



UNIVERSITY OF RUHUNA

Faculty of Engineering

End-Semester 7 Examination in Engineering: July 2016

Module Number: ME7301

Module Name: Maintenance Management

[Three Hours]

[Answer all questions, each question carries 10 marks]

- Q1. a) Explain the purpose of practicing maintenance management in a production plant. [3.0 Marks]
- b) Discuss the interactions to be developed between the maintenance division and other divisions of a production plant in order to function as a service division facilitating the overall production process of the plant. [3.0 Marks]
- c) What are the common difficulties encountered by a maintenance division in conducting regular maintenance activities of a conventional production plant? [4.0 Marks]
- Q2. a) Briefly explain the term “Key Performance Indicators (KPIs)” and its purpose in maintenance management point of view. [3.0 Marks]
- b) State and define three KPIs related to maintenance management. [3.0 Marks]
- c) Discuss using examples, the difficulties in measuring or calculating KPIs in a real production plant, and possible errors in final KPI values as a result of such difficulties. [4.0 Marks]
- Q3. a) Briefly explain the benefits of using Condition Monitoring and Predictive Maintenance to minimise unplanned breakdowns in a production plant. [2.0 Marks]
- b) State four technologies that can be used to predict the condition of plant machineries. [2.0 Marks]
- c) Explain the process of implementing a predictive maintenance program in a production plant in order to minimise unplanned breakdowns. [6.0 Marks]
- Q4. a) Describe the “Failure Mode and Effect Analysis (FMEA)” in the context of effective maintenance of plant machinery. [3.0 Marks]
- b) Describe what is meant by “Root Cause Analysis (RCA)” and its importance to reduce recurrent breakdowns of plant machinery. [3.0 Marks]

- c) State the procedure to identify and rectify the recurrent breakdowns of critical machines in a production plant using FMEA, RCA and other relevant maintenance analysis techniques.

[4.0 Marks]

- Q5. a) Define the "Total Productive Maintenance (TPM)" concept.

[4.0 Marks]

- b) Assume that you are the newly appointed Maintenance Manager of a production plant. The existing plant maintenance system is said to be inefficient and machine related problems have negatively affected both the production output and its quality. Also, there is very limited cooperation between the maintenance and the production related divisions. In this background, explain how you will apply the TPM concept to improve the maintenance system of the plant to support the overall production process.

[6.0 Marks]

- Q6. a) Provide short descriptions on the following quality standards.

- i. ISO 9000
- ii. ISO 14000

[2.0 Marks]

- b) Briefly describe the steps of applying the 5S concept in an engineering workshop of a maintenance division.

[4.0 Marks]

- c) State possible difficulties in implementing a Kaizen culture in a production plant at the first time.

[2.0 Marks]

- d) Briefly explain two Non-Destructive Testing (NDT) techniques providing one suitable application of each.

[2.0 Marks]