The Open University of Sri Lanka
Faculty of Engineering Technology
Department of Mechanical Engineering

Study Programme	:	BTech Hons in Engineering
Name of the Examination	:	Final Examination
Course Code and Title	:	**DMX 5211 Plant Maintenance**
Academic Year	:	2020-2021
Date	:	08 February 2022
Time	:	1400-1700 hrs
Duration	:	3 hours

General instructions

1. Read all instructions carefully before answering the questions.
2. This question paper consists of 07 questions. All questions carry equal marks.
3. Answer any 05 questions only.
4. Use the table attached at the end of the question paper to answer Q3.

Q1.

(a) "In any industry, maintenance cannot be treated in isolation from the production function". Do you agree with the statement? If agree /not agree, justify your answer giving suitable examples.

(4 marks)

(b) Draw a typical Failure Curve (Bath-Tub Curve) for a mechanical component and mark the different phases.

(6 Marks)

(c) Give reasons for failure in each of the phases mentioned in part(ii)

(6 Marks)

(d) Distinguish between 'Schedule Maintenance" and "Corrective Maintenance".

(4 Marks)

Q2.

(a) What is Condition Based Maintenance? (3 Marks)

(b) List down four possible parameters to gauge the state of a piece of equipment. (4 Marks)

(c) Proper planning and avoiding delays increases the resource availability. As a Maintenance Manager, explain the possible action you could do for utilizing resources efficiently. (6 Marks)

(d) Pollution prevention is a task of the maintenance department in many organizations. How does the Plant Operation and Plant Maintenance contribute to air pollution? (4 Marks)

(e) What are the common methods of solid waste disposal employed in the industry? (3 Marks)

Q3.

(a) What are the main reasons for mechanical friction between surfaces? (3 Marks)

(b) Compare Boundary lubrication and Hydrodynamic lubrication. (4 Marks)

(c) Name and discuss three functions of lubricating oil. (4 marks)

(d) What are the properties that a lubricant should possess? (3 Marks)

(c) Lubricant application techniques and the frequency of application vary according to type of lubricant, load, speed, accessibility, cost etc. Mention the usage of the following application techniques.

(i). Oil Bath Lubrication.

(ii). Splash System for Oil Lubrication.

(iii). Drip Lubrication.

(6 Marks)

Q4.

(a) Consideration should be given when designing and constructing buildings in order to prevent the spread of fire. Explain three factors that affect the spread of a fire in a building.

(3 Marks)

(b) What is meant by spontaneous risk in relation to industrial hazards?

(3 Marks)

(c) List down four processes in which spontaneous risks can be found.

(4 Marks)

(d) Explain three main precautions to be observed when working with Flammable and Dangerous Metals.

(6 Marks)

(e) Fixed firefighting systems use two types; Sprinkle and foam systems. Explain how these systems are activated?

(4 marks)

Q5.

(a) What are the common causes for overheating of bearings?

(4 marks)

(b) Internal clearance between rolling elements and the raceway is kept at higher than normal at some instances. Explain two reasons to maintain higher clearance than designated amount?

(4 Marks)

(c) List down three properties of bearing material and explain the importance of the mentioned properties in the case of sliding bearings.

(6 Marks)

(d). Discuss the factors that need to be considered when deciding the relubrication interval of bearings.

(3 Marks)

(i) Proper storage of bearings is an important factor to be considered in maintenance. Explain the conditions to be maintained in bearing storage.

(3 Marks)

Q6.

(a) Explain Total Productive Maintenance (TPM) methodology of working. What are the outcomes of implementing TPM within an organization?

(4 Marks)

(b) TPM is focused on eliminating causes of wastage of time and resources. Explain three actions you may consider for eliminating these causes.

(6 Marks)

(c) Reliability engineering is a major responsibility of a maintenance-engineering group. Explain the maintenance group's responsibilities in reliability engineering.

(4 Marks)

(d). As part of a predictive maintenance program, ultrasonic instruments are used for three primary applications. Explain these applications giving an example for each (6 Marks)

Q7. Write short notes on **any four** of the following; (5 Marks each)

(a) Fault tracing.

(b) Machine condition monitoring.

(c) Predictive vs corrective maintenance methods.

(d) TPM adoption challenges.

(e) Maintenance cost and predictive maintenance.

(f). Usage of Vent Pipes in a drainage system.

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