Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

EIGHTH SEMESTER B.TECH DEGREE EXAMINATION, MAY 2019

Course Code: EE404

Course Name: INDUSTRIAL INSTRUMENTATION AND AUTOMATION

Max. Marks: 100 Duration: 3 Hours

PART A

Answer all questions, each carries 5 marks. Marks

1		Explain the factors that govern the output characteristics of a transducer.	(5)
2		Explain the concept of Nano instrumentation.	(5)
3		List any five important features of instrumentation amplifiers.	(5)
4		What are the advantages and disadvantages of MEMS?	(5)
5		Explain the selection criterion for control valves?	(5)
6		Define an industrial automation system and enlist its components.	(5)
7		Compare programmable logic controller with personal computer.	(5)
8		What are the key features of DCS?	(5)

PART B

Answer any two full questions, each carries 10 marks.

9	(a)	Explain the factors influencing the choice of a transducer for an industrial instrumentation system	(6)
	(b)	Draw and explain second order sensor time response	(4)
10	a)	With the help of a diagram explain the working of an eddy current sensor.	(6)
	b)	Draw and explain the working of a capacitive differential pressure transducer.	(4)
11	a)	Draw the block diagram representation of a process control system and explain the functions of each block.	(5)
	b)	Explain the measurement of torque using strain gauges.	(5)

PART C

Answer any two full questions, each carries 10 marks.

12	a)	Explain the importance of signal conditioning in industrial instrumentation systems.	(5)
	b)	Explain the principle of operation of phase sensitive detector.	(5)
13	a)	With the help of a diagram explain the principle of MEMS accelerometer.	(5)
	b)	Differentiate between bulk and surface micromachining.	(5)

14 a) Derive an expression for the output voltage of a logarithmic amplifier and show that it is proportional to logarithm of input voltage. (5)

b) Explain the concept of graphical programming in virtual instruments (5)

PART D

Answer any two full questions, each carries 10 marks.

15 a) What is the role of actuators in automation system? How they are classified? (5)

b) How can you convert an open loop system to an automatic system? Explain with the help of an example. (5)

16 a) Draw the PLC ladder diagrams to realize two input AND, OR and XOR gates (5)

b) What are the main components of SCADA? (5)

17 a) With the help of a neat diagram explain the working of butterfly valve. (5)

b) Give the significance of timers and counters in PLC. (5)

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Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

EIGHTH SEMESTER B.TECH DEGREE EXAMINATION(S), OCTOBER 2019

Course Code: EE404

Course Name: INDUSTRIAL INSTRUMENTATION AND AUTOMATION

Max. Marks: 100 Duration: 3 Hours

PART A

Answer all questions, each carries 5 marks. Marks

1		Draw the step response of a first order sensor. Explain the effect of time constant on the nature of response of the sensor.	(5)
2		Explain the principle of operation of a variable reluctance tachometer.	(5)
3		What is an instrumentation amplifier and discuss its role in instrumentation systems?	(5)
4		What are the advantages and disadvantages of MEMS?	(5)
5		Explain the characteristic features of shape memory alloy.	(5)
6		Define an industrial automation system and enlist its components.	(5)
7		Compare programmable logic controller with personal computer.	(5)
8		What are the main components of SCADA?	(5)

PART B

Answer any two full questions, each carries 10 marks.

9	(a)	Explain the factors governing the selection of a transducer for an instrumentation system	(6)
	(b)	Draw and explain second order sensor time response	(4)
10	a)	The output of an LVDT is connected to a 5V voltmeter through an amplifier of gain 250. The voltmeter has 100 divisions. The scale can be read upto 1/5 th of a division. An output of 2 mV appears across the terminals of LVDT when the core is displaced through a distance of 0.5 mm. Calculate (i) Sensitivity of the LVDT (ii) sensitivity of the whole setup and (iii) resolution of the instrument	(6)
	b)	Draw and explain the working of a capacitive differential pressure transducer.	(4)
11	a)	Draw the block diagram representation of a process control system and explain the function of each block.	(5)
	b)	Explain the measurement of flow using a hot wire anemometer	(5)

PART C

Answer any two full questions, each carries 10 marks.

12	a)	With the circuit diagram of charge amplifier show how it enables measurement of electrical charge.	(6)
	b)	Explain the purpose of signal conditioning in instrumentation systems.	(4)
13	a)	Explain the principle of MEMS accelerometer.	(5)
	b)	With the help of a block diagram explain the architecture of virtual instruments.	(5)
14	a)	What is an isolation amplifier? Discuss its application in instrumentation.	(5)
	b)	Explain the concept of graphical programming in virtual instruments	(5)

PART D

Answer any two full questions, each carries 10 marks.

15	a)	Give the classification of control valves.	(5)
	b)	Explain the working of a solenoid actuator with the help of diagram.	(5)
16	a)	Draw the PLC ladder diagrams to realize two input AND, OR and XOR gates	(5)
	b)	What are the hardware elements of DCS?	(5)
17	a)	With the help of a block diagram explain the working of an automated system.	(5)
	b)	Give the significance of timers and counters in PLC.	(5)

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