

AQ-904

M.Sc. (Part-I) Semester-II (CBCS Scheme) Examination
CHEMISTRY
(Optical Methods and Environmental Chemistry)
Paper-VIII

Time : Three Hours]

[Maximum Marks : 80

Note :- (1) **ALL** questions are compulsory and carry equal marks.

(2) Use of scientific calculator is permitted.

1. (a) Draw a block diagram of a spectrophotometer and explain its working in brief. 6
- (b) Find out the concentration of unknown solution which had an absorbance of 0.630, if the standard solution (20 mg/ml) of the same substance showed an absorbance of 0.455 (path length = 1 cm). Also find out molar absorptivity, if the molecular weight is 150. 5
- (c) What is nephelometry? Why is it generally preferred over turbidimetry? 5

OR

- (p) What are the sources of NO_x and SO_2 in the atmosphere? Explain the undesirable effects manifested by them. 5
 - (q) What is acid rain? How is it caused? What steps are needed to control acid rain? 5
 - (r) Write informative notes on :
 - (i) Significance of air quality standard
 - (ii) Greenhouse effect. 6
5. (a) Give an account of the composition of soil. 5
- (b) Explain in brief thin layer chromatographic method of analysis for the determination of pesticides. 5
- (c) What is radiation? How is it classified? What effect does ionising radiations have on human life? 6

OR

- (p) What are pesticides? How are they classified? 5
- (q) Give an account of :
 - (i) Nuclear fall out
 - (ii) Bio-accumulation of DDT. 6
- (r) What are the different micronutrients present in soil? Write a note about the role of micronutrients. 5

(p) Explain Beer-Lambert's Law and give its limitations. 5

(q) The organic compound 2,3-dimethoxybenzaldehyde ($C_8H_{10}O_3$, M.W. 166.2) exhibits an absorption band at 220 nm. A solution containing 0.298 mg in 20 ml ethanol gave an absorbance of 1.73 in a 1 cm cell. Calculate the :

(i) Absorptivity

(ii) Molar absorptivity of the compound. 5

(r) Discuss in detail the determination of pKa value of an indicator. 6

2. (a) State the underlying principle of flame-photometry and explain the instrumentation required for the technique. 5

(b) Discuss the various causes of interferences in flame photometry and give methods for reduction of these interferences. 5

(c) Write notes on :

(i) Hollow cathode lamp

(ii) Non-flame techniques in AAS. 6

OR

(p) With the help of a block diagram, explain the working of AAS. 6

(q) How will you determine the concentration of sodium by calibration curve method using flame photometric analysis ? 5

(r) Compare Atomic absorption spectroscopy with flame emission spectroscopy. 5

3. (a) What is the origin of waste water ? Describe the various effects of water pollutants. 6

(b) Describe the method of determination of chemical oxygen demand in water. 5

(c) What is the public health significance of Cu and Pb metals present in water ? 5

OR

(p) What do you understand by water pollution ? Classify the types of water pollutants. 6

(q) How can the Biochemical oxygen demand be evaluated in a water sample ? 5

(r) Give an account of the different types of pesticidal pollutants in water and their sources. 5

4. (a) How are air pollutants classified ? Explain the effects of any two air pollutants on living and non-living things. 5

(b) What is photochemical smog ? How is it formed in the atmosphere ? What are its consequences ? 6

(c) How are the following pollutants estimated ?

(i) CO

(ii) NO_x . 5

OR