

**MASTER OF SCIENCE (CHEMISTRY) (CBCS - 2018 COURSE)**  
**M.Sc. (Chemistry) Sem-III : WINTER :- 2021**  
**SUBJECT: MODERN ASPECTS OF ANALYTICAL CHEMISTRY**

Day : Saturday  
Date 22-01-2022

W-20160-2021

Time : 02:00 PM-05:00 PM  
Max. Marks: 60

**N.B.**

- 1) All questions are **COMPULSORY**.
- 2) Figures to the **RIGHT** indicate **FULL** marks.
- 3) Draw neat and labeled diagrams **WHEREVER** necessary.
- 4) Use of **non-programmable calculator** is allowed.
- 5) Answers to both the sections should be written in **SEPARATE** answer book.

**SECTION – I**

**Q.1** Attempt **ANY THREE** of the following. **(15)**

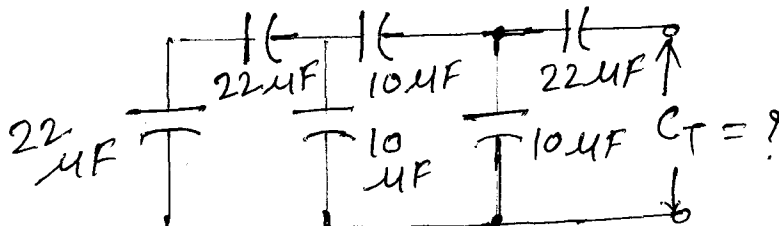
- a) Draw and explain the block diagram of Digital computer.
- b) Define the terms - Turns ratio, Voltage ratio, Current ratio, Step-up transformer, Step-down transformer.
- c) Explain the charging of capacitor.
- d) With suitable circuit diagram, explain the working of full wave rectifier.
- e) State and explain Kirchoff's laws.

**Q.2** A) Attempt **ANY TWO** of the following. **(10)**

- a) Explain the working principle of light emitting diode.
- b) Draw the symbols for - Air core inductor, Iron core inductor, Ferrite core inductor, Electrolytic capacitor, Non-electrolytic capacitor.
- c) Write the truth table for – AND, OR, NOT, EX-OR, NAND gates.

B) Solve **ANY ONE** of the following. **(05)**

- a) Find the value of resistors which are color coded as follows :
  - i) Green, Blue, Red, Silver
  - ii) Red, Red, Brown, Gold.
- b) Find the equivalent capacitance in the following circuit.



**SECTION – II**

**Q.3** Attempt **ANY THREE** of the following. **(15)**

- a) What do you mean by Copper based alloys? What is Bronze alloy? Write its composition. Explain in brief the analytical procedure used for the determination of *Tin* from Bronze alloy.
- b) What is steel? Write the constituents of steel alloy. Outline the analytical method of estimation of *Nickel* from given steel alloy.
- c) Define Ore. Write three names of different ores. What is chalcopyrite ore? Write its composition. Discuss in brief the quantitative determination of  $SiO_2$  from given chalcopyrite ore.
- d) What is fertilizer? Write different types of fertilizers. Outline the analytical procedure used to determine *Nitrogen* by Kjeldahl's method.
- e) What is mineral? Give three points of differences between ore mineral. Explain in brief a suitable analytical method for the estimation of *Phosphorus* from given sample of Monazite sand.

**PTO**

**Q.4 A)** Attempt **ANY TWO** of the following. **(10)**

- a) What do you mean by Portland Cement? Give the constituents of Portland cements. Describe analytical estimation of *Calcium* from given sample of Portland cements.
- b) Write the composition of Ilmenite ore. Explain a suitable analytical procedure for the determination of *Iron* from Ilmenite sample.
- c) What is Gnn metal? Write its composition. Discuss the analytical procedure for the estimation of *Zinc* from a Gnn metal alloy.

**B)** Solve **ANY ONE** of the following. **(05)**

- a) In the analysis of Nickel from given steel sample, 0.850 gm of the steel alloy weighed and then treated for a gravimetric analysis of Ni as Ni-(DMG)<sub>2</sub> ppt. The ppt was dried completely and weighed which gives 0.109 gm of it. Find out the % Ni present in the given sample of steel alloy.
- b) A Nitrogenous fertilizer was Kjeldahlised to liberate ammonia gas. The weight of the sample taken was 0.990 gm and the liberated NH<sub>3</sub> was then distilled in 50 mls of 0.5 N H<sub>2</sub>SO<sub>4</sub>. Unreacted excess of 0.5 N H<sub>2</sub>SO<sub>4</sub> is then back titrated with 0.5 N NaOH required 10 mls of std NaOH. Calculate the % Nitrogen present in the fertilizer sample.

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