

**B.Tech. Degree VIII Semester Regular/Supplementary Examination in
Marine Engineering June 2023**

**MRE 1804 MARINE CONTROL ENGINEERING AND AUTOMATION
(2013 Scheme)**

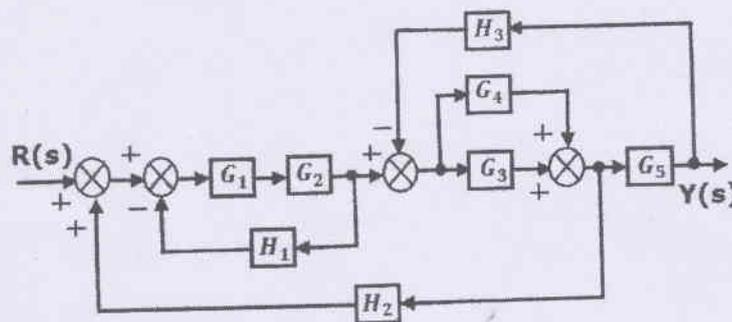
Time: 3 Hours

Maximum Marks: 100

(Answer ALL questions)

(5 × 20 = 100)

- I. (a) Explain with neat sketches any three level measuring device onboard ship. (6)
 (b) Explain oil mist detector. (8)
 (c) Elaborate the working of viscotherm. (6)
- OR**
- II. (a) Explain with a neat sketch force balance transducer. (6)
 (b) Draw and explain variable inductance transducer. (8)
 (c) Explain Synchros. (6)
- III. (a) Differentiate open loop and closed loop control system with examples. (8)
 (b) Explain proportional, integral, and derivative controller with example. (12)
- OR**
- IV. Explain the following terms with examples: (20)
 (i) ON-OFF control
 (ii) Desired value
 (iii) Set value
 (iv) Modulating control
 (v) Offset
- V. (a) Reduce the block diagram and find the transfer function $\frac{Y(s)}{R(s)}$. (10)



- (b) With a neat sketch explain Diaphragm actuator. (10)
- OR**
- VI. (a) A feedback control system is characterized by transfer function (10)

$$\frac{k}{(s^2 + 10s + k)}$$
 determine:
 (i) Gain 'k' so that the system will have a damping ratio of $\xi = 0.5$
 (ii) For this value of k find rise time, peak time, peak overshoot and settling time.
- (b) Explain valve positioner with a neat sketch. (10)

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- VII. Construct a Nyquist plot whose OLTf is given by (20)

$$G(s)H(s) = \frac{90}{(s+3)(s+6)}$$
 Comment on stability of open loop and closed loop system.

OR

- VIII. Explain Routh-Hurwitz stability criterion. Use Routh-Hurwitz stability criterion to determine the roots on s -plane and hence the stability of the system represented by characteristic equation. (20)

$$s^5 + 2s^4 + 2s^3 + 4s^2 + s + 2 = 0$$

- IX. (a) Explain three element type feed water control system with a neat sketch. (10)
 (b) Explain the automatic combustion control system in marine boiler. (10)

OR

- X. (a) Discuss the instrumentation requirements for a UMS class vessel. (10)
 (b) Sketch and describe a system used for Jacket cooling water temperature of the main machinery unit. (10)
