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Total No. of Printed Pages: [01]

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B. Tech. (ECE) (Semester – 5th)
CONTROL SYSTEM & APPLICATIONS
Subject Code: BECES1503
Paper ID: [18111322]

Time: 03 Hours

Maximum Marks: 60

Instruction for candidates:

1. Section A is compulsory. It consists of 10 parts of two marks each.
2. Section B consist of 5 questions of 5 marks each. The student has to attempt any 4 questions out of it.
3. Section C consist of 3 questions of 10 marks each. The student has to attempt any 2 questions.

Section – A

(2 marks each)

Q1. Attempt the following:

- a) Compare open loop and closed loop control systems.
- b) Consider any transfer function and draw poles-zeros in s-plane.
- c) What are the rules for drawing signal flow graphs?
- d) Explain time response of a first order control system.
- e) Define stability.
- f) What do you mean by PID controller?
- g) Explain controllability.
- h) What is the significance of plotting frequency response?
- i) Give an example of linear discrete time systems.
- j) How will you define observability?

Section – B

(5 marks each)

Q2. Represent the following set of equations by a signal flow graph and determine the overall gain relating x_5 and x_1 :

$$x_2 = ax_1 + fx_2; x_3 = bx_2 + ex_4; x_4 = cx_3 + hx_5; x_5 = dx_4 + gx_2.$$

Q3. Explain the correlation between time domain and frequency domain analysis.

Q4. A closed loop control system has the characteristics equation given by $s^3 + 4.5s^2 + 3.5s + 1.5 = 0$. Investigate the stability using Ruth-Hurwitz criterion.

Q5. What are the steps to find Solution of state equations?

Q6. Explain Nyquist plots for stability analysis.

Section – C

(10 marks each)

Q7. Determine the position, velocity and acceleration error constants and the steady state error for (i) unit step input (ii) unit ramp input.

Q8. Explain DC servomotor and AC servomotor with the help of diagrams.

Q9. Draw and explain State models for linear continuous –time systems.