

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

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| 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.

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| 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)
