M.E. PRODUCTION ENGG. FIRST YEAR SECOND SEM. EXAM. 2024

MAINTENANCE ENGINEERING AND TEROTECHNOLOGY (PM)

Time: Three Hours **Full Marks: 100**

Answer any **FIVE** questions.
All parts of a question *(a, b, c* etc) should be answered at one place.

1.a) Define the term 'Terotechnology' and develop the circular model showing the main functions of Tecrotechnology.

b) Define the terms MTBF, MTTR and availability factor. Find an expression for availability relating it to MTBF and MTTR.

c) Define the term maintainability and state how maintainability of a plant can be increased.

8+8+4= 20

2.a) What are the characteristics advantages of 'decision tree' of Failure Modes & Effects Analysis (FMEA)?

b) Describe briefly the methodology used for the construction of FMEA or FMECA.

c) Discuss the procedural steps practiced in industries regarding implementation of TPM.

5+5+10=20

3.a) Draw the bathtub curve for a typical mechanical system. Identify probability density functions in this curve.

b) Develop a bathtub curve to show how Weibull distribution can be suitably used for depicting the hazard rate of a system?

c) Three non-identical motors are connected in series configuration. The failure rates of the first and second motor are 0.0007 and 0.0009 failures/hr respectively. The reliability of a system for a 1000 hr mission time is calculated as 0.45. Determine the failure

rate of the third motor and the MTTF value for the system.

6+6+8=20

4.a) What is the life cycle costing of a plant? State various components of life cycle cost of plant.

b) What is the techno-economic life of a plant? Derive the mathematical expression for techno-economic life of a plant considering reliability effort function.

(2+6)+(2+10) = 20

5.a) Distinguish between breakdown and preventive maintenance. Discuss their usefulness in plant maintenance.

b) Determine the MTTF of a system having 'n' number of stand-by components.

c) Defining repair limit explain how the repair limit can be expressed when the maintenance cost follows a power function.

6+4+10= 20

6.a) What is the impact of terotechnology on the maintenance management?

b) Discuss different types of maintenance policies.

c) How the effective maintenance policy is selected for plants and equipment with the help of a decision tree?

5+5+10= 20

7.a) What are the advantages of condition monitoring?

b) Discuss about the different types of condition monitoring methods.

6+14= 20

8.a) Explain the various levels of condition monitoring.

b) Why Health and Usage Monitoring (HUM) is required in industry? Explain how the integration between Health and Usage is being made in practice.

10+10= 20

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