

MASTER OF SCIENCE (CHEMISTRY) (CBCS - 2018 COURSE)
M.Sc. (Chemistry) Sem-III :SUMMER- 2022
SUBJECT : MODERN ASPECTS OF ANALYTICAL CHEMISTRY

Day : Monday
 Date : 11/7/2022

S-20160-2022

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

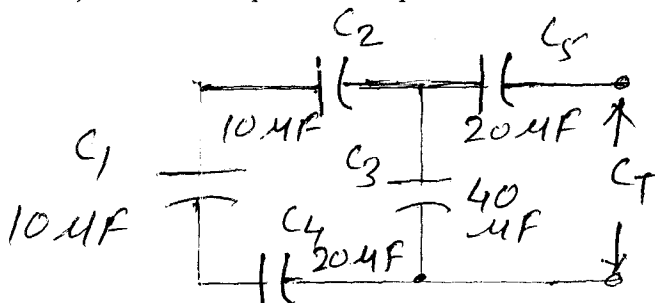
N.B.:

- 1) All questions are **COMPULSORY**.
- 2) Figures to the right indicate **FULL** marks.
- 3) Use of non-programmable **CALCULATOR** is allowed.
- 4) Draw neat and labeled diagram **WHEREVER** necessary.
- 5) Answers to both the section should be written in **SEPARATE** answer books.

SECTION - I

Q.1 Attempt **ANY THREE** of the following: **[15]**

- a) With suitable diagram explain the working principle of light emitting diode (LED).
- b) Draw the symbol and write truth table for following logic gates:
 - i) AND gate
 - ii) OR gate
 - iii) NOT gate
- c) Define the term rectification. Compare half and full wave rectifiers.
- d) Find the equivalent capacitance in the following circuit:



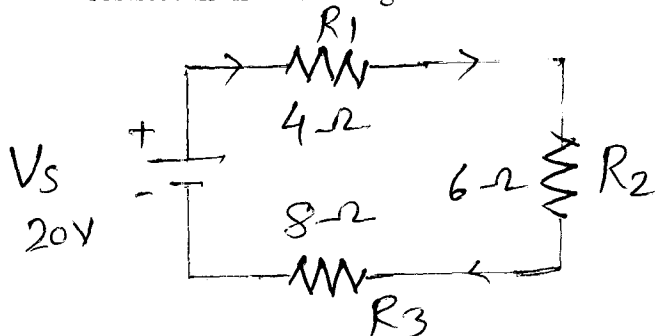
- e) Draw and explain the block diagram of digital computer.

Q.2 A) Attempt **ANY TWO** of the following: **[10]**

- a) State and explain Kirchhoff's Laws.
- b) Explain the action of forward biased PN junction diode.
- c) Draw the symbols of :
 - i) Photodiode
 - ii) Zener diode
 - iii) PNP transistor
 - iv) NPN transistor
 - v) Iron core inductor

B) Solve **ANY ONE** of the following: **[05]**

- a) Give the statement of Ohm's Law and find the current flowing through each resistor in the following circuit



- b) With necessary diagram, explain:
 - i) Unity transformer
 - ii) Step-up transformer
 - iii) Step-down transformer

P.T.O.

SECTION – II

Q.3 Attempt **ANY THREE** of the following: **[15]**

- a) What is mineral? Write the composition of Ilmenite ore. Explain the analytical procedure for the quantitative estimation of *Iron* from given Ilmenite ore.
- b) Write the composition of Portland cement. Discuss the chemical method for the quantitative estimation of *Silica* from given Portland cement sample.
- c) Define alloy. Explain the analytical method for the quantitative estimation of *Nickel* from the given sample of stainless steel.
- d) What is fertilizer? Define it and write the method of quantitative estimation of *Nitrogen* from the given fertilizer sample by using Kjeldahl's method.
- e) Write the composition of Brass alloy. Discuss the analytical method for the determination of *Tin* from the given brass alloy sample.

Q.4 A) Attempt **ANY TWO** of the following: **[10]**

- a) Write the constituents of Monazite sand. Explain the experimental procedure for the estimation of *Thorium* from given monazite sand.
- b) What is Hard steel? Write the major and minor constituents of hard steel. Outline the analytical method for the estimation of *Tungsten* from hard steel sample.
- c) What do you mean by Gun metal? Write its composition. Explain the analytical method for determination of *Copper* from the given Gun metal sample.

B) Solve **ANY ONE** of the following: **[05]**

- a) 0.555 gms of Nitrogen fertilizer was Kjeldahlised to liberate NH_3 which is then absorbed into 60 ml of 0.1N HCl. Unreacted excess 0.1N HCl was then back titrated with 0.1N NaOH require 10 ml of 0.1N NaOH. Calculate percentage nitrogen in the given fertilizer sample.
- b) In the analysis of Nickel from given steel alloy 0.600 gm of the alloy was treated for gravimetric estimation of Ni as $\text{Ni}(\text{DMG})_2$ ppt. The weight of dried ppt obtained was 0.050 gm. Calculate the percentage Nickel in the given alloy sample.

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