**Indian Maritime University**
(A Central University, Govt. Of India)
**End Semester Examination Dec-2019/Jan-2020**
**B. Tech(Marine Engineering)**
Semester -IV
**Applied Marine Control and Automation**
**UG11T3407**

Date:13-01-2020 Max Marks:**70**
Time:3 Hrs Pass Marks: **35**

**Part – A (compulsory)**
**Answer the following (10x2=20 Marks)**

1 What is a control system?

2 Explain Set-point, Offset and deviation.

3 Differentiate between Open-loop and Closed loop control system.

4 Why derivative element is added to proportional controller?

5 Discuss advantages of Feed-Forward type control system?

6 Explain transfer function.

7 Describe photo-cells

8 Compare Linear and non-linear control systems

9 Explain the basic principle of flapper-nozzle pneumatic relay

10 Direct acting and Reverse acting actuator

**Part – B**

**Answer any 5 out of 7 questions (5 x 10= 50 marks)**

11 a) Discuss the regulatory requirements of automation and controls on modern ships (7 Marks)
b) What are limitations to Automation (disadvantages) (3 Marks)

12 a) Sketch and explain the working principle Force balance transducer. (4 Marks)
b) Describe 2 wire and 3 wire methods of connection for RTD. (6 Marks)

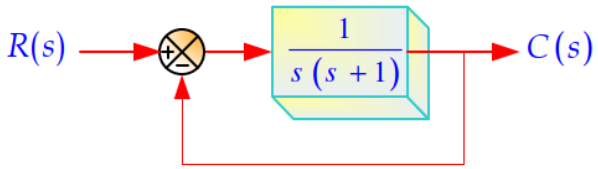
13 a) Explain Swelling and shrinkage phenomenon in boiler water (4 Marks)

b) Compare advantages and limitations of Pneumatic, electric and hydraulic control signals. (6 Marks)

14 a) List Various Direct and Indirect methods of level measurement. (2 Marks)
b) Explain Cascade type control system with example (8 Marks)

15 a) Write down the Mason's Gain formula for signal flow diagram. (3 Marks)
b) Write the advantages and disadvantages of transfer function for a system. (7 marks)

16 Determine the values of $T_d$ , $T_r$ , $T_p$ , $T_s$ when the control system shown in Figure below when it is subject to a unit step input. (10 Marks)




17 Describe a Main Engine Fuel Oil Viscosity control system with neat labeled block diagram? (10 Marks)