

Total No. of Questions : 8]

SEAT No. :

P4588

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[4860] - 1072

M.E. (Mechanical) (Design Engineering)

MECHANICAL MEASUREMENTS AND CONTROL

(2013 Credit Pattern)

Time : 3 Hours]

[Max. Marks : 50

Instructions to the candidates:

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

Q1) a) What are the important characteristics of a measuring instrument? **[6]**

b) Explain the following terms **[4]**

- i) Dynamic error
- ii) Static error
- iii) Probable error
- iv) Mean standard deviation

Q2) a) Explain the properties correlation co-efficient. **[4]**

b) In a partially destroyed record, the following data available. **[6]**

Variance of $x = 25$

Regression equation x upon y is $5x - y = 22$

Regression equation y upon x is $64x - 45y = 24$

Determine

- i) Mean value of x & y
- ii) Co-efficient of correlation between x & y

Q3) a) Determine co-efficient of correlation between employment & sales given **[6]**

Employment (person)	22	31	90	82	43	62	59	16	61	46	35	50
Sales(Rs.)	250	98	980	850	710	280	530	180	670	420	190	460

b) What are the various types of correlations **[4]**

P.T.O.

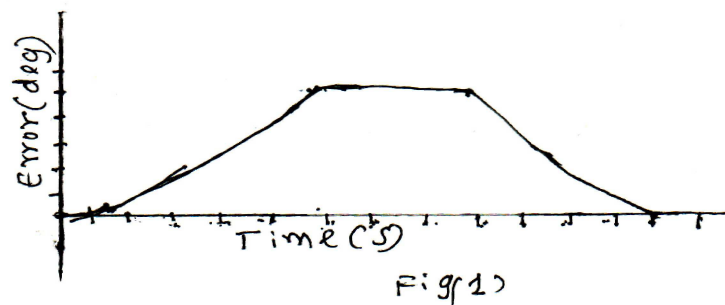
- Q4)** a) Explain with a neat sketch the working of hot wire anemometer. [5]
 b) Explain the method of measurement of pressure of 0.001mm of Hg. [5]

- Q5)** a) A disc mounted on a shaft of a machine has 12 pattern points. The no. of flashes projected on the disc is 6000 per minute. [6]
 Find

- i) The speed of machine if the disc appears stationary and has a single image of 12 points.
 ii) If the disc appears to move forward in the direction of rotation by 10rpm, what is the speed of disc.
 b) What are the methods of measuring [4]
 i) humidity
 ii) level

- Q6)** a) Differentiate between time domain and frequency domain modelling approach. [4]

- b) A plot of error vs. time for a control system is shown in fig.1 $u_p = 1$. N/deg. & $u_D = 2$ s. Find the maximum positive and negative values of derivative output. [6]



- Q7)** a) What are transient response specifications. [5]
 b) Represent a generic state space model using the block diagram approach and define the elements of the block diagram. [5]

- Q8)** a) Using Routh-Hurwitz criterion find the closed loop stability of the system given below [6]

$$\frac{C(s)}{R(s)} = \frac{2s+1}{s^3 + 3s^2 + 3s+1}$$

- b) Explain how derivative feedback control system makes more responsive to rapid changes and how it reduces overshoot [4]

