Total No. of Questions : 12]

SEAT No. :

P3640

[Total No. of Pages : 3

[4758]-19
T.E. (Mechanical)
METROLOGY AND QUALITY CONTROL
(2008 Course) (Semester-II)(311048)

Time : 3 Hours] *[Max. Marks : 100*

Instructions to the candidates:

1) ***Answers to the two sections should be written in separate books.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***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

Q1) a) Explain different types of errors in measurement. **[6]**

b) Describe the Accuracy and Precision. **[4]**

c) What are standards of measurement? Explain classification of various standards. **[8]**

OR

Q2) a) Explain with suitable diagram, construction and working of Johansson mikrokator comparator. **[8]**

b) Sketch the setup and describe the construction as well as operating procedure and principle of Auto-collimator. **[7]**

c) Differentiate between Measurement and Calibration. **[3]**

Q3) a) Design a plug and ring gauge to control the production of 90mm shaft and hole pair of H8 e9. **[10]**

Data given-

- 90mm diameter steps of 80 to 100 mm.
- Fundamental deviation for ‘e’ shaft=-11D0.41
- I = 0.45 0.001D.
- Standard tolerance for grade IT8=25i and IT 940i

P.T.O.

b) Describe with neat sketch the fring pattern obtained on various surface contours using interferometry. **[6]**

OR

Q4) a) Design the general type G0 and N0G0 gauge for component having 20H7f8 fit.

- Standard tolerance for grade IT7=16i and IT8=25i.
- Micron tolerance unit i=0.45 + 0.001D.
- Fundamental deviation for f shaft- 5.5D0.41.
- Wear allowance 10% of gauge tolerance. **[10]**

b) Explain with neat sketch the optical arrangement of NPL gauge length interferometer. **[6]**

Q5) a) Explain the floating carriage micrometer for effective diameter measurement of thread. Derive expression. **[8]**

b) Write short notes on.

i) Gear tooth vernier caliper.

ii) Machine Vision. **[8]**

OR

Q6) a) Derive an expression for best wire size and calculate diameter of best wire for M20 × 2.5 screw. **[6]**

b) Computerised CMM. **[4]**

c) Explain the use of constant chord method. Derive expression as

constant chord. $[\pi \times m \times \cos 2\theta /2]$

where m=module and θ =pressure angle. **[6]**

SECTION II

Q7) a) What are different quality costs? Explain cost of quality and value of quality. **[6]**

b) Explain: Quality policy. **[5]**

c) Explain what you understand by concurrent engineering. **[5]**

OR

Q8) a) Describe malcom national Quality awards. **[4]**

b) Write a note on quality circle. **[6]**

c) State seven quality control tools and explain any two. **[6]**

Q9) a) What do you mean by FMECA? Explain in detail. **[8]**

b) Write short Notes on. **[8]**

i) Quality Audit

ii) Kaizen

OR

Q10)a) Explain ISO 9000 Quality system standards. **[6]**

b) Write a short note on Total quality management. **[5]**

c) What is JIT ? Explain in details its applications. **[5]**

Q11)a) Compare 'P' chart and 'c' chart. **[6]**

b) Explain DMAIC uses in six sigma. **[6]**

c) Explain operating characteristics curve with LTPD, AQL, producer's risk(α), Consumer's risk (β). **[6]**

OR

Q12)a) Calculate the sample size AOQ for a single sampling plan. **[6]**

i) Probability of acceptance for 0.5% defectives in a lot is 0.525

ii) Lot size N= 10,000 units.

iii) Acceptance number =1

iv) nP' = 1.6

v) Defective found in the sample are not to be replaced

b) 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. **[6]**

Sample No.	1	2	3	4	5	6	7	8	9	10
Defectives	11	8	22	15	12	27	10	15	10	2

c) Statistical process control (SPC) **[6]**