BT-MRE-VIII -07.16-0843 Reg. No. | | | | | | | | |

B

B. Tech. Degree VIII Semester Examination in Marine Engineering July 2016

MRE 804 MARINE CONTROL ENGINEERING AND AUTOMATION

Time: 3 Hours Maximum Marks: 100

(5 × 20 = 100)

I. (a) Explain how bimetallic thermometer and thermocouple used for measuring temperature. (6)

(b) Explain oil mist detector, with a neat sketch. (6)

(c) Explain flapper nozzle mechanism. Explain any one application. (8)

OR

II. (a) With neat sketch explain flow measuring devices. (Explain any two) (6)

(b) Explain the principle and working of unbounded strain gauge, with neat sketch. (6)

(c) Draw and explain any one variable inductance and capacitance transducer. (8)

III. (a) Explain open loop and closed loop system with examples. Give its advantages and disadvantages. (8)

(b) Explain the term process control. Explain and differentiate the terms process variable, measured variable and manipulated variable with respect to process control using an example. (12)

OR

IV. (a) Explain proportional controller. What is the effect of adding integral and derivative function to it? Explain using an example. (14)

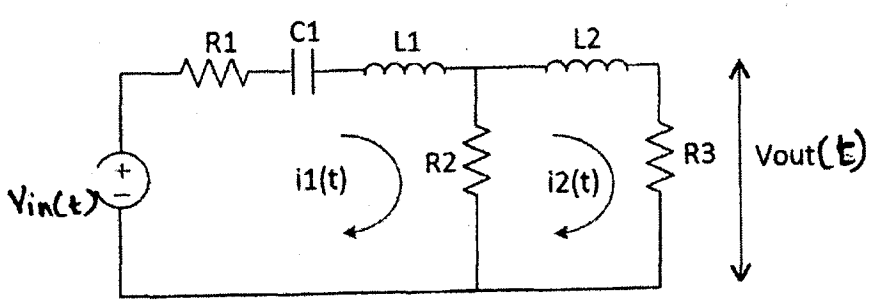
(b) Explain the following terms. (6)

(i) Two step control.

(ii) Cascade control.

V. (a) A system is described by a transfer function $\frac{1}{(s+2)(s^2+s+1)}$. Find the unit impulse response of the system. (10)

(b) Model the following electrical system and find the transfer function. (10)



OR

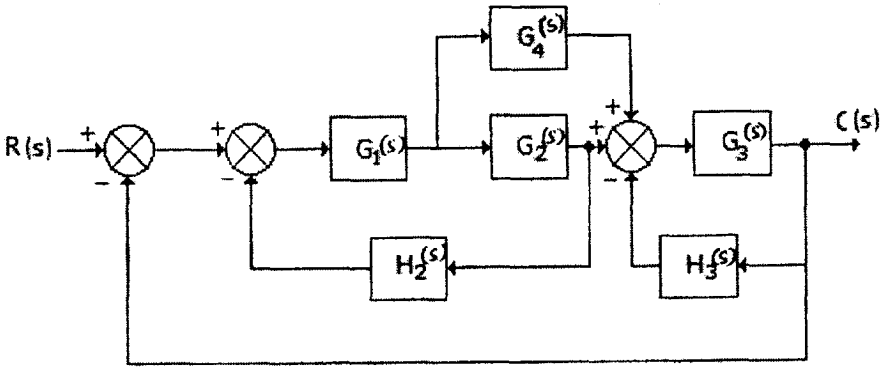
VI. (a) A feedback control system is characterized by transfer function $\frac{k}{(s^2+10s+k)}$ (10)

determine.

(i) Gain 'k' so that the system will have a damping ratio $\zeta = 0.5$.

(ii) For this value of k find rise time, peak time, peak overshoot and settling time.

(b) Reduce the block diagram and find the transfer function. (10)



VII. (a) For a unity feedback system having open loop transfer function $\frac{k(s+2)}{s^2(s^2+7s+12)}$ (10)

Determine:

(i) Type of system.

(ii) Error constants.

(iii) Steady state error for parabolic system.

(iv) Range of k for which steady state error due to parabolic input is less than 0.1.

(b) Using Routh Hurwitz criteria find the range of k for stability of a unity feedback system having open loop transfer function $\frac{k}{s(s+1)(s+2)}$. (10)

OR

VIII. (a) Define nyquist stability criterion. (5)

(b) Sketch nyquist contour whose open loop transfer function is given by $\frac{10(s+3)}{s(s-1)}$. (15)

Find the range of k for stability.

IX. (a) Sketch and describe control system used for air/fuel ratio control. (10)

(b) With the help of a block diagram explain the process of starting a direct reversing diesel engine with bridge control. What are the starting interlocks usually provided? (10)

OR

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

(b) Discuss the instrumentation requirements for a UMS class vessel. (10)

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