

(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 187852 Roll No.

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B.Tech.

(SEM.VIII) THEORY EXAMINATION 2013-14

MAINTENANCE ENGINEERING & MANAGEMENT

EME052

(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 140852 Roll No.

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B.Tech.

(SEM.VIII) THEORY EXAMINATION 2013-14

MAINTENANCE ENGINEERING & MANAGEMENT

Time : 3 Hours

Total Marks : 100

Note : Attempt all questions.

1. Attempt any **four** parts of the following : **(5×4=20)**
 - (a) Define maintenance and its objectives.
 - (b) Explain how reliability is related with maintainability.
 - (c) Describe operating life cycle with suitable example.
 - (d) An electronic system consists of three units connected in series with failure rate of 25 failures/ 10^6 h, 30 failures/ 10^6 h and 15 failures/ 10^6 h respectively. The equipment is to operate for 1000 h. What is the probability of survival of this equipment ?

- (e) What do you mean by standby unit and explain how it enhances the overall system reliability?
- (f) Derive the expression for parallel combination of two unit.

$$MTBF = \frac{1}{\lambda} \sum_{i=1}^n \frac{1}{i}$$

where λ = failure rate and n are the numbers of redundant components connected in parallel.

2. Attempt any **four** parts of the following : **(5×4=20)**
- (a) What is preventive maintenance and how does it differs from breakdown maintenance ?
- (b) Describe briefly the following decision policies related to preventive maintenance :
- (i) Optimal frequency of inspections
 - (ii) Optimal frequency of preventive maintenance.
- (c) Describe the nature of corrective maintenance workload.
- (d) What do you mean by condition monitoring ?
- (e) Explain the concept of zero breakdowns. List down the four phases for realizing it.
- (f) Explain the salient features of TPM (Total Productive Maintenance).
3. Attempt any **two** parts of the following : **(2×10=20)**
- (a) Describe the replacement polices for the following :
- (i) Equipment which deteriorates gradually
 - (ii) Items which are non-repairable

- (b) A machine X costs Rs. 5000. Its maintenance cost is Rs. 1000 in each of the first four years and then it increases by Rs. 200 every year. Assuming that the machine has no salvage value and the maintenance cost is incurred in the beginning of each year. Determine the optimal replacement time for the machine assuming time value of money is 10% per annum.
- (c) A machine M, costing Rs. 9000 has a maintenance cost of Rs. 200 in the first year of its operation which rises by Rs. 2000 in each of the successive years from its just previous year. Assuming that the machine replacement can be done only at the end of a year, determine optimal life span at which the machine be replaced.

4. Attempt any two parts of the following : (2×10=20)

- (a) Explain how an optimal solution is found out in an assignment problem.
- (b) A firm has a single machinist in repair shop. He works 8 hrs/day and on average 4 machines breakdown a day. It takes on an average one hour to repair a machine. Determine :
- (i) The expected number of machines in the repair shop.
 - (ii) The expected number of machines on which the machinist has not started to work.
 - (iii) The average down time per machine.
 - (iv) The average time a machine waits for service.
- (c) Define PERT and its significance in maintenance planning.

5. Attempt any **four** parts of the following : **(5×4=20)**
- (a) Discuss the determination of a maintenance plan for a productive system.
 - (b) Describe briefly the maintenance control.
 - (c) Describe the salient features of manpower planning and control for maintenance organization.
 - (d) State the various indices for evaluating the efficiency of maintenance functions in an organization.
 - (e) Write short note on spare parts planning.
 - (f) Write short note on maintenance policies used in a plant.