

M.E. PRODUCTION ENGINEERING FIRST YEAR SECOND SEM. EXAM 2018

MAINTENANCE ENGINEERING AND TEROTECHNOLOGY

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) What are the various types of maintenance strategies? State the conditions when breakdown maintenance is preferred to preventive maintenance.
- c) Define the term maintainability and state how maintainability of a plant can be increased.

8+8+4= 20

- 2.a) Using Markov chain model determine the availability of a plant.
- b) Defining redundancy show various configurations of redundancy used for increasing the reliability of a system.

10+10= 20

- 3.a) Draw the bath-tub curve for a typical mechanical system. Identify probability density functions in this curve.
- b) Derive the optimal inspection frequency for a system so as to enhance the profitability criteria.
- 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) State various maintenance indices as required for higher-level of managerial decision making.

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 various levels 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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