

BACHELOR OF SCIENCE (CBCS-2018 COURSE)
S. Y. B. Sc. Sem-III : WINTER- 2022
SUBJECT : CHEMISTRY : PHYSICAL & ANALYTICAL CHEMISTRY-I

Day : Tuesday

Time : 10:00 AM-01:00 PM

Date : 13-12-2022

W-18350-2022

Max. Marks : 60

N.B :

- 1) All questions are **COMPULSORY**.
 - 2) Figures to the right indicate **FULL** marks.
 - 3) Answers to both sections should be written in **SAME** answer book.
 - 4) Use of scientific **CALCULATOR** is allowed.
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SECTION - I

- Q.1** Attempt **ANY TWO** of the following: (12)
- a) Obtain the expression for the entropy change of an ideal gas in irreversible isothermal process.
 - b) Explain the use of conductivity cells in measurement of conductance.
 - c) Derive an equation for efficiency of Carnot's cycle.
- Q.2** Attempt **ANY THREE** of the following: (12)
- a) Calculate the percentage efficiency of a steam engine operating between 373K and 773K.
 - b) Calculate the entropy change involved in the isothermal reversible expansion of 5 moles of an ideal gas from a volume of 5 dm³ to a volume of 50 dm³ at 300 K. (R = 8.314 J mol⁻¹)
 - c) If the molecular conductivity of LiCl in 10⁻² M solution is 93.6 S cm² mol⁻¹, calculate its specific conductivity.
 - d) Discuss the moving boundary method for determination of transport number.
- Q.3** **A)** Attempt **ANY ONE** of the following: (06)
- a) Explain the terms electronic and electrolytic conductors.
 - b) What is conductometric titration? Explain conductometric titration between weak acid and strong base.

SECTION - II

- Q.3** **B)** Attempt **ANY ONE** of the following: (06)
- a) Describe estimation of halogens by Carius method.
 - b) How will you classify errors? Give examples.
- Q.4** Attempt **ANY TWO** of the following: (12)
- a) What are the different methods used to minimize different types of errors?
 - b) When and how does phosphate ion interfere in qualitative analysis? Discuss the methods used for the removal of this ion.
 - c) What is sampling? Explain sampling of solid, sampling of liquid and sampling of gases.
- Q.5** Attempt **ANY FOUR** of the following: (12)
- a) Explain the use of yellow ammonium sulphide in the separation of group II cation.
 - b) Discuss the effect of NH₄OH in the presence of NH₄Cl in qualitative analysis.
 - c) Explain how is nitrogen detected in an organic compound using Lassaigne's sodium fusion test, give chemical reactions.
 - d) Calculate proper number of significant figures in each of the following
i) 0.0090 ii) 2.0050 iii) 3.6902
 - e) If 3.52 gm sample of material is reported as 3.58 gm, find the absolute error.
 - f) Calculate the deviations for the following set of data
i) 50.90 ii) 50.92 iii) 50.94

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