

**B.Tech. Degree VIII Semester Special Supplementary Examination
in Marine Engineering October 2023**

**19-208-0810 MARINE CONTROL ENGINEERING AND AUTOMATION (ELECTIVE II)
(2019 Scheme)**

Time: 3 Hours

Maximum Marks: 60

Course Outcome

On successful completion of the course, the students will be able to:

- CO1: Understand the different measuring devices and signal transmitting devices.
 CO2: Gain knowledge regarding control theory and different types of controllers.
 CO3: Understand details of correcting units, system analysis and mathematical models.
 CO4: Understand about the stability and performance of control system.
 CO5: Gain knowledge on applications of control system on ships.

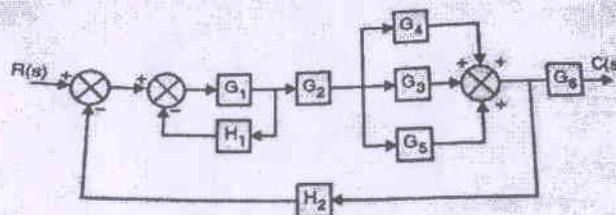
Bloom's Taxonomy Levels (BL): L1 – Remember, L2 – Understand, L3 – Apply, L4 – Analyze, L5 – Evaluate,
 L6 – Create

PI – Programme Indicators

(Answer ALL questions)

(5 × 15 = 75)

	Marks	BL	CO	PI
I. (a) How is oil mist created in crank case? With a neat diagram explain a measuring device to detect oil mist level in the crank case.	7	L2	1	1.6.12
(b) Draw and explain any two temperature measuring devices on board ship.	8	L1	1	1.6.12
OR				
II. (a) With a neat sketch explain the working of synchros. Explain the application of synchros on board ship.	8	L2	1	1.6.12
(b) Explain how LVDT can be used as a signal transmitting device?	7	L2	1	1.6.12
III. (a) Explain PID controller with an example.	10	L2	2	1.6.12
(b) Differentiate between open loop and closed loop control systems.	5	L1	2	1.6.12
OR				
IV. (a) Differentiate between distance velocity lag, measurement lag and transfer lag.	6	L2	2	1.6.12
(b) Elaborate with a neat sketch any one application of split range controller onboard ship.	9	L2	2	1.6.12
V. (a) Draw and explain diaphragm actuator.	6	L1	3	1.2.4. 12
(b) Find the ratio of $C(s)/R(s)$ for the given block diagram.	9	L4	3	1.2.4. 12

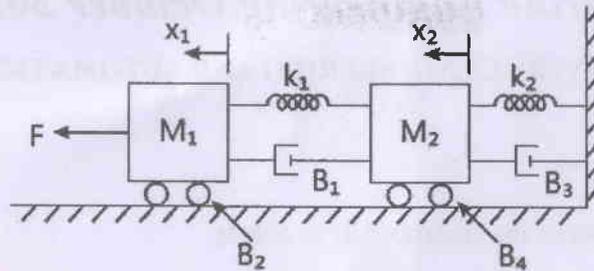


OR

(P.T.O.)

BT MRE-VIII(S.S)-10-23-2489

		Marks	BL	CO	PI
VI.	(a) For the mechanical system shown below derive the transfer function $X_1(s)/F(s)$.	9	L4	3	1.2.4. 12



(b)	The transfer function of a system $\frac{C(s)}{R(s)} = \frac{20}{s(s+2)}$. Find the step response of the given system.	6	L4	3	1.2.4. 12
-----	---	---	----	---	--------------

VII.	(a) For a unity feedback control system the open loop transfer function $G(s) = \frac{10(S+2)}{(S^2(S+2))}$. Find the error constants and steady state errors.	7	L4	4	1.2.4. 12
(b)	Explain the concept of stability of control systems. Also explain Routh Hurwitz stability criteria.	8	L2	4	1.2.4. 12

OR

VIII.	(a) Explain Nyquist stability criteria	5	L1	4	1.2.4. 12
(b)	Analyse the stability of the system whose open loop Transfer Function is given by $G(s).H(s) = \frac{60}{S(S+2)(S+10)}$.	10	L4	4	1.2.4. 12

IX.	(a) Explain the instrumentation requirements of UMS class vessels.	7	L2	5	1.6
(b)	With a neat sketch explain jacket cooling water system on board ship.	8	L2	5	1.6

OR

X.	Explain single element, two element and three element type feed water control system in marine boiler.	15	L2	5	1.6
----	--	----	----	---	-----

Blooms's Taxonomy Level

L1 - 16%, L2 - 57%, L4 - 27%.
