Dr Salman

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST 2 EXAMINATIONS – October 2018

B.Tech Vth Semester

COURSE CODE: 10B1WEC515 MAX. MARKS: 25

COURSE NAME: Theory and Application of Control systems

COURSE CREDITS: 03 MAX. TIME: 1 HR 30 MIN

Note: All questions are compulsory. Carrying of mobile phone during examinations will be treated as case of unfair means. Assume any missing data. Marks are indicated in parenthesis for each question.

1. Obtain the time domain specifications for the unit step response of a system with transfer function $T(s) = \frac{2\times10^4}{(s^2+10s+100)(s+200)}$ (5marks)

2. Use Routh-Hurwitz criterion to find the number of poles that are on the right half of the s-plane, and on $j\omega$-axis for a system with transfer function

$$T(s) = \frac{20}{s^8+s^7+12s^6+22s^5+39s^4+59s^3+48s^2+38s+20}$$ (4 marks)

3. Draw the root locus for $-\infty < K < 0$ for the system $G(s)H(s) = \frac{K}{s^2(s+8)^2}$. No need to use graph sheet. (5 marks)

4. Draw the Bode-plot(use semilog graph sheet for magnitude and phase plots) for

$$G(s)H(s) = \frac{16\times10^3(s+2)}{s(s+4)(s^2+12s+400)}$$ (6marks)

5. Write a short note on the following. (5 marks)

   i. Resonant peak in magnitude response.
   ii. Effect of adding a pole and a zero to transfer function on the bandwidth of the system.
   iii. Pade's approximation.
   iv. Relation between bandwidth and rise time of a system.
   v. PID controller.