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Total Number of Pages: 02

B.Tech
PEME5405

**7th Semester Regular / Back Examination 2017-18
METROLOGY, QUALITY CONTROL AND RELIABILITY**

BRANCH: MECH

Time: 3 Hours

Max Marks: 70

Q.CODE: B417

**Answer Question No.1 which is compulsory and any five from the rest.
The figures in the right hand margin indicate marks.**

Q1 Answer the following questions: (2 x 10)

- Differentiate hole basis and shaft basis system of fits.
- Define the 'airy points' and the points of minimum deflection.
- What do you understand by line and end standards?
- Distinguish maintainability and availability.
- Write two important causes of variation.
- what elements of gears are checked for accuracy?
- What is Taguchi loss function?
- What do you mean by parametric design?
- Briefly explain about system reliability?
- Explain briefly bath tub curve

Q2 Design the general type of GO and NO GO gauge for component (10)
having 30H7/f8 fit. Given that

- $i = 0.453\sqrt[3]{D} + 0.001D$
- Upper deviation of 'f' shaft = $-5.5D^{0.41}$
- 30mm falls in the diameter step of 18-30mm.
- IT7 = 16i
- IT8 = 25i
- Wear allowances is 10 percentage of gauge tolerances.

Q3 a) Discuss about the different reasons for the occurrence of systematic errors. (5)

b) With an example explain how end standards are derived from the line standard. (5)

Q4 a) Define surface roughness. Describe different methods used for measuring surface roughness. (5)

b) A process has a good control when controlled between 3-sigma control limits of 118 and 124. The sample size is 4. (5)

- What is the standard deviation of the process?
- What are the control limits on R-chart?

Q5 a) Discuss the signal to noise ratio. How is it used in the taguchi method? what is an adjustment parameter and how it is used? **(5)**

b) Using Markov model briefly explain the availability of single repairable system. **(5)**

Q6 a) Explain about different types of acceptance sampling plans. **(5)**

b) Name the important elements of thread which are required to be measured in order to determine the accuracy of screw threads. Describe in brief how the errors in these elements affect the working of the threaded elements. **(5)**

Q7 Draw OC and AOQ curves for $n=200$, $c=2$ and determine AOQL **(10)**

Q8 Write short answer on any TWO: **(5 x 2)**

a) Curcularity

b) ANOVA

c) Quality circle