Universiti Tun Hussein Onn Malaysia

UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION
SEMESTER II
SESSION 2017/2018

COURSE NAME	:	INDUSTRIAL ENGINEERING AND QUALITY MANAGEMENT
COURSE CODE	:	BNJ 30403
PROGRAMME	:	2 BNG
EXAMINATION DATE	:	JUNE/JULY 2018
DURATION	:	3 HOURS
INSTRUCTION	:	ANSWER **ALL** QUESTIONS

THIS QUESTION PAPER CONSISTS OF **SIX (6)** PAGES ONLY

Q1 (a) Industrial engineering (IE) are often to figure out on how to do things better. It is acknowledged that IE is the design or improvement of a system of peoples, machines, information and money to achieve some goal with efficiency, quality and safety. Explain on how system can be improved by applying of IE.

(3 marks)

(b) IE apply science, mathematics and engineering methods to complex system integration and operations. Because of these systems are so large and complex, industrial engineers need to have knowledge and skills in a wide variety of disciplines, the ability to work well with people and a broad, systems perspective. Differentiate between the job scopes of Industrial Engineers in manufacturing industry and logistic industry.

(4 marks)

(c) Cumulative Trauma Disorders (CTDs) known as physical ailments or abnormal conditions of bodily injury to nerves, tissues, tendons and joints that occurring gradually over a period months or years. Predict **THREE (3)** main risk factors for office-related CTDs.

(3 marks)

(d) Based on the **Q1 (c),** choose **TWO (2)** main risk of factors listed. Then, list **THREE (3)** examples of each risk factors chosen.

(6 marks)

(e) List **FOUR (4)** prevention strategies to avoid eyestrain.

(4 marks)

Q2 (a) **Table Q2 (a)** shows the pints number of type A blood used at Woodlawn Hospital in the past six weeks.

(i) Predict the demand for the week of October 12 using naïve approach.

(1 mark)

(ii) Develop a 3-year moving average to forecast registrations for the October 12.

(1 mark)

(iii) By using a 3-week weighted moving average, with the weight of 0.5, 0.1, 0.3 and 0.6, which is use 0.6 for the most recent period. Determine the forecast of demand for the week of October 12.

(2 marks)

(iv) Calculate the forecast for the week of October 12 using exponential smoothing with a forecast for August 31 of 360 pints used. Given smoothing constant, α is 0.2.

(6 marks)

(v) Compute a general equation for this case, and forecast the registrations on year 15 by using trend projection method.

(10 marks)

Q3 (a) The project life cycle consist of defining, planning, executing and closing stages. Show **THREE (3)** examples of closing stage activities.

(3 marks)

(b) Two new software projects are proposed to a young, start-up company. The Alpha project will cost \$150,000 to develop and is expected to have annual net cash flow of \$40,000. The Beta project will cost \$200,000 to develop and is expected to have annual net cash flow of \$50,000. Both projects has initial investment and projected cash flows for 4 years.

(i) Compare the payback period of Alpha Project and Beta Project.

(2 marks)

(ii) Determine the rate of return for both projects.

(2 marks)

(iii) Calculate the net present value, NPV for both project if required rate of return is 20%.

(4 marks)

(iv) Interpret the answer from **Q3 (b) (iii).**

(2 marks)

(c) A chain of home health care firm in Lousiana 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.

(3 marks)

(iii) If the cost is \$2 per distance, determine the total cost for the optimum location.

(1 mark)

Q4 (a) Quality control consists of two contrasting approaches which is reactive approach and preventive approach. Differentiate between reactive approach and preventive approach.

(4 marks)

(b) Discover **SIX (6)** basic concepts of Total Quality Management (TQM).

(6 marks)

(c) Its acknowledged that many companies will not start transformation from their conventional ways to TQM strategy, unless they faced with problem or forced by customers. Sketch flowchart of the TQM effect for manufacturing-based company.

(4 marks)

(d) The model that is used to improve a process in Six Sigma management is called the DMAIC Model, which is stand for Define, Measure, Analyze, Improve and Control. Explain the Measure phase of DMAIC Model.

(4 marks)

(e) A successful Six Sigma program will yield the several benefits to the management of an organization. Predict **TWO (2)** benefits of Six Sigma implementation in automotive company.

(2 marks)

Q5 (a) There are several factors might contribute to variation. List **FOUR (4)** sources of variation with its **TWO (2)** of examples.

(4 marks)

(b) The ABC Manufacturing Company wishes to monitor and control the product's dimension during casting process. Each data are taken based on data of measurements as summarized in **Table Q5 (b).** [Refer Table Q5 (b) in Appendix II 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 dimensions measurements.

(1 mark)

- **END OF QUESTIONS** -

FINAL EXAMINATION

SEMESTER / SESSION : SEMESTER II 2017/2018 PROGRAM : 2 BNG
COURSE : INDUSTRIAL ENGINEERING AND QUALITY MANAGEMENT COURSE CODE: BNJ 30403

Table Q2 (a): Pints number of type A blood

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 and its coordinates

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

Table Q5 (b): Data Collected during measurements

Subgroup Number	Date	Time	Measurements (mm)				
			X_1	X_2	X_3	X_4	X_5
1	April 1	00:00	8.0	9.4	7.6	8.8	8.9
2		02:00	9.3	8.8	9.2	9.2	8.2
3		04:00	7.4	7.4	7.9	9.0	8.1
4		06:00	9.3	8.0	7.4	7.9	8.2
5		08:00	9.4	7.9	9.6	9.4	9.2
6	April 2	00:00	8.7	9.3	8.8	8.9	8.7
7		02:00	8.0	8.5	8.1	8.4	8.4
8		04:00	9.6	8.3	8.3	7.9	8.9
9		06:00	8.4	7.6	8.7	8.5	8.0
10		08:00	9.4	8.7	9.0	9.6	9.4
11	April 3	00:00	8.5	8.1	9.6	8.3	8.2
12		02:00	8.5	8.5	8.0	9.0	9.4
13		04:00	8.0	9.2	8.2	8.5	8.4
14		06:00	8.1	8.8	9.4	8.4	7.9
15		08:00	7.8	9.6	9.0	8.0	8.3

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Table Q5 (b) : Value of A_2, D_3 and D_4

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

OBSERVATIONS IN SAMPLE, n	CHART FOR AVERAGES: FACTORS FOR CONTROL LIMITS			CHART FOR STANDARD DEVIATIONS: FACTOR FOR CENTRAL LINE	CHART FOR STANDARD DEVIATIONS: FACTORS FOR CONTROL LIMITS				CHART FOR RANGES: FACTOR FOR CENTRAL LINE	CHART FOR RANGES: FACTORS FOR CONTROL LIMITS				
	A	A_2	A_3	c_4	B_3	B_4	B_5	B_6	d_2	d_3	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