UTHM
Universiti Tun Hussein Onn Malaysia

UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAM
SEMESTER II
2013/2014 SESSION

COURSE NAME	:	INDUSTRIAL MANAGEMENT
COURSE CODE	:	BBT 41002
PROGRAMME	:	4 BBV
EXAM DATE	:	JUNE 2014
DURATION	:	2 HOURS
INSTRUCTION	:	ANSWER ALL QUESTIONS

THIS EXAM PAPER CONTAINS **EIGHT (8)** PAGES INCLUSIVE OF COVER

S1 (a) State the three (3) basic elements of an industrial production system and explain briefly these elements in the context of an automobile manufacturing.

(6 marks)

(b) Describe briefly three (3) intangible factors that influence location decisions.

(6 marks)

(c) BESTARIA Sdn. Bhd. is responsible in producing cooking oil for export. For future expansion, it has the alternative to choose from three possible production sites, A, B and C that have the cost structure as shown in Table S1(c) below.

Table S1(c) : Cost Structure for Three Alternative Location

Site	Fixed Cost / Year	Variable Cost / Tonne
A	100,000	25
B	80,000	40
C	75,000	50

(i) If BESTARIA Sdn. Bhd. wants to produce 10,000 tons of cooking oil this year, determine the most feasible production site.

(8 marks)

(ii) If BESTARIA Sdn. Bhd. intents to have annual profits of RM40,000, calculate the production volume of cooking oil per year for each site if the selling price is RM60 per tonne.

(5 marks)

S2 (a) Give two (2) types of inventories with brief explanations.

(4 marks)

(b) Explain three (3) importance of quality implementation.

(6 marks)

(c) The 5S methodology describes how to organize a work space for efficiency and effectiveness by identifying and storing the items used, maintaining the area and items, and sustaining the new order. Explain all five (5) primary phases in 5S.

(15 marks)

S3 (a) Explain the difference(s) between job enlargement and job enrichment by using an example.

(6 marks)

(b) Based on a careful work study in the MAJU Courier Service Sdn. Bhd., the results for a report preparation service have been summarized in Table S2(b) below.

Table S2(b): Work Study Analysis for Report Preparation Service

Job Element	Observations (minutes)					Performance Rating
	1	2	3	4	5	
A	35	40	33	42	39	120%
B	12	10	36*	15	13	110%
C	3	3	5	5	4	90%
D	15	18	21	17	45*	85%

* Machine Error

(i) Compute the normal time for each work element.

(6 marks)

(ii) If the allowance for this type of work is 15%, calculate the standard time.

(3 marks)

(iii) Determine the number of observations needed for a 95% confidence level within 5% accuracy. You may want to calculate the sample size for each job element.

(10 marks)

S4 (a) Explain two (2) factors that influence new product opportunities.

(2 marks)

(b) Describe with diagram the four (4) phases of a product's lifecycle.

(4 marks)

(c) 23 HOURS Restaurant has a few kitchen layouts under consideration for its kitchen department. The strategy is to provide the best kitchen layout possible so that chefs can deliver their food on time. As the newly appointed director of the company, you have been asked to evaluate these kitchen layouts. Distances between different workstations of the kitchen and the kitchen layouts has been provided in Figure S3(c).

(i) Calculate the total distance for each kitchen layout.

(9 marks)

(ii) Among the layout given in Figure S3(c), which layout is the most feasible? Evaluate your choices based on the least/minimum total trip distance.

(4 marks)

(iii) Due to restaurant location change and physical constraints, your company has decided that Kitchen Layout 4 is no longer a feasible choice. In addition, there is also a new rule by the fire department where the storage cannot be adjacent/beside the stove. Based on these new information, re-evaluate each kitchen layout choices and recommend a suitable kitchen layout. Give supporting reason for your new choice.

(6 marks)

- END OF QUESTION -

FINAL EXAM

Number of trips between work centers:

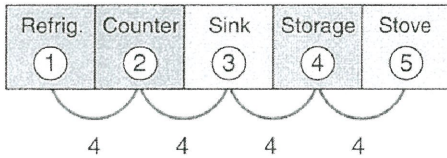| To: From:		Refrigerator 1	Counter 2	Sink 3	Storage 4	Stove 5
Refrig.	1	0	8	13	0	10
Counter	2	5	0	3	3	8
Sink	3	3	12	0	4	0
Storage	4	3	0	0	0	5
Stove	5	0	8	4	10	0

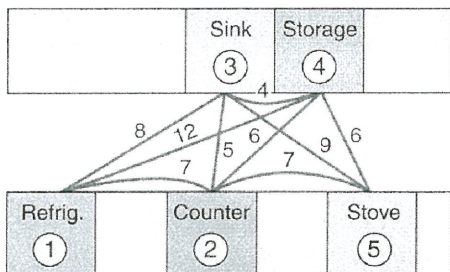**Kitchen Layout 3**

Walking distance in feet
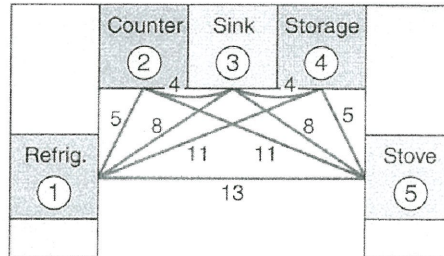
Kitchen Layout 1

Walking distance in feet

Kitchen Layout 2

Walking distance in feet
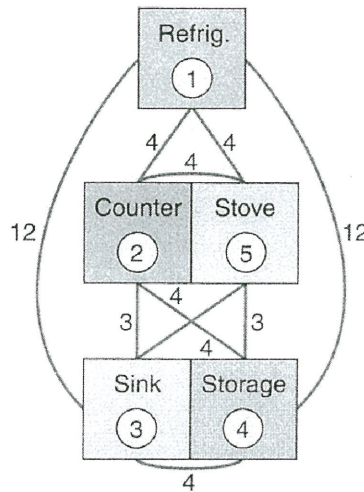

Kitchen Layout 4

Walking distance in feet

FIGURE S3

5

FINAL EXAM

LIST OF FORMULA

<u>Break-Even Analysis</u>

Break-even Volume, $V_b = \dfrac{c_F}{P_s - C_v} = \dfrac{Fixed\ Cost}{Selling\ Cost/unit - Variable\ Cost/unit}$

<u>Time Studies</u>

Average observed time = (sum of times recorded) / number of observations

Normal time = (average observed time) x (performance rating factor)

Standard time = (total normal time) / (1 – allowance factor)

$$s = \sqrt{\frac{\sum(x - \bar{x})^2}{n - 1}} = \sqrt{\frac{\sum x^2 - \frac{(\sum x)^2}{n}}{n - 1}}$$

$$n = \left(\frac{zs}{h\bar{x}}\right)^2$$

n = Required sample size
z = number of standard deviations required for desired level of confidence (from table)
s = standard deviation of the initial sample
$\bar{x}$ = mean of sample size
h = accuracy level desired in percent of the job element, expressed as decimal (5% = .05)

$$n = \frac{z^2 p(1 - p)}{h^2}$$

n = Required sample size
z = number of standard deviations required for desired level of confidence (from table)
p = estimated value of sample proportion (of time worker is observed busy or idle)
h = acceptable error level, in percentage decimals (5% = .05)

Process Layout Analysis

$$minimize\ cost = \sum_{i=1}^{n}\sum_{j=1}^{n} X_{ij}C_{ij}$$

$n = total\ number\ of\ work\ centers\ or\ depts$

$i,j = individual\ departments$

$X_{ij} = number\ of\ loads\ moved\ from\ dept.\,i\ to\ dept.\,j$

$C_{ij} = cost\ to\ move\ a\ load\ between\ dept.\,i\ and\ dept.\,j$

FINAL EXAM

LIST OF FORMULA

Inventory Control

$$EOS = \sqrt{\frac{2DS}{H}}$$

Total Cost = Carrying costs + Ordering Costs + Puchase Costs

$$TC = \frac{QH}{2} + \frac{DS}{Q} + PD$$

D = Demand, S = Ordering Cost, H = Holding Cost, Q = units per order

Quality Control

$$\sigma_{\hat{p}} = \sqrt{\frac{\bar{p}(1 - \bar{p})}{n}}$$

$$UCL_p = \bar{p} + z\sigma_{\hat{p}}, LCL_p = \bar{p} - z\sigma_{\hat{p}}$$

$\bar{p}$ = mean fraction defective in sample
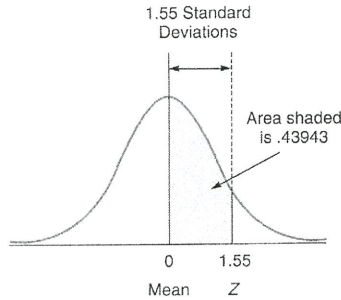
z = number of standard deviations

$\sigma_{\hat{p}}$ = standard deviation of the sampling distribution

FINAL EXAM

NORMAL DISTRIBUTION TABLE

As an alternative to Table I.1, the numbers in Table I.2 represent the proportion of the total area away from the mean, μ, to one side. For example, the area between the mean and a point that is 1.55 standard deviations to its right is .43943.

TABLE I.2

z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
0.0	.00000	.00399	.00798	.01197	.01595	.01994	.02392	.02790	.03188	.03586
0.1	.03983	.04380	.04776	.05172	.05567	.05962	.06356	.06749	.07142	.07535
0.2	.07926	.08317	.08706	.09095	.09483	.09871	.10257	.10642	.11026	.11409
0.3	.11791	.12172	.12552	.12930	.13307	.13683	.14058	.14431	.14803	.15173
0.4	.15542	.15910	.16276	.16640	.17003	.17364	.17724	.18082	.18439	.18793
0.5	.19146	.19497	.19847	.20194	.20540	.20884	.21226	.21566	.21904	.22240
0.6	.22575	.22907	.23237	.23565	.23891	.24215	.24537	.24857	.25175	.25490
0.7	.25804	.26115	.26424	.26730	.27035	.27337	.27637	.27935	.28230	.28524
0.8	.28814	.29103	.29389	.29673	.29955	.30234	.30511	.30785	.31057	.31327
0.9	.31594	.31859	.32121	.32381	.32639	.32894	.33147	.33398	.33646	.33891
1.0	.34134	.34375	.34614	.34850	.35083	.35314	.35543	.35769	.35993	.36214
1.1	.36433	.36650	.36864	.37076	.37286	.37493	.37698	.37900	.38100	.38298
1.2	.38493	.38686	.38877	.39065	.39251	.39435	.39617	.39796	.39973	.40147
1.3	.40320	.40490	.40658	.40824	.40988	.41149	.41309	.41466	.41621	.41174
1.4	.41924	.42073	.42220	.42364	.42507	.42647	.42786	.42922	.43056	.43189
1.5	.43319	.43448	.43574	.43699	.43822	.43943	.44062	.44179	.44295	.44408
1.6	.44520	.44630	.44738	.44845	.44950	.45053	.45154	.45254	.45352	.45449
1.7	.45543	.45637	.45728	.45818	.45907	.45994	.46080	.46164	.46246	.46327
1.8	.46407	.46485	.46562	.46638	.46712	.46784	.46856	.46926	.46995	.47062
1.9	.47128	.47193	.47257	.47320	.47381	.47441	.47500	.47558	.47615	.47670
2.0	.47725	.47778	.47831	.47882	.47932	.47982	.48030	.48077	.48124	.48169
2.1	.48214	.48257	.48300	.48341	.48382	.48422	.48461	.48500	.48537	.48574
2.2	.48610	.48645	.48679	.48713	.48745	.48778	.48809	.48840	.48870	.48899
2.3	.48928	.48956	.48983	.49010	.49036	.49061	.49086	.49111	.49134	.49158
2.4	.49180	.49202	.49224	.49245	.49266	.49286	.49305	.49324	.49343	.49361
2.5	.49379	.49396	.49413	.49430	.49446	.49461	.49477	.49492	.49506	.49520
2.6	.49534	.49547	.49560	.49573	.49585	.49598	.49609	.49621	.49632	.49643
2.7	.49653	.49664	.49674	.49683	.49693	.49702	.49711	.49720	.49728	.49736
2.8	.49744	.49752	.49760	.49767	.49774	.49781	.49788	.49795	.49801	.49807
2.9	.49813	.49819	.49825	.49831	.49836	.49841	.49846	.49851	.49856	.49861
3.0	.49865	.49869	.49874	.49878	.49882	.49886	.49889	.49893	.49897	.49900
3.1	.49903	.49906	.49910	.49913	.49916	.49918	.49921	.49924	.49926	.49929