



PBA-003-027501

Seat No. _____

M. Sc. (Electronics) (Sem. V) (CBCS) Examination

November / December - 2018

Paper - 17 : Basic Concepts of Control Systems

Faculty Code : 003

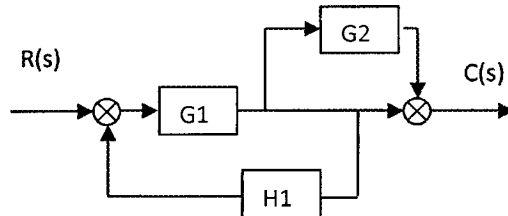
Subject Code : 027501

Time : $2\frac{1}{2}$ Hours]

[Total Marks : 70

1 Answer the following questions in brief : (any seven) 14

- (1) Derive Laplace transform of a pulse function.
- (2) Define controlled variable and manipulated variable.
- (3) State initial and final value theorems.
- (4) Define a 2nd order system.
- (5) What is an open loop control system ?
- (6) What are state variables ?
- (7) Reduce the block-diagram to minimum :



- (8) Explain proportional control action with help of necessary equation and graph.
- (9) How can one define a linear time-varying system ?
- (10) What is a transfer function ?

2 Attempt any two of the following questions : 14

- (1) Mention and explain all rules to manipulate block-diagrams.
- (2) Explain partial fraction method to find inverse Laplace transform. Also derive the inverse Laplace of

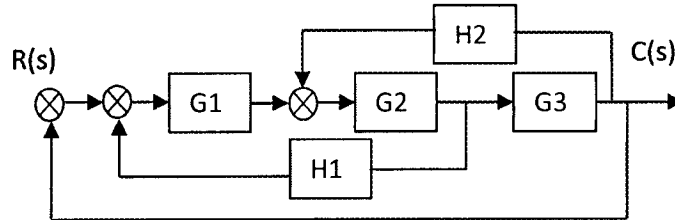
$$\frac{s^2 + s + 3}{(s+1)(s+2)}$$

- (3) Derive the response of first-order system against step, ramp and impulse inputs.

3 Answer the following questions :

(1) Describe in brief unit-step, unit-ramp and unit-impulse 5
functions. Derive Laplace transforms of each.

(2) Reduce the following block diagram. 5



(3) State and prove the real integration theorem. 4

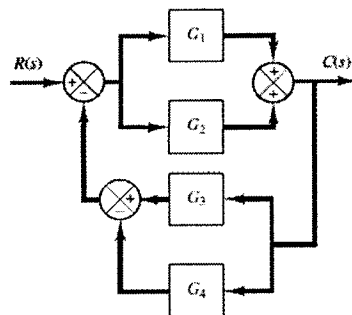
OR

3 Answer the following questions :

(1) Define delay time, rise time, peak time, maximum 5
overshoot and settling time for a transient response
with necessary diagram.

(2) Explain how a non-linear mathematical model can 5
be approximated to linear.

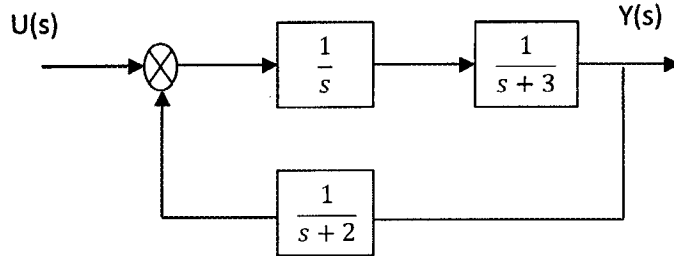
(3) Reduce the block diagram to minimum. 4



4 Answer the following questions :

(1) Explain pulse and impulse functions in detail. **5**

(2) Derive state space representation for the system in the block diagram. **5**



(3) State and prove the real differentiation and final value theorems. **4**

5 Answer any **two** of the following questions : **14**

(1) Derive the transient response of a first order system for unit step, unit ramp and unit impulse input. Also discuss its inference.

(2) What will be effect of multiplication by e^{-at} and change of time scale on Laplace transform of a function, $f(t)$. Also find inverse Laplace transform of,

$$F(s) = \frac{5(s+7)}{(s+1)^2(s+2)}$$

(3) Describe the state space representation of a dynamic system.

(4) Describe the step response of a second order system.
