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Total No. of Pages : 02

Total No. of Questions : 08

M.Tech.(Ev.S & E) (Sem.-2)
POLLUTION MONITORING TECHNIQUES
Subject Code : ES-507
Paper ID : [E0993]

Time : 3 Hrs.

Max. Marks : 100

INSTRUCTION TO CANDIDATES :

1. Attempt any FIVE questions out of EIGHT questions.
2. Each question carries TWENTY marks.

1. Define and contrast between (a) Molarity (b) Molality (c) Normality (d) per cent weight in respect of solutions.
2. What are indicator organisms? What are the qualities of indicator organisms? Explain the suitability of Coliform group as indicator organisms. Establish a relationship between pathogens and indicator organisms.
3. a) A 100 mL sample containing chloride is titrated with AgNO_3 in a precipitation reaction. Calculate the concentration on Chloride ion in mg/L, if 10 mL of 0.01 N AgNO_3 is used to reach the equivalence point. Discuss the reliability of the analysis.

b) An analysis of a sample of water whose pH was measured as 7.6 yielded the following concentrations in mg/L :

<u>Cations</u>		<u>Anions</u>	
Ca^{2+}	80	Cl^-	100
Mg^{2+}	30	SO_4^{2-}	201
Na^+	72	HCO_3^-	150
K^+	06		

Find the Total hardness, the carbonate hardness, the noncarbonate hardness, and the total alkalinity expressed as CaCO_3 . Estimate the total dissolved solids (TDS) in mg/L. Check the correctness of the chemical analysis. If the pH were 10, what change would you expect in the calculated value of alkalinity? (Take, Ca - 40.1, Mg - 24.3, Na - 23, K - 39.1, Cl - 35.5, S - 32, O - 16, H - 1, C - 12).

4. Discuss the suitability of the following for environmental analysis by taking a suitable example :
 - a) Gravimetric and precipitation methods.
 - b) Chromatography and polarography.
5. State, derive and explain the use of the following laws in environmental monitoring
 - a) Lambert's law
 - b) Beer's Law
6.
 - a) Draw the schematic diagram of a spectrophotometer and explain the calibration and use. Indicate the suitability of use of UV and VIS spectrometers.
 - b) How does atomic absorption spectrophotometry (AAS) differ from simple spectrometry? Indicate the suitability of AAS.
7.
 - a) Draw the schematic diagram of a gas chromatograph. Explain the working.
 - b) Discuss the various thermal analysis techniques. Indicate their suitability.
8. Write short notes on :
 - a) Radioactivity measurement.
 - b) NMR.
 - c) Mass spectrometry.
 - d) XRD.