

Roll No.

Total No. of Pages : 02

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B.Tech. (Electrical & Electronics Engineering) (Sem.-6)

**DIGITAL CONTROL SYSTEMS**

Subject Code : BTEEE-603D-18

M.Code : 79949

Date of Examination : 07-07-22

Time : 3 Hrs.

Max. Marks : 60

**INSTRUCTIONS TO CANDIDATES :**

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

**SECTION-A**

1. Write briefly :

- a) What is the transfer function of ZOH?
- b) Why sample and hold circuit is used?
- c) Write down the transfer function of unit delay element?
- d) What is pulse transfer function?
- e) Write down the definition of controllability.
- f) Draw the constant damping ratio loci in z-plane.
- g) Give any two advantages of state space method.
- h) Which method is used for stability analysis of digital control system?
- i) What do you understand by state transition matrix?
- j) What is initial value theorem in z-transform?

### SECTION-B

2. Derive the relation between s plane and z plane-using Bilinear Transformation Technique.
3. State and prove the Nyquist sampling theorem.
4. Explain dead beat control using state feedback.
5. Write short note on state observer based controller design.
6. Consider the following system :

$$\frac{Y(z)}{U(z)} = \frac{z+1}{z^2+1.3z+0.4}$$

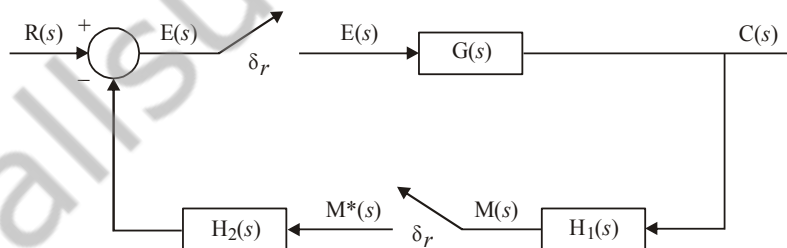
Represent the system in controllable canonical form, observable canonical form and diagonal canonical form.

### SECTION-C

7. Find out the suitable range of K for the stable system for transfer function given below :

$$\frac{Y(z)}{U(z)} = \frac{z+10.632Kz}{z^2-1.368z+0.368}$$

8. Obtain closed loop pulse transfer function of system shown below where R(s) is the input and C(s) is the output.



9. How the mapping between s-plane and z-plane is possible? Explain in detail with the help of primary strips and complimentary strips concept.

**NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.**