Registration No: | | | | | | | | | | |

Total Number of Pages: 02 **M.TECH**

P2AECC02

2nd Semester RegularExamination 2016-17

INDUSTRIAL PROCESS CONTROL INSTRUMENTATION

BRANCH: APPLIED ELECTRONIC& INSTRUMENTATION ENGG, ELECTRONIC& INSTRUMENTATION ENGG

Time: 3 Hours

Max Marks: 100

Q.CODE:Z491

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

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

a) Why do we choose signal conditioning in a circuit?
b) The resistors in Wheatstone bridge are given by $R_1=R_2=R_3=120$-Ohms and $R_4=$ 121-ohms. If the supply is 10V. Find the voltage offset?
c) The temperature has a range of 300-440K and a set point of 384K. Find the percentage of span error when the temperature is 379K?
d) State the definition of Proportional Bandand write its typical value.
e) Draw the voltage follower circuit and state its importance.
f) What is rate control and reset control schemes?
g) Explain the reverse and direct action.
h) State the three major functions of adaptive control system.
i) The pressure in a tank varies from 20psi to 100psi. The pressure in tank is desired to be kept at 50psi. What is the full scale error when pressure inside the tank is 30psi?
j) Draw the block diagram of self tuning regulator and explains.

Q2 **a)** A liquid-level control system linearly converts a displacement of 2 to 3 m into a 4-20mA control signal. A relay serves as the two position controller to open or close an inlet valve. The relay closes at 12mA and opens at 10mA. Find (a) the relation between displacement level and current, and (b) the neutral zone or displacement gap in meters. **(10)**

b) Explain I-P and P-I converter. **(10)**

Q3 **a)** A sensor output a voltage ranging f grom-2.4 to-1.1 V. For interface to an analog-to-digital converter, this needs to be 0 to2.5V. Develop the required signal conditioning. **(10)**

b) What sample and Hold circuit? Draw the S/H practical circuit and state its uses. **(10)**

Q4 **a)** What is adaptive control system? Explain the details about the Gain scheduling and MRAC. **(10)**

b) Write the control parameters. Explain the multi position and single mode position in control system. What is floating mode control? **(10)**

Q5 **a)** Design a PID temperature controller system which inputs error in 0-4V **(10)**

range. The output to final control element is 0-8V. Given K_p=2.4% per%, K_i= 9.0(%/min)/%, K_d =0.7% /(%/min).

b) Draw the circuit of PID controller using Op-amp. What are the effects of PID controller in any system? State the application of PID controller in industry. **(10)**

Q6 **a)** State the different types of actuator and narrate these actuators with diagram. **(10)**

b) What is control valve? Explain the control valve principle and control valve characteristics. **(10)**

Q7 **a)** Classify the modes of control action in process control system. Explain the continuous controller modes. **(10)**

b) What is PLC? Write and explain the basic parts of PLC. State the applications of PLC. **(10)**