Document No : UniKL MFI_SD_AC41
Revision No: 02
Effective Date: 01 December 2008

CONFIDENTIAL

SET B

UNIVERSITI KUALA LUMPUR
Malaysia France Institute

FINAL EXAMINATION
JANUARY 2010 SESSION

SUBJECT CODE	:	FTB 43202
SUBJECT TITLE	:	FAILURE ANALYSIS
LEVEL	:	BACHELOR
TIME / DURATION	:	9.00am – 12.00pm (3 HOURS)
DATE	:	06 MAY 2010

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 THREE (3) questions only.
6. Answer ALL questions in English.

THERE ARE 2 PAGES OF QUESTIONS, EXCLUDING THIS PAGE.

SECTION A (Total: 40 marks)

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

Question 1

(a) Define a failure analysis

(5 marks)

(b) Determine 5 (five) causes of the failure.

(5 marks)

Question 2

Discuss the following methods in the failure analysis

(i) Site Visit
(ii) Visual Examination
(iii) Macroscopic and Microscopic Analysis
(iv) Chemical Analysis
(v) Report Writing

(10 marks)

Question 3

(a) Explain the Griffith`s theory as applied in fracture mechanism (5 marks)
(b) What the features observed as a result of ductile failure (5 marks)

Question 4

Explain the following testing used in determining the mechanical properties of the failed components:

(i) Tensile test
(ii) Impact test
(iii) Hardness test
(iv) Fracture toughness test

(10 marks)

SECTION B (Total: 60 marks)

INSTRUCTION: Answer THREE (3) questions only.

Please use the answer booklet provided.

Question 1

What is abrasive wear?. Explain the mechanisms of abrasive wear and what is protection can you offer to reduce the wear in the machine part?.

(20 marks)

Question 2

(a) Describe the difference in fracture mechanism between a aluminum alloy and glass material.

(b) What is intergranular corrosion? Describe the metallurgical condition that can lead to intergranular corrosion in an austenitic stainless steel.

(20 marks)

Question 3

(a) A hook on a two-leg chain broke while lifting a 500 ton load. Examination on the failed hook indicates considerable deformation and necking prior to failure. List some of possible reasons for the failure.

(10 marks)

(b) What is fatigue failure?. How would you determine the cause for the failure?.

(10 marks)

Question 4

The boiler tubes in a petrochemical furnace need to be inspected after two years of operation during shut-down program, Explain two metallurgical methods used to inspect the condition of the tubes without removing them from the furnace.

(20 marks)

END OF QUESTIO