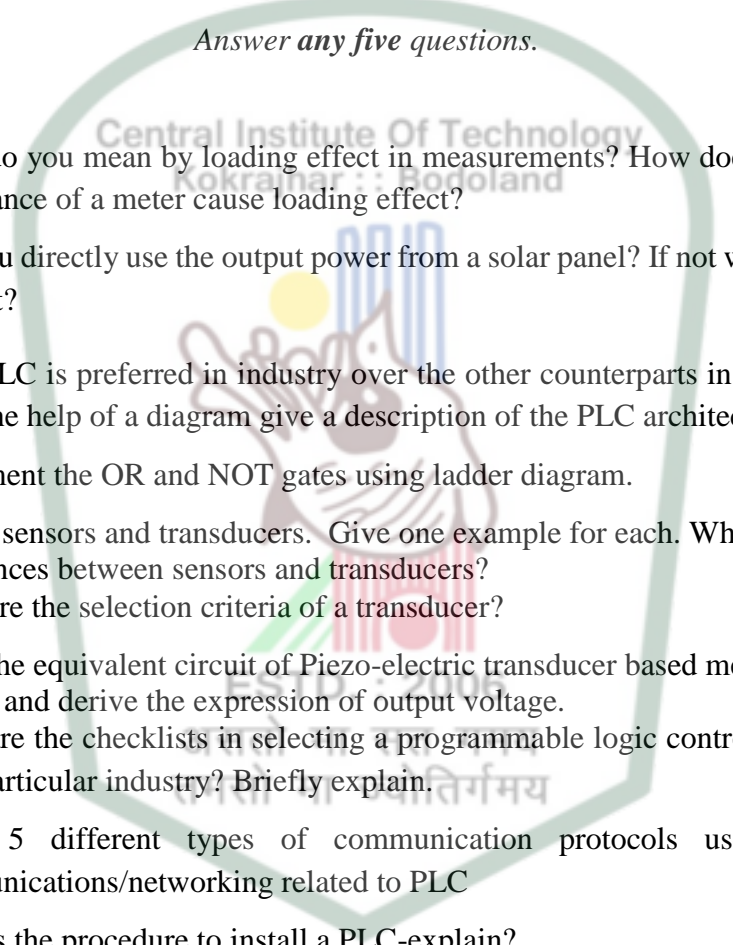**2024**

APPLIED ELECTRONICS AND INSTRUMENTATION IN ENERGY HARVESTING

Full Marks: 100

Time: Three hours

The figures in the margin indicate full marks for the questions.

*Answer **any five** questions.*

1	a)	What do you mean by loading effect in measurements? How does the input admittance of a meter cause loading effect?	1+4=5
	b)	Can you directly use the output power from a solar panel? If not what do you suggest?	2
	c)	Why PLC is preferred in industry over the other counterparts in industries? With the help of a diagram give a description of the PLC architecture.	2+7=9
	d)	Implement the OR and NOT gates using ladder diagram.	4
2	a)	Define sensors and transducers. Give one example for each. What are the differences between sensors and transducers?	6
	b)	What are the selection criteria of a transducer?	4
	c)	Draw the equivalent circuit of Piezo-electric transducer based measurement system and derive the expression of output voltage.	10
3	a)	What are the checklists in selecting a programmable logic controller (PLC) for a particular industry? Briefly explain.	8
	b)	Enlist 5 different types of communication protocols used in the communications/networking related to PLC	2
	c)	What is the procedure to install a PLC-explain?	5
	d)	Describe a method for drawing maximum power from a solar panel.	5
4		Draw and explain the operation of the following: (i) Dual slope type ADC and (ii) Sample and Hold (S&H) circuit.	10 + 10
5	a)	Explain Harmonic Distortion Analyser with a neat block diagram?	10
	b)	What is Schmitt Trigger? Explain its operation with a circuit diagram. Also, draw its hysteresis curve.	10

6 a) In the Wien bridge oscillator circuit depicted in the figure below, determine   10
       the condition required for the bridge to be balanced.
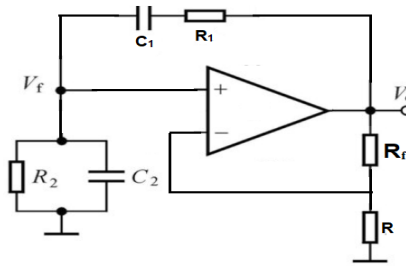
   b) With the help of a neat block diagram explain the operation of PLL. Also   10
       explain the parameters of PLL.

7   Write Short notes on the following (any four)   5x4=20

   a) Wired Technology b) WiFi   c) GSM d) Internet of Things

   e) Bluetooth f) VCO g) Sweep frequency generator

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