DAN-003-2014022 Seat No. _____

B. Sc. (Sem. IV) (CBCS) (W.E.F. 2019) Examination

April - 2022

BC-401 : Biochemistry

(Biophysical & Biochemical Techniques)

(New Course)

Faculty Code : 003

Subject Code : 2014022

Time : $2\frac{1}{2}$ Hours] [Total Marks :**70**

1 (A) Answer the following questions briefly : **4**

(1) Arrange the following electromagnetic radiations in ascending order their wavelengths : Gamma rays, UV-rays, X-rays, Microwaves and Visible light.

(2) What colourd filter would you use in colorimeter to record absorbance of a blue colored solution and way ?

(3) Which lamps are used as source of visible light in colorimeters as well as visible spectrophotometers?

(4) Define Wavelength.

(B) Define photoelectric effect and describe its use in photo detectors. **2**

OR

(B) Describe different types of cuvettes used in colorimeters and spectrophotometers. **2**

(C) Explain why gamma radiation has highest energy. Where as radio waves have lowest energy ? **3**

OR

(C) Draw labeled diagram of double beam spectrophotometer showing different components. **3**

(D) Write a short note on Diffraction grating monochromators and their advantages. **5**

OR

(D) Discuss various applications of spectrophotometers. **5**

2 (A) Answer the following questions briefly : 4

(1) Write two applications of common laboratory centrifuge (clinical centrifuge) in biochemistry.

(2) Name two eukaryotic cell structures that can't be separated by high sleep centrifuge and their separation would require preparative ultracentrifuge.

(3) Write the formula showing relationship between Centrifugal force and Relative centrifugal force RCF.

(4) Why differential centrifugation is carried out at lower temperatures in refrigerated centrifuge ?

(B) If you are having two interchangeable rotors of a high speed centrifuge with you : one having diameter of 10 cms and another having diameter of 30 cms. When rotated at same rpm, which of these two rotors would generate higher RCF ? Why ? 2

OR

(B) In an angle head rotor, the top radius was 20 cms and bottom radius was 40 cms. What will be the average radius of the rotor ? 2

(C) Define density gradient centrifugations and list the the materials used to prepare density gradients. 3

OR

(C) Why very small or minute particles in a suspension are resistant to settling down under the influence of the gravity ? How centrifugal force can help them sediment ? 3

(D) Write a short note on analytical ultracentrifugation and its uses. 5

OR

(D) Discuss the sub-cellular fractionation scheme for isolation of cell organelles. 5

3 (A) Answer the following questions briefly : 4

(1) Define Becquerel as the unit of radioactivity.

(2) Write importance of Geiger Muller counter in the laboratory.

(3) When $_{92}U^{238}$ undergoes radioactive decay it produces $_{92}Th^{234}$ and $_{2}He^{4}$. What type of radioactive emission is happening during this reaction ?

(4) Write examples of different isotopes of Carbon.

(B) Briefly describe importance of carbon dating in biological sciences. **2**

OR

(B) Define atomic number and mass number for atoms using suitable examples. **2**

(C) A sample containing radioisotope of phosphorous 32p having a mass of 80 grams. How many grams of the radioactivity of 32P would remain after 42 days ? Half life of Radioisotopes of phosphorous 32P is 14 days. **3**

(C) Briefly describe autoradiography and its application in biochemistry. **3**

(D) Write a short note on liquid scintillation counter. **5**

OR

(D) Write a detailed note on applications of radioisotopes in the field of medicine. **5**

4 (A) Answer the following questions briefly **4**

(1) Name the coloring reagent used to detect spots of amino acids on paper chromatogram.

(2) In a chromatographic system, when concentration of compound in a mobile phase was 100 times higher than its concentration in the stationary phase. Calculate the Kd value of this compound.

(3) Write full form of HPLC.

(4) List the substance those can be separated and characterized by using Gas liquid chromatography.

(B) What factors governs the pore size Agrose gels ? **2**

OR

(B) In gel permeation chromatography, under which conditions Elution volume (Ve) value would be same as Void volume (Vo) ? **2**

(C) In thin layer chromatography of organic acids, the distance travelled by solvent front from the origin was 10 cm while the distance travelled by lactic acid and citric acid from the origin were 2 cm and 4 cm respectively. Calculate the Rf values for lactic acid and citric acid. **3**

OR

(C) Describe the advantages of thin layer chromatography in comparison to paper chromatography. **3**

(D) Write principle and applications of affinity chromatography. **5**

OR

(D) Discuss the principle and application of ion exchange chromatography. **5**

5 (A) Answer the following questions briefly : **4**

(1) Define electrophoresis.

(2) Why do we mix DNA sample with glycerol or sucrose before loading it into the wells for electrophoresis ?

(3) Write example of trekking dye in agarose gel electrophoresis of DNA.

(4) Which fluorescent dye is used to stain and detect DNA and RNA bands in gel electrophoresis ?

(B) List different materials that can be used as supporting medium in gel electrophoresis. **2**

OR

(B) If you have two proteins having identical charge/mass ratio and one of them is a globular protein where another one is a fibrous protein. Which one of the two would run faster during gel electrophoresis and Why ? **2**

(C) Describe the principle based on which the proteins are separated in native PAGE. **3**

OR

(C) Briefly describe the principle of Isoelectric focusing. **3**

(D) Write principle and applications of SDS PAGE. **5**

OR

(D) Write a detailed note on various factors affecting electrophoretic mobility of molecules. **5**
