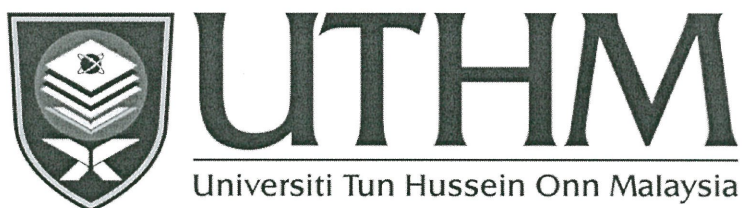


**CONFIDENTIAL**



**UNIVERSITI TUN HUSSEIN ONN MALAYSIA**

**FINAL EXAMINATION  
SEMESTER I  
SESSION 2014/2015**

COURSE NAME : SENSORY EVALUATION OF  
FOOD  
COURSE CODE : BWD 20803  
PROGRAMME : 2 BWD  
EXAMINATION DATE : DECEMBER 2014/JANUARY 2015  
DURATION : 3 HOURS  
INSTRUCTION : ANSWER ALL QUESTIONS

THIS QUESTION PAPER CONSISTS OF SEVEN (7) PAGES

**CONFIDENTIAL**

- Q1** (a) Why was sensory evaluation introduced?  
(2 marks)
- (b) Define the terms sensory evaluation.  
(5 marks)
- (c) Describe how does the taste work. Illustrate the pathway from tongue to brain.  
(10 marks)
- Q2** (a) List the classification of the test methods?  
(5 marks)
- (b) Explain each of the test methods.  
(5 marks)
- Q3** (a) List the requirements for sensory evaluation.  
(2 marks)
- (b) Describe briefly the preparation of samples and training of panelist.  
(5 marks)
- (c) Identify and explain the errors to be aware in sensory evaluation?  
(6 marks)
- Q4** (a) Compare and contrast the measurement scale.  
(10 marks)
- Q5** (a) There are two typical methods of the discrimination test used for screening of the panelists which are triangle and duo-trio tests. Compare and contrast between these test methods.  
(5 marks)
- (b) Analyse two analytical sensory forms that can be used in simple paired comparison test. Give example by constructing a score sheet of both sensory forms of the characteristics in two different chocolate bars.  
(10 marks)
- (c) A manufacturer decided to carry out a market assessment of crunchiness in crispy rice bar. They decided to carry out a ranking test to determine if there were significant differences in crunchiness between the four leading brands R, S, T, and U. A panel of 15 panelists participated in a ranking test. **Table 1** summarizes the results. Assume  $t_{\alpha/2\infty}$  is 1.96 at significance level of 5%.

**Table 1: Rank order of crunchiness for 15 panelists ranking four products.**

No of panelists	R	S	T	U
1	1	3	2	4
2	1	2	3	4
3	1	2	4	3
4	2	1	3	4
5	1	3	2	4
6	3	1	2	4
7	1	3	2	4
8	1	3	2	4
9	3	2	1	4
10	1	3	4	2
11	1	2	3	4
12	1	2	3	4
13	1	2	4	3
14	3	1	2	4
15	1	3	2	4

(10 marks)

Q6

The milk candy is a proprietary food product imported from Thailand. It is composed of 79% milk powder and 21% sugar. The plain (without added flavour), chocolate (chocolate flavour added), coffee (coffee flavour added), and strawberry (strawberry flavour added) milk candies were evaluated. The eight panelists evaluated the sweetness intensity of these milk candies on the unstructured scale. Analysis of Variance (two-way ANOVA) was used to determine differences among the four milk candies and panelists performance.

- (a) From **Table 2**, analyse the data by calculating their sum of squares of total, panelists, products and error.

(10 marks)

- (b) Construct the two-way ANOVA in order to find  $F$ -ratio of panelists and product.

(10 marks)

- (c) Compare the value of both calculated  $F$ -ratio with critical value  $F$ -ratio based on 5% of significance level. Make a conclusion from the comparison.

(5 marks)

**Table 2: Sweetness scores of four flavours of milk candies.**

No. of panellists	Products			
	Plain milk candies	Chocolate milk candies	Coffee milk candies	Strawberry milk candies
1	4.8	5.3	8.5	2.8
2	10.3	6	12.8	7.5
3	11.5	8	13.3	4.5
4	5.8	13.3	13.3	3.3
5	3.8	11.8	13.3	1.5
6	5	8.3	11.8	4.5
7	5	8.8	13	6.8
8	5.3	12	13.5	4.3

- END OF QUESTION -

## FINAL EXAMINATION

SEMESTER/SESSION: SEM I/2014/2015  
 COURSE NAME : SENSORY EVALUATION OF FOOD

PROGRAMME : 2 BWD  
 COURSE CODE: BWD 20803

## Appendix 1:

## Percentage Points of the Chi-Square Distribution

Degrees of Freedom	Probability of a larger value of $\chi^2$								
	0.99	0.95	0.90	0.75	0.50	0.25	0.10	0.05	0.01
1	0.000	0.004	0.016	0.102	0.455	1.32	2.71	3.84	6.63
2	0.020	0.103	0.211	0.575	1.386	2.77	4.61	5.99	9.21
3	0.115	0.352	0.584	1.212	2.366	4.11	6.25	7.81	11.34
4	0.297	0.711	1.064	1.923	3.357	5.39	7.78	9.49	13.28
5	0.554	1.145	1.610	2.675	4.351	6.63	9.24	11.07	15.09
6	0.872	1.635	2.204	3.455	5.348	7.84	10.64	12.59	16.81
7	1.239	2.167	2.833	4.255	6.346	9.04	12.02	14.07	18.48
8	1.647	2.733	3.490	5.071	7.344	10.22	13.36	15.51	20.09
9	2.088	3.325	4.168	5.899	8.343	11.39	14.68	16.92	21.67
10	2.558	3.940	4.865	6.737	9.342	12.55	15.99	18.31	23.21
11	3.053	4.575	5.578	7.584	10.341	13.70	17.28	19.68	24.72
12	3.571	5.226	6.304	8.438	11.340	14.85	18.55	21.03	26.22
13	4.107	5.892	7.042	9.299	12.340	15.98	19.81	22.36	27.69
14	4.660	6.571	7.790	10.165	13.339	17.12	21.06	23.68	29.14
15	5.229	7.261	8.547	11.037	14.339	18.25	22.31	25.00	30.58
16	5.812	7.962	9.312	11.912	15.338	19.37	23.54	26.30	32.00
17	6.408	8.672	10.085	12.792	16.338	20.49	24.77	27.59	33.41
18	7.015	9.390	10.865	13.675	17.338	21.60	25.99	28.87	34.80
19	7.633	10.117	11.651	14.562	18.338	22.72	27.20	30.14	36.19
20	8.260	10.851	12.443	15.452	19.337	23.83	28.41	31.41	37.57
22	9.542	12.338	14.041	17.240	21.337	26.04	30.81	33.92	40.29
24	10.856	13.848	15.659	19.037	23.337	28.24	33.20	36.42	42.98
26	12.198	15.379	17.292	20.843	25.336	30.43	35.56	38.89	45.64
28	13.565	16.928	18.939	22.657	27.336	32.62	37.92	41.34	48.28
30	14.953	18.493	20.599	24.478	29.336	34.80	40.26	43.77	50.89
40	22.164	26.509	29.051	33.660	39.335	45.62	51.80	55.76	63.69
50	27.707	34.764	37.689	42.942	49.335	56.33	63.17	67.50	76.15
60	37.485	43.188	46.459	52.294	59.335	66.98	74.40	79.08	88.38



## FINAL EXAMINATION

SEMESTER/SESSION: SEM I/2014/2015

PROGRAMME : 2 BWD

COURSE NAME : SENSORY EVALUATION OF FOOD

COURSE CODE: BWD 20803

Appendix 2: Critical values table for duo-trio test and paired comparison test for difference (one tailed).

<i>n</i>	Significance (%)			<i>n</i>	Significance (%)		
	5	1	0.1		5	1	0.1
5	5	-	-	29	20	22	24
6	6	-	-	30	20	22	24
7	7	7	-	31	21	23	25
8	7	8	-	32	22	24	26
9	8	9	-	33	22	24	26
10	9	10	10	34	23	25	27
11	9	10	11	35	23	25	27
12	10	11	12	36	24	26	28
13	10	12	13	37	24	26	29
14	11	12	13	38	25	27	29
15	12	13	14	39	26	28	30
16	12	14	15	40	26	28	30
17	13	14	16	41	27	29	31
18	13	15	16	42	27	29	32
19	14	15	17	43	28	30	32
20	15	16	18	44	28	31	33
21	15	17	18	45	29	31	34
22	16	17	19	46	30	32	34
23	16	18	20	47	30	32	35
24	17	19	20	48	31	33	36
25	18	19	21	49	31	34	36
26	18	20	22	50	32	34	37
27	19	20	22	51	33	35	38
28	19	21	23	56	35	38	40

## FINAL EXAMINATION

SEMESTER/SESSION: SEM I/2014/2015  
 COURSE NAME : SENSORY EVALUATION OF FOOD

PROGRAMME : 2 BWD  
 COURSE CODE: BWD 20803

Formulae:

$$SS_{\text{total}} = \sum_{i=1}^N X_i^2 - \frac{(\sum X)^2}{N} \text{ over all } x \text{ data points.}$$

$$S^2 = \frac{\sum_{i=1}^N X_i^2 - \frac{(\sum X)^2}{N}}{N - 1}$$

$$SS_{\text{total}} = SS_{\text{between}} + SS_{\text{within}}$$

$$SS_{\text{between}} = (1/b) \sum T_a^2 - T^2/N$$

Let  $T =$  a total (It is useful to work in sums)

let  $a =$  number of products (or treatments)

let  $b =$  number of panelists per treatment.

The product,  $ab = N$ .

MS=SS/df

$$T = (12 \sum R^2 / bt(t+1)) - (3b(t+1))$$

$$LSRD = t_{\alpha/2\infty} \sqrt{(bt(t+1)/6)}$$

where  $t$  is the number of samples,  $b$  the number of panelists, and  $R$  the rank sum.