B.E.(with Credits)-Regular-Semester 2012-Mechanical Engineering Sem V

ME502 - Metrology and Quality Control

P. Pages : 2 **GUG/S/18/3798**

Time : Three Hours * 0 9 3 8 * Max. Marks : 80

Notes : 1. All questions carry marks as indicated.
2. AnswerQ.1 or 2, 3 or 4, 5 or 6, 7 or 8, 9 or 10.
3. Due credit will be given to neatness and adequate dimensions.
4. Assume suitable data wherever necessary.
5. Illustrate your answers wherever necessary with the help of neat sketches.
6. Use of non-programmable calculator is permitted.

1. a) Explain Tolerance, Allowance and fundamental deviation. **8**

b) Explain clearance fits with various types. **8**

OR

2. a) Design General type of Go and No-Go gauge for $60H_8d_9$. **12**

b) Explain unilateral and bilateral system of tolerances. **4**

3. a) Explain Zeiuss opto test comparator. **8**

b) How optical comparator are better than mechanical? Explain. **8**

OR

4. a) Define straightness. Describe optical flat used for measuring straightness. **8**

b) Explain two wire method for measurement of thread. **8**

5. A machine is working to a specification of 12.58 ± 0.05 MM . A study of 50 consecutive pieces shows the following measurements. **16**

1	2	3	4	5	6	7	8	9	10
12.54	12.58	12.61	12.57	12.57	12.58	12.60	12.65	12.60	12.65
12.58	12.57	12.60	12.61	12.60	12.59	12.62	12.57	12.59	12.61
12.62	12.60	12.64	12.56	12.62	12.59	12.61	12.57	12.60	12.60
12.56	12.60	12.58	12.59	12.61	12.56	12.67	12.56	12.63	12.62
12.59	12.61	12.64	12.59	12.58	12.57	12.60	12.61	12.56	12.62

1) Determine the process capability.
2) Determine $\bar{x}$ and R control limits.
3) State wether the machine is capable of meeting the tolerances.
4) Calculate % defective, if any.
5) Suggest possible ways by which the percent defective can be reduced. ($A_2 = 0.58$, $D_4 = 2.11$, $D_3 = 0$)

Assume –
1) Normal distribution.
2) d_2 for subgroup size 5 is 2.326.

OR

6. a) 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 subgroup $\Sigma\bar{x} = 412.83$ 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. ($d_2 = 2.059$, $D_3 = 0$, $D_4 = 2.28$) **10**

b) Define Quality Assurance. What are its main functions. **6**

7. a) Describe in details various types of quality audits. **8**

b) Explain ISO 9000. **8**

OR

8. a) Explain characteristics of OC curve. **8**

b) Explain sampling plan. **8**

9. a) Explain Milling fixtures. **8**

b) Describe Jig bushes with neat sketches. **8**

OR

10. a) What do you mean by fixtures? What are the various factors to be consider in designing milling fixtures? Give advantages of using milling fixtures. **8**

b) Explain principles of locations of Jigs and fixtures with suitable examples. **8**

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