Name : .....

Roll No. : .....

Invigilator's Signature : .....

CS/B.Tech (BME)/SEM-5/BME-503/2009-10

2009

ANALYTICAL AND DIAGNOSTIC EQUIPMENT

Time Allotted : 3 Hours Full Marks : 70

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

GROUP – A
(Multiple Choice Type Questions)

1. Choose the correct alternatives for the following : $10 \times 1 = 10$

   i) The ratio of the radiant power transmitted by a sample to the radiant power incident on the sample is known as

      a) transmittance b) luminescence

      c) absorbence d) optical density.

   ii) In case of IR spectrophotometer, one of the common IR sources is

      a) Deuterium lamp

      b) Mercury lamp

      c) Nernst filament

      d) Tungsten-halogen lamp.

   iii) Electromagnetic blood flowmeter is based on

      a) Lenz's law b) Beer-Lambert's law

      c) Faraday's law d) Fleming's law.

iv) Which parameter of a substance in a solution is measured by colorimeter ?

a) Density b) Concentration

c) Molecular weight d) Colour.

v) The logic processor of automatic recognition and cell counting system recognize each picture element by

a) 'ON' status

b) 'OFF' status

c) 'ON' and 'OFF' status

d) 'SIZE' and 'SHAPE' status.

vi) The light is dispersed in monochromator of spectrophotometer by

a) filter

b) mirror

c) diffraction grating of prism

d) lens.

vii) The UV light wavelength is in the range of

a) 200 nm - 400 nm b) 400 nm - 700 nm

c) 700 nm - 800 nm d) 520 nm - 580 nm.

viii) The electrical resistance of the thin glass bulb of pH meter is

a) 100 Ω - 1000 Ω b) 100 m Ω - 1000 m Ω

c) 100 k Ω- 1000 k Ω d) 100 M Ω - 1000 M Ω.

ix) The value of the constant AC current source in plethysmograph is

a) 0·1 mA, 200 Hz b) 1 mA, 200 kHz

c) 10 mA, 400 kHz d) 100 mA, 400 kHz.

x) Lung volume and capacity are measured using

a) Pneumotachometer b) Potentiometer

c) Photometer d) Spirometer.

GROUP – B
(Short Answer Type Questions)

Answer any *three* of the following. 3 × 5 = 15

2. Draw a schematic diagram of the magnetic flowmeter for blood flowmeter and explain its working principle.

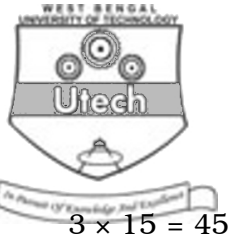
3. Mention the different methods of blood cell counter. State the basic principle of blood cell counter by electrical conductivity method. Mention the salient parameters of Coulter counter.

4. Briefly describe cystoscopy giving emphasis on lithotripsy.

5. What are the different types of flow sensing pneumotachometers ? Briefly describe.

6. Describe the Beer-Lambert's law in spectrophotometer. Mention the names of the common practical IR sources in IR spectrophotometer. 3 + 2

7. Define tidal volume of Respiratory system. Mention the relationship between tidal volume and minute volume. What is the function of pneumotachometer ? 2 + 2 + 1



GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following. 3 × 15 = 45

8. Explain the basic principle of oximetric measurement. Describe the pulse oximeter with a neat sketch. What is impedance pneumometer ? 5 + 8 + 2

9. a) Define systolic and diastolic pressures.

   b) Describe one direct method of monitoring blood pressure.

   c) When is direct method of blood pressure measurement used ? 2 + 9 + 4

10. Describe the pH measurement procedure using glass electrode with a neat sketch. Describe the Clark method of pO_2 measurement. 8 + 7

11. Describe the cardiac output measurement by impedance technique. Describe the Coulter counter with a neat sketch. 7 + 8

12. Draw the block diagram of basic spectrophotometer type instrument with a small description. Why is the optical filter used in spectrophotometer type instrument ? Describe briefly. Explain the basic principle of calorimetric measurement of unknown sample. 4 + 6 + 5

13. Describe the Gas chromatography system with a basic schematic diagram. Explain the basic principle of Flame photometer. 11 + 4