16/8/22

B.Sc.-M.Sc. INTEGRATED PROGRAMME (BIOTECHNOLOGY)
SEMESTER IV, EXAMINATION 2022
PAPER CODE – BBT-CC13 TH
PAPER TITLE: BIO-ANALYTICAL TOOLS

Time: 3 Hours **MM: 75**

Attempt all questions. All parts of a question must be attempted in continuation. Start answer of a fresh question on a new page. Cite examples and draw labeled diagrams wherever necessary

Question 1: Mark the most suitable answer of multiple choice.

i. Resolving power of a microscope is depending upon,
a) Wavelength of light used
b) Numerical aperture of lens system
c) Refractive index
d) Both A and B

ii. Which of the following part of light microscope controls the intensity of light entering the viewing area?
a) Coarse adjustment screw
b) Fine adjustment screw
c) Diaphragm
d) Condenser lens

iii. Which of the following microscope can be used to view live cells?
a. SEM
b. TEM
c. Phase contrast microscope
d. All of these

iv. Which of the following components is not present in the compound microscope?
a. Stage clips
b. Fine adjustment
c. Electron gun
d. Binocular eye piece

v. Molar absorbtivity is the measure of the
A. amount of light absorbed per unit length
B. amount of light absorbed per unit concentration
C. amount of light reflected and absorbed per unit concentration
D. All of the above

vi. Which of the following is not an IR vibrational mode?

A. Stretching
B. Scissoring
C. Rocking
D. Rolling

vii. According to the Beer-Lambert Law, on which of the following does absorbance not depend?

a) Extinction coefficient of the sample.
b) Distance that the light has travelled through the sample.
c) Colour of the solution.
d) Solution concentration.

viii. Differential centrifugation is based on the differences in _____ of biological particles of different _____.

a) Size, density.
b) Sedimentation rate, sizes and density.
c) Size, structure.
d) Mass, size.

ix. Chromatogram is a plot of elution Time/Volume with respect to,

a) Quantity
b) Density
c) Concentration
d) Specific gravity

x. A protein solution has both monomer and diamer species. Which of the following techniques is used to separate them?

a. Ion Exchange Chromatography
b. Gel Filtration Chromatography
c. Hydrohphobic Interaction Chromatography
d. Thin Layer Chromatography

xi. Which of the following is the application of ion exchange chromatography?

a) The softening of hard water
b) The demineralisation of water
c) The separation of proteins
d) All of the above

xii. In an SDS-PAGE which statement wrong

a) Proteins are denatured by the SDS
b) Proteins have the same charge-to-mass ratio
c) Smaller proteins migrate more rapidly through the gel
d) All of the above

xiii. The electrophoretic mobility μ is mathematically expressed as

a. V.E
b.V/E
c.E/V
d.1/VE

xiv. If the electrophoresis of Histone and Myoglobin will be performed under denaturing condition (pH 7.0),

a. Both migrates in the same direction
b. Both migrates in the opposite direction
c. Both migrates in the same direction with different speed
d. Histone migrate but Myoglobin does not

xv. Which of the following factors will not affect the rate of migration of DNA in agarose gels?

a) DNA concentration
b) Gel concentration
c) Voltage
d) DNA conformation

Question 2. Explain any TWO of the following **(7.5x2)**

a. Explain the instrumentation and application of phase contrast microscopy.
b. Discuss different application of Fluorescence Microscopy in detail.
c. Compare SEM and TEM instrumentation.
d. How the scanning electron microscope is used for diagnosis of infectious disease?

Question 3. Explain any TWO of the following **(7.5x2)**

a. What is the principle of absorption spectroscopy? Derive Beer-Lambert law.
b. Explain the instrumentation of Fluorescence Spectroscopy? Why there is a difference in Exciation and emission wavelengths?
c. Discuss the principle and application of DSC?
d. Explain the difference between rate zonal centrifugation and isopycnic centrifugation.

Question 4. Explain any TWO of the following **(7.5x2)**

a. Briefly describe the Principle and Application of gel filtration chromatography.
b. What are the different types of gels used in the Ion exchange chromatography? How the charge states of any protein is correlated with the sample pH, pI value of proteins? Explain in the light of Ion exchange chromatography?
c. Explain the principle and application of Affinity chromatography. What are the different materials used for affinity chromatography.
d. Discuss the principle, instrumentation and application of HPLC.

Question 5. Explain any TWO of the following **(7.5x2)**

a. Briefly describe factors influencing gel electrophoresis.
b. How SDS-PAGE is used to determine molecular mass of a protein? Explain in detail.
c. Explain application of nanotechnology in medicine.
d. Discuss the principle, instrumnetatio and application of isoelectric focusing.

-x-x-x-x-