

# Indian Maritime University

( A Central University, Govt of India)

May-June 2018 End Semester Examinations

## B. Tech (Marine Engineering)

Semester-VII/VIII

### Advanced Marine Control Engineering & Automation (UG11T2702/ UG11T1802)

Date: 12.06.2018

Max Marks:100 Marks

Time: 3 Hrs

Pass Marks:50 Marks

#### Part A (10 × 3 = 30 Marks)

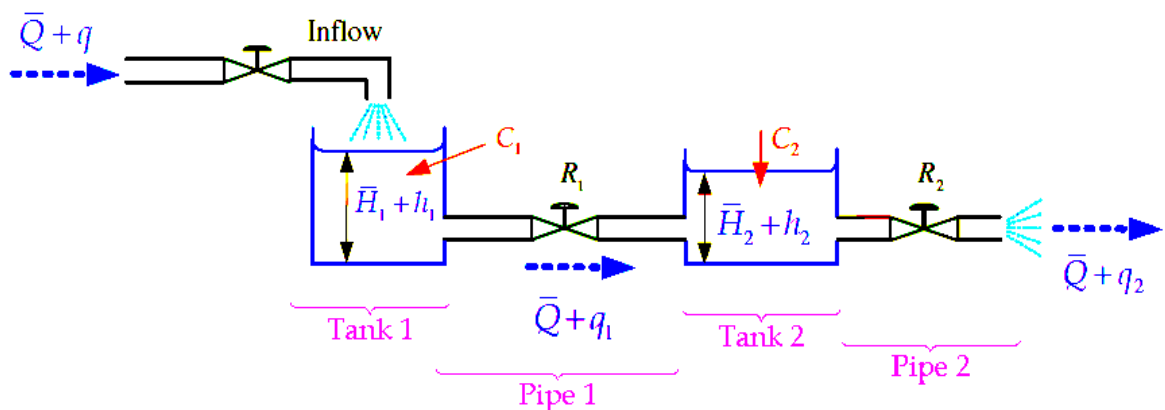
All Questions are compulsory

1. (a) What do you mean by a control system?
- (b) Why negative feedback is preferred in control system?
- (c) What is the effect of feedback on sensitivity?
- (d) What is synchro pair? What for it is used?
- (e) What is electrical zero position of a synchro transmitter?
- (f) Define Mason's gain formula.
- (g) What are static error constants?
- (h) Define corner frequency.
- (i) What is called PLC?
- (j) Compare Pneumatic and Hydraulic control system.

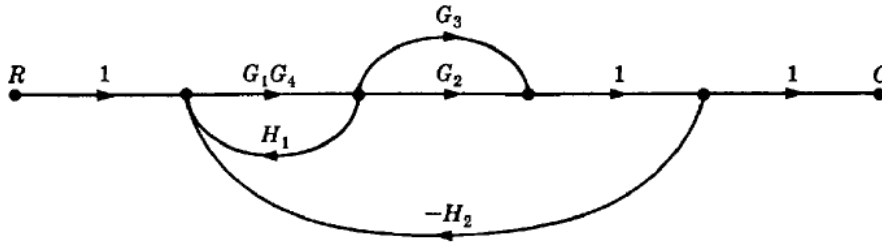
#### Part B (5 × 14 = 70 Marks)

Answer any five of the following

2. (a) Compare open loop and closed loop system. (7)
- (b) Consider the liquid level system shown in following Figure. In this system, two tanks interact. Find transfer function  $Q_2(s)/Q(s)$ . (7)

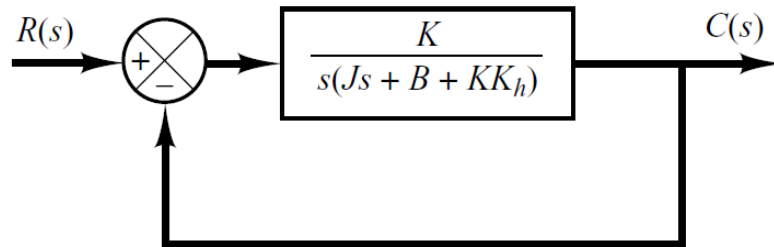


3. (a) Apply Mason's Rule to calculate the transfer function of the system represented by following Signal Flow Graph. (7)



- (b) What is called gear trains? Obtain the mathematical modelling of gear trains. (7)

4. (a) For the system shown in Figure, determine the values of gain  $K$  and velocity-feedback constant  $K_h$  so that the maximum overshoot in the unit-step response is 0.2 and the peak time is 1 sec. With these values of  $K$  and  $K_h$ , obtain the rise time and settling time. Assume that  $J=1$  kg-m<sup>2</sup> and  $B=1$  N-m/rad/sec. (7)



- (b) Determine the range of system parameter  $k$  for which the system is stable.  $S^3 + 3S^2 + 3S + 1 + K = 0$ . (7)

5. (a) Draw and explain the electronic PID controller. (7)  
 (b) Explain I – P converter with neat sketch. (7)
6. (a) Discuss flapper nozzle system with suitable diagram. (7)  
 (b) Draw and explain the function of diaphragm actuator. (7)
7. (a) Draw and explain fuel oil viscosity control system. (7)  
 (b) List the checks to be carried before going UMS. (7)
8. (a) Draw and explain lubricating oil temperature control. (7)  
 (b) Write a short on Integrated Automation Control and Monitoring system. (7)

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