22543

24225

3 Hours / 70 Marks Seat No. | | | | | | | | |

Instructions : (1) All Questions are *compulsory.*

(2) Answer each next main Question on a new page.

(3) Illustrate your answers with neat sketches wherever necessary.

(4) Figures to the right indicate full marks.

(5) Assume suitable data, if necessary.

Marks

1. Attempt any FIVE of the following : **5 × 2 = 10**

(a) Name any two properties of analytes and their corresponding techniques used in analytical instrument.

(b) State the function of monochromator used in analytical instruments and give its two examples.

(c) State the Beer-Lambert law with its mathematical expression.

(d) State the principle of flame photometry.

(e) List the applications of mass spectrometers. (Any two)

(f) Classify the chromatography techniques.

(g) State the necessity of monitoring pollutants in environment.

2. Attempt any THREE of the following : **3 × 4 = 12**

(a) Explain in brief the classification of analytical instruments.

(b) Draw the neat labelled block diagram of a Liquid Chromatograph (LC) and make a list of its basic parts.

(c) Explain the working principle of infrared gas analyser with neat labelled diagram.

(d) Specify any four types of gas pollutants in atmosphere with their average concentration. Name the measurement techniques employed for each gas pollutant.

3. Attempt any THREE of the following : **3 × 4 = 12**

(a) With the help of neat schematic diagram, explain the working of single-beam filter photometer.

(b) Suggest the application areas for Gas Chromatograph (GC) and Liquid Chromatograph (LC) and justify your answer. (Any two areas for each)

(c) Draw the neat labelled diagram of Glass electrode and state its usage in pH measurement.

(d) With the help of neat block diagram, explain the SO_2 measurement using conductivity method.

4. Attempt any THREE of the following : **3 × 4 = 12**

(a) With the help of neat schematic diagram, explain the operation of single-beam direct reading spectrophotometer.

(b) Draw the schematic diagram of a time-of-flight mass spectrometer and write the functions of its essential parts.

(c) Explain procedure to troubleshoot IR gas analyser.

(d) Explain the working principle of paramagnetic oxygen analyser.

(e) With the help of neat block diagram, explain the nitrogen oxides measurement using CO laser.

5. Attempt any TWO of the following : **2 × 6 = 12**

(a) Draw the block diagram of a flame photometer and state the functions of its major parts. Suggest its two applications.

(b) Draw the block diagram of a Gas Chromatograph (GC) and explain in brief the functions of its basic parts.

(c) Draw the circuit diagram of thermal conductivity analyser using thermistors and explain its operation.

6. Attempt any TWO of the following : **2 × 6 = 12**

(a) Draw the block diagram of a Nuclear Magnetic Resonance (NMR) spectrometer and explain in brief the functions of its major parts. Give its two applications.

(b) With the help of neat labelled block diagram, explain the use of complete blood gas analyser to measure pCO_2 and pO_2.

(c) With the help of neat labelled block diagram, explain an ozone measurement using conductivity meter. Suggest the analytical technique to measure ozone gas and explain its operation with neat block diagram.
