Total No. of Questions: 6 *Total No. of Printed Pages:2*

Enrollment No.....

Faculty of Engineering
End Sem (Odd) Examination Dec-2022
RA3CO27 Sensors and Instrumentation

Programme: B.Tech. Branch/Specialisation: RA

Duration: 3 Hrs. **Maximum Marks: 60**

Note: All questions are compulsory. Internal choices, if any, are indicated. Answers of Q.1 (MCQs) should be written in full instead of only a, b, c or d.

Q.1 i. A sensor is a _____. **1**
(a) Subsystem (b) Machine (c) Module (d) All of these

ii. The function of a sensor is to _____. **1**
(a) Detect events within specified environment
(b) Separate physical parameters
(c) Track and transfer data to computer processor
(d) Both (a) and (c)

iii. Sensor effectiveness depends on _____ parameter. **1**
(a) Sensitivity (b) Radiation (c) Restively (d) All of these

iv. Application of tactile sensors is _____. **1**
(a) Elevator touch-sensitive buttons (b) Smart mobile phones
(c) Cars (d) Both (a) and (b)

v. Punched cards are _____. **1**
(a) Display system (b) Sound system
(c) Memory system (d) None of these

vi. In a control system the output of the controller is given to- **1**
(a) Amplifier (b) Sensor
(c) Final control element (d) Comparator

vii. Filling data between impulses in DAC is known as _____. **1**
(a) Reconstruction (b) Sampling
(c) Interpolation (d) None of these

viii. How to overcome the limitation of binary weighted resistor type DAC? **1**
(a) Using R-2R ladder type DAC
(b) Multiplying DACs
(c) Using monolithic DAC
(d) Using hybrid DAC

P.T.O.

ix. Signal conditioning is carried out in _____. **1**
(a) Transducer housing (b) Processor
(c) Network interface (d) None of these

x. Input data of smart sensor will be _____. **1**
(a) Analog (b) Digital
(c) Analog and digital (d) None of these

Q.2 i. Define instrument. List the types of instruments. **2**
ii. What are the basic requirements of measurement? **3**
iii. Explain the principle of operation of L.V.D.T. with its characteristics. **5**
OR iv. Explain in detail the calibration technique and draw the calibration curve in general. **5**

Q.3 i. What do you understand by laser transducer? **2**
ii. State different methods used for flow measurement. State the advantages and disadvantages of any one of them. **8**
OR iii. Explain the types of proximity sensors and describe their use as accelerometer and vibration sensors. **8**

Q.4 i. What is the waveform chart in LabView? **3**
ii. What are the data types? Explain all numeric data types in LabView. **7**
OR iii. Explain the differences between dataflow and control flow programming languages. **7**

Q.5 i. Draw the generalising DAS system. **3**
ii. Explain the different components of an analog data acquisition system. **7**
OR iii. List out the applications of DAS in manufacturing. **7**

Q.6 Attempt any two:
i. What are smart sensors? Explain the working principles of smart sensors. **5**
ii. What are the standard security metrics of smart sensors used in automatic robot control? **5**
iii. Explain following terms: **5**
(a) Self calibration (b) Self testing
(c) Self communicating

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Scheme of Marking

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Note: The Paper Setter should provide the answer wise splitting of the marks in the scheme below.

Q.1	i)	A Sensor is a _____. d) All the above	1
	ii)	The function of a sensor is to _____. (d) Both a and c	1
	iii)	Sensor effectiveness depends on _____ parameter. (a) Sensitivity	1
	iv)	Application of Tactile sensors is _____. (d) Both a and b	1
	v)	Punched cards are _____ c) Memory system	1
	vi)	In a control system the output of the controller is given to c)Final control element	1
	vii)	Filling data between impulses in DAC is known as _____ c) Interpolation	1
	viii)	How to overcome the limitation of binary weighted resistor type DAC? a) Using R-2R ladder type DAC	1
	ix)	Signal conditioning is carried out in _____ a) Transducer housing	1
	x)	Input data of smart sensor will be _____ a) Analog	1

Q.2	i.	definition — 1 , Types — 1	2
	ii.	Each requirement — 1 marks	3
	iii.	Principle — 3 , characteristics — 2	5
OR	iv.	Technique — 3, Curve — 2	5
Q.3	i.	definition — 2 (mean-u)	2
	ii.	Methods each — 1 marks, Advantages-2, Disadv-2	8
OR	iii.	Types each — 1 marks, Uses- Accelerometer-2, Uses - Vibration- 2	8
Q.4	i.	Definition - 2 , Diagram - 1	3
	ii.	Definition - 2 , Numerical Data Type each - 1.5 each	7
OR	iii.	Difference with explanation - 7	7
Q.5	i.	Diagram with Components — 2, Brief Explanation — 1	3
	ii.	Components - 2, Explanation of each component — 5	7
OR	iii.	Each application - 1.5 Marks.	7
Q.6		working -	
	i.	definition - 2 , principle — 3	5
	ii.	Each Matrix — 1.5 marks.	5
	iii.	Explanation of each - 1.5 mats.	5