Critical value of F at 5% level

Degrees of Freedom (Denominator)	Degrees of Freedom (Numerator)				
	2	3	4	5	6
2	19.00	19.16	19.25	19.30	19.33
3	9.55	9.28	9.12	9.01	8.94
4	6.94	6.59	6.39	6.26	6.16
5	5.79	5.41	5.19	5.05	4.95
6	5.14	4.76	4.53	4.39	4.28

Specifications for Class A pipettes

Capacity (ml)	Tolerance transfer	Tolerance measuring
1	±0.006ml	±0.01ml
2	±0.006	±0.01
3	±0.01	±0.01
4	±0.01	±0.01
5	±0.01	±0.02
10	±0.02	±0.03
20	±0.03	±0.03
25	±0.03	±0.05

***

ET.1
02.5

M.Sc. DEGREE I SEMESTER EXAMINATION IN
ENVIRONMENTAL TECHNOLOGY
MARCH 2002

CHEMOMETRY AND GOOD LABORATORY PRACTICES

Time: 3 Hours Maximum Marks: 50

SECTION - A

(Answer ***ANY FIVE*** questions)
(All questions carry ***EQUAL*** marks)

(5 x 2 = 10)

I. 1. Round off to the nearest hundredth. Express to 3 significant figures.
(a) 33.246 (b) 243.50 (c) 10.145

2. Give the number of significant figures in the following:
(a) 18.23×10^{5} (b) 0.37 (c) 0.040

3. Give answers in proper significant figures
Multiply $21.5\times4.1\times10^{-4}\times2.3\times627.0$

4. How is detection limit defined?

5. Illustrate with examples the kind of errors in measurements.

6. Define equivalent conductance.

SECTION - B

(Answer ***ANY FIVE*** questions)
(All questions carry ***EQUAL*** marks)

(5 x 3 = 15)

II. An aqueous solution contains 15% by weight sodium chloride. Calculate- (a) its molality and (b) mole fraction of solute present.

III. A 50ml sample of 0.1M HCl solution is titrated with 0.1M NaOH. Calculate the pH of the solution after addition of 10ml of NaOH.

IV. Calculate the distribution coefficient of iodine between carbon tetra chloride and water if, on equilibration of 0.2500 gram of I_2 in 50 ml water with 25 ml of CCl_4, 0.2443 gram of I_2 is extracted into CCl_4.

V. What are the systematic errors in pipetting? How to correct for these errors?

VI. A 25 ml pipette at 25°C delivers a volume of water, which weighs 24.9866g. Does it conform to Class A pipette?

VII. A certain acid base indicator acts as a weak acid and has a pH = 4.35. Calculate the pH range in which the indicator changes color.

SECTION - C

(Answer ***ANY FIVE*** questions)
(All questions carry ***EQUAL*** marks)

(5 x 5 = 25)

VIII. What are the various types of hazardous chemicals? Illustrate each with one example.

IX. Analysis of Zn in a brass sample.

	%
1)	11.7
2)	11.6
3)	1.9
4)	11.2
5)	11.5
6)	11.2
7)	11.4
8)	11.0
9)	10.8
10)	10.9

Calculate the mean and standard deviation of the mesurements at 95% confidence level.

X. A hydrogen electrode dipping in pure distilled water is coupled to a 0.1M Calomel electrode. What is the e.m.f. of the cell? (The potential of the calomel electrode is +0.334V.)

Contd.....3

XI. Calculate the pH of a 0.01M solution of sodium formate, given the dissociation constant of formic acid as 2.1×10^{-4}.

XII. A new method is proposed for the spectophotometric determination of iron sample. The method, when applied to a water sample gave a mean value of 2.42ppm for five repeated measurements with a standard deviation of 0.21ppm. The standard method gave a mean value of 2.38ppm for seven measurements with a standard deviation of 0.18ppm. Is the new method better in precision than the standard method?

XIII. A method for the analysis of a pesticide free cabbage gave the following results: 0.2, -0.5, -0.2, 1.0, 0.8, -0.6, 0.4, 1.2 μg of the pesticide. Calculate the detection limit for the pesticide at 95% confidence level for a single analysis.

***

Critical values of student's 't' at various levels of probability

	Factor for Confidence Interval	
Degrees of Freedom	95%	99%
1	12.7	6.37
2	4.30	9.92
3	3.18	5.84
4	2.78	4.60
5	2.57	4.03
6	2.45	3.71
7	2.36	3.50
8	2.31	3.36
9	2.26	3.25
10	2.23	3.17

Contd.....4.