Printed Pages: 01 **Sub Code: MTEE032**
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M. TECH.
(SEM -II) THEORY EXAMINATION 2018-19
DIGITAL CONTROL SYSTEM

Time: 3 Hours ***Total Marks: 70***

Note: Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1. Attempt *all* questions in brief. **2 x 7 = 14**

(a) List the advantages of digital control system.
(b) What are hold circuits?
(c) What is asymptotic stability?
(d) List the condition for stability in Routh-hurwitz table.
(e) Give the formulae to find the asymptotic path to reach infinite pole/zero.
(f) Define resonant frequency.
(g) What are the uses of lead compensator?

SECTION B

2. Attempt any *three* of the following: **7 x 3 = 21**

(a) Describe the sample and hold operations?
(b) Explain the Duality between controllability and observability.
(c) Describe the location marginal pricing and congestion management.
(d) Obtain the Z-transform of the following:
(i) $x(t) = \frac{1}{a}(1 - e^{-at})$ (ii) $t^2 e^{-at}$
(e) List the difference between the Jury stability test and stability analysis using bilinear transformation coupled with routh stability criterion?

SECTION C

3. Attempt any *one* part of the following: **7 x 1 = 7**

(a) Write the state transition matrix and its properties?
(b) Explain about the digital compensator design using frequency response plots.

4. Attempt any *one* part of the following: **7 x 1 = 7**

(a) Explain about the frequency response specifications.
(b) Explain the necessary and sufficient conditions for design of statefeedback controller.

5. Attempt any *one* part of the following: **7 x 1 = 7**

(a) List out the construction rules of root locus plot.
(b) Explain about optimal digital control system.

6. Attempt any *one* part of the following: **7 x 1 = 7**

(a) Discuss about the transient response specifications.
(b) Explain the design procedure of lead-lag compensator using frequency response plot.

7. Attempt any *one* part of the following: **7 x 1 = 7**

(a) A second order discrete time system is characterized by the difference question $y(n) - 0.1\,y(n-1) - 0.02\,y(n-2) = 2\,x(n) - x(n-1)$.Determine $y(n)$ For n ≥ 0 when $x(n) = u(n)$ and the initial conditions are $y(-1) = -10$ and $y(-2) = 5$

(b) Determine the causal signal $x(n)$ having the Z transform

$$X(Z) = \frac{1}{(1 + Z^{-1})(1 - Z^{-1})^2}$$