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10MT82

Reliability and Fault Tolerance

Time: 3 hrs.

Max. Marks:100

Note: *Answer any FIVE full questions, selecting atleast TWO questions from each part.*

PART - A

1 a. Explain in detail failure and failure modes of reliability using "Bath tub Curve". **(08 Marks)**
   b. Define Maintainability, Failure frequency and Availability. **(06 Marks)**
   c. Trial data showing that 105 items failed during a test with a total operating time one million hours (for all item i.e both failed and passed). Find the reliability of product after 1000 hr. **(06 Marks)**

2 a. Explain Redundancy techniques of design for reliability. **(07 Marks)**
   b. Describe Failure modes , Effects and Criticality Analysis (FMECA). **(06 Marks)**
   c. Explain Root cause analysis briefly. **(07 Marks)**

3 a. Define critical maintenance and explain basic model of maintenance system. **(06 Marks)**
   b. Briefly describe preventive maintenance. **(06 Marks)**
   c. Obtain relationship between reliability and failure. **(08 Marks)**

4 a. Write short notes on : i) Trend monitoring   ii) Lubrication maintenance. **(12 Marks)**
   b. Describe Top – down Bottom Up (TIBU) approval to the formulation of maintenance strategy. **(08 Marks)**

PART - B

5 a. Explain failure masking by redundancy. **(07 Marks)**
   b. Elucidate common mode failure. **(07 Marks)**
   c. Describe allocating failure rates to subassemblies and components. **(06 Marks)**

6 a. Explain briefly Fault tolerant control system and automatic fault management system. **(12 Marks)**
   b. Explain about Fault tolerant actuator with suitable diagram. **(08 Marks)**

7 a. Define Fault tree and how fault tree can be constructed. **(08 Marks)**
   b. Describe Product and equipment hazards. **(06 Marks)**
   c. Briefly explain fault classification. **(06 Marks)**

8 Draw Fault tree for the coolant supply to heat exchanger as shown in fig. Q8. Here the top event is loss of minimum flow to the heat exchanger. **(20 Marks)**
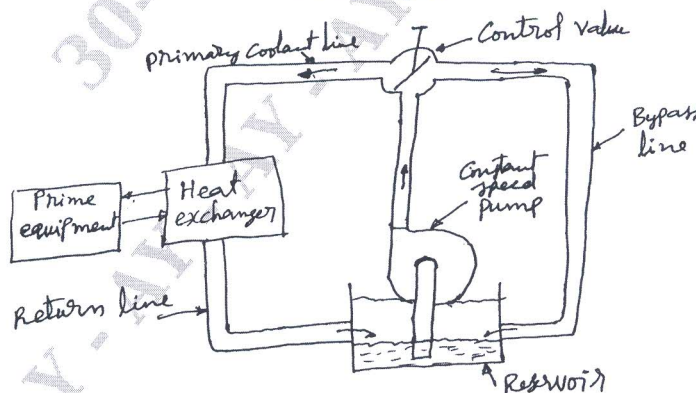

Fig.Q8
Coolant Supply System
diagram

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