

Scheme - G

Sample Test Paper - I

Course Name : Diploma in Instrumentation/ Diploma in Instrumentation and Control

Course Code : IS/IC

Semester : Fifth

**17539**

Subject Title : Analytical Instrumentation

Marks : 25

Times:1 Hour

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**Instructions:**

1. All questions are compulsory.
2. Illustrate your answers with neat sketches wherever necessary.
3. Figures to the right indicate full marks.
4. Assume suitable data if necessary.
5. Preferably, write the answers in sequential order.

**Q1. Attempt any THREE of the following.**

**(9 Marks)**

- a. State Beer Lamberts Law. Give its mathematical expressions.
- b. Draw a schematic diagram of time of flight Mass spectrometer.
- c. Define electrophoresis. List its four applications.
- d. State necessity of analytical instruments.

**Q2. Attempt any TWO of the following.**

**(8 Marks)**

- a. Describe working of null detector type pH meter with the help of neat diagram.
- b. Give basic principle of NMR spectrometer. List any two applications of it.
- c. Differentiate between Colorimeter and spectrophotometer.(four points)

**Q3. Attempt any two of the following.**

**(8 Marks)**

- a. Write working principle of flame photometer with neat diagram.
- b. Why dual beam spectrophotometer is preferred over single beam spectrophotometer?
- c. Describe construction of glass electrode with neat diagram.

Scheme - G

**Sample Test Paper -II**

Course Name : Diploma in Instrumentation/ Diploma in Instrumentation and Control

Course Code : IS/IC

Semester : Fifth

**17539**

Subject Title : Analytical Instrumentation

Marks : 25

Times:1 Hour

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**Instructions:**

1. All questions are compulsory.
2. Illustrate your answers with neat sketches wherever necessary.
3. Figures to the right indicate full marks.
4. Assume suitable data if necessary.
5. Preferably, write the answers in sequential order.

**Q1. Attempt any THREE of the following.**

**(9 Marks)**

- a. State the principle of chromatography. Classify chromatography.
- b. Draw & label block diagram of infrared gas analyzer.
- c. State the necessity of air pollutant monitoring instruments.
- d. Draw labeled diagram of electrode which can simultaneously measure  $pO_2$  and  $pCO_2$  of blood.

**Q2. Attempt any TWO of the following.**

**(8 Marks)**

- a. Describe working of thermal conductivity analyser using thermistor with a neat diagram.
- b. With neat block diagram of Liquid chromatography. What is the role of high pressure pump in it?
- c. List any four gas pollutants. Name measuring techniques for each pollutant.

**Q3. Attempt any two of the following.**

**(8 Marks)**

- a. Draw the labeled diagram for measurement technique used for measuring carbon monoxide.
- b. Draw & the lable block diagram of a complete blood gas analyser.
- c. Describe each block of Gas chromatography in brief.

Sample Question Paper

Course Name : Diploma in Instrumentation/ Diploma in Instrumentation and Control

Course Code : IS/IC

Semester : Fifth

Subject Title : Analytical Instrumentation

Marks : 100

**17539**

Times: 3 Hours

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**Instructions:**

1. All questions are compulsory.
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3. Figures to the right indicate full marks.
4. Assume suitable data if necessary.
5. Preferably, write the answers in sequential order.

**Q1. A) Attempt any THREE**

**(12 Marks)**

- a) State function of transducer and signal conditioner in the block diagram of analytical instrument system.
- b) Describe principle of operation of Mass spectrometer with neat diagram.
- c) Draw a labeled block diagram of infrared gas analyser. Write its two applications.
- d) Give general equation for representation of concentration of gases. State significance of each term.

**Q1. B) Attempt any ONE**

**(06 Marks)**

- a) State six factors that affect pH measurement and justify.
- b) What is chromatography? What is significance of column length on chromatogram?

**Q2. Attempt any FOUR**

**(16 Marks)**

- a) Write any four advantages of flame photometer.
- b) Describe liquid chromatography with the help of a labeled diagram.
- c) Describe suitable measurement technique of SO<sub>2</sub> with a neat labeled diagram.
- d) With neat diagram give constructional details of NMR spectrophotometer.
- e) Write types of various gas pollutants. State its typical concentration.
- f) Draw and Describe circuit diagram for computation of total CO<sub>2</sub> for blood gas analyzer.

**Q3. Attempt any FOUR**

**(16 Marks)**

- a) List any four analytical instruments based on Beer Lambert's law. Also write one application of each instrument.

- b) Draw & label schematic diagram of magnetic deflection mass spectrometer.
- c) What is electrophoresis? List parts of electrophoresis apparatus.
- d) Compare between gas chromatography and liquid chromatography.
- e) How measurement of ozone is done with the help of conductivity meter?

**Q4. A) Attempt any THREE**

**(12 Marks)**

- a) Which separation technique is based on distribution between two phases? Classify the technique in brief.
- b) Draw and label block diagram of complete blood gas analyzer.
- c) Draw labeled diagram of thermal conductivity analyzer using thermistor. Give significance of thermistor used in it.
- d) What is resonance condition? Describe nuclear energy level in NMR Spectrophotometer.

**Q4. B) Attempt any ONE**

**(06 Marks)**

- a) Describe how measurement of nitrogen oxide is done using CO laser technique.
- b) Give significance of atomizer. Describe discharge type atomizer used in flame photometer.

**Q5. Attempt any FOUR**

**(16 Marks)**

- a) Draw optical diagram of spectrophotometer using prism monochromator. State the role of prism in it.
- b) Define pH. What is the effect of temperature on pH value?
- c) Define chemiluminescence? How measurement of nitrogen oxides is done using chemiluminescence?
- d) What is effect of blood on electrode. State use of buffer solution.
- e) Describe Conductivity method for measurement of SO<sub>2</sub>.
- f) Draw block diagram of gas chromatography. State function of carrier gas and detector.

**Q6. Attempt any FOUR**

**(16 Marks)**

- a) List applications of 1) GCMS 2) LCMS (two each)
- b) Describe calomel electrode with neat diagram.
- c) Draw integral burner type atomizer. Write its constructional details.
- d) List applications of NMR (any four)
- e) In chromatography, if the temperature of oven increases, what will be its effect on retention time and chromatogram? Describe in brief.