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Register No. :

Name of the Candidate:

DIPLOMA EXAMINATION, 2010

(MAINTENANCE ENGINEERING AND MANAGEMENT)

(PAPER – IV)

**140. QUANTITATIVE TECHNIQUES IN MAINTENANCE
MANAGEMENT**

December)

(Time: 3 Hours

Maximum: 100 Marks

Use of Statistics tables permitted

SECTION – A

Answer any TWO questions

(2×20=40)

All questions carry equal marks

1. Explain the different types of maintenance in detail. (20)
2. a) Describe the role of inventory management in maintenance. (10)
b) Discuss the application of waiting line theory in maintenance. (10)
3. Explain the different types of spares used in maintenance. (20)
4. a) Discuss the purpose of reliability engineering in maintenance. (10)
b) With suitable example and sketches, explain the different types of system reliability configuration. (10)

SECTION – B

Answer any THREE questions

(3×20=60)

All questions carry equal marks

5. A repairman is to be hired to repair machines, which break down at an average rate of 3 per hour. The breakdowns follow Poisson distribution. Non-productive time of machine is considered to cost Rs.16 per hour. Two repairmen have been interviewed; one is slow but cheap, while the other is fast but expensive. The slow repairman charges Rs.8 per hour and he services machines at the rate of 4 per hour. The fast repairman demands Rs.10 per hour and he services at an average rate of 6 per hour. Which repairman should be hired? Assume an 8 hour working day. (20)

6. A firm is thinking of replacing a particular machine whose cost price is Rs.12,200. The scrap value of the machine is Rs.200/-. The maintenance costs are found to be as follows:

[continued....]

Year	1	2	3	4	5	6	7	8
Maintenance Cost in Rs.	220	500	800	1200	1800	2500	3200	4000

Determine when the firm should get the machine replaced. (20)

7. A maintenance project is composed of 7 activities whose time estimates are listed below.

Activities	Times in weeks		
	t_0	t_m	t_p
1-2	1	1	7
1-3	1	4	7
1-4	2	2	8
2-5	1	1	1
3-5	2	5	14
4-6	2	5	8
5-6	3	6	15

1. Draw the network
 2. Calculate the expected variances for each activity
 3. Find the expected project completed time
 4. Calculate the probability that the project will be completed at least 3 weeks than expected
 5. If the project due date is 18 weeks, what is the probability of not meeting the due date?
8. a) Explain how the simulation is useful in crew and equipment planning. (10)
 b) Write short notes on the following terms (2×5=10)
 (i) MTTF ii) MTBF
9. Explain the various steps to be followed in failure mode and effect analysis. (20)
10. Write short notes on the following: (4×5=20)
 i) Markov chain in maintenance
 ii) Availability and maintainability
 iii) Total productive maintenance
 iv) Fault tree analysis
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