Examination Period 3: 2017/18

**ENGM00818N**

Module Title  Condition Monitoring
Level  Seven
Time Allowed  Two hours

**Instructions to students:**

- Enter your student number **not** your name on all answer books.
- Answer **four** questions: **two** from **Section A** and **two** from **Section B**.
- All questions are equally weighted.
- Begin each question in a separate page; label each page clearly with the number of the question you are answering.
- The use of a non-programmable calculator is permitted.

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Section A

Answer two out of three questions.

Question 1

Machine condition prognosis is critical to assess the remaining life of a machine.

a. Discuss the role of tribology in machine condition prognosis and explain the tribo Diagnostic-Circle for advanced and reliable predictions.  
   (15 marks)

b. Identify some real applications of machine condition prognosis.  
   (10 marks)

Total: 25 marks

Question 2

Analysis of the lubricating oil is one of the most important condition monitoring techniques for rotating machinery.

a. Discuss the different types of sensor classification depending on the oil sampling point.  
   (10 marks)

b. Discuss three types of oil condition sensors and their working principle.  
   (15 marks)

Total: 25 marks

Question 3

Thermography is a matured and widely accepted condition monitoring tool where the temperature is measured in real time in a non-contact manner.

a. Which are the IR regions most commonly used in IRT and why?  
   (10 marks)

b. Explain the differences between active and passive thermography.  
   (5 marks)

c. List the different methods in thermography depending on how the heat is introduced into the structures.  
   (10 marks)

Total: 25 marks

End of Section A
Section B follows overleaf
Section B

Answer two out of three questions.

Question 4

a. Discuss, with critical awareness of practical problems, how an electrochemical monitoring technique could be taken from the laboratory to a field application to monitor corrosion or degradation of a coating system in service. (18 marks)

b. Explain your criteria for repair or failure. (7 marks)

(Total: 25 marks)

Question 5

a. Produce a short report demonstrating a critical understanding of the literature on how organic coating systems work to protect underlying substrate from corrosion. (15 marks)

b. You should consider the theory and mechanisms of corrosion protection when damage to the coating occurs. (8 marks)

c. Part of the report should identify suitable coating systems for a particular application. (2 marks)

(Total: 25 marks)

Question 6

a. Critically assess an electrochemical monitoring technique of your choice for an in-service application for stressed safety critical components. (15 marks)

b. Evaluate methodologies that could be used prior to production to screen candidate materials. Consider mechanisms and techniques for obtaining and treating data. (10 marks)

(Total 25 marks)

End of Section B
End of Paper