



Name : .....

Roll No. : .....

Invigilator's Signature : .....

**CS/B.TECH/BME(O)/SEM-5/BME-503/2012-13**

**2012**

**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**

**( Objective Type Questions )**

1. Answer any *ten* of the following : 10 × 1 = 10

A. Choose the correct alternatives for the following :

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

a) Density                      b) Concentration

c) Molecular weight      d) Colour.

ii) Generally, the orifice diameter of Coulter counter is

a) 25  $\mu\text{m}$                       b) 50  $\mu\text{m}$

c) 75  $\mu\text{m}$                       d) 100  $\mu\text{m}$ .

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- iii) The logic processor of automatic recognition and cell counting system recognize the each picture element by
  - a) 'ON' status
  - b) 'OFF' status
  - c) 'ON' and 'OFF' status
  - d) 'SIZE' AND 'SHAPE' status.
- iv) The light is dispersed in monochromatic of spectrophotometer by
  - a) Filter
  - b) Mirror
  - c) Diffraction grating or prism
  - d) Lens.
- v) The UV light wavelength is in the rage of
  - a) 200 – 400 nm      b) 400 – 700 nm
  - c) 700 – 800 nm      d) 520 – 580 nm.
- vi) 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.
- vii) 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.
- viii) Electromagnetic blood flowmeter is based on
  - a) Lenz's law      b) Beer-Lambert's law
  - c) Faraday's law      d) Fleming's law.



- ix) Dilution curve is obtained from
- Blood pressure measurement
  - Blood flow measurement
  - Cardiac output measurement
  - Colorimetric measurement.
- x) Lung volume and capacity are measured using
- Pneumotachometer
  - Potentiometer
  - Photometer
  - Spirometer.
- B. Answer the following questions very briefly :
- What is 'Auger electron' ?
  - What is laparoscope ?
  - Why is tungsten used in electron microscope ?
  - What is the function of blood gas analyser ?

### GROUP – B

#### ( Short Answer Type Questions )

Answer any *three* of the following questions.  $3 \times 5 = 15$

- What are the different non-invasive techniques of blood flow measurement ? Briefly explain.
- Briefly describe cystoscopy giving emphasis on lithotripsy.
- What are the different types of Flow sensing pneumotachometers ? Briefly describe.
- Describe the Beer-Lambert's law in spectrophotometer. Mention the name of the common practical IR sources in IR spectrophotometer. 3 + 2
- 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 questions.

$$3 \times 15 = 45$$

7. Describe the pH measurement procedure using glass electrode with a neat sketch. Describe the Clark method of  $pO_2$  measurement. 8 + 7
8. Describe the cardiac output measurement by impedance technique. Describe the Coulter counter with a neat sketch. 7 + 8
9. 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
10. Describe the Gas chromatography system with a basic schematic diagram. Explain the basic principle of Flame photometer. 15
11.
  - a) Describe the basic components of a Scanning Electron Microscope.
  - b) Using a diagram show the path of electron beam through the lenses. Explain their roles in the formation of the image.
  - c) What are back scattered electrons ? 5 + 7 + 3
12.
  - 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

