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Roll N Total Time :	Io. No. of Questions : 08 M.Tech. (EE) (2013 Onwards) (So DIGITAL CONTROL SYSTE Subject Code : MTEE-104 M.Code : 70728 : 3 Hrs.	Total No. of Pages : 02 em.–1) EM Max. Marks : 100
INSTRU 1. A 2. E	UCTION TO CANDIDATES : Attempt any FIVE questions out of EIGHT questions. Each question carries TWENTY marks.	
1.	Discuss the following :	
;	a) Principles of signal conversion	7
1	b) Basic discrete time signals	e
	c) Practical aspects of choice of sampling rate	
2.	a) A discrete time system is described by the transfer func	ction 10
	$\frac{Y(z)}{R(s)} = \frac{1}{z^2 - 0.75z + 0.125}$ Find the response y (k) to the input (i) r (k) = $\delta(k)$	(ii) $r(k) = \mu(k)$
1	b) Using Jury's method find the stability of the system w is given by $\Delta(z) = 3z^5 + 10z^4 + 5z^3 + 6z^2 + 7z + 8$	hose characteristic polynomia
3.	Explain the digital position control system. Also discuss a Stepper motor. Support your answer with suitable diagrams	Forque speed characteristics os, whenever required.20
4.	Discuss in detail the z plane specifications of control system	m design. 20
5.	By considering suitable examples explain the different compensator and digital Lag compensator using root locus	design steps of digital Lead plot. 20

6. Obtain the Canonical state variable models from the following transfer function 20

$$G(s) = \frac{S+3}{s^3 + 9s^2 + 24s + 20}$$

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- 7. a) What is controllability and observability? State and prove the necessary and sufficient conditions for the system to be completely Controllable and Observable. 10
 - b) Find the controllability and observability of the following system : 10

$\dot{x}(t) = \begin{bmatrix} -2 & 1 \\ 1 & -2 \end{bmatrix} x(t) + \begin{bmatrix} 1 \\ 1 \end{bmatrix} u(t)$

 $y(t) = [0 \ 1] x(t)$

8. Discuss the following in detail :

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- a) Z domain description of systems with dead time 10
- b) Digital Temperature control system

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10