

CONFIDENTIAL



UNIVERSITI TUN HUSSEIN ONN MALAYSIA

**FINAL EXAMINATION
SEMESTER I
SESSION 2016/2017**

COURSE NAME : INDUSTRIAL ENGINEERING AND
QUALITY MANAGEMENT

COURSE CODE : BNJ 30403

PROGRAMME : 3 BNG/BNH/BNL/BNM

EXAMINATION DATE : DECEMBER 2016/JANUARY 2017

DURATION : 3 HOURS

INSTRUCTION : ANSWER FIVE (5) QUESTIONS ONLY

TERBUKA

THIS PAPER CONSISTS OF EIGHT (8) PAGES

CONFIDENTIAL

- Q1** (a) Industrial engineers are often to figure out on how to do things better. The most distinctive aspect is the flexibility and versatility it can offer. Explain briefly why many companies are hiring Industrial Engineers and then promoting them into management position. (3 marks)
- (b) Industrial engineers 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 the job scopes of Industrial Engineers in manufacturing and logistics industries. (5 marks)
- (c) As an Industrial Engineer at CAD Semiconductor Industries, you are required to design and recommend the working posture of standing workstation for industrial employees as shown in **Figure Q1 (c)**. Using appropriate sketches, point out the design concepts for the best recommended working posture of standing workstation. (12 marks)

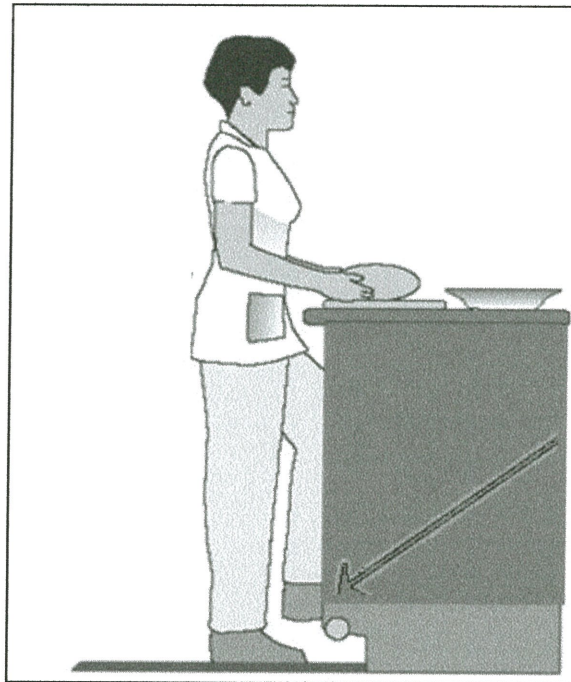


Figure Q1 (c)

TERBUKA

- Q2** (a) Planning for facility location is important in starting a new business. Explain **three (3)** factors to be considered in selecting the facility location. (6 marks)
- (b) The assembly of a modern toy involves 9 tasks as summarized in **Table Q2 (b)**. The production line need to produce 4,800 units of toys a week, whereby the operation time is 40 hours per week.

Table Q2 (b): Assembly tasks information

Task	Time Required (seconds)	Immediate Predecessors
A	12	-
B	6	A
C	6	A
D	5	-
E	11	D
F	12	D
G	13	B, C
H	9	E, F
I	7	G, H

- (i) Determine the appropriate cycle time. (3 marks)
- (ii) Propose your precedence diagram (3 marks)
- (iii) Calculate the minimum number of stations possible. (3 marks)
- (iv) Determine the theoretical maximum efficiency of the set up. (3 marks)
- (v) Determine the idle time for the line. (2 marks)

TERBUKA

- Q3** (a) State **two (2)** advantages of specialization in business for:
- (i) Management, and
 - (ii) Labor.
- (4 marks)

- (b) The JP Invention Sdn Bhd manufactures the container food court product based on recycle container from the Johor Port Harbor. The main product will be supply for local entrepreneur in the Southern Region of Malaysia for modern business model on ‘Halal’ food. The marketing and production manager has planned an overtime schedule for the selected staff for every weekend (four day per month) with 8 hours per day to reduce the backlog on the popular container. **Table Q3 (b)** shows the scheduling data which involves an ordering time, processing time, and due date for the container delivery.

Table Q3 (b): Ordering, Processing Time and Due Date Data

No. of Order (Container Type)	Estimated Processing Time (hours)	Due Date (Hours from now)
S	12	72
T	32	48
A	36	80
C	28	84
R	48	112
Z	24	40

- (i) Analyze the schedules using First Come First Serve (FCFS), Earliest Due Date (EDD), and Shortest Processing Time (SPT) rules.

(6 marks)
- (ii) Based on scheduling performance obtained in Q3(b)(i), suggest appropriate scheduling sequence if ‘Delivery Time’ is the main selection criteria.

(4 marks)

TERBUKA

- (c) Hyatt Regency Hotel (HRH) is one of the popular hotel and accommodation among the traveler and tourist from Middle East country in Malaysia. Currently, available HRH branch has been 250 hotels around the world to meet the demand in Tourist Industry. In Malaysia, each HRH consists of 1000 rooms per hotel to meet the customer requirement and demand. Each room needs the shower gel bar and the hotel managers need to forecast on room service items, especially on the shower gel bar. The daily demands for the shower gel bar are 2000 bars. Ordering cost is RM5 and the inventory holding cost is RM 0.70 per bar per year. The delivery lead time from supplier is 5 days. The yearly room service is 365 days approximately.
- (i) Calculate the Economic Order Quantity (EOQ) for the shower gel bar.
(3 marks)
- (ii) Based on EOQ obtained in Q3(c)(i), calculate the requirement for Annual Inventory Cost.
(3 marks)

- Q4** (a) Compare the differences between Inspection, Quality Control and Quality Assurance. Provide examples to support your comparison.
(9 marks)
- (b) Total Quality Management (TQM) is an approach to provide quality product and services to customers, increase productivity and reduce cost. Employee involvement is an important concept of TQM. Briefly explain the concept of employee involvement in TQM.
(5 marks)
- (c) Business Excellence Framework (BEF) can be considered as a Total Quality Management Framework and one example of Industrial Systems Framework. Currently, BEFs are used in at least 80 countries as a key mechanism to help organizations to improve. Explain briefly **three (3)** benefits of using BEFs.
(6 marks)

TERBUKA

- Q5** (a) Statistical Process Control (SPC) has been widely implemented for quality control in manufacturing industry. Beside control chart, describe the other **three (3)** SPC tools that involve variable data analysis. (6 marks)
- (b) Critical dimensions in hard disc drive manufacturing are monitored and controlled using control chart. Each plot in the control chart is taken based on data of four (4) measurement samples as summarized in **Table Q5 (b)**.
- (i) If the central line for X-bar is 195, propose the control limits. [Design parameter for X-bar is $A_2 = 0.729$] (7 marks)
- (ii) Based on the plotting of X-bar chart, discuss the quality condition of the critical dimensions (in-control and/or out-of-control). (7 marks)

Table Q5 (b): Assembly tasks information

Number of Subgroup Samples	X ₁	X ₂	X ₃	X ₄
1	131.0	184.8	182.2	212.8
2	181.3	193.2	180.7	174.3
3	154.8	170.2	168.4	174.4
4	157.5	154.2	169.1	161.9
5	216.3	174.3	166.2	184.3
6	186.9	180.2	149.2	185.0
7	167.8	143.9	157.5	194.9
8	178.2	186.7	142.4	167.6
9	162.6	143.6	132.8	177.2
10	172.1	191.7	203.4	196.3

TERBUKA

- Q6** (a) Briefly describe **three (3)** sources of variation in the production processes. (6 marks)
- (b) **Table Q6 (b)** shows the total defects of product A based on quality inspection at assembly line Y.

Table Q6 (b): Total defect of product A

No	Types of defects	Total
1	Short circuits	75
2	Wrong components	62
3	Damage components	135
4	Lost components	13
5	Others	15

Construct a Pareto Chart based on the data given in **Table Q6 (b)**.

(14 marks)

- END OF QUESTIONS -

TERBUKA

FINAL EXAMINATION

SEMESTER / SESSION : SEMESTER I /2016/2017
 COURSE : INDUSTRIAL ENGINEERING AND
 QUALITY MANAGEMENT

PROGRAM : 3 BNG/BNH/BNL/BNM
 COURSE CODE: BNJ 30403

EQUATIONS

$$f(x, y) = \sum_{i=1}^n w_i (|x - a_i| + |y - b_i|)$$

Average completion time = sum of total flow time / Number of jobs

Utilization = Total jobs processing time / sum of total flow time

Average number of jobs in the system = Sum of flow time/ Total processing time

$$UCL_R = D_4 \bar{R}$$

$$CL_{\bar{x}} = \bar{x} \pm A_2 \bar{R}$$

$$\bar{\bar{X}} = \frac{\sum \bar{X}}{g}$$

$$LCL_R = D_3 \bar{R}$$

$$StdTime = \frac{TotalNormalTime}{1 - Allowance}$$

$$\bar{R} = \frac{\sum R}{g}$$

$$NormalTime = Average\ cycle\ Time \times Rating$$

Standard Time, ST

$$= \frac{Total\ observation\ time}{Total\ output} \times Productive\ \% \times Rating \times \frac{1}{1 - allowance}$$

$$TM = \frac{\sum t}{c} Idle\ time = nc - \sum t Efficiency = \frac{\sum t}{nc} (100)$$

