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# B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

## September / October 2023 Supplementary Examinations

**Programme: B.E.**

**Branch: Medical Electronics Engineering**

**Course Code: 19ML5PE1WS**

**Course: Wearable Sensors**

**Semester: V**

**Duration: 3 hrs.**

**Max Marks: 100**

**Date: 15.09.2023**

**Instructions:** 1. Answer any FIVE full questions, choosing one full question from each unit.  
2. Missing data, if any, may be suitably assumed.

### UNIT - I

- |   |                                                                                                   |    |
|---|---------------------------------------------------------------------------------------------------|----|
| 1 | a) Elaborate on the characteristics of the body fluids that are used by the non-invasive sensors. | 12 |
|   | b) Identify and explain the salient parts of a surface acoustic wave sensor.                      | 08 |

### OR

- |   |                                                                                                      |    |
|---|------------------------------------------------------------------------------------------------------|----|
| 2 | a) Suggest a circuit design to estimate the blood parameters through fingertip photoplethysmography. | 12 |
|   | b) Discuss any three issues that are encountered while fabricating a wearable sensor.                | 08 |

### UNIT - II

- |   |                                                                                                                   |    |
|---|-------------------------------------------------------------------------------------------------------------------|----|
| 3 | a) Discuss the procedure involved in cluster node addition and deletion. Depict the procedures with neat figures. | 08 |
|   | b) Discuss the salient features of Internet of Things.                                                            | 06 |
|   | c) Present an overview of general identity management for digital objects.                                        | 06 |

### OR

- |   |                                                                                            |    |
|---|--------------------------------------------------------------------------------------------|----|
| 4 | a) Discuss the need for light weight solutions and edge intelligence in the field of IoT.  | 05 |
|   | b) Discuss how the scale of 'things' and systems managed?                                  | 05 |
|   | c) Discuss the different categories of issues and threats encountered during IoT security. | 10 |

**Important Note:** Completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. Revealing of identification, appeal to evaluator will be treated as malpractice.

### **UNIT - III**

- |   |                                                                                                   |           |
|---|---------------------------------------------------------------------------------------------------|-----------|
| 5 | a) Discuss the types of communication that are employed in a wearable body sensor networks.       | <b>08</b> |
|   | b) Identify and explain the specific security breaches that has to be faced by a biomedical WBSN. | <b>12</b> |

### **UNIT - IV**

- |   |                                                                                     |           |
|---|-------------------------------------------------------------------------------------|-----------|
| 6 | a) Elaborate on the different types of implantable medical devices.                 | <b>12</b> |
|   | b) Discuss the critical trade-offs that need to be balanced in IMD security design. | <b>08</b> |

### **UNIT - V**

- |   |                                                                                      |           |
|---|--------------------------------------------------------------------------------------|-----------|
| 7 | a) Discuss few techniques that can be employed to monitor the core body temperature. | <b>06</b> |
|   | b) Justify the following statement, "ECG satisfies the biometric requirements".      | <b>06</b> |
|   | c) Briefly discuss the security requirements for healthcare system using WBSNs.      | <b>08</b> |

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