Question Paper Code : 91452

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2014.

Fifth Semester

Aeronautical Engineering

EE 2365/EE 58/AE 1304/080180023/10122 AE 505 — CONTROL ENGINEERING

(Regulation 2008/2010)

Time : Three hours Maximum : 100 marks

(Semi log sheet and Graph sheet should be provided)

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Name two types of electrical analogous for mechanical system.

2. Write the analogous electrical elements in force voltage analogy for the elements of mechanical translational system.

3. Distinguish between open loop and closed loop system.

4. What is the basis for framing the rules of block diagram reduction technique?

5. Name the test signals in control system.

6. List time domain specifications.

7. Define gain margin.

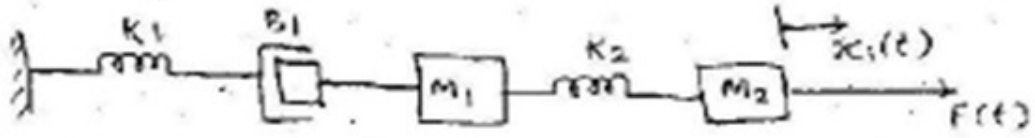
8. What are the advantages of bode plot.

9. What are the drawbacks in proportional controller

10. List the advantages and disadvantages in integral controller.

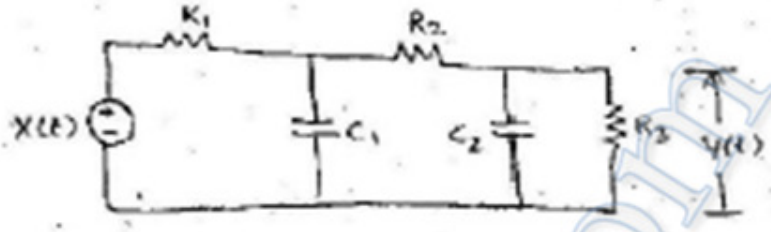
PART B — (5 × 16 = 80 marks)

11. (a) Obtain the transfer function of the mechanical system shown in figure :



Or

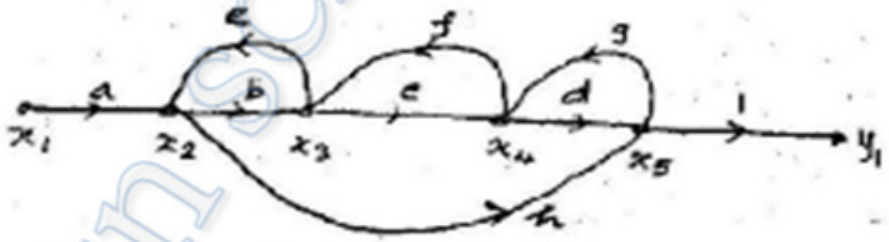
(b) Find the transfer function of the electrical network shown in figure :



12. (a) Determine the overall transfer function of the system shown in the figure using block diagram reduction technique.

Or

(b) Find the gain of signal flow graph shown in the figure.



13. (a) The open loop transfer function of a control system with unity feedback is given by $G(s) = 150/s(1+0.25s)$

(i) Evaluate the generalised error series for the system. (8)

(ii) Determine the steady state error for an input, $r(t) = (1+t^2)u(t)$. (8)

Or

(b) For a closed loop system $G(s) = 100/s(s+2)$ and $H(s) = (1+0.1s)$, Obtain its unit step response. Find the time domain specification also.

14. (a) Determine the range of 'K' for which the system given by the characteristic equation; $s^4 + 20Ks^3 + 5s^2 + 10s + 45 = 0$, is stable.

Or

(b) Draw the bode plot for the system described by the transfer function. $G(s) = 50/s(1 + 0.25s)(1 + 0.1s)$ Also find the gain and phase margin.

15. (a) Describe the characteristics of PID controllers.

Or

(b) (i) Write the relevance of PI controller in the stability and steady state error of a system. (8)

(ii) How the PID controllers affect the transfer function of a system. (8)