B

B. Tech. Degree VIII Semester Examination in Marine Engineering August 2015

### MRE 804 MARINE CONTROL ENGINEERING AND AUTOMATION

Time: 3 Hours   Maximum Marks: 100

(5 × 20 = 100)

I. (a) Explain different types of flow measuring devices, with the help of neat diagrams.   (12)
    (b) Explain with a neat diagram variable inductance transducer.   (8)

OR

II. (a) Explain flapper nozzle system.   (5)
    (b) Give an application of flapper nozzle system with diagram and working.   (8)
    (c) Explain the following: (7)
         (i)   Viscosity sensors
         (ii) PH meters

III. (a) Explain open loop and closed loop system with diagrams. Give its advantages and   (12)
          disadvantages with examples.
     (b) Explain two step control with diagram.   (8)

OR

IV. (a) Explain the functions of proportional, integral and derivative action controllers   (12)
         with diagrams.
    (b) Explain PID controller. What are its advantages over PI controller?   (8)

V. (a) Determine the transfer function for the mechanical rotational system given below.   (10)
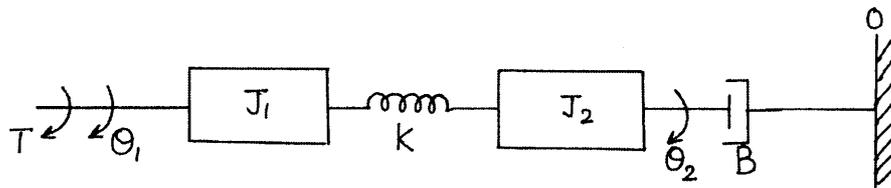
    (b) Explain diaphragm actuators and valve positioner.   (10)

OR

VI. (a) Reduce the block diagram and find the transfer function.   (10)
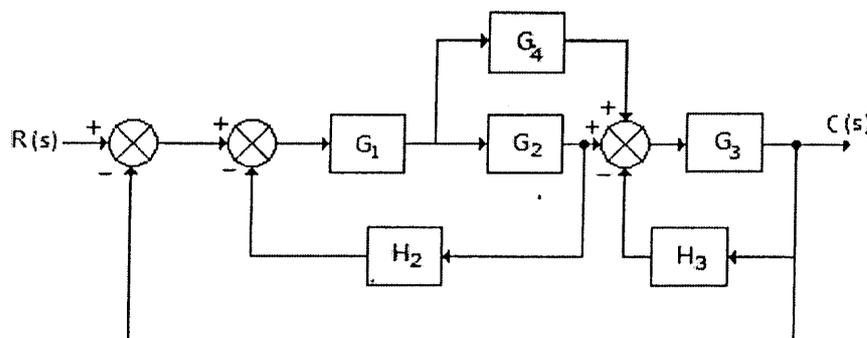
(P.T.O.)

(b) A system is described by a transfer function $\dfrac{1}{\left(s^2+s+1\right)}$. Find the unit step response of the system. (10)

VII. (a) Explain the concept of stability. What is the role of poles and zeroes on stability? (8)

(b) Using Routh Hurwitz criteria find the location of roots on a plane and hence the stability of the system with characteristic polynomial $s^7+9s^6+24s^5+24s^4+24s^3+24s^2+23s+15=0$. Comment on stability. (12)

OR

VIII. The open loop transfer function of a system is $G(s)H(s)=\dfrac{1}{s^2(s+1)(2s+1)}$. (20)

Determine the stability of closed loop system using Nyquist stability criterion. Comment on stability of the system.

IX. (a) Explain the instrumentation requirements for a UMS class vessel. (10)

(b) Sketch and describe a system used for cooling water temperature control of a main machinery unit. (10)

OR

X. (a) Describe the control system used for automatic combustion control in marine boiler with diagram. (10)

(b) Explain the system used for feed water control two and three element type with diagrams. (10)

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