



Department of Marine Engineering	LP: MR16803
B.E/ B.Tech /M.E/ M.Tech : MARINE Regulation: 2016	Rev. No: 01
PG Specialisation : N/A	Date: 09.12.19
Sub. Code / Sub. Name : MR16803 MARINE CONTROL ENGINEERING AND AUTOMATION	
Unit: I BASICS OF CONTROL SYSTEM	

Unit Syllabus: Terms used in control systems, open loop and closed loop control systems, comparison of closed and open loop, feedback and feed forward control systems, merits and demerits. Basic understanding of on-off control, proportional plus integral plus derivative controls. Block diagrams for control systems

Objective: The students are able to understand the basics of Control system, their merits & demerits. .

Session No *	Topics to be covered	Ref	Teaching Aids
1.	Terms used in control systems	T2 PG127-132	PPT / BB
2.	Open loop and closed loop control systems	R3 PG21	PPT / BB
3.	Comparison of closed and open loop	R3 PG22	PPT / BB
4.	Feedback and feed forward control systems	T2 PG 107,244	PPT / BB
5.	Merits and demerits	R3 PG152	PPT / BB
6.	Understanding of on-off control	R3 PG135	PPT / BB
7.	Proportional plus integral controls	T2 PG 144	PPT / BB
8.	Proportional plus integral plus derivative controls	T2 PG142-149	PPT / BB
9.	Block diagrams for control systems	T2 PG 236,240,243	PPT / BB

Content beyond syllabus covered (if any):

* Session duration: 50 minutes



Sub. Code / Sub. Name: **MR16803 MARINE CONTROL ENGINEERING AND AUTOMATION**
Unit: II **CONTROL SIGNALS**

Unit Syllabus: Electronics: Basic application of semi conductors (Diodes as rectifiers) and transistor amplifiers.

Pneumatics: Basic study, Nozzle-flapper, bellows, Position balance and force balance proportional controllers, relays, three term controller, pneumatic supply system.**Hydraulics:** Basic study, open loop and closed loop hydraulic circuits, Hydraulic supply system

Objective: The students should be able to understand pneumatic and hydraulic control Signals..

Session No *	Topics to be covered	Ref	Teaching Aids
10	Basic application of semi conductors	T2 PG89	PPT / BB
11	Transistor amplifiers	T2 PG 102-104	PPT / BB
12	Pneumatics: Basic study	T1 PG 111-115	PPT / BB
13	Nozzle-flapper, bellows	T1 PG111-125	PPT / BB
14	Position balance and force balance propotional controllers	T2 PG77	PPT / BB
15	Relays,three term controller, pneumatic supply system	T2 PG167	PPT / BB
16	Hydraulics: Basic study	T2 PG122	PPT / BB
17	Open loop and closed loop hydraulic circuits	T1 PG 291-294	PPT / BB
18	Hydraulic supply system	T1 PG291-294	PPT / BB

Content beyond syllabus covered (if any):

* Session duration: 50 minutes



Sub. Code / Sub. Name: **MR16803 MARINE CONTROL ENGINEERING AND AUTOMATION**
Unit: III **PROCESS AND KINETIC CONTROL**

Unit Syllabus: PROCESS CONTROL: Basic study of process control with examples, elements of control loop, control loop characteristics, control loop response, stability of process control systems, proportional, integral and derivative control actions. Multi-loop control systems such as Cascade control, Ratio control and Split range control. **KINETIC CONTROL:** Basic study, servomechanism analysis, significance of step and ramp input. **Position control:** Ward Leonard all electric steering gear and Synchro servo mechanism. **Speed control.:** Speed control of D.C motors, Governors.

Objective: The students will be able to understand process control, kinematic control, position control.

Session No *	Topics to be covered	Ref	Teaching Aids
19	Basic study of process control with examples	R3 PG295-300	PPT / BB
20	Elements of control loop, control loop characteristics, control loop response	T2 PG142	PPT / BB
21	Stability of process control systems	T2 PG270-271	PPT / BB
22	Proportional, integral and derivative control actions	T2 PG142-149	PPT / BB
23	Multi-loop control systems	T2 PG152	PPT / BB
24	KINETIC CONTROL: Basic study, servomechanism analysis	T2 PG239-245	PPT / BB
25	Significance of step and ramp input	T1 PG265-266	PPT / BB
26	Ward Leonard all electric steering gear and Synchro servo mechanism	T2 PG246-247	PPT / BB
27	Speed control of D.C motors, Governors.	T2 PG248-249	PPT / BB

Content beyond syllabus covered (if any):

* Session duration: 50 minutes



Sub. Code / Sub. Name: **MR16803 MARINE CONTROL ENGINEERING AND AUTOMATION**
Unit: IV **TRANSMISSION**

Unit Syllabus: Pneumatic and electric transmission - suitability for marine use. **Correcting Units-** Diaphragm actuators, Valve positioner, piston actuator, and Electro pneumatic transducers. Electro- hydraulic actuators, Electric actuator control valves.

- **Objective:** The students will be able to understand the different types of Transmission elements.

Session No *	Topics to be covered	Ref	Teaching Aids
28	Pneumatic transmission for marine use	T2 PG 75-78	PPT / BB
29	Electric transmission for marine use	T2 PG 79-83	PPT / BB
30	Basics of correcting units	R3 PG266-275	PPT / BB
31	Diaphragm actuators.	T1 PG316 318	PPT / BB
32	Valve positioner	T2 PG117	PPT / BB
33	Piston actuator	R3 PG270	PPT / BB
34	Electro pneumatic transducers	T2 PG78	PPT / BB
35	Electro- hydraulic actuators control valves	T1 PG295-301	PPT / BB
36	Electric actuator control valves	T1 PG295-301	PPT / BB

Content beyond syllabus covered (if any):

* Session duration: 50 minutes



Sub. Code / Sub. Name: **MR16803 MARINE CONTROL ENGINEERING AND AUTOMATION**

Unit: V **APPLICATION OF CONTROLS ON SHIPS**

Unit Syllabus: Marine Boiler - Automatic Combustion control, Air - Fuel ratio control, feed water control single,two and three-element type, steam pressure control, fuel oil temperature control, Control in main machinery units for temperature of lubricating oil, jacket cooling water, fuel oil viscosity control. Bridge control of main machinery, requirements for UMS classification.**APPLICATION OF COMPUTERS IN SHIPS:** Basic concepts. Analog computers and Simulation. The use of Digital computers..

Objective: The students will be able to understand the Application of control systems onboard ships .

Session No *	Topics to be covered	Ref	Teaching Aids
37	Marine Boiler - Automatic Combustion control, Air - Fuel ratio control	T2 PG201,225	PPT / BB
38	Feed water control single,two and three-element type	T2 PG 228	PPT / BB
39	Steam pressure control	T2 PG 203-204	PPT / BB
40	Fuel oil temperature control	R-3 PG310-311	PPT / BB
41	Control in main machinery units for temperature of lubricating oil, jacket cooling water, fuel oil viscosity control	T2 PG212-213	PPT / BB
42	Bridge control of main machinery	T2 PG219	PPT / BB
43	Requirements of UMS classification	R3 PG 9-11	PPT / BB
44	Basic concepts - Analog computers and Simulation	T2 PG281-282	PPT / BB
45	Application of digital computers.	T2 PG 300-311	PPT / BB

Content beyond syllabus covered (if any):

* Session duration: 50 minutes



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TEXT BOOKS:

1. D.A. Taylor, "Marine Control Practice", 2nd Edition, Butter worth & Co (Publishers) Ltd., London, 1987.
2. Leslie Jackson, "Instrumentation and Control Systems", 3rd Edition, Thomas Reed Publication Ltd., London, 1992.
3. Bolton, "Control Systems", 1st Ed. Elsevier, Indian reprint 2011(Yesdee Publishing)
4. Smith, "Application Of Automatic Machinery And Alarm Equipment In Ships", Marine Engineering Practice, Vol 1,Part 06, IMarEST, London

REFERENCES:

1. L.F. Adams, "Engineering Instrumentation and Control", 1st Edition, English Language Book Society (ELBS), Hodder, Stoughton, Great Britain, 1984.
2. Peter Harriott, " Process Control", 26th reprint, Tata McGraw Hill Publishing Co. Ltd., 2005
3. J.Majumder & Elstan Fernandez "Marine Control Technology" Shroff Publishers 5th Reprint 2012
3. Bhattacharya, S.K., "Control Sytem Engineering", 2nd Ed. ,Pearson, 2012
4. Sinclair, "Sensors and Transducers", 3rd Ed.Elsevier, Reprint 2011 (Yesdee Publishing)

	Prepared by	Approved by
Signature		
Name	PROFESSOR. S KRISHNAN	PROFESSOR. S KRISHNAN
Designation	HOD	HOD
Date	09-DEC-2019	
Remarks *:		
Remarks *:		

* If the same lesson plan is followed in the subsequent semester/year it should be mentioned and signed by the Faculty and the HOD