UNIVERSITI TUN HUSSEIN ONN MALAYSIA

PEPERIKSAAN AKHIR
SEMESTER II
SESI 2009/2010

NAMA MATA PELAJARAN	:	KEJURUTERAAN INDUSTRI
KOD MATA PELAJARAN	:	DDA 3052
KURSUS	:	3 DDM/DDX/DDT
TARIKH PEPERIKSAAN	:	APRIL 2010
JANGKA MASA	:	2 JAM
ARAHAN	:	JAWAB **EMPAT (4)** SOALAN SAHAJA DARIPADA LIMA (5) SOALAN.

KERTAS SOALAN INI MENGANDUNGI SEMBILAN (9) MUKA SURAT BERCETAK

Q1. (a) List down **FOUR** (4) techniques available to evaluate location alternatives.

(4 Marks)

(b) Briefly describe concept of location breakeven analysis with appropriate example for evaluating optimal location.

(6 Marks)

(c) Amir Khan, an independent washing machine repairman, is considering purchasing a house in Batu Pahat, Johore that he will use as a base of operations for his repair business. Amir primary sources of business are 10 laundry shops located throughout the Batu Pahat area. He has overlaid a grid on a map of the city and determined the following locations for these clients as well as the expected number of calls per month he receives (refer to Table 1).

Table 1: Customer's locations

Client	Grid Location	Expected Calls per Month
1	(5, 8)	2
2	(10, 3)	1
3	(14, 14)	1
4	(2, 2)	3
5	(1, 17)	1
6	(18, 25)	1/2
7	(14, 3)	1/4
8	(25, 4)	4
9	(35, 1)	3
10	(16, 21)	1/6

Find the optimal location of his house to minimise the weighted sum of the rectilinear to the 10 customers. Compute also cost of transportation for optimum location if the cost is RM2.00/distance.

(15 Marks)

Q2. (a) A work study was conducted for a process which involved 6 work elements consecutively. Data from snap back stop watch in minutes of a manual and automatic assembly process is shown in Table 2. The allowances are 5% for fatigue, 6% for delay, and 7% for personal relief. The worker's salary is RM2000 per month.

(i) Compute the standard time for the whole assembly process.

(6 Marks)

(ii) If the demand is 10,000 unit per month, estimate the number of operators required for the assembly process. The company is operating 20 days per month and a single 8 hour shift per day.

(4 Marks)

(iii) If the company willing to employ 50 workers, compute the over time cost per day for each worker for the production of 10,000 units per month. Assume only 80% workers are available for over time and the over time pay rate is 2.0 times of the normal wage.

(5 Marks)

Table 2 : Data of Work Study

			Cycle Time (minutes)				
Work Elements	**Method of Assembly**	**Rating**	**1**	**2**	**3**	**4**	**5**
A	Manual	90%	5	4.3	4.5	4.8	4.6
B	Manual	85%	12.3	13.4	10.0	14.5	13.0
C	Automatic		4	4	4	4	4
D	Manual	110%	8.9	7.7	9.0	9.3	8.6
E	Manual	115%	15.8	14.6	17.3	18.0	16.7
F	Automatic		6	6	6	6	6

(b) Briefly explain the following terminology related to ergonomic:

(i) Anthropometrics
(ii) Biomechanics
(iii) Work physiology

(6 Marks)

(c) Assume that you are design engineer assigned to design and fabricate an ergonomic chair. What would be the critical parameters need to be taken into account in order to realise your product?

(4 Marks)

Q3. Company XYZ produces car accessories for domestic market. Demand data for a certain interior car accessories by customer is shown in Table 3. Forecasting is an essential tool of anticipating for future demand so that the company can always ready its resources to fulfil the customers demand. Please assist this company to forecast the demand for month of October using the methods described by (a)-(e).

(a) Naive.

(2 Marks)

(b) 4-period simple moving average.

(3 Marks)

(c) 3-period weighted moving average with weightage value of 0.5, 0.3 and 0.2 (highest value for the most recent period).

(4 Marks)

(d) Simple exponential smoothing with $\alpha = 0.3$. Assume the forecast for month of July is 20.

(6 Marks)

(e) Using regression technique, forecast the demand for month of Disember.

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

(10 Marks)

Table 3: Demand Data (unit)

Jan	17
Feb	19
Mar	18
April	15
May	20
June	18
July	22
Aug	20
Sept	23

Q4. (a) Assume that you are production manager of Max Electronic Ltd. Recently, you have received an order for 100 printers, which is to be delivered at the start of week 7 of your schedule. Subassembly G must be ordered in multiples of 80 units and all other components are ordered lot-for-lot. Using the information given in Table 4, develop each of the following:

(i) A product structure tree and;
(ii) Determine how many units of subassembly G to order and the timing of those orders. Assume that the components are used only for this particular printer. (Use MRP table in Appendix I)

Table 4: Product information

Item	Lead Time (weeks)	Amount On Hand	Components
Printer	2	10	B, G, C(3)
B	1	5	E, F
C	1	20	G(2), H
E	2	4	-
F	3	8	-
G	2	15	-
H	1	10	-

(15 Marks)

(b) A manufacturing company consumes 10,000 units of a particular item. The company has a production capacity of 60 units per day. The cost of each unit produced by the company is RM8.00. The set-up and tooling cost is RM96.00 per set-up. The carrying charges are 15% of the cost per unit item. Given that the company operates for 300 days annually.

Determine:

(i) Economic quantity to be manufactured in each batch.
(ii) How frequently should the production runs to be made.
(iii) The production period annually.

(10 Marks)

Q5. (a) What is your definition of quality?

(2 Marks)

(b) Describe briefly the philosophical differences between:
(i) Inspection
(ii) Quality Control
(iii) Quality Assurance
(iv) Total Quality Management

(8 Marks)

(c) Construct a Pareto Chart using the data as shown in Table 5.

(5 Marks)

Table 5: Type of product defects

Defect	Operator	No. of Defects	Defect	Operator	No. of Defects
Bent Valve Stems	10	48	Oversized Stems	10	0
	20	0		20	0
	30	0		30	30
	40	0		40	0
	50	0		50	0
	60	0		60	0
	70	0		70	0
	80	0		80	0
	90	0		90	0
Short Overall Length	10	0	Bad Grind	10	0
	20	76		20	0
	30	0		30	0
	40	0		40	21
	50	0		50	0
	60	0		60	25
	70	0		70	0
	80	0		80	0
	90	0		90	28
Undersized Stems	10	0	Undersized Grooves	10	0
	20	0		20	0
	30	179		30	0
	40	27		40	100
	50	0		50	250
	60	4		60	75
	70	0		70	100
	80	0		80	200
	90	0		90	0

(d) The data in Table 6 are X-bar and R values for 12 samples of size n = 5. They were taken from a process producing bearings. The measurements are made on the inside diameter of the bearing.

Table 6: Data of sampling inspection

Sample Number	X-bar	Range
1	345	3
2	342	4
3	316	2
4	386	9
5	350	5
6	341	6
7	326	4
8	338	3
9	348	2
10	336	5
11	319	3
12	386	6

(i) Set up the X-bar and R charts on this process. (Refer table in Appendix II).
(8 Marks)

(ii) Does the process seem to be in control? If yes, why or if no, why not?
(2 Marks)

Appendix I

PEPERIKSAAN AKHIR

SEMESTER/SESI : SEMESTER 2/2009/2010 KURSUS : 2DDT/DDM/DDX
MATA PELAJARAN : KEJURUTERAAN INDUSTRI KOD MATA PELAJARAN: DDA 3052

Item:	Lot Size: Lead Time:							
	Week							
	1	2	3	4	5	6	7	8
Gross Requirements								
Scheduled Receipts								
Projected-on-hand inventory								
Planned Receipts								
Planned Order Releases								

Item:	Lot Size: Lead Time:							
	Week							
	1	2	3	4	5	6	7	8
Gross Requirements								
Scheduled Receipts								
Projected-on-hand inventory								
Planned Receipts								
Planned Order Releases								

Item:	Lot Size: Lead Time:							
	Week							
	1	2	3	4	5	6	7	8
Gross Requirements								
Scheduled Receipts								
Projected-on-hand inventory								
Planned Receipts								
Planned Order Releases								

Appendix II

PEPERIKSAAN AKHIR

SEMESTER/SESI : SEMESTER 2/2009/2010 KURSUS : 3DDT/DDM/DDX
MATA PELAJARAN : KEJURUTERAAN INDUSTRI KOD MATA PELAJARAN: DDA 3052

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

OBSERVATIONS IN SAMPLE, n	CHART FOR AVERAGES: FACTORS FOR CONTROL LIMITS A	A_2	A_3	CHART FOR STANDARD DEVIATIONS: FACTOR FOR CENTRAL LINE c_4	FACTORS FOR CONTROL LIMITS B_3	B_4	B_5	B_6	CHART FOR RANGES: FACTOR FOR CENTRAL LINE d_2	FACTORS FOR CONTROL LIMITS 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