



**SB-3509**

**M. Sc. (Part - II) Examination**

**March / April - 2011**

**Analytical Chemistry : Paper - II**

**(Instrumental Methods of Analysis) (New Course)**

Time : 3 Hours]

[Total Marks : 70

**Instructions :**

(1)

नीचे दशांशके निशानीवाणी विगतो उत्तरवही पर अवश्य लिखनी. Fillup strictly the details of signs on your answer book.		Seat No. :	
Name of the Examination :		<input type="text"/>	
M. SC. (PART - 2)		<input type="text"/>	
Name of the Subject :		<input type="text"/>	
ANALYTICAL CHEMISTRY - 2 (NEW)		<input type="text"/>	
Subject Code No. : <input type="text"/>		Section No. (1, 2,.....) : <input type="text"/>	
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		Student's Signature	

- (2) All questions are compulsory.  
(3) Figures to the right indicate full marks to that question.  
(4) Answers to all questions to be written in same answer book.

- 1 (a) Give classification, construction and working of a single crystal ion selective electrode. Name its buffer. **9**

**OR**

- (a) How is ammonium ion concentration estimated using neutral carrier membrane electrode ?  
(b) Describe the principle and working of biomembrane sensors for amino acid.

**OR**

- (b) Explain the terms : boundary potential and alkaline errors.  
(c) 10.0 ml of sea water is diluted to 100.0 ml and the potential is measured with calcium ISE. The reading is +32.0 mV. A standard solution containing  $2 \times 10^{-4}$  M calcium ion gives the reading of +12.0 mV. Calculate ppm of calcium ion in sea water sample (Ca = 40.0).

- 2 (a) Describe the steps of anodic stripping voltammetry. 16  
What is adsorptive stripping ?

OR

- (a) Explain the principle of differential pulse polarography.  
Give its application.
- (b) Give a brief account on determination of analytes using  
CV with gold microelectrode as biosensors.

OR

- (b) Explain the principle of square-wave polarography.  
State its limitation.
- (c) Define submit current. Why rapid scan polarography  
fails for binary mixture analysis ?

OR

- (c) Describe voltammetric sensors in chromatography.
- (d) In DPP multiple standard addition method, aqueous  
solution of nitrobenzene was reduced at microelectrode  
giving following results. Calculate the concentration of  
nitrobenzene in ppm (Nitrobenzene=123)

Added Conc. in mm :	0.0	0.1	0.2	0.3	0.4
Peak current $\mu A$ :	2.51	4.16	5.75	7.42	9.10

- 3 (a) What is radio release method ? Give its application. 9

OR

- (a) Explain isotope dilution technique for quantitative  
analysis.
- (b) Explain the principle of vadioimmuno assay.

OR

- (b) Describe construction and working of a semiconductor  
detector used to measure radioactivity.
- (c) 7.0 g of pure  $^{127}\text{I}$  is placed in a reactor with a neutron  
flux of  $1.1 \times 10^5 \text{ n/cm}^2/\text{S}$  and is bombarded for 25 min.  
The half life of the product formed  $^{128}\text{I}$  is 25.0 min.  
50.0 min after the bombardment was stopped the activity  
in the sample is 9000 d/s. What is the cross section in  
barns for the reaction  $^{127}\text{I}(n, \gamma) ^{128}\text{I}$  ?

- 4 (a) Explain the principle of differential scanning calorimetry. 12

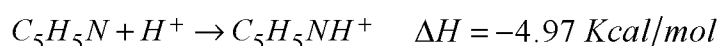
**OR**

- (a) How a mixture of calcium oxalate and magnesium oxalate analysed by TGA ?
- (b) Explain the criteria for selecting reference material. Give their names.,

**OR**

- (b) Explain factors affecting TGA results. Give advantages of DTG over TGA.

- (c) A 1.0 ml portion of 1.0 M HCl was added to 99.0 ml aqueous solution of pyridine



The temperature of reaction vessel increased by  $4.55 \times 10^{-3}$  K. Assuming no heat absorbed by the vessel, the specific heat of solution 1.00 cal/gK and the density of solution 1.0089/ml. Calculate concentration of pyridine in the sample.

- 5 (a) Explain the use of ion suppressor column in IEC. 12  
Give its application.

**OR**

- (a) Describe continuous flow curtain electrophoresis.
- (b) (1) Explain the criteria in selecting pumps.  
(2) Describe working of reciprocating pump in HPLC.

**OR**

- (b) (1) Compare salient features of TLC and HPTLC.  
(2) Explain the function of degassers in HPLC.
- (c) Discuss the kinetic variables affecting zone broadening in chromatography.

**OR**

- (c) Compare packed columns, WCOT and SCOT columns of chromatograph.

- 6 (a) Describe two dimensional paper chromatograph. 12

OR

- (a) Explain temperature programming in chromatography. Give its use.
- (b) Describe the selectivity and drawback of flame ionization detector.

OR

- (b) Discuss the criteria of selecting the carrier gas in GC. Name any three widely used stationary phase.
- (c) (1) How are bonded phase supports prepared ?  
(2) Why GLC is better than GSC ?

OR

- (c) Two solutes with distribution ratio of 1.47 and 1.86 are to be separated on a column in which has  $V_s/V_m = 13.6$ . How many theoretical plates are needed to ensure resolution of 1.40 ? What length of column is required if  $H = 0.250$  cm ?
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