Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

M. E. - SEMESTER – II • EXAMINATION – SUMMER • 2014

Subject code: 1720704 **Date: 04/12/2014**

Subject Name: Digital Control System

Time: 02:30 pm - 05:00 pm **Total Marks: 70**

Instructions:

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

Q.1 (a) Explain the process of signal reconstruction. (07)

Q.1 (b) Explain the property of Z-transform. (07)

Q.2 (a) Find the Z- transform of the discrete ramp function. (07)

Q.2 (b) Explain the z-domain and s-domain relationship. (07)

Or

Q.2 (b) Write the difference equation governing the system

$G(s) = \frac{1}{s+1}$ and $G(s) = \frac{1}{s^2}$ (07)

Q.3 (a) Find the inverse Z-transform of $\frac{z-4}{(z-1)(z-2)^2}$ (07)

Q.3 (b) Check the stability of the given equation:

$$z^4 - 1.7z^3 + 1.04z^2 - 0.268z + 0.024 = 0$$ (07)

Or

Q.3 What is bilinear transformation and solve the following example with this technique:

$$G(z) = z\left[\frac{5}{s(s-1)(s+2)}\right]$$ (14)

Q.4 Explain the stability criterion of digital system and Juryôs test with

one suitable example. (14)

Or

Q.4 (a) A continuous time signal is given as $f(t) = 2\sin 4t + \cos 2t$ is sampled at rate of 10 rad/sec.

Using ZOH find the sampling interval and the sampled value for t=4 sec. (07)

Q.4 (b) Define an ideal sampler and also give the significance of hold circuit. (07)

Q.5 (a) Discuss the effect of sampling on controllability and observability of the system. (07)

Q.5 (b) Define state transition matrix and explain its importance. (07)

Or

Q.5 (a) If $G(s) = \frac{K}{s(s+2)}$ then a suitable D(z) when ramp input is applied. (07)

Q.5 (b) Discuss the advantages of Digital control over analog control. (07)