LIB
17/12/13 FN

Reg. No. : | | | | | | | | | | | | |

Question Paper Code : 81164

M.E. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2013.

Elective

CAD/CAM

CC 9259/10222 CDE 53/QE 950 — MAINTENANCE ENGINEERING AND MANAGEMENT

(Regulation 2009/2010)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What are the objectives of maintenance engineering?

2. What is the difference between maintenance and maintainability?

3. What are the reasons for replacement?

4. What are the elements of preventive maintenance?

5. What are the methodologies to determine the maintenance crew size in break down maintenance?

6. List the important human errors in engineering maintenance?

7. What are the causes of equipment reliability problems?

8. What is the five zero concept in maintenance management?

9. What is availability?

10. What are the five elements of TPM?

PART B — (5 × 16 = 80 marks)

11. (a) (i) Explain the various costs associated with maintenance. (6)

(ii) What are the types of maintenance? Explain them in brief. (10)

Or

(b) (i) Briefly explain the need for Tero technology. (8)

(ii) Briefly explain the functions of maintenance department. (8)

12. (a) (i) Explain various maintenance policies with their applications. (8)

(ii) The purchase price of a machine is Rs. 52,000. The installation charges amount to Rs. 14,400 and its scrap value is Rs. 6400. The maintenance cost in various years is given in table 12 (a). (8)

Table 12(a)

Year	1	2	3	4	5	6	7	8
Maintenance cost (Rs.)	600	800	1050	1400	2100	3500	5000	6800

Is it worth buying the machine?

Or

(b) A manufacturer is offered two machines A and B. A has cost price of Rs. 2,500. Its running cost is Rs. 400 for each of the first 5 years and increases by Rs. 100 every subsequent year. Machine 'B' having the same capacity as 'A' costs Rs. 1,250 and has a running cost of Rs. 600 for 6 years, increasing by Rs. 100 per year thereafter. If money is worth 10% per year, which machine should be purchased? Scrap value of both the machines are assumed to be negligible. (16)

13. (a) In a machine shop, the failure rate of machines follows Poisson process with a mean failure rate of 16 machines/day. The maintenance time of the breakdown machines follows negative exponential distribution with a mean service time of 20 minutes/machine The cost of down time of a machine is Rs. 3,000/hour The wage of the maintenance mechanic is Rs. 100/day. Find the optimum number of mechanics to be assigned for maintenance work such that the sum of the cost of downtime of the machines and cost of mechanic is minimized. Assume eight hour per shift and one shift per day. (16)

Or

(b) (i) Briefly explain the guidelines for reducing the human error in maintenance. (8)

(ii) A piece of equipment has 30 parts of a specific type with a failure rate of 20 failures per million hours of operation. Assume that the equipment is operated continuously throughout the day and night and the spares are restocked every 4 months. Calculate the probability of having a spare part available when required, if only 4 spare parts are carried in inventory. (8)

14. (a) Briefly explain the following :

(i) FMECA (8)

(ii) Design for maintainability. (8)

Or

(b) Briefly explain the following :

(i) Four major components of Reliability Centered Maintenance (RCM) (8)

(ii) Define the following indexes associated with RCM

(1) Emergency percentage index (3)

(2) Maintenance overtime percentage index (3)

(3) Equipment availability (2)

15. (a) Define TPM. Explain the stages of TPM? (16)

Or

(b) Explain the following :

(i) Autonomous maintenance (8)

(ii) OEE (8)
