**BTETPE 802A Industrial Automation and Control**

Week 1

1. What is Automation?
2. Define: Control in Industrial Automation.
3. How Industrial Automation is distinct from IT?
4. Explain features of IT for the factory that differentiate it with its more ubiquitous counterparts that are used in offices and other business.
5. Explain the different type of Automation system.
6. With the help of block diagram explain the Functional configuration of a typical sensor system.
7. With the help of block diagram explain Industrial Actuator Systems.
8. Discuss what is automation pyramid?
9. Name static characteristics and explain any three.
10. Explain Dynamic characteristics.
11. Write a short note on Random characteristic.

Week 2

1. A continuous time signal for a duration of 4s is uniformly sampled without aliasing and generating a finite length sequence containing 4000 samples, what is the highest frequency component that could be present in the continuous time signal?
2. A 4 bit DAC produces an output voltage of 5V for an input code 1111. What will be the value of the output voltage for an input code of 0101?
3. Consider a simple signal processing system shown in figure below:
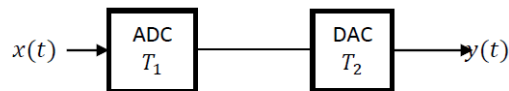
The sampling periods of the ADC and DAC converters are $T1 = 5\ ms$ and $T2 = 2\ ms$ respectively. Input to the system is given as: $(t) = 3cos\ 100\pi t + 2sin\ 250\pi t$, then output (t) is:
4. Write a short note on Resistance Temperature Detector.
5. Write a short note on Thermistor.
6. Draw a diagram of Fiber optic position sensor and explain its working.
7. Explain with diagram what Electromagnetic flowmeter is?
8. Explain what is Measurement of pH?

Week 3

1. Discuss with block diagram the Elements of a measuring system.
2. What is Unbalanced D.C. Bridge, from its equation give any three conclusions.
3. Discuss Differential Amplifier and derive the equation for same.
4. Discuss Instrumentation Amplifier and derive the equation for same.
5. What is limiting error?

Week 4

1. Discuss about closed loop SISO System.
2. With block diagram, derive the equation for proportional control c(s).
3. Give Guideline for selection of controller mode.
4. Discuss the values of proportional gain in closed loop continuous oscillation technique.

Week 5

1. Drive an equation for Digital P-I-D Control.
2. Explain with the help of block diagram working of Feedforward Control.
3. Discuss the Control of a System with Inverse Response.
4. What is Override Control and Split Range Control?
5. Give the advantages of cascade control.

Week 6

1. What is Sequence and Logic Control?
2. Compare Logic and Sequence Control with Analog Control.
3. Explain what is Programmable Logic Controllers (PLC)?
4. Give the significant advantages over conventional control panels of PLC.
5. Explain the Architecture of PLC with the help of block diagram.

Week 7

1. Explain the operation set of PLC programming languages.
2. List and explain Process control input and outputs in stamping process.
3. Give the measure features of IEC 1131-3.
4. Draw Architecture of Control Software organized with SFCs and explain its processing's?
5. Explain any four hardware configurations components in PLC system.
6. Explain Analog Input Module and give its parameters?

Week 8

1. What is Computer Numerical Control?
2. Give the advantages of CNC machines.
3. Classify CNC machine tool systems and explain any one way.
4. Dynamic viscosity (μ) of a liquid is $8.9\times10^{-4}kg$, pipe's cross-section(A) is $8\ cm2$ and hydraulic diameter (DH) of the pipe is $6\ cm$. Reynolds number (Re) is 2.5×105. Find mass flow rate (W) through the pipe.
5. Draw and explain block diagram of closed-loop incremental PTP system.

Week 9

1. Give the Advantages of Hydraulic Actuation Systems.
2. What is Hydraulic fluid? Explain any three component components that hold and carry the fluid from the pump to the actuator.

3. Explain any three Directional control valves.
4. Describe typical types of instruments and switches used in hydraulic circuits

Week 10

1. Describe Flapper nozzle amplifier with diagram.
2. Write a short note on Pneumatic Proportional plus Integral Controller.
3. What is the function of air relay?
4. Explain Variable Speed Drive.
5. Write a short note on Variable Reluctance type Step Motor and give its specification.

Week 11

1. Explain Mechanical construction of DC servomotor.
2. What is DC servomotor and explain its construction.
3. Give the Advantages of transistor PWM dc drives over thyristor drives.
4. Explain what Brushless DC motors is and give its advantages?
5. Explain what is Stator and Rotor in Permanent Magnet Brushless DC Motor.

Week 12

1. Discuss major motivations for the Fieldbus.
2. Give the different protocol aspects in Fieldbus.
3. Discus with the block diagram Fieldbus Network Architecture.
4. What is Cyclic and Acyclic Communication?
5. Which activities are include in the scope of production planning?
6. Give major aspects of production planning.