

PARUL UNIVERSITY
PARUL INSTITUTE OF APPLIED SCIENCES
MID SEMESTER INTERNAL EXAMINATION, OCTOBER 2017
B. Sc. Semester I

Subject: Biotechnology/Biochemistry/Microbiology

Paper Code: 11102101

Title of the paper: Biophysics & Instrumentation

Date: 09/10 /2017

Time: 10:00-11:30AM

Maximum Marks: 40

Instructions:

- 1. All questions are compulsory and options are given in first and second question only.**
 - 2. Numbers to the right of question indicate the marks of respective question.**
-

Q. 1 Attempt any one question of the following. **(08)**

(i) What are the various detectors used in Gas Liquid Chromatography?
Discuss in detail.

(ii) What is optical microscopy? Discuss different types of optical microscopy.

Q. 2 Attempt any three questions of the following. **(12)**

(i) Sketch the light path for the setup of dark-field microscopy.

(ii) Compare the two types of electron microscopy?

(iii) A student sets up a paper chromatogram and places a spot of green food dye on the origin. After six minutes the solvent has moved 10 cm and a blue spot has advanced 5 cm. After fourteen minutes the solvent has advanced a further 8 cm. How many cm from the origin is the blue spot likely to be?

(iv) What are the common techniques used for detecting colourless spots in paper chromatography?

(v) A molecular exclusion column is designed with a protein fractionation range of 5,000 to 4,00,000 Daltons. In this column myoglobin, serum albumin, catalase and an unknown protein were migrated. Following is the elution volume data obtained from experiment

Protein	Mol. Wt.	Elution volume (ml)
Myoglobin	16900	118
Serum Albumin	68500	58
Unknown protein	?	37
Catalase	221600	24

What is the molecular weight of the unknown protein?

Q. 3 Do as directed. Attempt all five questions. **(05)**

(i) List the parameters that affect the resolution of optical microscopes.

(ii) If an image is 80 mm and the actual size of the object is 20 μm , what is the magnification?

(iii) What is "Column bleeding"?

(iv) Write the name of tracking dye used in gel chromatography.

(v) What is “Retention time” in chromatography?

Q. 4 Write correct option in your answer sheet for following 15 multiple choice questions. **(15)**

- MCQ 1 Which of the following light is suitable for getting maximum resolution?
(A) Red (B) blue
(C) Green (D) orange
- MCQ 2 Resolving power of an microscope can be increased by
(A) using an light of longer wave length and by increasing the NA (B) using an light of longer wavelength and by decreasing the NA
(C) using an light of shorter wave length and by increasing the NA (D) using an light of shorter wave length and by decreasing the NA
- MCQ 3 What type of microscopy allows for the visualization of internal components within live, unstained specimens?
(A) Phase contrast (B) Bright-field
(C) Dark-field (D) Flourescence
- MCQ 4 The general expression for the appearance of a solute in an effluent is (where V is the elution volume of a substance , V_0 void volume, k_D distribution constant and V_i internal water volume)
(A) $V = V_0 + k_D V_i$ (B) $V = V_0 / V_i$
(C) $V = V_0 - k_D V_i$ (D) $V / V_0 = k_D V_i$
- MCQ 5 In a mixture of the proteins listed below, which should elute second in size-exclusion (gel filtration) chromatography?
(A) cytochrome c, Mr = 13,000 (B) immunoglobulin G, Mr = 145,000
(C) polymerase, Mr = 450,000 (D) serum albumin, Mr = 68,500
- MCQ 6 Rf value for an analyte in paper chromatography ranges from
(A) -1 to +1 (B) 0 to 1.0
(C) -2 to +2 (D) 0 to ∞
- MCQ 7 The composition of Silica gel H is
(A) Silica gel without binder (B) Silica gel + CaSO₄
(C) Silica gel + alumina (D) Silica gel + MgSO₄
- MCQ 8 Locating agent of amino acids is
(A) Amphoteric oxides (B) Ninhydrin spray
(C) Diazo reagent (D) Neutral oxides
- MCQ 9 Which of the following gases is unsuitable for use as a GC carrier gas?
(A) Nitrogen (B) Oxygen
(C) Helium (D) Argon
- MCQ 10 Sucrose can be determined after silylation using chromatographic technique
(A) HPLC (B) Gas Liquid Chromatography
(C) Gel Chromatography (D) Paper Chromatography
- MCQ 11 Which of the following amino acid will display the slowest migration through a column filled with a strong cation exchange resin?
(A) Glu (B) Asp
(C) Lys (D) Gly
- MCQ 12 Which of the following can be separated using affinity chromatography
(A) Enzyme (B) Antibody

- (C) DNA (D) All of these
- MCQ 13 The stationary phase in reverse phase chromatography is
(A) Hydrophilic (B) Hydrophobic
(C) Both of the above (D) None of the above
- MCQ 14 Immunofluorescence involves use of
(A) Fluorophore (B) Antibody
(C) Fluorescence microscope (D) All of the above
- MCQ 15 Who is credited with the invention of microscope?
(A) Hans Janssen & Zacharias Janssen (B) Anton van Leeuwenhoek
(C) Robert Hooke (D) Galileo Galilei

-- End of Paper--