6th Semester Regular / Back Examination 2015-16
INSTRUMENTATION DEVICES AND SYSTEMS-II
**BRANCH: AEIE,EIE,IEE**
Time: 3 Hours
Max Marks: 70
Q.CODE: W330
Answer Question No.1 which is compulsory and any five from the rest.
The figures in the right hand margin indicate marks.

Q1   Answer the following questions: **(2 x 10)**

a) For a piezoelectric crystal, Write the transfer function showing dynamic relation between deformation of the crystal and the force applied to it

b) In a spring mass system, if the seismic mass is 50g, damping constant is 'D' and spring constant is 5000 N/m. Find natural frequency of vibration and damping ratio of the system

c) Why the capacitive type level indicator output is linear explain with suitable equation and example

d) How conductivity can be measured by two pole cell arrangement.

e) Write the basic principle of operation of a photodiode

f) What is the significance of Numerical Aperture for step index fiber?

g) Write down the basic principle of operation of a flapper-nozzle system.

h) What is the function of an Actuator?.Write the principle of operation of a solenoid valve

i) Explain about fiber optic sensor with neat block diagram.

j) How final control operation is performed in a process control system.Explain with suitable block diagram

Q2 **a)** Draw an equivalent circuit of piezoelectric crystal, cable, charge amplifier and recorder. Derive its transfer function.   **(5)**

b) Describe principle of operation of operation of a Resistive Accelorometer with strain gauge which sense displacement of the mass with neat diagram   **(5)**

Q3 **a)** Difference between two-pole and four pole cell for conductivity measurement. And write about different type of sources of error in conductivity measurement.   **(5)**

b) With neat diagram explain the operation of capacitive type hygrometer.   **(5)**

Q4 Two concentric tubes of length 8m and diameter ratio of 2 are used as a **(10)** capacitive level transducer to measure the depth 'h' of a liquid tank. The liquid depth varies between 0m to 7m. Dielectric constant of liquid is 2.4 and permittivity of free space is 8.85 pF/m. The transducer is (C_2) is incorporated in a bridge as shown in the figure.
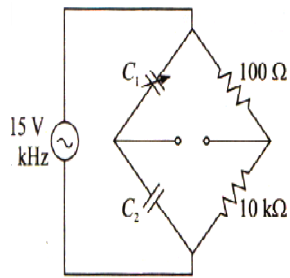
(a) Calculate C_1 to set the open circuit voltage to zero when tank is empty.

(b) Calculate output voltage V_0 when the tank is full.

Q5 **a)** What is Pyrometry? Describe construction and principle of operation of a broadband pyrometers. **(5)**

b) Explain the operation of fibre optic interferrometric sensor. **(5)**

Q6 **a)** Write the principle of operation of a stepper motor as an electrical actuator. **(5)**

b) Write the material used for making LEDs. Draw the circuit diagram and explain the operation of LED. **(5)**

Q7 **a)** What is discrete state Process control .Give examples. **(5)**

b) What is Ladder diagram?.Explain its elements with symbols used in Ladder diagram. **(5)**

Q8 Write short notes on any two: **(5 x 2)**

a) Programmable Logic Controller
b) Types of Control Valves and their characteristics
c) DC motors-Types, characteristics and principle of operations
d) Restive hygrometers