UNIVERSITI TUN HUSSEIN ONN MALAYSIA

Universiti Tun Hussein Onn Malaysia

UNIVERSITI TUN HUSSEIN ONN MALAYSIA

PEPERIKSAAN AKHIR
SEMESTER I
SESI 2016/2017

NAMA KURSUS	:	KEJURUTERAAN INDUSTRI
KOD KURSUS	:	DAM 31802
PROGRAM	:	2 DAM
TARIKH PEPERIKSAAN	:	DECEMBER 2016/ JANUARY 2017
JANGKA MASA	:	2 JAM 30 MINIT
ARAHAN	:	JAWAB **EMPAT (4)** SOALAN SAHAJA.

TERBUKA

KERTAS SOALAN INI MENGANDUNGI **TUJUH BELAS (17)** MUKA SURAT

BAHASA MELAYU

S1   (a)   Senaraikan **tiga (3)** objektif rekabentuk susunatur.

(3 markah)

(b)   Terangkan secara ringkas kos berubah-ubah, kos tetap dan kos keseluruhan.

(4 markah)

(c)   Clean Clothes Cleaner sedang mempertimbangkan empat lokasi untuk dibina pusat operasi pencucian pakaian. Data yang didapati dari siri analisa yang dijalankan adalah seperti **Jadual S1(c).** Unjuran operasi adalah pada kadar 10,000 pencucian setiap bulan;

(i)   plot garisan kos keseluruhan untuk kesemua lokasi pada satu graf,

(10 markah)

(ii)   kenalpasti kadar pencucian untuk pelbagai alternatif yang menghasilkan kos terendah,

(5 markah)

(iii)   jika jangkaan jumlah pencucian pada lokasi terpilih adalah 6,000 penghantaran sebulan, tentukan lokasi yang memberikan kos keseluruhan terendah berpandukan daripada graf.

(3 markah)

S2   (a)   Senaraikan **dua (2)** kelebihan dan **satu (1)** kekurangan pengukuran masa piawai menggunakan kaedah persampelan kerja.

(3 markah)

(b)   Terangkan secara ringkas kaedah " *times study*"dan "*work sampling*" dalam penentuan masa piawai.

(6 markah)

(c)   Kajian persampelan kerja telah dijalankan pada kerja sediaada untuk membangunkan masa piawai yang baru. Pekerja dipantau selama 5 hari. Pada tempoh tersebut, 2500 unit barang telah dihasilkan. Penganalisis menilai pekerja melakukan kerja pada *rating* 95 peratus. Kadar kelegaan untuk rehat dan peribadi yang ditetapkan oleh syarikat ialah pada kadar 20 peratus. Pada tempoh penganalisaan didapati 15 peratus masa pengeluaran terhenti disebabkan oleh masalah peralatan dan bahan mentah.

(i)   kirakan masa piawai dalam min/unit.

(6 markah)

(ii)   jika jumlah permintaan untuk loji tersebut ialah 3,100 unit seminggu dan hanya 60 peratus pekerja sahaja yang sanggup melakukan kerja lebih masa, tentukan purata kerja lebih masa sehari yang perlu diatur untuk memenuhi permintaan.

TERBUKA

(10 markah)

SULIT

S3   (a)   Senaraikan **empat (4)** objektif *aggregate planning*.

                                                  (4 markah)

    (b)   Terangkan secara ringkas terminologi berikut anthropometrik, *work physiology* dan biomekanik. yang mempunyai hubungan dengan ergonomik.

                                                  (6 markah)

    (c)   Pengurus besar syarikat pengeluar bahan-bahan binaan merasakan permintaan untuk Plasterboard mempunyai hubungan dengan bilangan permit pembinaan yang dikeluarkan pada suku tahun sebelumnya. Pengurus telah mengumpul data seperti yang ditunjukkan pada **Jadual S3(c).**

      (i)   hitung nilai kecerunan m dan penggalan c.

                                                  (10 markah)

      (ii)   tentukan ramalan penghantaran Plasterboard apabila bilangan permit pembinaan adalah 30.

                                                  (5 markah)

$$m = \frac{n\sum xy - \sum x \sum y}{n\sum x^2 - \left(\sum x\right)^2} \qquad\qquad c = \frac{\sum y - m\sum x}{n}$$

S4   (a)   Senaraikan **empat (4)** jenis inventori.

                                                  (4 markah)

    (b)   **Rajah S4(b)** mengandungi bil bahan-bahan untuk Produk 1 di mana jumlah penggunaan setiap komponen dikumpul ke dalam satu senarai untuk produk;

      (i)   kira bilangan komponen E yang diperlukan untuk menghasilkan 1000 unit Produk 1,

                                                  (3 markah)

      (ii)   jika terdapat 5 unit C, 6 unit D, dan 4 unit F dalam inventori, kirakan unit E dan F mesti dibeli untuk menghasilkan 100 unit Produk 1.

                                                  (5 markah)

    (c)   **Rajah S4(c)** menunjukkan proses pemasangan injap. Injap dihasilkan melalui proses pemeriksaan ketat iaitu P1, P2, P3 dan P4, kadar gagal bagi setiap proses masing-masing 2.5%, 1%, 3% dan 2%. Permintaan bulanan untuk injap adalah 20,000 unit. Syarikat beroperasi 24 hari sebulan dan syif 8 jam sehari;

      (i)   kira kuantiti bagi komponen #3 dan #4,

                                                  (5 markah)

      (ii)   jika masa pemprosesan SB#1 dan B#2 adalah 1.5 min dan 2 min masing-masing bagi setiap produk, tentukan bilangan SB#1 dan B#2 diperlukan untuk memenuhi permintaan.

                                                  (8 markah)

S5   (a)   Bincangkan **empat (4)** sebab keperluan kualiti.

(4 markah)

(b)   **Jadual S5(b)** mewakili kekerapan kecacatan cat dari kilang pemasangan automotif;

     (i)   kira peratusan jumlah dan kumulatif bagi setiap kecacatan,

(4 markah)

     (ii)   bina Carta Pareto untuk mengenal pasti masalah utama kecacatan cat.

(5 markah)

(c)   Telstar Appliance Company menggunakan proses mengecat peti sejuk dengan salutan enamel. Dalam setiap syif, 5 sampel peti sejuk dipilih (1.4 jam sela masa) dan ketebalan cat (mm) ditentukan. Jika lapisan enamel adalah nipis, ia tidak akan memberi perlindungan yang cukup. Jika ia terlalu tebal, ia akan menyebabkan penampilan yang tidak sekata dengan lelehan dan pembaziran cat. **Jadual S5(c)(i)** menyenaraikan pengukuran dari 20 syif berturut-turut;

     (i)   lengkapkan **Jadual S5(c)(i)** dan sertakannya sekali dengan skrip jawapan anda.

(7 markah)

     (ii)   sediakan Carta X-bar dan Carta R untuk proses ini. Rujuk **Jadual S5(c)(ii)** dan gunakan **Rajah S5(c)(ii)** dan **Rajah S5(c)(iii)** untuk menjawab soalan.

(5 markah)

S6   (a)   Terangkan istilah berikut;
     (i)   *completion time,*
     (ii)   *makespan,*
     (iii)   *tardiness.*

(4 markah)

(b)   Menggunakan Peraturan Johnson, tentukan jumlah masa siap dan masa melahu bagi Proses 1 dan Proses 2 seperti yang ditunjukkan dalam **Jadual S6(b)**.

(7 markah)

(c)   **Rajah S6(c)** menunjukkan struktur produk A1. Maklumat permintaan pelanggan dan status inventori bagi setiap item adalah ditunjukkan dalam **Jadual S6(c)(i)** dan **Jadual S6(c)(ii)**. Sediakan jadual perancangan keperluan bahan 'material requirement planning' (MRP) bagi item B1 (dengan aturan L4L) dan item C (dengan aturan POQ (P = 2)). Isikan maklumat berkaitan dalam **Jadual S6(c)(iii)** dan sertakannya sekali dengan skrip jawapan anda.

(14 markah)

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– SOALAN TAMAT –

ENGLISH

Q1 (a) List **three (3)** objective of layout design.

(3 marks)

(b) Briefly explain variable cost, fix cost and total cost.

(4 marks)

(c) Clean-Clothes Cleaners is considering four possible sites to build a new clothes cleaning operation centre. Data from conducted analysis shown in **Table Q1(c)**. Operation projection range is 10,000 per month

　(i) Plot the total cost lines for all the locations on a single graph.

(10 marks)

　(ii) Identify the cleaning range for various alternatives that yield the lowest cost.

(5 marks)

　(iii) If the expected volume of cleaning at the selected location is to be 6,000 delivery per month, determine the location that would provide the lowest total cost by refer from the graph.

(3 marks)

Q2 (a) List **two (2)** advantages and **one (1)** disadvantage of standard time measurement by using work sampling method.

(3 marks)

(b) Briefly explain the time studiesand work sampling in determine standard time.

(6 marks)

(c) A work sampling study was made of an existing job to develop new time standards. A worker was observed for 5 days. During that period, 2500 units were produced. The analyst rated the worker as performing at a 95 percent performance rate. Allowances in the firm for rest and personal time are 20 percent. During the observation period analyst found out 15 percent production stopped due to equipment and material problem.

　(i) Compute the standard time in min/unit.

(6 marks)

　(ii) If the total demand for the plant is 3100 units per week, and only 60 percent of the employee is willing to work overtime determine the average overtime per day must be arranged in order to meet the demand.

(10 marks)

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Q3 (a) List **four (4)** Aggregate Planning objective.

(4 marks)

(b) Briefly explain the following terminology related to ergonomic anthropometrics , Work physiology and biomechanics.

(6 marks)

(c) The general manager of a building materials production plant feels that the demand for plasterboard shipments may be related to the number of construction permits issued during the previous quarter. The manager has collected the data shown in **Table Q3(c).**

(i) Compute values for the gradient m and intercept c

(10 marks)

(ii) Determine a forecast for plasterboard shipments when the number of construction permits is 30.

(5 marks)

$$m = \frac{n\sum xy - \sum x \sum y}{n\sum x^2 - \left(\sum x\right)^2} \qquad c = \frac{\sum y - m\sum x}{n}$$

Q4 (a) List **four (4)** types of inventories.

(4 marks)

(b) **Figure Q4(b)** contains a bill of materials for Product 1 in which the total usage of each component is collected into a single list for the product;

(i) compute the number of component E required to produce 1000 units of Product 1.

(3 marks)

(ii) if there are 5 units of C, 6 unit of D, and 4 units of F in inventory, calculate the units of E and F must be purchased to produce 100 units of Product 1.

(5 marks)

(c) **Figure Q4(c)** shows the process of the valve assemblies. The produced valves undergo stringent checking process which are P1, P2, P3 and P4, scrap rate for each process are 2.5%, 1%, 3% and 2% respectively. Monthly demand for the valve is 20,000 units. The company is operating 24 days per month and a single 8 hour shift per day;

(i) calculate the quantity for component #3 and #4,

(5 marks)

(ii) if the processing time of SB#1 and B#2 are 1.5 min and 2 min per product respectively, determine the number of SB#1 and B#2 required to fulfill the demand.

(8 marks)

Q5   (a)   Discuss **four (4)** reason of quality requirement.

(4 marks)

(b)   **Table Q5(b)** representing the frequency of paint defects from an automotive assembly plant;

(i)   calculate the percentage of total and cumulative percentage for each defect,

(4 marks)

(ii)   construct the Pareto Chart to identify the major problem of paint defects.

(5 marks)

(c)   Telstar Appliance Company uses a process to paint refrigerators with a coat of enamel. During each shift, a sample of 5 refrigerators is selected (1.4 hours apart) and the thickness of the paint (mm) is determined. If the enamel is too thin, it will not provide enough protection. If it's too thick, it will result in an uneven appearance with running and wasted paint. **Table Q5(c)** lists the measurement from 20 consecutive shifts;

(i)   complete the **Table Q5(c)** and attach it along with your answer script,

(7 marks)

(ii)   prepare the X-bar Chart and R Chart for this process. Refer to **Table Q5(c)(i)** and use **Figure Q5(c)(ii)** and **Figure Q5(c)(iii)** as well to answer the questions.

(5 marks)

Q6   (a)   Explain the term of;
(i)   completion time,
(ii)   makespan,
(iii)   tardiness.

(4 marks)

(b)   Using Johnson's Rule, determine the total completion time and idle time for Process 1 and Process 2 as shown in **Table Q6(b)**.

(7 marks)

(c)   **Figure Q5(c)** shows a product structure for product A1. Data of customer demands and inventory status for all items are shown in **Table Q5(c)(i)** and **Table Q5(c)(ii)**. Prepare a material requirement planning (MRP) for item B1 (with rules L4L) and item C (with rules POQ (P = 2)). Fill in related information in **Table Q5(c)(iii)** and attach it along with your answer script.

(14 marks)

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- END OF QUESTION -

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SEMESTER / SESSION		*PROGRAMME*	
KURSUS	: KEJURUTERAAN INDUSTRI	KOD KURSUS	: DAM 31802
COURSE		*CODE COURSE*	

Jadual S1(c)/Table Q1(c)

Location	Fixed Costs (RM)	Variables Costs (RM)
A	350,000	5
B	170,000	25
C	100,000	40
D	250,000	20

Jadual S3(c)/ Table Q3(c)

Construction Permits	Plasterboard Shipments
15	6
9	4
40	16
20	6
25	13
25	9
15	10
35	16

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PEPERIKSAAN AKHIR			
FINAL EXAMINATION			
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KURSUS *COURSE*	: KEJURUTERAAN INDUSTRI	KOD KURSUS *CODE COURSE*	: DAM 31802
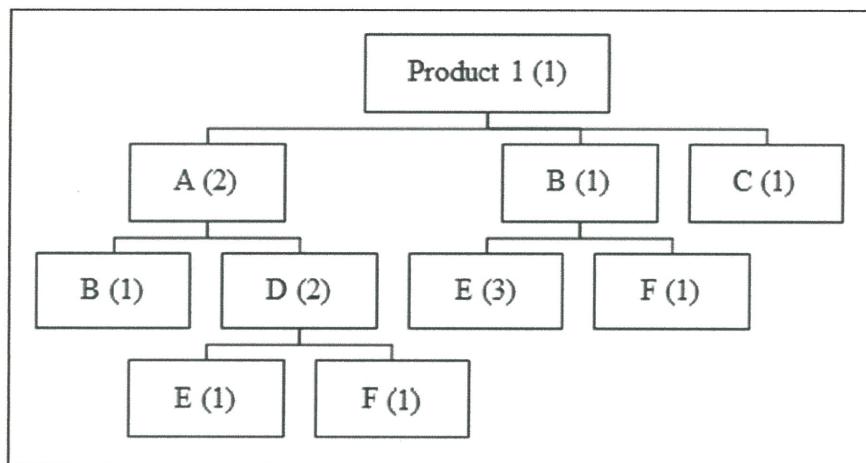
Rajah S4(b) / Figure Q4(b)

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```
#1  Body ────────────────────────────┐
                                      B#1   Assemble
#2  Bushing ──────────┐                     Stem and
                      SB#1 ─────────┘       Bushing to
#3  Stem ─────────────┘                     Body
                                      P1

#4  Packing ──────────┐
                      SB#2 ── P2 ── B#2  Assemble
#5  Cap ──────────────┘                  Cap
                                      P3

#6  Handle ───────────────────────────┐
                                      B#3   Assemble
#7  Nut ──────────────────────────────┘     Handle

                                      P4   Final
                                           Inspection
```
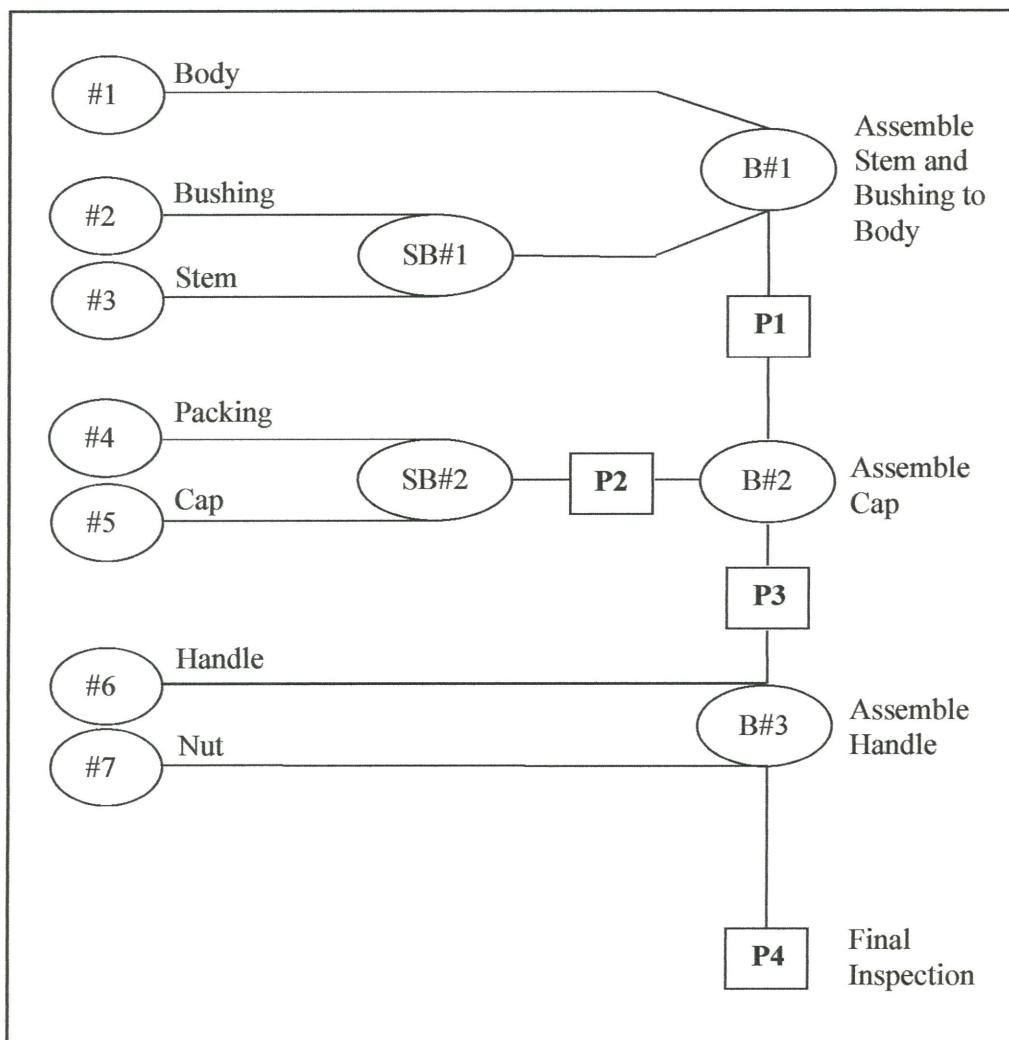
Rajah S4(c) / Figure Q4(c)

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Jadual S5(b) / Table Q5(b)

Paint Defect	Frequency
Orange Peel	12
Sealer Under	4
Dirt in Paint	65
Thin Paint	5
Off-Color	2
Sag	21
Scratch	3
Other	1

Jadual S5(c)(i) / Table Q5(c)(i)

Shift no. (Subgroup)	Thickness (mm)					Mean, X Bar	Range, R
	X_1	X_2	X_3	X_4	X_5		
1	2.7	2.3	2.6	2.4	2.7		
2	2.6	2.4	2.6	2.3	2.8		
3	2.3	2.3	2.4	2.5	2.4		
4	2.8	2.3	2.4	2.6	2.7		
5	2.6	2.5	2.6	2.1	2.8		
6	2.2	2.3	2.7	2.2	2.6		
7	2.2	2.6	2.4	2.0	2.3		
8	2.8	2.6	2.6	2.7	2.5		
9	2.4	2.8	2.4	2.2	2.3		
10	2.6	2.3	2.0	2.5	2.4		
11	3.1	3.0	3.5	2.8	3.0		
12	2.4	2.8	2.2	2.9	2.5		
13	2.1	3.2	2.5	2.6	2.8		
14	2.2	2.8	2.1	2.2	2.4		
15	2.4	3.0	2.5	2.5	2.0		
16	3.1	2.6	2.6	2.8	2.1		
17	2.9	2.4	2.9	1.3	1.8		
18	1.9	1.6	2.6	3.3	3.3		
19	2.3	2.6	2.7	2.8	3.2		
20	1.8	2.8	2.3	2.0	2.9		
					Total =		

Note: Fill in above table and attached together with your answer script.

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Jadual S5(c)(ii) / Table Q5(c)(ii)

Factors for Computing Central Lines and 3σ Control Limits for $\bar{X}$, s and R Charts.

OBSERVATIONS IN SAMPLE, n	CHART FOR AVERAGES			CHART FOR STANDARD DEVIATIONS					CHART FOR RANGES					
	FACTORS FOR CONTROL LIMITS			FACTOR FOR CENTRAL LINE	FACTORS FOR CONTROL LIMITS				FACTOR FOR CENTRAL LINE	FACTORS FOR CONTROL LIMITS				
	A	A_2	A_3	c_4	B_3	B_4	B_5	B_6	d_2	d_1	D_1	D_2	D_3	D_4
2	2.121	1.880	2.659	0.7979	0	3.267	0	2.606	1.128	0.853	0	3.686	0	3.267
3	1.732	1.023	1.954	0.8862	0	2.568	0	2.276	1.693	0.888	0	4.358	0	2.574
4	1.500	0.729	1.628	0.9213	0	2.266	0	2.088	2.059	0.880	0	4.698	0	2.282
5	1.342	0.577	1.427	0.9400	0	2.089	0	1.964	2.326	0.864	0	4.918	0	2.114
6	1.225	0.483	1.287	0.9515	0.030	1.970	0.029	1.874	2.534	0.848	0	5.078	0	2.004
7	1.134	0.419	1.182	0.9594	0.118	1.882	0.113	1.806	2.704	0.833	0.204	5.204	0.076	1.924
8	1.061	0.373	1.099	0.9650	0.185	1.815	0.179	1.751	2.847	0.820	0.388	5.306	0.136	1.864
9	1.000	0.337	1.032	0.9693	0.239	1.761	0.232	1.707	2.970	0.808	0.547	5.393	0.184	1.816
10	0.949	0.308	0.975	0.9727	0.284	1.716	0.276	1.669	3.078	0.797	0.687	5.469	0.223	1.777
11	0.905	0.285	0.927	0.9754	0.321	1.679	0.313	1.637	3.173	0.787	0.811	5.535	0.256	1.744
12	0.866	0.266	0.886	0.9776	0.354	1.646	0.346	1.610	3.258	0.778	0.922	5.594	0.283	1.717
13	0.832	0.249	0.850	0.9794	0.382	1.618	0.374	1.585	3.336	0.770	1.025	5.647	0.307	1.693
14	0.802	0.235	0.817	0.9810	0.406	1.594	0.399	1.563	3.407	0.763	1.118	5.696	0.328	1.672
15	0.775	0.223	0.789	0.9823	0.428	1.572	0.421	1.544	3.472	0.756	1.203	5.741	0.347	1.653
16	0.750	0.212	0.763	0.9835	0.448	1.552	0.440	1.526	3.532	0.750	1.282	5.782	0.363	1.637
17	0.728	0.203	0.739	0.9845	0.466	1.534	0.458	1.511	3.588	0.744	1.356	5.820	0.378	1.622
18	0.707	0.194	0.718	0.9854	0.482	1.518	0.475	1.496	3.640	0.739	1.424	5.856	0.391	1.608
19	0.688	0.187	0.698	0.9862	0.497	1.503	0.490	1.483	3.689	0.734	1.487	5.891	0.403	1.597
20	0.671	0.180	0.680	0.9869	0.510	1.490	0.504	1.470	3.735	0.729	1.549	5.921	0.415	1.585

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X-BAR CHART
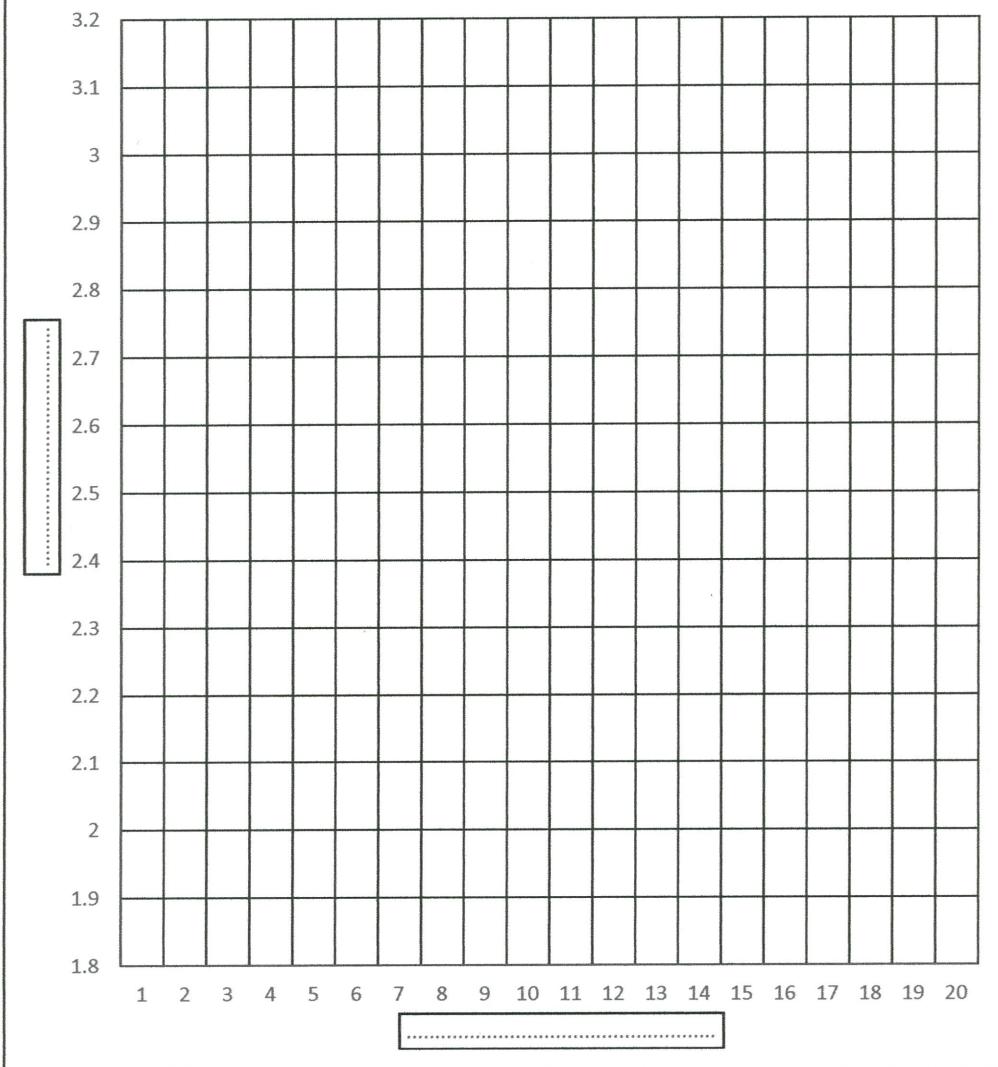
Rajah S5(c)(ii)/ Figure Q5(c)(ii)

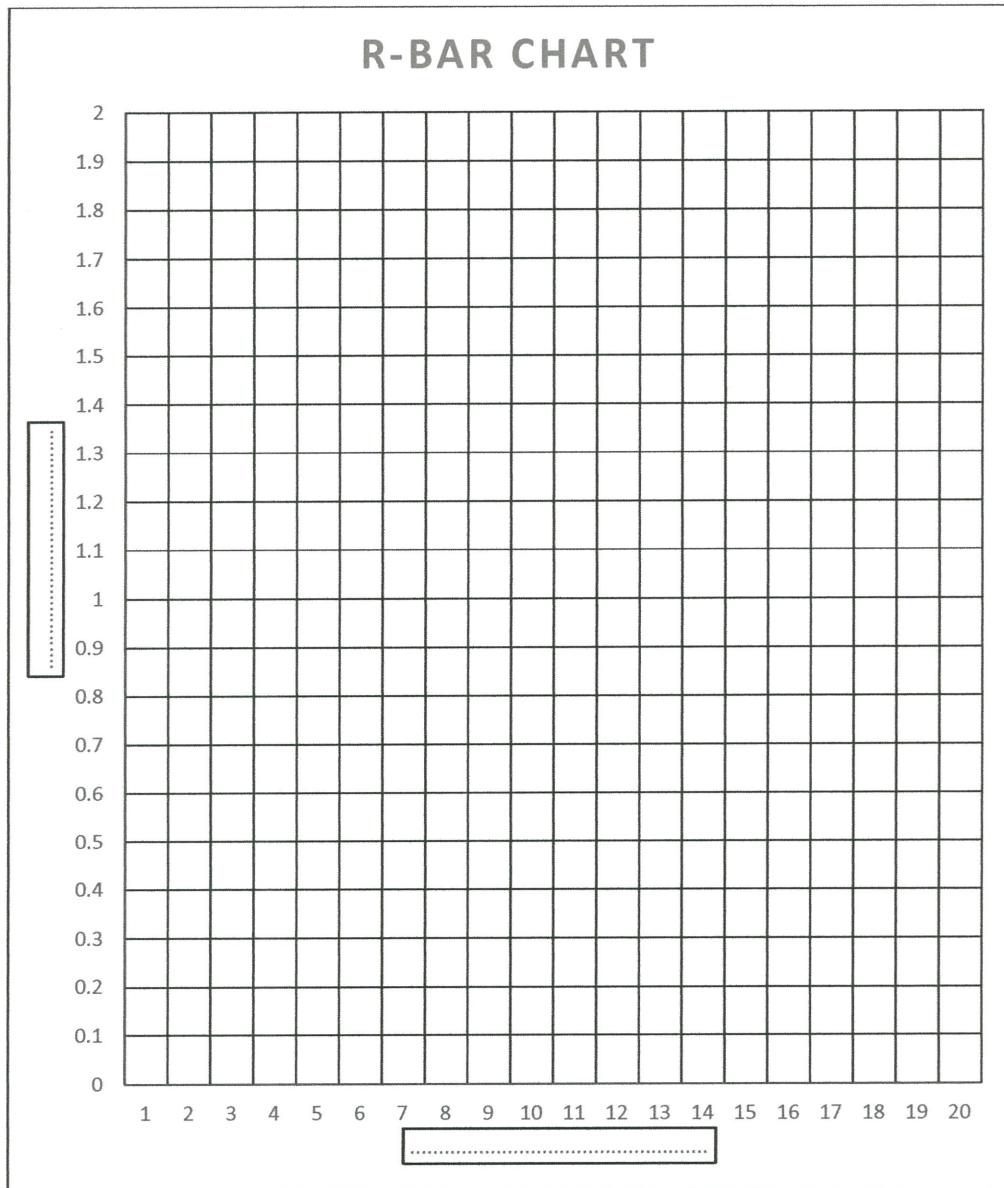*# Fill in above chart and attached together with your answer script.*

R-BAR CHART

Rajah S5(c)(iii)/ Figure Q5(c)(iii)

 # Fill in above chart and attached together with your answer script

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Jadual S6(b) / Table Q6(b)

	Time (min)								
	A	B	C	D	E	F	G	H	I
Process 1	1	5	8	3	9	5	7	2	9
Process 2	8	3	2	3	8	6	7	2	1

Rajah S6(c) / Figure Q5(c)
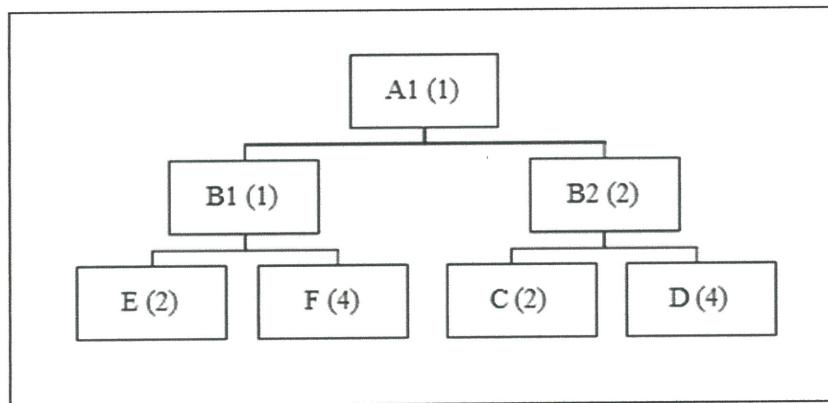
Jadual S6(c)(i) / Table S6(c)(i)

Week	7	8	9	10	11	12
Demand		60		30		120

Jadual S6(c)(ii) / Table S6(c)(ii)

Item	Rule	Lead Time (week)	On-hand inventory	Item	Rule	Lead Time (week)	On-hand inventory
A1	FOQ = 50	1	50	F	FOQ = 50	1	0
B1	L4L	2	30	C	POQ (P = 2)	1	0
B2	FOQ = 50	1	30	D	FOQ=400 safety stock = 100	3	10
E	FOQ = 70	1	10				

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Jadual S5(c)(iii) / Table Q5(c)(iii)

Item: A1 — Lot Size: / Lead Time:

Week							
Gross Requirements							
Scheduled Receipts							
Projected-on-hand inventory							
Planned Receipts							
Planned Order Releases							

Item: B1 — Lot Size: / Lead Time:

Week							
Gross Requirements							
Scheduled Receipts							
Projected-on-hand inventory							
Planned Receipts							
Planned Order Releases							

Item: B2 — Lot Size: / Lead Time:

Week							
Gross Requirements							
Scheduled Receipts							
Projected-on-hand inventory							
Planned Receipts							
Planned Order Releases							

Item: C — Lot Size: / Lead Time:

Week							
Gross Requirements							
Scheduled Receipts							
Projected-on-hand inventory							
Planned Receipts							
Planned Order Releases							

 # Fill in above table and attached together with your answer script.

SULIT

TERBUKA

PEPERIKSAAN AKHIR
FINAL EXAMINATION

SEMESTER / SESI	: SEM 1 2016/2017	PROGRAM	: 2 DAM
SEMESTER / SESSION		*PROGRAMME*	
KURSUS	: KEJURUTERAAN INDUSTRI	KOD KURSUS	: DAM 31802
COURSE		*CODE COURSE*	

Rumus/Formula:

$$TC = FC + VC(Q)$$

$$f(x,y) = \sum_{i=1}^{n} w_i \left(|x - a_i| - |y - b_i|\right) \rightarrow Minisum\ formula$$

$$f(x,y) = max(|x - a_i| + |y - b_i|)$$

$$First\ point:\ (x_1, y_1) = 0.5(c_1 - c_2, c_1 + c_3 + c_5)$$

$$Second\ point:\ (x_2, y_2) = 0.5(c_2 - c_4, c_2 + c_4 - c_5)$$

$\left.\right\}$ *Minimax formula*

$$Normal\ time = \frac{(Total\ observation\ time)x(Productive)x(Rating)}{(1 - Allowance\ factor)}$$

$$a = \frac{\sum y - b\sum x}{n} \qquad b = \frac{n\sum xy - \sum x \sum y}{n\sum x^2 - \left(\sum x\right)^2} \longrightarrow Regression\ formula$$

$$Q^* = \sqrt{\frac{2DS}{H}} \qquad TC = \frac{D}{Q}S + \frac{Q^*}{2}H$$

$$Q^* = \sqrt{\frac{2DS}{H(1-d/p)}} \qquad TC = \frac{D}{Q}S + \frac{Q^*}{2}H*(1-d/p) \qquad d = \frac{D}{working\ days/year}$$

TERBUKA