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Total number of printed pages – 2

B. Tech  
PEME 5405

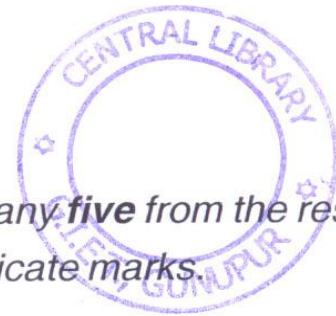
**Seventh Semester Back Examination – 2014**  
**METROLOGY, QUALITY CONTROL AND RELIABILITY**

**BRANCH : MECH**

**QUESTION CODE : L 181**

**Full Marks – 70**

**Time : 3 Hours**



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

1. Answer the following questions : 2 × 10
  - (a) Distinguish between the 'airy points' and the points of minimum deflection.
  - (b) Thread micrometre is used for which purpose ?
  - (c) Define control limit.
  - (d) Differentiate between Tolerance and Allowance.
  - (e) Define double sampling plan.
  - (f) Why is it essential to estimate the reliability ?
  - (g) What do you mean by parametric design ?
  - (h) Show the shape of an ideal sampling plan OC.
  - (i) Differentiate the nominal dimension and actual dimension.
  - (j) What do you mean by interference fit ?
2. Distinguish between line standard and end standard. How are end standards derived from line standard ? Give examples of these two type standards. 10
3.
  - (a) Describe how external taper can be measured using a sine bar. 5
  - (b) Explain Tylor's principle applied to design limit gauges. 5
4.
  - (a) Explain the AOQ and AOQL. 4
  - (b) Describe briefly about different control charts. 6

P.T.O.

5. A double sampling plan is as follows :  
 Select a sample of 2 from a lot of 20. If both the articles are good, accept the lot. If both are defective, reject the lot. If one is good, take a second sample of one article. If the article in the second sample is good, accept the lot.  
 If a lot of 25% defective is submitted, what is the probability of the acceptance ?  
 Use the combinatorial formula to evaluate the probability. 10
6. (a) Lots of 3000 crank shafts are submitted for inspection by ultra-sonic testing for internal flaws. Prepare a sequential sampling using the following data : 5
- AQL = 0.10  
 LTPD = 0.30  
 Procedure's risk ( $R_p$ ) = 0.05  
 Consumer's risk ( $R_c$ ) = 0.10
- (b) 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
7. (a) Define reliability and methods of arranging the components in the system of reliability. 5
- (b) Describe the acceptance sampling plan based on life tests. 5
8. Write short notes on any **four** : 2.5×4
- (a) Interchangeability  
 (b) ANOVA  
 (c) Markov model  
 (d) Circularity  
 (e) Control charts for fraction.

