

22543

22232

3 Hours / 70 Marks

Seat No.

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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 answer in sequential order.

Marks

1. Attempt any FIVE of the following :

10

- (a) State the principle of incandescent lamp.
- (b) Define optical filters. Give its types.
- (c) State Beer – Lambert’s law. Write down its Mathematical expression.
- (d) State quantum theory with respect to flame photometers.
- (e) “Chromatography is a physical method of separation.” Justify this statement.
- (f) Draw a labelled diagram of Nier 60 sector type of mass spectrometer.
- (g) State the need of monitoring pollutants for environmental sustainability.

2. Attempt any THREE of the following :

12

- (a) Explain analytical instrument system with a neat block diagram.



- (b) Explain working principle of conductivity analyzer using thermistors.
- (c) Draw a labelled block diagram of gas chromatograph mass spectrometer.
- (d) Describe with neat sketch the working principle of conductivity method for measuring SO₂ in air.

3. Attempt any THREE of the following :

12

- (a) Explain the working principle of flame photometry with a neat labelled block diagram.
- (b) Explain with neat diagram the working principle of time of flight type mass spectrometer.
- (c) Explain working principle of infrared gas analyzer with schematic diagram.
- (d) Explain Carbon monoxide measurement using gas chromatography.

4. Attempt any THREE of the following :

12

- (a) Explain the working principle of spectrophotometer using prism. Draw it neat schematic diagram.
- (b) State the applications of gas chromatography.
- (c) Draw a labelled diagram of a complete blood gas analyzer.
- (d) Explain the working principle of Chemiluminescence method for monitoring nitrogen oxide present in environment.
- (e) Explain ozone measurement using conductivity meter.

5. Attempt any TWO of the following :**12**

- (a) “Multichannel photometers are used for chemical analysis of multiple samples.” Justify this statement with neat schematic diagram.
- (b) Explain the working principle of liquid chromatography with neat sketch.
- (c) Define pH. State principle and working of null detector type pH meter with diagram.

6. Attempt any TWO of the following :**12**

- (a) Draw a schematic diagram of double beam filter photometer. Differentiate between single and double beam filter photometer.
 - (b) Explain with circuit diagram the total computation of HCO_3^- , TCO_2 slope and total CO_2 and base excess.
 - (c) Represent the concentration of gases. Give the types and concentration of various gas pollutants.
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