower boiling point than *p*-nitrophenol ?

(*g*) Arrange the following elements in increasing order of the most positive electron affinity, giving reasons : F, Cl, Br, I.

(*h*) Name any *two* elements which are more likely to form acidic oxides.

(*i*) What is chromatography ?

(*j*) A compound having molecular formula C_2H_6O shows what kind of isomerism ?

(*k*) Melting point of trans-2-Butene is higher than cis-2-Butene. Explain.

(*l*) What is sublimation ? Name *one* compound which can be purified by this process.

Section A

Attempt any *two* questions from this Section.

2. (*a*) Draw the MO energy level diagram of O_2 and show whether it is paramagnetic or diamagnetic. 4

(*b*) State Afbau principle and discuss its limitations. 3

(*c*) Draw the resonance structures of carbonate ion and phosphate ion. 3

3. (*a*) Explain why : 3×2=6

(*i*) The melting point of LiI is 446°C while that of LiF is 870°C.

(*ii*) KI is soluble in alcohol whereas KCl is not.

(*iii*) The melting point of NaF is 1268°C while that of NaI is 924°C.

(*b*) Complete the following by writing an acceptable value of the missing quantum number. What type of orbital is described by each set ? 4

(*i*) n = ?; l = 2; m = 0; s = +½

(*ii*) n = 2; l = ?; m = –1; s = –½

(*iii*) n = 4; l = 2; m = 0; s = ?

(*iv*) n = ?; l = 0; m = 0; s = +½.

4. (*a*) Draw the Born-Haber cycle of LiCl and indicate how the lattice energy can be calculated using the data from various reactions appearing in it. 5

(*b*) Explain the variation of ionization energy across a period and down a group in the periodic table, giving reasons. 3

(*c*) Calculate the bond order of He_2, N_2 and F_2 and arrange them in order of increasing bond length. 2

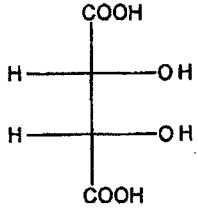
Section B

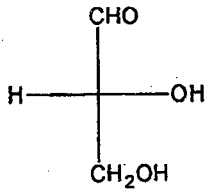
Attempt any *two* questions from this Section.

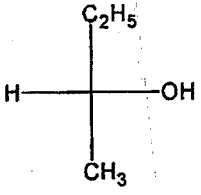
5. (*a*) Arrange the following in increasing order of stability and explain the order :

$(CH_3)_3C^+$, $(CH_3)_2CH^+$, $CH_3CH_2^+$, CH_3^+. 4

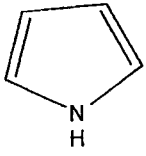
(*b*) Assign R/S configuration to the following compounds : 3



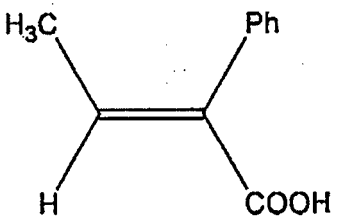


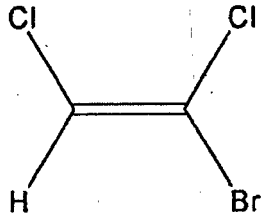


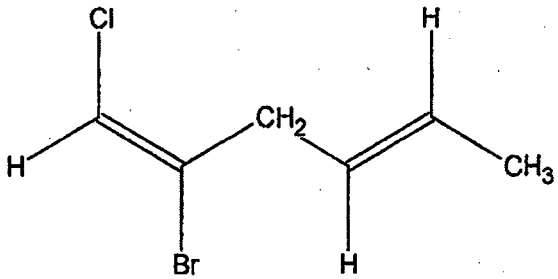
(*c*) Which compound is aromatic in nature and why ? 3



6. (*a*) Assign E or Z configuration to the following compounds : 3





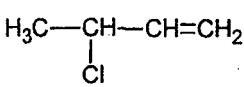


(*b*) Give the resonating structures of phenoxide ion. 3

(*c*) What is TLC ? Explain. 4

7. (*a*) What are enantiomers and diastereomers ? Explain their physical and chemical properties. 4

(*b*) Give IUPAC notation of the following compounds 4



(*c*) Why is chloroacetic acid stronger than acetic acid ? 2

Section C

Attempt any *two* questions from this Section.

8. (*a*) What is an ideal solution ? Why do real gases deviate from ideal behaviour ? 4

(*b*) Under what conditions can the real gases be liquefied ? 3

(*c*) Differentiate between gases and liquids. 3

9. (*a*) State the laws of photochemistry. 2

(*b*) What happens when the following changes are made to the chemical reaction : 4

$$3Fe(s) + 4H_2O(g) \rightleftharpoons Fe_3O_4(s) + 4H_2(g) \ldots\ldots \Delta H = -151 \text{ kJ mol}^{-1}$$

(*i*) When pressure is decreased

(*ii*) When the temperature is increased

(*iii*) When 2 moles of H_2 are added

(*iv*) When H_2 formed is removed from the system.

(*c*) The following data was obtained for the absorbance of copper sulphate solutions of various concentrations. Using Lambert-Beer's law, plot a suitable graph to

find the molar extinction coefficient of copper sulphate at 650 nm : 4

Concentration/(10^2 mol dm^{-3})	Absorbance
2	0.11
4	0.21
6	0.28
8	0.42
10	0.53
12	0.58

10. (*a*) What will be the pH of the following salts, less than 7, greater than 7 or equal to 7 : 3

(*i*) Potassium acetate

(*ii*) Ammonium chloride

(*iii*) Ammonium acetate.

Justify your answer by appropriate chemical equations.

(*b*) State Kohlrausch law of independent migration of ions. Calculate the molar conductivity of AgCl at infinite dilution at 298 K if the molar conductivities at infinite dilution of KCl, KNO_3, $AgNO_3$ are 0.01499, 0.0145 and 0.01334 S m^2 mol^{-1}. 3

(*c*) Write a short note on conductometric titrations. 4