SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY :: PUTTUR
(AUTONOMOUS)
(Approved by AICTE, New Delhi & Affiliated to JNTUA, Anantapuramu)
(Accredited by NBA & Accredited by NAAC with 'A' Grade)
(An ISO 9001:2008 Certified Institution)
Siddharth Nagar, Narayanavanam Road, PUTTUR-517 583
QUESTION BANK

Subject with Code: TMPC (16ME8813)	**Course & Branch: M. Tech(TE)**
Sem : II-Sem	**Regulation: R16**

UNIT-I

1.	(a)	Briefly explain the generalized measurement system with a block diagram using an example.	(6M)
	(b)	Differentiate between static and dynamics measurement of a physical quantity and explain the important characteristics related to a measurement system under dynamic conditions.	(6M)
2.	(a)	Explain briefly the various errors associated with instruments in measuring systems and explain the concept of uncertainty analysis.	(8M)
	(b)	What is a transducer? Mention any two mechanical and electrical transducers with corresponding sensing elements.	(4M)
3.	(a)	Explain the major consideration which governs the selection of an instrument transducer.	(4M)
	(b)	Explain the following form as related to dynamic characteristics of an instrument:	
		(i) Speed of response and measuring tag	(2M)
		(ii) Fidelity and dynamic error	(2M)
		(iii) Dead time and dead zone	(2M)
		(iv) Step, ramp and linear input function	(2M)
4.		Define the terms	
		(i) range and span	(2M)
		(ii) readability	(2M)
		(iii) sensitivity	(2M)
		(iv) hysteresis	(3M)
		(v) threshold and resolution	(3M)
5.		Explain the following terms with an example	
		(i) accuracy	(4M)
		(ii) precision	(4M)
		(iii) calibration	(4M)
6.	(a)	What are the methods of measurement system?	(6M)
	(b)	What are the modes of measurement system?	(6M)
7.	(a)	Explain input-output configurations of measuring instruments and measuring system.	(6M)
	(b)	What are the applications of measurement system?	(6M)
8.	(a)	Explain the mechanical detector-transducer element.	(4M)
	(b)	What is meant by transducer and classification of transducer?	(8M)
9.	(a)	Explain the Linear and angular motion potentiometers.	(6M)

	(b)	Explain briefly the types of errors encountered in a transducer.	(6M)
10.		What is meant by piezoelectric transducers and explain working and advantages disadvantages of piezoelectric transducer?	(12M)

UNIT-II

1.		Describe the principle of operation of a McLeod Gauge with a neat sketch and derive the expression for pressure measurement.	(12M)
2.	(a)	Describe the working principle of Pirani thermal conductivity gauge with suitable sketch. Also draw the electrical circuit for the compensation due to change in ambient temperature.	(8M)
	(b)	A diaphragm pressure gage is constructed of spring steel to measure a pressure differential of 1000 psi. The diameter of the diaphragm is 0.5 in. Calculate the diaphragm thickness so that the maximum deflection is one-third the thickness. What is the natural frequency of this diaphragm?	(4M)
3.	(a)	Enumerate the desirable characteristics of manometric liquids. Name some of the manometric liquids.	(6M)
	(b)	Explain with a neat sketch the constructional features and basic working principle of McLeod gauge used for the measurement of low pressure.	(6M)
4.	(a)	Categorize the pressure measuring instruments?	(4M)
	(b)	Classify the manometers and explain about U-tube differential manometer.	(8M)
5.	(a)	What are the advantages and limitations of manometers?	(6M)
	(b)	With neat sketch explain bourdon tube pressure gauge.	(6M)
6.		Explain the Ionization gauge with neat sketch and give the advantages and disadvantages.	(12M)
7.	(a)	Discuss the working principle of thermal conductivity gauge.	(5M)
	(b)	Explain the working principle of thermocouple vacuum gauge with its advantages and disadvantages.	(7M)
8.		How are very high pressures measured? Explain briefly with a neat sketch the construction and working of a Bridgman gauge used for measuring high pressures.	(10M)
9.		Explain briefly any **three** of the following pressure transducers	
		(i)Capacitance type	(4M)
		(ii) Pressure voltage type	(4M)
		(iii) Electromagnetic type	(4M)
		(iv) Resistance type pressure transducers	(4M)
		(v) Piezoelectric type	(4M)
10.		What are the advantages and disadvantages of "Diaphragm elements"?	(12M)

UNIT-III

1.	(a)	Explain the use of pressure probes in the measurement of supersonic compressible flows as well as for sub-sonic compressible flow.	(6M)
	(b)	Derive the expression for stagnation pressure in both cases.	(6M)
2.	(a)	Explain with neat diagram the working principle of turbine meters in the measurement of flow.	(6M)
	(b)	Explain the working principle of measuring flow using orifice meter with a neat sketch.	(6M)
3.	(a)	Why a Rotameter called variable area flow meter. Sketch and explain its working.	(6M)
	(b)	Explain the principle and operation of	
		(i) Ultrasonic flow meter	(3M)
		(ii) Magnetic flow meter.	(3M)
4.		Explain venturimeter give the expression for rate of flow and write the advantages and disadvantage	(12M)
5.	(a)	Difference between a venturimeter and an orifice meter.	(6M)
	(b)	Explain the flow measurement methods.	(6M)
6.	(a)	What is flow nozzles and explain advantages and disadvantages.	(6M)
	(b)	Explain Pitot tube and write the advantages and disadvantages	(6M)
7.	(a)	Explain Rotameter and elbowmeter.	(6M)
	(b)	List the applications of flow measurements	(6M)
8.		Derive a relation for mass flow rate foe variable head meters for compressible fluids.	(12M)
9.	(a)	What is the difference between the "Rate meters" and "Quantity meters"?	(8M)
	(b)	What is an "Annubar tube"?	(4M)
10.		Explain briefly the following	
		(i) Current meter	(6M)
		(ii) Turbine meter	(6M)

UNIT-IV

1.		Explain the working principle of hot wire anemometer with a neat sketch using constant current and constant temperature measurement techniques.	(12M)
2.	(a)	Give a comparison between "thermistors "and "metal resistors"?	(6M)
	(b)	List the factors which should be considered while selecting resistance thermometers.	(6M)
3.	(a)	Explain in detail about hot wire anemometer.	(6M)
	(b)	Explain in detail about thermal flow meter.	(6M)
4.		Give the fundamental law governing the measurement of temperature and explain in detail the measurement of temperature by mercury in glass thermometer with a neat sketch. A thin plate is initially at a uniform temperature of 200.	(12M)
5.	(a)	A bimetallic strip is constructed of strips of yellow brass and invar bonded together at 30. Each has a thickness of 0.3 mm. Calculate the radius of curvature when a 6.0 cm strip is subjected to a temperature of 100.	(8M)
	(b)	Derive the expression for the radius of curvature of a bimetallic strip in the measurement of temperature using mechanical methods.	(4M)
6.	(a)	List any five physical properties of matter which are used to measure temperature and state clearly how each is used.	(6M)
	(b)	Explain in detail about Vapor pressure thermal system.	(6M)
7.		Explain with neat sketches the working principle of a radiation pyrometer and optical pyrometer.	(12M)
8.	(a)	Explain with neat sketch the slug sensor in measuring the heat flux and derive the expression for the same. Also mention any two limitations of slug type sensors in measuring heat flux.	(6M)
	(b)	Explain with neat sketch the working principle of a Gardon heat flux meter.	(6M)
9.	(a)	Explain in detail about Pyrometric cones that are used for the measurement of temperature.	(6M)
	(b)	Explain in detail about optical pyrometer.	(6M)
10.	(a)	State the advantages and disadvantages of thermocouples.	(6M)
	(b)	Explain briefly the working of ration pyrometer.	(6M)

UNIT-V

1.		Explain in detail about	
		(i) capacitive level sensor	(6M)
		(ii) Mechanical torsion meter	(6M)
2.	(a)	What are the different types of liquid level measurements? Explain sight glass level gauge.	(8M)
	(b)	Describe the operation of Electrical liquid level sensor.	(4M)
3.		With the help of neat sketch explain magneto hydrodynamic generator	(12M)
4.		What are the indirect methods of liquid level measurements? Discuss about Hydrostatic pressure devices and capacitance type level gauge.	(12M)
5.		Explain gamma-ray liquid level measurement and electrical level gauges.	(12M)
6.		Draw the complete schematic for measurement of liquid level using a float. Describe its working principle.	(12M)
7.		Define the following terms	
		(i) Mass density	(4M)
		(ii) weight density and	(4M)
		(iii) Specific gravity.	(4M)
8.		Draw the different types of hydrometers and explain the working principle.	(12M)
9.	(a)	Explain the force balance method and differential pressure method.	(6M)
	(b)	What are the various methods of measurements of density and specific gravity?	(6M)
10.		Give the different methods of viscosity measurements .Explain rotating cylinder method.	(12M)

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