

**B.Tech. MECHANICAL ENGINEERING  
(COMPUTER INTEGRATED  
MANUFACTURING)**

**Term-End Examination**

**June, 2016**

00890

**BME-025 : CONDITION MONITORING AND  
MAINTENANCE ENGINEERING**

*Time : 3 hours*

*Maximum Marks : 70*

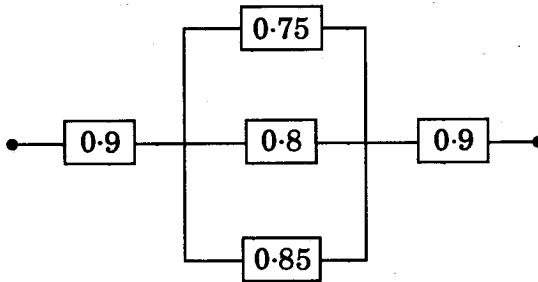
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*Note : Answer any ten questions. All questions carry equal marks. Use of scientific calculator is allowed.*

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1. (a) Explain the different functions of Plant Engineering and Management.
- (b) Describe the systematic procedure by top down-bottom up approach. 7
  
2. (a) Write down the procedural steps of scheduling the preventive maintenance.
- (b) What is A-B-C analysis ? Explain the step-by-step method to conduct the A-B-C analysis. 4+3

3. A complex mechatronics system consisting of sensor gadgets has MTBF of 150 hours and MTTR of 180 minutes. Find the availability. 7
4. The reliability of a system is estimated at 0.76. On application of condition monitoring techniques the reliability of the system is found to be improved to 0.88. Find the reliability improvement factor (RIF) and give your comments on its probability of failures. 7
5. Find the reliability of the following combination of the components whose reliabilities are shown in the blocks of the diagram : 7



6. An electronically controlled system has 150 elements and each has MTBF of 15000 hours. Its cumulative operating time is two hours. Calculate the following : 7
- The probability of failure
  - The probability of failure if the elements are grouped as a set of 20 each in a redundant manner
  - The Reliability Improvement Factor (RIF)

7. The failure rate of a mechanical watch is 0.0005 failures per hour. Calculate the Mean time to failure (MTTF).

7

8. What do you understand by FMECA ? What are the steps in basic analysis procedure of FMECA ? Distinguish between design FMEA and process FMEA.

7

9. A printer has one printing press, one binding machine and manuscripts of six books for publication. The duration required (in days) for printing and binding the books are given below :

Book	1	2	3	4	5	6
Printing time (days)	30	120	50	20	90	110
Binding time (days)	80	100	90	60	30	10

In what order should the books be selected so as to minimize the total duration to publish all the books ? In how much time will the printing and binding of all the books be completed ?

7

10. A manual stamper currently valued at ₹ 1,000 is expected to last 2 years and costs ₹ 4,000 per year to operate. An automatic stamper which can be purchased for ₹ 3,000 will last for 4 years and can be operated at an annual cost of ₹ 3,000. If money carries the rate of interest 10% per annum, determine which stamper should be purchased.

7

11. What is Kaizen ? Explain briefly different methods or approaches of Kaizen.

7

12. The cumulative operating time is found to be 60 hours in a system consisting of 120 components each having mean time between failures (MTBF) of 6000 hours. Find the reliability of the system.

7