



**UNIVERSITI KUALA LUMPUR
Malaysia France Institute**

**FINAL EXAMINATION
SEPTEMBER 2014 SESSION**

SUBJECT CODE : FID26102
SUBJECT TITLE : INDUSTRIAL MANAGEMENT
LEVEL : DIPLOMA
TIME / DURATION : 8.00 PM - 10.00 PM
(2.0 HOURS)
DATE : 9 JANUARY 2015

INSTRUCTIONS TO CANDIDATES

1. Please read the instructions given in the question paper **CAREFULLY**.
 2. This question paper is printed on both sides of the paper.
 3. Please write your answers on the answer booklet provided.
 4. Answer should be written in blue or black ink except for sketching, graphic and illustration.
 5. This question paper consists of **TWO (2)** sections. Section A and B. Answer **ALL** questions in Section A. For Section B, answer **TWO (2)** questions only.
 6. Answer all questions in English.
 7. Formulae is provided in the last page
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THERE ARE 5 PAGES OF QUESTIONS, EXCLUDING THIS PAGE

SECTION A (Total: 60 marks)

INSTRUCTION: Answer ALL questions.
Please use the answer booklet provided.

Question 1

Define Maintenance Management.

(3 marks)

Question 2

Objective of maintenance is to reduce cost. Name those two (2) costs.

(3 marks)

Question 3

Explain what is terotechnology?

(3marks)

Question 4

Distinguish between Mean Time To Failure (MTTF) and Mean Time Between Failure (MTBF).

(3 marks)

Question 5

Illustrate "Bathtub Curve" with label and explain briefly

(8 marks)

Question 6

Explain four (4) elements of Reliability

(8 marks)

Question 7

What is failure rate for a transformer, when its reliability is 0.955 for 5000 hours of operation?

(4 marks)

Question 8

Describe any two (2) of planned maintenance

(12 marks)

Question 9

Differentiate between Quality Control and Quality Assurance

(6 marks)

Question 10

Explain the purpose of the following quality tools

a) Pareto Chart

(5 Marks)

b) Ishikawa Diagram

(5 Marks)

SECTION B (Total: 40 marks)

INSTRUCTION: Answer only TWO questions.
Please use the answer booklet provided.

Question 11

- a) Calculate reliability for each RBD1 and RBD2. Determine which one has better reliability.

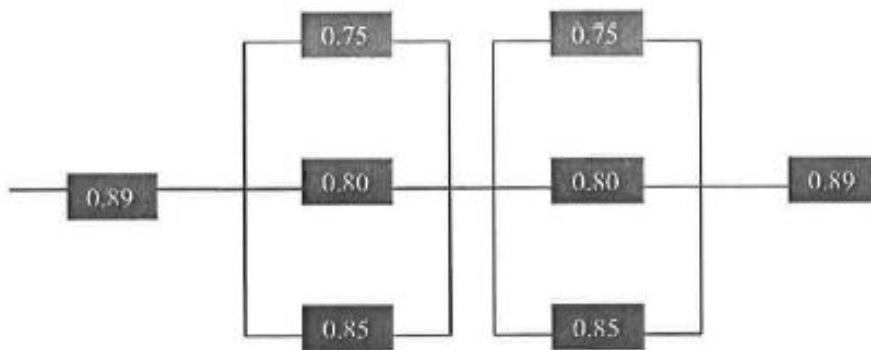


Figure 1:RBD1

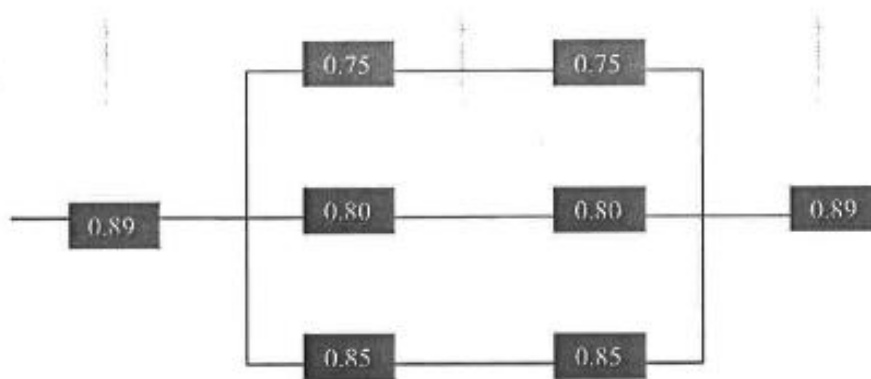


Figure 2:RBD1

(12 Marks)

- b) Six (6) components have been tested and failed after 45, 52, 58, 60, 74 and 65 hours respectively. Calculate:
- i. The failure rate
 - ii. MTBF
 - iii. Reliability if the component's operating time required at 30 hours.

(8 Marks)

Question 12

A small electronic device is designed to emit a timing signal of 10 milliseconds (ms). During the production of this device, subgroups of five units are taken and tested at periodic intervals. The results of inspection are shown in Table 1 below. The Constant for X bar and R Chart is given in Table 2.

Table 1 : Duration of automatic signal

Number of subgroup	Sample device				
	x1	x2	x3	x4	x5
1	188	158	200	205	220
2	199	211	178	169	201
3	205	210	198	189	187
4	250	220	214	187	221
5	203	209	205	220	218
6	193	200	241	235	197

Table 2 : Constant for X bar and R Chart

Sample Size <i>n</i>	X bar Chart <i>A2</i>	R Chart	
		<i>D3</i>	<i>D4</i>
3	1.023	0	2.574
4	0.729	0	2.282
5	0.577	0.076	2.114
6	0.483	0.136	1.924
7	0.419	0.187	1.684

- a) Calculate $\bar{\bar{X}}$ and $\bar{\bar{R}}$ (5 marks)
- b) Plot the X-bar chart (6 marks)
- c) Plot R Chart (6 marks)
- d) Analyze the control chart and give comment (3 marks)

Question 13

A lathe machine used in MFI Workshop is very efficient. Every week students are using the machine for 100 hours. Based on data in Table 3, calculate the machine:

- a) MTTF and MDT for one month. (10 marks)
- b) Reliability at operating condition (t) of 100 hours (5 marks)
- c) Availability (5 marks)

Table 3: Lathe Machine Breakdown Data

Duration	No of breakdown	Total Downtime
Week 1	5	60 minutes
Week 2	6	70 minutes
Week 3	7	80 minutes
Week 4	8	90 minutes

END OF QUESTION

Formulae

$$R \text{ (Series)} = R_1 \times R_2 \times \dots \times R_n$$

$$R \text{ (Parallel)} = [R_1 \times R_2 \times \dots \times R_n] + [R_1 \times R_2 \times \dots (1-R_n)] + [R_1 \times (1-R_2) \times \dots \times R_n] + [(1-R_1) \times R_2 \times \dots \times R_n]$$

$$R \text{ (Redundancy)} = 1 - [(1-R_1) \times (1-R_2) \times \dots (1-R_n)]$$

$$R = e^{-\lambda t} = e^{-t/u} \qquad \lambda = \frac{1}{\mu}$$

$$MTTF = \frac{Tup}{a} \qquad MDT = \frac{Tdm}{a}$$

$$A = \frac{Tup}{Tup + Tdm} \times 100\%$$

$$\bar{\bar{X}} = (\sum \bar{X}) / \text{number of samples}$$

$$\bar{R} = (\sum R) / \text{number of samples}$$

$$LCL = \bar{\bar{X}} - A_2 \bar{R}$$

$$UCL = \bar{\bar{X}} + A_2 \bar{R}$$

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

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