UNIT -I

1) What is mobile computing?

> Mobile Computing is the interaction between the human and computer by which a computer is expected to share some different data (transmitting voice, text, video, audio)

> Mobile Computing is a technology for transmitting data without having to be connected in a fixed medium.

> Example: ad-hoc Network and infrastructure Network.

2) Define – Wireless Communication

> Wireless communication is the transfer of information over a distance without the use of electrical conductors (or) wires.
> The distance involved may be short, long.

3) What are the applications of mobile computing?

> Automatic connectivity while on the move
> Easy deployment
> Scalability
> Stack information
> Web Access
> Entertainment
> Location Tracking

4) Differentiate mobile computing from wireless networking

> Mobile Computing: Mobile is a word that is commonly used to describe portable devices. A mobile device is one that is made to be taken anywhere.

> Wireless Networking: Wireless, on the other hand, doesn't mean mobile. Traditional computers (or) other non-mobile devices can access wireless networks.
> > Example: LAN, WAN.

5) What are the challenges in wireless communication?

> Multipath propagation

> Spectrum Limitations

> Limited Energy

> User Mobility

6) What is the objective of MAC protocols?

➢ Maximization of channel utility

➢ Minimization of Latency of transmission

➢ Latency means "Time taken by the data to transmit"

7) What are the issues of wireless MAC protocol?

There are two types of issues. They are

➢ Hidden terminal problem in infrastructure less network.

➢ Exposed terminal problem in infrastructure less network.

8) What are characteristics of mobile computing?

➢ Ubiquting Computing: Share information at anywhere, anytime in any place.
➢ Location Awareness : GPS
➢ Adaptation : Accessing continuous information
➢ Broadcast : Hotspot, WiFi
➢ Personalization : Play store, notification, GPS

9) What are types of wireless networks?

(i) Local Area Network (LAN)
   Range : within a building (or) campus
(ii) Metropolitan Area Network (MAN)
   Range : within a city.
(iii) Wide Area Network (WAN)
    Range: World wide.

10) Differentiate traditional ad-hoc from cognitive ad-hoc.

In a traditional ad-Hoc Network, spectrum is pre-determined and fixed over space and time. But in case of cognitive radio ad-Hoc network, the available spectrum distribution varies over time and space.

11) What is meant by ad-hoc network?

An ad-Hoc Network is a local area network that is built spontaneously as devices connect. Instead of relying on a base station to co-ordinate the flow of messages to each node in the network, the individual network nodes forward packets to and from each other.

12) What are the classification of mac protocol?

➢ Contention – based Protocols with reservation mechanism

➢ Contention – based Protocols with Scheduling.

13) What is the role of MAC protocol?

> ➢ Frame delimiting and recognition.

> ➢ Addressing of destination stations (both as individual stations and as group of stations)

> ➢ Conveyance of source station addressing information.

> ➢ Transparent data transfer of LLC PDNs (or) of equivalent information in the Ethernet information in the Ethernet sub layer.

14) What is MACA protocol?

> ➢ MACA stands for MULTIPLE ACCESS COLLISION AVOIDANCE.

> ➢ MACA solves the hidden / exposed terminal problems by regulating the transmitter power

15) What is fixed assignment schemes?

> ➢ The Fixed assignment schemes are usually called Circuit – Switched Schemes.

> ➢ In the fixed assignment schemes, the resources requirement for a call are assigned for the entire duration of the call.

16) What are mobile computing devices?
> ➢ A Mobile Computing device is any device that is created using mobile components.

17) What is the advantage of mobile computing?

> ➢ Location Flexibility
> ➢ Saves Time
> ➢ Enhanced Productivity
> ➢ Ease of research
> ➢ Entertainment
> ➢ Stream lining of Business processes

18) What is the taxonomy of mac protocol?

> ➢ Fixed Assignment Schemes
> ➢ Random Access Schemes
> ➢ Reservation Schemes

19) What is mobile software?
> ➢ Mobile software is the actual progress that run on the mobile network. It deals with the characteristics and requirements of mobile applications.

> ➢ This is the engine of that mobile device in other terms, it is the operating system of that appliance.

20) What is mobile hardware?

> ➢ Mobile Hardware includes mobile devices (or) device components that receive (or) access the service of mobility. They would range from portable Laptops, Smart Phones, Tablet PCs, Personal Digital Assistants.

PART – B

1. State & explain the various applications of mobile computing

2. Explain the architecture of a mobile computing environment. Define the function of the presentation, application and data tier of mobile computing environment.

3. Explain the working of a contention- based MAC protocol. Give two examples of contention based MAC protocol

4. What are the principle responsibilities of the MAC Protocol? How do MAC Understanding BTL2 protocol for wireless networks differ from those in wired network?

5. Explain why do MAC scheme in wired network fail in wireless networks and how does the multiple access with collision avoidance (MACA) scheme work?

6. What are the board categories of MAC protocols? Name one popular from each of these categories.

7. Explain the various random assignment schemes that are used in MAC protocol.

8. a)Compare the mechanisms of TDMA, FDMA, and CDMA with their functions

9. What is FDMA & TDMA? Briefly explain its working and at least one of its important applications

10. Explain the basic scheme of the CDMA protocol. What is the role of a Understanding BTL2 pseudorandom generator in the working of the CDMA protocol?

UNIT- II

MOBILE INTERNET PROTOCOL AND TRANSPORT LAYER

1) What is Mobile IP?
Mobile IP is an Internet Engineering Task Force (IETF) standard communication protocol that is designed to allow mobile device user to move from one network to another while maintaining a permanent IP Address.

2) What is a Mobile IP?

Whenever the user is connected to an Application across the Internet is said to be in Mobile status. The routers actually uses the IP Address in IP Datagram to do the routing functions.
Mobile IP can also deal with dynamic IP Address. Transformation of packet from home network to mobile network.

3) What is the terminology related to Mobile IP?
The Terminology related to Mobile IP are
  - Home Address
  - Home Network
  - Foreign Agent
  - Foreign Network
  - Home Agent
  - Care of Address.

4) What are the features of Mobile IP?

  - Efficiency and scalability
  - Transparency
  - Compatibility
  - Security

5) What is the key mechanism in Mobile IP?
Mobile IP is associated with the following three basic mechanisms
  - Discovering the care-of-address
  - Registering the care-of-address
  - Tunnelling the care-of-address.

6) What is the care of address (COA) in Mobile IP?

  - It is an address that identifies the mobile node's current location. It can be viewed as the end of a tunnel from the home agent.
  - The packet sent to the Mobile Node (MN) are delivered to COA. COA is typically associated with the mobile node's foreign agent.

7) What is agent solicitation?

- ➤ In case a mobile node (MN) does not receive any COA , then the MN should send an agent solicitation message.
- ➤ However, it is important to ensure that these agent solicitation messages do not flood the network
- ➤ A mobile node can usually send up to three solicitation messages (one per second) as soon it enters a new network.

8) What is agent discovery?

During call establishment it is necessary for a mobile node to determine its Foreign Agent. This task is referred to as Agent Discovery.

The following two discovery methods are popularly used :

- ➤ Agent Advertisement
- ➤ Agent Solicitation.

9) What is encapsulation and decapsulation?

- ➤ Tunnelling is the process of sending a packet via a tunnel and it is achieved by a mechanism called **encapsulation**.
- ➤ It refers to assembling a packet's existing header and data in the data part of the new packet.
- ➤ On the other hand, Disassembling the data part of an encapsulated packet is called **decapsulation.**

10) What is the mobile node?

A Mobile Node is a hand held equipment with roaming capabilities. It can be a cell phone, a Personal Digital Assistant(PDA), Laptop, etc.

11) What is the home agent?

- ➤ It stores information about all mobile nodes whose permanent Home Address is in the network assigned to the HA.
- ➤ It maintains a location directory.
- ➤ Home Agent is a IP Address of Home Network.

12) What is the foreign agent?
- ➤ It is a Router of a Foreign Network.
- ➤ Packet from the Home Agent is send to the Foreign Node when it is free which delivers to the Mobile Node.
- ➤ It is the current subnet to which the mobile node is visiting.

13) What is the correspond node?
This is the node with which the Mobile Node under considerations (that has possibly moved to a Foreign Network) is communicating with.

14) What is the home network and foreign network?
Home Network :
- ▪ Identification of Mobile Network.
- ▪ Within the Home Network there is no need of Mobile IP.

Foreign Network :
> A Network which is away from a Home Network (HA & COA)

> Helps Foreign Network to identify the Home Network IP Address.

15) What is route optimization?

> Binding cache entry details
> Foreign Agent smooth handoff

. **16) What is tunnelling?**
> Tunnelling establishes a virtual pipe for the packets available between a tunnel's entry and end point.
> Tunnelling is the process of sending a packet via a tunnel and it is achieved by a mechanism called encapsulation.

17) What is snooping?

The modified software at base station is known as snoop. It monitors every packet that passes through the TCP connection in both directions that is from mobile host to Foreign Host and vice versa. It buffers the TCP segments close to the mobile host.

18) What are the advantages of mobile ip?

> Mobility
> Computing
> Accessing continuous information
> While on the move, we can route the packets which is to be delivered on the opposite side.

19) Define - HLR

> Home Location Register.
> The GPRS Register is a part of HLR which stores all relevant GPRS data.
> In a port of HLR which stores all the relevant data of GPRS in a mobile.
> I/P Network, GGSN and SGSNs can be compared with Home Agent and Foreign Agent.

20) Define - VLR

> It is essentially a temporary database that is updated whenever a new Mobile node enters its area by roaming. The information is obtained from the corresponding HLR database.
> The function of the VLR is to reduce the number of queries to the HLR and make the user feel as if he is in his Home Network

PART – B

1. Explain why the traditional IP cannot be used in a mobile network. What are the main differences between the traditional IP and the mobile IP? How does mobile IP support mobile hubs?

2. Explain the following terms associated with mobile IP
   a)Home address
   b)Mobile node
   c)Foreign Agent
   d) Foreign Network
   e) Home network

3. Write short notes on the following
   a) Corresponding Node
   b)Care of address
   c)Agent Discovery
   d) tunneling and Encapsulation

4. a) Explain the operation of mobile IP with the help of a suitable schematic diagram and by suitable examples
   b)Explain the agent advertisement procedure of mobile IP

5. Give a brief account of route optimization in Mobile IP

6. a) Why do congestion occur in a network? Explain how does TCP detect and handle congestion. b) Explain the working of freeze-TCP.

7. Explain the layered architecture of the TCP/IP protocol suite and compare it with the ISO/OSI architecture.

8. What is slow start in TCP operation? Explain its working. How does slow start help improve the performance of TCP?

9. Define I-TCP and Explain Indirect TCP(I-TCP) with the help of a suitable Schematic diagram.

10. Briefly discuss the M-TCP approach of extending TCP to work efficiently in Mobile wireless networks. How does M-TCP maintain end to end semantics?

UNIT – III - MOBILE TELECOMMUNICATION SYSTEM

PART A

1) Define - GSM

➢ The Global System for Mobile Communication is at present being used in India.
➢ GSM was founded in Europe in 1992.
➢ The GSM is the standard for mobile telecommunication through cellularnetworks at data rates if upto 14.4 kbps.

2) What are the services provided by GSM?

➢ Bearer services
➢ Teleservices
➢ Supplementary

3) What are subsystems in gsm system (or) system architecture in GSM?

➢ Radio Subsystem (RSS)
➢ Network and Switching subsystem(NSS)
➢ Operation subsystem(OSS)

4) What are the control channel groups in GSM?

➢ Broadcast control channel (BCC)
➢ Common control channel(CCC)
➢ Dedicated control channel(DCC)

5) What is frequency range of uplink and downlink in GSM network?

➢ The frequency range of uplink in GSM network is 890-960 mHz The frequency range of downlink in GSM network is 935-960 mHz

6) What is RSS?

➢ RSS stands for radio subsystem

➢ RSS comprises all radio specific entities

7) What are the entities of GSM?

➢ Base station subsystem(BSS)
➢ Base transceiver station(BTS)
➢ Base station controller(BSC)

8) What are the advantages of GSM ?

- ➢ Communication
- ➢ Total mobility
- ➢ World wide connectivity
- ➢ High capacity
- ➢ High transmission quality Security functions

9) What are the disadvantage of GSM ?

- ➢ No end to end encryption of user data
- ➢ Reduced concentration while moving
- ➢ High
  complexity
  Card type

10) What is GSM security?

- ➢ Aunthentication
- ➢ Confidentiality
- ➢ Anonymity

11) What is meant by GPRS ?

General packet radio service provides packet mode transfer for application that exhibit

traffic patternssuch as frequent transmission of small volumes.

12) What are the service provided by the GPRS system?

- ➢ point to point (PTP)services
- ➢ point to multipoint(PTM)
  services

13) What is a GPRS architecture ?

- ➢ GPRS architecture has two new network elements called,
- ➢ Serving GPRS Support Node(SGSN)
- ➢ Gateway GPRS SupportNode(GGSN)

14) What is meant by GGSN?

- ➤ SGSN is serving GPRS support node.
- ➤ It is inter networking unit between the GPRS network and external packet data network
- ➤ GGSN is connected to external network via the GI interface and transfers packet to GPRS

15) What is SGSN?

- ➤ SGSN is serving GPRS support node
- ➤ It supports the MS via the GB interface
- ➤ The GSN is connected to a BSC via frame relay.

16) What are the usesof SS7 ?

- ➤ Connection setup
- ➤ Connection release
- ➤ Handover of connection to other mscs

17) What is UMTS?

- ➤ Universal Mobile Telecommunication System
- ➤ CDMA 2000 and UMTS were developed separately and are two separate ITU approved 3G standards
- ➤ The UMTS was developed mainly for countries with GSM network.

18) What are the specification of UMTS?

UMTS system are compatible with GSM networks UMTS system use different

frequently bands.

19) How does UMTS network differ from 2G network?

- ➤ Higher speech quality
- ➤ Higher data rate
- ➤ Virtual Home Environment (VHE)

20) What are the entities of UMTS network?

- ➤ User equipment(UE)
- ➤ Radio network subsystem(RNS)
- ➤ Core network

PART – B

1. Describe in detail about the system architecture of Global System for Mobile Communication

2. Explain how a GSM network provides security to the customers.

3. Briefly explain how the mobile cellular communication has evolved over different generations of technology

4. Explain briefly about categories of GSM services

5. Explain GPRS architecture in detail.

6. Describe the GPRS procedure in detail.

7. What is UMTS? Describe the functions of HLR and VLR in call routing & roaming?

8. What do you mean by VHE? Explain how VHE is realized in 3G networks?

9. Do mobile phones affect the human body negative? Explain your answer.

UNIT – V
MOBILE PLATFORMS AND APPLICATIONS

1) What is the significance of device os?

- o It moderates the relationship between the computer and its peripherals.

- o It helps in the management of files,- copying, deleting, moving of files

  from one storage location to the other. It encourages the memory for its

  efficient usage and thus adding the speed of the computer.

2) What are the constraints of mobile device OS?

- o Limited memory
- o Limited screen size
- o Miniature keyboard

3) What are the types of mobile operating system?

Symbian, Android, Windows mobile, Palm OS, Blackberry,iOS

4) What is palm OS?

Palm OS is the computer operating system that provides a software platform for the Palm series of handheld personal digital assistants (PDAs) made by Palm Inc.

5) What is the function of IOS?

- o Integrated search support enables simultaneous search through files, media, applications and email.

- o Gesture recognition supports, for example, shaking the device to undo the most recent action.

6) What is an android?

Android was developed by Google and the Open Handset Alliance (OHA), a coalition of hardware, software and telecommunications companies. More than 30 companies were involved in the OHA, including Qualcomm, Broadcom, HTC, Intel, Samsung, Motorola, Sprint, Texas Instruments and Japanese wireless carriers KDDI and NTT DoCoMo.

7) What are the four layers of android structure?

- o Application layer
- o Application Frameworks

o Libraries and runtimes KERNEL

8)What is a blackberry OS ?

➢ BlackBerry OS is a proprietary mobile operating system designed specifically for Research In Motion's (RIM) BlackBerry devices. The BlackBerry OS runs on Blackberry variant phones like the BlackBerry Bold, Curve, and Pearl and Storm series.

9) What is M-Commerce? Give two advantage?

"M-Commerce is the use of mobile devices to communicate, inform transact and entertain using text and data via a connection to public and private networks." (Lehman Brothers)

Advantages:

o **Completely Customization:** the service provider has access to data about the user's preferences and status which facilitates better, personalized service.

o **More Convenience:** the small size and ease of use of mobile receivers, coupled with freedom from problems caused by infrastructure, makes for a higher degree of user convenience.

10)What is a mobile payment system?

Mobile payment, also referred to as mobile money, mobile money transfer , and mobile wallet generally refer to payment services operated under financial regulation and performed from or via a mobile device. Instead of paying with cash, cheque, or credit cards, a consumer can use a mobile phone to pay for a wide range of services and digital or hard goods.

11) What is microkernel OS?

In computer science, a microkernel (also known as μ-kernel) is the near-

minimum amount of software that can provide the mechanisms needed to implement an

operating system (OS). These mechanisms include low-level address space

management, thread management, and inter-process communication (IPC).

12) What are the features of SYMBIAN?

Multitasking real time,32 bit OS and it runs on the ARM based processors
design and also the design of symbian OS is microkernel based.

13) What are the advantages of android?

It has open platform and suitable for many mobile phones.

It needs lower footprint of 250 kB.

It supports libraries and robust in nature.

It has an integrated web browsing.

14) What are the two features of windows phone?

> For security cryptography library is available.

> virtual memory managem   ent is provided.

> The GWE can handle input and output

> An improved version of windows mobile os support multitasking.

15) What are the disadvantages of mobile OS?

If any problems affected in OS, you may lose all the contents which have been
stored already Unwanted user can use your own system

16) What are the advantages m-commerce?

> Mobile handheld devices can be personalized.

> Advantages of using M-Commerce in business organization includes, cost savings,
business   opportunities.

> M-Commerce is user friendly, providing light weight, flexibility etc.

17) What are the disadvantages of m-commerce?

➢ The mobile devices has small screen which might limit user's menu choice, text typing capabilities.

➢ Mobile devices usually do not provide processing power or graphics of personal computers.

➢ Restricted bandwidth limits reach of M-Commerce everywhere in practical scenario.

18) What is mobile payment system?

o Mobile payments are a natural evolution of E-Payment schemes.

o It may be defined as initiation, authorization and confirmation of a financial transaction using a mobile device.

Types of mobile payment schemes:

o Bank account based

o Credit card based

o Micro payment

19) What are the desirable properties of a mobile payment system?

➢ Easy to use

➢ General purpose

➢ Interoperability

➢ Trust

20) What are the security issues of mobile payment system?

Users of mobile devices can be difficult to trace because of roaming of the user. Also the mobile devices go online and offline frequently. Thus attackers would be very difficult to trace. A major is the lack of any satisfactory mechanism available at present to authenticate a particular user.

PART B

1. Explain the special features that an operating system for mobile device needs to support

2. Explain in detail, microkernel operating system.
3. Explain the principle functions of the operating system of a mobile device
4. Compare the features provided by the following operating system: Android, Symbain, Windows phone

5. Explain in detail, the architecture of Android operating system.
6. Explain the flexibilities that a user would be required to sacrifice when a single tasking operating system is used in the mobile device.
7. Explain the applications of M – Commerce.
8. Explain in detail, Mobile payment system.
9. Explain in detail, M – Commerce.
10. Explain the various security issues in mobile payment system.