UNIVERSITI SAINS MALAYSIA

Peperiksaan Semester Pertama
Sidang Akademik 1988/89

IMG 316/2 - Penilaian Penderia Makanan

Tarikh: 5 November 1988 Masa: 9.00 pagi - 11.00 pagi
(2 jam)

Jawab mana-mana 4 (Empat) soalan. Semua soalan mesti dijawab di dalam Bahasa Malaysia. Tiap-tiap soalan diperuntukkan 25 markah.

Sila pastikan kertas soalan ini mengandungi 6 soalan dan 13 mukasurat bercetak.

1. Huraikan dengan terperinci bagaimana anda hendak mengwujudkan profil tekstur?

2. Jawab kedua bahagian soalan ini.

Alice menjalankan ujian penerimaan ke atas sampel daging yang dinilai di bawah cahaya lampu merah dan putih. Keputusan yang diperolehi adalah seperti berikut:

	Skor Penerimaan	
Panel	Cahaya Putih	Cahaya Merah
1	20	22
2	18	19
3	19	17
4	22	18
5	17	21
6	20	23
7	19	19
8	16	20
9	21	22
10	19	20

(a) Beri satu perbincangan mengenai keputusan yang anda perolehi daripada data tersebut. (Tunjukkan cara analisis dan gunakan paras signifikan 5%).

(b) Beri satu perbincangan ringkas mengenai ujian penerimaan termasuk kepentingan ujian tersebut dalam industri makanan.

3. Beri keterangan ringkas mengenai ujian peringkat (Ranking Test). Data tersebut adalah keputusan ujian peringkat ke atas lima jenama minuman kotak. Sifat yang dinilaikan ialah kemanisan.

(a) Buat pengiraan mengikut kaedah Jadual Jumlah Pangkat (Rank Total) dan kaedah Fisher dan Yates ke atas data-data tersebut.

(b) Terangkan perbezaan di antara keputusan kedua-dua kaedah tersebut.

	Jenama				
Hakim	003	211	962	712	395
1	3	2	4	5	1
2	2	4	5	3	1
3	3	4	5	2	1
4	4	3	5	2	1
5	5	3	2	4	1
6	5	2	3	4	1
7	2	4	5	3	1
8	3	4	5	2	1
9	3	4	5	2	1
10	2	4	5	2	1
11	4	3	5	2	1
12	4	3	5	2	1
13	3	4	5	2	1
14	3	4	5	2	1
15	4	3	5	2	1
16	4	3	5	2	1
17	2	4	5	3	1
18	2	4	4	3	1
19	2	4	5	2	1
20	3	4	5	2	1

4. Beri huraian terperinci mengenai kaedah-kaedah ujian diskriminasi termasuk faktor-faktor yang mesti dititikberatkan dalam menjalankan ujian tersebut.

5. Penilaian deria masih memainkan peranan penting dalam industri makanan walaupun terdapat peralatan moden. Bincangkan kenyataan tersebut dengan terperinci.

6. Jawab semua bahagian soalan ini:

(a) Susunan kewujudan not-not tekstur dalam makanan boleh ditentukan. Beri penjelasan mengenai susunan sifat tekstur makanan yang diterima di dalam profil tekstur mengikut Szczesniak.

(b) Lengkungan profil Tekstur Instron untuk tiga jenis hasilan makanan diberikan dalam Lampiran. Sel load yang digunakan berberat 5 kg. Setiap sampel ditekan sehingga 50% daripada ketinggian asal.

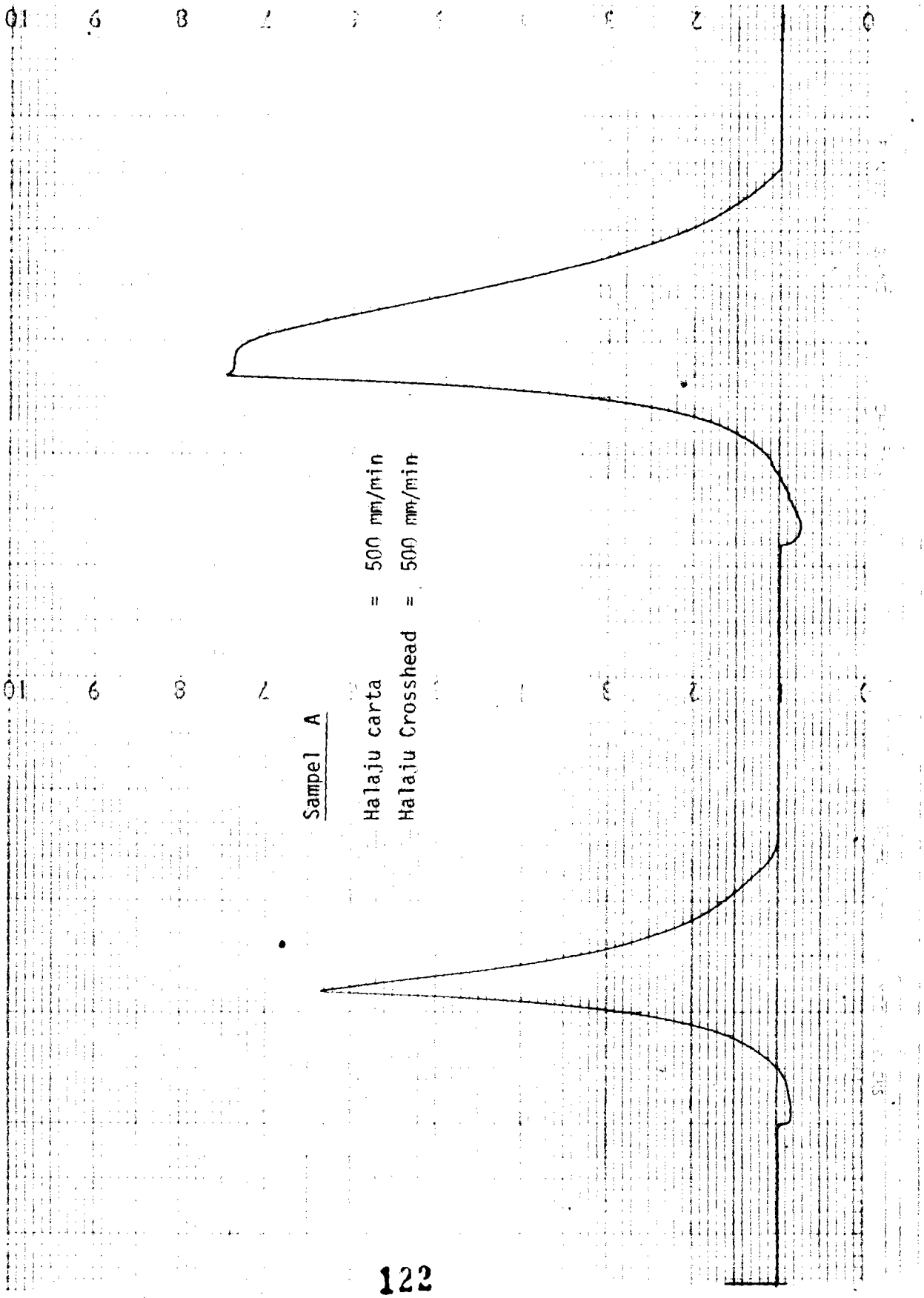
(i) Apakah ketinggian asal sampel-sampel tersebut?

(ii) Definisikan sifat-sifat tekstur yang diperolehi daripada lengkungan profil tekstur Instron.

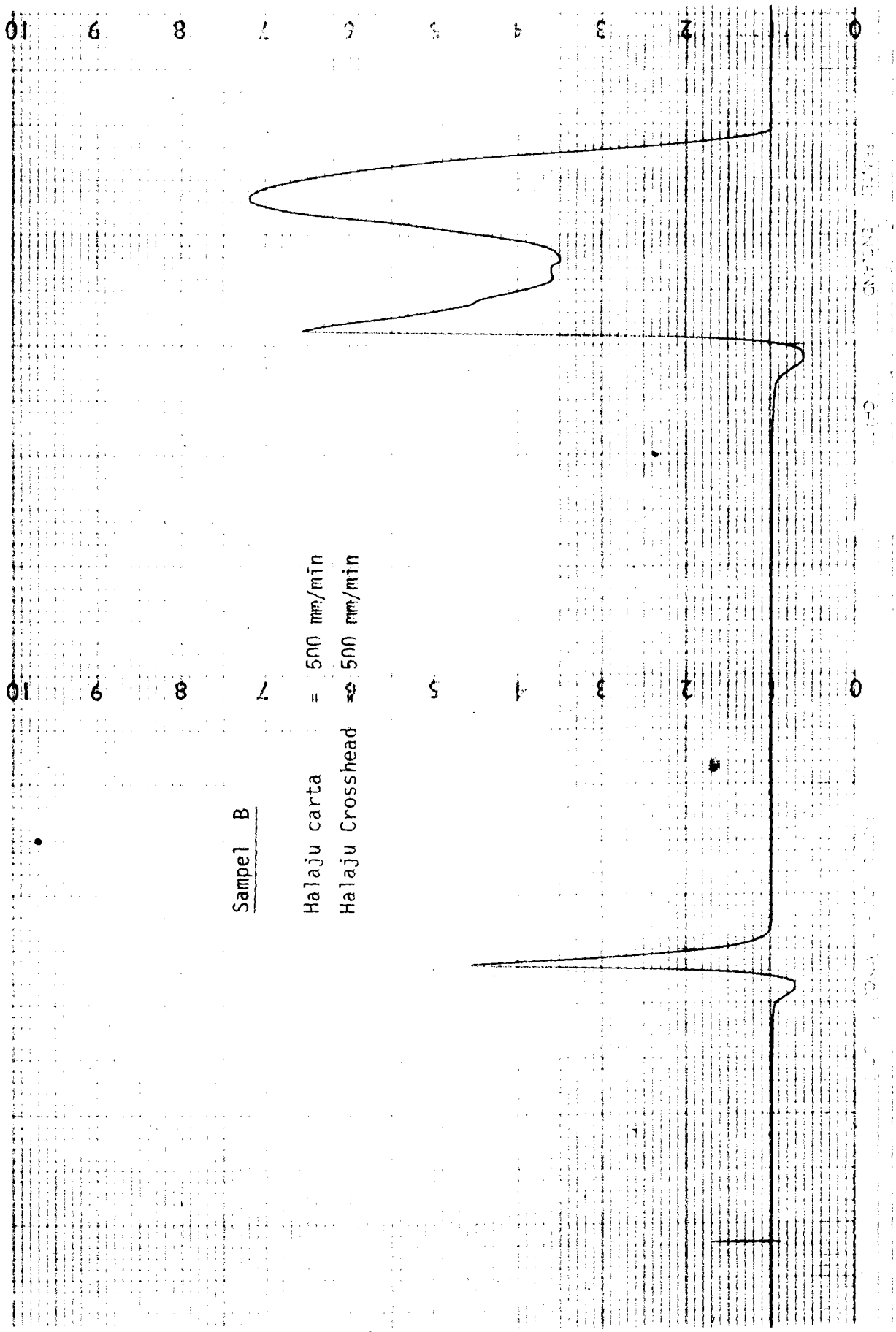
(iii) Beri penjelasan mengenai perbezaan dan persamaan sifat-sifat tekstur dalam sampel-sampel makanan tersebut.

(iv) Cadangkan satu hasilan makanan bagi setiap sampel yang jelas mempunyai sifat tersebut.

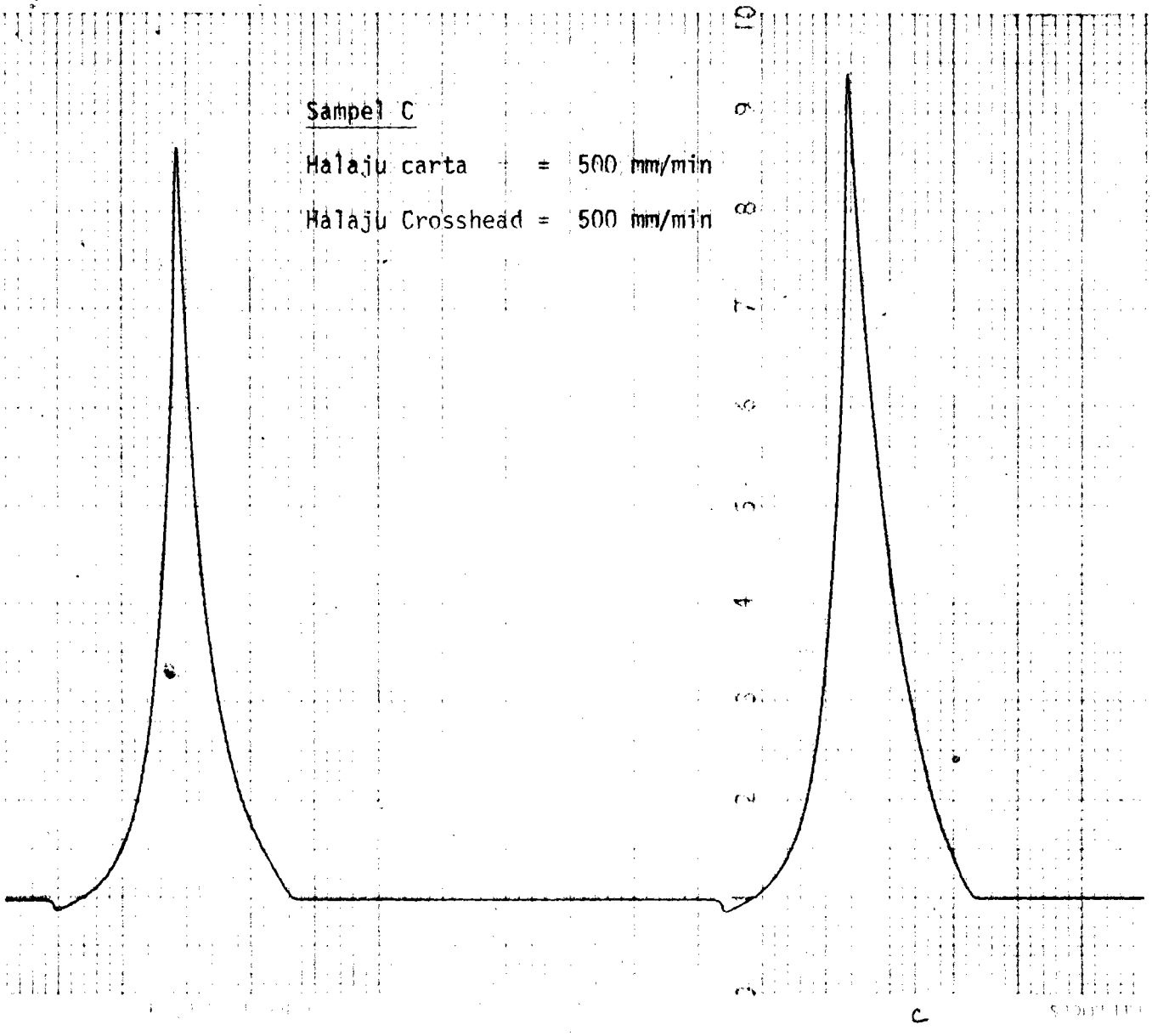
IMG 316/2



IMG 316/2


0 1 2 3 4 5 6 7 8 9 10
0 1 2 3 4 5 6 7 8 9 10
Sampel B
Halaju carta = 500 mm/min
Halaju Crosshead = 500 mm/min

LAMPIRAN


Sampel C
Halaju carta = 500 mm/min
Halaju Crosshead = 500 mm/min
C

JADUAL 1

STATISTICAL CHART

Variance ratio — 1 percent point for distribution of *F*

n_1 — degrees of freedom for numerator

n_2 — degrees of freedom for denominator

n_2 \ n_1	1	2	3	4	5	6	8	12	24	∞
1	4052	4999	5403	5625	5764	5859	5981	6106	6234	6366
2	98.49	99.00	99.17	99.25	99.30	99.33	99.36	99.42	99.46	99.50
3	34.12	30.81	29.46	28.71	28.24	27.91	27.49	27.05	26.60	26.12
4	21.20	18.00	16.69	15.98	15.52	15.21	14.80	14.37	13.93	13.46
5	16.26	13.27	12.06	11.39	10.97	10.67	10.29	9.89	9.47	9.02
6	13.74	10.92	9.78	9.15	8.75	8.47	8.10	7.72	7.31	6.88
7	12.25	9.55	8.45	7.85	7.46	7.19	6.84	6.47	6.07	5.65
8	11.26	8.65	7.59	7.01	6.63	6.37	6.03	5.67	5.28	4.86
9	10.56	8.02	6.99	6.42	6.06	5.80	5.47	5.11	4.73	4.31
10	10.04	7.56	6.55	5.99	5.64	5.39	5.06	4.71	4.33	3.91
11	9.65	7.20	6.22	5.67	5.32	5.07	4.74	4.40	4.02	3.60
12	9.33	6.93	5.95	5.41	5.06	4.82	4.50	4.16	3.78	3.36
13	9.07	6.70	5.74	5.20	4.86	4.62	4.30	3.96	3.59	3.16
14	8.86	6.51	5.56	5.03	4.69	4.46	4.14	3.80	3.43	3.00
15	8.68	6.36	5.42	4.89	4.56	4.32	4.00	3.67	3.29	2.87
16	8.53	6.23	5.29	4.77	4.44	4.20	3.89	3.55	3.18	2.75
17	8.40	6.11	5.18	4.67	4.34	4.10	3.79	3.45	3.08	2.65
18	8.28	6.01	5.09	4.58	4.25	4.01	3.71	3.37	3.00	2.57
19	8.18	5.93	5.01	4.50	4.17	3.94	3.63	3.30	2.92	2.49
20	8.10	5.85	4.94	4.43	4.10	3.87	3.56	3.23	2.86	2.42
21	8.02	5.78	4.87	4.37	4.04	3.81	3.51	3.17	2.80	2.36
22	7.94	5.72	4.82	4.31	3.99	3.76	3.45	3.12	2.75	2.31
23	7.88	5.66	4.76	4.26	3.94	3.71	3.41	3.07	2.70	2.26
24	7.82	5.61	4.72	4.22	3.90	3.67	3.36	3.03	2.66	2.21
25	7.77	5.57	4.68	4.18	3.86	3.63	3.32	2.99	2.62	2.17
26	7.72	5.53	4.64	4.14	3.82	3.59	3.29	2.96	2.58	2.13
27	7.68	5.49	4.60	4.11	3.78	3.56	3.26	2.93	2.55	2.10
28	7.64	5.45	4.57	4.07	3.75	3.53	3.23	2.90	2.52	2.06
29	7.60	5.42	4.54	4.04	3.73	3.50	3.20	2.87	2.49	2.03
30	7.56	5.39	4.51	4.02	3.70	3.47	3.17	2.84	2.47	2.01
40	7.31	5.18	4.31	3.83	3.51	3.29	2.99	2.66	2.29	1.80
60	7.08	4.98	4.13	3.65	3.34	3.12	2.82	2.50	2.12	1.60
120	6.85	4.79	3.95	3.48	3.17	2.96	2.66	2.34	1.95	1.38
∞	6.64	4.60	3.78	3.32	3.02	2.80	2.51	2.18	1.79	1.00

Jadual 2

STATISTICAL CHART

Significant studentized range at the 5% level

Degrees of freedom, f	Number of treatments, a																		
	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1	18.0	26.7	32.8	37.2	40.5	43.1	45.4	47.3	49.1	50.6	51.9	53.2	54.3	55.4	56.3	57.2	58.0	58.8	59.6
2	6.09	8.28	9.80	10.89	11.73	12.43	13.03	13.54	13.99	14.39	14.75	15.08	15.38	15.65	15.91	16.14	16.36	16.57	16.77
3	4.50	5.88	6.83	7.51	8.04	8.47	8.85	9.18	9.46	9.72	9.95	10.16	10.35	10.52	10.69	10.84	10.98	11.12	11.24
4	3.93	5.00	5.76	6.31	6.73	7.06	7.35	7.60	7.83	8.03	8.21	8.37	8.52	8.67	8.80	8.92	9.03	9.14	9.24
5	3.61	4.54	5.18	5.64	5.99	6.28	6.52	6.74	6.93	7.10	7.25	7.39	7.52	7.64	7.75	7.86	7.95	8.04	8.13
6	3.46	4.34	4.90	5.31	5.63	5.89	6.12	6.32	6.49	6.65	6.79	6.92	7.04	7.14	7.24	7.34	7.43	7.51	7.59
7	3.34	4.16	4.68	5.06	5.35	5.59	5.80	5.99	6.15	6.29	6.42	6.54	6.65	6.75	6.84	6.93	7.01	7.08	7.16
8	3.26	4.04	4.53	4.89	5.17	5.40	5.60	5.77	5.92	6.05	6.18	6.29	6.39	6.48	6.57	6.65	6.73	6.80	6.87
9	3.20	3.95	4.42	4.76	5.02	5.24	5.43	5.60	5.74	5.87	5.98	6.09	6.19	6.28	6.36	6.44	6.51	6.58	6.65
10	3.15	3.88	4.33	4.66	4.91	5.12	5.30	5.46	5.60	5.72	5.83	5.93	6.03	6.12	6.20	6.27	6.34	6.41	6.47
11	3.11	3.82	4.26	4.58	4.82	5.03	5.20	5.35	5.49	5.61	5.71	5.81	5.90	5.98	6.06	6.14	6.20	6.27	6.33
12	3.08	3.77	4.20	4.51	4.75	4.95	5.12	5.27	5.40	5.51	5.61	5.71	5.80	5.88	5.95	6.02	6.09	6.15	6.21
13	3.06	3.73	4.15	4.46	4.69	4.88	5.05	5.19	5.32	5.43	5.53	5.63	5.71	5.79	5.86	5.93	6.00	6.06	6.11
14	3.03	3.70	4.11	4.41	4.64	4.83	4.99	5.13	5.25	5.36	5.46	5.56	5.64	5.72	5.79	5.86	5.92	5.98	6.03
15	3.01	3.67	4.08	4.37	4.59	4.78	4.94	5.08	5.20	5.31	5.40	5.49	5.57	5.65	5.72	5.79	5.85	5.91	5.96
16	3.00	3.65	4.05	4.34	4.56	4.74	4.90	5.03	5.15	5.26	5.35	5.44	5.52	5.59	5.66	5.73	5.79	5.84	5.90
17	2.98	3.62	4.02	4.31	4.52	4.70	4.86	4.99	5.11	5.21	5.31	5.39	5.47	5.55	5.61	5.68	5.74	5.79	5.84
18	2.97	3.61	4.00	4.28	4.49	4.67	4.83	4.96	5.07	5.17	5.27	5.35	5.43	5.50	5.57	5.63	5.69	5.74	5.79
19	2.96	3.59	3.98	4.26	4.47	4.64	4.79	4.92	5.04	5.14	5.23	5.32	5.39	5.46	5.53	5.59	5.65	5.70	5.75
20	2.95	3.58	3.96	4.24	4.45	4.62	4.77	4.90	5.01	5.11	5.20	5.28	5.36	5.43	5.50	5.56	5.61	5.66	5.71
24	2.92	3.53	3.90	4.17	4.37	4.54	4.68	4.81	4.92	5.01	5.10	5.18	5.25	5.32	5.38	5.44	5.50	5.55	5.59
30	2.89	3.48	3.84	4.11	4.30	4.46	4.60	4.72	4.83	4.92	5.00	5.08	5.15	5.21	5.27	5.33	5.38	5.43	5.48
40	2.86	3.44	3.79	4.04	4.23	4.39	4.52	4.63	4.74	4.82	4.90	4.98	5.05	5.11	5.17	5.22	5.27	5.32	5.36
60	2.83	3.40	3.74	3.98	4.16	4.31	4.44	4.55	4.65	4.73	4.81	4.88	4.94	5.00	5.06	5.11	5.15	5.20	5.24
120	2.80	3.36	3.69	3.92	4.10	4.24	4.36	4.47	4.56	4.64	4.71	4.78	4.84	4.90	4.95	5.00	5.04	5.09	5.13
∞	2.77	3.32	3.63	3.86	4.03	4.17	4.29	4.39	4.47	4.55	4.62	4.68	4.74	4.80	4.84	4.89	4.93	4.97	5.01

Jadual 3

STATISTICAL CHART

The distribution of t

Degrees of freedom	Probability of a larger value, sign ignored								
	0.500	0.400	0.200	0.100	0.050	0.025	0.010	0.005	0.001
1	1.000	1.376	3.078	6.314	12.706	25.452	63.657		
2	0.816	1.061	1.886	2.920	4.303	6.205	9.925	14.089	31.598
3	0.765	0.978	1.638	2.353	3.182	4.176	5.841	7.453	12.941
4	0.741	0.941	1.533	2.132	2.776	3.495	4.604	5.598	8.610
5	0.727	0.920	1.476	2.015	2.571	3.163	4.032	4.773	6.859
6	0.718	0.906	1.440	1.943	2.447	2.969	3.707	4.317	5.959
7	0.711	0.896	1.415	1.895	2.365	2.841	3.499	4.029	5.405
8	0.706	0.889	1.397	1.860	2.306	2.752	3.355	3.832	5.041
9	0.703	0.883	1.383	1.833	2.262	2.685	3.250	3.690	4.781
10	0.700	0.879	1.372	1.812	2.228	2.634	3.169	3.581	4.587
11	0.697	0.876	1.363	1.796	2.201	2.593	3.106	3.497	4.437
12	0.695	0.873	1.356	1.782	2.179	2.560	3.055	3.428	4.318
13	0.694	0.870	1.350	1.771	2.160	2.533	3.012	3.372	4.221
14	0.692	0.868	1.345	1.761	2.145	2.510	2.977	3.326	4.140
15	0.691	0.866	1.341	1.753	2.131	2.490	2.947	3.286	4.073
16	0.690	0.865	1.337	1.746	2.120	2.473	2.921	3.252	4.015
17	0.689	0.863	1.333	1.740	2.110	2.458	2.898	3.222	3.965
18	0.688	0.862	1.330	1.734	2.101	2.445	2.878	3.197	3.922
19	0.688	0.861	1.328	1.729	2.093	2.433	2.861	3.174	3.883
20	0.687	0.860	1.325	1.725	2.086	2.423	2.845	3.153	3.850
21	0.686	0.859	1.323	1.721	2.080	2.414	2.831	3.135	3.819
22	0.686	0.858	1.321	1.717	2.074	2.408	2.819	3.119	3.792
23	0.685	0.858	1.319	1.714	2.069	2.398	2.807	3.104	3.767
24	0.685	0.857	1.318	1.711	2.064	2.391	2.797	3.090	3.745
25	0.684	0.856	1.316	1.708	2.060	2.385	2.787	3.078	3.725
26	0.684	0.856	1.315	1.706	2.056	2.379	2.779	3.067	3.707
27	0.684	0.855	1.314	1.703	2.052	2.373	2.771	3.056	3.690
28	0.683	0.855	1.313	1.701	2.048	2.368	2.763	3.047	3.674
29	0.683	0.854	1.311	1.699	2.045	2.364	2.756	3.038	3.659
30	0.683	0.854	1.310	1.697	2.042	2.360	2.750	3.030	3.646
35	0.682	0.852	1.306	1.690	2.030	2.342	2.724	2.996	3.591
40	0.681	0.851	1.303	1.684	2.021	2.329	2.704	2.971	3.551
45	0.680	0.850	1.301	1.680	2.014	2.319	2.690	2.952	3.520
50	0.680	0.849	1.299	1.676	2.008	2.310	2.678	2.937	3.496
55	0.679	0.849	1.297	1.673	2.004	2.304	2.669	2.925	3.476
60	0.679	0.848	1.296	1.671	2.000	2.299	2.660	2.915	3.460
70	0.678	0.847	1.294	1.667	1.994	2.290	2.648	2.899	3.435
80	0.678	0.847	1.293	1.665	1.989	2.284	2.638	2.887	3.416
90	0.678	0.846	1.291	1.662	1.986	2.279	2.631	2.878	3.402
100	0.677	0.846	1.290	1.661	1.982	2.276	2.625	2.871	3.390
120	0.677	0.845	1.289	1.658	1.980	2.270	2.617	2.860	3.373
∞	0.6745	0.8416	1.2816	1.6448	1.9600	2.2414	2.5758	2.8070	3.2905

Jadual 4

Rank totals required for significance at the 5% level ($\alpha \leq 0.05$)

(Source: Kramer *et al.*, 1974)

The four figure blocks represent: lowest insignificant rank sum, any treatment – highest insignificant rank sum, any tre. Lowest insignificant rank sum, predetermined treatment – highest insignificant rank sum, predetermined treatment.

No. of reps.	Number of treatments or samples ranked								
	2	3	4	5	6	7	8	9	10
2	–	–	–	–	–	–	–	–	–
	–	–	–	3–9	3–11	3–13	4–14	4–16	4–18
3	–	–	–	4–14	4–17	4–20	4–23	5–25	5–28
	–	4–8	4–11	5–13	6–15	6–18	7–20	8–22	8–25
4	–	5–11	5–15	6–18	6–22	7–25	7–29	8–32	8–36
	–	5–11	6–14	7–17	8–20	9–23	10–26	11–29	13–31
5	–	6–14	7–18	8–22	9–26	9–31	10–35	11–39	12–43
	6–9	7–13	8–17	10–20	11–24	13–27	14–31	15–35	17–38
6	7–11	8–16	9–21	10–26	11–31	12–36	13–41	14–46	15–51
	7–11	9–15	11–19	12–24	14–28	16–32	18–36	20–40	21–45
7	8–13	10–18	11–24	12–30	14–35	15–41	17–46	18–52	19–58
	8–13	10–18	13–22	15–27	17–32	19–37	22–41	24–46	26–51
8	9–15	11–21	13–27	15–33	17–39	18–46	20–52	22–58	24–64
	10–14	12–20	15–25	17–31	20–36	23–41	25–47	28–52	31–57
9	11–16	13–23	15–30	17–37	19–44	22–50	24–57	26–64	28–71
	11–16	14–22	17–28	20–34	23–40	26–46	29–52	32–58	35–64
10	12–18	15–25	17–33	20–40	22–48	25–55	27–63	30–70	32–78
	12–18	16–24	19–31	23–37	26–44	30–50	33–57	37–63	40–70
11	13–20	16–28	19–36	22–44	25–52	28–60	31–68	34–76	36–85
	14–19	18–26	21–34	25–41	29–48	33–55	37–62	41–69	45–76
12	15–21	18–30	21–39	25–47	28–56	31–65	34–74	38–82	41–91
	15–21	19–29	24–36	28–44	32–52	37–59	41–67	45–75	50–82
13	16–23	20–32	24–41	27–51	31–60	35–69	38–79	42–88	45–98
	17–22	21–31	26–39	31–47	35–56	40–64	45–72	50–80	54–89
14	17–25	22–34	26–44	30–54	34–64	38–74	42–84	46–94	50–104
	18–24	23–33	28–42	33–51	38–60	44–68	49–77	54–86	59–95
15	19–26	23–37	28–47	32–58	37–68	41–79	46–89	50–100	54–111
	19–26	25–35	30–45	36–54	42–63	47–73	53–82	59–91	64–101
16	20–28	25–39	30–50	35–61	40–72	45–83	49–95	54–106	59–117
	21–27	27–37	33–47	39–57	45–67	51–77	57–87	63–97	69–107
17	22–29	27–41	32–53	38–64	43–76	48–88	53–100	58–112	63–124
	22–29	28–40	35–50	41–61	48–71	54–82	61–92	67–103	74–113
18	23–31	29–43	34–56	40–68	46–80	51–93	57–105	62–118	68–130
	24–30	30–42	37–53	44–64	51–75	58–86	65–97	72–108	79–119
19	24–33	30–46	37–58	43–71	49–84	55–97	61–110	67–123	73–136
	25–32	32–44	39–56	47–67	54–79	62–90	69–102	76–114	84–125
20	26–34	32–48	39–61	45–75	52–88	58–102	65–115	71–129	77–143
	26–34	34–46	42–58	50–70	57–83	65–95	73–107	81–119	89–131

.....bersambung (Jadual 4)

No. of reps.	Number of treatments or samples ranked								
	2	3	4	5	6	7	8	9	10
21	27–36 28–35	34–50 36–48	41–64 44–61	48–78 52–74	55–92 61–86	62–106 69–99	68–121 77–112	75–135 86–124	82–149 94–137
22	28–38 29–37	36–52 38–50	43–67 46–64	51–81 55–77	58–96 64–90	65–111 73–103	72–126 81–117	80–140 90–130	87–155 99–143
23	30–39 31–38	38–54 40–52	46–69 49–66	53–85 58–80	61–100 67–94	69–115 76–108	76–131 85–122	84–146 95–135	91–162 104–149
24	31–41 32–40	40–56 41–55	48–72 51–69	56–88 61–83	64–104 70–98	72–120 80–112	80–136 90–126	88–152 99–141	96–168 109–155
25	33–42 33–42	41–59 43–57	50–75 53–72	59–91 63–87	67–108 73–102	76–124 84–116	84–141 94–131	92–158 104–146	101–174 114–161
26	34–44 35–43	43–61 45–59	52–78 56–74	61–95 66–90	70–112 77–105	79–129 87–121	88–146 98–136	97–163 108–152	106–180 119–167
27	35–46 36–45	45–63 47–61	55–80 58–77	64–98 69–93	73–116 80–109	83–133 91–125	92–151 102–141	101–169 113–157	110–187 124–173
28	37–47 38–46	47–65 49–63	57–83 60–80	67–101 72–96	76–120 83–113	86–138 95–129	96–156 106–146	106–174 118–162	115–193 129–179
29	38–49 39–48	49–67 51–65	59–86 63–82	69–105 74–100	80–123 86–117	90–142 98–134	100–161 110–151	110–180 122–168	120–199 134–185
30	40–50 41–49	51–69 53–67	61–89 65–85	72–108 77–103	83–127 90–120	93–147 102–138	104–166 114–156	114–186 127–173	125–205 139–191
31	41–52 42–51	52–72 55–69	64–91 67–88	75–111 80–106	86–131 93–124	97–151 106–142	108–171 119–160	119–191 131–179	130–211 144–197
32	42–54 43–53	54–74 56–72	66–94 70–90	77–115 83–109	89–135 96–128	100–156 109–147	112–176 123–165	123–197 136–184	134–218 149–203
33	44–55 45–54	56–76 58–74	68–97 72–93	80–118 86–112	92–139 99–132	104–160 113–151	116–181 127–170	128–202 141–189	139–224 154–209
34	45–57 46–56	58–78 60–76	70–100 74–96	83–121 88–116	95–143 103–135	108–164 117–155	120–186 131–175	132–208 145–195	144–230 159–215
35	47–58 48–57	60–80 62–78	73–102 77–98	86–124 91–119	98–147 106–139	111–169 121–159	124–191 135–180	136–214 150–200	149–236 165–220
36	48–60 49–59	62–82 64–80	75–105 79–101	88–128 94–122	102–150 109–143	115–173 124–164	128–196 139–185	141–219 155–205	154–242 170–226
37	50–61 51–60	63–85 66–82	77–108 81–104	91–131 97–125	105–154 112–147	118–178 128–168	132–201 144–189	145–225 159–211	159–248 175–232
38	51–63 52–62	65–87 68–84	80–110 84–106	94–134 100–128	108–158 116–150	122–182 132–172	136–206 148–194	150–230 164–216	164–254 180–238
39	52–65 53–64	67–89 70–86	82–113 86–109	97–137 102–132	111–162 119–154	126–186 135–177	140–211 152–199	154–236 168–222	169–260 185–244
40	54–66 55–65	69–91 72–88	84–116 88–112	99–141 105–135	114–166 122–158	129–191 139–181	144–216 156–204	159–241 173–227	173–267 190–250