

GUJARAT TECHNOLOGICAL UNIVERSITY

B.E. SEMESTER : VIII

MARINE ENGINEERING

Subject Name: **MARINE CONTROL ENGINEERING AND AUTOMATION**

Sr. No.	Course Contents	Total Hrs
1.	Control System : Introduction to control terms, Block diagrams for control systems, open loop and closed loop feed back control, comparison of closed loop and open loop, Feed forward control. Feed forward modification. Regulators and Servomechanism. Proportional plus integral plus derivative controls, use of various control modes.	07
2.	Graphical Representation of Signals : Inputs of Step Ramp sinusoid, Pulse and Impulse, Exponential Function etc. Error Detector, Controller output elements. The Dynamics of a simple servo-mechanism for Angular Position Control: The Torque Proportional to Error, Servomechanism, Different response of servomechanism. Technique for improving the general performance of servomechanism. The frequency response test. Series compensation using Nyquist Diagram. Parallel compensation using the Inverse Nyquist Diagram.	08
3.	Process Control Systems : Automatic Closed loop process. Control system Dynamic characteristic of Processes. Dynamic characteristic of controllers. Practical pneumatic controllers. Electronic Instrumentation for Measurement and control.	07
4.	Analog Computing and Simulation : Introduction, Basic concepts. Analog computers. Simulation. The use of Digital computer in the simulation control system. Hybrid Computers.	05
5.	Transmission : Pneumatic and electric transmission, suitability for marine use. Pneumatic and types of Controllers hydraulic, electric and electronic controllers for generation of control action. Time Function controllers.	07
6.	Correcting Units : Diaphragm actuators, Valve-positioners, piston actuators, Electro-pneumatic transducers. Electro-hydraulic actuators and Electric actuator control valves.	04
7.	Application of Controls on ships : Marine Boiler-Automatic combustion control, Air/fuel ratio control feed water control single two and three element type, steam pressure control, combustion chamber pressure control, fuel oil temperature control, Control in Main Machinery units for Temperature of lubricating oil, jacket cooling water, fuel valve cooling water, piston cooling water and scavenage air, fuel oil viscosity control Bridge control of main machinery. Instrument for UMS classification.	07

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.

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 Mc Graw Hill Publishing Co.Ltd.,2005