BRAINWARE UNIVERSITY

Term End Examination 2023-2024
Programme – B.Sc.(MLT)-2022
Course Name – Laboratory Automation
Course Code - BMLTS303
(Semester III)

Full Marks : 60   Time : 2:30 Hours

[The figure in the margin indicates full marks. Candidates are required to give their answers in their own words as far as practicable.]

Group-A

(Multiple Choice Type Question)   1 x 15=15

1. Choose the correct alternative from the following :

(i) How does the use of Westgard rules explain the relationship between quality control and patient care-

a) It discusses the historical development of healthcare.

b) It relates data to quality control procedures.

c) It identifies errors that may affect patient results.

d) It selects appropriate statistical tools for analysis.

(ii) State which of the following is NOT a common application of flow cytometry

a) Immunophenotyping of cells

b) Cell cycle analysis

c) DNA sequencing

d) Apoptosis detection

(iii) Cite the full form of FACS

a) Fluorescence activated cell sorting

b) Fluorescent Antibody Cell Staining

c) Flow Cytometry Advanced System

d) Fused Aperture Cell Sorter

(iv) In the context of QC program examination, what might be the significance of observing trends in QC data?

a) Trends provide information about the financial status of the laboratory.

b) Trends help identify seasonal variations in patient testing.

c) Trends can reveal shifts or drifts in the test system.

d) Trends indicate the number of patient appointments.

(v) State the primary purpose of an External Quality Control (QC) program

a) To assess the internal financial processes of a company.

b) To ensure that products or services meet specific quality standards.

c) To manage interpersonal conflicts within an organization.

d) To determine market share.

(vi) Discuss the primary purpose of an automated anaerobic chamber in a quality control laboratory

a) To identify potential contaminants in samples

b) To select appropriate analytical methods

c) To maintain a controlled anaerobic environment

d) To discuss laboratory safety protocols

(vii) Discuss the primary purpose of a Pap smear in a clinical laboratory

a) To measure blood pressure

b) To assess liver function

c) To screen for cervical cancer

d) To count and analyze blood cells

(viii) How does the use of Bactek automation relate to the concept of lean laboratory management

a) It increases laboratory staff workload.

b) It automates all laboratory processes.

c) It streamlines workflow, reducing waste and errors.

d) It relies on manual record-keeping.

(ix) Discuss the advantage of using a colony counter in automation for microbial analysis

a) Increased risk of contamination

b) Greater flexibility in experimental design

c) Enhanced accuracy and efficiency in colony counting

d) Reduced need for culture media

(x) In the phlebotomy department, which technique should be applied for blood collection to minimize the risk of hemolysis

a) Squeezing the puncture site

b) Using a large bore needle

c) Allowing the tube to fill gradually

d) Collecting the sample in a serum separator tube

(xi) In laboratory automation, describe the essential function of sample preparation analyzer

a) To calibrate other instruments

b) To process and condition samples for analysis

c) To provide real-time data visualization

d) To generate analytical reports

(xii) In laboratory automation, select the type of analyzer would be involved in designing a customized automated testing protocol

a) Spectrophotometer

b) Liquid handling system

c) Gas chromatograph

d) Mass spectrometer

(xiii) Discuss the primary function of a mass spectrometer in laboratory automation

a) Sample mixing

b) Liquid handling

c) Ionization and analysis of compounds

d) Temperature control

(xiv) Cite the main principle behind blood count impedance cell counters

a) Optical detection

b) Electrical impedance

c) Chemical reactions

d) Mechanical counting

(xv) State the primary purpose of a Levey-Jennings chart in quality control

a) To identify trends in data

b) To select appropriate statistical tests

c) To discuss quality control procedures

d) To explain the principles of quality control
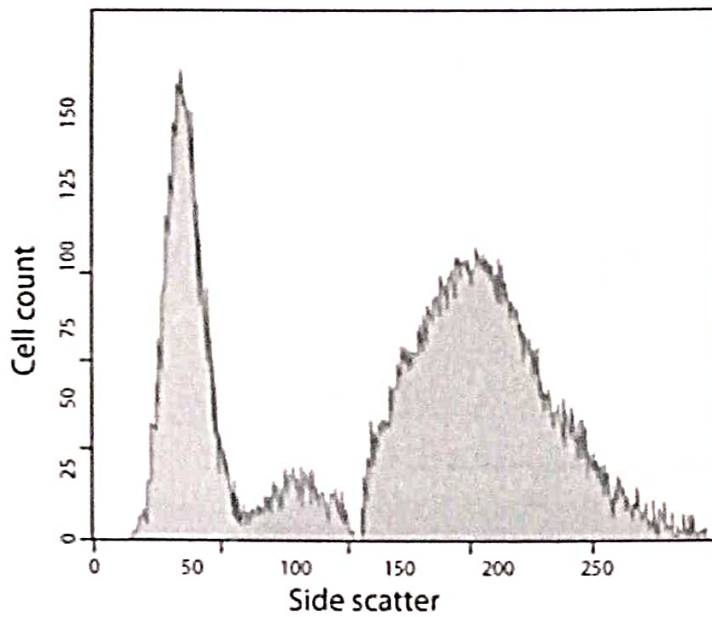
Group-B
(Short Answer Type Questions)

3 x 5=15

2. Distinguish between open system and closed system (3)

3. Define proficiency testing for quality control (3)

4. Discuss two advantages of using an electronic or automated colony counter (3)

5. How automation is associated to the processing of microbiological cultures in a clinical laboratory. (3)
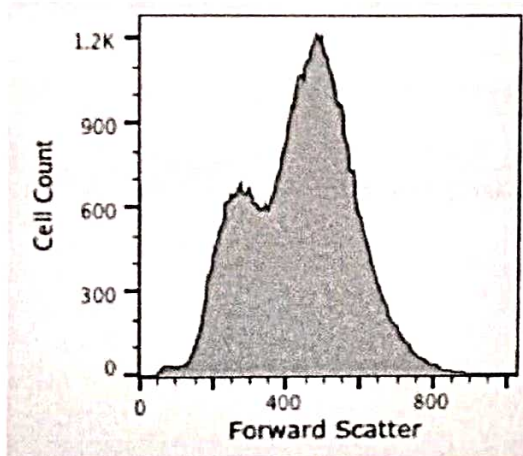
6. (3)

Conclude the flowcytometry result

OR

(3)

Conclude the flowcytometry data

Group-C
(Long Answer Type Questions)   5 x 6=30

7. Explain the important precautions followed when using a glucometer for glucose   (5)
   estimation.
8. Explain the sample preparation process for rapid hemoglobin estimation, including the   (5)
   handling of blood samples and any necessary reagents.
9. Assess the potential risks associated with the release of incorrect laboratory results and   (5)
   their impact on patient care
10. Discuss three advantages and three disadvantages of laboratory automation in medical   (5)
    diagnostics.

11.

CD4 - FITC
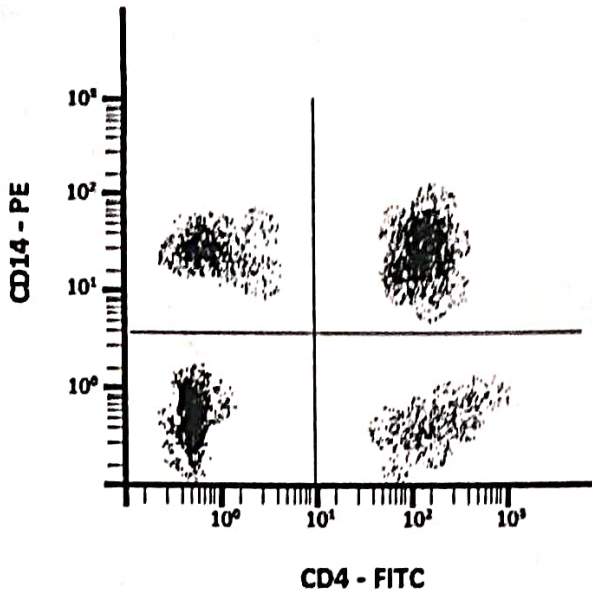
A researcher want to isolate T-helper cell from a culture.He stained CD 4 biomarker with FITC fluorescent dye and CD 14 biomarker with PE fluorescent dye.Here,T- helper cell express both CD 14 and CD4.Conclude the result and identify the CD14 positive CD 4 positive T helper cell population from this FACS data describe the sample preparation procedure

12. Formulate recommendations for improving the overall efficiency and safety of a clinical   (5)
    laboratory based on a comprehensive evaluation.

                                    OR

    Compare the sensitivity and specificity of different diagnostic tests for a particular disease. (5)

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