Enrollment No._____

NAVRACHANA UNIVERSITY
a UGC recognized University

School: School of Science
Program/s: BMS
Year: 3rd **Semester:** 7th
Examination: End Semester Examination
Examination year: December - 2021

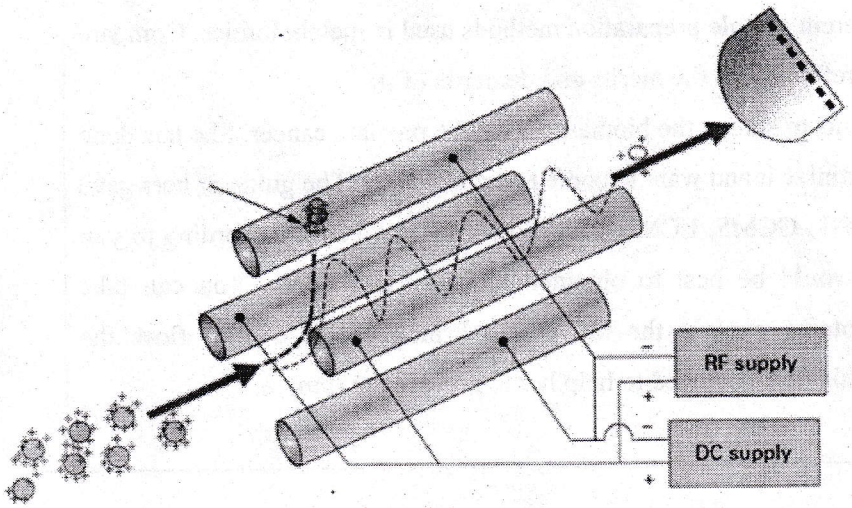
Course Code: BM403 **Course Name:** Proteomics and Metabolomics
Date: 03/12/2021 **Total Marks:** 40
Time: 02.30pm to 4.30 pm **Total Pages:** 04

Instructions:

- *Write each answer on a new page.*
- *Draw the diagram wherever necessary*
- *Stick to the Word Limit given in the Questions.*

Q. No.	Details	Marks	CO	BTL
Q.1	**Do as Directed.** 1. In mass spectrometer, the ions are sorted out in which of the following ways? a. By accelerating them through electric field b. By accelerating them through magnetic field c. By accelerating them through electric and magnetic field d. By applying a high voltage 2. In every mass spectrometer, velocity and mass play a major role in deciding the separation of metabolites. If, a molecule needs to be separated with the help of a time-of-flight mass spectrometer, then the velocity v of an accelerated ion is related to its mass by which of the following? a. proportional to m (its mass) b. inversely proportional to its mass c. proportional to the square root of its mass d. inversely proportional to the square root of its mass 3. In which state of matter mass spectroscopy is being performed? a. solid b. liquid c. gaseous d. plasma	**1x8=8**	CO1, CO2, CO3, CO4, CO5	BTL1 BTL2 BTL3

	4. The procedure for mass spectroscopy starts with which of the following processes? a. The sample is bombarded by electron beam b. The ions are separated by passing them into electric and magnetic field c. The sample is converted into gaseous state d. The ions are detected 5. Purification of a protein can be measured as an increase in _____ a. temperature b. pH value c. specific activity d. polarity 6. Cyanogen bromide cleaves the protein at Sulphur containing amino acid. a. True b. False 7. Your purification strategy of combinations of chromatography steps gives a protein preparation with a single band on SDS-PAGE. Which of the following would be best for determining the protein concentration (as mg/ml or molarity)? a. Measure a UV absorbance scan and use the absorbance at 280nm with the molar extinction coefficient (predicted from the amino acid sequence) b. Determine amino acid composition after hydrolysis to amino acids c. Colorimetric assay using Bradford or BCA assays d. Guess the concentration from the intensity of bands on SDS-PAGE gels 8. _____ type of chromatography is used to study the composition of peptide.			
Q.2	**Answer the following (20-30 words only per answer)** 1. Justify "Quadrupole mass spectrometry varying electric field is precisely controlled so that during each stage of a scan, ions of one particular mass-to-charge ratio pass down the length of the analyzer." 2. State the Solvents used in ESI. 3. After exposing protein to trypsin, you obtain • Gly-Trp-Arg • Trp-Lys • Asp-Ser After exposing the protein to chymotrypsin, you obtain • Lys-Asp-Ser • Gly-Trp • Arg-Tyr Find out the correct sequence of the peptide?	**2x4=8**	CO1, CO2, CO3, CO4, CO5	BTL 1 BTL2 BTL3

	4. State any four application of proteomics analysis with example.			
Q.3	**Answer the following – *any four* (max 350 words per answer)** 1.Cosider the following diagram:  a. which of the method is described in the diagram. State the principle, and uniqueness of it. b. The flow of particles which are channeled are show in the diagram. In the middle of the diagram what does it indicate? c. In this diagram which type of detector is used. 2. Consider the following statement of MALDI TOF and answer the following question: "These are designed to maximally absorb light at the wavelength of the laser, typically a nitrogen laser of 337 nm or a neodymium/yttrium-aluminum-garnet (Nd-YAG) at 355 nm" a. what is the statement talking about? b. Describe the principle used in this method? c. Why only nitrogen laser of 337 nm or a neodymium/yttrium-aluminum-garnet (Nd-YAG) at 355 nm is used more? 3.Taking suitable examples explain how we can calculate mass peaks of different compounds. 4. Define isoelectric point. What will be the ionic forms of alanine at pH < 2, pH = 6 and pH >10? (Hint: Show Structure based) 5.Explain principle and mechanism of Edman degradation method for sequencing.	**3x4=12**	CO1, CO2, CO3, CO4, CO5	BTL1 BTL2 BTL3

Q.4	**Answer the following (max 450 words per answer).**	**4x3=12**	CO1, CO2, CO3, CO4, CO5	BTL1 BTL2 BTL3
	1. Explain the mechanism of yeast two hybrid system stating any one example. State its advantage and disadvantage. 2. Discuss the different sample preparation methods used in metabolomics. Compare it in detail with reference to the merits and demerits of it. 3. A researcher wants to screen the biomarkers for the prostate cancer. She has done a method to scrutinize it and want to come to a conclusion. The guide of hers gave her the option to do GCMS, LCMS, LCMS/MS, LCMS(TOF). According to you which method would be best to obtained the desired results. You can take hypothetical proteins explain the ms peaks, Principle and overall flow the procedure. For this first you need to help her to prepare the sample.			

----------All The Very Best----------