Course BE(MARINE)

Batch 14

Semester VII

Subject Code ME702

Subject Name **Marine Control Engineering & Automation**

UNIT - 1(Control systems)

Part-A

20*2marks

1 Define control system

2 Define desired value

3 Write any two differences between open loop and closed loop system

4 What is meant by offset?

5 What is meant by feed forward control system?

6 What is meant by feedback controller?

7 List out the various control modes?

8 What is the use of integral control?

9 What is the use of reset control?

10 What is meant by controlled variable?

11 Write the transfer function of a system for a open loop system?

12 Write few disadvantages of an open loop control system?

13 Write the transfer function of a system for a closed loop system?

14 What is mean by cascade control system?

15 What is meant by an adaptive control system?

16 List any two advantages of Open loop control system

17 Define manipulated variable?

18 Define Process variable

19 Define system

20 Write the expression for a proportional controller?

PART-B

15*6 Marks

1 Define the following terms, set value, desired value, over shoot, offset in Control System?

2 Draw the block diagram of feedback control system and explain?

3 What are the process time lags, explain?

4 Explain adaptive control system with an example?

5 What is meant by cascade control?

6 Comparison of open loop and closed loop control system

7 Draw the PID mode control system for rudder control using OP-AMP circuit?

8

9 What is ON-OFF control mode? Explain it with necessary waveforms?

10 What is meant by Disturbance in a control system? Give an illustrative example for a temperature process?

11 Describe the term 'stability' of Automatic control system?

12 Describe the types of Oscillation?

13 Draw the graphical Symbols of the following components.

1. Pressure, Temperature, level and Flow sensors.
2. I/P and P/I converters
3. Valve

14 Differentiate Transducer and Transmitters?

15 Explain Direct and Reverse acting control signal?

PART-C

6*10 Marks

1 Explain one of the PID controllers tuning technique in detail?

2 Explain a feed forward control system with an example?

3 Explain two step PI controllers with an example?

4 Explain cascade control system with an example?

5 Briefly explain about open loop and closed loop control system with diagram ?

6 Briefly explain about feedback and feed forward control system with diagram?

UNIT - 2(Servomechanism)

Part-A

20*2marks

1 Define Settling time?

2 Define Delay time?

3 What is the use of tolerance band for a system?

4 Define Rising time?

5 What is meant by error detector?

6 What is the use of Comparator?

7 What is an automatic controller?

8 What is meant by a self acting controller?

9 Define proportional band?

10 What is a synchro?

11 What is a three term controller?

12 What is hybrid computer?

13 What is an analogue computer?

14 Draw the integrator using op-amp?

15 What is meant by kinetic control system?

16 What is meant by regulatory mechanisim?

17 What is the IEEE specification of Ethernet?

18 What is meant by a relay?

19 What are the layers in TCP/IP protocol?

20 What are internal utility relay in PLC?

PART-B

15*6 Marks

1 Explain Time constant with a practical example?

2 Explain Transfer lag of process?

3 Explain Distance velocity lag and measurement lag?

4 Define Range ability?

5 Explain about continuous control?

6 Discuss briefly CPP?

7 What are meant by Synchro's?

8 Explain briefly direct digital control?

9 Draw the speed control set up of a DC Shunt motor, and explain briefly?

10 Briefly explain hybrid computer?

11 Explain about analog computer?

12 Compare Analog and Discrete signal?

13 List the uses of simulation?

14 What is an Operational amplifier?

15 List few uses of Op-Amp?

PART-C

6*10 Marks

1 Explain the various control modes of a controller with required waveforms?

2 Explain the construction and working principle of RTD?

3 Describe a closed loop control system with an example and a neat sketch?

4 Explain the working principle of Thermocouple with diagram?

5 Explain the working principle of PLC and discuss the step process in a PLC operation?

6 Explain the main engine starting systems with neat sketch?

UNIT - 3(Transmission)

Part-A

20*2marks

1 What is meant by pneumatic controller?

2 What is the difference between a transmitter and a transducer?

3 What is meant by a voltage comparator?

4 Draw the characteristics of nozzle flapper?

5 What is meant by a pulse timer?

6 What is a on delay timer?

7 What is meant by off delay timer?

8 What is meant by data memory?

9 What is meant by program memory?

10 Write any three advantages of PLC?

11 What is meant by HMI?

12 What are counters?

13 What is a coil in PLC?

14 What is Opto – isolation?

15 Define NO and NC?

16 Define sinking and sourcing of PLC?

17 What are registers used for?

18 Define latch?

19 What is meant by retentive timer?

20 List the types of PLC's?

PART-B

15*6 Marks

1 Draw boiler oil purification control system and explain briefly?

2 Give a short note on SCADA system?

3 Draw the diagram of a pneumatic PID controller?

4 What is meant by a PLC and why is it used? List its advantages?

5 Explain TCP/IP protocol?

6 Give the scanning process in PLC?

7 What is meant by differential relay and draw the schematic diagram?

8 Explain the working principle of flapper nozzle?

9 Explain a level control application using pneumatic control system?

10 Show the nozzle flapper characteristics?

11 Draw the ladder logic in PLC for the following condition

a. When both the switches S1 & S2 is ON , only then lamp L1 is ON

b. If S1 or S2 is ON , then L1 is OFF

12 Draw the ladder logic in PLC for the following condition

a. Switch S1 should only turn ON the lamp L1

b. Similarly, switch S2 should only turn OFF the lamp L1

13 Draw the ladder logic in PLC for the following condition

a. There are four switches S1,S2,S3 & S4 controls a lamp L1

b. Only when any three switches or above are closed the lamp should glow

14 Draw the ladder logic in PLC for the following condition

a. If S1 and S2 is HIGH , then L1 is OFF

b. If S1 and S2 is LOW , then L1 is OFF

c. If S1 is HIGH and S2 is LOW , then L1 is ON

d. If S1 is LOW and S2 is HIGH , then L1 is ON

15 Describe about moment balance mechanism?

PART-C

6*10 Marks

1 Discuss the basic instructions and registers of PLC?

2 Explain ISO/OSI Protocol in detail?

3 Explain in details open loop and closed loop hydraulic circuit with figures?

4 Compare the traditional control and PLC?

5 Discuss the significant blocks of PLC and list out the advantages of PLC?

6 Describe the working of Valve Motor Drive?

UNIT - 4(Correcting units)

Part-A

20*2marks

1 What is meant by DCS?

2 Define SCADA?

3 Define a Control Valve?

4 What is meant by an actuator?

5 Define FCE?

6 Define Flashing?

7 Define Cavitation?

8 Define Dead band?

9 What is meant by Hysteresis?

10 Define Drift?

11 Define Span?

12 Define Plugging?

13 Which are the types of control valves?

14 What is the necessity of a valve positioner?

15 What is a piston actuator?

16 What is an electro-pneumatic transducer?

17 What is the disadvantage of a continuous bleed type relay?

18 Mention two advantages of a positioner?

19 What is meant by direct and reverse acting actuator?

20 Which are the types of valve positioners?

PART-B

15*6 Marks

1 Explain about continuous bleed type pneumatic relay with a neat sketch?

2 Explain about true force balance mechanism?

3 Compare RLC and PLC?

4 Explain about latch instruction?

5 Compare DCS and PLC?

6 List the advantages of DCS?

7 What are the advantages of SCADA?

8 Compare SCADA and DCS?

9 Explain the characteristics of Fast opening valve?

10 Explain the characteristics of linear valve?

11 Discuss the construction and working principle of Butterfly valve?

12 Discuss the construction and working principle of Gate valve?

13 Discuss the construction and working principle of Globe valve?

14 Discuss the construction and working principle of Ball valve?

15 briefly explain the types of control valves?

PART-C

6*10 Marks

1 Explain the working of a diaphragm actuator with diagram?

2 Write a note on control valves and explain a self acting control valve?

3 Discuss the construction and working principle of Diaphragm valve?

4 Explain the combustion control of main boilers?

5 Briefly explain about valve positioners with neat Diagram ?

6 Explain the auxiliary boiler control system with Diagram?

UNIT - 5(Application of controls in ships)

Part-A

20*2marks

1 What is meant by Split control method?

2 What is meant by viscosity?

3 What is meant by low signal selector?

4 What is meant by Purging cycle?

5 What is meant by kinematic viscosity

6 What is meant by swell effect in a boiler?

7 What is meant by high signal selector?

8 Define Maneuvering?

9 Define Master controller?

10 Define Salve controller?

11 What is meant by Ignition cycle?

12 What is meant by main burner cycle?

13 What is meant by shrink effect in a boiler?

14 Define PLC?

15 Define Error?

16 What is mean by System?

17 Define Servo mechanism?

18 Define interfacing?

19 What is meant by Optical isolation?

20 Define Timers and Counters?

PART-B

15*6 Marks

1 What are valve positioners, explain them briefly?

2 Compare flashing and cavitations?

3 What is meant by an actuator and how actuators are selected?

4 Draw the arrangement of a piston actuator?

5 Draw an electro pneumatic controller?

6 Briefly explain electro hydraulic speed control?

7 Brief about Direct-acting actuator?

8 Discuss about Reverse-acting actuators?

9 Explain fuel cooling water temperature control with diagrams?

10 Write short notes on feed water circulation system?

11 Draw the block diagram of a fuel valve cooling system?

12 What are the advantages of using cascade control?

13 Draw the block schematic of a three element boiler water level control?

14 Explain about two element boiler water level control with diagram?

15 Explain the Theory of Wheat stone bridge and its advantages as well?

PART-C

6*10 Marks

1 Explain three element boiler water level control with diagram?

2 Explain steam temperature control with diagrams?

3 Discuss about exhaust steam pressure control?

4 Describe the process of piston cooling water control system?

5 Explain the process of fuel valve cooling water control system?

6 Discuss different cooling control systems used in Marine machineries?