Code No: **R1642021** **R16** **Set No. 1**

IV B.Tech II Semester Advanced Supplementary Examinations, Aug/Sep - 2022

DIGITAL CONTROL SYSTEMS

(Electrical and Electronics Engineering)

Time: 3 hours **Max. Marks: 70**

Question paper consists of Part-A and Part-B
Answer ALL sub questions from Part-A
Answer any FOUR questions from Part-B

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PART–A *(14 Marks)*

1. a) What are the advantages of digital systems? [3]
   b) State the theorems of z-transform. [3]
   c) State the Properties of STM. [2]
   d) Write the importance of absolute stability? [2]
   e) Write briefly about the settling time? [2]
   f) Write the advantages of the controller used in the feedback path? [2]

PART–B *(4x14 = 56 Marks)*

2. a) Draw the block diagram and explain the function of each block of digital control system? [7]
   b) Explain the operation of equivalent circuit of sample and hold circuit? [7]

3. a) Explain the detailed process of finding the Z-transform of a signal using the sampler switch? [7]
   b) Find the Z-transform of the signal $f(k) = (k+1)a^k;\ k \geq 0$? [7]

4. a) Write the differences between the classical control system and state space analysis? [5]
   b) Find the state space representation for the discrete time system $y(k+3)+6y(k+2)+11y(k+1)+8y(k)=10u(k)$? Also draw the state diagram. [9]

5. a) Explain the necessary conditions and step wise procedure of Jury's stability test? [7]
   b) Describe the mapping between the s-Plane and the z-Plane with neat diagram. [7]

6. a) Discuss in detail about the design and application of lag compensator with necessary equations? [7]
   b) Explain the design procedure of lead compensator with root locus technique in the z-Plane. [7]

7. a) Explain the methods of finding the state feedback gain matrix with relevant equations? [7]
   b) Write about the Ackerman's formula and its role in the enhancement of stability? [7]