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Total number of printed pages – 2

B. Tech
PCEI 4305

Sixth Semester (Special/Back) Examination – 2013

INSTRUMENTATION DEVICES AND SYSTEMS - II

BRANCH(S) : AEIE, IEE

QUESTION CODE : E 327

Full Marks – 70

Time : 3 Hours

*Answer Question No. 1 which is compulsory and any **five** from the rest.
The figures in the right-hand margin indicate marks.*

1. Answer the following questions : 2 × 10
- (a) State Piezoelectric effect. Is it reversible ?
 - (b) What is the purpose of using Charge Amplifier in a Piezoelectric crystal ?
 - (c) Why Gamma ray is preferred than Alpha and Beta rays for level measurement ?
 - (d) Define pH of a solution. Is it required to mention temperature of the solution along with pH value ?
 - (e) What is a Pyrometer ?
 - (f) Write the materials used for making LEDs.
 - (g) Explain the phenomena of Total Internal Reflection.
 - (h) What is the function of Actuator ?
 - (i) What are the advantages of using Stepper motor comparing to other conventional motors ?
 - (j) What is a Timer in process control ?
2. (a) Draw an equivalent circuit representing Piezoelectric Crystal, Cable and Recorder. Derive the Transfer Function for basic Piezoelectric Force Measurement system. 5

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- (b) Draw schematic diagram of an Accelerometer consisting of Mass, Spring and Damping. Explain the method of measurement of Acceleration and Vibration. 5
3. (a) With suitable diagram, explain the method of level measurement using floats. 5
- (b) With suitable diagram, describe construction and operation of any one Humidity sensor. 5
4. (a) Briefly explain principles of operation of LED and Photoresistor. 5
- (b) Briefly explain principles of operation of Broad Band and Narrow Band Pyrometers. 5
5. (a) Describe constructions of Step Index and Graded Index optical fibers. Explain propagation of light through these fibers. 5
- (b) Briefly describe Modulation of Light Intensity by Transmission medium in fiber optic instrumentation systems. 5
6. (a) Describe construction and principle of operation of Flapper / Nozzle system. 5
- (b) Describe construction and characteristics of various types of control valves used in process control. 5
7. (a) Describe functions of various components used in Ladder Diagram. 5
- (b) Describe architecture and operation of Programmable Logic Controller. 5
8. Write short notes on any **TWO** : 5 × 2
- (a) Principles of liquid conductivity measurement
- (b) State and explain Planck's law and Stefan Boltzmann law
- (c) DC motors – Types, characteristics and principle of operation.

