

**B.Tech Odd Semester (CBCS) Exam.,  
December—2016**

**AGRICULTURAL ENGINEERING**

**( 5th Semester )**

Course No. : AE-504

**( Food Chemistry and Microbiology )**

Full Marks : 75

Pass Marks : 30

Time : 3 hours

- Note : 1. Attempt **one** question from each Unit.  
2. Begin each answer in a new page.  
3. Answer parts of a question at a place.  
4. Assume reasonable data wherever required.  
5. The figures in the margin indicate full marks for the questions.

UNIT—I

1. (a) Classify and discuss different types of carbohydrate with examples. 7  
(b) Define water activity. Write down the role and types of moisture in food. 8

2. (a) Write short notes on the following : 8  
(i) Polysaccharides  
(ii) Racemic mixture  
(iii) Anomers  
(iv) Emulsion  
(b) Define the types of sols and write the difference between them. 7

UNIT—II

3. (a) What is browning? Describe the different types of food browning. Discuss the desirable and undesirable changes in food due to browning. 7  
(b) Write short notes on the following : 8  
(i) Gelatinization  
(ii) Dietary fiber  
(iii) Hydrolysis of starch  
(iv) Lipolysis  
4. Define the functional properties of sugar. 15

UNIT—III

5. (a) What are the various methods of edible oil and fat extraction? Discuss each. 9  
(b) Define the following terms : 6  
(i) Hydrogenation  
(ii) Interesterification  
(iii) Autoxidation

( 3 )

6. (a) Explain the chemistry of frying. 7  
(b) What are the different types of test for assessing the quality of frying oils? 8

UNIT—IV

7. (a) Write the different types of microbes those affect in food. Describe how certain microbes are used for food preservation. 10  
(b) The initial and the required spore concentrations in a food are  $10^9$  and  $10^3$  per container respectively. If the decimal reduction time for *C. botulinum* at 121 °C is 0.21 min, find the time required to complete sterilization of the food at 121 °C. 5
8. (a) Explain the microbial growth pattern in foods. 5  
(b) Derive the relationship between half-life of a reaction ( $t_{1/2}$ ) and the rate constant ( $k$ ). 5  
(c) Milk pasteurization is carried out at either 85 °C temperature for 4 s or at 71 °C for 40 s with sterilization value 8. Calculate the  $z$ -value for reference temperature of 71 °C and 85 °C. 5

( 4 )

UNIT—V

9. (a) Define thermal resistant constant. Derive the expression

$$\log_{10} \frac{N}{N_0} = \frac{t}{D}$$

where  $N$  = spore concentration at a time  $t$ ,  $N_0$  = initial spore concentration and  $D$  = decimal reduction time. 7

- (b) Define the following terms : 8  
(i) Gram-positive and gram-negative bacteria  
(ii) Binary fission  
(iii)  $F$ -value  
(iv) Food spoilage

10. (a) Explain different factors that affect the growth of microorganisms in or on foods. 10  
(b) In a pasteurization process, the reduction in the number of visible cells is  $10^{15}$  and  $F$ -value used is 9.0 minute. If the reduction is to be increased to  $10^{16}$ , because of increase of concentration, what is the new  $F$ -value? 5

★ ★ ★