



UNIVERSITY OF RUHUNA

Faculty of Engineering

End-Semester 7 Examination in Engineering: July 2017

Module Number: ME 7301

Module Name: Maintenance Management

[Three Hours]

[Answer all questions, each question carries 10 marks] -

- Q1. a) State at least five key challenges that come across in the implementation of maintenance practices/strategies in a medium-scale Sri Lankan manufacturing firm. [2.5 Marks]
- b) If you were newly appointed as the chief maintenance engineer of a medium-scale manufacturing firm [refer to Q1 (a)], discuss how you will overcome the challenges indicated Q1 (a). [5.0 Marks]
- c) As the newly appointed chief maintenance engineer, discuss how you will establish "Key Performance Indicators (KPIs)" to the organization mentioned in Q1 (a)? [2.5 Marks]
- Q2. a) State at least six ways of reducing the frequency and the severity of machine breakdowns in a manufacturing plant. [3.0 Marks]
- b) Describe the procedure for establishing a preventive maintenance program to maintain the machines in a manufacturing plant. Note: Assume that there are no prior preventive maintenance programs implemented. [3.0 Marks]
- c) State the procedure to identify and rectify the recurrent breakdowns of critical machines in a manufacturing plant using Failure Mode and Effect Analysis (FMEA), Root Cause Analysis (RCA), and other relevant maintenance analysis techniques. [4.0 Marks]
- Q3. a) Why it is important to establish a good maintenance communication system in a manufacturing organisation? [2.0 Marks]
- b) What are the communication methods generally used in maintenance management? [2.0 Marks]
- c) Prepare three sample documents used for communication in day-to-day maintenance activities. [6.0 Marks]

- Q4. a) Distinguish between idea generation schemes and Kaizen schemes. [3.0 Marks]
- b) How do you justify Kaizen as a Key performance indicator (KPI) in a production organization? [3.0 Marks]
- c) Briefly explain five possible ways of promoting a Kaizen scheme in a government or semi-government organization where performance based employee evaluations rarely persist. [4.0 Marks]
- Q5. a) Non-destructive Estimation (NDE) plays a key role in maintenance management to ensure the systems running smoothly. Explain the importance of NDE methods in plant maintenance. [4.0 Marks]
- b) Briefly explain six commonly used Non-destructive Testing methods and their use in practice. [6.0 Marks]
- Q6. a) Overall equipment effectiveness (OEE) is one of the key factors considered in measuring the effectiveness of Total Productive Maintenance (TPM). Briefly explain the five pillars of TPM. [4.0 Marks]
- b) A food item production line machine is operating in 12 hour shifts. Table 01 shows the average time consumed for special reasons within the 12-hour production schedule. It is known that the average quality loss is 25 units per shift from its nominal production of 500 units per shift. Average cycle time is 1 min.
- Calculate the Overall Equipment Efficiency (OEE 1) of the machine.
 - Draw the Overall Equipment Efficiency Chart (based on OEE 1).
 - Calculate the percentage of unaccounted losses exists in this production operation?
 - Calculate the OEE loss due to breakdowns.
- [6.0 Marks]

Table 01

Description	Time (min)
Tea and Meals	60
Preventive Maintenance	30
Breakdown	60
Change over time	15