B.Tech. Degree VIII Semester Examination in Marine Engineering July 2018

MRE 1804 MARINE CONTROL ENGINEERING AND AUTOMATION
(2013 Scheme)

Time: 3 Hours   Maximum Marks: 100

$(5 \times 20 = 100)$

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I.	(a)	Explain with neat sketches any two pressure measuring device.	(6)
	(b)	Explain with a neat diagram shaft power meters.	(6)
	(c)	Explain the following with neat diagrams:	(8)
		(i) Oil Mist Detector	
		(ii) pH meters	

OR

II.	(a)	Explain with a diagram the Electro-Pneumatic signal converters.	(6)
	(b)	Draw and explain LVDT.	(6)
	(c)	Explain Flapper Nozzle mechanism with any one application.	(8)

III.	(a)	Explain the terms "Process Control" and "Feedback" with respect to automatic control system. Differentiate open loop and closed loop control systems.	(8)
	(b)	Explain the following with diagrams:	(12)
		(i) Cascade control system	
		(ii) Split range control system	

OR

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IV.	(a)	Explain ON-OFF control with an example. Explain its advantage and disadvantage.	(8)
	(b)	Explain the effect of proportional, integral and derivative controllers with a suitable example.	(12)

V.	(a)	Explain Diaphragm actuators and Piston actuators with neat diagrams.	(8)
	(b)	Derive the impulse response of a second order system for 'undamped', 'under damped' and 'critically damped' case.	(12)

OR

VI.	(a)	Reduce the following block diagram and find the transfer function C(s)/R(s).	(10)
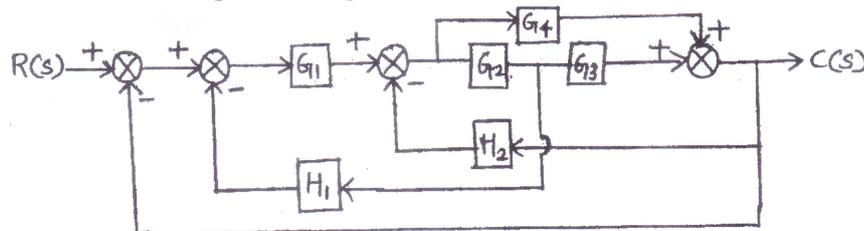
	(b)	Model the given electrical system using differential equation and find the transfer function.	(10)
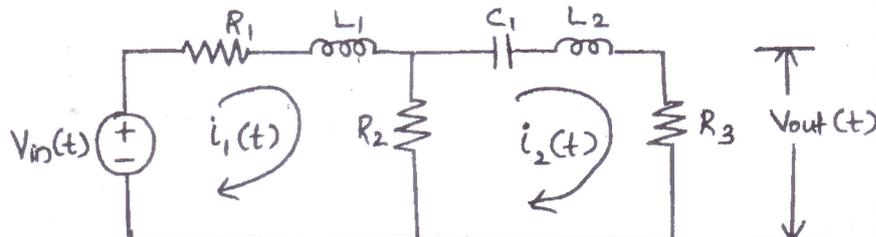
VII. (a) A Unity feedback system is characterized by open loop transfer function (10) $\frac{10}{s(s+1)(s+2)}$. Find the type of system, error constants and steady state error when subjected to an input $r(t)=1+2t$; $t>0$.

(b) The characteristic polynomial of a system is given by (10) $s^7+5s^6+9s^5+9s^4+4s^3+20s^2+36s+36=0$. Determine the location of roots on s-plane and hence stability of the system using Routh Hurwitz Stability Criterion.

OR

VIII. (a) Explain Nyquist Stability Criterion. (5)

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

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

(b) Explain Jacket Water Cooling control system of main engine unit. (10)

OR

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

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

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