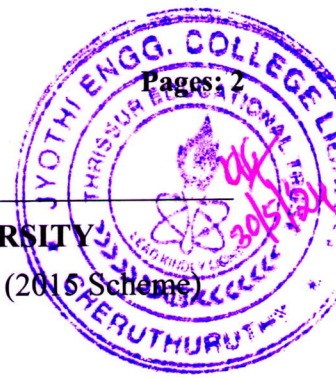Reg No.:_____   Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
Eighth Semester B.Tech Degree (S, FE) Examination May 2024 (2015 Scheme)

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   List any five factors affecting choice of transducer.   (5)

2   Explain the principle of variable reluctance tachometer.   (5)

3   List the major features of an instrumentation Amplifier.   (5)

4   What is MEMS? Mention the advantages and disadvantages of MEMS over other sensors.   (5)

5   Explain the features of shape memory alloys in robotic applications.   (5)

6   Write the selection criteria for the choice of the actuators.   (5)

7   What are the main components in a SCADA system and a DCS system?   (5)

8   What is the concept of latching?   (5)

PART B
Answer any two full questions, each carries 10 marks.

9   a)   Draw the block diagram representation of a process control system and explain the functions of each block.   (6)

     b)   Draw the step response of a first order sensor. Explain the effect of time constant on the nature of response of the sensor.   (4)

10   a)   Explain the measurement of flow using a hot wire anemometer.   (5)

     b)   The output of an LVDT is connected to a 4 V voltmeter through an amplifier of gain 500. The voltmeter has 100 divisions. The scale can be read up to 1/4 th of a division. An output of 1.8 mV appears across the terminals of LVDT when the core is displaced through a distance of 0.6 mm. Calculate (i) Sensitivity of the LVDT (ii) sensitivity of the whole setup and (iii) resolution of the instrument   (5)

11   a)   A parallel plate capacitor transducer uses plates of area 300 mm^2 which are separated by a distance of 0.2 mm. (i) Determine the value of capacitance when   (5)

the dielectric is air having a permittivity of 8.85 x 10^{-12} F/m (ii) Determine the change in capacitance if a linear displacement reduces the distance between the plates to 0.18 mm. Also determine the ratio of per unit change of capacitance to per unit change of displacement.

b) Draw and explain the working of a capacitive differential pressure transducer. (5)

PART C
Answer any two full questions, each carries 10 marks.

12 a) Explain the concept and working of phase sensitive detectors. (6)

    b) What are the noise sources in instrumentation? (4)

13 a) Explain the MEMS fabrication techniques with proper block diagram (6)

    b) Define and explain graphical programming. List the various graphical programming languages. (4)

14 a) Explain virtual instrumentation system. How is it different from traditional instruments? (6)

    b) Explain charge amplifier and list out its advantages and disadvantages. (4)

PART D
Answer any two full questions, each carries 10 marks.

15 a) Define Automation systems. Explain the different types of automation systems. (6)

    b) What are valve actuators? Explain its different types. (4)

16 a) What is relay ladder logic in PLC? (5)

    b) Draw the PLC ladder diagrams to realize two input AND, OR gates. (5)

17 a) Explain the different input output used in PLC. (5)

    b) Explain the working principle of a pneumatic actuator. (5)

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