

M.TECH (FTBE) EXAMINATION, 2019

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 × 10 = 10

- I. The indices used to quantify water associated with proteins.
- II. Protein separation in accordance with m/z values using 'MALDI-TOF' and 'Electrospray Ionization' mass spectrometers.

(b) Define the following:

5 × 2 = 10

- I. Thermally irreversible protein gel
- II. Salting-out effect
- III. Svedberg unit
- IV. Denatured gel
- V. Type II β -turn

Q2. Differentiate between (any 2):

2 × 5 = 10

- a. 1D SDS-PAGE vs. 2D SDS-PAGE
- b. GPC vs. HIC
- c. Denaturation vs. Protein degradation

Q3. Answer any two from (a), (b) and (c) in this block.

5 + 5 = 10

- (a) How is water associated with protein categorized?
- (b) Explain how 'Solution gel IEF' is an improvement over 'Tube IEF'.
- (c) Justify that 'protein folding' is not a self-assembly process.

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

10

- (a) Ramachandran plot for elucidation of primary structure of an unknown protein.
(b) Sequence of steps for determination of primary structure of an unknown leaf protein.

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

10 + 10 = 20

- (a) Endo-PG is purified using column chromatography. 30 ml of a resin having 20 mg/ml capacity is to be packed into a glass column. The following data were recorded during purification of this enzyme.

In	Exo-PG activity at pH = 3	mg protein
Column load	1336.93	227.65
Column wash	25.16	53.36
Column trailing	23.13	26.42
0.16 M NaCl	89.52	16.82
0.25 M NaCl	19.51	43.26
0.50 M NaCl	228.59	13.06

- a) Calculate the purification fold of endo-PG. **4**
b) What is this column chromatography technique known as? **1/2**
c) What resin would you use for this method? **1/2**
d) Which binding buffer would you prefer for this purification procedure? **1/2**
e) What volume of binding buffer would you use to equilibrate the column? **1**
f) What would be the dilution factor of the enzyme for column loading? **1**
g) Why is NaCl used in the eluting buffer composition? **1**
h) Suggest an alternate eluting buffer. **1/2**
i) How would you regenerate the column? **1/2**
j) How would you store the resin? **1/2**
- (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, 2019

(1st Year -2nd Semester)**Advanced Protein Technology**

Time: 3 hrs.

Full Marks : 100

Part – II (Full marks 40)

A. Answer any four of the following :

(10 x 4= 40)

1. (a) What is the difference between Chemical Score and Biological Value of a protein? Protein may act as emulsifying agent- comment
- (b) How would you prepare defatted soy meal and then how would you prepare soy isolate from it?
- (c) How would you prepare soy spun fibre? (3+3+4)
2. (a) Mention the dependent and independent variables associated with food extrusion operation
- (b) Write the advantages and disadvantages of food extrusion.
- (c) What are the effects of feed composition and feed rate on the quality of extrudate? (3+3+4)
3. (a) Show the method of preparation of both Type A and Type B gelatin ?
- (b) Relate the properties and use of gelatin (3+7)
4. (a) Name the major protein constituents in whey.
- (b) Name the methods available for production of whey protein concentrate (WPC)
- (c) Why whey protein is regarded as good functional and nutritional material?
- (f) Name some application areas for whey protein
- (g) How can WPC be modified ? (2+2+3+1+2)
5. (a) Name some precipitants used for protein separation operation.
- (b) Show the mechanism of any two affinity chromatographic techniques used to separate proteins
- (c) Write short note on : hollow-fiber extraction process (3+2+2.5x2)
6. Write short note on:
 - (a) Twin screw extruder
 - (b) Classification of chromatographic separation techniques
 - (c) Affinity complexation and biosorption (3+4+3)