

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- α) (%) | Critical values t_α |
|-----------------------|-------------------------------|
| 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 ² - 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 g². 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**

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_p and C_{pk} 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**
