Ref. No. Ex/PG/FTBE/T/129B/2024

M.TECH (FTBE) FIRST YEAR SECOND SEMESTER EXAMINATION 2024

ADVANCED PROTEIN TECHNOLOGY

Time : Three Hours (50 marks for each Part) Full Marks : 100

Use separate Answer scripts for each part.

PART- I (50 MARKS)

ANSWER Q1 AND ANY TWO FROM THE REST

Q1. Using the proteomics approach, describe the sequence of steps of determination of the primary structure of a leaf protein to adjudge its quality for soup making. **20**

Q2. Differentiate between (any 3): **3 × 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 column chromatography. 25 ml of Butyl 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 for column loading? **2**
iii. Why is NaCl used in the eluting buffer composition? **3**

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M.FTBE FIRST YEAR SECOND SEMESTER EXAM 2024

Advanced Protein Technology

Part-II

(Marks 50)

Answer any four of the following questions : (4 x 12.5 = 50)

1. Write three merits and three demerits of lab-grown meat. Mention three functional use of gelatin. With the help of flow chart show how can Type II Gelatin be manufactured. What is the chemical composition of gelatin? 3+2+5+2.5

2. What are the differences between whey protein concentrate and whey protein isolate? What is the composition of whey? Name the proteins present in whey. What are the steps in manufacturing soy protein isolate? Mention some applications of soy protein isolate. 2+2+2.5+4+2

3. Name different types of protein extraction methods . Name one plant protein which has good emulsification and foaming property. Name one protein which shows good antimicrobial activity. Name one amino acid which generally contribute to roasted aroma. Colour of processed protein food is majorly contributed by which reaction ? Name one plant derived protein which serves as source of high amount globulins and name another one which serves as a good source of glutelins. 2+2+2+2+2+2.5

4. What do you mean by extrusion? What are the general advantages of 'extrusion'? With the help of a neat sketch and proper labeling show the different components of a single screw extruder used in protein processing. What is the significance of 'compression zone' in an extruder? 2+2.5+5+3

5. What are 'L/D' , 'compression ratio' and 'expansion ratio'? Mention different types of twin-screw extruders. What are the advantages of 'twin-screw extruder' over 'single screw extruder'? What are the objectives vegetable protein texturization? What is the basic principle of protein texturization? 4.5+2+2+2+2

6. What are the full forms of 'SEM' and 'AFM' ? Name some texturized protein products. Mention the effects of (i) particle size (ii) protein content and (iii) oil content on texturization. 3+2+7.5