MUTHAYAMMAL ENGINEERING COLLEGE
(An Autonomous Institution)
(Approved by AICTE, New Delhi, Accredited by NAAC & Affiliated to Anna University)
Rasipuram - 637 408, Namakkal Dist., Tamil Nadu.

MUST KNOW CONCEPTS	MKC

BME & MDE	2021-22

Course Code & Course Name : 16BME06 - BODY AREA NETWORKS

Year/Sem : III&IV / V&VII

S.No.	Term	Notation (Symbol)	Concept / Definition / Meaning / Units / Equation / Expression	Units
		Unit-I : Introduction		
1.	Body area network	-	Body Area Network (BAN) technology is the use of small, low power wireless devices which can be carried or embedded inside or on the body. Applications include: health and wellness monitoring.	-
2.	Ban and health care	-	A body area networks (BAN) can provide a wide range of applications in primary for medical healthcare such as telemetering vital sign, telecontrolling medical equipment, and in addition for non-medical service such as entertainment.	-
3.	Technical challenges	-	A body area sensor network and its environment. A BASN can interact with existing systems, such as networks in hospitals and retirement communities. Body sensors in BASN nodes provide data to the body aggregator, which is central to managing body events.	-
4.	Sensor	-	A sensor is a device that detects the change in the environment and responds to some output on the other system	-
5.	Sensor design	-	The basic function of an electronic sensor is to measure some feature of the world, such as light, sound, or pressure and convert that	-

			measurement into an electrical signal, usually a voltage or current. The electrical output of a given sensor can easily be converted into other electrical representations.	
6.	Biocompatibility	-	Biocompatibility is the most commonly used term to describe appropriate biological requirements of a biomaterial or biomaterials used in a medical device. Biocompatibility has also been described as the ability of a material to perform with an appropriate host response in a specific application.	-
7.	Biocompatibility energy supply	-	Energy supply is the delivery of fuels or transformed fuels to point of consumption. It potentially encompasses the extraction, transmission, generation, distribution and storage of fuels. It is also sometimes called energy flow.	-
8.	Components of biocompatibility	-	The beneficial tissue response and the clinically relevant performance of a biomaterial, cytotoxicity, genotoxicity, mutagenicity, carcinogenicity and immunogenicity are considered to be the components which constitute “biocompatibility	-
9.	Biocompatibility material	-	Titanium Most biocompatible material is Titanium as it possess very good strength and low density value.	-
10.	Optimal node placement	-	The result shows that through optimal node placement approach, energy consumed in the network can be minimized if nodes are selectively placed using the minimum transmission cost.	-
11.	Number of nodes	-	The number of nodes is always one less than the principal quantum number: Nodes = n – 1. In the first electron shell, n = 1. The 1s orbital has no nodes. In the second electron shell, n = 2.	-
12.	System security and reliability	-	Security and reliability are terms used to discuss the strength and stability of the electricity grid, also known as an electric power ‘system’. The security of	-

			an electricity grid is its technical resilience (or strength), namely its ability to quickly respond and remain stable when unexpected events occur.	
13.	Bsn architecture	-	Wireless Body Sensor Networks (WBSNs) are a subsetof wireless sensor networks, which can offer this paradigm shift and can be used for early detection of the different diseases.	-
14.	Tier 1	-	Intra-WBSN: In Intra-WBSN, the on-body and/or implanted bio-medical sensor nodes send the sensed data to the coordinator or base station	-
15.	Tier2	-	Inter-WBSNs: In Inter-WBSN, coordinators or base stations send the received data to the sink(s) after required data processing and data aggregation	-
16.	Tier3	-	Extra-WBSN: In this tier the sink(s) send the collected data to the remote medical center and/or any other destination via regular infrastructure such as internet	-
17.	Protocol	-	With the proposed BSN architecture, a number of wireless biosensors including 3-lead ECG, 2-lead ECG strip, and SpO2 sensors have been developed	-
18.	Energy efficient routing protocols for wbasn	-	In this paper, a new energy-efficient routing protocol (EERP) has been proposed for WSNs using A-star algorithm. The proposed routing scheme improves the network lifetime by forwarding data packets via the optimal shortest path.	-
19.	Most efficient protocol	-	UDP is unreliable without any ACK, whereas TCP is reliable with ACK for each packet. UDP throughput will be higher than TCP. But UDP does not ensure the delivery of the packet. Same is true with power efficiency.	-
20.	Wbasns	-	A Wireless Body Area Network (WBAN) connects independent nodes (e.g. sensors and actuators) that are situated in the clothes, on the body or under the skin of a person. The	-

			network typically expands over the whole human body and the nodes are connected through a wireless communication channel.	
21.	Power consumption	-	Battery replacement in WBAN can be done easily. So there is no worry of power consumption.	-
22.	Requirements of wban	-	Reliability Latency Security Power Consumption	-
23.	Reliability	-	High reliability is required when data concerning health is sent by the WBAN sensors.	-
24.	Latency	-	The response time to emergency situations should not be long. Real-time transmission is required in this case.	-
25.	Security	-	Personal and critical data should be handled with care to ensure the privacy and security of data.	-
Unit-II : Hardware for BAN				
26.	Processor	-	A processor (CPU) is the logic circuitry that responds to and processes the basic instructions that drive a computer. The CPU is seen as the main and most crucial integrated circuitry (IC) chip in a computer, as it is responsible for interpreting most of computers commands.	-
27.	MCU	-	It's controlling the hardware that implements the device's operation. The MCU receives inputs from buttons, switches, sensors, and similar components; and controls the peripheral circuitry—such as motors and displays—in accordance with a preset program that tells it what to do and how to respond.	-
28.	MCU Full Form	-	Microcontroller unit	-
29.	Low power MCUs	-	The C8051F98x is the industry's lowest power microcontroller (MCU), consuming as little as 150 µA/MHz in	-

			active mode and 10 nA in sleep mode with full memory retention.	
30.	Mobile Computing	-	Mobile computing is human–computer interaction in which a computer is expected to be transported during normal usage, which allows for the transmission of data, voice, and video. Mobile computing involves mobile communication, mobile hardware, and mobile software.	-
31.	Integrated Processor	-	The baseband processor (BBP) allows user data to be processed in the digital domain between an end application and the transceiver device. … The baseband processor design is also easily designed using system modeling tools such as Simulink.	-
32.	Radio transceiver	-	In radio communication, a transceiver is an electronic device which is a combination of a radio transmitter and a receiver, hence the name. It can both transmit and receive radio waves using an antenna, for communication purposes.	-
33.	Memory	-	Memory refers to the processes that are used to acquire, store, retain, and later retrieve information. There are three major processes involved in memory: encoding, storage, and retrieval.	-
34.	Encoding	-	Encoding is the process of putting a sequence of characters (letters, numbers, punctuation, and certain symbols) into a specialized format for efficient transmission or storage.	-
35.	Storage	-	Storage is a process through which digital data is saved within a data storage device by means of computing technology. Storage is a mechanism that enables a computer to retain data, either temporarily or permanently	-
36.	Retrieval	-	Information retrieval is the process of obtaining information system resources that are relevant to an information need from a collection of those resources. Searches can be based on full-text or other content-based indexing.	-

37.	Antenna	-	An antenna or aerial is the interface between radio waves propagating through space and electric currents moving in metal conductors, used with a transmitter or receiver.	-
38.	PCB antenna	-	A PCB Trace antenna is comprised of a trace drawn directly onto a PCB. Furthermore, depending on the type of antenna and your space requirements, the type of trace will vary.	-
39.	Wire antenna	-	A random wire antenna is a radio antenna consisting of a long wire suspended above the ground, whose length does not bear a relation to the wavelength of the radio waves used, but is typically chosen more for convenience.	-
40.	Ceramic antenna	-	A Ceramic Chip antenna is a specific type of antenna vaunted for its small spatial requirements. Furthermore, these particular antennas are usually integrated into PCBs to emit high-frequency electromagnetic waves. However, they are limited in their range, which makes them ideally suited for small devices, such as WiFi routers and smartphones.	-
41.	External antenna	-	A connector that allows an external antenna to be connected for improved reception while in vehicles and/or homes. The antenna may be located outdoors for maximum signal performance. External antenna jacks were common before smartphones, but are now extremely rare.	-
42.	Directional antenna	-	A directional antenna or beam antenna is an antenna which radiates or receives greater power in specific directions allowing increased performance and reduced interference from unwanted sources. Satellite television receivers usually use parabolic antennas.	-
43.	Semi directional antenna	-	Semi-directional antennas are **designed to direct the RF signal in a specific direction for point-to-point communication**. Semi-directional antennas are used for short to medium	-

			distance communication indoors or outdoors. The main types of semi-directional antennas are Patch/Panel and Yagi.	
44.	Omni directional antenna	-	An omnidirectional antenna is a class of antenna which radiates equal radio power in all directions perpendicular to an axis, with power varying with angle to the axis, declining to zero on the axis.	-
45.	Dipole antenna	-	A dipole antenna commonly consists of two identical conductive elements such as metal wires or rods. … The dipole is the simplest type of antenna from a theoretical point of view. Most commonly it consists of two conductors of equal length oriented end-to-end with the feedline connected between them.	-
46.	Power sources	-	A source of electrical energy. Electric power system, a network of electrical components used to supply, transmit and use electric power. Electricity generation, the process of generating electric power from other sources of primary energy.	-
47.	Batteries	-	a container consisting of one or more cells, in which chemical energy is converted into electricity and used as a source of power.	-
48.	Fuel cells	-	A cell producing an electric current direct from a chemical reaction.	-
49.	Sensor nodes	-	A sensor node, also known as a mote, is a node in a sensor network that is capable of performing some processing, gathering sensory information and communicating with other connected nodes in the network. A mote is a node but a node is not always a mote	-
50.	Fuel cells for sensor nodes	-	Pure hydrogen type, there are hydrocarbon fuels for fuel cells, including diesel, methanol	-
Unit-III : Wireless Communication And Network Protocols				
51.	Wireless communication	-	Wireless communication is the transfer of information between two or more points that do not use an electrical conductor as a medium by which to	-

			perform the transfer.	
52.	Wireless Communication protocol	-	The wireless communication protocol is the set of rules used to exchange data between electronic devices. Ex: Bluetooth, ZigBee, LoRa, NBIoT, WiFi, and Thread.	-
53.	RF communication	-	Radio frequency communication is used in human body for integrated communications from different in body implants and body sensors will allow hearing for deaf, sight for blind and mobility for disabled.	-
54.	Application of RF communication	-	Cochlear hearing implants Pacemakers on bladder control devices	-
55.	Body effects on RF transmission	-	The various tissues and organs have their own unique conductivity, dielectric constant and characteristic impedance.	-
56.	Signal at the implant	-	It is the sum of a low transmitted power, antenna gain, Transmission losses and the high body losses.	-
57.	RF Antenna	-	RF Antenna input is typically used to connect a television antenna, cable TV wire, or satellite feed to a television, VCR, or other device that can process radio-frequency video signals, including some computers.	-
58.	Antenna Design	-	Antenna design is an important factor in using UAVs over extended range and where there are obstructed views.	-
59.	Elements of antenna	-	Floating conductive radiator Reference Feedline Impedance matching network	-
60.	Drawbacks of small antenna	-	Poor efficiency Low radiation resistance Narrow Bandwidth and High Q	-
61.	Patch antenna	-	It is used for pacemaker applications	-
62.	Helix antenna	-	It is required for stent or urinary tract implant	-
63.	Radiation pattern	-	Radiation pattern are made with the body phantom using a self contained transmitter immersed in the liquid. If the Antenna to be attached with a cable then it contribute Radiation pattern.	-

64.	Test procedures of antennas	-	Signal reception levels Immunity to noise.	-
65.	Propagation characteristics	-	The input power, absorption power in human body, accepted power, input efficiency, accepted efficiency, and total efficiency.	-
66.	Base station	-	In the area of wireless computer networking, a base station is a radio receiver/transmitter that serves as the hub of the local wireless network, and may also be the gateway between a wired network and the wireless network.	-
67.	BAN Topologies	-	Star topology Mesh topology and Hybrid topology.	-
68.	Stand - Alone Topologies	-	In a standalone application server instance topology, you install all the MDM Hub components on a standalone application server instance.	-
69.	Stand alone database	-	The standalone database requires one server while distributed databases require multiple servers (at least two).	-
70.	Wireless Personal Area network	-	A wireless personal area network (WPAN) is a PAN carried over a low-powered, short-distance wireless network technology such as IrDA, Wireless USB, Bluetooth or ZigBee.	-
71.	ZigBee	-	Zigbee is a low-cost, low-power, wireless mesh network standard targeted at battery-powered devices in wireless control and monitoring applications.	-
72.	IEEE802.15.1	-	It defines physical layer (PHY) and Media Access Control (MAC) specification for wireless connectivity with fixed, portable and moving devices within or entering personal operating space.	-
73.	IEEE P802.15.13	-	It used to enable quick multimegabyte data transfers within the scope of a WPAN.	-
74.	IEEE P802.15.14	-	This standard specifies the physical layer (PHY) and media access control sublayer (MAC) for impulse radio ultra wideband (UWB) wireless ad hoc connectivity with fixed, portable, and moving devices	-

75.	ZigBee device types	-	ZigBee coordinator ZigBee router ZigBee end device	-
Unit-IV : Coexistence Issues With BAN				
76.	Coexistence issues with WBAN	-	Coexistence remains one of the major concerns and challenges of license-exempt bands, as they are used for WBANs. A variety of approaches has been developed, as the avoidance of coexistence impact is subject to a conflict of objectives.	-
77.	Interferences in coexistence issues	-	When multiple BANS coexist then the performance of an individual BAN is degraded due to interference with neighbouring BANS. Interference causes unsuccessful transmission data, thus lowering the throughout ,and energy of devices is wasted is an important resource for WBAN devices,	-
78.	Classification of interference	-	Intrinsic interference from wireless systems running the same protocol in the same or neighboured frequency band Extrinsic interference from wireless systems running a different protocol in the same or neighboured frequency band Extrinsic interference from (micro) electronic systems with electromagnetic or RF-emission (EMI, RFI)	-
79.	Parameters of frequency behaviour in physical layer	-	The spectral mask The effective radiated power The peak power density The frequency range(s) The transmitter's and receiver's spurious emissions	
80.	Intrinsic interference behavior	-	All nodes use the same frequency characteristics, i.e., the same bandwidth and the same modulation scheme. All nodes follow the same channel access mechanisms, i.e., LBT or back off strategies. All nodes may come with similar traffic characteristics, with regard to	-

			traffic load & traffic cycles	
81.	Extrinsic interference behavior	-	The nodes are operated within the same frequency band. The frequency characteristics of the interferer might be different from the interfered station. The traffic characteristics might be completely different.	-
82.	Countermeasures-Safety aspects	-	The system either avoids to be exposed to the event. Exposure is mainly avoided by planning and/or coordination with other systems. • Or the system attempts to be protected against the event. Protection can be achieved by redundancy and/or adaptivity.	-
83.	Countermeasures can be achieved by-	-	Company policies Regulation bodies Standard bodies Technical innovations	-
84.	Company policies	-	This might include prohibition of some wireless products on campus, e.g., **Bluetooth or 802.11b.** Obviously, applications are moving away from this practice, as they are not suitable for changing topologies.	-
85.	Regulation bodies	-	The rules from regulation bodies might include basic coexistence rules, such as LBT or TPC.	-
86.	Standard bodies	-	The most prominent example of a standard-based approach was offered by the legacy IEEE802.2 workgroup with regard to the coexistence between IEEE802.11 (WLAN) and IEEE802.15.1 (Bluetooth)	-
87.	Technical innovations	-	These look for new solutions with regard to physical and data link layer protocols or with regard to system level (driver) solutions.	-
88.	Countermeasures on physical layer	-	The countermeasures on the physical layer are around the technologies to split up one medium into different channels, e.g., with space, frequency, or code division multiple access (SDMA, FDMA, CDMA).	-
89.	Channel classification	-	Active classification can be done during the course of normal communication, or the devices can	-

			exchange dummy packets with the specific goal of building a classification list. Passive classification is accomplished by listening to channels. Most of today's single-chip transceivers come with two options of passive channel supervision	
90.	Complexity of channel classification	-	As the wireless signal is spatially distributed, the observation of one station has only local significance. If nodes are extensively using power-down modes, they might not be informed about a change in frequency — and thus have to re-register	-
91.	Frequency hopping	-	Frequency hopping spread spectrum (FHSS) is the simplest spread spectrum technique, which helps to counteract against frequency specific interference on a statistical basis. FHSS uses M different carrier frequencies that are modulated by the source signal.	-
92.	Recent developments of Bluetooth	-	In order to reduce the overall energy consumption due to synchronization times, the Bluetooth low energy technology reduces the number of synchronization channels to four. The adaptivity helps to blacklist a subset of frequencies. The third approach is on the driver-side in order to coordinate the channel access of the different media.	-
93.	Countermeasures on data link layer	-	The countermeasures on the data link layer are built around the variations of time division multiple access(TDMA), which allows multiple stations use one channel.	-
94.	Disadvantage of centralized approach	-	All slave stations must remain synchronized with the master, which in the general case requires precision timers and regular activity. In case that the synchronization is performed within the communication channel, the topology is limited to star or hierarchical star, i.e., tree topologies.	-

95.	Security layers of BIS	-	Physical barrier Physiological barrier Innate immune system Adaptive immune system -Humoral immune system -Cellular immune system	-
96.	Bacterial attacks	-	Jamming, Collision, Exhaustion and Interrogation Selective forwarding, Sinkhole attacks, Sybil attacks, Wormholes, Acknowledgement spoofing HELLO Flood attacks, Buffer overflow attacks Network scanning, Traffic analysis, False alarms	-
97.	Virus infection	-	Corrupting the routing information, Misdirection Time synchronization corruption, Worms, Trojan Horse, Backdoor, Hoaxes.	-
98.	Secured protocols	-	There are a number of secured protocols design for WSN is the **Security Protocols for Sensor Networks(SPINS)**	-
99.	Components of SPINS	-	**μTESLA**(micro version of the timed, efficient, streaming, loss-tolerant authentication protocol) **SNEP**(Secure Network Encryption Protocol)	-
100.	Protective mechanisms of Artificial Immune System(AIS)	-	Recognising antigens, Eliminating antigens Adapting to new antigens	-
Unit-V : ASSISTING AND THERAPEUTIC EQUIPMENTS				
101.	Chronic disease	-	Chronic diseases are defined broadly as conditions that last 1 year or more and require ongoing medical attention or limit activities of daily living or both.	-
102.	Chronic disease example	-	Cancer, heart disease, stroke, diabetes, and arthritis.	-
103.	Chronic disease monitoring	-	Monitoring is periodic measurement that guides the management of a chronic or recurrent condition. It can be done by clinicians, patients, or both.	-
104.	Wireless device for chronic	-	Ultra low power wearable device able to acquire patient vital parameters,	-

	disease monitoring		causing minimal discomfort and allowing high mobility.	
105.	BAN in Hospital patients 1)Heart patients	-	A BAN in place on a patient can alert the hospital, even before they have a heart attack, through measuring changes in their vital signs.	-
106.	2)Diabetic patients	-	A BAN on a diabetic patient could auto inject insulin through a pump, as soon as their insulin level declines.	-
107.	Physiological sensors	-	ECG,SpO2,EEG and PDA	-
108.	Elderly patients	-	Children, the elderly require special approaches and an understanding of the physiologic, psychosocial, and physiologic impact of aging.	-
109.	Elderly patient definition	-	Conventionally, “elderly” has been defined as a chronological age of 65 years old or older, while those from 65 through 74 years old are referred to as “early elderly” and those over 75 years old as “late elderly.”	-
110.	Cardiac arrhymia	-	Improper beating of the heart, whether irregular, too fast or too slow. Cardiac arrhythmia occurs when electrical impulses in the heart don't work properly.	-
111.	Cardiac arrhymia monitoring devices	-	Cardiac arrhythmia monitoring devices are used for monitoring the patients at risk or with heart arrhythmia.	-
112.	Cardiac arrhythmia monitoring devices name	-	Zimetbaum7	-
113.	Types of Cardiac monitoring system	-	Holter monitor, Event recorder, Mobile cardiac telemetry, Insertable cardiac monitor	-
114.	Arrhythmia monitoring	-	Arrhythmia monitoring refers to tests physicians use to identify the type and the cause of irregular heart rhythms.	-
115.	Multi patient monitoring system	-	An efficient system that can monitor multiple patients' health parameters simultaneously and can effectively deliver the data to a patient monitoring system where it is stored permanently.	-
116.	Use of multi patient	-	The proposed system is used to measure the physical parameters like	-

	monitoring system		body temperature, heart rate, ECG, blood sugar and oxygen level with the help of biosensors using arm microcontroller.	
117.	Neural record	-	Neural recording implants, as a part of BMI, are capable of capturing brain signals, and amplifying, digitizing, and transferring them outside of the body with a transmitter.	-
118.	Multi channel neural record	-	Advances in implantable multi-electrode array technology have enabled researchers to record the activity of neuronal ensembles from multiple brain regions.	-
119.	Neural signal	-	Neural signals consist of recordings of potentials that are presumably generated by mixing some underlying components of brain activity.	-
120.	Gait analysis		Gait analysis is the systematic study of animal locomotion, more specifically the study of human motion, using the eye and the brain of observers, augmented by instrumentation for measuring body movements, body mechanics, and the activity of the muscles.	
121.	Gait analysis uses	-	Gait analysis is a way to assess the dynamic posture and coordination during movement. This analysis is a means to evaluate, record, and make any necessary corrections for a smooth gait.	-
122.	Abnormal gait	-	Abnormal gait or a walking abnormality is when a person is unable to walk in the usual way.	-
123.	Sports medicine	-	Sports medicine is a branch of medicine that deals with physical fitness and the treatment and prevention of injuries related to sports and exercise.	-
124.	Example of sports medicine	-	Physical therapist, Certified athletic trainer, nutritionist	-
125.	Electronic pill	-	A electronic or digital pill is a pharmaceutical dosage form that contains an ingestible sensor inside of a pill.	-

Placement Questions				
126.	Technical challenges of BAN	-	Sensor design Biocompatibility Energy supply Optimal node placement Number of nodes System security System reliability	-
127.	Criteria for BAN architectural design	-	Miniaturization Low cost Low power consumption Wireless communication Secured and reliable protocols Intelligent Expandable Flexible Programmable Ease for sensor integration	-
128.	BSN and healthcare	-	Monitoring patients with chronic diseases Monitoring Hospital patients Monitoring elderly patients	-
129.	Physiological parameter (BSN sensor type)	-	Blood pressure(Implantable/wearable mechanoreceptor) ECG, cardiac output (Implantable/wearable mechanoreceptor and ECG sensor Body temperature(wearable thermistor) Urine output-Renal failure(Implantable bladder pressure /volume sensor)	-
130.	Biochemical parameter(BSN sensor type)	-	Adrenocorticosteroids-hypertension (Implantable biosensor) Troponin, creatine kinase-Heart disease(Implantable biosensor) Inflammatory markers, White cell count, pathogen metabolites – Infectious diseases (implantable biosensor) Urea, creatinine, potassium-Renal failure(implantable biosensor)	-
131.	Processor in BAN (Microcontroller)	-	To optimize the performance and power consumption of the MCU, the MSP430 (Texas instrument) provides different modes of operation and modular disabling/enabling controls.	-
132.	Radio transceiver	-	To cater for the high bandwidth required for physiological sensors and ease the interface with other wireless sensors, the Chipcon CC2420 is used for the BSN	-

			node. As an IEEE 802. 15. 4 compliant chipset, the Chipcon CC2420 allows the BSN node to communicate with other wireless sensor networks.	
133.	Flash memory	-	The BSN node is designed with an on – board flash memory for enabling high-speed sampling nd dynamic program updates. For this purpose, a 4-megabit Atmel At45DB041B serial flash memory module is used.	-
134.	Board connector	-	The connectors are wired similarly to a bus where signals are designed to pass through from one side of the board to another, in order to provide the stackable functionality.	-
135.	Antenna	-	Antennas can be considered reciprocal devices that convert currents into field and fields into current .The BSN node is designed with only the mounting holes(Ant and GND) for the user to try different antenna designs.	-
136.	RF communication in body	-	A radio frequency (RF) signal refers to a wireless electromagnetic signal used as a form of communication, if one is discussing wireless electronics.	-
137.	Antenna design	-	An in-body antenna needs to tunable with an intelligent transceiver and routine. This will enable the antenna coupling circuit to be optimized and the best signal strength obtained.	-
138.	Antenna testing	-	Before designing a matching network for the antenna/transceiver interface it is necessary to measure the impedance of the antenna within a representative medium.	-
139.	Implementation of Wireless communication	-	IEEE 802.11 is a set of media access control and physical layer specification for implementing wireless networking computer communication. It was founded in 1987 to begin standardization of spread spectrum WLANs for use in the ISM bands.	-
140.	802.11 high rate standard	-	IEEE 802.11b is a high rate standard approved in 1999.It provided new data rate capabilities of 11 Mbps, 5.5 Mbps in addition to the original 2 Mbps and 1	-

			Mbps user rates of IEEE 802.11	
141.	Intrinsic interference	-	All nodes follow the same channel access mechanisms, i.e., LBT or back off strategies. All nodes may come with similar traffic characteristics.	-
142.	Extrinsic interference	-	The traffic characteristics might be completely different. So predictions of the future behavior are not possible. Digital systems tend to be much more event-driven.	-
143.	Star-mesh hybrid network	-	Network topology connecting a mesh network with one or more star networks or several star networks with each other. A mixed star and mesh network combines the simplicity of the singlehop star topology with the extendibility and flexibility of the multi-hop mesh topology	-
144.	Limit of Detection (LOD)	-	The lowest detectable analyte concentration, commonly defined as the concentration equivalent of three standard deviations of the y-intercept of the calibration working curve.	-
145.	Biosensor	-	The term "biosensor" strictly refers to chemical sensors where a biological sensing element such as an enzyme or antibody is used to couple the analyze concentration in a sample matrix to a transducer	-
146.	Types of topology	-	• Physical Topology • Logical topology	-
147.	Characteristics of network topology	-	1. Latency 2. Robustness 3. Capacity and complexity of data routing 4. Data processing	-
148.	Advantages of Muti-sensor system	-	Improved Signal-to-Noise Ratio (SNR) Enhanced robustness and reliability in the event of sensor failure Extended parameter coverage Integration of independent features and prior knowledge Increased dimensionality of the measurement	-

149.	Contextual sensing	-	the ability to detect contextual information and present it to the user to augment the user's sensory system;	-
150.	The Five W's of Context	-	1. Who – the identity of the user or other people in the environment 2. What – human activity and interaction in current systems 3. Where – the environment within which the activity is taking place 4. When – timestamp of the capture records 5. Why – person's affective states and intension	-
Faculty Prepared		**Dr. J. Alphas Jeba Singh** Associate Professor, Department of BME.		**Signature**

HoD