

22543

12425

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) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

**Marks**

1. Attempt any FIVE of the following :

**10**

- (a) Define LASER. Give its full form.
- (b) List any four techniques used in Analytical Instrument transducer for “Radiation Absorption” property.
- (c) State Beer-Lambert’s law. Give its mathematical expression.
- (d) Describe the effect of interaction of radiation with matter.
- (e) State the impact of purity of gases in Gas Chromatography.
- (f) State the principle of Chromatography.
- (g) Define Pollutant. State its any two impacts.



**2. Attempt any THREE of the following : 12**

- (a) Describe working of optical absorption filter.
- (b) Explain working of catheter tip electrode used for measurement of  $pO_2$  &  $pCO_2$  with neat schematic diagram.
- (c) Describe the working of time of Flight Mass Spectrometer with neat, labelled diagram.
- (d) State the need of air pollution monitoring instruments (4 points).

**3. Attempt any THREE of the following : 12**

- (a) Describe the constructional features and working principle of double beam filter photometer with neat schematic diagram.
- (b) Explain with neat diagram operation of mass spectrometer.
- (c) Define pH. State use and importance of buffer solution in pH measurement.
- (d) Convert Volumetric Concentration of gas to Gravimetric Concentration of gas.

**4. Attempt any THREE of the following : 12**

- (a) Explain the working of spectrophotometer using prism with neat schematic diagram.
- (b) State the significance of column temperature in gas chromatography.
- (c) Define thermal conductivity of gas. Explain the working principle of thermal conductivity gas analyser with neat schematic diagram.
- (d) Describe working principle of conductivity Meter for Ozone measurement.
- (e) Explain the Nitrogen Oxide (NO) measurement using CO LASER with neat diagram.

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

- (a) State the role of grating in spectrophotometer. Describe working of spectrophotometer using grating.
- (b) Define Liquid Chromatography. Describe its constructional features and working principle with neat schematic diagram.
- (c) Illustrate the constructional features and principle of working of Infra-Red gas analyser. State any four drawbacks of IR gas analyser.

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

- (a) Illustrate constructional features and working principle of NMR. State any four applications of NMR.
  - (b) Describe computation of  $\text{TCO}_2$  w.r.t. blood gas analyser with neat circuit diagram. State any four applications of blood gas analyser.
  - (c) List any four gas pollutant with their concentration values. Explain each gas pollutant in brief.
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