Total No. of Questions : 8]

SEAT No. :

P4065

[Total No. of Pages : 2

[5255]-563

M.E. (Mechanical) (Design Engineering)
MECHANICAL MEASUREMENTS & CONTROL
(2013 Course) (Semester - III) (602214)

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 indicate full marks.***
4) ***Use of electronic pocket calculator is allowed.***
5) ***Assume suitable data if necessary.***

Q1) a) Explain calibration & Necessity of calibration. **[5]**

b) Explain null & deflection type of instruments. **[5]**

Q2) a) Define **[6]**

i) Mean

ii) Median

iii) Standard Deviation

iv) Variance

b) Write note on Systematic Errors. **[4]**

Q3) a) By using following data find lines of regression & compute Karl Pearson coefficient of correlation. **[6]**

$\Sigma x = 15000$ $\Sigma y = 6800$ $\Sigma xy = 1022250$ $\Sigma x^2 = 2272500$ $\Sigma y^2 = 463025$ $n = 100$

b) Explain different types of correlation. **[4]**

Q4) a) Explain construction & working of RTD. **[5]**

b) Explain any one instrument used for noise measurement. **[5]**

P.T.O.

Q5) a) How radiation and surface properties can be measured. **[5]**

b) List out various instruments for frequency measurement. Explain stroboscope in detail. **[5]**

Q6) a) Represent a generic state space model using the block diagram approach and define the elements of the block diagram. **[5]**

b) Explain Poles and Zeros of System. Explain Lyapunov's criterion for stability of system. **[5]**

Q7) a) Characteristic equation of the system is given $S^4 + 3S^3 + 3S^2 + 2S + K = 0$. Find value of K, if system is stable, using Routh Hurwitz criterion. **[5]**

b) Derive the governing differential equation for the following electro-mechanical system(dc motor) shown in figure Q7(B)**[5]**

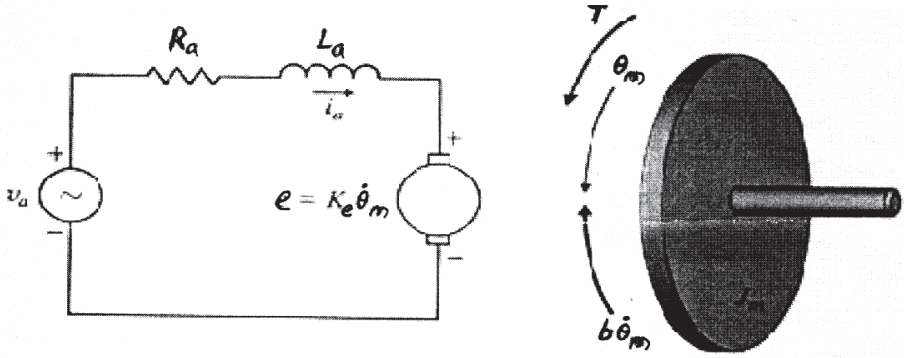

Figure Q7 (B)

Q8) a) Explain Proportional + Integral + Derivative control action. **[5]**

b) Figure Q8 (B) shows an error time graph. Sketch the PD controller output w.r.t. time K_p = 5%/%, KD = 0.5%/s and m(0) = 20%. **[5]**

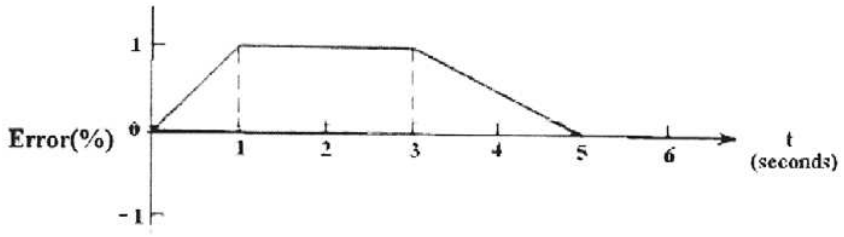

Figure Q8 (B)

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