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UNIVERSITI TUN HUSSEIN ONN MALAYSIA

**FINAL EXAMINATION
SEMESTER I
SESSION 2012/2013**

COURSE NAME : INDUSTRIAL ENGINEERING
COURSE CODE : DDA 3052 / DAM 31802
PROGRAMME : 3 DDM / DAM
EXAMINATION DATE : OCTOBER 2012
DURATION : 2 HOURS
INSTRUCTIONS : ANSWER **FOUR (4)** QUESTIONS ONLY

THIS QUESTION PAPER CONSISTS OF FIVE (5) PAGES

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- Q1.** (a) An industrial engineer is essential requirements for an organization. Give reasons for such requirements. (5 marks)
- (b) Plant layout is required to smooth the production in an organization. Explain various layouts with figures and their usage. (5 marks)
- (c) The matrix given in Table 1 is the cost of transporting materials from X company from Batu Pahat to various dealer net works in Malaysia. Find out the least transport cost by which materials can be transported for the method given below. The transporting cost is given in the Table 1.
- i) North West Corner method. (5 marks)
- ii) Low Cost Method. (5 marks)

Table 1: Cost matrix

	D	E	F	G	Available
A	11	13	17	14	250
B	16	18	14	10	300
C	21	24	13	10	400
Demand	200	225	275	250	

- Q2.** The observations given in the Table 2 is actual time taken by a worker for doing a job repeatedly was taken by a time study observer. The rating factor is 17 % of the total time taken. Calculate the normal time and time taken to do job of 8 hours in a shift. The allowance given in doing the worker is 12 % for all the factors. If the total job to done is 1000, how much time will be taken.

Table 2: Job time

Observation No.	1	2	3	4	5	6	7	8	9	10
Job 1 (minutes)	10	25	16	12	18	23	19	21	12	11
Job 2 (minutes)	12	13	11	14	12	11	10	9	14	11

(20 marks)

- Q3.** Project report is required for a product to start manufacturing for fast moving product. The requirement is based on forecast. The details are given in the Table 3.

Table 3: Sales data

Time period	Actual x 1000
January 2011	23
February 2011	19
March 2011	22
April 2011	23
May 2011	18
June 2011	22
July 2011	22
August 2011	27
September 2011	25
October 2011	22
November 2011	22
December 2011	27

- i) Assume three month moving average method. (10 marks)
- ii) Exponential smoothing method with smoothing constant α is 0.10. (10 marks)

Suggest a suitable method to follow and plot the forecast data on a graph paper.

- Q4** (a) What is an inventory and Economic Order Quantity? (3 marks)
- (b) Just in Time (JIT) is new techniques used industries. What are advantages of JIT? (4 marks)
- (c) Briefly explain the ergonomic factors that a product should have in order to protect the consumer when using it. (13 marks)

- Q5** (a) Control charts for \bar{X} and R range is to be established on a certain part, measured in millimeters. Data were collected in subgroup sizes 6 and are given in Table 4. Determine the central line and control limits. Evaluate the graph and give appropriate conclusions. If the process is out of control, find out the revised limits.

(10 marks)

Table 4: Data of inspection

Subgroup Number	\bar{X}	R- Range
1	20.35	0.34
2	20.40	0.36
3	20.36	0.32
4	20.48	0.36
5	20.35	0.36
6	20.40	0.35
7	20.43	0.31
8	20.37	0.34
9	20.48	0.30
10	20.42	0.37
11	20.39	0.29
12	20.38	0.30
13	20.40	0.33
14	20.41	0.36
15	20.45	0.34

Other data:

- i) $A_2 = 0.483$, ii) $D_4 = 2.004$, iii) $D_3 = 0.00$,
 iv) $A = 1.225$, v) $D_2 = 5.078$, vi) $D_1 = 0$
 vii) $d_2 = 2.534$

(b) Given information as shown in the Table 5 on job times and due dates, determine the optimal processing sequence using (1) FCFS, (2) SPT, and (3) EDD. For each method, find the following:

- i) Average job flow time and the average job tardiness.
- ii) Which method is preferable when the shop is highly congested?

Table 5: Operation time for different jobs

Job	Job Time (hours)	Due date (hours)
A	3.5	7
B	2.0	6
C	4.5	18
D	5.0	22
E	2.5	4
F	6.0	20

(10 marks)