Total No. of Questions : 9]

SEAT No. :

P2367

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[4758]-512

T.E. (Mechanical/Automobile)

METROLOGY AND QUALITY CONTROL (End Semester)

(2012 Pattern) (Semester-I)

Time : $2^{1}/_{2}$ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Neat diagrams must be drawn wherever necessary.***
2) ***Figures to the right indicate full marks.***
3) ***Use of electronic pocket calculator and steam tables is allowed.***
4) ***Assume suitable data if necessary.***

Q1) a) Explain principle's of Engineering metrology in details. **[6]**

b) Write a note on laser interferometer. **[4]**

OR

Q2) a) Explain different methods of measuring flatness. **[6]**

b) Differentiate between primary texture and secondary texture. **[4]**

Q3) a) Define Taylor's principle. **[2]**

b) Write a note on floating carriage micrometer. **[4]**

c) Explain universal measuring machine. **[4]**

OR

Q4) a) Explain principle of interferometry. **[2]**

b) Write a note on span gauging. **[4]**

c) Explain Automatic inspection system. **[4]**

Q5) a) Explain Deming's fourteen points in details. **[8]**

b) Explain seven New Quality tools. **[8]**

OR

P.T.O.

Q6) a) Define cost of prevention, cost of appraisal, cost of internal failure & cost of external failure. **[8]**

b) Explain seven quality control tools. **[8]**

Q7) a) Explain in detail OC curve and show following element on OC curve **[6]**

i) α-Risk

ii) β-Risk

iii) AOQ

iv) LTPD

b) Two machines producing components are checked up for the statistical stability. Draw the 'P' chart for both machines and comment upon the processes. Sample size for both machines are 200. **[10]**

Machine A

Sample No.	1	2	3	4	5	6	7	8	9	10
Defectives	25	28	30	30	20	29	31	26	31	27

Machine B

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

OR

Q8) a) Differentiate between single, double and multiple sampling plan. **[6]**

b) Components are being turned on CNC lathe to a specification of 12.58 $\pm$ 0.05mm. Five batches of five components each have been drawn for inspection at 1 hour intervals. The readings are tabulated below. **[10]**

Batch 1	Batch 2	Batch 3	Batch 4	Batch 5
12.62	12.63	12.62	12.61	12.59
12.60	12.56	12.56	12.66	12.58
12.62	12.60	12.57	12.62	12.57
12.61	12.59	12.58	12.61	12.59
12.65	12.60	12.63	12.60	12.56

i) Determine the process capability.

ii) Determine the three-sigma limits for the $\bar{X}$ chart.

iii) Draw the control chart and give your assessment. Assume the normal distribution and d_2 for group size 5 is 2.326.

Q9) Write short notes on following (Any Three): **[18]**

a) TPM.

b) Six sigma.

c) Kanban.

d) QFD.

e) JIT.

f) Poka-yoke.

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