Total No. of Questions : 8]

SEAT No. :

P4733

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[4760]-1071

M.E. (Mechanical) (Design Engineering)

MECHANICAL MEASUREMENT AND CONTROL

(2013 Pattern) (Semester - III)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Answer any Five questions.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Use of calculator is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) Explain different types of errors in measurement. **[5]**

b) Explain uncertainty in measurement system. **[5]**

Q2) a) Computer Karl Pearson coefficient of correlation from the following data using 20 as mean for price, 70 as mean for demand. **[6]**

Price	14	16	17	18	19	20	21	22	23
Demand	84	78	70	75	66	67	62	58	60

b) Differentiate between regression and correlation analysis. **[4]**

Q3) a) Computer correlation coefficient from the data **[7]**

$$N = 10 \sum x = 350; \sum y = 310m, \sum (x-32)^2 = 162, \sum (y-32)^2 = 222,$$

$$\sum (x-35)(y-31) = 92$$

b) What are the properties of regression coefficients. **[3]**

Q4) a) Explain the construction and working of ultrasonic flow meter. **[6]**

b) Explain the working of thermal conductivity gauge with a neat sketch. **[4]**

Q5) a) Explain with neat sketch, principle of working of capacitance level gauge. **[6]**

b) How do you measure frequency and phase angle? **[4]**

P.T.O.

Q6) a) Differentiate between time domain and frequency domain based modelling approach. **[5]**

b) Discuss the application of closed loop control system in automotive. **[5]**

Q7) a) Using Routh Horwitz criterion, find the stability of closed loop system given below

$C(s)/R(s) = (2s+1)/(s^3+3s^2+3s+1)$ **[7]**

b) Discuss the importance of Transient response specifications w.r.t. performance of control system. **[3]**

Q8) a) Discuss the advantages of PID controller. **[5]**

b) Explain frequency domain analysis using Bode plots. **[5]**