



17539

16117

3 Hours / 100 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.*

Marks

1. A) Attempt **any three**: **12**
- a) What is pH? List the types of electrodes used for pH measurement.
 - b) State the basic principle of NMR. Explain resonance condition in NMR.
 - c) Name any four blood gas parameters. State their normal range.
 - d) List the types and concentration of various gas pollutants.
- B) Attempt **any one**: **6**
- a) What is gas chromatography? Draw and explain labelled block diagram of gas chromatography.
 - b) Draw and explain the construction of magnetic deflection mass spectrometer.
2. Attempt **any four**: **16**
- a) Draw the block diagram of flame photometer and explain its working.
 - b) Classify liquid chromatography. State any 2 applications of liquid chromatography.
 - c) Explain conductivity measurement techniques for gas pollutants.
 - d) What do the abbreviations GCMS and LCMS stand for? State two applications of each.
 - e) Define chemiluminescence. How is measurement of nitrogen dioxide done using chemiluminescence?
 - f) Explain the working principle of thermal conductivity analyzer. List any two applications.
3. Attempt **any four**: **16**
- a) State Beer Lambert's law. Give its mathematical expression.
 - b) List any four applications of NMR.
 - c) Explain the working of null detector type pH meter.
 - d) Compare gas chromatography and liquid chromatography (four points).
 - e) Describe measurement technique for ozone.

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4. A) Attempt **any three** : 12
- a) Draw a neat block diagram of liquid chromatography. What is the role of high pressure pump in it ?
 - b) State any four drawbacks of IR analyzer.
 - c) Draw the labelled diagram of electrode which can measure PO_2 and PCO_2 of blood. Explain its working.
 - d) Define (i) Nuclear spin (ii) Resonance level (iii) Chemical shift (iv) Spectrometer.
- B) Attempt **any one** : 6
- a) Describe how measurement of carbon monoxide is done using gas chromatography.
 - b) Explain the working principle and construction of multichannel photometer with a neat diagram.
5. Attempt **any four** : 16
- a) Differentiate between colorimeter and spectrometer.
 - b) Draw the block diagram of paper electrophoresis. Explain its working.
 - c) Explain any one technique for measurement of SO_2 concentration in air.
 - d) Draw a neat block diagram of complete blood gas analyzer and explain it.
 - e) Define (i) Environment (ii) Pollutant (iii) Air pollution (iv) Acid rain.
 - f) Name the detectors used in gas chromatography. Explain any one in detail.
6. Attempt **any four** : 16
- a) State the basic principle time of flight mass spectrometer.
 - b) Explain the elements of analytical instruments with the help of a block diagram.
 - c) Explain the working of integral burner type atomizer with a neat diagram.
 - d) Draw and explain double beam densitometer.
 - e) What is the significance of column length in GC ?
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