



1ST SEM. 2017/18

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UNIVERSITY OF SWAZILAND

FINAL EXAMINATION PAPER

PROGRAMME : FOOD SCIENCE, NUTRITION AND TECHNOLOGY LEVEL III

COURSE CODE : FNS303

TITLE OF PAPER : SENSORY EVALUATION

TIME ALLOWED : TWO (2) HOURS

INSTRUCTIONS : ANSWER QUESTION ONE (1) AND ANY OTHER TWO (2) QUESTIONS. STATISTICAL TABLES AND FORMULA ARE PROVIDED AT THE END OF THE QUESTION PAPER

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QUESTION 1 (COMPULSORY)

- a) What is sensory analysis?
(10 Marks)
- b) Describe **four (4)** points you would cover on a pre-screening questionnaire for selecting members of a sensory evaluation panel.
(4 Marks)
- c) Most large consumer goods companies have departments dedicated to sensory analysis. Discuss **five (5)** points on the importance of sensory analysis.
(10 Marks)
- d) Describe the ideal environment for sensory evaluation under the following points:-
i. Discussion area
ii. Booth area
iii. Climatic control
iv. Lighting

(16 Marks)
[TOTAL MARKS = 40]

QUESTION 2

- a) What is an expert panel? Give an example of an industry that requires an expert panel.
(6 Marks)
- b) Discuss the sensory test protocol considerations under the following headings:-
i. Sample serving temperatures
ii. Serving containers
iii. Instruction to panelists
iv. Randomization and blind labeling
(12 Marks)
- c) Explain the following discrimination methods. Also explain how samples should be presented to the panel:-
i. Paired comparison test
ii. Ranking test
(12 Marks)

[TOTAL MARKS = 30]

QUESTION 3

- a) Discuss the following characteristics of food that can be evaluated by sensory analysis:-
- i. Appearance
 - ii. Aroma
 - iii. Flavour
 - iv. Texture

(20 Marks)

- b) Two soft drinks “Coke” and “Pepsi” marked with 3-digit random codes were offered to a panel of 30 assessors. The question asked was “Which sample do you prefer”. Twenty responded that they preferred “Coke” and 10 responded that they preferred “Pepsi”. Is there a significant difference ($p < 0.05$) in preference between “Coke” and “Pepsi”? Justify your answer.

(10 Marks)

[TOTAL MARKS = 30]

QUESTION 4

- a) Explain the following psychological errors and how they can be minimized in sensory evaluation
- i. Error of central tendency
 - ii. Halo effect

6 Marks

- b) Describe how you would conduct the following discrimination and affective sensory evaluation methods. Show your sample order presentation assuming you are presenting two (2) samples (A and B) :-
- i. Paired comparison test
 - ii. Duo trio test, balance reference mode

(12 Marks)

- c) Three lemon flavoured cordials “A”, “B” and “C” were presented to 30 assessors who were asked to rank the samples in-order of flavour intensity. The rank sums are shown in the Table below.

	Lemon flavoured cordial		
	A	B	C
Rank sums	58	61	61

Are there any significant differences ($p < 0.05$) in the flavour intensity of the three samples? Justify your answer. Show all your workings.

(12 Marks)

[TOTAL MARKS = 30]

Table 1. Minimum number for correct judgements to establish significance at various probability levels for paired comparison and Duo-trio tests (one-tailed, $p = 1/2$)

No of trials (N)	Probability levels						
	0.05	0.04	0.03	0.02	0.01	0.005	0.001
7	7	7	7	7	7		
8	7	7	8	8	8	8	
9	8	8	8	8	9	9	
10	9	9	9	9	10	10	10
11	9	9	10	10	10	11	11
12	10	10	10	10	11	11	12
13	10	11	11	11	12	12	13
14	11	11	11	12	12	13	13
15	12	12	12	12	13	13	14
16	12	12	13	13	14	14	15
17	13	13	13	14	14	15	16
18	13	14	14	14	15	15	16
19	14	14	15	15	15	16	17
20	15	15	15	16	16	17	18
21	15	15	16	16	17	17	18
22	16	16	16	17	17	15	19
23	16	17	17	17	18	19	20
24	17	17	18	18	19	19	20
25	18	15	18	19	19	20	21
26	18	18	19	19	20	20	22
27	19	19	19	20	20	21	22
28	19	20	20	20	21	22	23
29	20	20	21	21	22	22	24
30	20	21	21	22	22	23	24
31	21	21	22	22	23	24	25
32	22	22	22	23	24	24	26
33	22	23	23	23	24	25	26
34	23	23	23	24	25	25	27
35	23	24	24	25	25	26	27
36	24	24	25	25	26	27	28
37	24	25	25	26	26	27	29
38	25	25	26	26	27	28	29
39	26	26	26	27	28	28	30
40	26	27	27	27	28	29	30
41	27	27	27	28	29	30	31
42	27	28	28	29	29	30	32
43	28	28	29	29	30	31	32
44	28	29	29	30	31	31	33
45	29	29	30	30	31	32	34
46	30	30	30	31	32	33	34
47	30	30	31	31	32	33	35
48	31	31	31	32	33	34	36
49	31	32	32	33	34	34	36
50	32	32	33	33	34	35	37
60	37	38	38	39	40	41	43
70	43	43	44	45	46	47	49
80	48	49	49	50	51	52	55
90	54	54	55	56	57	58	61
100	59	60	60	61	63	64	66

Table 2. Minimum numbers of agreeing judgements necessary to establish significance at various probability levels for the paired comparison and paired preference tests (two tailed, $p = 1/2$)

No. of trials (n)	Probability Levels						
	0.05	0.04	0.03	0.02	0.01	0.005	0.001
7	7	7	7	7			
8	8	8	8	8	8		
9	8	8	9	9	9	9	
10	9	9	9	10	10	10	
11	10	10	10	10	11	11	11
12	10	10	11	11	11	12	12
13	11	11	11	12	12	12	13
14	12	12	12	12	13	13	14
15	12	12	13	13	13	14	14
16	13	13	13	14	14	14	15
17	13	14	14	14	15	15	16
18	14	14	15	15	15	16	17
19	15	15	15	15	16	16	17
20	15	16	16	16	17	17	18
21	16	16	16	17	17	18	19
22	17	17	17	17	18	18	19
23	17	17	18	18	19	19	20
24	18	18	18	19	19	20	21
25	18	19	19	19	20	20	21
26	19	19	19	20	20	21	22
27	20	20	20	20	21	22	23
28	20	20	21	21	22	22	23
29	21	21	21	22	22	23	24
30	21	22	22	22	23	24	25
31	22	22	22	23	24	24	25
32	23	23	23	23	24	25	26
33	23	23	24	24	25	25	27
34	24	24	24	25	25	26	27
35	24	25	25	25	26	27	28
36	25	25	25	26	27	27	29
37	25	26	26	26	27	28	29
38	26	26	27	27	28	29	30
39	27	27	27	28	28	29	31
40	27	27	28	28	29	30	31
41	28	28	28	29	30	30	32
42	28	29	29	29	30	31	32
43	29	29	30	30	31	32	33
44	29	30	30	30	31	32	34
45	30	30	31	31	32	33	34
46	31	31	31	32	33	33	35
47	31	31	32	32	33	34	36
48	32	32	32	33	34	35	36
49	32	33	33	34	34	35	37
50	33	33	34	34	35	36	37
60	39	39	39	40	41	42	44
70	44	45	45	46	47	48	50
80	50	50	51	51	52	53	56
90	55	56	56	57	58	59	61
100	61	61	62	63	64	65	67

Source : .E.B .Roessler et al.. Journal of Food Science, 1978, 43, 940-947

Table 3. Critical values of Chi-square (χ^2)

df	Level of significance for one-tailed test					
	0.10	0.05	0.025	0.01	0.005	0.0005
	Level of significance for two-tailed test					
	0.2	0.1	0.05	0.02	0.01	0.001
1	1.64	2.71	3.84	5.41	6.64	10.83
2	3.22	4.6	5.99	7.82	9.21	13.82
3	4.64	6.25	7.82	9.84	11.34	16.27
4	5.99	7.78	9.49	11.67	13.28	18.46
5	7.29	9.24	11.07	13.39	15.09	20.52
6	8.56	10.64	12.59	15.03	16.81	22.46
7	9.8	12.02	14.07	16.62	18.48	24.32
8	11.03	13.36	15.51	18.17	20.09	26.12
9	12.24	14.68	16.92	19.68	21.67	27.88
10	13.44	15.99	18.31	21.16	23.21	29.59
11	14.63	17.28	19.68	22.62	24.72	31.26
12	15.81	18.55	21.03	24.05	26.22	32.91
13	16.98	19.81	22.36	25.47	27.69	34.53
14	18.15	21.06	23.68	26.87	29.14	36.12
15	19.31	22.31	25	28.26	30.58	37.7
16	20.46	23.54	26.3	29.63	32	39.29
17	21.62	24.77	27.59	31	33.41	40.75
18	22.76	25.99	28.87	32.35	34.8	42.31
19	23.9	27.2	30.14	33.69	36.19	43.82
20	25.04	28.41	31.41	35.02	37.57	45.32
21	26.17	29.62	32.67	36.34	38.93	46.8
22	27.3	30.81	33.92	37.66	40.29	48.27
23	28.43	32.01	35.17	38.97	41.64	49.73
24	29.55	33.2	36.42	40.27	42.98	51.18
25	30.68	34.38	37.65	41.57	44.31	52.62
26	31.8	35.56	38.88	42.86	45.64	54.05
27	32.91	36.74	40.11	44.14	46.96	55.48
28	34.03	37.92	41.34	45.42	48.28	56.89
29	35.14	39.09	42.69	46.69	49.59	58.3
30	36.25	40.26	43.77	47.96	50.89	59.7
32	38.47	42.59	46.19	50.49	53.49	62.49
34	40.68	44.9	48.6	53	56.06	65.25
36	42.88	47.21	51	55.49	58.62	67.99
38	45.08	49.51	53.38	57.97	61.16	70.7
40	47.27	51.81	55.76	60.44	63.69	73.4
44	51.64	56.37	60.48	65.34	68.71	78.75
48	55.99	60.91	65.17	70.2	73.68	84.04
52	60.33	65.42	69.83	75.02	78.62	89.27
56	64.66	69.92	74.47	79.82	83.51	94.46
60	68.97	74.4	79.08	84.58	88.38	99.61

*The table lists the critical values of chi square for the degrees of freedom shown at the left for tests corresponding to those significance levels heading each column. If the observed value of χ_{obs}^2 is greater than or equal to the tabled value, reject H_0 .

Source: Table IV of Fisher and Yates, *Statistical Tables for Biological, Agricultural and Medical Research*, published by Longman Group Ltd, London (previously published by Oliver and Boyd Ltd, Edinburgh) and by permission of the authors and publishers.

$$\chi^2 = \frac{12}{[N \times K (K + 1)]} \sum (T_k)^2 - [3 \times N (K + 1)]$$

$$\text{LSDR} = 1.96 \sqrt{\frac{NK(K+1)}{6}}$$

Where

K = number of samples
N = number of panellists
T_k = rank totals