Summer Examinations 2016

ENGM00816N

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.
• The use of a non-programmable calculator is permitted.
• Students are permitted to remove this examination paper at the end of the examination.

No. of Pages 3
No. of Questions 6
Section A

Answer two out of three questions.

1. Maintenance costs, as defined by normal plant accounting procedures, are normally a major portion of the total operating costs in most plants. Explain the advantages, disadvantages and use of the different maintenance strategies. (25 marks)

2. Lubricants control friction and wear in a given system. The parameter that plays a fundamental role in lubrication is oil viscosity. Describe the concept of kinematic and absolute viscosity. (8 marks)

   Explain how temperature, pressure and shear rate could affect viscosity. (7 marks)

   Write a short report explaining the basic detection principles of an oil quality sensor. List the most relevant contaminants and factors that could affect the oil quality reading. (10 marks)

3. Explain the difference between physics-based and data-driven approaches to prognostics. If fault simulation is used to produce data, which approach does it fall into? (25 marks)

End of Section A
Section B follows overleaf
Section B

Answer two out of three questions.

Organic coatings are used to protect metal substrate in many engineering applications. In this scenario you have been tasked as a laboratory researcher with screening different coating systems for a heavy industrial application such as pipeline or civil engineering structure protection.

4. You will need to write a short report which explains how organic coating systems work to protect underlying substrate from corrosion. You will consider how the effects on corrosion protection due to damage of the coating can be minimised. You should also identify suitable coating systems for the screening. (25 marks)

5. Describe in detail how you would screen a selection of coating systems using two established laboratory techniques. At least one of the techniques should be an electrochemical procedure. In your report you will explain why you should use two techniques and compare them. Discuss hypothetical results from our screening tests with typical data values you might expect. How would you present your results and explain any inconsistencies in the data from the different techniques? (25 marks)

6. Describe how an electrochemical technique could be adapted from the laboratory to field application to monitor your candidate coating system once it goes into service. What will you be measuring and how will you decide on a criteria for repair or failure? (25 marks)

End of Section B
End of Paper