

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

Day : Saturday
Date : 9/7/2022

S-18350-2022

Time : 03:00 PM-06:00 PM
Max. Marks : 60

N.B.

- 1) All questions are **COMPULSORY**.
- 2) Figures to the **RIGHT** indicate **FULL** marks.
- 3) Used of scientific calculator is **ALLOWED**.
- 4) Answers to the both sections should be written in the **SAME** answerbook.

SECTION – I (PHYSICAL CHEMISTRY)

- Q.1** Attempt **ANY TWO** of the following : **(12)**
- a) Explain the moving boundary method for the determination of transport number.
 - b) Derive an expression for the efficiency of Carnot's heat engine.
 - c) What are inadequacies of 1st law of thermodynamics? Give different statements of second law of thermodynamics.
- Q.2** Attempt **ANY THREE** of the following : **(12)**
- a) Calculate the percentage efficiency of steam engine operating between 100K and 50K.
 - b) Heat supplied to a Carnot's engine is 1899.5 KJ, how much useful work can be done by the engine which works between 273 K and 373 K?
 - c) In a conductance cell, the two electrodes are 1.6 cm apart and have an area of cross section 3.2 cm². Find the cell constant.
 - d) Elaborate an equivalent and molecular conductivities.
- Q.3** A) Attempt **ANY ONE** of the following : **(06)**
- a) Explain the role of conductivity water in the measurement of conductance of the solutions.
 - b) State and explain Kohlrausch's law of independent migrations of ions.

SECTION – II (ANALYTICAL CHEMISTRY)

- Q.3** B) Attempt **ANY ONE** of the following : **(06)**
- a) How will you classify errors? Give examples.
 - b) Describe Duma's method of estimation of nitrogen.
- Q.4** Attempt **ANY TWO** of the following : **(12)**
- a) Discuss in detail the process of sampling of solid and sampling of liquid.
 - b) Write a note on 'solubility product'.
 - c) Describe Kjeldhal's method of estimation of nitrogen in an organic compound.
- Q.5** Attempt **ANY FOUR** of the following : **(12)**
- a) Explain the process of borate removal scheme in qualitative analysis.
 - b) What is the difference between accuracy and precision?
 - c) Discuss the use of yellow ammonium sulphide in qualitative analysis.
 - d) Calculate the number of significant figures in each of the following
i) 80.000 ii) 95.0087 iii) 25.005
 - e) If 3.45 gm sample of material is reported as 3.47 gm. find the absolute error.
 - f) The following sets of weights were obtained
29.8 mg, 30.2 mg, 28.6 mg, 29.7 mg. Calculate mean deviation.
