

# Internet of Things and Applications

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**Department of Electronic Science**  
**Class: TYBSc: SEM 5**  
**ELSEC352: Paper XI: Internet of Things and Applications**  
**Question Bank**  
**Unit 1: Introduction to IoT**

Sr. No	Questions	Remark
1.	<b>Define IoT. A dynamic</b>	
2.	<b>State Dynamic Characteristics of IoT</b>	
3.	<b>Which are devices connected in IoT, Mention it.</b>	
4.	<b>What are the challenges of IoT?</b>	
5.	<b>What is the full form of IoT and IIoT.</b>	
6.	<b>Write advantages of IoT</b>	
7.	<b>What are the challenges of risk associated with IoT.</b>	
8.	<b>What are different types of Sensors IoT.</b>	
9.	<b>What are different components of IoT.</b>	
10.	<b>State application of IoT</b>	
11.	<b>Explain physical Design of IoT.</b>	
12.	<b>Draw and Explain block diagram of IoT.</b>	
13.	<b>What is the role of things and Internet IoT.</b>	
14.	<b>What are the architecture constraints of RESET based communication API.</b>	
15.	<b>Enlist the IoT Enabling Technology. Explain anyone.</b>	
16.	<b>List out the Features of IoT.</b>	
17.	<b>List out the interfaces used in IoT?</b>	
18.	<b>Mention the applications of IoT</b>	
19.	<b>With the help of neat diagrams, describe the levels of IoT with an example each</b>	
20.	<b>Draw the block diagram of an IoT Devices.</b>	
21.	<b>Give brief overview of IoT.</b>	
22.	<b>What are different challenges of IoT?</b>	

23.	<b>What effect will the internet of things (IoT) have on our daily lives? Explain with any one example of smart device</b>	
24.	<b>Explain vision of IoT?</b>	
25.	<b>What are challenges of IoT?</b> IoT is a rapidly growing industry with endless potential applications in every sector, but there are unique challenges associated with adding connectivity to — well, everything. Those hurdles include <b>ensuring dependable connectivity, robust security, and compatibility between devices, systems, and software</b>	
26.	<b>What impacts will the Internet of Things (IoT) have on Energy Sector?</b> In the energy zone, the IoT can also impact both manufacturing and delivery, as an instance via facilitating monitoring of oil wellheads and pipelines. While IoT additives are embedded into elements of the electrical grid, the resulting infrastructure is generally known as the “clever grid”. This use of IoT enables more manipulate through utilities over the drift of strength and might decorate the efficiency of grid operations. It may additionally expedite the combination of micro generators into the grid. A smart-grid era can also offer purchasers with more expertise and manipulate their electricity usage via using smart meters within the domestic or office.	
27.	<b>Why is the Internet of Everything important?</b> The whole lot brings collectively humans, process, statistics and things to make networked connections greater applicable and precious than ever earlier than – turning data into actions that create new skills, richer studies and an extraordinary financial possibility for companies, individuals and nations.	
28.	<b>What impacts will the Internet of Things (IoT) have on Agriculture Sector?</b> The IoT may be leveraged by the agriculture industry through precision agriculture, with the purpose of optimizing production and performance even as decreasing charges and environmental effects. For farming operations, it involves analysis of distinctive, often actual-time records on weather, soil and air best, water supply, pest populations, crop maturity, and other factors which includes the price and availability of the device and hard work.	

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**Unit 2: IoT Protocols**

Sr. No	Questions	Remark
1.	<b>What is mean by HTTP?</b>	
2.	<b>What is mean by TCP?</b>	
3.	<b>Mention IoT enabling technology.</b>	
4.	<b>What is mean by Bluetooth?</b>	
5.	<b>Which layer used for wireless connection IoT.</b>	
6.	<b>What is the application layer in IoT protocol?</b>	
7.	<b>What is the link layer in IoT Protocol?</b>	
8.	<b>Explain MQTT.</b>	
9.	<b>What do you mean by BLE?</b>	
10.	<b>Explain XMPP.</b>	
11.	<b>What is different communication model?</b>	
12.	Describe an example of IoT service that uses publish-subscribe communication model.	
13.	<b>Explain Push pull communication in IoT.</b>	
14.	<b>Explain how IoT works?</b>	
15.	<p><b>State the difference between IoT and Machine to Machine(M2M)</b></p> <p>Commonly speaking, m2m will be taken into consideration a subset of IoT. M2m is sort of a line connecting 2 factors, and iot is sort of a community, a gadget composed of masses of m2m and triggering plenty of interactions/activities.</p> <p>Giving a simple definition to m2m which is transferring records from one gadget to another one. It's been used everywhere in our each day lifestyles. For instance, front protection. Similar to using your worker card to unencumber a door.</p> <p>When the security detector gets the identity from the employee card and then free up the door as soon as the identity is accepted. This is m2m.</p>	
16.	<p><b>Which layer of IoT uses HTTP protocol?</b></p> <p>The <b>transport layer</b> is the protocol supporting the movement of the data, such as Transmission Control Protocol (TCP), HTTP or User Datagram Protocol (UDP). The application layer is the interface between the IoT device and the network with which it will communicate.</p>	
17.	<p><b>What are the 4 main components of IoT system?</b></p> <p>IoT systems are the same in that they represent the integration of four</p>	

	distinct components: <b>sensors/devices, connectivity, data processing, and a user interface.</b>	
18.	<b>Which protocol is used to link all the devices in the IoT?</b> TCP/IP protocol TCP/IP protocol is used to link all devices in IoT.	
19.	<b>Which layer is lowest in IoT?</b> Physical layer IoT layer architecture 1) <b>Physical layer:</b> It is the bottom IoT design component often recognized as the sensor framework. It communicates through computing nodes such as RFIDs, sensors, and actuators. The stored data would be transferred to the accumulated upper layer.	
20.	<b>What are the three pillars of IoT?</b> Four pillars underpin the ability of IoT to operate successfully: <b>device, data, analytics and connectivity.</b>	
21.	What is sensor in IoT? Sensors play an important role in creating solutions using IoT. Sensors are <b>devices that detect external information, replacing it with a signal that humans and machines can distinguish.</b>	
22.	<b>How many levels are in IoT?</b> IoT Architecture Levels describes examples and architecture elements of IoT Level 1,Level 2,Level 3,Level 4 and IoT Level 5. IoT architecture elements vary based on applications of use. Based on this fact, various levels are defined for IoT system	
23.	<b>What are the 4 Internet layers?</b>  <p>The four layers of original TCP/IP model are <b>Application Layer, Transport Layer, Internet Layer and Network Access Layer.</b></p>	
24.	<b>Is ZigBee an IoT protocol?</b>  <p>The ZigBee wireless technology is basically a openly available global</p>	


	standard to address the unique needs of low-power, low-cost wireless M2M(machine-to-machine) networks and also Internet-of-Things(IoT). It operates on IEEE 802.15.	
25.	<b>Why do we need protocol?</b> Essentially, it <b>allows connected devices to communicate with each other, regardless of any differences in their internal processes, structure or design.</b> Network protocols are the reason you can easily communicate with people all over the world, and thus play a critical role in modern digital communications	
26.	<b>What layer is IP protocol?</b> the network layer The most significant protocol at <b>layer 3</b> (also called the network layer) is the Internet Protocol, or IP. IP is the standard for routing packets across interconnected networks--hence, the name internet.	
27.	<b>Is Bluetooth and ZigBee same?</b> Bluetooth is a wireless technology that is used to connect devices in short range, whereas ZigBee is wireless technology standard for personal area networks that uses low-power digital radio waves.	
28.	<b>Why Z-Wave is better than ZigBee?</b> <b>Z-Wave uses low-frequency radio bands that don't interfere with Wi-Fi.</b> On the other hand, Zigbee uses the IEEE 802.15. 4. This frequency isn't prone to interference, especially if you have a 2.4 GHz Wi-Fi network at home.	
29.	<b>What is the range of Z-Wave?</b> While Z-Wave has a range of <b>100 meters or 328 feet in open air</b> , building materials reduce that range, it is recommended to have a Z-Wave device roughly every 30 feet, or closer for maximum efficiency.	
30.	<b>What is Industrial Internet of Things (IIoT)?</b> The usage of an internet of things(IoT) technologies in production is The Industrial Internet of Things (IIoT). Additionally called the commercial internet, IIoT incorporates system gaining knowledge of and massive information generation, harnessing the sensor data, device-to-system (m2m) communicate and automation technology these existed in industrial settings for years.	
31.	<b>Why should we care about the Industrial IoT?</b> The industrial iot allows the smart gadget to your vehicle that brakes robotically when it detects an impediment in the street. It permits the affected person monitoring gadget in hospitals to monitor everything from an affected person's coronary heart rate to their remedy intake. It allows a mining device or space robotic to securely and effectively perform where people can't.	
32.	<b>What is ZigBee Protocol for Internet of Things (IoT)?</b> Zigbee is a low energy ingesting ieee 802.15.4(2003) fashionable based	

	<p>specification, zigbee is a mind baby of sixteen automation companies. What makes it novel is the usage of mesh networking which makes usage of conversation assets an awful lot greater efficient. Zigbee based iot nodes can hook up with a significant controller using in-between nodes for propagating the statistics. It makes transmission and handling of data strong.</p>													
33.	<p><b>. Mention the advantages of an Industrial IoT.</b> Industrial IoT can substantially help the industries to enhance its</p> <ul style="list-style-type: none"> <li>• Scalability</li> <li>• Performance</li> <li>• Connectivity</li> <li>• Cost savings</li> <li>• Time financial savings</li> <li>• Safety &amp; operational efficiencies</li> </ul>													
34.	<p><b>What are the key components of a M2M system?</b> Key components of an M2M system are</p> <ul style="list-style-type: none"> <li>• RFID (Radio Frequency Identification)</li> <li>• Sensors</li> <li>• Wi-Fi</li> <li>• Autonomic Computing</li> </ul>													
35.	<p><b>Name a few IoT protocols.</b> XMPP – Extensible Messaging and Presence Protocol. AMQP – Advanced Message Queuing Protocol. CoAP – Constrained Application Protocol. MQTT – Message Queue Telemetry Transport. VSCP – Very Simple Control Protocol. STOMP – Simple Text Oriented Messaging Protocol. DDS – Data Distribution Service.</p>													
36.	<p><b>Describe an example of IoT service that uses WebSocket-based communication.</b></p>													
37.	<p><b>Describe an example of IoT service that uses publish-subscribe communication model.</b></p>													
38.	<p><b>What is the difference between M2M and IoT?</b></p> <table border="1"> <thead> <tr> <th>Basis of</th> <th>IoT</th> <th>M2M</th> </tr> </thead> <tbody> <tr> <td>Abbreviation</td> <td>Internet of Things</td> <td>Machine to Machine</td> </tr> <tr> <td>Intelligence</td> <td>Devices have objects that are responsible for decision making</td> <td>Some degree of intelligence is observed in this.</td> </tr> <tr> <td>Connection type used</td> <td>The connection is via Network and using various</td> <td>The connection is a point to point</td> </tr> </tbody> </table>	Basis of	IoT	M2M	Abbreviation	Internet of Things	Machine to Machine	Intelligence	Devices have objects that are responsible for decision making	Some degree of intelligence is observed in this.	Connection type used	The connection is via Network and using various	The connection is a point to point	
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		communication types.	
Communication protocol used		Internet protocols are used such as <u>HTTP</u> , <u>FTP</u> , and <u>Telnet</u> .	Traditional protocols and communication technology techniques are used
Data Sharing		Data is shared between other applications that are used to improve the end-user experience.	Data is shared with only the communicating parties.
Internet		Internet connection is required for communication	Devices are not dependent on the Internet.
Type of Communication		It supports cloud communication	It supports point-to-point communication.
Computer System		Involves the usage of both Hardware and Software.	Mostly hardware-based technology
Scope		A large number of devices yet scope is large.	Limited Scope for devices.
Business Type used		Business 2 Business(B2B) and Business 2 Consumer(B2C)	Business 2 Business (B2B)
Open API support		Supports Open API integrations.	there is no support for Open APIs
Examples		Smart wearables, Big Data and Cloud, etc.	Sensors, Data and Information, etc.



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**Unit 3: Health Care and Smart City Application of IoT**

Sr. No	Questions	Remark
1.	<p><b>Define Smart grids?</b>            What are smart grids in IoT?</p>  <p>The “smart grid” is <b>the next generation of those energy systems, which have been updated with communications technology and connectivity to drive smarter resource use.</b> The technologies that make today's IoT-enabled energy grid “smart” include wireless devices such as sensors, radio modules, gateways and routers.</p>	
2.	<p><b>What is smart grid and how it works?</b>            The smart grid <b>uses a two-way digital communication of technologies and computer processing which enables electricity industry to better manage energy delivery and transmission.</b> It is capable of providing real time information and enable the nearby quick balancing of supply and demand</p>	
3.	<p><b>What is a real example of smart grid device in IoT?</b>            Explanation: One of the examples of Smart Edge Devices for Utility is <b>Smart Meters.</b></p>	
4.	<p><b>What is smart city in IoT?</b></p>	
5.	<p><b>What are 3 benefits for smart grid?</b>  <b>Explore the future benefits of a smarter grid.</b></p> <ul style="list-style-type: none"> <li>• Providing more reliable power. ...</li> <li>• Generating more efficient renewable power. ...</li> <li>• Using a mix of energy sources. ...</li> <li>• Working with smart devices and smart homes. ...</li> <li>• Reducing our carbon footprint. ...</li> <li>• Paving the road for electric vehicles. ...</li> <li>• Creating smart job opportunities.</li> </ul>	
6.	<p><b>What are Smart cities give examples?</b></p>	



- An infrastructure based around technology.
- Environmental initiatives.
- Effective and highly functional public transportation.
- Confident and progressive city plans.
- People able to live and work within the city, using its resources.

7.	<b>How IoT System is useful in weather monitoring?</b>	
8.	<b>What are the IOT devices used for weather monitoring? temperature sensor, humidity sensor, light sensor, and rain level sensor.</b>	
9.	<b>Explain domain specific IoTs in Home Automation.</b>	
10.	<b>Explain domain specific IoTs in Smart cities.</b>	
11.	<b>Explain domain specific IoTs in Smart Environment?</b>	
12.	<b>Explain domain specific IoTs in Smart energy.</b>	
13.	<b>Why is there a need for an IoT management?</b> The capabilities of an IoT device management platform can save time, reduce costs, improve security, and provide the critical monitoring and management tools you need to keep your devices online, up-to-date and optimized for your specific application needs.	
14.	<b>What is meant by IoT system management?</b> IoT device management is the method of authenticating, configuring, monitoring, provisioning and maintaining the software and device firmware that offers its functional capabilities. In order to maintain the security, health, and connectivity of the IoT devices, effective device management is essential.	
15.	<b>Which are the applications used in smart cities?</b>	
16.	<b>What is meant by IoT Smart homes?</b>  Smart homes connect the devices and home appliances together in order to improve efficiency. These interconnect devices under one roof such as geysers, ovens, smart TVs, thermostats and allow communication between the devices.  IoT connects these devices to the internet and these devices constantly send and receive information about the surroundings. The devices send the data to giant cloud servers mostly via IoT gateways. Smart homes allow users to remotely monitor their devices via mobile applications. Applications of smart homes also include home security systems, smart thermostats and smart refrigerators.  Smart homes cities integrate with the entire cities by creating and controlling a network.  <b>Smart thermostats</b>	

	<p>The Smart homes include thermostats that are capable of sensing and controlling the temperature. This controls the flow.</p> <p><b>Location-based smart devices</b></p> <p>Smart devices can track your location and instantly send messages to other devices to operate. For example, your smart thermostats can track your location from a smart car and switch on the ACs before you arrive</p> <p><b>Voice-enabled devices</b></p> <p>These devices can interpret human voices and convert these into text that is interpreted by the machines. Machines then perform the necessary task. Examples include alexa and siri.</p> <p>Smart security systems Security systems that are made using IOT use features such as facial recognition, iris scanners and other security modes.</p> <p><b>Facial recognition</b></p> <p>This is one of the most propelling uses of the IoT. facial recognition models track the features of the face such as the eyes, noses, chin and lips to predict the output of the person. Based on the accuracy the machine is further trained or sent for development.</p> <p><b>Motion detection</b></p> <p>Similar to facial detection but here the sensors record the movements or changes on the surroundings. These behavioural changes are then sent to the model for further analysis.</p> <p><b>Biometric access control</b></p> <p>Biometrics have become the backbone of any organisation's security systems. They are easy to manage and hassle-free. The employees and the staff members simply record their thumb or iris impressions on arrival and the machine marks their attendances. This model saves time and cost.</p>	
<p><b>17.</b></p>	<p><b>Write advantages and disadvantages for IoT smart homes?</b></p> <p><b>Advantages:</b> Smart homes allow you to add improvised functionality into regular homes. These make lives easier.</p> <p>For instance, smart vacuums clean up your entire home when you are away and smart refrigerators stock up your fridge and manage your diet charts.</p> <p>Smart homes offer security, stability, flexibility and peace of mind.</p> <p><b>Disadvantages:</b></p> <p>It becomes difficult to integrate the system when each one of the IoT devices is sold by different vendors</p> <p>Many times, the IoT devices are not compatible with each other. Each of the devices must be connected to the WiFi in addition to being connected to</p>	

	<p>devices such as Google Assistant.</p> <p>The prices of setting up smart homes are highly expensive and so the customers may not prefer to make such a hefty investment when regular homes just work fine without IoT.</p> <p>Security is still a big threat in smart homes. Smart homes must have a powerful firewall in order to avoid system hacking</p>	
<p><b>18.</b></p>	<p><b>What is meant by IoT Smart City?</b></p> <p>The internet of things technology allows smart cities to stay connected worldwide. Smart cities are driven by technology to make smart cities more safer, modern and reliable. It leads to a boost in the economy.</p> <p>Smart cities include services, devices and technology that work with IoT. These offer services to improve water, electricity, roads, transportation, public areas, buildings and digital services such as broadbands. These replace regular machines with smart machines that contain sensors to sense and collect data and actuators generate efficient responses on the basis of the data incoming from sensors.</p> <p>Smart cities make the lives of the citizens more comfortable and easy. Smart cities with traffic sensors have decreased road accidents and deaths to a large extent.</p>	
<p><b>19.</b></p>	<p><b>Write down the features of smart cities.</b></p> <p>Features of smart cities</p> <p><b>1. Smart water management</b></p> <p>Smart water management uses the internet of things to gain access to real-time information about the water systems and the water bodies. This allows humans to better manage their water resources and their requirements.</p> <p><b>2. Smart lighting</b></p> <p>Smart lighting contains sensors that can sense when the night falls and automatically switch on the street lighting. These sensors can also sense when the sun comes and they automatically switch off. Smart lighting also is capable of reaching with the help of solar energy.</p> <p><b>3. Smart traffic management</b></p> <p>Smart traffic management integrates with smart cities in order to better control and manage traffic in the cities. It offers different routes to regulate the traffic and it sends help quickly in case of a road incident. These systems are in constant contact with the traffic police and deliver the officers with real-time updates.</p> <p><b>4. Smart parking</b></p> <p>Smart parking is a technology that makes use of a combination of efforts by IoT</p>	

devices and humans. This allows drivers to locate empty spots in parking areas, detect the cars around them and alert the drivers in case they are blocking someone else driveways.

**5. Smart waste management**

Smart waste management involves the use of sensors that detect full garbage bins to notify the city authorities. These management systems collect and store data over the course of years to create better drinking routes and reduce the cost of operation.

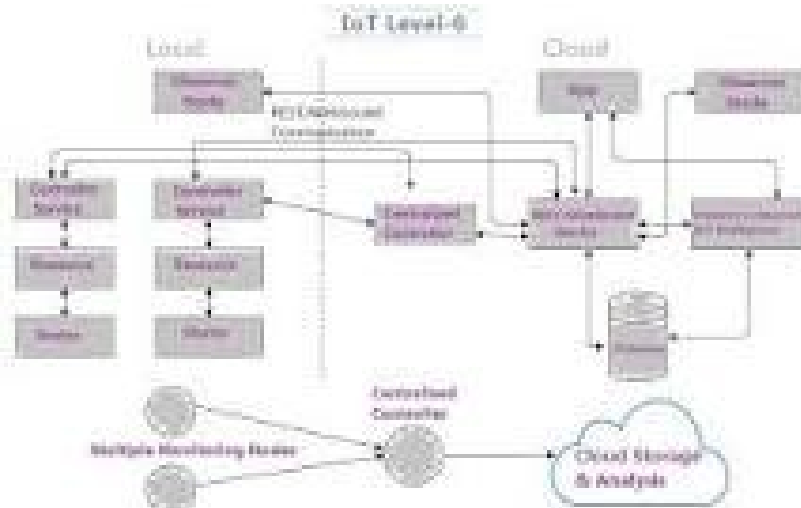
**6. Smart policing**

Smart policing is one of the important features of smart cities. It involves the use of IOT based technologies to manage the citizens of the city. These technologies collect data about the cities in order to better manage the city. For example, cameras in local areas can provide data about the areas with more burglary cases in order for the police to take the next step of actions.

**20. Determine the IoT levels for designing home automation system including smart lightening and intrusion detection.**

By analyzing and sensing the human movements and environment, the light can be controlled by the smart lightening system. For example, a person enters a room, the light turns on automatically and it turns off when a person leaves the room. For this purpose, Solid State lightening, IP enabled light are included. These can be controlled via mobile or web application. E.g. Phillips Hue Lights Intrusion detection includes the sensors and cameras used to raise alerts and detect intrusions via SMS, image, video, and email. This will improve security. Different devices are configured to.....

**21. Which IoT level is used for home automation?**



	<p><b>IoT Level-1 Example</b></p> <p>An app is used to monitor in-home automation, a few home appliances, and lights</p>	
<p><b>22.</b></p>	<p><b>Which IoT level is used for smart lighting?</b>          It firstly sense the human movements and their environment to control the light, which is the level 2 automation that execute automated business processes. And the software and hardware from the third party is needed to enhance the functionality of IoT enabled lighting, which is <b>level 3</b> innovation.</p>	
<p><b>23.</b></p>	<p><b>What are the IoT levels in IoT?</b></p> <div data-bbox="288 667 724 952" data-label="Diagram"> </div> <p><b>Here at the 4 maturity levels of IoT, and what they mean for organizations:</b></p> <ul style="list-style-type: none"> <li>• Level 1: Data Generation and Ingestion. What is it about: In level 1, organizations begin projects to generate and collect IoT data. ...</li> <li>• Level 2: First Analytics. ...</li> <li>• Level 3: Deep Learning. ...</li> <li>• Level 4: Autonomous Decision Making.</li> </ul>	
<p><b>24.</b></p>	<p><b>What are three examples of IoT?</b>  <b>Dishwashers, refrigerators, smart TVs, smart watches, cars and trucks, heating and cooling systems, fitness machines and trackers</b></p> <div data-bbox="288 1339 628 1659" data-label="Diagram"> </div> <p><b>Smart Mobiles, smart refrigerators, smartwatches, smart fire alarms, smart door locks, smart bicycles, medical sensors, fitness trackers, smart security system, etc.,</b></p>	
<p><b>25.</b></p>	<p><b>Determine an IoT levels for designing structural Health monitoring (SHM) system.</b></p> <p>An IoT( Internet of Things) enabled health monitoring device connected to a patient can be considered as a virtual patient in the digital world. This system has huge advantages over traditional health monitoring system which comprises of several</p>	<p><b>71,72 pgno</b></p>

<p><b>26.</b></p>	<p><b>Describe how the environment can be more protected with the help of IoT technology in the following categories:</b></p> <p>(i) Air pollution monitoring (ii) Noise pollution monitoring          (iii) Forest fire detection (iv) River flood detection</p> <p>(iii) Forest fire detection :<b>The fire can be detected by the flame sensor which gives a digital output that corresponds to the Fire status and is received by the Arduino Nano.</b></p>	
<p><b>27.</b></p>	<p><b>Explain how the IoT technology is impacting the healthcare sector and changing</b></p> <p>our everyday lifestyle with the following examples:          i) Health &amp; Fitness monitoring (ii) Wearable electronics</p>	



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**Unit 4: Smart Home and Agriculture Application of IoT**

Sr. No	Questions	Remark
1.	<p><b>How IoT is used in smart agriculture?</b>            IoT in agriculture uses robots, drones, remote sensors, and computer imaging combined with continuously progressing machine learning and analytical tools for monitoring crops, surveying, and mapping the fields, and providing data to farmers for rational farm management plans to save both time and money.</p>	
2.	<p><b>Which sensors are required for IoT application in agriculture?</b>            Connect a range of IoT-based agricultural sensors such as <b>temperature, moisture, depth, humidity sensors</b> for agriculture, and more for environmental monitoring applications.</p>	
3.	<p><b>What kind of problems can IoT solve for agri food?</b>  <b>IoT use cases in agriculture (with examples)</b></p> <ul style="list-style-type: none"> <li>• 1. Monitoring of climate conditions.</li> <li>• Greenhouse automation.</li> <li>• Crop management.</li> <li>• Cattle monitoring and management.</li> <li>• Precision farming.</li> <li>• Agricultural drones.</li> <li>• Predictive analytics for smart farming.</li> <li>• End-to-end farm management systems</li> </ul>	
4.	<p><b>What is Raspberry Pi?</b></p>	<b>179</b>
5.	<p><b>How Raspberry Pi used in IoT?</b>            The Raspberry Pi is a very cheap computer that runs Linux, but it also provides a set of GPIO (general purpose input/output) pins, allowing you to control electronic components for physical computing and explore the Internet of Things (IoT).</p>	
6.	<p><b>What are the features of Raspberry Pi?</b>  <i>It has ARM based Broadcom Processor SoC along with on-chip GPU (Graphics Processing Unit). The CPU speed of Raspberry Pi varies from 700 MHz to 1.2 GHz. Also, it has on-board SDRAM that ranges from 256 MB to 1 GB. Raspberry Pi also provides on-chip SPI, I2C, I2S and UART modules.</i></p>	<b>Think</b>
7.	<p><b>What are the advantages of Raspberry Pi?</b></p>	





**There are various benefits to the Raspberry Pi:**

- Low cost (~35\$)
- Huge processing power in a compact board.
- Many interfaces (HDMI, multiple USB, Ethernet, onboard Wi-Fi and Bluetooth, many GPIOs, USB powered, etc.)
- Supports Linux, Python (making it easy to build applications)

8.	<b>What is the use of GPIO pin?</b>	
9.	<b>What is the meaning of DSI and CSI? What is the purpose of that?</b>	<b>180 PgN</b>
10.	<p><b>What are the challenges of IoT in Agriculture?</b>          The biggest challenges faced by IoT in the agricultural sector are <b>lack of information, high adoption costs, and security concerns</b>, etc. Most of the farmers are not aware of the implementation of IoT in agriculture.</p> <p>Or</p> <p>The major challenges of smart agriculture include <b>continuous monitoring, energy harvesting, automatic irrigation, and disease prediction</b> .          And important issue that arises in farming is the loss of crops to various diseases.</p>	
11.	<p><b>How can IoT use in water management system?</b>          With IoT, <b>the whole water supply chain can become more transparent and easier to control</b>. With the help of sensors, a smart city water management system can enable you to collect real-time data—information that helps you visualize water distribution across the network.</p> <p>Or</p> <p>How can IoT help in water management?          Smart water systems based on internet of things (IoT) sensors, big data and analytics can reduce the amount of water that's wasted during agricultural and manufacturing processes, improve the efficiency of water distribution systems and alert companies if toxins or other impurities are detected.</p>	
12.	<p><b>What is smart water management system?</b>          Smart Water Management is the activity of planning, developing, distributing and managing the use of water resources using an array of IoT technologies which are designed to increase transparency, and make more reasonable and sustainable usage of these water resources.</p>	
13.	<p><b>How is IoT used in management?</b>          Consider the applications in facilities management, for example. IoT <b>allows for facilities to be monitored automatically at a more detailed level and for maintenance to be coordinated accordingly</b>. IoT sensors in equipment</p>	

	can automatically trigger alerts in the event of failure, reducing downtime.																									
<b>14.</b>	<b>What is the use of SPI and I2C interface on Raspberry pi?</b>	<b>186</b>																								
<b>15.</b>	<b>Explain the use of HDMI output port on Raspberry pi.</b>	<b>180</b>																								
<b>16.</b>	<b>How does IoT work in smart farming?</b> IoT smart farming solutions is a system that is built for <b>monitoring the crop field with the help of sensors (light, humidity, temperature, soil moisture, crop health, etc.) and automating the irrigation system.</b>																									
<b>17.</b>	<b>What are the best applications of the IoT in agriculture?</b> <b>Applications of IoT in Agriculture</b> <ul style="list-style-type: none"> <li>• Precision Farming. ...</li> <li>• Agricultural Drones. ...</li> <li>• Livestock Monitoring. ...</li> <li>• Smart Greenhouses. ...</li> <li>• Monitor Climate Conditions. ...</li> <li>• Remote sensing. ...</li> <li>• Computer imaging.</li> </ul>																									
<b>18.</b>	<b>What are the benefits of IoT in agriculture?</b> <b>IoT in Agriculture: Reshaping the Future</b> <ul style="list-style-type: none"> <li>• Improved data collection driving farming efficiency. The agricultural sector is in a race today. ...</li> <li>• Resource optimization. ...</li> <li>• End-to-end production control. ...</li> <li>• Reduced wastage and cost management. ...</li> <li>• Cleaner process reducing the carbon footprint. ...</li> <li>• Process automation. ...</li> <li>• Accentuated product quality.</li> </ul>																									
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	<table border="1"> <thead> <tr> <th><b>S No.</b></th> <th><b>Arduino</b></th> <th><b>Raspberry Pi</b></th> </tr> </thead> <tbody> <tr> <td>1.</td> <td>Control unit of Arduino is from Atmega family.</td> <td>While control unit of Raspberry Pi is from ARM family.</td> </tr> <tr> <td>2.</td> <td>Arduino is based on a microcontroller.</td> <td>While Raspberry Pi is based on a microprocessor.</td> </tr> <tr> <td>3.</td> <td>It is designed to control the electrical components connected to the circuit board in a system.</td> <td>While Raspberry Pi computes data and produces valuable outputs, and controls components in a system based on the outcome of its computation.</td> </tr> <tr> <td>4.</td> <td>Arduino boards have a simple hardware and software structure.</td> <td>While Raspberry Pi boards have a complex architecture of hardware and software.</td> </tr> <tr> <td>5.</td> <td>CPU architecture: 8 bit.</td> <td>CPU architecture: 64 bit.</td> </tr> <tr> <td>6.</td> <td>It uses very less RAM, 2 kB.</td> <td>While Raspberry Pi requires more RAM, 1 GB.</td> </tr> <tr> <td>7.</td> <td>It clocks a processing speed of 16 MHz.</td> <td>While Raspberry Pi clocks a processing speed of 1.4 GHz.</td> </tr> </tbody> </table>	<b>S No.</b>	<b>Arduino</b>	<b>Raspberry Pi</b>	1.	Control unit of Arduino is from Atmega family.	While control unit of Raspberry Pi is from ARM family.	2.	Arduino is based on a microcontroller.	While Raspberry Pi is based on a microprocessor.	3.	It is designed to control the electrical components connected to the circuit board in a system.	While Raspberry Pi computes data and produces valuable outputs, and controls components in a system based on the outcome of its computation.	4.	Arduino boards have a simple hardware and software structure.	While Raspberry Pi boards have a complex architecture of hardware and software.	5.	CPU architecture: 8 bit.	CPU architecture: 64 bit.	6.	It uses very less RAM, 2 kB.	While Raspberry Pi requires more RAM, 1 GB.	7.	It clocks a processing speed of 16 MHz.	While Raspberry Pi clocks a processing speed of 1.4 GHz.	
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	8.	It is cheaper in cost.	While Raspberry Pi is expensive.	
	9.	It has a higher I/O current drive strength.	While Raspberry Pi has a lower I/O current drive strength.	
	10.	It consumes about 200 MW of power.	While it consumes about 700 MW of power.	
	11.	Its logic level is 5V.	Its logic level is 3V.	
	12.	It does not have internet support.	It has inbuilt Ethernet port and WiFi support.	
	13.	It has higher current drive strength.	It has lower current drive strength.	
	14.	Some of the applications of Arduino are traffic light countdown timer , Weighing machines , etc.	Some of the application of Raspberry Pi are Stop motion cameras , Robot Controllers , Game Servers.	
<b>20.</b>	<b>Write a program to interface LED on/off from Raspberry pi/Python.</b>			<b>187/188</b>
<b>21.</b>	<b>Draw and explain generic block diagram of single board computer(SBC) based IoT device.</b>			<b>179</b>
<b>22.</b>	<b>Which are the building block of an IoT device? Explain it in details.</b>			<b>178</b>
<b>23.</b>	<b>Write a python program for controlling an LED with a switch.</b>			<b>188</b>
<b>24.</b>	<b>Explain the implementation of IoT technology in following areas:</b> (i) Smart Parking (ii) Smart Lightening (iii) Emergency response (iv) smart roads in smart cities			

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