

# Scheme of Marking and solution.

Subject: Digital control.

~~set~~ **BE./Insem.-97**

Q. 1. a) i. z transformation of difference eqn - (12mk)

ii.  $Y(z)/R(z)$  - (12mk)

iii.  $y[k] = \{1, -2, 3, -4, \dots\}$  (3mk)

b) Limiting factor (Any four) (4mk)

i) Information Loss ii) Destabilizing effect.

iii) Algorithm Accuracy in word length

iv) Infor. Loss due to disturbances.

Q. 2

i)  $X(z) = \frac{2z^3 + 2}{(z-2)^2(z-1)}$

$x[k] = 9k(2^{k-1}) - 2^k + 3, \quad k=0, 1, 2, \dots$

ii)  $X(z) = \frac{1}{z^2(z-0.5)}$

$x[k] = 8[0.5]^k - 28[k-2] - 8[k-1] - 8\delta[k] \quad ; k \geq 0$   
 $= 0 \quad ; k < 0$

Q. 3. a)  $\frac{C(z)}{R(z)} = \frac{G_{h0}G_2(z) \cdot G_R(z)}{1 + G_{h0}G_2H(z)} - (6mk)$

b) List & Explanation of deadbeat controller characteristics — (Any four in detail) (4mk)

Q. 4 Derivation of position form - (7mk)

Advantages of velocity over position (3mk).

Q. 5. For  $T = 0.05 \text{ sec} \rightarrow \quad \quad \quad < K < \quad \quad \quad$  [4mk]

$T = 0.5 \text{ sec} \rightarrow \quad \quad \quad < K < \quad \quad \quad$  [4mk]

Characteristic eqn  $1 + G_{h0}G(z) = 0 \rightarrow$  Roots of system should be  $|z| < 1$

Increase in sampling Time decreases stability of system (2mk)

Q.6 -a) Jury's criterion any four — [2mks]

b) system is stable — 1

Analysis solution of all coefficient in  
Jury's Table — 1mk each  
with —  
Verification of condition.

**BE/Insem. - 97**