M.Tech. 3rd Semester (EEE)
Examination, December–2024
PLC CONTROLLER AND THEIR APPLICATION
Paper–MTEEE-601

Time allowed : 3 hours]   *[Maximum marks : 100*

Note : *Attempt any **five** questions, selecting at least **one** question from each unit.*

Unit–I

1. Write short note on :   20

    (i) Drill press operation

    (ii) Input output module

2. Write short note on :   20

    (i) CPU processor

    (ii) Operational procedure

Unit–II

3. Explain ladder diagram construction and flow chart for spray process system.   20

4. Write short note on :

    (i) Module addressing

    (ii) Holding registers

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Unit–III

5. Explain timer and counter function in PLC.   20

6. Write short note on :   20
    (i) Master control relay
    (ii) Sweep function

Unit–IV

7. Explain controlling of 2 axis and 3 Axis robots with PLC.
                                                         20

8. Write short note on :   20
    (i) Analog signal processing
    (ii) Matrix function

M.Tech. 3rd Semester (EEE)
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PLC CONTROLLER & THEIR APPLICATIONS
Paper– MTEEE – 601

Time allowed : 3 hours]   *[Maximum marks : 100*

Note: *Attempt any five questions in all.*

1. Explain in detail about the internal architecture of the programmable logic Controllers.   20

2. Consider a start-stop seal circuit. When the start button is pressed, the coil energizes. When the button is released the coil remains on. It is held on by a realing contact that is in parallel with the start button. The seal contact closes when the output coil goes on. If the stop button is pressed, the coil goes off. For the said problem, show relay logic, its Connection diagram, PLC logic and its connection diagram, PLC latch/unlatch logic.   20

3. (a) Write an instruction list and ladder diagram to describe a valve which is to be operated to lift a load when a pump is running and either the lift switch is operated or a switch is operated indicating that the load has not already been lifted.   10

   (b) Write the instruction list and ladder diagram for the following functions:- (i) NOR (ii) NOT (iii) AND   10

4. Explain following using examples: 20

    (i)   Holding Register

    (ii) Input group register

    (iii) Module Addressing

    (iv) Spray Processing System

5. (a) Explain the basic counter program with the help of ladder diagram and program instruction and waveforms.   10

    (b) How many configurations are there for PLC counter functions? Explain.   10

6. Explain following:-   20

    (i)   CLR & Sweep functions & applications.

    (ii) Data handling functions & examples.

7. (a) How does proportional - integral - derivative process control system improve control compared to proportional-integral control only?   10

    (b) Explain the important features of the PLC and also list the different languages used for PLC programming.   10

8. Write note on:-   20

    (i)   Controlling of a Two axis Robot

    (ii) Analog Signal Processing

    (iii) Position Indicator with PID control

M. Tech. 3rd Semester (EEE) Examination,
December–2022
PLC CONTROLLER & THEIR APPLICATION
Paper : MTEEE-601

Time allowed : 3 hours]   [Maximum marks : 100

Note: *Attempt any five questions in all.*

1. (i)   Discuss about the programmable logic controllers
          and configurations.   10

    (ii) What are programmable logic controller numbers
          and codes ?   10

2. (i)   Design gate logic relay logic and PLC logic for a
          motor control circuit with a process fan is to run
          only when all of the following conditions are met.
          Input 1 is on, input 2 is on or both 2 & 3 are on,
          input 5 & 6 are both on, one or more of the inputs
          7, 8 or 9 are on.   10

    (ii) Consider any PLC ladder diagram and show its
          equivalent gate diagram.   10

3. (i)   Write the instruction list and ladder diagram for
          the following functions :

          (a) NOR   (b) XNOR   (c) XOR   10

    (ii) Illustrate a process of repairing subroutine. Draw
          the required logic diagram.   10

4. Explain the following using examples :   20

    (i)   Changing the bit pattern of a Register

    (ii) Output group Register

    (iii) Holding Register

    (iv) Module Addressing

5. (i) Explain the three different forms of timers with timing diagram.   10

(ii) Discuss the applications of a dual counter for parts to be counted on a conveyer belt. Assume required design considerations.   10

6. Explain the following :   20

(i) JUMP with NON-RETURN

(ii) SKIP

(iii) Master control relay

(iv) Number conversion functions

7. (i) How does proportional-integral process control system improve control compared to proportional control only ? Use example.   10

(ii) Explain the difference between discrete type PLC and analog PLC.   10

8. Write notes on :   20

(i) Sequence functions and applications

(ii) Analog modules & systems

(iii) PID Tuning

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M.Tech. (EEE) 3rd Semester
Examination, December–2024
PROCESS CONTROL
Paper–MTEEE-603

Time allowed : 3 hours]   [Maximum marks : 100

Note : Attempt any five questions.

1.   (a)   How do you reduce the number of degrees of freedom to zero so that you can have a completely specified system with unique behaviour.   10

    (b)   State and explain the dominant physical and chemical phenomenon taking place in the process to be controlled.   10

2.   (a)   What is computer simulation, and what it is used for?   10

    (b)   Explain Linearization. State its importance with an example.   10

3.   (a)   Discuss a set of simple heuristic rules used to select the most appropriate type of feedback controller for a particular system.   10

    (b)   Explain the procedure of Controller Tuning.   10

4.   (a)   What is the effect of dead time in the response of simple feedback control loops ? Explain in physical terms.   10

    (b)   What is the impact of model inaccuracies on the effectiveness of dead time compensation ?   10

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5. (a) What types of controllers would be used for the two controllers of a cascade control system ? How to tune them ?

   (b) Are the stability characteristics of the closed loop response of a cascade system better than those of a simple feedback ? Justify your answer. 10

6. (a) What is meant by the term "decoupling" two control loops ? Explain with example. 10

   (b) Define the relative gain array for a process with two inputs and two outputs. 10

7. (a) Describe the structure of a conventional digital computer and identify the characteristics of each hardware component in the structure. 10

   (b) Identify the functions and hardware components of a computer process I/O interface. 10

8. Write notes on : 20

   (i) Optimal and adaptive control of processes

   (ii) Data Acquisition and Control

M.Tech. 3rd Semester (EEE)
Examination, November–2023
PROCESS CONTROL
Paper– MTEEE-603

Time allowed : 3 hours]   *[Maximum marks : 100*

Note: Attempt any five questions.

1. (a) Explain that the d disturbances reduce the number of degrees of freedom by d.   10

   (b) Why can a control system not be designed for an overspecified process? Explain.   10

2. (a) What is the most attractive point of linearization for control purposes and why?   10

   (b) Define the deviation variables. What is the point of linearization in order to define the deviation variables that will be useful for process control purposes?   10

3. (a) Define an open loop and closed loop system. Also explain the open loop and closed loop responses.   10

   (b) Discuss the tuning of controller using Ziegler-Nichols technique.   10

4. (a) State the impart of model inaccuracies on the effectiveness of dead time compensators.   10

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(b) What is the goal when designing a controller for a system with inverse response? Describe what an inverse response compensator does.   10

5. Discuss the relative advantages and disadvantages of Feedforward and feedback control systems. Why the addition of feedback control improve the performance of a feedforward system? Explain using suitable examples of systems.   20

6. (a) Explain the feedforward control nature of a decoupler. When do we have the perfect decoupler and when it is not?   10

   (b) What is meant by a physically unrealizable decoupler? Explain.   10

7. Describe two different ways that can be used to improve the quality of a reconstructed continuous signal from its discrete time values. State relative advantages and disadvantages of the two methods.   20

8. Write notes on:-   10+10

   (i) Operating system for real time process control

   (ii) Data Acquisition System

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M. Tech. 3rd Semester (EEE) Examination,
December–2022
PROCESS CONTROL
Paper : MTEEE-603

Time allowed : 3 hours] *[Maximum marks : 100*

Note: *Attempt any five questions.*

1. (i) What do you mean by degrees of freedom, relate the degree of freedom to the solution of E equations with V variables. 10

   (ii) How does the number of degrees of freedom affect the number and selection of the control objectives in a process ? 10

2. (i) Why are the linearized approximate models useful for process control purpose ? Explain. 10

   (ii) State that when is the linearized model more accurate-near or far from the point of linearization, and why ? 10

3. (i) Why is the control value selection needed ? Explain. 10

   (ii) Discuss the strengths and weaknesses of a feedback control system. Explain using suitable examples. 10

4. (i) What is the reason that the Controller design of processes with dead time a particularly sensitive and difficult problem ? Explain with an example. 10

   (ii) Show that the dead time and the inverse response compensators are based on the same logic. What are their implementation difficulties ? 10

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5. What kinds of processes stand to benefit the most from feedforward control and why ? Do the stability characteristics of a process change with feedforward control as they do with feedback ? Explain.   20

6. (i) What is meant by decoupling two control loops ? Do the two loops of the process need decoupling. (Take any relevant example of a process) ?   10

   (ii) What is one way decoupling of two control loops, and why could it be acceptable ?   10

7. What is the need to convert a continuous signal to discrete time signal and vice-versa ? Give a suitable example for this need using a reference to the computer control of a industrial boiler system.   20

8. Write notes on :   10+10

   (i) Optimal and adaptive control of processes

   (ii) Process control languages

M.Tech 3rd Semester (EEE) Examination,

December–2024

HVDC TRANSMISION

Paper–MTEEE-615

Time allowed : 3 hours]　　　　　[Maximum marks : 100

Note : Attempt any *five* questions in all.

1. (a) With the help of neat schematic diagram explain the operation of 3-phase, 6 Pulse Graetz's Circuit. 　　　15

   (b) Write the special features of converter transformers. 　　　5

2. (a) Draw the typical layout of HVDC transmission system and explain each part. 　　　10

   (b) Explain the types of HVDC links and its application with neat diagram. 　　　10

3. What is the meaning of ignition angle control and explain individual phase control and equidistant control method ? 　　　20

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4. (a) Explain the constant extinction angle control and constant current control.   10

    (b) Explain the types of harmonics generated in HVDC system.   10

5. What are the major types of AC-DC systems interaction and also explain about the harmonic interactions in details ?   20

6. Describe DC power modulation and its importance in multi-terminal HVDC systems.   20

7. Explain transient overvoltage due to DC and AC side line faults with neat sketches.   20

8. Explain the role of circuit breakers and surge arresters in providing overvoltage protection to converters and other critical components in HVDC systems.   20

M. Tech 3rd Semester (EEE)
Examination, November-2023
HVDC TRANSMISSION
Paper–MTEEE-615

Time allowed : 3 hours]   [Maximum marks : 100

Note: Attempt *five* questions in all.

1. Derive the expression for input power, output power and power factor of 12- pulse bridge converter with delay angle α. Assume there is no overlap.   20

2. Explain basic conversion principles and static converter configuration of HVDC transmission system.   20

3. Derive the expression for input power, output power and power factor of 12-pulse bridge converter with delay angle α. Assume there is no overlap.   20

4. Explain constant current control and constant ignition angle control.   20

5. Explain harmonic instability problems and DC power modulations.   20

6. Explain operation and control of series and parallel systems in HVDC.   20

7. Briefly discuss over voltages due to disturbance on DC side and overvoltage due to DC and AC side line faults.   20

8. Write a short note on the following:

   (a) Converter Faults and Over Current Protection

   (b) Surge Arrestors   20

M.Tech. (EEE), 3rd Semester,
Examination, December-2022
HVDC TRANSMISSION
Paper –MTEEE-615

Time allowed : 3 hours]   [Maximum marks : 100

Note: *Attempt any five Questions in all.*

1. Explain the 3 pulse static power converter along with associated derivation of expression.   20

2. Write a short note on the following: 20

    (a) Rectifier and Inverter Operation

    (b) Special features of Converter Transformers

3. What do you mean by harmonics and what effect does it have on power quality. How can you eliminate harmonics?   20

4. Write short note on the following: 20

    (a) AC and DC Filters

    (b) Individual Phase Control and Equidistant Firing Angle Control.

5. Withe respect to voltage interaction comment on interaction between HVAC and DC system.   20

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6. Explain the operating principle and control of series parallel multiterminal DC links? 20

7. Write the short note on the following: 20

   (a) DC line protection

   (b) Circuit Breakers

8. Write short note on the following: 20

   (a) Overvoltage protection of converters

   (b) Surge arrestors