

Code No: A109210802

R09**Set No. 2**

II B.Tech I Semester Examinations, November 2010
PROCESS INSTRUMENTATION
Chemical Engineering

Time: 3 hours**Max Marks: 75**

Answer any FIVE Questions
All Questions carry equal marks

1. Describe the “float-and tape method” used for direct measurement of liquid level. [15]
2. Write in detail about temperature measuring instruments. [15]
3. When do you use an indicating instrument? Explain types of indicating scales, briefly. [15]
4. Explain “thermocouple vacuum gage” with a neat sketch. [15]
5. List the methods of composition analysis that provides continuous indication of composition. [15]
6. Explain, in detail, the static and dynamic characteristics of measuring instruments. Explain, the principle, construction and working of an optical pyrometer [15]
7. (a) Explain briefly the effect of the material of thermocouple on the speed of response with neat graph.
(b) Explain with neat graph for the effect of size of thermocouple on the speed response. [7+8]
8. Air at 60 psi pressure and 100°F flows in a pipe. A pitot tube is used to measure the velocity. The mano meter shows a differential pressure of 20 in. water at 60°F. What is the velocity? Assume a reasonable velocity coefficient. [15]

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R09**Set No. 4**

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PROCESS INSTRUMENTATION**Chemical Engineering****Time: 3 hours****Max Marks: 75**

Answer any FIVE Questions
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1. Explain advantages & limitations of "circular chart recording" briefly. [15]
2. What are the sources of static error in industrial pressure thermometers? How can they be corrected? [15]
3. Explain the open-channel meters briefly. [15]
4. Explain the measurement of moisture in gases by psychrometer method with a neat diagram. [15]
5. Draw and explain Callendar-Griffiths Bridge with necessary equations. [15]
6. Explain "magnetic - clutch pressure" differential meter with a neat sketch. [15]
7. It is desired to measure the temperature (about 1100°F) in a furnace having a highly oxidising atmosphere. The temperature changes so rapidly that a bare thermocouple must be used. Which type would you select? Why? Explain its construction and principle. [15]
8. A vessel of 60 ft height is filled by adding a second immiscible liquid (sp gr 0.6) above the first and allowing the first (sp gr 1.0) to run out the bottom. If a pressure gage is used to measure the pressure at the bottom of the tank, what is the range of the pressure gage to indicate the full motion of the interface? [15]

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R09**Set No. 1**

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1. Discuss advantages & limitations of “strip recording chart” briefly. [15]
2. Explain basic concepts of response of first order type instrument. Give some examples of first order type instruments and explain with a neat sketch any one instrument. [15]
3. (a) Explain in detail about thermopile with neat sketch.
(b) Explain briefly about lens of thermal radiation receiver with neat sketch. [7+8]
4. Explain about the “reciprocating - piston meter” with a diagram. [15]
5. Describe the working and principles of a thermal conductivity cell used for gas analysis. [15]
6. How do you measure the “surface level between two immiscible liquids of differing specific gravity”? Explain with a neat diagram. [15]
7. Prove that algebraic sum of the thermal emf's generated in a thermocouple circuit containing any number of dissimilar homogenous conductors is a function only of the temperature. [15]
8. How do you measure the pressure in corrosive fluids? Explain in detail. [15]

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R09**Set No. 3**

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PROCESS INSTRUMENTATION**Chemical Engineering****Time: 3 hours****Max Marks: 75**

Answer any FIVE Questions
All Questions carry equal marks

1. Name few commonly used thermocouples. What are the desirable characteristics of thermocouples for industrial use? [15]
2. Describe the "bubbler system" used for liquid level measurement with a neat diagram. [15]
3. Write importance of the following in open-channel meters:
 - (a) Rectangular-notch weir
 - (b) V-notch. [7+8]
4. (a) What are the three most common input functions which are used to understand the dynamic characters of instruments - Explain.
 (b) Explain the following
 - i. Speed of response
 - ii. Measuring lag
 - iii. Fidelity
 - iv. Dynamic error. [7+8]
5. What are the basic differences between atomic emission and atomic fluorescence spectroscopy? Why source modulation often is employed in atomic absorption spectroscopy? [15]
6. (a) What is an instrumentation diagram? Illustrate with a neat sketch.
 (b) What are the items to be included in an instrumentation diagram? Explain briefly. [6+9]
7. A metal of spectral emissivity 0.8 is at 1500 °F inside a furnace and can be considered a black body. The metal and furnace are, of course, opaque. If the furnace walls are at
 - (a) 1500 °F
 - (b) 2000 °F,
 What temperature will be indicated by an optical pyrometer sighted on the metal? [15]
8. In the enlarged-leg manometer, the displacement of the float is to be 1.0 in., the area of the float chamber 10 sq in., and the manometer fluid mercury. For a maximum span of 100 in. H₂O, what is the inside diameter of the range tube? [15]

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Set No. 3

FIRSTRANKER