

S.Y.B.SC. SEM – III (2014 COURSE) : WINTER - 2017

SUBJECT : CHEMISTRY : PHYSICAL & ANALYTICAL CHEMISTRY (C – 31)

Day : Tuesday

Time : 12.00 NOON TO 02.00 PM

Date : 31/10/2017

W-2017-0618

Max. Marks : 40

N.B.:

- 1) All questions are **COMPULSORY**.
- 2) Figures to the right indicate **FULL** marks.
- 3) Use of scientific calculator / Log table is **ALLOWED**.
- 4) Draw neat and labeled diagrams **WHEREVER** necessary.
- 5) Answers to both the sections should be written in the **SAME** answer book.

SECTION – I [Physical Chemistry]

- Q.1** Attempt **ANY TWO** of the following: [10]
- a) Give different statements of second law of thermodynamics.
 - b) Elaborate on conductivity cells.
 - c) Discuss the term equivalent conductivity.
- Q.2** Attempt **ANY ONE** of the following: [05]
- a) Derive an expression for entropy change associated with temperature and volume changes of 'n' moles of an ideal gas.
 - b) Write precise note on physical significance of entropy.
- Q.3** Solve **ANY TWO** of the following: [05]
- a) 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.
 - b) Calculate the percentage efficiency of a steam engine operating between 383 K and 298 K.
 - c) Calculate the increase in entropy of 3 moles of an ideal gas as it changes from 300 K at 0.2×10^5 Pa to 1000 K at 2×10^5 Pa.
($R = 8.314 \text{ J mol}^{-1}$, $C_p = 29.29 \text{ JK}^{-1} \text{ mol}^{-1}$).

SECTION – II [Analytical Chemistry]

- Q.4** Attempt **ANY TWO** of the following: [10]
- a) Describe Liebig's method for estimation of carbon and hydrogen in the given compound.
 - b) Describe sampling of solid.
 - c) Derive Henderson's equation for pH of acidic buffer.
- Q.5** Attempt **ANY ONE** of the following: [05]
- a) How are the errors classified? Give an account of determinate errors.
 - b) Describe simple distillation method.
- Q.6** Attempt **ANY TWO** of the following: [05]
- a) The following sets were obtained:
30.02 mg, 30.15 mg, 30.40 mg. Calculate deviation and mean deviation.
 - b) How many significant figures does each of the following numbers have?
i) 0.3805 ii) 0.5089 iii) 0.0001 iv) 5.000 v) 6.0800
 - c) The hydrogen ion concentration of a solution is 5.9×10^{-3} moles/litre. Calculate the pH of the solution.

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