

**GUJARAT TECHNOLOGICAL UNIVERSITY**  
**B. E. - SEMESTER – VII • EXAMINATION – WINTER 2012**

**Subject code: 171402****Date: 31/12/2012****Subject Name: Food Standards and Quality Standards****Time: 10.30 am - 01.00 pm****Total Marks: 70****Instructions:**

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

**Q.1 (a)** Answer the following questions briefly: **07**

- (i) Define optimum sensory quality.
- (ii) Mention sources for recruiting sensory panels.
- (iii) What do you understand by affective sensory tests?
- (iv) Differentiate between triangle and duo-trio test.
- (v) What do you understand by significance level?
- (vi) For a Poisson's variate  $x$ ,  $p(2) = 2/e^2$  and  $p(3) = 3/e^2$ . Calculate the value of  $p(2)$  or  $p(3)$ .
- (vii) Define degrees of freedom.

**(b)** Answer the following as directed: **07**

- i) Define Quality control.
- ii) Highlight on the importance of vision statement for an organization.
- iii) What are characteristics of Goal?
- iv) Write salient features of today's Quality concept.
- v) What is surveillance audit?
- vi) Differentiate between cleaning and sanitation.
- vii) Top management commitment to quality is important in setting up TQM. Justify the statement.

**Q.2 (a)** A control sample C of a milk chocolate was compared with four test samples S1, S2, S3, and S4 for relative preference using a conventional 9-point hedonic evaluation involving 10-panelists. The consolidated scores obtained were tabulated as follows: **07**

Panelist	Control C	Sample S1	Sample S2	Sample S3	Sample S4
1	3	2	5	6	7
2	4	1	5	3	6
3	2	1	6	5	6
4	2	2	5	8	7
5	3	2	4	6	8
6	3	2	4	5	7
7	3	2	5	5	8
8	3	2	9	8	5
9	2	1	4	7	8
10	2	1	5	4	7

Answer the following queries giving reasons:

- (i) Which sample can be rated as 'moderately disliked'?
- (ii) Which sample can possibly be rated as 'most liked'?

- (iii) Calculate the fiducial limits for control at 5% and 1%.
- (iv) Which sample is superior to control both at 5% and 1%?
- (v) Which sample(s) is(are) inferior to control at 5%?
- (vi) Which sample(s) is(are) inferior to control at 1%?
- (vii) Which sample is neither superior nor inferior to control?

Given that

t (5%, df = 9)	2.26
t (1%, df = 9)	3.25

- (b) Differentiate between simple and composite hypotheses with examples. What are the possible errors involved. Explain the implications of such errors giving examples. **07**

If  $\gamma(h)$  be the probability distribution function of accepting the hypothesis  $H_0$  when it is true, then prove that  $\gamma(h) = 1 - \beta(h)$  ;

where,  $\beta(h)$  = Probability function representing acceptance of hypothesis  $H_0$  when an alternative hypothesis is true.

What function would you maximize? Give reasons for your answer.

**OR**

- (b) Write brief notes on the following: **07**
- (i) Two-tail test of hypothesis.
  - (ii) F-test.
  - (iii) Basic criteria for good estimators.
  - (iv) Null Hypothesis.
  - (v) Ranking evaluation.
  - (vi) Binomial distribution.
  - (vii) Employee acceptance tests

- Q.3** (a) A random sample of 600 apples packets was picked up from a large lot. 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. Find out the % interval within which the defective packets shall almost certainly lie. Given that **04**

(1- $\alpha$ ) (%)	Critical values $t_\alpha$
95	1.96
99	2.58
99.73	3.00

- (b) Sixty samples of pasteurized milk pouches were taken out from a large lot and their SPC/ml was determined. The expected SPC/ml present in the milk pouches known to be represented by an empirical distribution was also calculated. The data obtained was as follows: **05**

SPC/ml x $10^{-4}$	0	1	2	3	4	5	6	7
Observed No. of pouches	10	15	16	10	5	2	1	0
Expected No. of pouches	8	16	16	11	5	2	1	0

- (i) Calculate the mean SPC/ml for the samples drawn.
- (ii) Comment on the results and respond if the observed SPC/ml could be accepted with confidence.
- (iii) Can you conclude that the samples were drawn randomly?

Degrees of Freedom(df)	X <sup>2</sup> - Values	
	Level of	
	1%	5%
6	16.81	12.6
7	18.47	14
8	20	15.5
9	21.67	16.9

- (c) Define regression analysis and differentiate between simple and multiple regressions. For a given data set of 34 values of two variables (x,y), the following consolidated information is provided: **05**

$$\bar{x} = 0.4, \bar{y} = 8, \sum (y - \bar{y})^2 = 2.3, \sum (x - \bar{x})^2 = 0.5, \sum (y - \bar{y})(x - \bar{x}) = 1$$

Determine the approximate linear relationship between x and y and calculate the coefficient of correlation. If critical value of r (at  $\alpha = 5\%$  and  $df = 32$ ) is 0.34, how would you rate the relationship between x and y?

**OR**

- Q.3** (a) Ten tomato ketchup bottles were randomly picked up from a large lot generated by an automatic filling line. The average net weight of one bottle was calculated as 497g and the variance was 9 g<sup>2</sup>. Determine if the sample mean differs significantly from the intended weight of 500g. **04**

Take	t (5%, df = 9)	2.26
	t (1%, df = 9)	3.25

- (b) Define Normal distribution and mention the properties and significance of such a distribution. **05**

$$\text{Demonstrate mathematically that } P(x) = \sqrt{\frac{2}{\pi}} e^{-2(x-4)^2}; -\infty < x < \infty,$$

represents a Normal distribution function. Calculate its mean standard deviation and variance.

- (c) Seven panelists independently evaluated two samples A and B of a RTD beverage on a 9-point hedonic scale for overall acceptability and awarded the following scores: **05**

Scores	Panelists						
	1	2	3	4	5	6	7
Score of sample A	2	1	2	3	2	1	2
Score of sample B	6	5	7	5	6	8	9

Develop an approximate linear relationship between the hedonic scores of A and B and calculate the coefficient of correlation between the two.

- Q.4** (a) Explain 5'S concept along with its advantages. **07**  
 (b) Draw diagrammatic representation of Transition TQM model with its all prongs. **04**  
 (c) Explain Zero defect concept. **03**

**OR**

- Q.4** (a) Explain HACCP with its seven principles. **07**  
**Q.4** (b) How Strategic thinking and strategic planning can affect on organization? **04**  
 (c) What are benefits of quality auditing? **03**

- Q.5** (a) Explain different types of audit based on auditor, scope of audit and time. **07**  
 (b) What is six sigma? State the importance of C<sub>p</sub> and C<sub>pk</sub> value. **03**

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

**OR**

**Q.5 (a)** A businessman wants to start a Fruit based products processing unit in India. **07**  
Name the mandatory certifications / licenses which shall be required to manufacture and sell his product in market and the respective agencies that deal with those certifications / licenses.

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

(c) Differentiate between Quality control and Quality Assurance with appropriate examples from Food industry? **04**

\*\*\*\*\*