BT–MRE–VIII(SS)–02.17–0155 Reg. No. | | | | | | | | |

A

B.Tech. Degree VIII Semester Special Supplementary Examination in Marine Engineering February 2017

MRE 804 MARINE CONTROL ENGINEERING AND AUTOMATION

Time: 3 Hours

Maximum Marks: 100
(5 × 20 = 100)

I. (a) Explain different temperature measuring devices with different properties. (9)
(b) Explain with a neat diagram unbonded strain gauges. (5)
(c) Explain the need of oil mist detector. Draw and Explain. (6)

OR

II. (a) Explain with a diagram the force balance transducers. (5)
(b) Draw and explain any variable inductance transducer. (6)
(c) Explain the different pneumatic controllers used for signal transmission for generating control action. (9)

III. (a) Explain the terms "Process Control" and "Feedback" with respect to automatic control system. Differentiate open loop and closed loop control systems. (6)
(b) What do you mean by system response? Explain distance velocity lag, measurement lag and transfer lag. (7)
(c) Explain the term transfer lag in ON-OFF control. Explain how it prevents oscillations. (7)

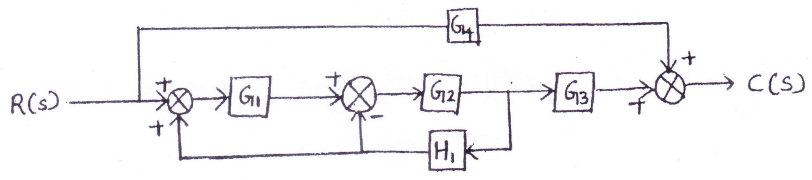
OR

IV. (a) Explain proportional, integral and derivative controller actions. Explain a PID controller with a suitable example (14)
(b) Explain the controller adjustment relays. (6)

V. (a) Explain piston actuators with a neat diagram. (5)
(b) Derive and comment on the response of a second order system for 'underdamped' case with unit impulse input. (7)
(c) Find the impulse response of a system whose closed loop transfer function is given by $\frac{C(s)}{R(s)} = \frac{20}{(s+1)(s+2)}$. Plot the graph. (8)

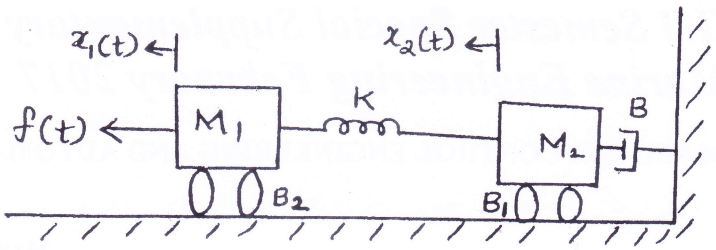
OR

VI. (a) Reduce the following block diagram and find the transfer function C(s)/R(s) (10)



(P.T.O.)

(b) Model the given mechanical system using differential equation and find the transfer function. (10)



VII. (a) A Unity Feedback System is characterized by closed Loop Transfer Function $\frac{K}{s^2+10s+K}$. Determine the gain 'K', so that the system will have a damping ratio of 0.5. For this value of 'K' find rise time, peak time, peak overshoot and settling time. (10)

(b) State the Routh Hurwitz stability criterion. Using it 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) Explain Nyquist stability criterion. (5)

(b) Sketch the Nyquist contour whose open loop transfer function given by $G(s)H(s)=\frac{K(1+s)^2}{s^3}$. Find the range of k for stability. (15)

IX. (a) Discuss the instrumentation requirements of a UMS class vessel. (10)

(b) Explain jacket water cooling control system of main machinery unit. (10)

OR

X (a) Explain with a neat diagram 2 term control of a Boiler's water level control system. (10)

(b) Explain with a neat diagram lubricating oil temperature control in main machinery unit. (10)

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