

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER-VII (NEW) EXAMINATION – WINTER 2018

Subject Code: 2171401

Date: 15/11/2018

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) Match the entities of Column-I with most appropriate entities of Column-II. **03**

S.No.	Column-I	Column-II
1.	Composite hypothesis is	Neyman & Pearson
2.	Multiplication law of probability	Sensation on skin
3.	Adaptation	Product differentiation
4.	Testing of hypothesis	Decrease in sensitivity
5.	Duo-trio test	Maximum consumer acceptance
6.	Optimal sensory quality	$H: \{\mu > 6 \text{ \& } \sigma^2 = 16\}$
7.	Tactile	Independent events
8.	Binomial distribution	d.f. = 1

(b) Answer the following briefly: **04**

- i. Explain threshold test with an example.
- ii. How can 'Halo effect' be prevented to influence sensory ratings?
- iii. A random variable follows Poisson's distribution such that $p(x = k) = p(x = k+1)$. Find its mean and variance.
- iv. Explain dilution test with examples.

(c) Answer the following: **07**

- i. What is Pareto Analysis?
- ii. Define Quality Assurance.
- iii. What is SQF?
- iv. What is AGMARK?
- v. How does value addition increases customer satisfaction?
- vi. Why employees are considered assets for an organization?
- vii. What is 'Zero defect' concept?

Q.2 (a) Define statistical hypotheses and explain when it can be termed as 'null hypotheses'. What are Type-I and Type-II errors? Explain with example which type of error is considered more risky in quality control and why? **03**

(b) Define Normal distribution and state its salient properties. **04**

Consider the function defined as $P(x) = \frac{\sqrt{2}}{\pi} e^{-2(x-3)^2}$; where $-\infty < x < \infty$. Show that it represents a Normal distribution function and calculate its mean, standard deviation and variance.

(c) Answer the following: **07**

- i. An unbiased coin is tossed thrice in succession. What is the probability that it will be 'head' all the three times?

- ii. An estimate of a population parameter μ is given as $E(t) = 1.3\mu$. State giving reason if the estimate is biased/unbiased. What is the magnitude of bias?
- iii. What could be the role of sound and light in sensory evaluation?
- iv. Five 'True/False' type objective questions are given. Calculate the probability of correctly guessing at least 3 answers.
- v. What does 'Neyman & Pearson' lemma deal with?
- vi. What is meant by UMVUE?
- vii. State the law of conditional probability.

OR

- (c) The frequency distribution of weights (g) of 100 packets drawn randomly from a large lot are as follows: **07**

Class Interval	5-10	10-20	20-30	30-40	40-50
Frequency	04	20	32	36	08

Calculate the following:

- The average weight of the Packet in gram.
- Median of the distribution.
- The value of the most frequently occurring observation.
- Range of the distribution.
- The average deviation of packet weight from its mean value.
- The variance of the packet weight.

- Q.3 (a)** A solids mixing equipment was attached to a fruit processing and bottling line to produce 200 ml bottled beverage. The solids mixing equipment was set to provide 15% total solids to the bottled beverage. The line was operated to produce a test lot of 5000 bottles. Out of this lot, ten samples were randomly picked up for analysis. The % total solids in each bottle was found to be 15%, 16%, 14%, 12.5%, 13.5%, 15%, 18%, 17%, 15%, & 13%. Examine if the solids mixing equipment is working as per the set point. **03**

α (%)	5	1
t (df =9)	2.26	3.25

- (b) What is normal distribution? State its properties and applications. Write its probability density function $N(\sigma^2, x)$. Mark off 1σ , 2σ and 3σ limits indicating the areas under the curve enclosed by these limits. **04**
- (c) A random sample of 610 canned pickles was drawn up from a large consignment meant for export. On investigation by QC experts, it was found that 61 of them were defective. Calculate the 'standard error' of the proportion of the defective ones in the sample drawn. Determine the limits within which the percent of defective cans in the consignment would almost certainly lie. [Given that $t_{\alpha} = 3.011$ for confidence limit of 99.73%] **07**

OR

- Q.3 (a)** Two samples of an instant coffee were put to 'triangle test' for difference analysis. Ten panelists were asked to score on 5-occasions (i.e. 5 replicates). What is the probability of identifying the odd sample by one panelist? What would be the likely number of panelists picking up the odd sample? **03**

- (b) To ascertain the efficacy of a 'point of sale' advertisement, the daily sales data of an assorted dry fruits gift pack was obtained from seven different retail outlets and is presented as follows: 04

Retail Outlets	1	2	3	4	5	6	7
Sales before advertisement	100	84	108	60	96	98	77
Sales after advertisement	112	94	118	64	105	110	79

Test at 5% and 1% significance level if the said advertisement could be termed as effective? [Take $t = 1.943$ at $k = 6$ & $\alpha = 5\%$ & $t = 3.143$ at $k = 6$ & $\alpha = 1\%$].

- (c) Explain the following briefly: 07
- (i) Regression analysis
 - (ii) Fiducial limits
 - (iii) ANOVA technique
 - (iv) Hedonic evaluation
 - (v) χ^2 - distribution
 - (vi) Degree of Freedom
 - (vii) Criteria for good estimators

Q.4 (a) State the objectives and mandate of Bureau of Indian Standards. 03

(b) Explain the concept of customer window in relation to food products. 04

(c) Draw Deming's circle. Explain stages of Deming's wheel and discuss how it can be used for continuous quality improvement. 07

OR

Q.4 (a) Discuss the evolutionary stages of ISO 9001:2015 standards. 03

(b) What do you mean by 5'S? Explain the application and advantages of 5S concept to organize the workplace at a processed food manufacturing company. 04

(c) Answer the following briefly: 07

- i. Which ministry administers Food Safety and Standards Authority of India?
- ii. What is the mandate of Food Safety and Standards Act of India?
- iii. Define food 'Adulterant' as per FSSAI.
- iv. Which project for the safety standards of food on the streets was recently launched by the Union Minister for Health and Family Welfare?
- v. FSSAI has issued an advisory banning the use of which material for wrapping and packaging of food items?
- vi. What is the difference between FSSAI Registration and FSSAI License?
- vii. What is the Penalty for selling sub-standard food?

Q.5 (a) Enlist the main functions of quality control department in a food industry. 03

(b) Explain Transition TQM model and compare it with Integrated TQM model. 04

(c) Define the following terms in relation to an organization: 07

- i) Vision ii) Mission iii) Objectives iv) Goal

Why does an organization need to have a vision and mission statement? Enlist the essential characteristics of a vision statement.

Q.5 (a) What is KAIZEN?

03

(b) Define process capability ratio. Food served at a restaurant should be between 38°C and 49°C when it is delivered to the customer. The process used to keep the food at the correct temperature has a process standard deviation of 2°C and the mean value for this temperature is 40. Calculate C_{pk} and process capability. Comment on the process. **04**

(c) Define food safety and food contamination. State seven principles of HACCP and discuss the prerequisite actions required before its implementation. **07**

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