MAY 2022 ENDSEM EXAM

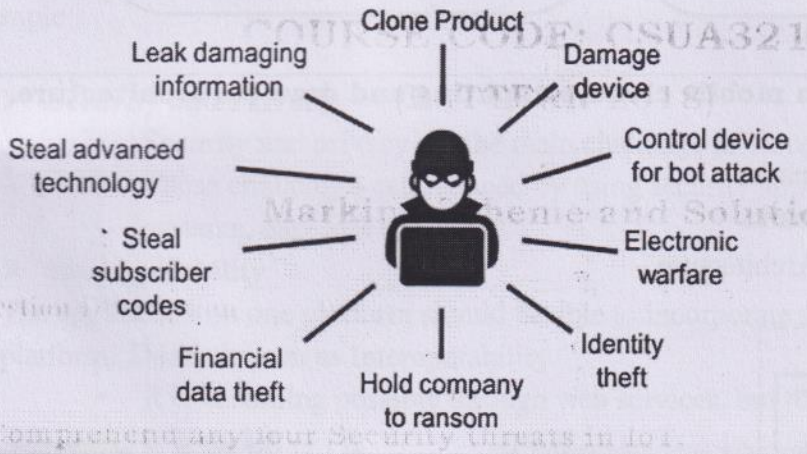
T.Y.B.TECH.(COMPUTER ENGINEERING) (SEMESTER- II)

COURSE NAME: INTERNET OF THINGS

COURSE CODE: CSUA32183

(PATTERN 2018)

Marking Scheme and Solution

Question No.	Question Description	Marks
Q.1	**a) Comprehend any four Security threats in IoT.**	[4]
	Ans: List 1 marks and brief explanation 3 marks	
		
	b) Elaborate the security requirements for any real time IoT application	[6]
	Explanation Security requirements in IOT ……2 marks Security required for real time application example explanation --------4 marks	
	Security Requirements : 1. Access Control 2. Authentication 3. Data confidentiality 4. Availability 5. Trust management 6. Secure software execution 7. Secure storage 8. Tamper resistance	

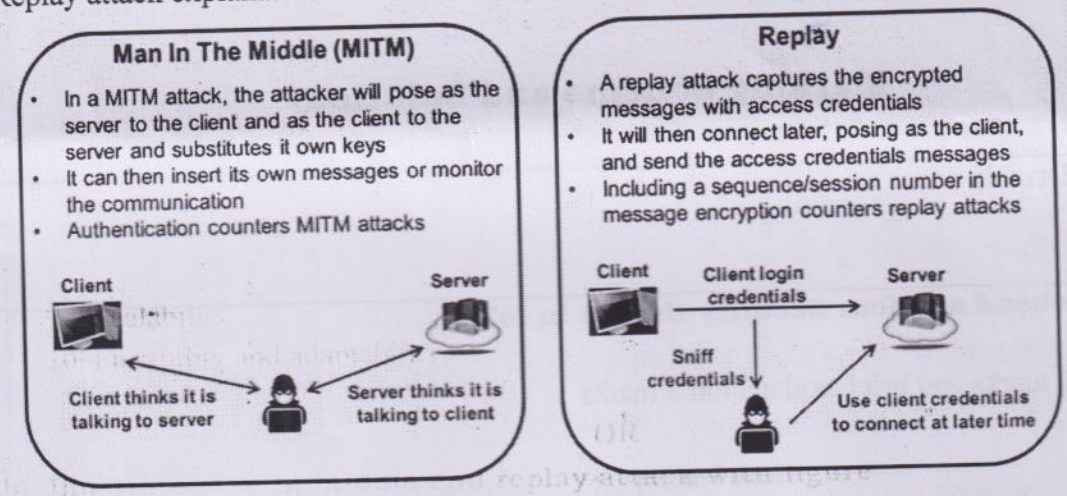
9. Scalability
10. Flexibility and adaptability

OR

b) Illustrate Man in middle and replay attack with figure [6]

Man in Middle attack explanation……..3 marks

Replay attack explanation ……..3 marks

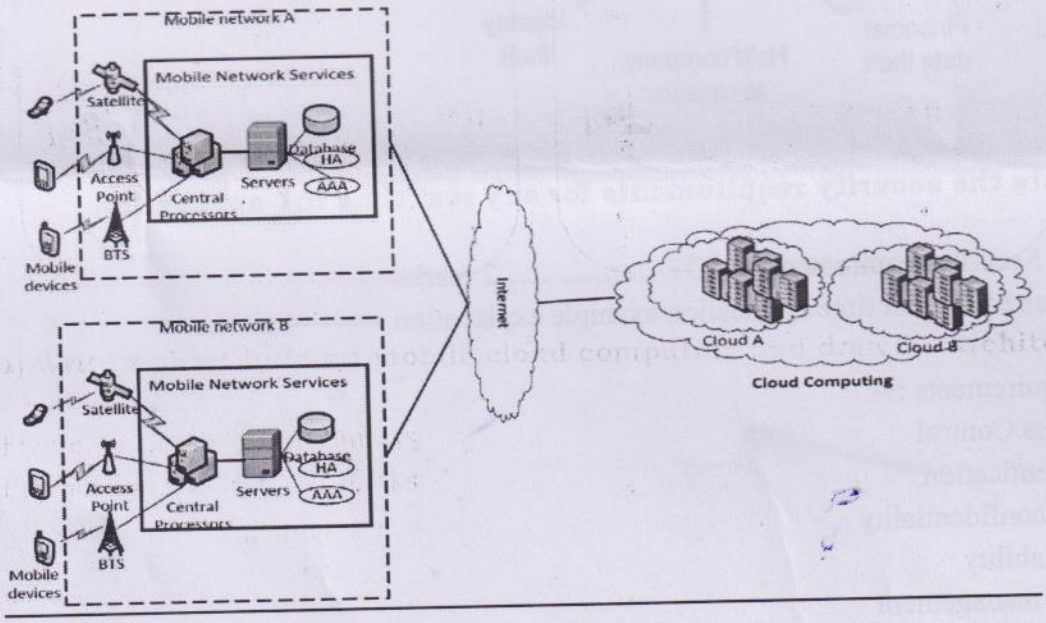


Q.2 **a) Write a short note on mobile cloud computing and draw its architecture.** [4]

Figure……2 marks

Explanation……2 marks

Mobile Cloud Computing Architecture



- **Mobile Cloud Computing** (MCC) is the combination of cloud computing and mobile computing to bring rich computational resources to mobile users, network operators, as well as cloud computing providers.
- The ultimate goal of MCC is to enable execution of rich mobile applications on a

plethora of mobile devices, with a rich user experience. MCC provides business opportunities for mobile network operators as well as cloud providers.

- More comprehensively, MCC can be defined as "a rich mobile computing technology that leverages unified elastic resources of varied clouds and network technologies toward unrestricted functionality, storage, and mobility to serve a multitude of mobile devices anywhere, anytime through the channel of Ethernet or Internet regardless of heterogeneous environments and platforms based on the pay-as-you-use principle.
- MCC uses computational augmentation approaches (computations are executed remotely instead of on the device) by which resource-constraint mobile devices can utilize computational resources of varied cloud-based resources.[2]
- In MCC, there are four types of cloud-based resources, namely distant immobile clouds, proximate immobile computing entities, proximate mobile computing entities, and hybrid (combination of the other three model).
- Giant clouds such as Amazon EC2 are in the distant immobile groups whereas cloudlet or surrogates are member of proximate immobile computing entities.
- Smartphones, tablets, handheld devices, and wearable computing devices are part of the third group of cloud-based resources which is proximate mobile computing entities.

b) Demonstrate challenges in cloud computing with an example. [6]

Challenges..... 4 marks

Example .....2 marks

- **Security and Privacy**
  - Security and privacy are the main challenge in cloud computing.
  - These challenges can reduced by using security applications, encrypted file systems, data loss software.
- **Interoperability**

The application on one platform should be able to incorporate services from the other platform. This is known as Interoperability.

  - It is becoming possible through web services, but to develop such web services is complex.
- **Portability**
  - The applications running on one cloud platform can be moved to new cloud platform and it should operate correctly without making any changes in design, coding.
  - The portability is not possible, because each of the cloud providers uses different standard languages for their platform.
- **Service Quality**
  - The Service-Level Agreements (SLAs) of the providers are not enough to guarantee the availability and scalability. The businesses disinclined to switch to cloud without a strong service quality guarantee.
- **Computing Performance**
  - High network bandwidth is needed for data intensive applications on cloud, this results in high cost.
  - In cloud computing, low bandwidth does not meet the desired computing performance.

➢ **Reliability and Availability**

- Most of the businesses are dependent on services provided by third-party, hence it is mandatory for the cloud systems to be reliable and robust.

OR

b) Exemplify the essential characteristics of the cloud computing with an example. [6]

List the characteristics..... 4marks
Example 2marks

1. Resources Pooling
It means that the **Cloud provider** pulled the computing resources to provide services to multiple customers with the help of a multi-tenant model. There are different physical and virtual resources assigned and reassigned which depends on the demand of the customer. The customer generally has no control or information over the location of the provided resources but is able to specify location at a higher level of abstraction
2. On-Demand Self-Service
It is one of the important and valuable features of Cloud Computing as the user can continuously monitor the server uptime, capabilities, and allotted network storage. With this feature, the user can also monitor the computing capabilities.
3. Easy Maintenance
The servers are easily maintained and the downtime is very low and even in some cases, there is no downtime. Cloud Computing comes up with an update every time by gradually making it better. The updates are more compatible with the devices and perform faster than older ones along with the bugs which are fixed.
4. Large Network Access
The user can access the data of the cloud or upload the data to the cloud from anywhere just with the help of a device and an internet connection. These capabilities are available all over the network and accessed with the help of internet.
5. Availability
The capabilities of the Cloud can be modified as per the use and can be extended a lot. It analyzes the storage usage and allows the user to buy extra **Cloud storage** if needed for a very small amount.
6. Automatic System
Cloud computing automatically analyzes the data needed and supports a metering capability at some level of services. We can monitor, control, and report the usage. It will provide transparency for the host as well as the customer.
7. Economical
It is the one-time investment as the company (host) has to buy the storage and a small part of it can be provided to the many companies which save the host from monthly or yearly costs. Only the amount which is spent is on the basic maintenance and a few more expenses which are very less.
8. Security
Cloud Security, is one of the best features of cloud computing. It creates a snapshot of the data stored so that the data may not get lost even if one of the servers gets damaged.
The data is stored within the storage devices, which cannot be hacked and utilized by any other person. The storage service is quick and reliable.
9. Pay as you go

In cloud computing, the user has to pay only for the service or the space they have utilized. There is no hidden or extra charge which is to be paid. The service is economical and most of the time some space is allotted for free.

10. Measured Service

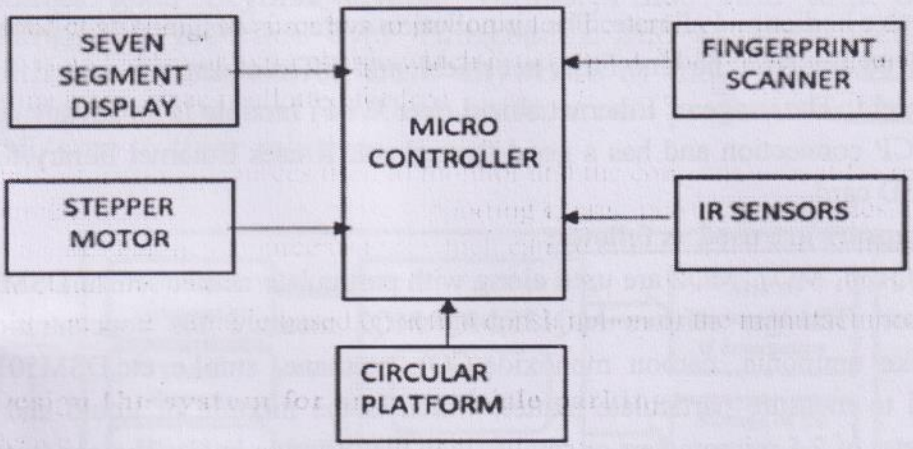
Cloud Computing resources used to monitor and the company uses it for recording. This resource utilization is analyzed by supporting charge-per-use capabilities.

This means that the resource usages which can be either virtual server instances that are running in the cloud are getting monitored measured and reported by the service provider. The model pay as you go is variable based on actual consumption of the manufacturing organization.

Q.3 **a) Design the system for smart vehicle parking.** [4]

Design..... 2marks

Explanation.....2marks



A smart vehicle parking is a system that helps drivers to find a vacant spot using sensors in each parking space by detecting the presence or absence of a vehicle.

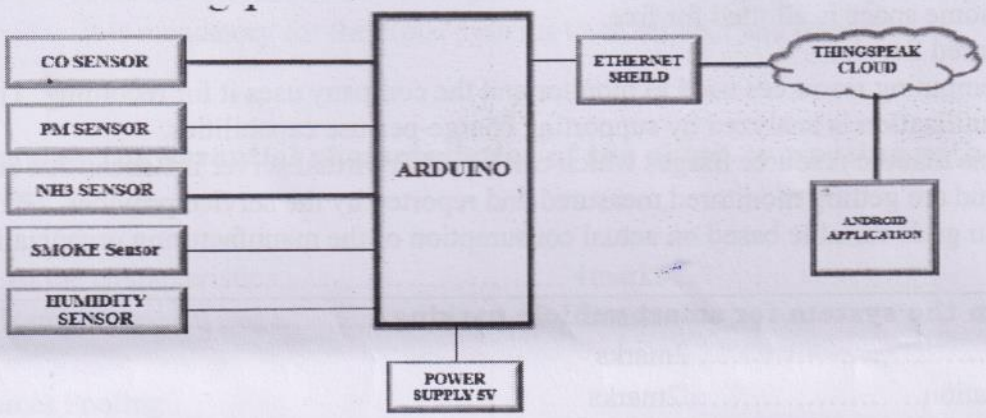
Working of system:

In Smart Parking System, the fingerprint scanner will stores the prints of the person and provides a slot (if available). The slots information can be displayed on a seven segment display or LCD. Infrared sensors detect the absence/presence of car and is interfaced with microcontroller which displays the information of slots on each seven segment display. Likewise, to retrieve the parked car, one's fingerprints must match and the slot where the car is parked will be provided. The circular path will automatically rotate and will provide particular ID corresponding to the slot being located in which division of slots is based on partition of 360 degree according to the size of garage.

b) Design an IoT based system for Air Pollution Monitoring. [6]

Design.....2 marks

Explanation…4 marks



Air pollution is the worst environmental problem and it causes a multitude of adverse effects on human health, water bodies and climate. The air pollution system is designed as follows:

Components required are: Arduino Uno,Ether net shield, and different sensors .

Use of Ethernet shield: The usage of Ethernet shield over Wi-Fi module is an advantage as it provides reliable TCP connection and has a good throughput. It uses Ethernet library to read and write using an SD card.

The different gas sensors are used as follows:

Gas sensors like MQ135, MQ7, MQ2 are used along with particulate matter sensor DSM501A and humidity sensor. The gas sensors MQ135,MQ7,MQ2 measure the concentration of hazardous gases like ammonia, carbon monoxide(CO), methane, smoke etc.DSM501A is PM2.5 sensor used to measure particulate matter, which is the mixture of liquid and solid particles with diameter of 2.5 micrometers or smaller than that floating in air. The concentration of various gases and particulate matter can be collected. The collected data is uploaded to cloud. The concentration of gases are obtained in microgram per meter cube and ppm (particles per million).

Thing Speak: Thing Speak is a cloud platform for Internet of Things. It allows the users to store the data collected from sensors in different channels. It is also used for real-time data processing, visualizations, and plugins. [6]

Working of system:

The concentration of each gas measured using various sensors are observed through serial monitor of arduino. Further, the data will be collected in the respective thingspeak channels by means of Ethernet shield and this data is now available in live for further processing.

Or

b) Summarize components required for building IoT based health monitoring system and design the system

Components…… 2marks

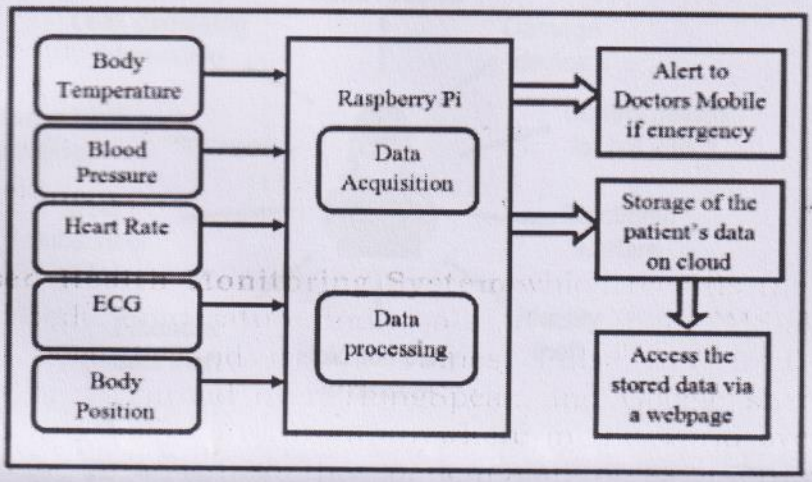
Explanation……..2marks

Design…… 2marks

Components for Health monitoring System

1. Arduino Uno/Raspberry pi
2. ESP8266 Wi-Fi module
3. LM35 temperature sensor
4. Pulse rate sensor
5. ECG Sensor
6. Heart rate sensor
7. Blood Pressure Sensor
8. Accelerometer

IoT based Health Monitoring System which records the patient heart beat rate and body temperature and also send an email/SMS alert whenever those readings goes beyond critical values. Pulse rate and body temperature readings are recorded over ThingSpeak and Google sheets so that patient health can be monitored from anywhere in the world over internet. A panic will also be attached so that patient can press it on emergency to send email/sms to their relatives.



Block diagram is shown in figure. The diagram is divided into two parts: Transmitter and receiver. In the transmitter section all the sensors are connected to the raspberry pi processor which does acquisition and processing and stores the processed data in the database which is on cloud. In the receiver section a web page is built and data collected is displayed on the web page by an authorized person. Also, the doctor is alerted in case of emergency.