R13

SET - 1

III B. Tech I Semester Regular Examinations November - 2015
INSTRUMENTATION & CONTROL SYSTEMS
(Mechanical Engineering)

Time: 3 hours

Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
2. Answering the question in **Part-A** is compulsory
3. Answer any **THREE** Questions from **Part-B**

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PART –A

1 a)	What are the different standard inputs for studying the dynamic response of a system?	[4M]
b)	What are the desirable properties of thermometric liquid?	[4M]
c)	What is the difference between direct and indirect liquid level measuring devices?	[4M]
d)	What is the purpose of strain rosette?	[3M]
e)	Define the following: i) humidity ii) dew point temperature iii) wet bulb temperature	[3M]
f)	What is a servo mechanism?	[4M]

PART –B

2 a)	What are Transducers and how are they classified? Explain their importance in an instrumentation process.	[8M]
b)	What are the various errors occur in the measuring instruments and explain the methods of elimination.	[8M]
3 a)	State law of thermocouples. How are the laws useful in construction of thermocouple thermometers?	[8M]
b)	Discuss the working of a bourdon tube pressure gauge with relevant sketch and mention merits and demerits.	[8M]
4 a)	Why a rotometer is called variable area flow meter? Sketch and explain its working.	[6M]
b)	What factors are to be considered for level measurement sensor selection?	[4M]
c)	Explain the construction and working of stroboscope with suitable diagram.	[6M]
5 a)	Explain different methods of temperature compensation in strain gauges.	[8M]
b)	Draw a neat sketch and explain the working of unbonded resistance type strain gauge.	[8M]
6 a)	Explain with sketch, the hydraulic dynamometer.	[8M]
b)	Describe the working & sling psychrometer used to study the properties of moist air.	[8M]
7 a)	What is closed loop system? Explain the various elements of it with a block diagram.	[10M]
b)	Distinguish between open-loop and closed loop control system.	[6M]

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SET - 2

III B. Tech I Semester Regular Examinations November - 2015
INSTRUMENTATION & CONTROL SYSTEMS
(Mechanical Engineering)

Time: 3 hours   Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. Answering the question in **Part-A** is compulsory
3. Answer any **THREE** Questions from **Part-B**
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PART –A

1	a)	Define the following: i) measurand ii) measurement iii) calibration iv) primary measuring element.	[4M]
	b)	Explain the principle on which the bimetallic thermometer works.	[4M]
	c)	Write a short note on magnetic flow meter.	[4M]
	d)	Derive an expression for gauge factor.	[3M]
	e)	How a strain gauge is used for measuring torque?	[4M]
	f)	State the advantages of closed loop systems.	[3M]

PART –B

2	a)	Sketch and explain generalized measurement system and its functional elements.	[8M]
	b)	Explain the difference in principle of operation of photo emissive cell, a photo conductive cell and a photo voltaic cell.	[8M]
3	a)	With the help of neat sketch explain the working of total radiation pyrometer.	[8M]
	b)	Explain the operation of pirani thermal conductivity gauge for pressure measurement with a sketch	[8M]
4	a)	Explain the construction and working of a hot wire anemometer.	[7M]
	b)	How can gamma rays be used to measure liquid level?	[5M]
	c)	Draw the diagram of a piezo electric accelerometer and explain its working.	[4M]
5	a)	What properties are to be considered in selecting materials for strain gauges and explain about strain rosettes?	[8M]
	b)	A rectangular rosette was used to determine the stress situation in a certain experiments and following observations are recorded: ε_1=900µm/m, ε_2=300µm/m, ε_3= -200µm/m, determine the principal strains, principal stresses and the location of principal planes. Take E=200GPa,and υ=0.3	[8M]
6	a)	With the help of neat sketch explain the working of absorption hygrometer.	[8M]
	b)	Explain briefly how a stroboscope is used to measure torque. State its advantages	[8M]
7	a)	Describe with neat sketch the open loop speed control system.	[7M]
	b)	Illustrate with example, explain closed loop temperature control system.	[9M]

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Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
2. Answering the question in **Part-A** is compulsory
3. Answer any **THREE** Questions from **Part-B**
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PART –A

1	a)	State the advantages of electrical transducers over other transducers.	[3M]
	b)	Explain the principle of conversion in bourdon tube pressure gauge.	[4M]
	c)	How seismic instruments used for measuring acceleration?	[4M]
	d)	Write the desirable characteristics of bonding materials.	[4M]
	e)	Explain the basic principle of mechanical torsion meter.	[4M]
	f)	What are the basic elements of a control system?	[3M]

PART –B

2	a)	Explain various dynamic performance characteristics with sketches.	[6M]
	b)	With a neat sketch explain the working of LVDT to measure linear displacement	[6M]
	c)	Describe the principle of operation of a piezo-electric transducer.	[4M]
3	a)	Explain the Mcleod vacuum gauges used for pressure measurement and its limitations	[8M]
	b)	State the three laws of thermocouples.	[3M]
	c)	What is a thermistor? How is it used for temperature measurement	[5M]
4	a)	Explain a capacitive liquid level sensor used to measure liquid level.	[7M]
	b)	Describe the working of a cryogenic fuel level indicator. What are its advantages and disadvantages?	[9M]
5	a)	Why bridge circuit is necessary for a strain gauge? Explain how the bridge circuit is used with a strain gauge.	[10M]
	b)	How resistive strain gauges are calibrated?	[6M]
6	a)	Sketch and explain the construction and working of a dew point meter.	[8M]
	b)	Explain the method of measuring force using a pneumatic load cell.	[8M]
7	a)	With a neat sketch explain the position control system.	[8M]
	b)	What is a servo mechanism? Explain its operation.	[8M]

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SET - 4

III B. Tech I Semester Regular Examinations, November - 2015
INSTRUMENTATION & CONTROL SYSTEMS
(Mechanical Engineering)

Time: 3 hours   Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
2. Answering the question in **Part-A** is compulsory
3. Answer any **THREE** Questions from **Part-B**
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PART –A

1	a)	Mention important characteristics of a transducer.	[3M]
	b)	Explain the bellows gauge used to measure gauge pressure.	[4M]
	c)	State the principle of tachogenerators.	[4M]
	d)	What is the purpose of providing backing for bonded strain gauges?	[4M]
	e)	What are load cells? Name the application of load cells.	[3M]
	f)	Distinguish between open and closed loop system.	[4M]

PART –B

2	a)	Explain various types of errors in measurement system by giving suitable examples.	[8M]
	b)	Describe the construction and working of capacitive transducer and state it advantages	[8M]
3	a)	What is thermopile? Explain the principle of operation with neat sketch.	[6M]
	b)	Explain the construction and working of strain gauge pressure cells.	[10M]
4	a)	Explain with a neat sketch how you will measure the fluid velocity by using turbine meter.	[8M]
	b)	Describe the different methods used for measurement of speed and explain their advantages and disadvantages.	[8M]
5	a)	Classify the bonded strain gauges and explain with neat sketches.	[10M]
	b)	Describe the tension measurement using strain gauge with neat diagram.	[6M]
6	a)	What is a proving ring? How is it used to measure force?	[5M]
	b)	With a neat sketch explain how torque can be measured by using strain gauge.	[8M]
	c)	Define the following : i) humidity ratio ii) relative humidity iii) wet bulb temperature.	[3M]
7	a)	With the help of block diagram explain how is the water level in a boiler controlled?	[8M]
	b)	Describe a speed control system for controlling speed of an I.C. engine.	[8M]

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