Scheme – G

Sample Question Paper

Course Name : Diploma in Chemical Engineering

Course Code : CH **17561**

Semester : Fifth

Subject Title : Chemical Process Instrumentation & Control

Marks : 100 **Time : 3 Hours**

Instructions:

1. All questions are compulsory
2. Illustrate your answers with neat sketches wherever necessary
3. Figures to the right indicate full marks
4. Assume suitable data if necessary
5. Preferably, write the answers in sequential order

Q.1 (A) Attempt any Three **(4 x 3 = 12)**

a) Define static and dynamic characteristics of an instrument? State any four static characteristics of an instrument.

b) List any four temperature scales and state the ice point and boiling point of water for each scale.

c) What is sight glass type direct level measurement of liquids? Enlist any four methods of level measurement of liquids.

d) State any one difference between variable head meter and variable area meter and give one example of each.

Q.1 (B) Attempt any one **(6 x 1 = 6)**

a) Draw a neat labeled diagram of C-type Bourdon tube and describe it's working.

b) State any four advantages of automatic control and draw a block diagram of an automatic controller for closed loop of control showing all the basic elements.

Q.2 Attempt any four **(4 x 4 = 16)**

a) State the meaning of the terms Servo Operation and Regulator Operations? Give one application of each.

b) Define transducer? Draw a diagram of Diaphragm pressure gauge and state its principle.

c) What is a valve positioner? State two functions of valve positioner.

d) Define programmable logic controllers? Describe its working?

e) Draw a neat labeled diagram showing the architecture of a programmable logic controller.

f) Distinguish between single seated and double seated valve with any one example. (Any four points)

Q.3 Attempt any four **(4 x 4 = 16)**

a) Draw a neat labeled diagram of a gas filled thermometer and state its principle.

b) Draw a neat labeled diagram for air purge method of level measurement and describe it's working.

c) Describe how a pressure gauge is calibrated with the help of dead weight tester.

d) With help of neat labeled diagram describe the working of an electromagnetic flow meter.

e) Differentiate between proportional, integral and derivative actions in a controller?

Q.4 (A) Attempt any three **(3 x 4 = 12)**

a) What is pyrometer? Describe the principle of optical pyrometer.

b) State the principle of a bimetallic thermometer. Describe its working with a neat diagram.

c) State the principle of positive displacement flow meter. State two advantages of rotating vane meter and also state any one application.

d) State four advantages and disadvantages of differential flow meters.

Q.4 (B) Attempt any one **(6 x 1 = 6)**

a) State any four factors while selecting a control valve for a process.

b) Draw and describe distributed controlled system. Architecture state any four features of distributed computer controlled system.

Q.5 Attempt any four **(4 x 4 = 16)**

a) Draw a neat labeled diagram of a rotameter and state its disadvantages (any four)

b) State any one difference between direct and indirect method of level measurement. State any one indirect method of level measurement and give one disadvantage and advantages of this method.

c) State which method is used for level measurement for measuring level of liquid where no physical contact between the liquid & instrument is allowed? Describe with neat labeled diagram

d) Describe with a neat diagram how you will measure the pressure with bellows pressure gauge.

e) Convert 1.5 bar in to units of (a) Pascal (b) height of water column.

Q.6 Attempt any two **(8 x 2 = 16)**

a) What is ON-OFF Control? What is differential gap? State any two instances where you will prefer ON-OFF Control and where you will avoid it.

b) What are installed and inherent valve characteristics? Draw a graph to show the linear type, equal percentage type inherent valve characteristics. State any two relations between valve gain and process gain.

c) With a neat sketch explain the construction and working of a distributed control system(DCS) used in process industries.

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Sample Test Paper-I

Course Name : Diploma in Chemical Engineering

Course Code : CH **17561**

Semester : Fifth

Subject Title : Chemical Process Instrumentation & Control

Marks : 25 **Time: 1 Hour**

Instructions:

1. All questions are compulsory
2. Illustrate your answers with neat sketches wherever necessary
3. Figures to the right indicate full marks
4. Assume suitable data if necessary
5. Preferably, write the answers in sequential order

Q.1 Attempt any three **(3 x 3 = 09)**

a) Define primary measurement. Give two examples of primary measurement.

b) Convert 32^{o} C in to Fahrenheit. State the melting point of ice & boiling point of water on Fahrenheit scale.

c) Define transducer. Draw a labeled diagram of a spiral Bourdon tube.

d) State method used for measuring the solid level. State the principle of this method.

Q.2 Attempt any two **(2 x 4 = 8)**

a) With help of a neat labeled diagram describe the principle & working of a bimetallic thermometer

b) State the relationship between atmospheric pressure & absolute pressure. State any two disadvantages of Bellows used in pressure measurement.

c) With help of neat diagram describe the principle & working of capacitance level indicator.

Q.3 Attempt any two **(2 x 4 = 8)**

a) Define Vacuum. With a neat labeled diagram describe how vacuum is measured with McLeod gauge.

b) With neat labeled diagram describe the principle & working of Radiation Pyrometer.

c) With a neat labeled diagram describe the principle & working of gas filled thermometer.

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Sample Test Paper-II

Course Name : Diploma in Chemical Engineering

Course Code : CH **17561**

Semester : Fifth

Subject Title : Chemical Process Instrumentation & Control

Marks : 25 **Time : 1 Hour**

Instructions:

1. All questions are compulsory.
2. Illustrate your answers with neat sketches wherever necessary.
3. Figures to the right indicate full marks.
4. Assume suitable data if necessary.
5. Preferably, write the answers in sequential order.

Q.1 Attempt any three **(3 x 3 = 09)**

a) State any three advantages and disadvantage of orifice meter.

b) Differentiate between open loop & closed loop system.

c) Define equal percent inherent flow characteristics. State the general equation for flow vs. valve opening for equal percentage valve.

d) Define PLCs. Describe how PLCs work?

Q.2 Attempt any two **(2 x 4 = 08)**

a) State the difference between variable head and variable area meter. State four disadvantages of variable area meter.

b) Draw and lable a block diagram for closed loop automatic control system showing all the basic elements.

c) Define Proportional control. State the control law for it .Define proportional sensitivity.

Q.3 Attempt any two **(2 x 4 = 08)**

a) Draw with neat lable a block diagram of PLC architecture.

b) Describe with a neat labeled diagram describe the working of a pneumatic proportional controller.

c) State working operation of air to open control value. State any two factors which are considered while selecting a control valve.