M.TECH (FTBE) EXAMINATION, 2018

ADVANCED PROTEIN TECHNOLOGY   TIME: 3 H   FULL MARKS = 100

PART- I (60 MARKS)

USE SEPARATE ANSWER SCRIPT FOR EACH PART

Q1. Answer either (a) or (b) in this block.

(a) Describe the following (any 1): $1 \times 10 = 10$

   I.   Properties of proteins that lend soya flour its functionality.
   II. Sequence of steps for identification of amino-acids of a fungal α-amylase produced from its apposite cell culture.

(b) Define the following: $5 \times 2 = 10$

   I.   Thermally reversible protein gel
   II.   Purification fold of protein
   III. Chaotropic agents
   IV.   Native gel
   V.   Type I ß-turn

Q2. Differentiate between (any 2): $2 \times 5 = 10$

   a. Loading gel vs. Resolving gel
   b. Sanger reaction vs. Edman reaction
   c. NP-HPLC vs. RP-HPLC

Q3. Answer any two from (a), (b) and (c) in this block. $5 + 5 = 10$

   (a) Explain the use of 'Ramachandran plot' in elucidating conformation of peptides.
   (b) Explain how '2D SDS-PAGE electrophoresis' is an improvement over '1D SDS-PAGE electrophoresis'.
   (c) Explain that 'protein folding' and 'protein degradation' are not self-assembly processes.

Q4. Answer any one from (a) and (b) in this block. 10

(a) Illustrate the process of determination of MW of proteins using '1D SDS-PAGE electrophoresis'.

(b) Illustrate protein separation in accordance with m/z values using 'MALDI-TOF and Electrospray Ionization' mass spectrometers.

Q5. Answer any two from (a), (b) and (c) in this block. 10 + 10 = 20

(a) Exo-PG enzyme is purified using column chromatography. For this purpose, 30 ml of a resin having 20 mg/ml capacity is packed into a glass column. The following data are recorded during the enzyme purification.

In	Exo-PG activity at pH = 4.0	mg protein	Exo-PG activity at pH = 4.3	mg protein
Column load	2346.99	382.20	2346.99	382.20
Column wash	3.28	70.15	5.64	65.40
Pre-column loss	1081.21	133.83	1262.91	151.88
0.16 M NaCl	-	8.13	-	4.52
0.25 M NaCl	0.77	5.35	0.43	2.93
0.50 M NaCl	2.68	2.59	1.17	1.98

a. Calculate the purification fold of exo-PG at either pH and recommend the pH of the binding buffer to be used for its purification. 5
b. What is this column chromatography technique known as? 1
c. Name the resin you would use in this method. 1
d. Which binding buffer would you prefer for this purification procedure? 1
e. What volume of binding buffer would you use to equilibrate the column? 1
f. Calculate dilution factor of the enzyme solution to be loaded to the column. 1

(b) How can Svedberg formula be used to determine molecular weight of proteins? Which equipment would be used for this purpose? Which protein purification step should precede its molecular weight determination? 8 + 1 + 1

(c) How would you determine pI values of glycine and histidine from their titration curves? Why are pKa values of these amino-acids perturbed? 4 + 6

MASTER OF TECHNOLOGY (F.T.B.E) EXAMINATION, 2018

(1st Year -2nd Semester)

Advanced Protein Technology

Time: 3 hrs.   Full Marks : 100

Part – II (Full marks 40)

A.   Answer any two of the following Q1, Q2 & Q3 :   (10 x 2 = 20)

1.   (a)   Define two nutritional and two functional parameters used to evaluate characteristics of a protein. Give example of application based on those characteristics.

(b)   Considering the respective process steps state how the difference between soy isolate and soy concentrate is achieved.

(c)   How would you prepare soy spun fibre?   (3+3+4)

2. (a)   Name the major protein constituents in whey.

(b)   How can you prepare whey protein concentrate?

(b)   Mention the meritorious characteristics of whey protein.

(c)   Name some application areas for whey protein

(d)   Mention one process of modification of whey protein concentrate   (2+3+2+1+2)

3. (a)   How would you prepare two different types of gelatine

(b)   Why does gelatine act as a good stabilizer

(c)   Beside being used as stabilizer, Gelatin has other functional properties –mention two such properties and give example of application   (3+2+2.5x2)

B.   Answer two of the following Q4,Q5 & Q6 :   (10 x 2 = 20)

4. (a)   Mention the process variables associated with food extrusion operation

(b)   With flow diagram show how texturized vegetable protein may be made using extrusion

(c)   Comment on the interrelationship among screw speed and initial moisture content of feed with quality attributes of the products like bulk density and expansion ratio   (3+3+4)

5. (a)   Explain the mechanism of action during hollow-fiber extraction process

(b)   Name some precipitants used for protein separation operation.

(c)   Explain: (i) affinity complexation (ii) biosorption   (3+2+2.5x2)

6. Write short note on:

(a)   Foam based separation of protein

(b)   Classification of chromatographic separation techniques

(c)   Spacer arm and chemisorptions   (3+4+3)