UNIVERSITY OF ESWATINI

SPECIAL EXAMINATION PAPER

PROGRAMME	:	FOOD SCIENCE, NUTRITION AND TECHNOLOGY LEVEL 3
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

DO NOT OPEN THIS PAPER UNTIL PERMISSION HAS BEEN GRANTED BY THE CHIEF INVIGILATOR

QUESTION 1 (COMPULSORY)

a) What is sensory analysis?

(10 Marks)

b) Explain how the following characteristics of food are perceived:-
   i. Aroma
   ii. Texture

(10 Marks)

c) Explain the **four (4)** basic kinds of taste

(8 Marks)

d) What is 5th 'basic' taste?.

(2 Marks)

e) Describe **five (5)** points you would cover on the pre-screening questionnaire for selecting members of a sensory evaluation panel.

(10 Marks)

[TOTAL MARKS = 40]

QUESTION 2

a) What are the different permutation of the three samples Coke, Pepsi and Refresh

(12 Marks)

b) Describe the sensory test protocol considerations with respect to the following:-
   i. Sample container
   ii. Palate cleansing
   iii. Instruction to panelists

(12 Marks)

c) Given two samples A and B show the different arrangement in a Duo Trio test. .

6 Marks)

[TOTAL MARKS = 30]

QUESTION 3

a) Briefly explain what is involved in the following steps during the recruitment of a sensory panel:-

i. Recruitment
ii. Interview
iii. Sensory screening
iv. Training

(20 Marks)

b) A duo-trio test was conducted to determine if methional could be detected in cheddar cheese in amount of 0.250 ppm. Fourteen out of 16 judges gave correct judgment. Was there a significant difference ($p < 0.05$) between samples treated with 0.250 ppm and untreated samples? Justify your answer.

(10 Marks)

[TOTAL MARKS = 30]

QUESTION 4

a) Describe the general arrangement in the following sensory evaluation area :-

i. Booth area
ii. Discussion room

(10 Marks)

b) Twelve households were presented with four samples of cake mixes to be used for baking. They were asked to rank them in order of preference and the rank sums are shown below:-

	Cake Mix			
	A	B	C	D
Rank sums	20	36	26	38

Are there any significant differences ($p < 0.05$) in preference of the four samples? Justify your answer. Using calculation and pairwise comparison show which samples were or not significantly different,

(20 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 = ½)

	Probability levels						
No of trials (N)	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	18	19
23	16	17	17	17	18	19	20
24	17	17	18	18	19	19	20
25	18	18	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

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

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 = ½)

	Probability Levels						
No. of trials (n)	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)

	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					
df	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	62.62
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

[a]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.

Friedman Equation

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

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

Where

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