

Name :

Roll No. :

Invigilator's Signature :

CS/B.Tech (BME)/SEM-5/BME-503/2010-11

2010-11

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) Auger electrons are a type of
 - a) Primary electrons
 - b) Secondary electrons
 - c) Loose electrons
 - d) Back-scattered electrons.
 - ii) The name of the dye used for cardiac output measurement is
 - a) Methylene blue
 - b) Indocyanide green
 - c) Oxygen
 - d) Methyl orange.
 - iii) In the flame photometer the intensity of the emitted wavelength rises with the rise in
 - a) Flame temperature
 - b) Concentration of the ion
 - c) Rate of atomization
 - d) None of these.



- iv) The bacterial spores used for checking the efficacy of an autoclave is
- | | |
|-----------|-------------------|
| a) E.coli | b) subtilis |
| c) aureus | d) none of these. |
- v) Centrifuge works on the principle of
- | | |
|------------------|-------------------|
| a) Sedimentation | b) Rotation |
| c) Precipitation | d) None of these. |
- vi) The CO_2 electrode is known as
- | |
|----------------------------------|
| a) Severing haus electrode |
| b) Ag-AgCl electrode |
| c) Glass pipette micro-electrode |
| d) Needle and wire electrode. |
- vii) The readout of a phonocardiograph is
- | |
|----------------------------------|
| a) High frequency chart recorder |
| b) Oscilloscope |
| c) Light Galvanometer |
| d) All of these. |
- viii) The transducer used in liquid column method of blood pressure measurement is
- | |
|--------------------------------|
| a) Unbonded strain gauge |
| b) Bonded strain gauge |
| c) Photoelectric transducer |
| d) Thermoresistive transducer. |
- ix) Endoscopy which involves examination of gullet, stomach, upper small intestine is called
- | | |
|----------------|-----------------|
| a) Cystoscopy | b) Arthroscopy |
| c) Colonoscopy | d) Gastroscopy. |
- x) Catheter tip pressure transducer when used in blood pressure measurement is called
- | |
|---------------------------|
| a) Non-invasive technique |
| b) Invasive technique |
| c) Indirect technique |
| d) All of these. |



GROUP – B

(Short Answer Type Questions)

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

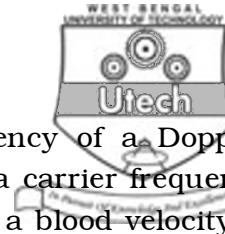
2. What is the method of functioning of an autoclave ? What are the Biological Indicators ? $3 + 2$
3. What is a flame photometer ? Give the diagram of a flame photometer and explain it. $2 + 3$
4. What is the difference between phonocardiogram and phonocardiograph ? How is heart sound recorded using phonocardiograph ? $2 + 3$
5. Describe oscillometric monitoring device of blood pressure.
6. How are blood cells counted by 'automatic optical method' ?
7. What are the diagnostic significances of the arthroscopy ? How is it performed ? $2 + 3$

GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following. $3 \times 15 = 45$

8. a) Explain with the help of a diagram the functioning of a scanning electron microscope.
b) What is an ultrasonic blood flowmeter ?
c) Explain the phenomenon of Doppler shift in an ultrasonic blood flowmeter. $7 + 3 + 5$
9. a) What do you understand by lung spirometer ?
b) What are the parameters measured in lung spirometry ?
c) Explain the flow volume curve of a lung spirometer. $5 + 5 + 5$



10. a) Calculate the maximal audio frequency of a Doppler ultrasonic blood flowmeter that has a carrier frequency of 7 MHz, a transducer angle of 45° , a blood velocity of 150 cm/sec and an acoustic velocity of 1500 m/s.
- b) Explain the method of Cardiac Output measurement by Fick's technique.
- c) Calculate the cardiac output, given the following data: Spirometer O_2 consumption 250 ml/min, arterial O_2 content 0.20 ml/ml, venous O_2 content 0.15 ml/ml. 5 + 5 + 5
11. a) What do you mean by blood gas analysis ?
- b) How is it important ?
- c) Describe the procedure of blood CO_2 measurement.
- d) What is the principle of transcutaneous PO_2 measurement ?
- e) How can PCO_2 monitoring be advantageous in medical diagnosis ? 1 + 1 + 7 + 3 + 3
12. a) Explain the basic principle of colorimetric measurement of unknown samples.
- b) Draw the basic schematic diagram of colorimeter and explain the calibration procedure of colorimeter. 5 + (5 + 5)
13. a) Define pH. How is blood pH measured using glass electrode ?
- b) How is fibre optics endoscope used in *in vivo* diagnosis and treatment of different diseases ? 7 + 8

=====