



UNIVERSITI TUN HUSSEIN ONN MALAYSIA

**FINAL EXAMINATION
SEMESTER I
SESSION 2019/2020**

COURSE NAME : INDUSTRIAL ENGINEERING AND
QUALITY MANAGEMENT

COURSE CODE : BNJ 30403

PROGRAMME : BNL / BNH

EXAMINATION DATE : DECEMBER 2019 / JANUARY 2020

DURATION : 3 HOURS

INSTRUCTION : ANSWER ALL QUESTIONS

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THIS QUESTION PAPER CONSISTS OF **SEVEN (7)** PAGES ONLY

- Q1**
- (a) Describe briefly the unique of industrial engineering (IE). (2 marks)
- (b) Industrial engineering (IE) known as the design or improvement of a system of people, machines, information, and money to achieve some goal with efficiency, quality and safety. Explain the tasks of industrial engineer in term of human, machine and quality. (3 marks)
- (c) Give **FOUR (4)** physical stressors place pressure or stress on part of human body. (2 marks)
- (d) Repetition known as one of the risk factors that can cause cumulative trauma disorders (CTD). List **FOUR (4)** example of activities of repetition factors contribute to CTD. (4 marks)
- (e) Illustrate **THREE (3)** awkward positions of workers' during working with the solutions of the correct posture that should be taken. (9 marks)
- Q2**
- (a) Identify **FOUR (4)** importance of forecasting. (2 marks)
- (b) Based on **Q2 (a)**, give **ONE (1)** example of each answer given. (2 marks)
- (c) Sales of Volkswagen's popular Beetle have grown steadily at auto dealership in Nevada during the past 5 years as shown in **Table Q2 (c)**. The sales manager had predicted in 2004 that 2005 sales would be 410 units. By using exponential smooting, $\alpha = 0.30$, calculate the forecast on 2010. (5 marks)
- (d) **Table Q2 (d)** shows the pints number of type B blood used at Hospital Sultanah Bahiyah in the past six weeks.
- (i) By using a 4-week weighted moving average, with the weight of 0.2, 0.1, 0.3 and 0.7, which is use 0.7 for the most recent period. Determine the forecast of demand for the week of October 12th. (1 mark)
- (ii) Compute a general equation for this case and forecast the registrations on year 15 by using trend projection method. (10 marks)

- Q3** (a) Explain **TWO (2)** major disadvantages of using existing functional organization to administer and complete the project. (4 marks)
- (b) Compose **FIVE (5)** steps on defining the project in Project Management. (10 marks)
- (c) A chain of home health care firm in Louisiana needs to locate a central office to conduct internal audits and other periodic reviews of its facilities. These facilities are scattered throughout the state, as detailed in **Table Q3 (c)**. Each site, except for Houma will be visited three times each year by a team of workers, who will drive from the central office to the site. Houma will be visited five times a year.
- (i) Determine the coordinates that represent a good central location for office by using Minisum Model. (3 marks)
- (ii) Based on **Q3 (c) (i)**, determine the optimum cost of location found. (2 marks)
- (iii) If the cost is \$2 per distance, determine the total cost for the optimum location. (1 mark)
- Q4** (a) Construct the quality hierarchy with its explanation. (8 marks)
- (b) Total Quality Management (TQM) generally acknowledged as an enhancement to the traditional way of doing business. Give **FOUR (4)** purpose of TQM. (4 marks)
- (c) Business Excellence Model (BEM) highlighted customer focus and workforce focus in its model. Distinguish **TWO (2)** criterias for both customer focus and workforce focus. (4 marks)
- (d) The model that is used to improve a process in Six Sigma management is called the DMAIC model. This stands for define, measure, analyse, improve and control. Describe **FOUR (4)** criteria involving in define phase. (4 marks)

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- Q5** (a) Variable Control Chart known as a graphical record of a particular quality characteristic. List **FOUR (4)** objectives of Variable Control Chart. (4 marks)
- (b) The SBM Manufacturing wishes to monitor and control the product's dimension during machining process. Each data are taken based on data of measurements as summarized in **Table Q5 (b1)**. Refer **Table Q5 (b2)** for the value of A_2 , D_3 and D_4 .
- (i) Determine the control limits for the X-bar chart. (6 marks)
 - (ii) Determine the control limits for the R-chart. (5 marks)
 - (iii) Plot the X-bar chart for preliminary data with trial control limits (2 marks)
 - (iv) Plot the R-chart for preliminary data with trial control limits. (2 marks)
 - (v) Discuss the quality condition of the dimension measurements. (1 mark)

- END OF QUESTIONS -

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Table Q2 (c)

Year	Sales
2005	450
2006	495
2007	518
2008	563
2009	584

Table Q2 (d)

WEEK OF	PINTS USED
August 31	360
September 7	389
September 14	410
September 21	381
September 28	368
October 5	374

Table Q3 (c)

City	Map coordinates	
	X	Y
Covington	9.2	3.5
Donaldsonville	7.3	2.5
Houma	7.8	1.4
Monroe	5.0	8.4
Natchitoches	2.8	6.5
New Iberia	5.5	2.4
Opelousas	5.0	3.6
Ruston	3.8	8.5

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Table Q5 (b1)

Subgroup Number	Date	Time	Measurements (mm)				
			X ₁	X ₂	X ₃	X ₄	X ₅
1	03/09	08:00	6.0	5.8	6.1	6.9	7.4
2		14:00	6.2	6.2	6.5	5.9	5.7
3	04/09	08:00	6.0	6.5	7.3	6.1	5.9
4		14:00	6.6	5.8	7.4	5.3	7.3
5	05/09	08:00	5.8	6.5	5.8	6.6	7.4
6		14:00	6.8	7.3	6.4	5.9	5.8
7	06/09	08:00	6.9	6.1	6.2	5.9	5.8
8		14:00	7.2	5.9	5.3	5.8	6.4
9	07/09	08:00	5.9	5.7	6.6	6.5	6.2
10		14:00	6.7	6.9	5.9	7.3	6.0

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Table Q5 (b2)

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

OBSERVATIONS IN SAMPLE, <i>n</i>	CHART FOR AVERAGES			CHART FOR STANDARD DEVIATIONS						CHART FOR RANGES				
	FACTORS FOR CONTROL LIMITS			FACTORS FOR CENTRAL LINE			FACTORS FOR CONTROL LIMITS			FACTORS FOR CENTRAL LINE				
	A	A ₂	A ₃	C ₄	B ₃	B ₄	B ₅	B ₆	d ₃	d ₂	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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