01757

BACHELOR OF TECHNOLOGY IN MECHANICAL ENGINEERING (COMPUTER INTEGRATED MANUFACTURING)

Term-End Examination

December, 2010

BME-025 : CONDITION MONITORING AND MAINTENANCE ENGINEERING

Time :-3 hours *Maximum Marks : 70*

Note : *Answer **any seven** questions. Use of calculator is permitted.*

1. (a) Explain the objectives of plant engineering and management. **2x5=10**

   (b) Discuss the advantages and disadvantages of centralised plant engineering department.

2. (a) What are breakdown maintenance and emergency maintenance ? How do you differentiate these two ? **2x5=10**

   (b) Processing times (including set-up times) and due dates for five jobs waiting to be processed at a work centre are given in the following table.

Determine the sequence of jobs, the average flow time, average job lateness and average number of jobs at the work centre, for each of these rules :

(i) Shortest processing time (SPT).

(ii) Earliest due date (EDD).

Job	Processing time (Days)	Due date (Days from now)
A	12	15
B	6	24
C	14	20
D	3	8
E	7	6

3. (a) What is A - B- C Analysis ? Explain the step-by-step method to conduct the A - B-C analysis. **2x5=10**

(b) Explain any five NDT techniques to estimate the condition of the equipment.

4. (a) Explain different types of maintenance giving suitable example. Suggest an organisation structure for the maintenance department of a medium sized company. **2x5=10**

(b) There are seven jobs (given in the table below), each of which has to go through machines A and B in that order. The processing time is in hours.

Job	1	2	3	4	5	6	7
Machine A	3	12	18	6	10	11	9
Machine B	8	10	15	7	12	1	3

Determine the sequence of jobs that will minimize the total time for completion of all the jobs.

5. (a) Give two examples (with supporting details) for each of a service and manufacturing firm, of the impact of technology in service and product design. **2x5=10**

(b) Explain the applications and merits of FMEA/FMECA.

6. (a) Discuss various techniques employed for monitoring the condition of the equipment. **2x5=10**

(b) The cost of a machine is Rs 6100 and its scrap value is only Rs 100. The maintenance costs are found from experience to be as given below.

Year	1	2	3	4	5	6	7	8
Maintenance cost (Rs)	100	250	400	600	900	1200	1600	2000

When should the machine be replaced ?

7. (a) What is the significance of data collection in reliability studies of repairable equipment? How can you make use of failure data of equipment ? **2x5=10**

(b) There is a special light bulb that never lasts longer than 2 weeks. There is a chance of 0.30 that a bulb will fail at the end of first week. There are 100 new bulbs initially. The cost for individual replacement is Rs 1.25 and the cost per bulb for group replacement is Re 0.50. Is it cheaper to replace all the bulbs.

(i) individually

(ii) every week, and

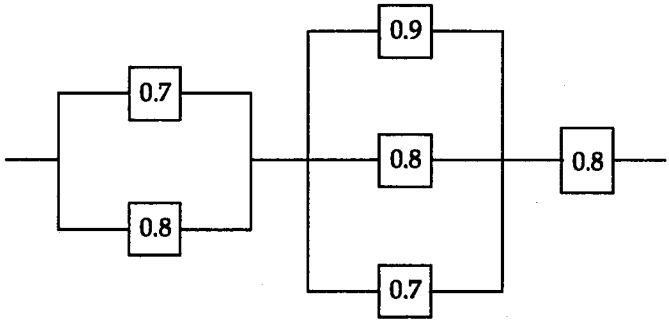
(iii) every second week.

8. (a) Describe in brief the design of reliability of repairable equipment. **2x5=10**

(b) In a reliability analysis, it is found that the data is fit in 2 - parameter Weibull distribution with the shape parameters as 1.5 and scale parameter as 4.2. Design the reliability in terms of characteristic life, optimal life, B1 life, T (median) and T (mode).

9. (a) The cumulative operating time is found to be 200 hours in a system consisting of 200 components each having MTBF of 20000 hours. Find the reliability of the system. **2x5=10**

(b) Find the reliability of the following combination of the components whose reliabilities are shown in the blocks of the diagram.



10. (a) Explain the role and focus of Kaizen on Total productive maintenance (TPM). **2x5=10**

(b) An electronically controlled system has 150 elements and each has MTBF of 15000 hours .It's cumulative operating time is two hours Calculate the following :

(i) The probability of failure.

(ii) The probability of failure if the elements are grouped as a set of 15 each in redundant manner.

(iii) The Reliability improvement factor (RIF).