



[4658] – 19

Seat No.	
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**T.E. (Mechanical / Automobile) (Semester – II) Examination, 2014  
METROLOGY AND QUALITY CONTROL  
(2008 Pattern)**

Time : 3 Hours

Max. Marks : 100

- Instructions :** 1) Answers to the **two** Sections should be written in separate books.  
2) Neat diagrams must be drawn **wherever** necessary.  
3) Black figures to the **right** indicate **full** marks.  
4) Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is **allowed**.  
5) Assume suitable data, if **necessary**.

SECTION – I

1. a) What is the difference between alignment test and performance test ? Explain with neat sketches any four such tests on drilling machine. **8**  
b) Differentiate between systematic error and random error. **4**  
c) Define accuracy and precision with an example. **4**  
OR  
2. a) Explain with neat sketch how to measure angle of taper plug gauge by using sine bar and sine centre. **8**  
b) State different types of comparators and explain sigma comparator in detail. **8**  
3. a) What is surface texture ? Explain contact and non contact type surface analysis method. **8**  
b) Write short note on :  
1) Autocollimator  
2) Constant deviation prism. **8**  
OR  
4. a) Design the general type of GO and NOT GO gauges for shaft and hole pair designated as  $40 H_8 d_9$   
a)  $i = 0.45 \sqrt[3]{D} + 0.001D$   
b) 40 mm lies between diameter range 30-50 mm  
c)  $IT_8 = 25 i$   
d)  $IT_9 = 40 i$   
e) Upper deviation of 'd' type of shaft =  $-16D^{0.44}$   
f) Wear allowance assumed to be 10% of gauge tolerance. **10**  
b) What are optical flat ? How are patterns of fringes interpreted ? **6**

P.T.O.



- 5. a) Explain with neat sketch Parkinson gear tester. 6
- b) Write a note on CMM. 6
- c) Describe the two wire method of checking the effective diameter of screw threads. Derive the relationship for this measurement. 6

OR

- 6. a) Describe the method of checking tooth thickness by using gear tooth vernier calliper. 6
- b) Explain Universal Measuring Machine with sketch. 6
- c) Explain optical profile projector in detail with sketch. 6

SECTION – II

- 7. a) Define cost of Quality and value of quality, explain different quality costs. 8
- b) Explain Juran’s trilogy approach with diagram. 8

OR

- 8. a) Explain seven quality control tools. 8
- b) Discuss the concepts of 5 ‘S’ and TPM. 8
- 9. a) Explain TS16949 and ISO 14000. 8
- b) Explain the concepts of Kaizen and JIT. 8

OR

- 10. Write short notes on : 16
  - i) FMECA
  - ii) Quality circle
  - iii) Quality Audit
  - iv) Quality Assurance.

- 11. a) Plot OC curve and show producer’s risk, AOQ, consumer’s risk, LTPD also define the same. 6
- b) Explain DMAIC uses in six sigma. 6
- c) A machine producing plastic moulded components is checked up for the statistical stability. Draw ‘P’ chart for machine and comment upon the process. Sample size = 200 Nos.

<b>Sample No.</b>	1	2	3	4	5	6	7	8	9	10
<b>Defectives</b>	11	08	22	15	12	27	10	15	10	02

6

OR

- 12. a) Differentiate between single, double and multiple sampling plan. 6
- b) For certain measurements, sub group size is 6,  $\sum \bar{X} = 649.6$  and  $\sum R = 129$  over 25 observations. Compute control limits for  $\bar{X}$  and R charts and control limit for the process. Use  $D_4 = 2.004$ ,  $D_3 = 0$ ,  $A_2 = 0.483$ ,  $d_2 = 2.534$ . 8
- c) Explain with neat sketch control chart pattern. 4