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Roll No

MMPD-202**M.E./M.Tech., II Semester**

Examination, December 2014

Reliability Engineering and Quality Management*Time : Three Hours**Maximum Marks : 70***Note:** Attempt any five questions. All questions carry equal marks.

1. In a fatigue test, the weibull parameters are obtained as the shape parameter $\beta = 1.5$, Scale parameter $\alpha = 5,600$ cycles and location parameter $\gamma = 0$. Determine the reliability at the end of 9000 cycles of operation what is the MTTF? 14
2. A life test is performed on brake pedals by an automobile manufacturer. The number of cycles to failure is the criterion used. A random sample of 40 units is tested and failed units are immediately replaced. The test is stopped after 10,000 cycles, 4 units failed at 1550, 4320, 6,540 and 7930 cycles. Estimate the mean time to failure and find a 95% confidence interval for the MTTF. 14
3. The following data was collected for an automobile: 14
 - Mean time between failures = 500 hr
 - Mean waiting time for spares = 5 hr
 - Mean time for repairs = 48 hr
 - Mean administrative time = 2 hr
 Compute the availability of the automobile.

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4. a) What is the meaning of quality of conformance? Explain the factors which influence the quality of conformance? 7

b) State the various stages which need to be controlled for ensuring proper quality of product and for ensuring improvement in quality. 7
5. Control charts for \bar{X} and R are maintained on certain dimensions of a manufactured part, measured in mm. The subgroup size is 4. The values of \bar{X} and R are computed for each subgroup. After 20 subgroups $\Sigma\bar{X} = 412.83$ and $\Sigma R = 3.39$. Compute the values of 3 sigma limits for the \bar{X} and R charts and estimate the value of σ' on the assumption that the process is in statistical control. 14
6. a) State and explain the advantages and limitations of acceptance sampling over 100% inspection. 7

b) Compare random sampling and stratified sampling? 7
7. Design a sequential sampling plan for the following specifications: 14
 - $\alpha = 0.05$, $P_1 = 0.10$
 - $\beta = 0.20$, $P_2 = 0.30$
 Also compute:
 - i) Average outgoing quality when $P' = P_1$
 - ii) Minimum number of items inspected for accepting the lot.
 - iii) Minimum number of defectives for rejection of the lot.
8. a) Describe Ishikawa's contribution to TQM? 7

b) Define T.Q.M. Explain how T.Q.M. can be ensured? 7
