17539

21415

3 Hours/100 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****.*
(6) ***Use*** *of Non-programmable Electronic Pocket Calculator is* ***permissible****.*

MARKS

1. A) Attempt **any three** : **12**
   a) Enlist element of analytical instrument. Give significance of each element.
   b) Describe principle of operation of Nuclear Magnetic Resonance Spectroscopy.
   c) Draw and explain typical circuit diagram for computation of pCO_2.
   d) Explain the measurement technique of nitrogen oxide using chemiluminescence.

   B) Attempt **any one** : **6**
   a) Explain the construction and working of electrodes used for pH measurement.
   b) What is chromatographic column ? Explain basic elements of liquid chromatography.

2. Attempt **any four** : **16**
   a) State and explain Beer Lambert law.
   b) Give detail classification of liquid chromatography.
   c) Describe measurement technique for SO_2 using conductivity method.
   d) Describe principle of operation of mass spectrometer with neat diagram.
   e) Explain electrophoresis in detail.
   f) Explain working principle of infrared gas analyzer with neat block diagram.

3. Attempt **any four** : **16**
   a) Explain principle and constructional detail of flame photometer.
   b) Describe Time of flight mass spectrometer with neat diagram.

P.T.O.

MARKS

c) State four factor that affect pH measurement and justify.

d) Explain following terms w.r. to chromatography :

i) Carrier gas supply ii) Detection system.

e) Write four types of gas pollutant. State their typical concentration values.

4. A) Attempt **any three** : **12**

a) Draw neat labelled diagram of gas chromatography.

b) Explain thermal conductivity analyzer using thermistor with neat diagram.

c) What is effect of blood on electrode ? State significance of buffer solution.

d) Explain following term with respect to NMR :

i) Nuclear energy level ii) Chemical shift.

B) Attempt **any one** : **6**

a) Explain Nitrogen oxide measurement technique using use of 'CO' laser with neat diagram.

b) State principle of colorimetric method. Describe working of double beam filter photometer with neat diagram.

5. Attempt **any four** : **16**

a) List four application of frame photometer.

b) Explain ozone measurement technique using conductivity meter.

c) What is blood gas analyzer ? Draw its block diagram.

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

e) Explain gas chromatography with the help of neat diagram.

f) Explain working principle of double beam densitometer with neat diagram.

6. Attempt **any four** : **16**

a) Explain construction and working of null detector type pH meter.

b) Describe working of single beam filter photometer with neat diagram.

c) Give two application each for

i) GC MS ii) LC MS.

d) Give two comparison between Gas chromatography and Liquid chromatography (four points).

e) a) What is resonance condition ?

b) State two applications of NMR.
