Seat No.: _____ **Enrolment No._____**

GUJARAT TECHNOLOGICAL UNIVERSITY

BE SEM-VII Examination-Nov/Dec.-2011

Subject code: 171402 **Date: 22/11/2011**

Subject Name: Food Standards & Quality Assurance

Time: 10.30 am-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)** Answer the following questions briefly and to the point: **07**

(i) Define sensory evaluation and mention how it is useful in quality control of food products?
(ii) Explain terminal threshold with an example.
(iii)Mention unique point of differentiation between Duo-trio, Triangle and Paired comparison tests.
(iv)How can 'Halo effect' be prevented to influence sensory ratings?
(v) A random variable x (x = 0, 1, 2, 3,… n) follows Poisson's distribution such that p(x = k) = p(x = k+1). Find its mean and variance.
(vi)Calculate the degrees of freedom enjoyed by a Normal distribution.
(vii) Define Null Hypotheses.

(b) Answer the following questions in short. **07**

i) Inspection alone cannot bring the quality. Why?
ii) Why Employee involvement is important in TQM?
iii) Write the characteristics of Good Sanitizer.
iv) If the means are right, Ends will be right. Justify the statement.
v) State the significance of verification and validation of process in HACCP.
vi) State the advantages of 5'S concept.
vii) Introduce the term – Creativity

Q.2 **(a)** Explain Deming's wheel with seven steps. **07**

(b) Discuss Interactive TQM model with its approaches. **04**

(c) How quality concept is changing from yesteryears quality? **03**

OR

Q.2 **(b)** How customer satisfaction can be correlated with value addition? **04**

(c) Explain briefly any three drivers of quality in present era. **03**

Q.3 **(a)** Enlist eight quality management principles. Explain any three principles in detail. **07**

(b) What is ISO? Explain any three clauses from ISO 9001:2008. **04**

(c) What is six sigma? State the importance of Cp and Cpk value. **03**

OR

Q.3 **(a)** Discuss the different types of audit based on auditor, scope of audit and time. **07**

(b) An entrepreneur wish to start Fruit and vegetable processing unit in India. Suggest what mandatory certifications / license, he should obtain to sell his product in market and elaborate its significance. **04**

(c) What are benefits of Cleaning and sanitation to food industry? **03**

Q.4 **(a)** Define 'Hedonic Evaluation'? Four samples A, B, C and D of a red wine were subjected to 9-point hedonic evaluation involving 12-panelists for establishing superiority. The mean hedonic scores for A, B, C and D are 2.0, 2.8, 3.2 and 5.8 respectively. The fiducial limits for sample A at 5% and 1% significance level was calculated as 2.6 ± 0.5 and 2.6 ± 0.7 respectively Answer the following questions giving reasons: **04**

(i) Which sample is superior in comparison to A?
(ii) Point out samples inferior to A.
(iii) Point out samples neither inferior nor superior to A.

(b) What is Normal distribution? State the properties and importance of such a distribution. Show that $f(x) = \frac{5}{\sqrt{\pi}} e^{-25x^2}$; where $-\infty < x < \infty$, represents probability distribution function of a Normal distribution with mean zero and variance 1/50. **05**

(c) Differentiate between simple and composite hypotheses giving examples. What is Null Hypotheses? Explain the possible decisions that can be taken in any statistical hypotheses test process. What are the possible errors involved. Which type of error is more risky and why? **05**

OR

Q.4 **(a)** Five samples (A, B, C, D, E) of a RTD beverage were ranked for preference by 8-panelists and the following consolidated data were obtained : **04**

Panelist	Sample A	Sample B	Sample C	Sample D	Sample E
1	2	1	5	4	3
2	1	3	5	2	4
3	1	4	5	3	2
4	1	2	4	5	3
5	3	2	4	5	1
6	1	2	4	5	3
7	2	3	5	4	1
8	1	3	5	4	2

For five samples and 8-replicates, the Rank Sum Totals required for significance at 1% and 5% levels can be tabulated as follows :

Significance level	Upper Pair	Lower Pair
At 1% Significance Level	13 -35	15 - 33
At 5% Significance Level	15 – 33	17- 31

Answer the following questions with standard justifications:

(i) Which two product samples are significantly different?
(ii) Which product sample(s) is/are significantly superior?
(iii)Which product sample(s) is/are significantly inferior?
(iv) Which product sample(s) is/are neither superior nor?

(b) What is Poisson's distribution? State the properties and importance of such a distribution. For a Poisson's variate x, $p(1) = p(2)$. Find out the following: **05**

(i) Mean, Variance and standard deviation of the distribution.

(ii) p(1 OR 2)

(c) Let S be a given sample space and H_o be a hypothesis which completely or partially specifies the sample space distribution. Further, let ω be the region of S where H_o is rejected. If γ(h) be the probability of accepting the hypothesis H_o when it is true, the prove that γ(h) = 1- β(h) ; **05**

where, $\beta(h) = P(x \varepsilon S - \omega \mid h)$ or $P(S - \omega \mid h)$ and $h \varepsilon H$
= Probability of accepting the hypothesis H_o when an alternative hypothesis h is true.

As a QC officer, what function would you want to maximize and how?

Q.5 **(a)** Two samples S_1 & S_2 of an orange drink were put to Triangle Test to find out which one is preferred. It was found that S_1 was preferred 18 times while S_2 was preferred 8 times. A null hypothesis H_o was set up to say that the desired preference for S_1 & S_2 should be 10 & 12 times respectively. Examine if there is significant difference between the hypothesized & observed results. **05**

Degrees of Freedom(df)	X^2 - Values Level of	
	1%	5%
1	6.33	3.84
2	9.21	5.99
3	11.3	7.81
4	13.3	9.49
5	15.1	11.1

(b) To demonstrate the success of a promotional campaign the daily sales data of a fruit based beverage obtained from six different retail outlets was presented as follows: **05**

Retail Outlets	1	2	3	4	5	6
Sales before campaign	50	42	54	30	48	49
Sales after campaign	56	47	59	32	55	55

Test at α = 5% if the promotional campaign could be termed as success? [Take t-value at df = 5 & α = 5% = 2.02]

(c) Differentiate between "Point Estimation" and "Interval Estimation" techniques. A random sample of 500 chocolate packets was drawn up from a large consignment. On inspection it was found that 60 of them were defective. Calculate the standard error of the proportion of defective packets in the sample drawn. Determine the % range within which the defective packets would almost certainly lie. **04**

Confidence Coefficient (%)	Critical values t_α
95	1.96
99	2.58
99.73	3.00

OR

Q.5 **(a)** An automatic Tomato Ketchup filling machine was purchased to produce 50 g packets. For testing its filling accuracy, a large lot of filled up tomato ketchup packets were produced and then a random sample of 10 packets were drawn up whose weights in gram were recorded as 50, 49, 52, 44, 45, **05**

48, 46, 45, 49 and 45. Test at $\alpha = 5\%$ if the filling machine is working as per the rated metering capacity. [Take t-value at df = 9 & $\alpha = 5\% = 2.262$]

(b) Define sampling distribution. What is meant by "Point Estimation"? Explain the criteria which a good estimator of a population parameter should satisfy. **05**

(c) Write meaningful notes on the following: **04**

(i) ANOVA technique (ii) Level of significance
(iii) Two-tailed test (iv) Regression analysis

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