Reg. No. : | | | | | | | | | | |

Question Paper Code: 54502

B.E. / B.Tech. DEGREE EXAMINATION, DEC 2020

Fourth Semester

Electronics and Instrumentation Engineering

15UEI402 - CONTROL ENGINEERING

(Regulation 2015)

Duration: 1:15hrs Maximum: 30 Marks

PART A - (6 x 1 = 6 Marks)

(Answer any six of the following questions)

1. Control of industrial process by automatic rather than manual means is often called as

   (a) Negative feedback (b) Automation
   (c) A design gap (d) A specification

2. Closed loop control system should have which of the following properties

   (a) Good Regulation against disturbance
   (b) Desirable response to commands
   (c) Low sensitivity to changes in plant parameters
   (d) All the above

3. A system has a transfer function of $(s) = \frac{50}{s+50}$, when the response reaches its 63% of its final value

   (a) 0.02 sec (b) 0.05 sec (c) 0.10 sec (d) 0.50 sec

4. What is the Laplace transform of impulse input having magnitude 'X'?

   (a) X (b) X^2 (c) 1/X (d) 1

5. A transfer function of a system is $G(s) = \frac{10((1+0.2s)}{(1+0.5s)}$ .The phase shift at $\omega = 0\ and\ \omega = \infty$, will be respectively

(a) $90°\ and\ 0°$ (b) $-180°\ and\ 180°$
(c) $-90°\ and\ 90°$ (d) none of these

6. A bode magnitude plot of a system has -20dB gain at low frequencies. The system is

(a) Type 0 (b) Type 1
(c) Type 2 (d) Nothing can be deduced about type number

7. Using Routh's criterion, the number of roots lying in the right half S-plane for the characteristic equation $s^4 + 2s^3 + 2s^2 + 3s + 6 = 0$ is

(a) 1 (b) 2 (c) 3 (d) 4

8. Using Routh's criterion, the number of roots lying in the right half S-plane for the characteristic equation $s^4 + 2s^3 + 2s^2 + 3s + 6 = 0$ is

(a) 1 (b) 2 (c) 3 (d) 4

9. The number of integrators in a state diagram is equal to number of

(a) State variables (b) Phase variables
(c) State vector (d) Input vector

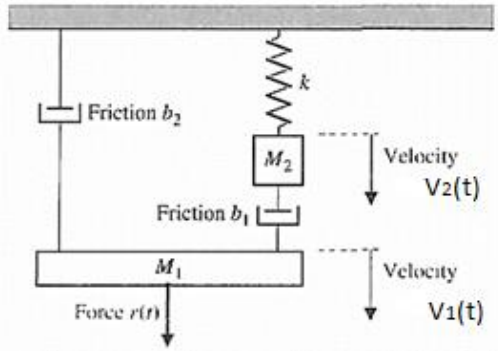
10. Consider a second order system whose state-space representation is of the form X = AX + Bu. If $x_1(t) = x_2(t)$, the system is

(a) controllable (b) uncontrollable
(c) observable (d) unstable

PART – B (3 x 8= 24 Marks)

(Answer any three of the following questions)

11. Derive$V_1(s)/R(s)$ the Force current analogy by transforming the given mechanical system. (8)



12. Derive the expression for second order system in under damped condition when input is unit step and also draw its response. (8)

13. Consider the unity feedback system type 1 system with open loop transfer function $G(s) = \frac{K}{s^2(0.2s+1)}$, Assume that system is required to be compensated to meet the following specifications.

(i) Acceleration error constant K_a=10

(ii) Phase margin $\geq 35°$. (8)

14 Applying Routh stability criterion and comment the range of stability of the closed loop system which have the characteristic equation as follows
$(s+2)(s+4)(s^2+6s+25)+k$. (8)

15. Determine the state model of armature controlled DC motor. (8)