

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)

\*\*\*\*

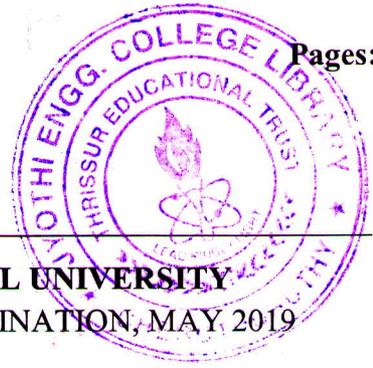
A

H1080

Pages: 2

Reg No.: \_\_\_\_\_

Name: \_\_\_\_\_



**APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY**  
**EIGHTH SEMESTER B.TECH DEGREE EXAMINATION, MAY 2019**

**Course Code: EE402**

**Course Name: Special Electrical Machines**

Max. Marks: 100

Duration: 3 Hours

**PART A**

*Answer all questions, each carries 5 marks.*

Marks

- 1 Draw and explain the Torque speed curves of an AC servomotor for various values of control voltage (5)
- 2 Define Step angle and detent torque for a Stepper motor. (5)
- 3 Explain working principle of two-pole single-phase AC series motor with diagram. (5)
- 4 Explain why rotor position sensor is required for the operation of switched reluctance motor. (5)
- 5 What are the advantages of PMBLDC motor over DC motor? (5)
- 6 Differentiate trapezoidal type BLDC motor and sinusoidal type PMBLDC motor (5)
- 7 Enumerate linear motors and list any four applications. (5)
- 8 Write short note on linear induction motor. (5)

**PART B**

*Answer any two full questions, each carries 10 marks.*

- 9 a) Explain the types of series split field DC servomotor. (4)  
b) With relevant diagrams explain field controlled DC Servomotors (6)
- 10 a) Explain any two modes of excitation used in three phase permanent magnet stepper motor. (5)  
b) Explain the construction of multi stack Variable reluctance stepper motor with neat sketches. (5)
- 11 a) Compare the performance of AC and DC servo motors and list the applications. (6)  
b) Define the following terms as applied to a Stepper motor (1) Start-stop mode (2) (4)  
Slewing mode.

**PART C**

*Answer any two full questions, each carries 10 marks.*

- 12 a) Draw the phasor diagram of AC series motor and derive the voltage equation (5)  
b) Derive the torque equation of hysteresis motor (5)

A

H1080

Pages: 2

- 13 a) With neat sketches explain the construction and operation of 6/4 SRM (10)
- 14 a) Write short notes on the principle of hysteresis motor with necessary diagrams (5)
- b) Draw and explain  $n+1$  switches and diode configuration power converter for SRM. (5)

**PART D**

*Answer any two full questions, each carries 10 marks.*

- 15 Explain the principle of operation of PMBLDC motor for 120° commutation with neat circuit diagram. (10)
- 16 With necessary diagrams explain Longitudinal flux linear switched reluctance motor and Transverse flux linear switched reluctance motor. (10)
- 17 a) Draw and explain the performance characteristics of PMBLDC motor. (6)
- b) Derive the expression for linear force. (4)

\*\*\*\*