

Seat No.: \_\_\_\_\_

Enrolment No. \_\_\_\_\_

**GUJARAT TECHNOLOGICAL UNIVERSITY****BE - SEMESTER– VII (New) EXAMINATION – WINTER 2019****Subject Code: 2171401****Date: 23/11/2019****Subject Name: Food Standards and Quality Assurance****Time: 10:30 AM TO 01:00 PM****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1 (a)** (i) Define sensory evaluation and mention how it is useful in quality control of food products? **03**  
(ii) Explain terminal threshold with an example.  
(iii) What is triangle test?
- (b)** Answer the following: **04**  
(i) A closed bag contains 50 apples out of which 10 are known to be defective. Seven apples are drawn one by one. What is the probability that all the three are non-defective?  
(ii) Differentiate between paired comparison and duo-trio test.  
(iii) Define the term Synergy.  
(iv) Mention desirable traits of sensory panels.
- (c)** Answer the following: **07**  
i. What is meant by “Misbranding of foods”.  
ii. Introduce briefly BIS certification.  
iii. Which ministry of Government of India regulates ‘AGMARK’?  
iv. Define Benchmarking.  
v. State the importance of Quality Function Deployment.  
vi. Differentiate between Quality control and Quality assurance.  
vii. What is the mandate of Codex Alimentarius Commission?
- Q.2 (a)** Four samples A, B, C and D of a beverage were subjected to 9-point hedonic evaluation involving 10-panelists for testing superiority. The mean hedonic scores for A, B, C and D are 2.0, 2.8, 3.5 and 5.6 respectively. The fiducial limits for sample A at 5% and 1% significance level was calculated as  $2.4 \pm 0.5$  and  $2.6 \pm 0.6$  respectively. **03**  
Answer the following questions with reasons:  
i. Which sample is superior in comparison to A?  
ii. Point out samples inferior to A.  
iii. Pick samples that are neither inferior nor superior to A.

- (b) State the properties and importance of Normal distribution. **04**

Show that the function  $N(x) = \sqrt{\frac{3}{\pi}} e^{-3(x-5)^2}$ ;  $-\infty < x < \infty$ , represents a Normal distribution function. Calculate its mean, standard deviation and variance.

- (c) What is Poisson's distribution? State properties and applications of such a distribution. For a Poisson's variate  $x$ ,  $p(2) = 9 p(4) + 90 p(6)$ . Determine the following: **07**

- (i) Mean, Variance and standard deviation of the distribution.  
 (ii)  $p(1 \text{ or } 3)$

**OR**

- (c) State the applications of Chi-Square test. Two samples A & B of RTE snack food were subjected to Triangle Test to determine which one is preferred. It was found that A was preferred 18 times while B was preferred 8 times. A null hypothesis  $H_0$  was set up to state that the desired preference for A & B should be 10 & 12 times respectively. Examine if there is significant difference between the hypothesized & observed results. **07**

Degrees of Freedom (df)	$\chi^2$ - Values	
	Significance level, $\alpha$	
	1%	5%
1	6.35	3.85
2	9.23	6.0
3	11.33	7.86
4	13.33	9.69
5	15.12	11.13

- Q.3** (a) What is SQF? What are the major food hazards? How can HACCP be applied from 'farm to table'? **03**

- (b) Explain Deming's wheel with seven steps. **04**

- (c) Enlist eight quality management principles of TQM. Draw a schematic representation of Transition TQM model along with its approaches. Discuss employee involvement and system component. **07**

**OR**

- Q.3** (a) An entrepreneur wishes to start a food processing unit in India. Suggest what mandatory certifications/licenses he/she should obtain to sell product in market. Elaborate the relevance of each one. **03**

- (b) What do you understand by Six Sigma ( $6\sigma$ )? State the importance of  $C_p$  and  $C_{pk}$  value. A company produces carbonated drink with total solids that has to lie in the range of 13 – 14%. Calculate process capability and process capability index if total solids mean value 13.5 with standard deviation of 0.31. **04**

- (c) Enlist the principles of HACCP. Is HACCP mandatory in India? What is the scope and mandate of ISO 9001:2015? List the benefits of ISO certification for food industries. **07**

- Q.4 (a)** Examine the following frequency distribution of weights (in g) of a certain product picked up randomly from a large lot: **03**

Class Interval	5-10	11-20	21-30	31-40	41-50
Frequency	02	18	35	36	09

Calculate the following:

- The average weight of the product in g.
  - Median of the distribution
  - The value of the most frequently occurring observation
  - Range of the distribution
  - Standard deviation
  - Variance
- (b) State applications of “t-test”. An automatic bottle filling machine was installed to pack 200 ml coconut water. For testing its filling accuracy, a large lot of bottles were produced. A random sample of 12 bottles was drawn up from this lot. The volume of coconut water in these bottles was measured and recorded as 200, 198, 203, 204, 190, 198, 196, 190, 196, 200, 204 and 192 ml. Examine at 5% and 1% significance level if the filling machine is performing as per its rated capacity. **04**

Degrees of Freedom (k)	t - Values	
	Level of significance ( $\alpha$ )	
	1%	5%
11	3.1	2.2
12	3.0	2.18

- (c) Write short notes on the following: **07**
- Prof. R.A Fisher
  - Dilution test
  - Interval estimation.
  - Regression analysis
  - UMVUE
  - ANOVA
  - Laws of probability

**OR**

- Q.4 (a)** Explain the following in one/two sentences: **03**
- Neyman and Pearson lemma
  - Gustation
  - r-index

- (b) Explain one and two tailed tests. What are possible decisions that can be taken in any statistical hypotheses test process? Explain the significance of Type-I and Type-II errors in QC terminology? **04**
- (c) Explain the mathematical criteria for good point estimators. A random sample of 800 retorted bottles of milk based drink was drawn from a large consignment. Out of these 160 were found defective in some respect. Determine 95% & 99 % confidence limits for the proportion of damaged cans in the consignment. **07**

$\alpha$	Critical value of statistic
5%	1.957
1%	2.577

- Q.5** (a) List functions of Quality Assurance Department in a food industry? **03**
- (b) Briefly explain the implementation stages of TQM. What are the obstacles in implementing total quality management system in food industry? **04**
- (c) Define the following: **07**
- Copyright
  - Mission Statement
  - Vision Statement
  - Objectives of Department
- Why do organizations need a vision statement? Enlist the characteristics of a good vision statement.

**OR**

- Q.5** (a) What is SWOT analysis? State the significance of SWOT in TQM. **03**
- (b) Explain the scope and the mandate of Food Safety and Standards Act of India. **04**
- (c) Define Quality Audit. Discuss the different types of audit based on time frame and scope. State the advantages of auditing. **07**

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