May-June 2018

Q.P. Code :17026

(Time: 3 Hours) [Total Marks: 80]

N.B.: 1. Question **No.1.** is **compulsory.**

2. Attempt any **three** questions out of the remaining **five** questions.

3. Assume **suitable** data wherever **required.**

4. **Figures** to the **right** indicates **full** marks.

1. (a) What is the basic principles of Scheduled adaptive control. [5]

(b) What is the fundamental difference between feedforward control and conventional feedback control [5]

(c) What is Smith predictor and why it is so called? [5]

(d) What is the typical controller tuning procedure for a cascade control system? [5]

2 (a) Describe the Inverse-Response system and explain the Inverse Response compensation with block diagram. [10]

(b) Derive the transient response of a first order system to a unit step change in disturbance under proportional feed-back control and find the offset. [10]

3 (a) A feed-back system has $G(s) H(s) = \dfrac{100}{s(s+0.5)(s+10)}$, draw the bode plot and comment on

stability [15]

(b) Explain split-range control system with a neat diagram. [5]

4 (a) Explain the time delay system and discuss the compensation with block diagram. [12]

(b) A certain feed back control system consists of a process with transfer function:

$G(s) = \dfrac{1}{(20s+1)(10s+1)}$, valve dynamics represented by $G_v(s) = \dfrac{0.25}{0.5s+1}$ and a controller of

unknown structure. The root-locus diagram for the control system is however known to have the following features:Two zeros located at s = -0.5 and s = -1.0; four poles located at s=0, s = -0.05, s= -0.1 and s = -2.0. From the given information, deduce the controller type and controller parameter values. [8]

5 (a) Discuss Ziegler-Nichols controller tuning and designa PID controller using Ziegler-Nichols closed loop method for a unity feedback control system having process transfer function as

$G(s) = \dfrac{1}{s(s+1)(s+3)}$. [15]

(b) Explain Internal Model control. [5]

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6 Write short notes on (any **four**)   [20]

    (a) Ratio control
    (b) Cohen-Coon controller tuning
    (c) Antireset windup
    (d) Control valve sizing.
    (e) Bode stability criterion.