Ref. No. Ex/PG/FTB/PE/T/124B/2025

M.TECH (FTBE) FIRST YEAR SECOND SEMESTER EXAMINATION 2025

ADVANCED PROTEIN TECHNOLOGY

PART- I (50 MARKS)

ANSWER Q1 AND ANY TWO FROM THE REST

Q1. Using the proteomics approach, describe the sequence of steps for determination of the primary structure of an insect (say cricket or grasshopper) protein and to adjudge its quality for bread making, with special mention of Ramachandran plots. **20**

Q2. Differentiate between (any 2): **2 × 7.5 = 15**

a. Polypeptide chain sequencing vs. Peptide sequencing
b. GPC vs. RP-HPLC
c. 1D SDS-PAGE vs. 2D SDS-PAGE
d. MALDI-TOF vs. Electrospray Ionization mass spectrometers

Q3. Answer any one of the following: **1 × 15 = 15**

a. Why are the six types of water associated with a protein important in food protein engineering?

b. How does the conventional approach of determination of molecular weights of protein compare with that of the proteomics approach?

Q4. a. Critically discuss 'protein degradation' *in vitro* vis-à-vis *in vivo* explaining their significances w.r.t food protein engineering. **6**

b. An enzyme is purified using HIC. 25 ml of Phenyl Sepaharose with 10 mg/ml capacity is to be packed into a column. The following data were recorded during purification of the enzyme.

In	PME activity at pH = 4	mg protein
Retained in dialysis bag	1336.93	227.65
Filtrate obtained by ultrafiltration	1032.54	185.46
Column trailing	25.16	53.36
0.16 M NaCl	89.52	16.82
0.25 M NaCl	19.51	43.26
0.50 M NaCl	228.59	13.06

i. Calculate the purification fold of the enzyme. **4**
ii. What would be the dilution factor of the enzyme solution used for column loading? **2**
iii. Why is NaCl used in the eluting buffer? **2**
iv. Why is phenyl-Sepharose preferred here over butyl-Sepharose? **1**

[Turn over

M.TECH. FOOD TECHNOLOGY AND BIO-CHEMICAL ENGINEERING
FIRST YEAR SECOND SEMESTER EXAM 2025

Advanced protein technology

Time: 3 hrs. Full Marks : 100

Part – II
Use separate answer script for each part

[Answer any four questions, 12.5 x 4 = 50)]

1. What do you mean by extrusion? With the help of a neat sketch show the different parts of an extruder. Write the mechanism of action at compression zone of an extruder. What are : expansion ratio and L/D ratio? 2 + 6+2.5 +2

2. Write advantages of food extrusion . What are the differences between single and twin screw extrusion? Explain the effect of (a) screw speed and (b) feed rate on the extrudates quality attributes like BD, ER, WHC, RR etc. What is the molecular principle of texturization? 2+2+ 2x3+2.5

3. Name some raw materials used for producing TVP? Name different types of texuturized protein products. What should be the characteristics of meat analogue ? What are full form of NSI and PDI ? Do NSI has effect on the ease of texuturization ? how ?. What is the benefits of texturization ? 2 + 2+2.5+2+2 +2

4. What is the protein % in ISP? With the help of flowchart show how can ISP be prepared starting from soybean. What are the pHs of soy protein extraction and precipitation ? How can precipitated ISP be separated ? Give examples of application of ISP? 1+ 5+2+2.5+2

5. Write two differences of acid whey and sweet whey. Mention the names of proteins present in whey and their approx. percentage. State the importance of any such two proteins in human helath. How can you prepare whey protein isolate from milk? Mention some applications of whey proteins. 2 + 3 + 2.5+3+2

6. What criteria make gelatin so important in food industry? How do gelatin forms thermo reversible gel? What are type A and type B gelatin ? With the help of a flow chart show how Type A gelatin can be manufactured ? Give some examples of application of gelatin 3 +2.5 +2+3+2