



Reg No.: _____

Name: _____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
B.Tech Degree S7 (S, FE) Examinations May 2026 (2019 Scheme)

Course Code: ECT443
Course Name: INSTRUMENTATION

Max. Marks: 100

Duration: 3 Hours

PART A

Answer all questions, each carries 3 marks.

Marks

- 1 Define the terms: accuracy and precision. (3)
- 2 Estimate the precision value of the 8th measurement that were recorded in the laboratory, for a set of values (3)

Measurement number	Measurement value Xn
1	99
2	102
3	103
4	98
5	101
6	100
7	103
8	98
9	106
10	99

- 3 Explain with a neat schematic, how a potentiometer can be used as a transducer. (3)
- 4 State the advantages and disadvantages of an LVDT. (3)
- 5 Explain any two applications of wave analyzers. (3)
- 6 Write the advantages of GPIB (3)
- 7 With suitable example explain latching in PLC Ladder logic (3)
- 8 Explain any two applications of SCADA. (3)
- 9 Explain rail and rung in a PLC ladder program. (3)
- 10 Sketch ladder diagrams for the following logic functions. (3)
- (i) XOR (ii) NAND

PART B

Answer any one full question from each module, each carries 14 marks.

Module I

- 11 a) What do you mean by static characteristics of an instrument? Explain any six static parameters of an instrument. (7)
- b) Explain with a neat sketch the functional elements of an instrument. (7)

OR

- 12 a) Differentiate a transducer from a sensor. Explain with examples the various classifications of a transducer. (7)
- b) Explain how the functional elements of a bourdon pressure gauge can be related to the elements of a generalized measurement system. (7)

Module II

- 13 a) Derive the expression for finding the gauge factor of a strain gauge. (10)
- b) List any two applications of a Hall effect transducer. (4)

OR

- 14 a) Illustrate the criteria for the selection of transducers. (7)
- b) Explain the principle of operation of LVDT. List out its advantages. (7)

Module III

- 15 a) Describe with a block diagram the working of a Logic State Analyzer. (6)
- b) Explain the block diagram of frequency synthesizer. (8)

OR

- 16 a) Explain with a neat sketch the basic block diagram of Digital Storage Oscilloscope. List out its applications. (7)
- b) Explain the block diagram of a harmonic analyzer. (7)

Module IV

- 17 a) Illustrate the architecture of SCADA . List out its advantages. (7)
- b) Explain with a neat sketch the architecture of a PLC. How it helps in industrial automation? (7)

OR

- 18 a) List the various input and output units used in a PLC. (7)
- b) Differentiate between Distributed Control System and a supervisory control and data acquisition system. (7)

Module V

- 19 a) Design the ladder rungs represented by the Boolean equations: (8)
- (a) $Q = A + \bar{B}$
- (b) $Q = \bar{A} \cdot B \cdot C + D$
- (c) $Q = A \cdot B + C \cdot D$
- (d) $Q = \bar{A} \cdot B \cdot C \cdot \bar{D}$
- b) Two motors are to be controlled in a sequence. The second motor starts 30 (6)

seconds after the starting of first motor by a push switch. Develop a PLC ladder diagram for the following cases and describe the circuit.

Case (A): Only one motor operates at a time.

Case (B): Both the motor gets off together after 50 seconds.

OR

- 20 a) Saw, Fan and oil pump all go ON when a start button is pressed. If the saw has operated less than 25s, the fan should run for an additional 5s after the shutdown of the saw. (14)
If the saw has operated for more than the 25 second, the fan should remain on until reset by a separate fan reset button and the oil pump should remain ON for an additional 12s after the saw is turned off. Write a program that will implement this process.
