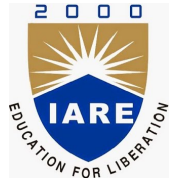


Hall Ticket No

--	--	--	--	--	--	--	--	--	--

Question Paper Code: AME019



INSTITUTE OF AERONAUTICAL ENGINEERING (Autonomous)

Dundigal, Hyderabad - 500 043

MODEL QUESTION PAPER-II

B.Tech VII Semester End Examinations, November 2020

Regulations: IARE - R16

INSTRUMENTATION AND CONTROL SYSTEMS

Mechanical Engineering

Time: 3 hour

Maximum Marks: 70

Answer ONE Question from each MODULE

All Questions Carry Equal Marks

All parts of the question must be answered in one place only

MODULE-I

- (a) Illustrate the block diagram of a generalized measurement system and explain its various elements. [7m]

(b) With the help of an example, explain the generalized measurement system. [7m]
- (a) List the various types of measuring instruments and explain each one of them [7m]

(b) Identify the various measuring instruments and explain the applications of measuring instruments in detail. [7m]

MODULE-II

- (a) Explain the principle of working of a pyrometer. With the help of a neat sketch. [7m]

(b) Build a measurement system for displacement measurement using LDR (Light dependent resistor) as sensor. [7m]
- (a) Tell about RTDs? On what basic principle do they work? Explain with diagram one of the RTDs. [7m]

(b) Explain the use of thermocouples for the measurement of average temperature of a room. [7m]

MODULE-III

- (a) Explain with neat sketch principle and working of Laser Doppler Anemometer mention advantages and disadvantages. [7m]

(b) Identify the importance of magnetic flow meter in flow measurement. Explain the working of a magnetic flow meter. [7m]
- (a) What are the various applications of ultrasonic waves in engineering? Explain the ultrasonic flow meter using the travel time difference method. [7m]

- (b) Select the principle and describe the working of a rotameter. Enumerate its Applications, advantages and limitations. [7m]

MODULE-IV

7. (a) Define gauge factor. Enumerate what does it indicate if a strain gauge has a low gauge factor?
(b) Compare and explain the difference between positive strain and negative strain.
8. (a) What is the importance of strain measurement? Explain how an unbounded strain gauge is used to measure strain. [7m]
(b) Classify the strain gauges and Discuss the advantages and disadvantages of unbounded strain gauges. [7m]

MODULE-V

9. (a) Explain with neat sketch the working of pneumatic control systems. [7m]
(b) Compare the pneumatic control systems with hydraulic control systems. Explain with neat sketch the working of hydraulic control systems. [7m]
10. (a) Explain with block diagrams any one speed control system. [7m]
(b) List the various engineering applications where measuring systems are involved with instruments. Explain the functions of instruments and measuring systems. [7m]
-

****END OF EXAMINATION****

COURSE OBJECTIVES:

The course should enable the students to:

1	The fundamental knowledge of measuring principles, configuration and functional description of instruments with static, dynamic inputs and error control.
2	The concepts and working of instrumentation devices for displacement, flow, dynamic and other mechanical measurement applications.
3	Instrumentation practices and automatic control system for monitoring industrial real time processes within limits of parameter specifications.

COURSE OUTCOMES:

After successful completion of the course, students should be able to:

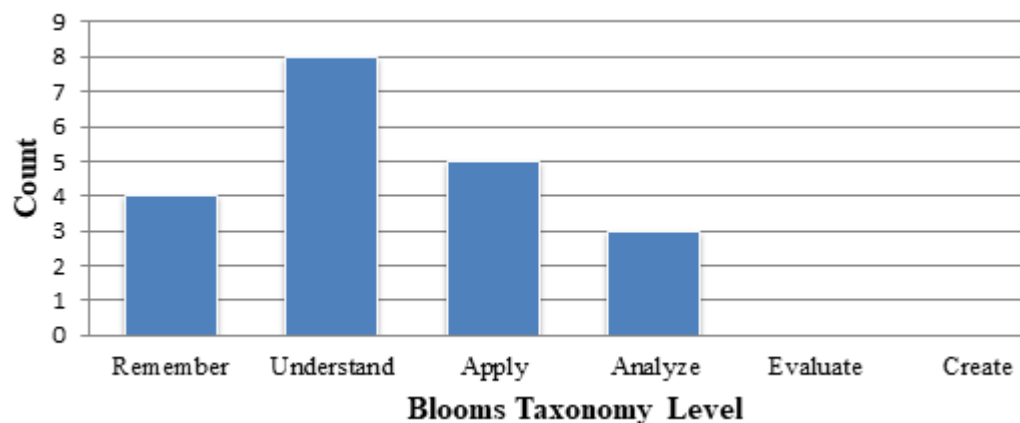
CO 1	Recognize the importance of basic principles, configuration and functional description of measuring instruments.
CO 2	Describe performance characteristics of an instrument when the device is exposed to measure dynamic inputs and error control.
CO 3	Categorize the measuring instruments based on the principle of working with the physical parameters such as displacement, temperature and pressure.
CO 4	Explain calibration of instruments for measurement of all types of mechanical parameters.
CO 5	Demonstrate working principle of level measuring devices for ascertaining liquid level and choose appropriate device for controlling fluid level in industrial applications.
CO 6	Discuss the theory, phenomena and working principle of flow measuring instruments and calibration.
CO 7	Make use of appropriate instrument for measuring Speed, Acceleration and Vibration by considering different aspects.
CO 8	Demonstrate the concepts for measurement of Stress, Strain, Humidity and their application for finding stress, strain, and humidity.
CO 9	Describe the principles of measurement of force, torque and power and their application in industries for finding force, torque and power.
CO 10	Apply relevant control systems for speed, position and control processes in practical applications.

MAPPING OF SEMESTER END EXAMINATION QUESTIONS TO COURSE OUTCOMES

Q.No		All Questions carry equal marks	Taxonomy	CO's	PO's
1	a	Illustrate the block diagram of a generalized measurement system and explain its various elements.	Understand	CO 1	PO 1
	b	With the help of an example, explain the generalized measurement system.	Apply	CO 2	PO 1
2	a	List the various types of measuring instruments and explain each one of them.	Remember	CO 1	PO 2
	b	Identify the various measuring instruments and explain the applications of measuring instruments in detail.	Apply	CO 2	PO 1
3	a	Explain the principle of working of a pyrometer. With the help of a neat sketch.	Understand	CO 3	PO 1
	b	Build a measurement system for displacement measurement using LDR (Light dependent resistor) as sensor.	Apply	CO 4	PO 1
4	a	Tell about RTDs? On what basic principle do they work? Explain with diagram one of the RTDs.	Understand	CO 3	PO 1
	b	Explain the use of thermocouples for the measurement of average temperature of a room.	Apply	CO 4	PO 2
5	a	Explain with neat sketch principle and working of Laser Doppler Anemometer mention advantages and disadvantages.	Understand	CO 5	PO 1
	b	Identify the importance of magnetic flow meter in flow measurement. Explain the working of a magnetic flow meter.	Apply	CO 6	PO 2
6	a	What are the various applications of ultrasonic waves in engineering? Explain the ultrasonic flow meter using the travel time difference method.	Remember	CO 6	PO 1
	b	Select the principle and describe the working of a rotameter. Enumerate its Applications, advantages and limitations.	Apply	CO 6	PO 2
7	a	Define gauge factor. Enumerate what does it indicate if a strain gauge has a low gauge factor?	Remember	CO 7	PO 1
	b	Compare and explain the difference between positive strain and negative strain.	Understand	CO 8	PO 2

8	a	What is the importance of strain measurement? Explain how an unbounded strain gauge is used to measure strain.	Understand	CO 7	PO 1
	b	Classify the strain gauges and Discuss the advantages and disadvantages of unbounded strain gauges.	Analyze	CO 8	PO 2
9	a	Explain with neat sketch the working of pneumatic control systems.	Understand	CO 9	PO 1
	b	Compare the pneumatic control systems with hydraulic control systems. Explain with neat sketch the working of hydraulic control systems.	Analyze	CO 10	PO 2
10	a	Explain with block diagrams any one speed control system.	Understand	CO 9	PO 1
	b	List the various engineering applications where measuring systems are involved with instruments. Explain the functions of instruments and measuring systems.	Analyze	CO 10	PO 2

KNOWLEDGE COMPETENCY LEVELS OF MODEL QUESTION PAPER



Signature of Course Coordinator
Dr. GVR Seshagiri Rao, Associate Professor

HOD, ME