Roll Number _____

B.E. I (CSE A, CSE B) Examination Feb-March 2023
1ACRC2 Applied Chemistry & Environmental Science
Duration: 3 Hours

Max Marks : 60

Note: *Answer any Two sub-parts of a given question carrying equal marks.*
Give Chemical equations, labeled diagram and examples wherever needed.
Different parts of a question should be attempted in continuation.
Neat presentation is desirable.

Q.1 A Explain the process of volumetric titration method used for determination of 6
alkalinity of water sample. Name the two indicators used in this method along with
name and sequence of their use.
20 ml of the water sample require 5 ml of N/50 HCl up to final end point.
Calculate total alkalinity of water sample.

B Why EDTA water hardness determination is called complexometric titration? 6
What type of complexes are formed in this titration? Why and which buffer
solution is used in this titration?
20 ml of hard water sample requires 6 ml of N/100 ETDA solution up to end point.
Calculate total hardness of water sample.

C Define and Differentiate between Soft water, hard water, distilled water and 6
mineral water. List (names only) various water quality monitoring parameters.

Q.2 A Define and differentiate between Alloys and Composites. Why scope for tailoring 6
is more in Alloys / Composites? Justify.

B Explain chemical composition of ordinary Portland cement including roles of 6
individual constituents? Why sand, inert aggregates and water is used in making
Concrete?

C What (list) useful informations are obtained by Material testing? Differentiate 6
between Laboratory and Field testing with one example each. What should be done
to improve reliability of Lab test?

Q.3 A How Acid value of lubricating oil is determined in laboratory and what 6
information it carries? 2.1 ml. of N/50 KOH solution is required for neutralization
of free acids up to phenolpthalein end point present in 2 g of oil sample. Calculate
Acid value of oil and interpret quality of lubricating oil.

B What are the importance of Oiliness, Viscosity and Viscosity Index of lubricating 6
oil? Explain laboratory method of determination of Viscosity of lubricating oil.

C Write notes on: (Any two) 6
1. Pensky-Marten Flash point apparatus 2. Solid lubricants 3. Cutting fluids

A Draw and explain basic block diagram of spectroscopic technique used in material characterization. What is the basis (principle) of qualitative and quantitative analysis by any spectroscopic method? 6

B Derive and Explain Beer-Lamberts law and its applications. 6
A $4*10^{-4}$ M solution of Aniline has A = 0.504 at 280 nm, when measured in a 1.00 cm cell. Find A and %T of $1.5*0^{-3}$ M solution of Aniline when measured at same λ but in a 0.5 cm cell.

C Explain construction, working and applications of Colorimeter. This technique belongs to which category under Spectroscopy and why? 6

Q.5 A CO_2 is an air pollutant? Comment Yes or No, and justify your answer including role of CO_2 in our environment. 6

B Name various segments of Environment. List and explain various adverse impacts of development on our Environment. 6

C Write explanatory notes on: (Any two) 6
   1. 5 R's to control pollution
   2. Eutrophication
   3. Natural resources

END OF QUESTION PAPER

ACR1C2 Chemistry & Environmental Science

Duration: 3 Hours

Max Marks : 60

Note: *Answer any Two sub-parts of a given question carrying equal marks.*
Give Chemical equations, labeled diagrams and examples wherever needed.
Different parts of a question should be attempted in continuation.
Neat presentation is desirable.

Q.1A Define and classify water hardness. Why water hardness is expressed in ppm   6
$CaCO_3$ equivalents?
Calculate all different types of water hardness of water sample containing following salts (in ppm): $Mg(HCO_3)_2$= 73, $Ca(HCO_3)_2$= 40, $CaSO_4$= 136, $MgCl_2$= 47, $CaCl_2$= 55 and $NaCl$= 58.5.

B Why EDTA water hardness determination is called complexometric titration?   6
What type of complexes are formed in this titration? Also comment on water solubility, colour and relative stability of these complexes formed.
20 ml of hard water sample requires 5 ml of N/100 ETDA solution up to end point. Calculate total hardness of water sample.

C Explain chemistry and process involved in any one water softening method   6
including its advantages and limitations.

Q.2 A List (chart) classification of Engineering materials. Explain any one category in   6
detail including its properties, examples and uses.

B Define Refractory material. Where these are used? What are the various reasons of   6
failure of a refractory during working?

C What (list) useful informations are obtained by Material testing? Differentiate   6
between Destructive and Non-destructive testing with one example each.

Q.3 A Explain the terms Lubricant and lubrication. Classify different types of lubricating   6
oils including their general properties and uses.

B What is the importance of flash point of lubricating oil? Explain laboratory method   6
of determination of flash point of lubricating oil.

C Write explanatory notes on: (Any two)   6
1. Greases   2. Solid lubricants   3. Cutting fluids

Q.4 A Draw and explain basic block diagram of spectroscopic technique used in   6
material testing. What is the basis (principle) of qualitative and quantitative analysis by any spectroscopic method?

B Derive and Explain Beer-Lamberts law and its applications. Calculate the   6
molar absorptivity of a $5*10^{-3}$ M solution, which has an absorbance of 0.30, when path length is 1 cm.

C Define and classify Chromatography and its applications. What is the role of   6
stationary phase and mobile phase in chromatography?

Q.5 A What is Eutrophication? What factors are responsible for this? Why this is   6
considered very serious problem associated with water bodies? Suggest corrective measures.

B Greenhouse effect is essential for sustaining life on earth but Global warming   6
is causing various adverse effects to our environment, but basic science of both is same. Justify this statement.

C Write explanatory notes on: (Any two)   6
1. Environment Impact Assessment (EIA)
2. Sustainable development
3. Atmosphere

END OF QUESTION PAPER