**B. Sc. Part II – Semester IV - PAPER – II**

**BIOPHYSICAL & BIOCHEMICAL TECHNIQUES**

**Unit-I**

**Q1) Which technique separates charged particles using electric field?**

a) Hydrolysis

b) Electrophoresis

c) Protein synthesis

d) Protein denaturing

**Answer: b) Electrophoresis**

**Q2)** **Electrophoresis was developed by:**

a) Tswett

b) Tsvedberg

c) Tiselius

d) Sanger

**Answer: c) Tiselius**

**Q3) The speed of migration of ions in electric field depends upon:**

a) Shape and size of molecule

b) Magnitude of charge and shape of molecule

c) Magnitude of charge shape and mass of molecule

d) Magnitude of charge and mass of molecule

**Answer: b) Magnitude of charge and shape of molecule**

**Q4)** **Which of the following statements is true about migration of biomolecules?**

a) The rate of migration is directly proportional to the resistance of medium

b) Rate of migration is directly proportional to current

c) Low voltage is used for separation of high mass molecules

d) Rate of migration is inversely proportional to current

**Answer: b) Rate of migration is directly proportional to current**

**Q5)** **What does the electrophoresis apparatus consist of?**

a) Gel, buffer chamber and fire pack

b) Buffer chamber and electrophoresis unit

c) Electrophoresis unit and gel separator

d) Power pack and electrophoresis unit

**Answer: d) Power pack and electrophoresis unit**

**Q6)** **Which of the following factors does not influence electrophoretic mobility?**

a) Molecular weight

b) Shape of molecule

c) Size of molecule

d) Stereochemistry of molecule

**Answer: d) Stereochemistry of molecule**

**Q7)** **When is electrophoresis not used?**

a) Separation of proteins

b) Separation of amino acids

c) Separation of Lipids

d) Separation of nucleic acids

**Answer: c) Separation of Lipids**

**Q8)** **What cannot be a reason for using electrophoresis?**

a) Comparing two sets of DNA

b) Organizing DNA by shape of backbone

c) Organizing DNA fragments from largest to smallest

d) Organizing DNA in order we can see

**Answer: b) Organizing DNA by shape of backbone**

**Q9) For separation of DNA by electrophoresis, which of the following method is commonly used?**

a)Agarose-vertical

b) Agarose-horizontal

c)PAGE-Vertical

d) PAGE- horizontal

**Answer:** **b) Agarose-horizontal**

**Q10) The role of UREA in PAGE separation of DNA is to**

a) Act as anion

b) Act as cation

c) Helps to denature the DNA

d) Provide buffer stability of the gel

**Answer:** **c) Helps to denature the DNA**

**Unit II**

**Q1)** **If proteins are separated according to their electrophoretic mobility then the type of electrophoresis is:**

a) SDS PAGE

b) Affinity Electrophoresis

c) Electro focusing

d) Free flow electrophoresis

**Answer: a) SDS PAGE**

**Q2) Sodium Dodecyl Sulfate (SDS) used in SDS PAGE is**

a) An anionic detergent

b) A cationic detergent

c) A non ionic detergent

d) A cation exchanger

**Answer: a) An anionic detergent**

**Q3) Function of β-mercaptoethanol in SDS-PAGE is**

a) To give negative charges to amino acids in the protein

b) For the oxidation of disulfide bonds in the proteins

c) For the reduction of disulfide bonds in the proteins

d) For breaking hydrogen bonds in the proteins

**Answer: c) For the reduction of disulfide bonds in the proteins**

**Q4) In SDS-PAGE of Protein separation, one SDS molecule will binds to---**

a) Every amino acid

b) Every two amino acids

c) Every Three amino acids

d) Every four amino acids

**Answer: b) Every two amino acids**

**Q5) The role of Ammonium persulfate (APS) in SDS-PAGE is to**

a) act as a catalyst in the polymerization of acrylamide

b) Act as a source of free radicals

c) Act as a bridge between acrylamide and bis-acrylamide

d) Act as a pore builder in the polymerized gel

**Answer: b) Act as a source of free radicals**

**Q6) The “traking dye” used in SDS-PAGE will be**

a) Anionic

b) Cationic

c) Non-ionic

d) Amphipathic

**Answer: a) Anionic**

**Q7) Which of the following is used as a “trakin dye” in SDS-PAGE of protein?**

a) Bromophenol blue

b) Xylene cyanol

c) Orange G

d) All of these

**Answer: d) All of these**

**Q8) Glycerol is added to protein samples before they are loaded to the wells of PAGE for**

a) TO stabilize protein structure

b) To provide density to the sample

c) To helps to bind SDS to the protein

d)To helps to reduce disulfide bonds by β- mercaptoethanol

**Answer:** **b) To provide density to the sample**

**Q9) For Better resolution of minute protein bands in SDS-PAGE, which of the following staining method is advised?**

a) CBB Staining

b) Silver Staining

c) Avidin staining

d) All of these

**Answer: b) Silver Staining**

**Q10) The percentage of SDS commonly used in the buffers of SDS PAGE is**

a) 0.1%

b)1.0%

c) 10%

d) 1-10%

**Answer:** **a) 0.1%**

**Q11)** **Which of the following is an immunodiffusion test?**

a) Double-diffusion

b) Gel diffusion

c) Ouchterloney technique

d) All of these

**Answer: d) All of these**

**Q12)** **In Counter immunoelectrophoresis**

a) electrophoresis will drive the antibody and antigen parallel to each other

b) electrophoresis will drive the antibody and antigen toward each other

c) the antibody will migrate towards anode

d) the antibody will migrate towards cathode

**Answer: b) electrophoresis will drive the antibody and antigen toward each other**

**Q13) What is the ELISA test intended to measure?**

a) Antibody to HIV only

b) Antigen to HIV only

c) Presence of free, circulating virus in the patient

d) Antibodies directed against HLA molecules

**Answer: a) Antibody to HIV only**

**Q14)** **Immunoaffinity chromatography can be used in biochemical applications to**

a) break down antibody structure

b) purify protein antigen

c) break down antigen and analyze quantitatively

d) none of the above

**Answer: b) purify protein antigen**

**Q15)** **In Rocket Immunodiffusion the length of the rocket is**

a) proportional to the amount of antibody placed in each well

b) inversely proportional to the amount of antibody placed in each well

c) inversely proportional to the amount of antigen placed in each well

d) proportional to the amount of antigen placed in each well

**Answer: d) proportional to the amount of antigen placed in each well**

**Unit-III**

**Q1)** **The neutral atoms of all isotopes of the same element contain the same number of \_\_\_\_\_\_\_\_\_\_.**

a) Neutrons only.

b) Electrons

c) Mass numbers

d) Masses

**Answer: b) Electrons**

**Q2)** **Isotopes of an element have a different number of**

a) Proton

b) Neutron

c) Electron

d) Atom

**Answer: b) Neutron**

**Q3)** **The number of protons or atomic number is reduced to 2 by which form of radioactive decay?**

a) Beta-decay

b) Gamma decay

c) Alpha decay

d) None of the above

**Answer: c) Alpha decay**

**Q4)** **Which statement is true for all three types of radioactive emission?**

a) They are deflected by electric fields

b) They ionise gases

c) They are completely absorbed by a thin aluminium sheet

d) They emit light

**Answer: b) They ionise gases**

**Q5)** **The unit of radioactivity is**

a) Electron volt

b) Electron ampere

c) Curie

d) MV

**Answer: c) Curie**

**Q6) Which of the following is not a type of radiation detectors?**

a) Geiger Muller counter

b) Proportional counter

c) Semiconductor detector

d) Flame emission detector

**Answer: d) Flame emission detector**

**Q7)** **Which of the following acts as quenching gas in Geiger Muller counter?**

a) Alcohol

b) Argon gas

c) Krypton

d) Hydrogen

**Answer: a) Alcohol**

**Q8)** **Which of the following acts as ionising gas in Geiger Muller counter?**

a) Alcohol

b) Argon gas

c) Krypton

d) Hydrogen

**Answer: b) Argon gas**

**Q9)** **Scintillation detector is a large flat crystal of which of the following materials?**

a) Sodium chloride

b) Sodium iodide

c) Sodium sulphate

d) Sodium carbonate

**Answer: a) Sodium Chloride**

**Q10)** **Liquid Scintillators are used for which of the following materials?**

a) Low energy beta materials

b) High energy beta materials

c) Low energy gamma materials

d) High energy gamma materials

**Answer: a) Low energy beta materials**

**Q11)** **Liquid samples must be counted using ionization chamber by placing them in which of the following?**

a) Test tube

b) Corvettes

c) Ampoules

d) Flask

**Answer: c) Ampoules**

**Q12)** **Which of the following isotopes is not a radioisotope?**

a) Carbon-13

b) Carbon-14

c) Tritium

d) Sulphur-35

**Answer: a) Carbon-13**

**Q13)** **Which of the following detection methods is not commonly used to detect isotopically labelled drug metabolites?**

a) Infra red spectroscopy

b) Nuclear magnetic resonance spectroscopy

c) Scintillation counting (detection of radioactivity)

d) Mass spectrometry

**Answer: a) Infra red spectroscopy**

**Q14)** **Which of the following isotopes has the shortest half life?**

a) Fluorine-18

b) Carbon-11

c) Tritium

d) Carbon-14

**Answer: b) Carbon-11**

**Q15)** **The radio isotope used to control the disease like blood cancer (Leukaemia) is:**

a) Phosphorus-32

b) Cobalt-60

c) Iodine-131

d) Sodium-24

**Answer: b) Cobalt-60**

**Unit-IV**

**Q1)** **How might solid sodium carbonate be obtained from sodium carbonate solution?**

a) Centrifugation

b) Filtration

c) Evaporation

d) It cannot be extracted

**Answer: c) Evaporation**

**Q2)** **What is the best description of blood?**

a) Sol

b) Foam

c) Solution

d) Aerosol

**Answer: a) Sol**

**Q3)** **Which one of the following dispersions does not have liquid continuous phase?**

a) Nanosuspension

b) Microemulsion

c) Gel

d) Foam

**Answer: c) Gel**

**Q4)** **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.

**Answer: b) Sedimentation rate, size and density**

**Q5) Which of the following statements about the basic principle of sedimentation is False?**

a) The denser a biological structure is, the faster it sediments in a centrifugal field.

b) The more massive a biological particle is, the slower it moves in a centrifugal field.

c) The denser the buffer system is, the slower the particle will move in a centrifugal field.

d) The greater the centrifugal force is, the faster the particle sediments.

**Answer: b)The more massive a biological particle is, the slower it moves in a centrifugal field.**

**Q6) After centrifugation of milk, the supernatant is**

a) fat

b) whey

c) casein

d) water

**ANswer: b) Whey**

**Q7) In 500 × g, what does g represent in accordance to centrifugation?**

a) Gravitational force

b) Centrifugal force is 500 times greater than earthly gravitational force

c) Centrifugal force is 500 times less than earthly gravitational force

d) Centrifugal force is 500 times same as that of earthly gravitational force

**Answer: b) Centrifugal force is 500 times greater than earthly gravitational force**

**Q8)** **Which of the following is not a type of centrifugation?**

a) Hydro cyclone

b) Tubular centrifuge

c) Microfiltration

d) Disk stack separator

**Answer: c) Microfiltration**

**Q9)** **Density gradient centrifugation separates the materials on the basis of\_\_\_\_\_\_\_\_\_\_?**

a) Size alone

b) Density alone

c) Both a & b

d) Velocity of movement

**Answer: c) Both a & b**

**Q10)** **Which of the following is an effective way of purifying liquids containing suspensions?**

a) crystallization

b) decanting

c) centrifuging

d) separating funnel

**Answer: c) centrifuging**

**Q11)** **How does centrifugation work?**

a) Through dripping particles

b) Through spinning

c) By keeping large particle in the center and smaller on the outside

d) By separating particles into different tubes

**Answer: c) By keeping large particle in the center and smaller on the outside**

**Q12)** **If you were centrifuging whole milk, which would you expect to get flung further out from the center of the centrifuge?**

**a) The cream/fat**

**b) Both would be equally flung**

**c) The skim milk**

**d) Neither would be flung**