MOBILE COMPUTING

**Introduction to Personal Communications Services**

**Short Answer Type Questions**

1. **Define the following terms and state their usage:**
   * **RVC**
   * **TMSI**
2. **What is hand-off? What are the different hand-off strategies? Discuss the merits and demerits of each such strategy.**  
   OR  
   **What is Handoff? Differentiate between hard and soft handoffs.**  
   OR  
   **What do you mean by hand-off? Discuss how hard hand-off is different from soft hand-off.**
3. **What do you mean by Mobile Communication? What are the advantages of Mobile Communication over PSTN?**  
   **What is the difference between network protocol and network architecture?**
4. **Why is the cell structure supposed to be a Hexagon in a mobile network?**  
   *[WBUT 2014]*
5. **Explain management of mobility in GSM network.**
6. a) **What is Mobile Station Roaming Number?**  
   b) **Differentiate between Soft hand-off and Hard hand-off.**  
   c) **What is HLR? What data are stored in it?**
7. **What are the main reasons for using cellular systems? Describe the dynamic channel allocation in cellular systems.**
8. **In a TDMA cellular system, the one-way bandwidth is 12.5 MHz. The channel bandwidth is 30 kHz and there are 395 voice channels in the system. The frame duration is 40ms, with 6 time slots per frame. The system has an individual user data rate of 16.2 kbps, of which the speech with error protection has a rate of 13 kbps. Calculate the efficiency of the TDM frame.**
9. **What do you mean by hand-off? Discuss how hard hand-off is different from soft hand-off.**
10. **Write down the limitations of accessing the mobile internet.**

**Long Answer Type Questions**

1. **What is the multiple access technique? Do a comparative study among FDMA, TDMA, and CDMA.**
2. **Draw the system architecture of GSM and explain the functionality of HLR and VLR.**  
   *[WBUT 2013, 2014]*
3. a) **Discuss the three different mechanisms to improve the cell capacity and coverage area in cellular systems.**  
   b) **What is MANET?**  
   c) **What is the Micro-cell zone concept?**  
   d) **Briefly differentiate between GSM and CDMA technologies.**  
   *[WBUT 2014]*
4. a) **Explain the concept of frequency reuse in cellular systems.**  
   b) **What do you mean by co-channel interference and system capacity?**
5. **Explain how Handover takes place in GSM. What are the problems associated with Handover in GSM?**
6. a) **Discuss how digital communication is better than analog communication.**  
   b) **What are the main reasons for using cellular systems? Describe the dynamic channel allocation in cellular systems.**  
   c) **What are the limitations of GSM cell in terms of capacity for traditional GSM? How can the capacity be increased?**
7. **Write short notes on the following:**
   * a) **Call setup of a network for mobile-to-mobile call**
   * b) **Pervasive computing**
8. **Briefly discuss GSM signaling protocol architecture.**
9. **What is hand-off? How is hand-off different from roaming?**
10. a) **Write the main differences between Ad-hoc networks and other networks.**  
    b) **What advantages do Ad-hoc networks offer? Explain in detail by giving a suitable example.**  
    c) **What are the main problems in signal propagation? Why is reflection both useful and harmful?**
11. **Write short notes on the following:**

* a) **Voice across the Internet**
* b) **GSM Network**

**General Packet Radio Services**

**Short Answer Type Questions**

1. **Define packet switching and circuit switching.**
2. **What does GPRS stand for?**
3. **Describe the protocols of a GPRS system.**
4. **How is a mobile station attached and detached with the SGSN of the GPRS network? Explain the PDP context activation in GPRS network.**

**Long Answer Type Questions**

1. **Write a short note on GPRS.**

**Data Communication**

**Short Answer Type Questions**

1. **Define the following terms and state their usage: Near-far effect.**  
   *[WBUT 2013]*
2. **What are tunneling and encapsulation in the context of mobile IP?**  
   *[WBUT 2014]*
3. **What is spread spectrum technique? Name two standard spread spectrum techniques and state the main difference in their principles of operation.**  
   *[WBUT 2013]*
4. **What are hidden station problem and exposed station problem in WLAN? How are the problems solved?**  
   *[WBUT 2013]*
5. **What do you mean by tunneling and encapsulation in the context of Mobile IP?**
6. **Discuss briefly the relative advantages and disadvantages of WLAN network.**
7. **Describe the steps involved in data transfer from mobile node to a fixed node and vice versa with respect to Mobile IP.**
8. **Explain steps of communication using Mobile IP.**

**Long Answer Type Questions**

1. a) **What is meant by access control?**  
   b) **What are contention-based and contention-free access control mechanisms?**  
   c) **Why does CSMA/CD not work for medium access control of WLAN?**  
   d) **What is the alternative mechanism of CSMA/CD? Write steps of operation to implement such an alternative mechanism.**
2. a) **What are the roles of the Home Agent and Foreign Agent in Mobile IP?**  
   b) **How does IP differ from traditional TCP? Describe with a suitable diagram.**  
   c) **Briefly describe the congestion control, slow start, and fast retransmit mechanism.**  
   *[WBUT 2014]*
3. a) **What is direct sequence spread spectrum technology?**  
   b) **Distinguish between collisions of PHY and MAC layer.**  
   *[WBUT 2015]*
4. a) **Compare radio waves, microwaves, and infrared waves with respect to their data rates, transmission distance, interference, and cost.**  
   b) **Explain clearly why Cellular IP cannot be used in place of Mobile IP.**  
   *[WBUT 2015]*
5. **What is congestion problem? Briefly point out some features of TCP congestion control and congestion in mobile ad-hoc networks.**  
   *[WBUT 2015]*
6. **Define the following terms with respect to Mobile IP:**
   * (i) **Agent Solicitation**
   * (ii) **Registration**
   * (iii) **Discovery**
   * (iv) **Co-located Address**
7. **Write short note on WLAN.**
8. a) **Discuss the effect of multi-path propagation in wireless communication.**  
   b) **Define hopping sequence and dwell time.**  
   c) **Mention the features of infrared and radio transmission in WLAN and also state their advantages and disadvantages.**
9. a) **Briefly discuss the hand-off management in WLAN.**  
   b) **Explain the operation of MIPv6.**  
   c) **Write down the advantages of MIPv6 compared with MIPv4.**
10. **Briefly discuss the Physical layer description in WLAN.**

**Wireless Application Protocol**

**Short Answer Type Questions**

1. **What is WAP? Why is it used?**
2. **Describe the system architecture and protocol architecture of IEEE 802.11 with a suitable diagram.**
3. **Explain the system architecture of infrastructure-based wireless networks with diagrams.**  
   *[WBUT 2015]*
4. **What are the features of WML?**

**Long Answer Type Questions**

1. **What is WSP? What are the services provided by WSP? Explain WSP session suspend and session resume services.**
2. a) **How can we reach the security in WAP applications?**  
   b) **Explain the WML documents modes with examples.**
3. **What is WAP gateway? Write down its functionalities. Discuss different WAP protocols.**
4. **What are the WAP components used in mobile devices? With a neat diagram explain the WAP architecture.**

**Wireless Local Loop**

**Short Answer Type Questions**

1. a) **What are the key advantages of WLL over a wired subscriber loop?**  
   b) **What is an Ad-hoc wireless network?**

**Long Answer Type Questions**

1. **Write short notes on the following:**
   * a) **Wireless Local Loop**
   * b) **WAP Protocol Stack**

**3G Mobile Services**

**Short Answer Type Questions**

1. **Define the following term and state their usage: Orthogonal code and its usage in mobile communication.**  
   *[WBUT 2013]*
2. **What are the frequency bands of operation for CDMA?**  
   *[WBUT 2014]*
3. **What are the features proposed for 4G systems? Explain.***[WBUT 2015]*
4. **What are the main components in RCL architecture? How will you design a UMTS router output port?**

**Long Answer Type Questions**

1. a) **How does CDMA technology improve system performance as compared to FDMA?**  
   b) **Discuss the relative merits of W-CDMA and CDMA 2000.**  
   **Write short note on 3G mobile telecommunication.**

**Global Mobile Satellite Systems**

**Short Answer Type Questions**

1. **Write short note on Tridium Satellite System.**
2. a) **What is SUMR (Satellite User Mobile Register)?**  
   b) **Define the following terms with respect to satellite system:**
   * i. **Coverage Angle**
   * ii. **Elevation Angle**
   * iii. **Foot Print**
3. a) **What do you mean by satellite network?**  
   b) **Briefly explain different types of satellites.**

**Wireless Enterprise Networks**

**Short Answer Type Questions**

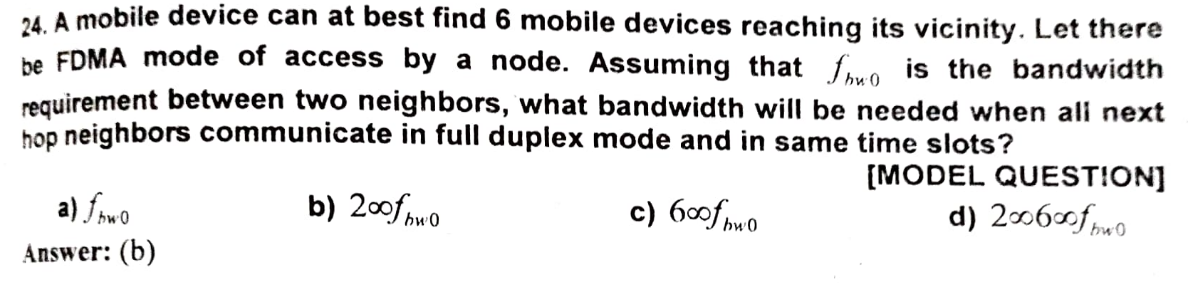
1. **Define the following term and state their usage: FCC**
2. **What are the differences between Destination Sequence Distance Vector and the Standard Distance Vector routing algorithms?**  
   *[WBUT 2014]*
3. **What do you mean by Ad-hoc piconet? Mention the different criteria of WAN.**
4. **Discuss the advantages and limitations of Bluetooth as a wireless standard.**
5. **Distinguish between Bluetooth and Hyper LAN.**
6. **What is the basic unit of networking in Bluetooth?**

**Long Answer Type Questions**

1. **Write short notes on the following:**
   * a) **Hiper LAN**
   * b) **MANET**
2. a) **Briefly discuss Bluetooth protocol stack.**  
   b) **Give two examples of Bluetooth applications.**
3. a) **Show master-slave architecture in a piconet of Bluetooth devices.**  
   b) **What are the features of Palm OS?**  
   c) **Explain Symbian OS architecture.**

**INTRODUCTION TO PERSONAL COMMUNICATIONS SERVICES**  
*Multiple Choice Type Questions*

1. **GSM uses**  
   a) CDMA  
   b) TDMA  
   c) FDMA  
   d) both (b) and (c)  
   **Answer:** (d)
2. **A single frame in GSM comprises time slots**  
   a) 10  
   b) 7  
   c) 8  
   d) 4  
   **Answer:** (c)
3. **Which of the following is a computerized center responsible for connecting & recording call information and billing?**  
   a) Base station  
   b) Cell  
   c) MSC  
   d) Mobile station  
   **Answer:** (c)
4. **Frequency reuse can help which of the following systems?**  
   a) Cellular system  
   b) Conventional mobile telephony  
   c) Paging system  
   d) Cordless telephony  
   **Answer:** (a)
5. **If N is the number of cells per cluster, then frequency reuse factor of the cellular system is**  
   a) N  
   b) 1/N  
   c) N²  
   d) None of these  
   **Answer:** (b)
6. **GSM operates at**  
   a) 860-960 MHz  
   b) Less than 500 MHz  
   c) Greater than 500 MHz  
   d) None  
   **Answer:** (a)
7. **Network signalling in GSM is**  
   a) SS7  
   b) SS5  
   c) Cipher  
   d) None  
   **Answer:** (a)
8. **Which of the following is a mobile/wireless simulator?**  
   a) NS2  
   b) NS3  
   c) Qualnet  
   d) All of these  
   **Answer:** (d)
9. **True or False: GSM's transmission bandwidth is larger than that of GPRS.**  
   a) True  
   b) False  
   c) Equal  
   d) None of these  
   **Answer:** (b)
10. **The core concept used in cellular technology is**  
    a) Frequency reuse  
    b) Code reuse  
    c) None of these  
    **Answer:** (a)
11. **The terminal is undisclosed at the time of interaction with the network for the possible operations. Under which list will this belong in EIR?**  
    a) White list  
    b) Grey list  
    c) Black list  
    d) None of these  
    **Answer:** (b)
12. **Which of these cells are used for densely populated areas?**  
    a) Macro cells  
    b) Micro cells  
    c) Selective cells  
    d) Umbrella cells  
    **Answer:** (b)
13. **Cell A uses the same frequency as Cell B. Cell A is a**  
    a) Adjacent cell  
    b) Co-channel cell  
    c) Macro cell  
    d) Selective cell  
    **Answer:** (b)
14. **CSM uses two bands of 25 MHz in width for**  
    a) Half duplex communication  
    b) Simplex communication  
    c) Full duplex communication  
    d) None of these  
    **Answer:** (c)
15. **GPS (Global Positioning System) is an example of**  
    a) MEO  
    b) LEO  
    c) GEO  
    d) None of these  
    **Answer:** (a)
16. **GSM system has**  
    a) 120 pair of channels  
    b) 128 pair of channels  
    c) 124 pair of channels  
    d) 100 pair of channels  
    **Answer:** (c)
17. **GSM mobile stations and transceivers transmit and receive**  
    a) Full-duplex or half-duplex synchronous, asynchronous, or synchronous packet data by circuit switching  
    b) Full-duplex or half-duplex synchronous or asynchronous circuit-switched data  
    c) Full-duplex synchronous, asynchronous, or synchronous circuit-switched  
    d) Full or half-duplex synchronous voice-data and synchronous packet SMS data  
    **Answer:** (d)
18. **A GSM service visiting location registers information of the currently associated mobile stations.**  
    a) The information is about their TMSI, IMSI, and MSISDN  
    b) The information is about their HLR and IMSI  
    c) The information is about their HLR, IMSI, and MSISDN  
    d) The information is about their HLR and TMSI  
    **Answer:** (b)
19. **CDMA systems exhibit soft handover due to**  
    a) Autocorrelation codes used in each cell transceiver  
    b) Each cell using the same spread frequency spectrum  
    c) Narrow band interference and co-channel interference  
    d) Each cell having a distinct pseudo-noise code offset, so that the handover to the adjacent cell is simply by adding the offset to the mobile terminal pseudo-noise code  
    **Answer:** (d)
20. **Mobile computing differs from other distributed computing by limitations in**  
    a) Battery, memory resources, long-distance bandwidth constraints, and network and interoperability issues  
    b) Use of radio-frequency cellular communication  
    c) Use of radio frequency in 100-2000 MHz  
    d) Inaccessibility of web pages  
    **Answer:** (b)
21. **Modulation of a modulating signal with a very large carrier frequency in wireless transmission is necessary due to**  
    a) Antenna requirements, signal propagating medium properties, and need to multiplex the multiple channels and users at the transmitter  
    b) Smaller antenna size at high frequency  
    c) Little bending of the beams at high frequencies  
    d) Mobility requirements  
    **Answer:** (a)
22. **A cell has**  
    a) One base station which interconnects to mobile devices  
    b) One base station which interconnects to mobile devices and performs handover to the neighbouring base station and uses a frequency band which is distinct from the neighbouring cell  
    c) One base station and one access point which connects to mobile devices  
    d) One base station which interconnects to mobile devices and performs handover to the neighbouring base station and uses a frequency band which is the same as the neighbouring cell to ensure mobility of the device  
    **Answer:** (b)
23. **Windows CE**  
    a) Applications are developed by coding for the interrupt service threads  
    b) Supports 32 priority level assignments to the threads  
    c) Provides protection from priority inversion as it provides for priority inheritance mechanism  
    d) Assumes event handlers as fundamental units of execution and providing access to CPU  
    **Answer:** (b)
24. **A mobile device can at best find and communicate with its mobile** neighbouring**. Let there be FDMA mode of access by a node. Assuming the bandwidth requirement between two** neighbouring **is *foo*, what bandwidth will be needed when all next-hop neighbors communicate in full-duplex mode and in the same time slots?**  
    a) Famo  
    b) 200/foo  
    c) Goofina  
    d) 200600/foo  
    **Answer:** (b)



1. **VLR maintains a record for**  
   a) IMSI  
   b) TMSI  
   c) SIM  
   d) None of these  
   **Answer:** (b)

**GENERAL PACKET RADIO SERVICES**

*Multiple Choice Type Questions*

1. **Full form of HSCSD is**  
   a) High Spectrum Circuit Switched Data  
   b) High Speed Channel Switched Data  
   c) High Speed Circuit Switched Data  
   d) High Speed Circuit Switched Devices  
   **Answer:** (c)  
   [WBUT 2013]
2. **GPRS is**  
   a) General Packet Radio Service  
   b) Global Packet Radio Service  
   c) General Police Radio Service  
   d) None  
   **Answer:** (a)  
   [WBUT 2014]

**DATA COMMUNICATION**

*Multiple Choice Type Questions*

1. **IEEE 802.11b has a data transfer rate of**  
   a) 11 Mbps  
   b) 13 Mbps  
   c) 10 Mbps  
   d) None of these  
   **Answer:** (a)  
   [WBUT 2013]
2. **WLAN is**  
   a) Infrastructure network  
   b) Ad hoc network  
   c) May be either infrastructure or ad hoc network  
   d) None of these  
   **Answer:** (c)  
   [WBUT 2013]
3. **With IPv4 addressing, the problem for physical mobility is**  
   a) It does not provide QoS support  
   b) Its routing and forwarding require a fixed IP determined by a network  
   c) It has security issues  
   **Answer:** (c)  
   [WBUT 2014]
4. **Which one is used in WLAN?**  
   a) Access point  
   b) Router  
   c) Both (a) and (b)  
   d) None of these  
   **Answer:** (c)  
   [WBUT 2014]
5. **Which multiple access technique is used by IEEE 802.11 standard for wireless LAN?**  
   a) CDMA  
   b) CSMA/CA  
   c) ALOHA  
   d) None of these  
   **Answer:** (b)  
   [WBUT 2015]
6. **What is the access point (AP) in wireless LAN?**  
   a) Device that allows wireless devices to connect to a wired network  
   b) Wireless device itself that allows wireless devices to connect to a wired network  
   c) Both (a) and (b)  
   d) None of these  
   **Answer:** (a)  
   [WBUT 2015]
7. **The registration process of Mobile uses \_\_\_\_\_\_\_\_\_\_\_ as the transport protocol.**  
   a) UDP  
   b) TCP  
   c) IP  
   d) None of these  
   **Answer:** (b)  
   (Model Question)
8. **IEEE 802.11 supports**  
   a) Infrared  
   b) Frequency Hopping Spread Spectrum  
   c) Direct Sequence Spread Spectrum  
   d) All of these  
   **Answer:** (c)  
   (Model Question)
9. **WLANs are**  
   a) Infrastructured  
   b) Ad-hoc  
   c) May be both Infrastructured and Ad-hoc  
   d) None of these  
   **Answer:** (c)  
   (Model Question)
10. **A Wireless LAN using FHSS hops 10 times per cycle. If the bandwidth of the original channel is 10 MHz, and 2 GHz is the lowest frequency, the highest frequency (GHz) of the spectrum is**  
    a) 2.2  
    b) 2  
    c) 2.1  
    d) 3  
    **Answer:** (b)  
    (Model Question)
11. **What is the basic access method for WLANs as defined by IEEE 802.11?**  
    a) LLC  
    b) PCF  
    c) DCF  
    d) BFD  
    **Answer:** (b)  
    (Model Question)
12. **WLAN service uses**  
    a) 802.11 protocol and long-distance communication at high data rates  
    b) 802.16 protocol and long-distance communication at small data rates  
    c) 802.16 protocol and short-distance communication at high data rates  
    d) 802.11 protocol and short-distance communication at high data rates  
    **Answer:** (a)  
    (Model Question)

**WIRELESS APPLICATION PROTOCOL**

1. **WAP protocol stack has similarity to**  
   a) OS model  
   b) TCP/IP  
   c) Both of these  
   d) None of these  
   **Answer:** (c)  
   [WBUT 2013]
2. **WAP 2.0 runs at**  
   a) 384 Kbps  
   b) 364 Kbps  
   c) 54 Mbps  
   d) 11 Mbps  
   **Answer:** (a)  
   [WBUT 2014]
3. **The class O transaction service with no WTP is**  
   a) Reliable invoke message with no result message  
   b) Unreliable invoke message with no result message  
   c) Unreliable invoke message with one reliable result message  
   d) None of these  
   **Answer:** (b)  
   (Model Question)
4. **Wireless Transport Layer Security (WTLS) of WAP is used between**  
   a) The client and the server  
   b) The gateway and the target server  
   c) The client and the gateway  
   d) None of these  
   **Answer:** (c)  
   (Model Question)
5. **The security layer of WAP consists of**  
   a) WTLS  
   b) WSP  
   c) WCMP  
   d) WAE  
   **Answer:** (a)  
   (Model Question)

Here are the **Mobile Computing and Wireless Local Loop** multiple-choice questions with their answers:

**MOBILE COMPUTING & WIRELESS LOCAL LOOP**

1. **Ad hoc and wireless are examples of which type of networks?**  
   a) Fixed and wired  
   b) Mobile and wired  
   c) Fixed and wireless  
   d) Mobile and wireless  
   **Answer:** (d)  
   [WBUT 2013]
2. **WLL uses**  
   a) Specified bound  
   b) Unspecified bound  
   c) Low pass filter  
   d) None  
   **Answer:** (d)  
   [WBUT 2014]
3. **The process of channel coding, encryption, multiplexing, and modulation for transmission and reception are carried out by**  
   a) BTS  
   b) BSC  
   c) MSC  
   d) MS  
   **Answer:** (a)  
   [WBUT 2015

**WIRELESS ENTERPRISE NETWORKS**

1. **Which of the following is the main standard for Bluetooth?**  
   a) IEEE 802.15  
   b) IEEE 802.3  
   c) IEEE 802.11  
   d) IEEE 802.18  
   **Answer:** (a)  
   [WBUT 2014]
2. **Bluetooth uses**  
   a) 2.5 GHz ISM band  
   b) 2.4 GHz ISM band  
   c) 2.4 MHz ISM band  
   d) None of these  
   **Answer:** (b)
3. **Link Manager Protocol of Bluetooth**  
   a) Provides both connectionless and connection-oriented services  
   b) Responsible for link setup between Bluetooth devices and ongoing link management  
   c) Is a client-server protocol  
   d) None of these  
   **Answer:** (b)
4. **Bluetooth provides**  
   a) Connectionless-oriented communication  
   b) Peer-to-peer slave communication within the same Pico net with negligible interference between Pico nets as each uses distinct channel-frequency hopping sequences  
   c) Ad-hoc network peer-to-peer communication when two devices are on two different Pico nets, specifying a scatter net  
   d) Wireless LAN connectivity  
   **Answer:** (c)
5. **The authentication and encryption in Bluetooth is provided by**  
   a) LMP  
   b) L2CAP  
   c) SDP  
   d) None of these  
   **Answer:** (b)
6. **Which one of the following is a true statement?**  
   a) MANET is established using service discovery, and then services of Jini, TCP/IP, Bluetooth, and WiFi are discovered.  
   b) MANET discovers services by establishing Bluetooth and WiFi for service discovery.  
   c) MANET is established using the service location protocol.  
   d) MANET is established using an ad-hoc service discovery protocol.  
   **Answer:** (b)
7. **Bluetooth-based protocol is a combination of**  
   a) Circuit & packet switching  
   b) Circuit & message switching  
   c) Both of these  
   d) None of these  
   **Answer:** (a)
8. **Ad-hoc networks are examples of which types of networks?**  
   a) Fixed and wired  
   b) Mobile and wired  
   c) Fixed and wireless  
   d) Mobile and wireless  
   **Answer:** (d)
9. **The profile synchronization in Bluetooth is achieved by**  
   a) OBEX  
   b) TCS BIN  
   c) AT Commands  
   d) PPP  
   **Answer:** (b)

Here is the formatted version of your multiple-choice questions (MCQs) for Word:

**QUESTION 2013**  
**GROUP - A**  
(Multiple Choice Type Questions)

1. Choose the correct alternatives for the following:

i) GSM uses \_\_\_\_\_\_ for multiplexing.  
a) CDMA  
b) TDMA  
c) FDMA  
d) **both** (b) and (c)

ii) \_\_\_\_\_\_ is a computerized center responsible for connecting & recording call information and billing.  
a) Base station  
b) Cell  
c) **MSC**  
d) Mobile station

iii) A single frame in GSM comprises \_\_\_\_\_\_ time slots.  
a) 10  
b) 7  
**c) 8**  
d) 3

iv) IEEE 802.11b has a data transfer rate of \_\_\_\_\_\_.  
**a) 11 Mbps**  
b) 13 Mbps  
c) 10 Mbps  
d) None of these

v) Frequency reuse can help which of the following systems?  
**a) Cellular system**  
b) Conventional mobile telephony  
c) Paging system  
d) Cordless telephony

vi) WAP protocol stack has similarity to \_\_\_\_\_\_.  
a) OS model  
b) TCP/IP  
c) **Both of these**  
d) None of these

vii) WLAN is \_\_\_\_\_\_.  
a) Infrastructure network  
b) Ad hoc network  
c) **May be either infrastructure or ad hoc network**  
d) None of these

viii) Full form of HSCSD is \_\_\_\_\_\_.  
a) High Spectrum Circuit Switched Data  
b) High Speed Channel Switched Data  
c) **High Speed Circuit Switched Data**  
d) High Speed Circuit Switched Devices

ix) Ad hoc networks are examples of which type of networks?  
a) Fixed and wired  
b) Mobile and wired  
c) Fixed and wireless  
d) **Mobile and wireless**

x) If **N** is the number of cells per cluster, then the frequency reuse factor of the cellular system is \_\_\_\_\_\_.  
a) N  
**b) 1/N**  
c) N²  
d) None of these

Here is the formatted version for **GROUP - B** and **GROUP - C** of your questions, as well as the **MCQ** from **QUESTION 2014**:

**QUESTION 2013**

**GROUP - B**  
(Short Answer Type Questions)

1. What is hand-off? What are the different hand-off strategies? Discuss the merits and demerits of each such strategy.  
   *See Topic: INTRODUCTION TO PERSONAL COMMUNICATIONS SERVICES, Short Answer Type Questions No. 2.*
2. What is WAP? Why is it used?  
   *See Topic: WIRELESS APPLICATION PROTOCOL, Short Answer Type Questions No. 1.*
3. What are tunneling and encapsulation in the context of mobile IP?  
   *See Topic: DATA COMMUNICATION, Short Answer Type Questions No. 2.*
4. What is spread spectrum technique? Name two standard spread spectrum techniques and state the main difference in their principles of operation.  
   *See Topic: DATA COMMUNICATION, Short Answer Type Questions No. 3.*
5. What are hidden station problem and exposed station problem in WLAN? How are the problems solved?  
   *See Topic: DATA COMMUNICATION, Short Answer Type Questions No. 4.*

**GROUP - C**

(Long Answer Type Questions)

1. Define the following terms and state their usage:  
   a) Near-far effect  
   b) Orthogonal code and its usage in mobile communication  
   c) FCC  
   d) RVC  
   e) TMSI

***References:***  
a) See Topic: DATA COMMUNICATION, Short Answer Type Questions No. 1.  
b) See Topic: 3G MOBILE SERVICES, Short Answer Type Questions No. 1.  
c) See Topic: WIRELESS ENTERPRISE NETWORK, Short Answer Type Questions No. 1.  
d) See Topic: INTRODUCTION TO PERSONAL COMMUNICATIONS SERVICES, Short Answer Type Questions No. 1(i).  
e) See Topic: INTRODUCTION TO PERSONAL COMMUNICATIONS SERVICES, Short Answer Type Questions No. 1(ii).

1. What is multiple access technique? Do a comparative study among FDMA, TDMA, and CDMA.  
   *See Topic: INTRODUCTION TO PERSONAL COMMUNICATIONS SERVICES, Long Answer Type Questions No. 1.*
2. What are contention-based and collision avoidance mechanisms in a network?  
   What are the mechanisms for controlling contention in medium access control (MAC) networks, such as CSMA/CD?  
   What is the alternative mechanism to CSMA/CD? Write the steps of operation to implement such an alternative mechanism.  
   *See Topic: DATA COMMUNICATION, Long Answer Type Questions No. 1.*

a) Draw the system architecture of GSM and explain the functionality of HLR and VLR.  
b) Describe the architecture of a 3G network. What are the various services associated with a 3G network?  
c) Define packet switching and circuit switching.  
***References:***  
a) See Topic: INTRODUCTION TO PERSONAL COMMUNICATIONS SERVICES, Long Answer Type Questions No. 2.  
b) See Topic: 3G MOBILE SERVICES, Long Answer Type Questions No. 1.  
c) See Topic: GENERAL PACKET RADIO SERVICES, Short Answer Type Questions No. 1.

1. Write short notes on any three of the following:  
   a) Wireless local loop  
   b) Call setup of GSM network for mobile-to-mobile call  
   c) Pervasive computing  
   d) GPRS  
   e) Iridium satellite system

***References:***  
a) See Topic: WIRELESS LOCAL LOOP, Long Answer Type Questions No. 1(a).  
b) See Topic: INTRODUCTION TO PERSONAL COMMUNICATIONS SERVICES, Long Answer Type Questions No. 7(a).  
c) See Topic: INTRODUCTION TO PERSONAL COMMUNICATIONS SERVICES, Long Answer Type Questions No. 7(b).  
d) See Topic: GENERAL PACKET RADIO SERVICES, Long Answer Type Questions No. 1.  
e) See Topic: GLOBAL MOBILE SATELLITE SYSTEMS, Long Answer Type Questions No. 1.

**QUESTION 2014**

**GROUP - A**  
(Multiple Choice Type Questions)

1. Choose the correct alternative for the following:  
   GSM operates at \_\_\_\_\_\_.  
   **a) 860-960 MHz**  
   b) Less than 500 MHz  
   c) Greater than 500 MHz  
   d) None of these
2. Network signaling in GSM is:  
   a) **SS7**  
   b) SS5  
   c) Cipher  
   d) None
3. Which of the following is the main standard for Bluetooth?  
   **a) IEEE 802.15**  
   b) IEEE 802.3  
   c) IEEE 802.11  
   d) IEEE 802.16
4. GPRS is:  
   a**) General Packet Radio Service**  
   b) Global Packet Radio Service  
   c) General Police Radio Service  
   d) None
5. Which of the following is the problem in IPV4 addressing for physical mobility?  
   a) It has a 32-bit address  
   b) It does not provide QoS support  
   **c) Its routing and forwarding require a fixed IP determined by a network**d) It has security issues
6. WAP 2.0 runs at:  
   **a) 384 Kbps**  
   b) 364 Kbps  
   c) 54 Mbps  
   d) 11 Mbps
7. Which of the following is a mobile/wireless simulator?  
   a) NS2  
   b) NS3  
   c) Qualnet  
   **d) All of these**
8. WLL uses:  
   a) Specified bound  
   b) Unspecified bound  
   c) Low pass filter  
   **d) None**
9. If N is the number of cells per cluster, then the frequency reuse factor of the cellular system is:  
   a) N  
   **b) 1/N**c) N²  
   d) None of these
10. Which one is used in WLAN?  
    a) Access point  
    b) Router  
    **c) Both (a) and (b)**d) None of these

**GROUP - B**

(Short Answer Type Questions)

1. What do you mean by Mobile Communication? What are the advantages of Mobile Communication over PSTN? What is the difference between network protocol and network architecture?  
   *See Topic: INTRODUCTION TO PERSONAL COMMUNICATIONS SERVICES, Short Answer Type Questions No. 3.*

Here is the formatted version for your **QUESTION 2015** based on the structure provided:

**QUESTION 2015**

**GROUP - A**  
(Multiple Choice Type Questions)

1. Choose the correct alternatives for the following:

i) Which of the following is/are the main parts of a basic cellular system?  
a) A mobile unit  
b) A cell site  
c) A mobile telephone switching office  
**d) All of these**

ii) In \_\_\_\_\_\_ frequency spectrum is divided into smaller spectra and is allocated to each user.  
a) TDMA  
b) CDMA  
**c) FDMA**  
d) OFDMA

iii) Which of these cells are used for densely populated areas?  
a) Macro cells  
**b) Micro cells**  
c) Selective cells  
d) Umbrella cells

iv) Cell A uses the same frequency as cell B. Cell A is a \_\_\_\_\_\_.  
a) Adjacent cell  
**b) Co-channel cell**  
c) Macro cell  
d) Selective cell

v) The process of channel coding, encryption, multiplexing, and modulation for transmission and reception are to be carried out by:  
**a) BTS**  
b) BSC  
c) MSC  
d) MS

**v)** The coverage and capacity of a CDMA system is more than that of an SDMA system.

a) **true**  
b) false  
c) equal  
d) None of these

vi) The core concept used in cellular technology is \_\_\_\_\_\_.  
a) TDM  
**b) Frequency reuse**  
c) Code reuse  
d) None of these

vii) The terminal is under observation from the network for possible problems. Under which list will this belong in EIR?  
a) White list  
**b) Grey list**  
c) Black list  
d) None of these

viii) Which multiple access technique is used by IEEE 802.11 standard for wireless LAN?  
a) CDMA  
**b) CSMA/CA**  
c) ALOHA  
d) None of these

ix) What is the access point (AP) in a wireless LAN?  
**a) Device that allows wireless devices to connect to a wired network**  
b) Wireless device itself that allows wireless devices to connect to a wired network  
c) Both (a) and (b)  
d) None of these

**GROUP - B**

(Short Answer Type Questions)

1. Explain the system architecture of infrastructure-based wireless networks with diagrams.  
   *See Topic: WIRELESS APPLICATION PROTOCOL, Short Answer Type Questions No. 3.*
2. What do you mean by hand-off? Discuss how hard hand-off is different from soft hand-off.  
   *See Topic: INTRODUCTION TO PERSONAL COMMUNICATIONS SERVICES, Short Answer Type Questions No. 2.*
3. Describe the system architecture and protocol architecture of IEEE 802.11 with suitable diagram.  
   *See Topic: WIRELESS APPLICATION PROTOCOL, Short Answer Type Questions No. 2.*
4. What are the features proposed for 4G systems? Explain.  
   *See Topic: 3G MOBILE SERVICES, Short Answer Type Questions No. 3.*
5. What do you mean by ad-hoc piconet? Mention the different criteria of WAN.  
   *See Topic: WIRELESS ENTERPRISE NETWORK, Short Answer Type Questions No. 3.*

**GROUP - C**

(Long Answer Type Questions)

a) What is direct sequence spread spectrum technology?  
b) Distinguish between collisions of PHY and MAC layer.  
c) Explain how handover takes place in GSM. What are the problems associated with handover in GSM?  
*See Topic: DATA COMMUNICATION, Long Answer Type Questions No. 3.*  
*See Topic: INTRODUCTION TO PERSONAL COMMUNICATIONS SERVICES, Long Answer Type Questions No. 5.*

a) Discuss how digital communication is better than analog communication.  
b) What are the main reasons for using a cellular system? Describe the dynamic channel allocation in a cellular system.  
c) What are the limitations of GSM cells in terms of capacity for traditional GSM? How can the capacity be increased?  
*See Topic: INTRODUCTION TO PERSONAL COMMUNICATIONS SERVICES, Long Answer Type Questions No. 6.*

a) Discuss the advantages and limitations of Bluetooth as a wireless standard.  
b) Compare radio waves, microwaves, and infrared waves, with respect to their data rates, transmission distance, interference, and cost.  
c) Explain clearly why cellular IP cannot be used in place of mobile IP.  
*See Topic: WIRELESS ENTERPRISE NETWORK, Short Answer Type Questions No. 4.*  
*See Topic: DATA COMMUNICATION, Long Answer Type Questions No. 4.*

a) What do you mean by "Call Admission Control" in mobile communication? Discuss any two of the CAC schemes for mobile communication.  
b) What is the congestion problem? Briefly point out some features of TCP congestion control and congestion in a mobile ad-hoc network.  
*See Topic: DATA COMMUNICATION, Long Answer Type Questions No. 5.*

1. Write short notes on any three of the following:  
   a) WAP Protocol Stack  
   b) GPRS  
   c) Hiper LAN  
   d) WLAN  
   e) MANET

*See Topic: WIRELESS LOCAL LOOP, Long Answer Type Questions No. 1(b).*  
*See Topic: GENERAL PACKET RADIO SERVICES, Long Answer Type Questions No. 1.*  
*See Topic: WIRELESS ENTERPRISE NETWORK, Long Answer Type Questions No. 1(a).*  
*See Topic: DATA COMMUNICATION, Long Answer Type Questions No. 6.*  
*See Topic: WIRELESS ENTERPRISE NETWORK, Long Answer Type Questions No. 1(b).*