

Code: 23EC4601C

**III B.Tech - II Semester - Regular Examinations – APRIL 2026****SMART AND WIRELESS INSTRUMENTATION  
(ELECTRONICS & COMMUNICATION ENGINEERING)**

Duration: 3 hours

Max. Marks: 70

Note: 1. This question paper contains two Parts A and B.

2. Part-A contains 10 short answer questions. Each Question carries 2 Marks.

3. Part-B contains 5 essay questions with an internal choice from each unit. Each Question carries 10 marks.

4. All parts of Question paper must be answered in one place.

BL – Blooms Level

CO – Course Outcome

**PART – A**

		BL	CO
1.a)	Differentiate between active and passive sensors.	L3	CO1
1.b)	Define self-organization of network.	L2	CO1
1.c)	List out applications of FPGA in view of node architecture.	L2	CO3
1.d)	Define communication interface.	L2	CO3
1.e)	Define data rate.	L2	CO4
1.f)	Mention two advantages of Zigbee over Wi-Fi.	L2	CO4
1.g)	Define energy management in the view of WSN.	L2	CO5
1.h)	Define thermal energy harvesting.	L2	CO5
1.i)	Define piezoelectric effect.	L2	CO2
1.j)	Define structural health monitoring.	L2	CO2

## PART – B

			BL	CO	Max. Marks
<b>UNIT-I</b>					
2	a)	Define sensor in WSN. Explain Types of sensors and its application in detail.	L2	CO1	5 M
	b)	Discuss energy consumption concept of the different components of a sensor node.	L2	CO1	5 M
<b>OR</b>					
3	a)	Assess the challenges in security provisioning in WSN.	L4	CO1	5 M
	b)	Analyze the impact of energy constraints on WSN protocol design.	L4	CO1	5 M
<b>UNIT-II</b>					
4		Compare ASIC and FPGA in terms of performance, flexibility, power consumption and cost.	L3	CO3	10 M
<b>OR</b>					
5	a)	Explain the sensor node architecture with a neat block diagram.	L2	CO3	5 M
	b)	Describe the operation of XYZ node architecture and its components.	L2	CO3	5 M
<b>UNIT-III</b>					
6	a)	Explain the frequency spectrum used in wireless communication for WSN.	L2	CO4	5 M
	b)	Compare Zigbee, Bluetooth and Wi-Fi for WSN applications.	L3	CO4	5 M

<b>OR</b>					
7		Describe the hardware requirements for implementing Zigbee-based WSN.	L2	CO4	10 M
<b>UNIT-IV</b>					
8	a)	Illustrate the importance of energy harvesting in extending network lifetime.	L3	CO5	5 M
	b)	Explain different power sources used in WSN with advantages and limitations.	L2	CO5	5 M
<b>OR</b>					
9	a)	Explain battery technologies used in WSN.	L2	CO5	5 M
	b)	Explain RF energy harvesting and its working principle.	L2	CO5	5 M
<b>UNIT-V</b>					
10	a)	Illustrate precision agriculture using WSN.	L3	CO2	5 M
	b)	Illustrate WSN applications in traffic control and health care.	L3	CO2	5 M
<b>OR</b>					
11	a)	Explain pipeline monitoring using WSN.	L2	CO2	5 M
	b)	Describe the role of WSN in underground mining safety systems.	L2	CO2	5 M