B.Tech. Degree VIII Semester Regular/Supplementary Examination in Marine Engineering July 2022

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

Time: 3 Hours   Maximum Marks: 100

(5 × 20 = 100)

I.   (a) Explain any three Level measuring devices with neat diagrams.   (8)
     (b) Describe the working of the following with neat diagrams.   (12)
          (i)   Synchros
          (ii)   Oil Mist Detector

OR

II. (a) Explain the following with diagrams.   (20)
          (i)   Electro pneumatic signal converter
          (ii)   Viscosity sensor
          (iii) PH meter.

III. (a) Explain the working of Proportional, Integral and Derivative controllers   (15)
          with diagrams.
     (b) Compare the advantages and disadvantages of the above controllers.   (5)

OR

IV.   Explain the following with diagrams.   (20)
          (i)   Split range control
          (ii)   Ratio Control
          (iii) Cascade control.

V.   (a) Reduce the block diagram.   (10)
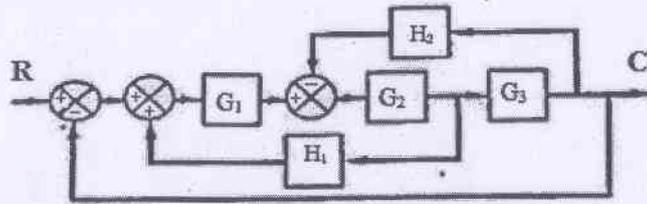
     (b) Explain the working of Valve positioners with neat diagram.   (10)

OR

VI. (a) The unity feedback system is characterized by an open loop transfer   (10)
          function, $G(s) = k / s(s + 10)$. Determine the gain K, so that the system
          will have a damping ratio of 0.5. For this value of K, determine settling
          time, peak overshoot and time to peak overshoot for a unit step input.

     (b) Derive the Transfer function of a Thermal system.   (10)

VII. (a) Determine the range of K for stability of unity feedback system using   (15)
          Routh stability criterion whose transfer function is

          $$C(s) / R(s) = K / s(s^2 + s + 1)(s + 2) + k$$

     (b) Explain Stability. What is the necessary condition for stability of any   (5)
          control system?.

OR

BT MRE–VIII(R/S)-07-22-0067

VIII.   State Nyquist stability criterion. Draw the Nyquist plot and find the (20) stability of the following open loop transfer function of unity feedback control system $G(s)H(s) = K(s+1)/s^2(s+10)$. If the system is conditionally stable, find the range of K for which the system is stable.

IX. (a) Explain the working of control system during Manoeuvring of Direct (12) Reversing Diesel Engine Bridge control of main machinery.

     (b) Explain jacket cooling water system. (8)

OR

X. (a) Explain Feed water control two element and three element type. (12)

    (b) Explain fuel oil viscosity control system. (8)

***

+