



## UNIVERSITY EXAMINATIONS

**FIRST SEMESTER 2025/2026 ACADEMIC YEAR**

**SECOND YEAR EXAMINATION FOR THE DEGREES OF  
BACHELOR OF EDUCATION (SCIENCE) BACHELOR OF  
SCIENCE (GEN)**

**CHE/CHEM 211: COMPARATIVE STUDY OF s AND p BLOCK  
ELEMENTS**

***STREAMS: BEd(Sc), BSc (Gen)***

***TIME: 2 HRS***

***DAY: THURSDAY [11.30 – 13.30 P.M]***

***DATE: 05/02/2026***

**THIS QUESTION PAPER CONSISTS OF FOUR (4) PAGES**

**PLEASE DO NOT OPEN UNTIL THE INVIGILATOR SAYS SO.**

**INSTRUCTIONS****ANSWER ALL QUESTIONS (70 MARKS)****QUESTION ONE (30 MARKS)**

- a) Give the general formula of silicides and state their main application (2 Marks)
- b) Identify the element which when burnt in the luminous light of a Bunsen burner produces
- i) A brick red flame (1 Mark)
  - ii) An apple green flame (1 Mark)
  - iii) A lilac flame (1 Mark)
- b) Complete the following reactions and state the physical properties of the resultant gases
- i)  $\text{PCl}_3 + 3\text{LiH} \rightarrow$  (2 Marks)
  - ii)  $\text{CO} + \text{Cl}_2 \rightarrow$  (2 Marks)
  - iii) State the physical properties of Sulfur trioxide and provide an equation showing its reaction with HF. (2 Marks)
- c) Compare:
- i) Thermal stability of  $\text{KCH}_3$  and  $\text{LiCH}_3$  (2 Marks)
  - ii) Ionic character of  $\text{MgC}_2\text{H}_6$  and  $\text{LiCH}_3$  (2 Marks)
  - iii) Reactivity between  $\text{KCH}_3$  and  $\text{LiCH}_3$  (2 Marks)
  - iv) The behavior of  $\text{Al}_{12}(\text{CH}_3)_6$  and  $\text{Si}(\text{CH}_3)_4$  in water (2 Marks)
- d) Explain the anomalous behavior of nitrogen (5 Marks)
- e) Using structural formula, explain bonding in  $\text{B}_2\text{H}_6$  (4 Marks)
- f) Write an equation for the reaction between  $\text{B}_2\text{H}_6$  and water and provide the structural formula of the main product (2 Marks)

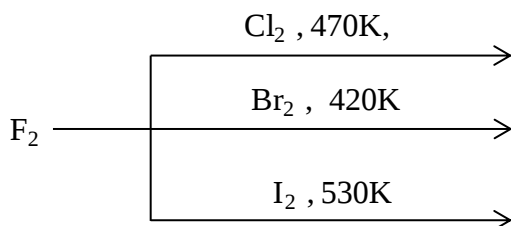
**QUESTION TWO (20 MARKS)**

- a) Write balanced chemical equations and give the structural formula of the products for the chemical reactions between:
- i) Aluminium and hydrochloric acid (2½ Marks)
  - ii) Calcium phosphate and conc sulphuric acid (2½ Marks)

- iii) Explain the anomalous behavior of oxygen (3 Marks)
- b) Citing various properties and reactions, explain the diagonal relationships between
- i) Beryllium and Aluminium (4 Marks)
  - ii) Lithium and magnesium (4 Marks)
  - iii) Boron and silicon (4 Marks)

**QUESTION THREE (20 MARKS)**

- a) Complete the following reactions (3 Marks)



- b) Highlight the physical characteristics of Dichlorine and Dibromine (2 Marks)
- c) Explain the uses of Noble gases (5 Marks)
- d) i) Define the term allotrope (1 Mark)
- ii) Briefly describe the allotropes of carbon (9 Marks)

|          |          |                 |           |           |           |           |           |           |           |           |            |          |          |          |          |          |          |
|----------|----------|-----------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|------------|----------|----------|----------|----------|----------|----------|
| 1<br>H   |          |                 |           |           |           |           |           |           |           |           |            |          |          |          |          |          | 2<br>He  |
| 3<br>Li  | 4<br>Be  |                 |           |           |           |           |           |           |           |           |            | 5<br>B   | 6<br>C   | 7<br>N   | 8<br>O   | 9<br>F   | 10<br>Ne |
| 11<br>Na | 12<br>Mg |                 |           |           |           |           |           |           |           |           |            | 13<br>Al | 14<br>Si | 15<br>P  | 16<br>S  | 17<br>Cl | 18<br>Ar |
| 19<br>K  | 20<br>Ca | 21<br>Sc        | 22<br>Ti  | 23<br>V   | 24<br>Cr  | 25<br>Mn  | 26<br>Fe  | 27<br>Co  | 28<br>Ni  | 29<br>Cu  | 30<br>Zn   | 31<br>Ga | 32<br>Ge | 33<br>As | 34<br>Se | 35<br>Br | 36<br>Kr |
| 37<br>Rb | 38<br>Sr | 39<br>Y         | 40<br>Zr  | 41<br>Nb  | 42<br>Mo  | 43<br>Tc  | 44<br>Ru  | 45<br>Rh  | 46<br>Pd  | 47<br>Ag  | 48<br>Cd   | 49<br>In | 50<br>Sn | 51<br>Sb | 52<br>Te | 53<br>I  | 54<br>Xe |
| 55<br>Cs | 56<br>Ba | 57–71<br>La–Lu  | 72<br>Hf  | 73<br>Ta  | 74<br>W   | 75<br>Re  | 76<br>Os  | 77<br>Ir  | 78<br>Pt  | 79<br>Au  | 80<br>Hg   | 81<br>Tl | 82<br>Pb | 83<br>Bi | 84<br>Po | 85<br>At | 86<br>Rn |
| 87<br>Fr | 88<br>Ra | 89–103<br>Ac–Lr | 104<br>Rf | 105<br>Db | 106<br>Sg | 107<br>Bh | 108<br>Hs | 109<br>Mt | 110<br>Ds | 111<br>Rg | 112<br>Uub |          |          |          |          |          |          |

f-block elements

|             |          |          |          |          |          |          |          |          |          |          |           |           |           |           |
|-------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|-----------|-----------|-----------|-----------|
| Lanthanoids | 58<br>Ce | 59<br>Pr | 60<br>Nd | 61<br>Pm | 62<br>Sm | 63<br>Eu | 64<br>Gd | 65<br>Tb | 66<br>Dy | 67<br>Ho | 68<br>Er  | 69<br>Tm  | 70<br>Yb  | 71<br>Lu  |
| Actinoids   | 90<br>Th | 91<br>Pa | 92<br>U  | 93<br>Np | 94<br>Pu | 95<br>Am | 96<br>Cm | 97<br>Bk | 98<br>Cf | 99<br>Es | 100<br>Fm | 101<br>Md | 102<br>No | 103<br>Lr |