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Question Paper Code: AEE511



INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal, Hyderabad - 500 043

MODEL QUESTION PAPER - I

Third Year B.Tech V Semester End Examinations, November – 2019

Regulations: R16

INDUSTRIAL AUTOMATION AND CONTROL

(EEE)

Time: 3 hours

Max. Marks: 70

Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the question must be answered in one place only

UNIT - I

1. a) Distinguish between the principles of operation of RTD and Thermistor for measuring the temperature of a process [7M]
b) Explain the advantage of using push-pull configuration in unbalanced A.C. and D.C. bridges. [7M]

2. a) Describe the architecture of industrial automation with automation pyramid. [7M]
b) Explain the principles of operation of inductive and capacitive types of proximity sensors. [7M]

UNIT – II

3. a) Distinguish with examples the difference between sequential control and continuous process control. [7M]
b) Explain a scheme for implementation of P-I-D controller using electronic circuit. [7M]

4. a) Explain the three methods for tuning of P, I and D parameters for a process. [7M]
b) Explain with an example the principle of ratio control. Elaborate with a block diagram any one scheme for achieving ratio control. [7M]

UNIT – III

5. a) Explain the Architecture of Programmable logic controller with neat sketch. [7M]
b) Explain the difference between SFC and Ladder diagram programming methods for PLC? [7M]

6. a) Design RLL Diagrams for the Forward and Reverse Control of an industrial motor. [7M]
b) Explain about function modules and counter modules used in PLC hardware. [7M]

UNIT – IV

7. a) Explain the differences between point to point and contouring CNC systems [7M]
b) Describe the principles of operation of hydraulic systems and list out its advantages. [7M]

8. a) What is part program? List the sequences of operations in a part program. [7M]
b) Describe the open loop and closed loop CNC systems with a neat sketch. [7M]

UNIT – V

9. a) Explain with schematic diagrams, open loop and closed loop control schemes used for step motors [7M]
b) Explain the closed loop position control scheme of PM BLDC motor drive. [7M]
10. a) Derive the dynamic speed response characteristics relating armature voltage, load torque and speed [7M]
b) Explain the operation of Closed-loop induction motor drive with constant volts/Hz control strategy. [7M]



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COURSE OBJECTIVES:

The course should enable the students to:

I	Learn the fundamental concepts about introduction to industrial automation and control and devices.
II	Study the performance of each system in detail along with practical case studies.
III	Develop various types of industrial automation and control and devices.
IV	Understand the process control of PLC automation.

COURSE OUTCOMES (COs):

CO 1	Describe working of various blocks of basic industrial automation system.
CO 2	Analyse various control aspects for the automation application.
CO 3	Construct a program using PLC to problems pertaining to automation industries.
CO 4	Describe the principal and operation of CNC machines and actuators.
CO 5	Distinguish various industrial drives for the industrial automation.

COURSE LEARNING OUTCOMES:

Students, who complete the course, will have demonstrated the ability to do the following:

CLO CODE	COURSE LEARNING OUTCOMES
AEE511.01	Describe the various elements of an Industrial Automation Systems and how they are organized hierarchically in levels.
AEE511.02	Define the different terms used for characterizing the performance of an instrument/ measurement system.
AEE511.03	Report the different methods for measurement of temperature, pressure, force, displacement and speed.
AEE511.04	Describe the signal conditioning circuits and identify different types of errors.
AEE511.05	Discuss the input-output relationship of a P-I-D controller'
AEE511.06	Explain the use of feed forward and ratio control schemes.
AEE511.07	Explain the predictive control schemes and also compensation scheme for control of a process with inverse response.
AEE511.08	Define Sequence and Logic Control and report the major functions performed by a PLC.
AEE511.09	Describe the hardware structure of a PLC Program and the execution of a PLC Program.
AEE511.10	Describe motivations for formal modelling in the design of sequence control programs for an industrial control problem.
AEE511.11	Describe the physical organization of hardware in the PLC.
AEE511.12	Define Numerical Control and describe its advantages and disadvantages.
AEE511.13	Name the types of control valves and sketch their ideal flow characteristics.
AEE511.14	Describe the principles of operation of hydraulic systems and understand its advantages.
AEE511.15	Describe pressure switches, as well as pressure and flow gauges used in hydraulic systems.
AEE511.16	Demonstrate energy saving with variable speed drive method of flow control compared to throttling.
AEE511.17	Explain with schematic diagrams, open loop and closed loop control schemes used for step motors.
AEE511.18	Describe the operational features of dc motor drives, Induction motor drives, BLDC motor drives for Electrical actuators.

MAPPING OF MODEL QUESTION PAPER QUESTIONS TO THE ACHIEVEMENT OF COURSE LEARNING OUTCOMES:

SEE QUESTION No.	COURSE LEARNING OUTCOMES		Course Outcomes	Blooms Taxonomy Level	
1	a	AEE511.03	Report the different methods for measurement of temperature, pressure, force, displacement and speed.	CO 1	Understand
	b	AEE511.03	Report the different methods for measurement of temperature, pressure, force, displacement and speed.	CO 1	Understand
2	a	AEE511.01	Describe the various elements of an Industrial Automation Systems and how they are organized hierarchically in levels.	CO 1	Understand
	b	AEE511.02	Define the different terms used for characterizing the performance of an instrument/ measurement system.	CO 1	Understand
3	a	AEE511.05	Discuss the input-output relationship of a P-I-D controller'	CO 2	Understand
	b	AEE511.05	Discuss the input-output relationship of a P-I-D controller'	CO 2	Understand
4	a	AEE511.05	Discuss the input-output relationship of a P-I-D controller'	CO 2	Understand
	b	AEE511.06	Explain the use of feed forward and ratio control schemes.	CO 2	Understand
5	a	AEE511.09	Describe the hardware structure of a PLC Program and the execution of a PLC Program.	CO 3	Understand
	b	AEE511.09	Describe the hardware structure of a PLC Program and the execution of a PLC Program.	CO 3	Understand
6	a	AEE511.10	Describe motivations for formal modeling in the design of sequence control programs for an industrial control problem.	CO 3	Understand
	b	AEE511.10	Describe motivations for formal modeling in the design of sequence control programs for an industrial control problem.	CO 3	Understand
7	a	AEE511.11	Describe the physical organization of hardware in the PLC.	CO 4	Remember
	b	AEE511.11	Describe the physical organization of hardware in the PLC.	CO 4	Understand
8	a	AEE511.11	Describe the physical organization of hardware in the PLC.	CO 4	Understand
	b	AEE511.11	Describe the physical organization of hardware in the PLC.	CO 4	Understand
9	a	AEE511.13	Name the types of control valves and sketch their ideal flow characteristics.	CO 5	Understand
	b	AEE511.13	Name the types of control valves and sketch their ideal flow characteristics.	CO 5	Understand
10	a	AEE511.17	Explain with schematic diagrams, open loop and closed loop control schemes used for step motors.	CO 5	Understand
	b	AEE511.17	Explain with schematic diagrams, open loop and closed loop control schemes used for step motors.	CO 5	Understand

Signature of the Course Coordinator

HOD, EEE