



JEPPIAAR
ENGINEERING COLLEGE

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

IT6601 – Mobile Computing

Question Bank

III YEAR A & B / BATCH : 2016 -2020

Vision of Institution

To build Jeppiaar Engineering College as an Institution of Academic Excellence in Technical education and Management education and to become a World Class University.

Mission of Institution

M1	To excel in teaching and learning, research and innovation by promoting the principles of scientific analysis and creative thinking
M2	To participate in the production, development and dissemination of knowledge and interact with national and international communities
M3	To equip students with values, ethics and life skills needed to enrich their lives and enable them to meaningfully contribute to the progress of society
M4	To prepare students for higher studies and lifelong learning , enrich them with the practical and entrepreneurial skills necessary to excel as future professionals and contribute to Nation's economy

Program Outcomes (POs)

PO1	Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2	Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3	Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations
PO4	Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5	Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO6	The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO7	Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9	Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10	Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11	Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO12	Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Vision of Department

To emerge as a globally prominent department, developing ethical computer professionals, innovators and entrepreneurs with academic excellence through quality education and research.

Mission of Department

M1	To create computer professionals with an ability to identify and formulate the engineering problems and also to provide innovative solutions through effective teaching learning process .
M2	To strengthen the core-competence in computer science and engineering and to create an ability to interact effectively with industries.
M3	To produce engineers with good professional skills, ethical values and life skills for the betterment of the society .
M4	To encourage students towards continuous and higher level learning on technological advancements and provide a platform for employment and self-employment .

Program Educational Objectives (PEOs)

PEO1	To address the real time complex engineering problems using innovative approach with strong core computing skills.
PEO2	To apply core-analytical knowledge and appropriate techniques and provide solutions to real time challenges of national and global society
PEO3	Apply ethical knowledge for professional excellence and leadership for the betterment of the society.
PEO4	Develop life-long learning skills needed for better employment and entrepreneurship

Program Specific Outcomes (PSOs)

PSO1	An ability to understand the core concepts of computer science and engineering and to enrich problem solving skills to analyze, design and implement software and hardware based systems of varying complexity.
PSO2	To interpret real-time problems with analytical skills and to arrive at cost effective and optimal solution using advanced tools and techniques.
PSO3	An understanding of social awareness and professional ethics with practical proficiency in the broad area of programming concepts by lifelong learning to inculcate employment and entrepreneurship skills.

BLOOM TAXANOMY LEVELS(BTL)

BTL1: Creating.,
BTL 2: Evaluating.,
BTL 3: Analyzing.,
BTL 4: Applying.,
BTL 5: Understanding.,
BTL 6: Remembering

SYLLABUS

OBJECTIVES:

The student should be made to:

- Understand the basic concepts of mobile computing
- Be familiar with the network protocol stack
- Learn the basics of mobile telecommunication system
- Be exposed to Ad-Hoc networks
- Gain knowledge about different mobile platforms and application development

UNIT I INTRODUCTION

9

Mobile Computing – Mobile Computing Vs wireless Networking – Mobile Computing Applications – Characteristics of Mobile computing – Structure of Mobile Computing Application. MAC Protocols – Wireless MAC Issues – Fixed Assignment Schemes – Random Assignment Schemes – Reservation Based Schemes.

UNIT II MOBILE INTERNET PROTOCOL AND TRANSPORT LAYER

9

Overview of Mobile IP – Features of Mobile IP – Key Mechanism in Mobile IP – route Optimization. Overview of TCP/IP – Architecture of TCP/IP- Adaptation of TCP Window – Improvement in TCP Performance.

UNIT III MOBILE TELECOMMUNICATION SYSTEM

9

Global System for Mobile Communication (GSM) – General Packet Radio Service (GPRS) – Universal Mobile Telecommunication System (UMTS).

UNIT IV MOBILE AD-HOC NETWORKS

9

Ad-Hoc Basic Concepts – Characteristics – Applications – Design Issues – Routing – Essential of Traditional Routing Protocols – Popular Routing Protocols – Vehicular Ad Hoc networks (VANET) – MANET Vs VANET – Security.

UNIT V MOBILE PLATFORMS AND APPLICATIONS

9

Mobile Device Operating Systems – Special Constrains & Requirements – Commercial Mobile Operating Systems – Software Development Kit: iOS, Android, BlackBerry, Windows Phone – MCommerce – Structure – Pros & Cons – Mobile Payment System – Security Issues.

TOTAL: 45 PERIODS

OUTCOMES:

- At the end of the course, the student should be able to:
- Explain the basics of mobile telecommunication system

- Choose the required functionality at each layer for given application
- Identify solution for each functionality at each layer
- Use simulator tools and design Ad hoc networks
- Develop a mobile application.

TEXT BOOK:

1. Prasant Kumar Pattnaik, Rajib Mall, “Fundamentals of Mobile Computing”, PHI Learning Pvt. Ltd, New Delhi – 2012.

REFERENCES:

1. Jochen H. Schller, “Mobile Communications”, Second Edition, Pearson Education, New Delhi
2. Dharma Prakash Agarval, Qing and An Zeng, "Introduction to Wireless and Mobile systems", Thomson Asia Pvt Ltd, 2005.
3. Uwe Hansmann, Lothar Merk, Martin S. Nicklons and Thomas Stober, “Principles of Mobile Computing”, Springer, 2003.
4. William.C.Y.Lee, “Mobile Cellular Telecommunications-Analog and Digital Systems”, Second Edition, Tata Mc Graw Hill Edition ,2006.
5. C.K.Toth, “AdHoc Mobile Wireless Networks”, First Edition, Pearson Education, 2002.

Course Outcomes (COs)

C310.1	Interpret the basics of mobile telecommunication system.
C310.2	Choose the required functionality of each layer.
C310.3	Identify the solution for the functionality of each layer.
C310.4	Identify and discuss the design of Ad-Hoc Networks.
C310.5	Compare and contrast different mobile platform and outline the various mobile application.

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Unit 2	Jochen H. Schller, “Mobile Communications”, Second Edition, Pearson Education, New Delhi Dharma Prakash Agarval, Qing and An Zeng, "Introduction to Wireless and Mobile systems"	Page 9 -17
Unit 3	Jochen H. Schller, “Mobile Communications”, Second Edition, Pearson Education, New Delhi	Page 18 -22
Unit 4	Jochen H. Schller, “Mobile Communications”, Second Edition, Pearson Education, New Delhi	Page 23 -38
Unit 5	Jochen H. Schller, “Mobile Communications”, Second Edition, Pearson Education, New Delhi C.K.Toth, “AdHoc Mobile Wireless Networks”, First Edition, Pearson Education, 2002.	Page 39 -45

UNIT I

INTRODUCTION

Mobile Computing – Mobile Computing Vs wireless Networking – Mobile Computing Applications – Characteristics of Mobile computing – Structure of Mobile Computing Application. MAC Protocols – Wireless MAC Issues – Fixed Assignment Schemes – Random Assignment Schemes – Reservation Based Schemes.

S. No.	Question	Course Outcome	Blooms Taxonomy
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			Level
1	<p>Distinguish Mobile Computing vs. Wireless Networking <u>APR/MAY 2017, NOV/DEC2017, APR/MAY 2018</u></p> <p>Mobile computing essentially denotes accessing information and remote computational services while, wireless networking provides the basic communication infrastructure necessary to make this possible. Mobile computing is based on wireless networking and helps one to invoke computing services on remote servers while on the move wireless networking is an important ingredient of mobile computing.</p>	C310.1	BTL4
2	<p>What are the two types of wireless networks?</p> <p>Wireless networks can be classified into two basic types. One is an extension of wired networks. It uses fixed infrastructures such as base stations to provide essentially single hop wireless communication with a wired network or a two-hop wireless cellular communication with another mobile</p> <p>The other type of wireless network is an ad hoc network. An ad hoc network does not use any fixed infrastructure and is based on multi-hop wireless communication</p>	C310.1	BTL1
3	<p>Illustrate the objectives of the Bluetooth technology</p> <p>It enable users to easily connect to a wide range of personal computing and telecommunication devices, without the need to buy, carry, or lay outcables. Bluetooth technology enables setting up of personal area networks (PANs) known as piconets and ad hoc networks known as scatternets. It provides opportunities for rapid deployment of ad hoc connections, and the possibility of automatic, transparent connections between devices. It promises to eliminate the need to purchase additional or proprietary cabling and configuration exercises needed to connect the individual devices.</p>	C310.1	BTL2
4	<p>Why “MAC protocol designed for infrastructure based wireless network may not work satisfactory in infrastructure less environment “ – justify? NOV/DEC 2017, APR/MAY 2018</p> <ul style="list-style-type: none"> • Bandwidth Efficiency <ul style="list-style-type: none"> – BW available is very limited – MAC should be designed such that the scarce bandwidth is utilized in an efficient manner • Hidden and Exposed Node Problem • Collision-prone shared channel <ul style="list-style-type: none"> – Multiple nodes may contend for the medium leading to collision – MAC should make sure that collision is minimized 	C310.1	BTL1

	<ul style="list-style-type: none">• Mobility of Nodes• Control information exchanged may become useless due to mobility• MAC performance should be satisfactory when nodes are mobile• Power consumption• QoS support• Critical for real time applications					
5	List the Characteristics of Mobile Computing Ubiquity Location awareness Adaptation Broadcast Personalization	C310.1	BTL1			
6	Explain the Structure of Mobile Computing Application. <table border="1"><tr><td>Presentation (Tier-1)</td></tr><tr><td>Application (Tier-2)</td></tr><tr><td>Data (Tier-3)</td></tr></table>	Presentation (Tier-1)	Application (Tier-2)	Data (Tier-3)	C310.1	BTL5
Presentation (Tier-1)						
Application (Tier-2)						
Data (Tier-3)						
7	What is <i>Presentation tier</i>? The topmost level of a mobile computing application concerns the user interface. A good user interface facilitates the users to issue requests and to present the results to the them meaningfullythe programs at this layer run on the client’s computer. This layer usually includes web browsers and customized client programs for dissemination of information and for collection of data from the user.	C310.1	BTL1			
8	What is <i>Application tier</i>? This layer has the vital responsibility of making logical decisions and performing calculations. It also moves and processes data between the presentation and data layers. It performs the processing of user input, obtaining information and then making decisions. This layer is implemented using technology like Java, .NET services, cold fusion	C310.1	BTL1			
9	What is <i>Data tier</i>? The data tier is responsible for providing the basic facilities of data storage, access, and manipulation. Often this layer contains a database. The information is stored and retrieved from this database	C310.1	BTL1			
10	What is base station? A base station (BS) is located at the centre of each cell. The BS in a cell receives communications from all mobile handsets in the cell and forwards the data to the appropriate handset. Thus, a base station keeps track of the calls of all handsets in its cell.	C310.1	BTL1			

11	What are the Different 1G standards used? AMPS (Advanced Mobile Phone System) in the USA NMT 450 (Nordic Mobile Telephone) in various European countries TACS (Total Access Communications System) in the UK	C310.1	BTL1
12	What is guard band? Frequency band split into five sub-bands (channels). the different channels are adjacent to each other, each channel was separated from the adjacent channels by a spacing of about 30 kHz. This was called a guard band. The use of guard bands was one of the causes of inefficient spectrum usage and resulted in the reduced number of simultaneous calls that could be supported.	C310.1	BTL1
13	What is Hidden and Exposed Terminal problem? <u>MAY/JUNE 2016</u> Hidden and Exposed Terminals Consider the scenario with three mobile phones as shown below. The transmission range of A reaches B, but not C (the detection range does not reach C either). The transmission range of C reaches B, but not A. Finally, the transmission range of B reaches A and C, i.e., A cannot detect C and vice versa. Hidden terminals A sends to B, C cannot hear A C wants to send to B, C senses a “free” medium (CS fails) and starts transmitting Collision at B occurs, A cannot detect this collision (CD fails) and continues with its transmission to B A is “hidden” from C and vice versa Exposed terminals B sends to A, C wants to send to another terminal (not A or B) outside the range C senses the carrier and detects that the carrier is busy. C postpones its transmission until it detects the medium as being idle again but A is outside radio range of C, waiting is not necessary C is “exposed” to B Hidden terminals cause collisions, where as Exposed terminals causes unnecessary delay.	C310.1	BTL1
14	How is GPRS higher than 2G? General Packet Radio Service (GPRS) is an extension of GSM and is considered to be the 2.5 generation technology. it is based on packet switching compared to circuit switching used in 2G. This was a significant improvement over 2G and helped to reduce call costs dramatically. it allows users to remain connected to the Internet without incurring additional charge and supports multimedia capabilities including graphics and video communications.	C310.1	BTL1

15	How is 3G higher than GPRS? The 3G systems support much higher data transmission rates and offer increased bandwidth, which makes them suitable for high-speed data applications as well as for high quality traditional voice calls. The 3G systems can be considered to be purely data networks, since voice signals are converted to digital data	C310.1	BTL1
16	What are the limitations / challenges of mobile computing? <u>NOV/DEC 2016 , NOV/DEC2018</u> Quality of connectivity Security concerns Power Consumption	C310.1	BTL1
17	What are the features / objectives of MAC protocols? <u>NOV/DEC 2018</u> It should implement some rules that help to enforce discipline when multiple nodes contend for a shared channel. It should help maximize the utilization of the channel. Channel allocation needs to be fair. No node should be discriminated against at any time and made to wait for an unduly long time for transmission. It should be capable of supporting several types of traffic having different maximum and average bit rates. It should be robust in the face of equipment failures and changing network conditions.	C310.1	BTL1
18	Categories of wireless networks Wireless networks can be divided mainly into two categories: (a) infrastructure-based wireless networks that include the WLANs, and (b) infrastructure-less wireless networks that include the mobile ad hoc networks (MANETs).	C310.1	BTL4
19	What are categories of MAC protocols? These MAC protocols can be broadly divided into the following three categories: Fixed assignment schemes Random assignment schemes Reservation-based schemes	C310.1	BTL1
20	What are the categories of fixed assignment MAC Frequency Division Multiple Access (FDMA) Time Division Multiple Access (TDMA) Code Division Multiple Access (CDMA)	C310.1	BTL1
21	What is Time Division Multiple Access (TDMA) TDMA is an access method in which multiple nodes are allotted different time slots to access the same physical channel. That is, the timeline is divided into fixed-sized time slots and these are divided among multiple nodes who can transmit.	C310.1	BTL1
22	What is CDMA In CDMA, multiple users are allotted different codes that consist of sequences of 0 and 1 to access the same channels. A special coding scheme is used that allows signals from multiple users to be	C310.1	

	multiplexed over the same physical channel.		BTL1
23	How to distinguish transmission from different nodes Two vectors are said to be orthogonal if their inner product = 0. Let p and q be two vectors and suppose p = (2, 5, 0) and q = (0, 0, 17), then the inner product of pq = (20+50+017) = 0. For good autocorrelation, binary 0 is represented as -1 and binary 1 is represented as +1. Let the binary sequence be 1001, then the representation sequence is +1-1-1+1.	C310.1	BTL61
24	What is Pseudorandom sequence generator To generate a series of pseudorandom numbers, a seed (or starting point) is required. Based on the selected seed, the next number can be generated using a deterministic mathematical transformation or can be generated probabilistically. In CDMA, a code actually denotes a starting point (seed) for a pseudorandom sequence generator (PRSG). PRSG generates a series of bits at a frequency which is much higher than the actual user data (such as digitized voice). These bits are XORd with the user data and subsequently the results are transmitted.	C310.1	BTL1
25	What is the random assignment schemes that are used in MAC protocols. <u>NOV/DEC 2016, APR/MAY 2017</u> ALOHA Slotted ALOHA CSMA CSMA/CD CSMA/CA	C310.1	BTL1
26	What is slotted ALOHA? An improvement over the pure ALOHA scheme is the slotted ALOHA. In the slotted ALOHA scheme, the chances of collisions are attempted to be reduced by enforcing the following restrictions. The time is divided into equal-sized slots in which a packet can be sent. Thus, the size of the packet is restricted.	C310.1	BTL1
27	Why the CSMA/CD technique, the sender starts to transmit if it senses the channel to be free. But, even if it senses the channel to be free, there can be a collision why? In a wired network, the implementation of a collision detection scheme is simple. However, in a wireless network it is very difficult for a transmitting node to detect a collision, since any received signal from other nodes would be too feeble compared to its own signal and can easily be masked by noise. As a result, a transmitting node would continue to transmit the frame, and only the destination node would notice the corrupted frame after it computes the checksum. This leads to retransmissions and severe wastage of channel utilization.	C310.1	BTL1
28	Define MACA: MACA stands for Multiple Access Collision Avoidance. MACA solves the hidden/exposed terminal problems by regulating the	C310.1	

	transmitter power. A node running MACA requests to use the medium by sending an RTS to the receiver. Since radio signals propagate omni-directionally, every terminal within the sender's radio range will hear this and then refrain from transmitting. As soon as the receiver is ready to receive data, it responds with a CTS.		BTL1
29	What are the two broad categories of MAC protocols for ad hoc networks. ? There are essentially two broad categories of MAC protocols for ad hoc networks. The first category controls shared medium access by letting terminals compete asynchronously. In this protocol, every node is free to transmit any time. But upon detection of a collision, the access arbitration policy is invoked to avoid the collision. The second type of MAC protocol divides the medium into channels so that each competing node uses a different channel, thereby avoiding collisions. One way to achieve this is by dividing the transmission time (slots), and inserting a frequency band between terminals and requiring them to synchronize in order to ensure that they never use the same slot, frequency or code.	C310.1	BTL1
30	List the advantages of mobile computing? <u>MAY/JUNE 2016</u> Increase in Productivity- Mobile devices can be used out in the field of various companies, therefore reducing the time and cost for clients and themselves. Entertainment- Mobile devices can be used for entertainment purposes, for personal and even for presentations to people and clients. Portability- this would be one of the main advantages of mobile computing, you are not restricted to one location in order for you to get jobs done or even access email on the go Cloud Computing- This service is available for saving documents on a online server and being able to access them anytime and anywhere when you have a connection to the internet and can access these files on several mobile devices or even PCs at home.	C310.1	BTL1
31	Name some of the disadvantages of WLANS? Quality of service, Proprietary solutions, Restrictions, Safety and Security	C310.1	BTL1
32	What Agent-based Computing An agent is any program that acts on behalf of a (human) user. A software mobile agent is a process capable of migrating from one computer node to another.	C310.1	BTL1
33	What is Communication? Communication is a two-way transmission and reception and reception of data streams. Transmissions are of two types, Guided Transmission Unguided Transmission.	C310.1	BTL1
34	List out the Components of a wireless communication system? Transmitter, receiver, filter, antenna, amplifier, mixers.	C310.1	BTL1
35	What are the different types of modulation ? The Modulation types are: i).Amplitude Modulation. ii).Frequency	C310.1	BTL1

	Modulation. iii).Phase Modulation.		
36	What is the aim of ubiquitous computing? <ul style="list-style-type: none"> The aim of ubiquitous computing is to design computing infrastructures in such a manner that they integrate seamlessly with the environment and become almost invisible. Present Everywhere Bringing mobile, wireless and sensor Ubiquitous computing (ubicomp) integrates computation into the environment, rather than having computers which are distinct objects. 	C310.1	BTL1
37	List out types of Wireless Devices? Laptops Palmtops PDAs Cell phones	C310.1	BTL1
38	What is Client-Server Computing ? An architecture in which the client is the requesting machine and the server is the supplying machine. The client contains the user interface and may perform some or all of the application processing.	C310.1	BTL1
39	What are the basic tasks of the MAC layer? Medium access Fragmentation of user data Encryption	C310.1	BTL1
40	Define Mobile Binding? A binding created for providing mobility to a mobile node after registration at a foreign network.	C310.1	BTL1
41	What do you mean by Digital Signature? Digital signatures are used to enable verification of the records. A DSA (Digital Structure Algorithm) is used to sign a record before transmitting. It provides for a variable key length of maximum 512 Or 1024 bits. The DSS(Digital Signature Standard) is based on the DSA. Signatures enable identification of the sender identify the orgin of the message, and check message integrity.	C310.1	BTL1
42	What are the different types of mobile Middleware? 1.Adaptation 2.Agent	C310.1	BTL1
43	What are the logical channels in GSM? <ul style="list-style-type: none"> Traffic channel(TCH) Control channel(CCH) 	C310.1	BTL1
44	What are the disadvantages of small cells? a) Infrastructure b) Handover c) Frequency	C310.1	BTL1
45	What are the characteristics of mobile computing devices? <ul style="list-style-type: none"> Adaptation Data dissemination and Management Heterogeneity Interoperability Context awareness 	C310.1	BTL1
46	What are the key constraints of mobile computing? <ul style="list-style-type: none"> unpredictable variation in network quality lowered trust and robustness of mobile elements 	C310.1	BTL1

47	Define the term wireless? Wireless telecommunications refers to the transfer of information between two or more points that are not physically connected. Distances can be short, such as a few metres for television remote control, or as far as thousands or even millions of kilometers for deep-space radio communications. It encompasses various types of fixed, mobile, and portable applications, including two-way radios, cellular telephones, personal digital assistants (PDAs), and wireless networking.	C310.1	BTL1
48	What is Mobility? <ul style="list-style-type: none"> • A person who moves Between different geographical locations Between different networks Between different communication devices Between different applications • A device that moves Between different geographical locations Between different networks 	C310.1	BTL1
49	Find out the characteristics while device can thus exhibit during communication. Fixed and Wired Mobile and Wired Fixed and Wireless Mobile and Wireless	C310.1	BTL1
50	Give the difference between the network 1G,2G,2.5G,3G mobile communication? 1G - Voice-only communication. 2G – Communicate voice as well as data signals. 2.5G – Enhancements of the second generation and sport data rates up to 100 kpbs. 3G – Mobile devices communicate at even higher data rates and support voice, data , and multimedia streams. High data rates in 3G devices enable transfer of video clips and faster multimedia communication.	C310.1	BTL1
PART B			
1	Explain hidden and exposed terminal problem and near and far terminal problem(Pg no:48) <u>APR/MAY 2017 , NOV/DEC 2017, NOV/DEC2018</u>	C310.1	BTL5
2	Explain the various taxonomy of MAC Protocols. Differentiate various schemes. (pg.no 51) <u>MAY/JUNE 2016 , NOV/DEC 2016 ,APR/MAY 2017,NOV/DEC 2017</u>	C310.1	BTL5
3	Explain the distinguishing features of various generations of wireless networks.(Pg-18) <u>NOV/DEC 2016</u>	C310.1	BTL5
4	Explain MAC Issues (Pg No:48) <u>APR/MAY 2017</u>	C310.1	BTL5
5	Explain the structure, characteristics, Applications of mobile computing? (pg-27) <u>MAY/JUNE 2016, NOV/DEC 2016 , APR/MAY 2017,NOV/DEC 2017, APR/MAY 2018</u>	C310.1	BTL5

6	Distinguish wireless LAN and wired LAN. (Pg. 32)	C310.1	BTL4
7	Explain the Bluetooth technology (Pg. 16)	C310.1	BTL5
8	Apply mobile computing to design taxi dispatcher and monitoring service. Explain the components in detail.(notes) <u>APR/MAY 2018</u>	C310.1	BTL3
9	What is CSMA? What are the categories of CSMA? Explain their working with advantage and disadvantage.(Pg. 33) <u>APR/MAY 2018</u>	C310.1	BTL1
10	Explain the various schemes of MAC protocol(pg.no 51)	C310.1	BTL5
11	List out the applications of Mobile computing? (Pg-29)	C310.1	BTL1
12	Explain the issues in wireless MAC(Pg no:48)	C310.1	BTL5
13	Expalin about FDMA and TDMA schemes (Pg. 33)	C310.1	BTL5
14	Explain the structure of Mobile computing? (Pg. 28)	C310.1	BTL5
15	Explain 1G,2G and 3G of wireless network? (Pg. 18)	C310.1	BTL5
16	Describe the various random assignment schemes used in MAC protocol <u>NOV/DEC 2018</u>	C310.1	BTL5
17	Discuss the various Reservation based schemes in MAC protocol <u>NOV/DEC 2018</u>	C310.1	BTL5

UNIT II

MOBILE INTERNET PROTOCOL AND TRANSPORT LAYER

Overview of Mobile IP – Features of Mobile IP – Key Mechanism in Mobile IP – route Optimization. Overview of TCP/IP – Architecture of TCP/IP- Adaptation of tCP Window – Improvement in TCP Performance.

S. No	Question	Course Outcome	Blooms Taxonomy Level
1	<p>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?</p> <p>IP is responsible for routing a packet to any host, connected to the</p>		

	<p>Internet, uniquely identified by an assigned IP address. The nodes in the LAN are assigned an address based on the LAN address.</p> <p>In the traditional IP addressing scheme, when a host moves to a different location, it may move to another network. As a result, it needs to change its IP address.</p> <p>The mobile IP allows mobile computers to stay connected to the Internet regardless of their location and without changing their IP address.</p> <p>The traditional IP does not support user mobility. Mobile IP was created by extending IP to enable users to keep the same IP address while travelling to a different network.</p>	C310.2	BTL1
2	<p>List the limitations of IPv4 and how are they overcome by IPv6.</p> <p>It would not be able to support the enormous number of users that are expected to use Internet in a couple of years. Also IP does not distinguish among the different applications, and treats all applications equally. A streaming video requires that video frames be transmitted without delay jitters, whereas applications such as e-mail can tolerate considerable delay. This needed the development of a new version of IP called Internet Protocol version 6 (IPv6) and also sometimes referred to as IP Next Generation or IPng.</p>	C310.2	BTL1
3	<p>3. Mention the following terms associated with mobile IP:</p> <p>Home Network: The home network of a mobile device is the network within which the device receives its identifying IP address (home address). In other words, a home network is a subnet to which a mobile node belongs to as per its assigned IP address. Within the home network, there is no need of mobile IP.</p> <p>Home Address (HA): The home address of a mobile device is the IP address assigned to the device within its home network. The IP address on the current network is known as home address.</p> <p>Foreign Agent (FA): The foreign agent is a router in a foreign network that functions as the point of attachment for a mobile node when it roams to the foreign network. The packets from the home agent are sent to the foreign node which delivers it to the mobile node.</p> <p>Foreign Network: The foreign network is the current subnet to which the mobile node is visiting. It is different from home network. In other words, a foreign network is the network in which a mobile node is operating when away from its home network.</p>	C310.2	BTL4

	<p>Correspondent Node (CN): The home agent is a router on the home network serving as the anchor point for communication with the mobile node. It tunnels packets from a device on the Internet, called a correspondent node (CN), to the roaming mobile node.</p> <p>Care-of-Address (COA): It is the address that is used to identify the present location of a foreign agent. The packets sent to the MN are delivered to COA.</p> <p>The COA can be any of the following two types:</p> <p>(a) <i>Foreign agent COA:</i> The COA is an IP address of foreign agent (FA).</p> <p>(b) <i>Co-located COA:</i> When the mobile node (MN) acquires a temporary IP address, that address acts as the COA.</p> <p>Home Agent (HA): It is located in home network and it provides several services for the MN. HA maintains a location registry. The location registry keeps track of the node locations using the current care-of-address of the MN.</p>		
4	<p>List the discovery of care-of-address in the context of movement of a mobile to a foreign network.</p> <p>The discovery of the care-of-address consists of four important steps.</p> <ol style="list-style-type: none"> 1. Mobile agents advertise their presence by periodically broadcasting the <i>agent advertisement</i> messages. 2. The mobile node receiving the <i>agent advertisement</i> message observes whether the message is from its own home agent and determines whether it is on the home network or on a foreign network. Foreign agents send messages to advertise the available care-of addresses. If a mobile host has not heard from the foreign agent to which its current care-of-address belongs, it takes up another care-of-address. 3. If a mobile node does not wish to wait for the periodic advertisement, it can send out <i>agent solicitation</i> messages that will be responded to by a mobility agent. 	C310.2	BTL1
5	<p>list the agent advertisement procedure of mobile IP.</p> <p>Foreign agents send messages to advertise the available care-of addresses.</p> <ul style="list-style-type: none"> • Home agents send advertisements to make themselves known. • Mobile hosts can issue agent solicitations to actively seek information. • If a mobile host has not heard from the foreign agent to which its 	C310.2	BTL1

	current care-of-address belongs, it takes up another care-of-address.		
6	<p>What do you mean by agent solicitation? Why are agent advertisement messages needed? <u>APR/MAY 2018</u></p> <p>In case a mobile node (MN) does not receive any COA, then the MN should send an agent solicitation message. But it is important to monitor 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 as it enters a new network. The basic purpose of the solicitation messages sent by a mobile node (MN) is to search for a foreign agent (FA).</p>	C310.2	BTL1
7	<p>Differentiate the functionalities of a foreign agent & Home agent? <u>NOV/DEC2017</u></p> <p>Home Agent (HA): It is located in home network and it provides several services for the MN. HA maintains a location registry. The location registry keeps track of the node locations using the current care-of-address of the MN.</p> <p>Foreign Agent (FA): The foreign agent is a router in a foreign network that functions as the point of attachment for a mobile node when it roams to the foreign network. The packets from the home agent are sent to the foreign node which delivers it to the mobile node.</p>	C310.2	BTL4
8	<p>What do you mean by encapsulation and decapsulation in the context of mobile IP? Explain why these are needed. <u>MAY/JUNE 2016</u></p> <p>Encapsulation refers to arranging a packet 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.</p> <p>Whenever a packet is sent from a higher protocol layer to a lower protocol layer, the operations of encapsulation and decapsulation usually take place. The packet is encapsulated by a new header that is placed in front of the existing IP header. The encapsulated packet is tunneled to the COA, which act as the new destination address and the HA acts as the source address of the packet. The MN after receiving the packet from CN, forwards a reply packet to the CN by specifying its own IP address along with the address of the CN</p>	C310.2	BTL1
9	<p>What do you mean by Binding request and Binding acknowledgement?</p> <p>Binding request: If a node wants to know the current location of a mobile node (MN), it sends a request to home agent (HA).</p> <p>Binding acknowledgement: On request, the node will return an acknowledgement message after getting the binding update message.</p>	C310.2	BTL1
10	<p>What is binding update and binding warning?</p> <p>Binding update: This is a message sent by HA to CN mentioning the correct location of MN. The message contains the fixed IP address of the mobile node and the care-of-address. The binding update can</p>	C310.2	BTL1

	<p>request for an acknowledgement.</p> <p>Binding warning: If a node decapsulates a packet for a mobile node (MN), but it is not the current foreign agent (FA), then this node ends a binding warning to the home agent (HA) of the mobile node (MN).</p>		
11	<p>What is tunneling process?</p> <p>The packet is forwarded by the home agent to the foreign agent. When the packet comes to the foreign agent (care-of-address), it delivers the packet to the mobile node. This process is called <i>tunneling</i>. Tunneling has two primary functions: encapsulation of the data packet to reach the tunnel endpoint, and decapsulation when the packet is delivered at that endpoint.</p>	C310.2	BTL1
12	<p>What are the layers of TCP/IP protocol stack?</p> <p>The four layers of the protocol are:</p> <p>Application layer-messages</p> <p>Transport layer-segments and additional information</p> <p>Internet layer-packets and destination host address</p> <p>Network interface layer-frames and adds checksum</p>	C310.2	BTL1
13	<p>What is TCP</p> <p><i>(Transmission Control Protocol):</i> On the sending side, TCP is responsible for breaking a message into small parts, adding sequence numbers and certain other information and after this, making them known as segments. TCP passes the segments to the lower layer protocol for transmission over the network. While at the receiver's end, TCP assembles the segments when they arrive and reconstructs the message.</p> <p>IP <i>(Internet Protocol):</i> At the host machine of an application sending a message, IP is responsible for constructing packets (also called datagrams) from the segments it receives from the transport layer protocol by adding the destination host address and then passes these on to the lower layer protocol for transmitting. On the receiver's side, it deconstructs the segments and then passes these to the transport layer protocol.</p>	C310.2	BTL1
14	<p>What is HTTP</p> <p><i>(Hyper Text Transfer Protocol):</i> The HTTP protocol is used for communications between a web server and the client-side application running on a web browser.</p> <p>SMTP <i>(Simple Mail Transfer Protocol):</i> The SMTP protocol is used for sending and receiving e-mails by a mail client.</p>	C310.2	BTL1
15	<p>What is MIME</p> <p><i>(Multipurpose Internet Mail Extensions):</i> The MIME protocol lets the SMTP encode multimedia files such as voice, picture, and binary data in e-mails and transmit them across TCP/IP networks. SMTP has been designed to handle only the text contents in e-mails. MIME helps e-</p>	C310.2	BTL1

	<p>mails to include non-text contents such as picture, voice, and binary data files by encoding the binary data in the ASCII text format.</p> <p>FTP (File Transfer Protocol): The FTP protocol is used to transfer files between the computers.</p>		
16	<p>What is SNMP <i>(Simple Network Management Protocol):</i> The SNMP protocol is used for administration and management of computer networks. The network manager uses tools based on this protocol to monitor network performance.</p> <p>ICMP (Internet Control Message Protocol): The ICMP protocol runs on all hosts and routers and is mainly used for reporting errors such as a non reachable host.</p>	C310.2	BTL1
17	<p>What is ARP <i>(Address Resolution Protocol):</i> The ARP protocol is used by IP to find the hardware address (also called the physical address) of a computer based on its IP address. The hardware (physical) address is stored in the ROM (Read Only Memory) of the computer's network interface card. It is also known as MAC (Media Access Control) address and also as an Ethernet hardware address (EHA).</p> <p>RARP (Reverse Address Resolution Protocol): The RARP protocol is used by IP to find the IP address based on the physical (MAC address) address of a computer.</p> <p>BOOTP (Boot Protocol): The BOOTP protocol is used for booting (starting) a diskless computer over a network. Since a diskless computer does not store the operating system program in its permanent memory, the BOOTP 82 <i>Fundamentals of Mobile Computing</i> protocol helps to download and boot over a network, using the operating system files stored on a server located in the network</p>	C310.2	BTL1
18	<p>What is DNS It stands for Domain Name System (or Service or Server). It is a software service available on the Internet that is responsible for translating domain names into IP addresses. DNS service hosted on the Internet translates the domain name into the corresponding IP address, since, after all, the Internet works using IP addresses.</p> <p>IGMP (Internet Group Management Protocol): The IGMP protocol is used by hosts to exchange information with their local routers to set up multicast groups. A setup of multicast groups allows efficient communication, especially for video streams and certain gaming applications. The routers also use the IGMP to check whether the</p>	C310.2	BTL1

	members of a known group are active or not.																						
19	What is DHCP? MAY/JUNE 2016, APR/MAY 2018 The Dynamic Host Configuration Protocol (DHCP) is a standardized network protocol used on Internet Protocol (IP) networks. The DHCP protocol is controlled by a DHCP server that dynamically distributes network configuration parameters, such as IP addresses, for interfaces and services.	C310.2	BTL1																				
20	What is Simple Mail Transfer Protocol (SMTP) It provides an 'electronic mail' function, that is used for transferring messages between different hosts. Originally, SMTP could handle text messages only. MIME helps transmit multimedia data within an e-mail by encoding the binary multimedia data in the ASCII format. File Transfer Protocol (FTP): FTP is mainly used for transferring files from one host to another based on a user command. FTP allows both binary and text file transfers. Each FTP connection opens two TCP connections, one for data transfer and the other for transfer of control commands such as put, get, etc.	C310.2	BTL1																				
21	What is IP datagram? An IP packet is also called a datagram. A datagram is of variable length which can be up to 65,536 bytes. It has two fields, namely header and data. <table border="1" data-bbox="253 1003 1068 1323"> <tr> <td>Version</td><td>HLen</td><td>Service</td><td>Total Length</td></tr> <tr> <td colspan="2">Identification</td><td>Flags</td><td>Fragment Offset</td></tr> <tr> <td>Time to Live</td><td>Protocol</td><td colspan="2">Header Checksum</td></tr> <tr> <td colspan="4">Source Address</td></tr> <tr> <td colspan="4">Destination Address</td></tr> </table> <p style="text-align: center;">Figure 5.4 IP datagram structure.</p>	Version	HLen	Service	Total Length	Identification		Flags	Fragment Offset	Time to Live	Protocol	Header Checksum		Source Address				Destination Address				C310.2	BTL1
Version	HLen	Service	Total Length																				
Identification		Flags	Fragment Offset																				
Time to Live	Protocol	Header Checksum																					
Source Address																							
Destination Address																							
22	Differentiate TCP/IP versus ISO/OSI Model: The Internet layer in TCP/IP roughly corresponds to the network layer of the ISO/OSI model. The network access layer encompasses the data link and physical layers. The TCP/IP protocol suite does not define specific data link layer protocols to be used and can work on any data link protocol such as token ring and Ethernet.	C310.2	BTL4																				
23	What is meant by Slow Start? TCP's reaction to a missing acknowledgement is quite drastic, but necessary to get rid of congestion fast enough. The behavior of TCP shows after the detection of congestion is called slow start.	C310.2	BTL4																				

24	<p>List the Advantages of I-TCP:</p> <ul style="list-style-type: none"> •I-TCP does not require any changes in the TCP protocol as used by the hosts in the fixed network or other hosts in a wireless network that do not use this optimization. •Without partitioning retransmission of lost packets would take place between mobile host and correspondent host across the whole network. •Optimization of new mechanisms is quite simple to be done in I-TCP as they only cover a single hop. •The short delay between the mobile host and foreign agent can be determined and is independent of other traffic streams. Therefore an optimized TCP can use precise time-outs to guarantee retransmission as fast as possible. •Partitioning into two connections also allows the use of a different transport layer protocol between the foreign agent and the mobile host or the use of compressed headers etc. The foreign agent can act as a gateway to translate between different protocols. 	C310.2	BTL1
25	<p>List the use of BOOTP protocol. NOV/DEC 2016</p> <p>The Bootstrap Protocol (BOOTP) is a computer networking protocol used in Internet Protocol networks to automatically assign an IP address to network devices from a configuration server. The BOOTP was originally defined in RFC 951.</p>	C310.2	
26	<p>What is called the exponential growth of the congestion window?</p> <p>The sender always calculates congestion window for a window start size of the congestion window is one segment. Sender sends one packet and waits for acknowledgement. If acknowledgement arises it raises the level of congestion window by one. If sender sends two packets if acknowledgement arises it raises the level of congestion window by two. This scheme raises the level of congestion window every time the acknowledges come back, which takes roundtrip time (RTT).</p>	C310.2	BTL1
27	<p>List the modification in single & multi hop wireless network? APR/MAY 2017</p> <p>Single hop network</p> <p>In a single hop network , when a packet leaves the source it just takes a single hop (goes through another network or you can say it passes through another router from a different network) before reaching its destination address.</p> <p>Multi-hop network</p> <p>In a multi-hop network a packet has to go through 2 or more networks in order to reach its destination address.</p> <p>While taking a hop through a different network a packet may go through various devices like Routers, network bridges, switches, etc...</p>	C310.2	BTL1
28	<p>which layer do each of the following protocols belong to? What is</p>	C310.2	

	<p>their functionality? <u>NOV/DEC2017</u></p> <p>1. RARP – Internet layer RARP (Reverse Address Resolution Protocol): The RARP protocol is used by IP to find the IP address based on the physical (MAC address) address of a computer.</p> <p>2. DNS – Application layer .It stands for Domain Name System (or Service or Server). It is a software service available on the Internet that is responsible for translating domain names into IP addresses. DNS service hosted on the Internet translates the domain name into the corresponding IP address, since, after all, the Internet works using IP addresses.</p>		BTL1
29	<p>Define COA? <u>NOV/DEC 2016</u></p> <p>Care-of-Address (COA): It is the address that is used to identify the present location of a foreign agent. The packets sent to the MN are delivered to COA.</p> <p>The COA can be any of the following two types:</p> <p>(a) <i>Foreign agent COA:</i> The COA is an IP address of foreign agent (FA).</p> <p>(b) <i>Co-located COA:</i> When the mobile node (MN) acquires a temporary IP address, that address acts as the COA.</p>	C310.2	BTL1
30	<p>What is Route Optimization? <u>APR/MAY 2017</u></p> <p>Route optimization enables the datagrams to be routed directly in both directions. Route optimization also provides support for smooth handoffs by letting the previous foreign agent tunnel datagrams to mobile node's current location.</p>	C310.2	BTL1
31	<p>What is MOT? Give its primary goal.</p> <p>DAB faces a broad range of different receiver capabilities. So to solve this problem it defines a common standard for data transmission, the multi-media object transfer (MOT) protocol. The primary goal of MOT is the support of data formats used in other multi- media systems</p>	C310.2	BTL1
32	<p>What is SUMR?</p> <p>An important register in satellite networks is the satellite user mapping register (SUMR). This stores the current position of satellites and a mapping of each user to the current satellite through which communication with a user is possible.</p>	C310.2	BTL1
33	<p>Define ISR?</p> <p>Interrupt Service Routine(ISR): A program unit (function, method, or subroutine) which runs when a hardware or software event occurs and running of which can be masked and can be prioritized by assigning a priority.</p>	C310.2	BTL1
34	<p>Define IST?</p> <p>Interrupt Service Thread(IST): A special type of ISR or ISR unit (function, method , or subroutine) which initiates and runs on an event and which can be prioritized by assigning a priority.</p>	C310.2	BTL1

35	Define TCP header. A header used in the TCP protocol; it consists of fields in five 32-bit words followed by words for the option fields and padding.	C310.2	BTL1
36	What are the characteristics of 2.5G/3.5G wireless networks? Data rates Latency Jitter Packet loss	C310.2	BTL1
37	What are the configuration parameters to adapt TCP to wireless environments? Large Windows Limited Transmit Large MTU Selective Acknowledgement Explicit Congestion Notification Timestamp No header compression	C310.2	BTL1
38	What are the applications of satellites? Weather forecasting Radio and TV broadcast Military satellites Satellites for navigation	C310.2	BTL1
39	List the full form for the following: a) CKSN b) EIR c) DTMF d) MOC a) CKSN- Ciphering key sequence number b) EIR- Equipment Identity Register c) DTMF- Dual Tone multiple frequency d) MOC- Mobile originated call	C310.2	BTL1
40	What is decapsulation? The reverse operation, taking a packet out of the data part of another packet, is called decapsulation	C310.2	BTL1
41	List the two basic reasons for a handover in GSM. The mobile station moves out of the range of a BTS or a certain antenna of a BTS. The received signal level decreases continuously until it falls below the minimal requirements for communication. The error rate may grow due to interference. All these effects may diminish the quality of the radio link. The wired infrastructure may decide that the traffic in one cell is too high and shift some MS to other cells with a lower load. Handover may be due to load balancing.	C310.2	BTL1
42	Differentiate GSM and DECT. GSM DECT 1. Global systems for mobile communications 2. Digital enhanced cordless telecommunications 3. Range is up to 70km. 4. Range is limited to about 300m	C310.2	BTL4
43	Define T-TCP? A protocol which is efficient and is used in situations where short messages are to be sent in sequence and a packet is delivered after the SYN and SYN_ACK packet exchanges and the connection closes after the packet exchanges of FIN, FIN_ACK, and CLOSING.	C310.2	BTL1
44	What are the features of TCP? The main features of TCP are: 1) Transmission as data Streams 2)	C310.2	BTL1

	Buffering and retransmission 3)Session-start, data transfer, and session-finish fully acknowledged end to end. 4)In-order delivery 5)Congestion Control and avoidance		
45	What are the characteristics of 2.5G/3.5G wireless networks? Data rates Latency Jitter Packet loss	C310.2	BTL1
46	What do you mean by mobility binding? The Mobile Node sends its registration request to the Home Agent. The HA now sets up a mobility binding containing the mobile node's home IP address and the current COA.	C310.2	BTL1
47	Define a tunnel. A tunnel establishes a virtual pipe for data packets between a tunnel entry and a tunnel endpoint. Packets entering a tunnel are forwarded inside the tunnel and leave the tunnel unchanged.	C310.2	BTL1
48	What are the functions which support service and connection control? Access point control function Call control and connection control function Network security agent Service control function Mobility management function	C310.2	BTL1
49	What are the examples for service scenarios identified in WATM ? Office environments Universities, schools, training, centres Industry Hospitals Home Networked vehicle	C310.2	BTL1
50	What led to the development of Indirect TCP? TCP performs poorly together with wireless links TCP within the fixed network cannot be changed. ,This led to the development of I-TCP which segments a TCP connection into a fixed part and a wireless part	C310.2	BTL1
51	What is the purpose of HLR? <u>NOV/DEC 2018</u> The Home Location Register (HLR) is the main database of permanent subscriber information for amobile network. The HLR is an integral component of CDMA (code division multiple access), TDMA (time division multiple access), and GSM (Global System for Mobile communications) networks.	C310.2	BTL1
52	What is the key mechanism in Mobile IP? <u>NOV/DEC 2018</u> Discovering the care-of-address Registering the care-of-address Tunneling the care-of-address	C310.2	BTL1
<u>PART B</u>			
1	Explain the key mechanism of mobile IP with the help of a suitable schematic diagram and by using suitable examples. What are the disadvantages of mobile IP?(Pg no:68) <u>NOV/DEC 2016</u>	C310.2	BTL5

2	Illustrate packet delivery mechanism in Mobile IP network with neat diagram? (Pg no:68) <u>APR/MAY 2017 ,NOV/DEC 2017</u>	C310.2	BTL2
3	comparison of various TCP advantages and disadvantages in wireless networking? (Pg no:92) <u>NOV/DEC 2016</u>	C310.2	BTL4
4	What are the main functions of DHCP? Why is DHCP needed? Can it be used when nodes are mobile? Explain your answer. Explain how mobile IP is different from DHCP. State some applications of DHCP.(Pg no:74) <u>MAY/JUNE 2016</u>	C310.2	BTL1
5	Explain the various improvements in TCP performance with diagram? How does it maintains end to end semantics?(Pg no:90) <u>MAY/JUNE 2016 , NOV/DEC 2017, APR/MAY 2018</u>	C310.2	BTL5
6	Explain IP-in-IP , minimal IP and GRE encapsulation methods? (Pg no:67) <u>MAY/JUNE 2016, APR/MAY 2017</u>	C310.2	BTL5
7	Explain the Architecture of TCP/IP? (Pg no:82) <u>MAY/JUNE 2016</u>	C310.2	BTL5
8	Explain Indirect TCP(I-TCP) with the help of suitable diagram(Pg no:85) <u>APR/MAY 2018, NOV/DEC2018</u>	C310.2	BTL5
9	Explain the agent discovery process in Mobile IP(Pg no:74) <u>APR/MAY 2018</u>	C310.2	BTL5
10	Explain about adaptation of TCP window(Pg no:90) <u>APR/MAY 2018</u>	C310.2	BTL5
11	Why the traditional IP cannot be used in the mobile network?IN what way does mobile IP support mobile Hubs? (Pg no:70) <u>NOV/DEC 2018</u>	C310.2	BTL5
12	Explain about the various TCP algorithms (Pg no:93)	C310.2	BTL5
13	Explain mobile IP requirements and terminologies <u>NOV/DEC2018</u> (Pg no:68)	C310.2	BTL5
14	Explain tunneling and encapsulation in detail (Pg no:67)	C310.2	BTL5
15	Explain what is the reaction of standard TCP in case of packet loss? In what situation does this reaction make sense and why is it quite often problematic in the case of wireless network and mobility? <u>NOV/DEC2018</u> (Pg no:85)	C310.2	BTL5

UNIT III

MOBILE TELECOMMUNICATION SYSTEM

Global System for Mobile Communication (GSM) – General Packet Radio Service (GPRS) – Universal Mobile Telecommunication System (UMTS).

S. No.	Question	Course Outcome	Blooms Taxonomy Level
1	List GSM services? Bearer services Tele services Supplementary services	C310.3	BTL1
2	What are the entities of operation sub system (OSS)? Operation and maintenance center Authentication center Equipment Identity Register	C310.3	BTL1
3	List out the different interfaces present in GSM? A interface A _{bis} interface O interface	C310.3	BTL1
4	List out the different subsystems of GSM? <u>NOV/DEC 2018</u> Radio sub system (RSS) Network and switching subsystem (NSS) Operation subsystem (OSS).	C310.3	BTL1
5	What is a BTS? The BTS Base Transceiver Station houses the radio transceivers that define a cell. It handles radio-link protocols with the Mobile Station and it record the Speech and data transmissions from the MS.	C310.3	BTL1
6	What is a SIM? The SIM is subscriber identity module, which stores all user-specific data that is relevant to GSM. User-specific mechanisms like charging and authentication are based on the SIM.	C310.3	BTL1
7	What is HLR? <u>NOV/DEC 2018</u> The home location register is a database used for mobile user information management. An HLR record consists of three types of information Mobile station information Location information Service information	C310.3	BTL1
8	What is IMEI?	C310.3	BTL1

	The IMEI is international mobile equipment identity number and which is used to identify the Mobile Station (MS).		
9	What is VLR overflow? The VLR associated to each MSC is a dynamic database which stores all important information needed for the MS users currently in the LA that is associated to the MSC. If a new MS comes into an LA the VLR is responsible for, it copies all relevant information for this user from the HLR	C310.3	BTL1
10	What is Authentication Center (AUC)? The Authentication Center is mainly used for security. The AUC contains the algorithms for authentication as well as the keys for encryption and generates the values needed for user authentication in the HLR	C310.3	BTL1
11	What is multicasting? <u>NOV/DEC2016</u> Multicasting is the networking technique of delivering the same packet simultaneously to a group of clients. In this case there is may be one or more senders, and the information is distributed to a set of receivers (there may be no receivers or any other number of receivers).	C310.3	BTL1
12	What is a Mobile Services switching center (MSC)? MSCs are high-performance digital ISDN switches. They set up connections to other MSCs and to the BSCs via the A interface, and form the fixed backbone network of a GSM system. Typically, an MSC manages several BSCs in a geographical region. A gateway MSC (GMSC) has additional connections to other fixed networks, such as PSTN and ISDN .	C310.3	BTL1
13	List GSM Network management functions? BSS function for BSS management HLR function for HLR management VLR function for VLR management, MSC function, AUC function, Call recording function.	C310.3	BTL1
14	Define Handoff. What are its types? <u>NOV/DEC2017</u> A handoff refers to the process of transferring an active call or data session from one cell in a cellular network to another or from one channel in a cell to another. A well-implemented handoff is important for delivering uninterrupted service to a caller or data session user. <ul style="list-style-type: none"> • Hard Handoff: Characterized by an actual break in the connection while switching from one cell or base station to another. The switch takes place so quickly that it can hardly be noticed by the user. Because only one channel is needed to serve a system designed for hard handoffs, it is the more affordable option. It is also sufficient for services that can allow slight delays, such as mobile broadband Internet. • Soft Handoff: Entails two connections to the cell phone from two different base stations. This ensures that no break ensues during the handoff. Naturally, it is more costly than 	C310.3	BTL1

	a hard handoff.		
15	What are the information in SIM? <u>APR/MAY 2018</u> Card type, serial no., list of subscribed services Personal identity number Pin unlocking key, Authentication key	C310.3	BTL1
16	What is IMSI? IMSI is the unique subscriber identity that identifies the HLR of the MSI. TMSI (temporary mobile subscriber identity) is used to avoid sending the IMSI on the radio path.	C310.3	BTL1
17	List three important features of GSM security? <u>MAY/JUNE 2016</u> Authentication Confidentiality Anonymity	C310.3	BTL1
18	What are the four types of handover available in GSM? <ul style="list-style-type: none"> • Intra cell handover • Inter cell intra BSC handover • Inter BSC Intra MSC handover • Inter MSC handover 	C310.3	BTL1
19	What do you mean by Roaming? Moving between access points is called roaming. Even wireless networks may require more than one access point to cover all rooms. In order to provide uninterrupted services, we require roaming when the user moves from one access point to another.	C310.3	BTL1
20	What are the categories of Mobile services? Bearer services Tele services Supplementary services	C310.3	BTL1
21	What are the services provided by supplementary services? <u>NOV/DEC2016</u> <ul style="list-style-type: none"> • User identification • Call redirection • Call forwarding • Closed user group • Multiparty communication 	C310.3	BTL1
22	What is meant by GPRS? The General packet radio service provides packet mode transfer for applications that exhibits traffic patterns such as frequent transmission of small volumes.	C310.3	BTL1
23	List the characteristics that used to specify the GPRS? Service precedence Reliability class Delay class User data throughput	C310.3	BTL1
24	What are the services offered by GPRS? <u>NOV/DEC2017</u> GPRS offers end-to-end packet-switched data transfer services	C310.3	BTL1

	which can be categorized into the following two types: Point-to-Point (PTP) service Point-to-Multipoint (PTM) service		
25	Name the Tele Services provided by GSM? <u>APR/MAY 2017</u> 1. Telephony 2. Emergency Number 3. Short Message services 4. Fax	C310.3	BTL1
26	What are the Network elements present in GPRS? GPRS architecture introduces two new network elements, called GPRS Support Node (GSN) and the Gateway GPRS Support Node (GGSN).	C310.3	BTL1
27	What are the main elements of UMTS? <u>MAY/JUNE 2016</u> User equipment Radio network subsystem Core network	C310.3	BTL1
28	What is UMTS? The Universal Mobile Telecommunication System (UMTS) is a third generation (3G) mobile communications system that provides a range of broadband services to the world of wireless and mobile communications.	C310.3	BTL1
29	list the suggestion on mobile phone with respect to human body? <u>APR/MAY 2017</u> Mobile phone use does not increase the risk of getting brain cancer or other head tumors The effects of the radiofrequency electromagnetic radiation (RF-EMR) emitted by mobile phones on affects fertility and reproductive systems. Mobile phone has caused changes in Heart Rate Variability indices and the change varied with its position	C310.3	BTL1
30	List out the Interfaces of UMTS? <ul style="list-style-type: none"> • <i>Uu</i> interface—User equipment to Node B (the UMTS WCDMA air interface) • <i>Iu</i> interface—RNC to GSM/GPRS (MSC/VLR or SGSN) <ul style="list-style-type: none"> • <i>Iu-CS</i>—Interface for circuit-switched data • <i>Iu-PS</i>—Interface for packet-switched data • <i>Iub</i> interface—RNC to Node B interface • <i>Iur</i> interface—RNC 	C310.3	BTL1
31	What is the frequency range of uplink and downlink in GSM network? GSM-900 uses 890 - 915 MHz to send information from the Mobile Station to the Base Transceiver Station (uplink) and 935 - 960 MHz for the other direction (downlink)	C310.3	BTL1

32	What is RSS? RSS stands for Radio subsystem (RSS) RSS comprises all radio specific entities	C310.3	BTL1
33	What is A interface ? Makes the connection between the RSS and the NSS Based on circuit-switched PCM-30 systems (2.048 Mbit/s), carrying up to 30 64 kbit/s connections	C310.3	BTL1
34	What is U interface ? Makes the connection between the BTS and MS Contains all the mechanisms necessary for wireless transmission	C310.3	BTL1
35	What is 0 interface ? Makes the connection between the RSS and the OSS Uses the Signalling System No.7 (SS7) based on X.25 carrying management data to/from the RSS	C310.3	BTL1
36	What is meant by BSSGP? BSSGP is Base Station Subsystem GPRS Protocol. It is used to convey routing and QoS- related information between the BSS and SGSN. BSSGP does not perform error correction and works on top of a frame relay network.	C310.3	BTL1
37	Expand GSM, GPRS and UMTS. Global System for Mobile Communication (GSM) General Packet Radio Service (GPRS) Universal Mobile Telecommunication System (UMTS)	C310.3	BTL1
38	What is Ab. interface IMakes the connection between the BTS.and BSC Consists of 16 or 64 kbit/s connections	C310.3	BTL1
39	What is infrastructure network Infrastructure networks not only provide access to other networks, but also include forwarding functions, medium access control etc. In these infrastructure-based wireless networks, communication typically takes place only between the wireless nodes and the access point, but not directly between the wireless nodes.	C310.3	BTL1
40	List the basic access mechanisms defined for IEEE 802.11. The mandatory basic method based on a version of CSMA/CA. An optional method avoiding the hidden terminal problem. A contention-free polling method for time bounded service.	C310.3	BTL1

41	What are the techniques used for MAC management? Synchronization,Power management,Roaming, Management information base(MIB)	C310.3	BTL1
42	Why is physical layer in IEEE802.11 subdivided ? What are its sublayers? The physical layer in IEEE802.11 is subdivided because a sublayer has to be dependant on the upper layers (architecture dependant)and the other has to be medium dependant. The two sublayers are namely, *Physical layer convergence protocol * Physical medium dependant sublayer	C310.3	BTL1
43	Define MSDU lifetime? MSDU lifetime is used to provide time bounded service which specifies the maximum time that can elapse between sending and receiving a MSDU. It has a range of 0-16000 ms.	C310.3	BTL1
44	Define SDP? SDP stands for Service discovery protocol.SDP defines the discovery of services enabled by a SDP server which has some information about the list of services available called the service record.	C310.3	BTL1
45	What do you mean by ESSID? ESSID means Extended Service Set Identifier.It is the name of the network and is used to separate two networks.Without knowing ESSID it is impossible to participate in a WLAN.	C310.3	BTL1
46	What are the low power states in Bluetooth? The low power states in Bluetooth are *Sniff state *Hold state *Park state	C310.3	BTL1

47	What are the handovers in hiperLAN? The handovers in hiperLAN are *Sector handover *Radio handover * Network handover	C310.3	BTL1
48	Define beacon? Beacon frame is used to convey timing information within a BSS.It contains a timestamp and other management information used for power management and roaming.The timestamp is used by the node to adjust its local clock.	C310.3	BTL1
49	What is the function of GGSN? The Gateway GPRS Support Node (GGSN) is a main component of the GPRS network. The GGSN is responsible for the interworking between the GPRS network and external packet switched networks, like the Internet and X.25 networks.	C310.3	BTL1
50	List the advantages of Wireless LANs Flexibility , Planning , Design , Robustness and Cost	C310.3	BTL1

PART B

1	Explain in detail about the system architecture of GSM.[<u>MAY/JUNE 2016, NOV/DEC 2016 , APR/MAY 2017 , NOV/DEC2017,NOV/DEC 2018</u>] Pg- 35	C310.3	BTL5
2	Explain about the architecture of GPRS? [May2014]. Pg- 41	C310.3	BTL5
3	Discuss the architecture of UMTS? pg- 42 <u>MAY/JUNE 2016 , NOV/DEC 2017, APR/MAY2018</u>	C310.3	BTL6
4	Explain about the various handover by GSM? Pg- 36 <u>NOV/DEC 2016, APR/MAY2018</u>	C310.3	BTL5
5	What kind of security will be provided for GSM? Explain. Pg-40 <u>MAY/JUNE 2016 NOV/DEC2016</u>	C310.3	BTL1
6	Explain about the protocol architecture of GPRS? Pg- 34 <u>MAY/JUNE 2016, NOV/DEC 2016, APR /MAY 2017]</u>	C310.3	BTL5
7	Explain about the GSM services ? Pg -33	C310.3	BTL5
8	Explain about inter cell and intra cell handovers n GSM ? Pg- 36	C310.3	BTL5
9	Discuss about the interfaces in UMTS pg- 42	C310.3	BTL6
10	Explain about MOT and MTO in GSM pg- 38	C310.3	BTL5

11	Explain about protocol architecture of GSM Pg- 37	C310.3	BTL5
12	Explain about call forwarding in GSM Pg- 39	C310.3	BTL5
13	Explain about the types of protocols used in GPRS Pg- 41	C310.3	BTL5
14	Describe the function of HLR and VLR in call routing and roaming? pg- 36 <u>NOV/DEC 2018</u>	C310.3	BTL6
15	Explain the working of UMTS ? pg- 42	C310.3	BTL5

UNIT IV

MOBILE AD-HOC NETWORKS

Ad-Hoc Basic Concepts – Characteristics – Applications – Design Issues – Routing – Essential of Traditional Routing Protocols – Popular Routing Protocols – Vehicular Ad Hoc networks (VANET) – MANET Vs VANET – Security .

S. No.	Question	Course Outcome	Blooms Taxonomy Level
1	<p>What is Ad-Hoc ?</p> <p>In a simplistic realization of this concept, a mobile device wanting to communicate can forward its packets to its neighbours, and the neighbour nodes in turn can forward those to their neighbours, and so on until the destination is reached.</p>	C310.4	BTL1
2	<p>Define MANET.</p> <p>A mobile ad hoc network (MANET) is a continuously self-configuring, infrastructure-less network of mobile devices connected without wires.</p> <p>However, of late several specialized MANETs such as Wireless Sensor Networks (WSNs) and Vehicular Ad hoc Networks (VANETs) have emerged. Each of these specialized ad hoc networks is suitable for a specific kind of application.</p>	C310.4	BTL1
3	<p>Define VANET.</p> <ul style="list-style-type: none"> - The Vehicular Ad-Hoc Network, or VANET, is a technology that uses moves cars as nodes in a network to create a mobile network. - Each of these specialized ad hoc networks is suitable for a specific kind of application. -Being ad hoc networks after all, all these networks share some basic characteristics. However, there exist significant differences among them with respect to their operation, design, and applications. 	C310.4	BTL1
4	<p>List the Characteristics of mobile Adhoc Network ? <u>MAY/JUNE 2016</u></p> <p>There are several characteristics that distinguish a MANET from an</p> <p>1. Lack of fixed infrastructure: Lack of any specific networking infrastructure is possibly the most distinguishing characteristic of a</p>	C310.4	

	<p>MANET.</p> <p>2. <i>Dynamic topologies:</i> Since the devices in a MANET are allowed to move arbitrarily, the network topology can change unpredictably.</p> <p>3. <i>Bandwidth constrained, variable capacity links:</i> Wireless links have significantly lower capacity than their wired counterparts.</p> <p>4. <i>Energy constrained operation:</i> The nodes in a MANET rely on battery power. These batteries are small and can store very limited amounts of energy.</p> <p>5. <i>Increased vulnerability:</i> MANETs are prone to many new types of security threats that do not exist in the case of their wired counterparts..</p> <p>6. <i>Other characteristics:</i> Other distinguishing characteristics of a MANET include a distributed peer-to-peer mode of operation, multi-hop routing, and relatively frequent changes to the concentration of nodes over any specific area.</p>		BTL1
5	<p>What are the Applications of MANETs <u>APR/MAY 2017</u></p> <p>A MANET can be set up quickly since no fixed infrastructures need to be deployed.</p> <p>Thus, in any situation where fixed infrastructure becomes difficult to be set up because of security, cost, inaccessibility of the terrain, or safety-related reasons, ad hoc networks become the preferred choice.</p> <p>Of the large number of applications that are possible with MANETs, a few example applications are defence-related operations and disaster management application</p> <p>1. <i>Communication among portable computers</i></p> <p>Miniaturization has allowed the development of many types of portables and computerized equipment, which have become very popular. Many of these portables work meaningfully when connected to some network, possibly a LAN or the Internet.</p> <p>For this, the portables are typically required to be within the range of some wireless hub.</p> <p>- Satisfaction of this requirement would, however, drastically reduce the flexibility and the mobility of the devices. As an example, consider a lecture room where no networking infrastructures exist.</p> <p>2. <i>Environmental monitoring</i></p> <p>A popular category of applications of MANETs is the collection of</p>	C310.4	BTL1

	<p>the various types of data about the environment in which they are deployed.</p> <p>Continuous data collection from remote locations is considered important for several applications such as environmental management, security monitoring, road traffic monitoring and management, etc.</p> <p>3.Military</p> <p>-The present-day military equipment have become quite sophisticated, have many automated parts and contain one or more computers.</p> <p>-This opens up the scope of setting up an ad hoc network consisting of various military equipment deployed in a frontline battle field. Ad hoc networking of these equipment can allow a military setup to take advantage of an information network among the soldiers, vehicles, and military information headquarters.</p> <p>- For example, an ad hoc network can be automatically set up at a battlefield among the equipment, and the hand-held devices can collect information from and disseminate command to the frontline personnel.</p> <p>4.Emergency applications</p> <p>-Ad hoc networks do not require any pre-existing infrastructure.</p> <p>-These networks, therefore, can be deployed easily and rapidly in emergency situations such as a search and rescue operation after a natural disaster, and for applications such as policing and fire fighting. In these situations, ad hoc networks can be set up on the fly.</p>		
6	<p>What are the MANET Design Issues? <u>NOV/DEC2018</u></p> <p>We point out below a few important issues that are relevant to the design of suitable MANET protocols.</p> <p>1.Network size and node density</p> <p>2.Connectivity</p> <p>3.Network topology</p> <p>4.User traffic</p> <p>5. Operational environment</p> <p>6. Energy constraint</p>	C310.4	BTL1
7	What is Routing ? and purpose of Routing ?	C310.4	

	<p>Packet routing is usually a much more complex task in an ad hoc network compared to that of an infrastructure-based network.- main complications arise on account of continual topology changes and limited battery power of the nodes. Recall that we discussed these issues in Section 7.4 and a few other issues that are inherent to MANETs.</p> <p>- When the destination node is not in the transmission range of the source node, the route has to be formed with the help of the intervening nodes in the network.</p> <p>-As we know, the purpose of routing is to find the best path between the source and the destination for forwarding packets in any store-and-forward network.</p>		BTL1
8	<p>What are the Several types of routing protocols have been proposed for MANETs.?</p> <p>Different routing protocols essentially implement the above steps (a) and (b) while meeting the constraints inherent to the network, such as low energy consumption, through the deployment of various techniques.</p> <p>-We will now review the essential concepts of a traditional routing technique.</p> <p>Later, we will build upon these concepts to introduce the routing protocols for ad hoc networks. No simple IP-address based routing is possible in a MANET due to the continual topology changes on account of node movements.</p>	C310.4	BTL1
9	<p>What are the essentials needs of traditional routing Protocols</p> <p>- It is necessary to have a clear understanding of the routing mechanisms deployed in a traditional network.</p> <p>It will help us appreciate the specific changes made to traditional routing protocols to support the specific requirements of an ad hoc network.</p> <p>Two important classes of routing protocols for traditional networks are the <i>link state</i> and the <i>distance vector</i>. These two protocols are extremely popular in packet-switched networks.</p> <p>Both these protocols require a node to determine the next hop along the “shortest path” towards a given destination. The shortest path is computed according to some specific cost metric such as the number of hops in the route.</p>	C310.4	BTL1
10	<p>Define link state protocols (LSP)</p> <p>-The term <i>link state</i> denotes the state of a connection of one router with one of its neighbours.</p> <p>- A neighbour of a router is one with which it can directly communicate without taking any help from the intervening routers. Each router determines its local connectivity information, and floods the network with this information with a <i>link state</i></p>	C310.4	BTL1

	<p><i>advertisement.</i></p> <ul style="list-style-type: none"> - As a router in the network receives this link state advertisement, it stores this packet in a link state packet database (LSPDB). -This storage of link state advertisements in an LSPDB is in addition to the routing table that each router maintains. 		
11	<p>Draw the schematic diagram of a router ?</p> <ul style="list-style-type: none"> • A unique <i>sequence number</i>, which is formed by increasing the count every time the router forms a new link state advertisement. * This link state advertisement is then flooded throughout the network as follows: A router sends a copy of a link state advertisement to all of its neighbours. <p>-A router receiving this message examines the sequence number of the last link state advertisement from the originating router by consulting its LSPDB.</p>	C310.4	BTL1
12	<p>Define Distance Vector (DV) Protocols ?</p> <ul style="list-style-type: none"> - The distance vector protocols get their name from the fact that they base their routing decisions on the distance to the destination in terms of the number of hops that a packet will have to traverse to reach its destination. - The term vector here means that routes are advertised as a vector (distance, direction), where distance is the number of hops between the two nodes and direction is defined in terms of the next hop router to which the packets need to be forwarded. 	C310.4	BTL1
13	<p>What is Routing in MANETs vs. Routing in Traditional Networks ?</p> <p>The following are the three important ways in which a MANET routing protocol differs from routing of packets in a traditional network.</p> <ul style="list-style-type: none"> • In a MANET, each node acts as a router, whereas ordinary nodes in a traditional wired network do not participate in routing the packets. • In a MANET, the topology is dynamic because of the mobility of the nodes, but it is static in the case of traditional networks. Thus, the routing tables in a MANET quickly become obsolete, making the routing process complicated. <p>In the simple IP-based addressing scheme deployed in wired networks, the IP address encapsulated in the subnet structure does not work because of node mobility.</p>	C310.4	BTL1
14	<p>What are the Types of communications?</p> <p>In a network, a node can initiate the following types of communications:</p> <p><i>Unicast:</i> In this, a message is sent to a single destination node.</p> <p><i>Multicast:</i> In this type of transmission, a message is sent to a selected subset of the network nodes.</p>	C310.4	BTL1

	<p><i>.Broadcast:</i> In this type of transmission, a message is sent to all the nodes in the network. Since unrestrained broadcast communications can choke a MANET, applications usually do not use broadcast communication.</p>		
15	<p>Write the Classification of Unicast MANET Routing Protocols</p> <p>Unicast routing protocols in MANETs are classified into proactive (table-driven), reactive (on-demand) and hybrid protocols. This classification is based on how a protocol manages to determine the route correctly in the presence of topology changes.</p> <p><i>Proactive (table-driven) protocols</i></p> <p>A proactive routing protocol is also known as a <i>table-driven</i> routing protocol. In this protocol, each node in a routing table maintains information about routes to every other node in the network. These tables are periodically updated in the face of random network topology changes. An example of a proactive (table-driven) protocol is the Destination Sequenced Distance Vector (DSDV) protocol.</p> <p><i>Reactive (on-demand) protocols</i></p> <p>A reactive routing protocol is also known as an on-demand routing protocol, since in this protocol nodes do not maintain up-to-date routes to different destinations, and new routes are discovered only when required.</p> <p>When a node does not have knowledge about any route to a specific destination, it uses a flooding technique to determine the route.</p>	C310.4	BTL1
16	<p>What is Hybrid routing protocols</p> <ul style="list-style-type: none"> - Hybrid routing protocols have the characteristics of both proactive and reactive protocols. These protocols combine the good features of both the protocols. - The hybrid routing protocols are designed to achieve increased scalability by allowing nodes with close proximity to work together to form some sort of a backbone to reduce the route discovery overheads. 	C310.4	BTL1
17	<p>What are the Popular MANET Routing Protocols:</p> <p>A few popular MANET routing protocols</p> <ol style="list-style-type: none"> 1. Destination-Sequenced Distance-Vector Routing Protocol 2. Dynamic Source Routing (DSR) Protocol. 3. Ad Hoc On-demand Distance Vector (AODV). 4. Zone Routing Protocol 	C310.4	BTL1

	5. Multicast Routing Protocols for MANET		
18	<p>Write the Important steps in the operation of DSDV? <u>NOV/DEC2018</u></p> <p>The important steps in the operation of DSDV are summarized below:</p> <ol style="list-style-type: none"> 1. Each router (node) in the network collects route information from all its neighbours. 2. After gathering information, the node determines the shortest path to the destination based on the gathered information. 3. Based on the gathered information, a new routing table is generated. 4. The router broadcasts this table to its neighbours. On receipt by neighbours, the neighbour nodes recompute their respective routing tables. 5. This process continues till the routing information becomes stable. 	C310.4	BTL1
19	<p>What are the contents of link state advertisement message? <u>NOV/DEC2017</u></p> <p>All link state advertisements begin with a common 20 byte header.</p> <p>This header contains enough information to uniquely identify the advertisement (LS type, Link State ID, and Advertising Router).</p> <p>Multiple instances of the link state advertisement may exist in the routing domain at the same time. It is then necessary to determine which instance is more recent.</p>	C310.4	BTL1
20	<p>What is the concept of RTT? <u>NOV/DEC 2016</u></p> <p>Round-trip time (RTT), also called round-trip delay, is the time required for a signal pulse or packet to travel from a specific source to a specific destination and back again. In this context, the source is the computer initiating the signal and the destination is a remote computer or system that receives the signal and retransmits it.</p>	C310.4	BTL1
21	<p>What is Vehicular Ad Hoc Networks (VANETs)</p> <p>A Vehicular Ad Hoc Network (VANET) is a special type of MANET in which moving automobiles form the nodes of the network.</p> <p>VANETs were initially introduced for vehicles of police, fire brigades, and ambulances for safe travelling on road. In this network, a vehicle communicates with other vehicles that are within a range of about 100 to 300 metres.</p> <p>Multi-hop communication often results in rather large networks. A vehicle that was outside the communication range of all other vehicles of a VANET can come in the range of a vehicle that is</p>	C310.4	BTL1

	already in the network and as a result can join the network.		
22	<p>Write the uses of VANET</p> <ul style="list-style-type: none"> • A VANET can help drivers to get advance information and warnings from a nearby environment via message exchanges. - A VANET can help disseminate geographical information to the driver as he continues to drive. For example, the driver would be notified of the nearby food malls or petrol refilling stations, map display, etc. <p>Drivers may have the opportunity to engage in other leisurely tasks, such as VoIP with family, watch news highlights, listen to series of media files known as podcasts, or even carry out some business activities such as participate in an office video conference session.</p>	C310.4	BTL1
23	<p><u>Difference Between MANET Vs VANET MAY/JUNE 2016 , NOV/DEC 2016, APR/MAY2018</u></p> <p>-A MANET, as we have already defined, is a collection of mobile nodes that communicate with each other over bandwidth constrained wireless links without any infrastructure support.</p> <p>-In this sense, we can consider a VANET to be a special category of MANET. The nodes are mobile in</p> <p>- VANETs as well as in MANETs. However, the VANET nodes (vehicles) can communicate with certain roadside infrastructures or base stations.</p> <p>- Further, the node mobility in a VANET is constrained to the road topologies, whereas the movement of nodes in a MANET is more random in nature.</p>	C310.4	BTL4
24	<p>What are the Security Issues in a MANET</p> <p>- A few important characteristics of ad hoc networks that can be exploited to cause security vulnerabilities are the following:</p> <p><i>Lack of physical boundary:</i> Each mobile node functions as a router and forwards packets from other nodes.</p> <p><i>Low power RF transmissions:</i> It is possible for a malicious node to continuously transmit and monopolise the medium and cause its neighbouring nodes to wait endlessly for transmitting their messages.</p> <p><i>Limited computational capabilities:</i> Nodes in an ad hoc network usually have limited computational capabilities.</p> <p>-It therefore becomes difficult to deploy compute-intensive security solutions such as setting up a public-key cryptosystem.</p> <p><i>Limited power supply:</i> Since nodes normally rely on battery power, an attacker might attempt to exhaust batteries by causing</p>	C310.4	BTL1

	unnecessary transmissions to take place or might cause excessive computations to be carried out by the nodes.		
25	<p>Write the Characteristics of secure ad hoc networks</p> <p>A secure ad hoc network should have the following characteristics:</p> <ul style="list-style-type: none"> • <i>Availability:</i> It should be able to survive denial-of-service (DoS) attacks. • <i>Confidentiality:</i> It should protect confidentiality of information by preventing its access by unauthorized users. • <i>Integrity:</i> It should guarantee that no transferred message has been tampered with. • <i>Authentication:</i> It should help a node to obtain guarantee about the true identity of a peer node. <p><i>Non-repudiation:</i> It should ensure that a node having sent a message, cannot deny it.</p>	C310.4	BTL1
26	<p>What are the of attacks on ad hoc networks</p> <p><i>Routing loop</i></p> <p>- By sending tampered routing packets, an attacker can create a routing loop. This will result in data packets being sent around endlessly, consuming bandwidth and causing dissipation of power for a number of nodes.</p> <p><i>Malicious code attacks</i></p> <p>A malicious code can be a virus, worm, spyware, or a Trojan. In a MANET, an attacker can propagate malicious code and can slow down the nodes, overload the network, or even crash the nodes.</p> <p><i>Repudiation attack</i></p> <p>Repudiation attack refers to the denial of participation in a communication. In this attack, a malicious user can deny a credit card or bank transaction.</p> <p><i>SYN flooding attack</i></p> <p>In this attack, an attacker creates a large number of half-opened TCT connections with the victim nodes by sending a large number of SYN packets to them. This causes the TCP connection tables of the victim nodes to overflow.</p> <p><i>Session hijacking</i></p> <p>In a typical session, all the communications are authenticated only at the beginning of the session. The attacker can spoof the IP address of a node that has just started a session and hijack the session from the victim and perform a DoS attack.</p>	C310.4	BTL1

	<p><i>Fabrication attack</i></p> <p>In AODV routing, when a node detects a broken link while forwarding a packet (possibly because the next hop node has either moved or has shutdown), it sends a route error message towards the packet sender. In the fabrication attack, a malicious node sends a false route error message to the packet sender, even when the next hop link is not broken.</p> <p><i>Black hole</i></p> <p>In this type of attack, a node can set up a route to some destination via itself, and when the actual data packets are received from other nodes, these are simply dropped. This node forms a black hole, to which data packets enter but never leave.</p> <p><i>Grey hole</i></p> <p>A special case of the black hole attack is the grey hole attack.</p> <p>In this attack, the attacker selectively drops some kinds of packets that pass through it but not the others.</p> <p><i>Partitioning</i></p> <p>In this kind of attack, the attacker partitions a network by causing some nodes to split up from the other nodes.</p> <p><i>Blacklist</i></p> <p>This attack tries to exploit a loophole in security mechanisms.</p> <p>Some ad hoc routing protocols try to tackle this security problem by keeping a list of perceived malicious nodes.</p> <p><i>Wormhole</i></p> <p>In a wormhole attack, a direct link (tunnel) between the two nodes is established.</p> <p>This is referred to as <i>wormhole link</i>. The direct link can be established by making use of a wired line, a long -range wireless transmission, or an optical link.</p> <p><i>Dropping routing traffic</i></p> <p>It is essential that in an ad hoc network, all nodes participate in the routing process.</p> <p>However, it is possible that a node may act selfishly and process only the routing information that is related to itself either maliciously or to conserve energy.</p>		
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	This behavior/attack can create network instability or can even segment the network.		
27	<p>Difference Between Proactive & Reactive protocols <u>APR/MAY 2017</u></p> <p><i>Proactive (table-driven) protocols</i></p> <p>A proactive routing protocol is also known as a <i>table-driven</i> routing protocol. In this protocol, each node in a routing table maintains information about routes to every other node in the network. These tables are periodically updated in the face of random network topology changes. An example of</p> <p>a proactive (table-driven) protocol is the Destination Sequenced Distance Vector (DSDV) protocol.</p> <p><i>Reactive (on-demand) protocols</i></p> <p>A reactive routing protocol is also known as an on-demand routing protocol, since in this protocol nodes do not maintain up-to-date routes to different destinations, and new routes are discovered only when required.</p> <p>When a node does not have knowledge about any route to a specific destination, it uses a flooding technique to determine the route.</p>	C310.4	BTL4
28	<p>Define Proactive (table-driven) protocols</p> <p>A proactive routing protocol is also known as a <i>table-driven</i> routing protocol. In this protocol, each node in a routing table maintains information about routes to every other node in the network. These tables are periodically updated in the face of random network topology changes. An example of a proactive (table-driven) protocol is the Destination Sequenced Distance Vector (DSDV) protocol.</p>	C310.4	BTL1
29	<p>What is a Wormhole attack?</p> <p>In a wormhole attack, a direct link (tunnel) between the two nodes is established.</p> <p>This is referred to as <i>wormhole link</i>. The direct link can be established by making use of a wired line, a long -range wireless transmission, or an optical link.</p>	C310.4	BTL1
30	<p>Compare AODV & DSR protocols? <u>NOV/DEC2017</u></p> <ul style="list-style-type: none"> • DSR has less routing overhead than AODV • AODV has less normalized MAC overhead than DSR. • DSR is based on a source routing mechanism whereas AODV uses a combination of DSR and DSDV mechanisms. • AODV has better performance than DSR in higher-mobility 	C310.4	BTL4

	scenarios.		
	DSR has less frequent route discovery processes than AODV		
31	Differentiate cellular with ad hoc networks? <u>APR/MAY2018</u> Cellular network consists of central entity known as base station and mobile devices as MSs (Mobile Subscribers). All the base stations are connected in different topology configurations. The ad hoc networks operate of its own without the need of any infrastructure. They are called self organizing networks. It utilizes multi-hop radio relay concept and hence are known as multi-hopped networks.	C310.4	BTL4
32	What is meant by destination sequence distance vector? Destination sequence distance vector(DSDV) routing is an enhancement to distance vector routing for ad-hoc networks. Distance vector routing is used as routing information protocol in wired networks.DSDV adds sequence numbers and dambling to the distance vector algorithm.	C310.4	BTL1
33	What is the use of Mobile Node? A mobile node is an end-system or router that can change its point of attachment to the internet using mobile IP.The MN keeps its IP address and can continuously communicate with any other system in the internet as long as link-layer connectivity is given.Mobile nodes are not necessarily small devices such as laptops with antennas or mobile phones; a router onboard an aircraft can be a powerful mobile node.	C310.4	BTL1
34	What are the advantages of HAWALI? Security: Challenge-response extensions are mandatory.In contrast to Cellular IP,routing changes are always initiated by the foreign domain's infrastructure. Transparency: HAWALI is mostly transparent to mobile nodes.	C310.4	BTL1
35	What are the disadvantages of HAWALI? Security: There are no provisions regarding the setup of IPSec tunnels. Implementation: No private address support is possible because of co-located Care-of Addresses	C310.4	BTL1
36	What is Grey hole A special case of the black hole attack is the grey hole attack. In this attack, the attacker selectively drops some kinds of packets that pass through it but not the others.	C310.4	BTL1
37	What is a Blacklist This attack tries to exploit a loophole in security mechanisms. Some ad hoc routing protocols try to tackle this security problem by keeping a list of perceived malicious nodes.	C310.4	BTL1

38	What is Fabrication attack In AODV routing, when a node detects a broken link while forwarding a packet (possibly because the next hop node has either moved or has shutdown), it sends a route error message towards the packet sender. In the fabrication attack, a malicious node sends a false route error message to the packet sender, even when the next hop link is not broken.	C310.4	BTL1
39	What is Malicious code attacks A malicious code can be a virus, worm, spyware, or a Trojan. In a MANET, an attacker can propagate malicious code and can slow down the nodes, overload the network, or even crash the nodes.	C310.4	BTL1
40	What is Repudiation attack Repudiation attack refers to the denial of participation in a communication. In this attack, a malicious user can deny a credit card or bank transaction.	C310.4	BTL1
41	What is SYN flooding attack In this attack, an attacker creates a large number of half-opened TCT connections with the victim nodes by sending a large number of SYN packets to them. This causes the TCP connection tables of the victim nodes to overflow.	C310.4	BTL1
42	What is Routing loop - By sending tampered routing packets, an attacker can create a routing loop. This will result in data packets being sent around endlessly, consuming bandwidth and causing dissipation of power for a number of nodes.	C310.4	BTL1
43	What is unicast ? Unicast: In this, a message is sent to a single destination node.	C310.4	BTL1
44	What is Multicast? Multicast: In this type of transmission, a message is sent to a selected subset of the network nodes.	C310.4	BTL1
45	What is Broadcast In this type of transmission, a message is sent to all the nodes in the network. Since unrestrained broadcast communications can choke a MANET, applications usually do not use broadcast communication.	C310.4	BTL1
46	What is Energy constrained operation? The nodes in a MANET rely on battery power. These batteries are small and can store very limited amounts of energy.	C310.4	BTL1
47	What is the use of sequence numbers in DSDV? Each routing advertisement comes with a sequence number. Within ad-hoc networks, advertisements may propagate along many paths. Sequence numbers help to apply the advertisements in correct order. This avoids the loops that are likely with the unchanged distance vector algorithm.	C310.4	BTL1
48	What are the disadvantages of Cellular IP? Efficiency: Additional network load is induced by forwarding	C310.4	BTL1

	<p>packets on multiple paths.</p> <p>Transparency: Changes to MNs are required</p> <p>Security: Routing tables are changed based on messages sent by mobile nodes. Additionally, all systems in the network can easily obtain a copy of all packets destined for an MN by sending packets with the MN's source address to the cellular IP gateway.</p>		
49	<p>What are the problems associated with reverse tunneling?</p> <p>Firewalls</p> <p>Multi-cast</p> <p>TTL</p>	C310.4	BTL1
50	<p>What do you mean by damping in DSDV?</p> <p>Transient changes in topology that are of short duration should not destabilize the routing mechanisms. Advertisements containing changes in the topology currently stored are therefore not disseminated further. A node waits with dissemination if these changes are probably unstable. Waiting time depends on the time between the first and best announcement of a path to a certain destination.</p>	C310.4	BTL1
<u>PART B</u>			
1	Explain about characteristics and applications of MANET? Pg - 118 <u>MAY/JUNE 2016, APR/MAY 2018</u>	C310.4	BTL5
2	Explain, Compare and contrast the traditional routing protocols? Pg-124 <u>NOV/DEC 2016</u>	C310.4	BTL5
3	Explain how routing is done in MANET? Explain about DSR in detail and compare with DSDV ?Pg - 128 <u>MAY/JUNE 2016, NOV/DEC 2017, NOV/DEC 2018</u>	C310.4	BTL5
4	Explain the various MANET routing protocols with advantages and disadvantages? Pg -130 <u>NOV/DEC 2016</u>	C310.4	BTL5
5	What is VANET? Differentiate MANET and VANET? Architecture of VANET? Pg -137 <u>MAY/JUNE 2016, NOV/DEC 2017, APR/MAY 2018</u>	C310.4	BTL1
6	Explain the security issues and attacks in MANET & VANET? Pg- 138 <u>MAY/JUNE 2016</u>	C310.4	BTL5
7	Explain the Design issues of MANET routing protocols in detail? Pg -122 <u>APR/MAY 2017, APR/MAY 2018</u>	C310.4	BTL5
8	Explain the various VANET routing protocols in detail ? Pg -137 <u>APR/MAY 2017</u>	C310.4	BTL5
9	Illustrate the process of route discovery, route reply, data delivery and route caching using DSR(<u>notes</u>) <u>APR/MAY 2018</u>	C310.4	BTL2
10	Explain about the On demand routing protocols? Pg - 125	C310.4	BTL5

11	Explain about the Proactive routing protocols? Pg - 127	C310.4	BTL5
12	Explain about the attacks in MANET? Pg -134	C310.4	BTL5
13	Explan in detail about architecture of VANET and various security attacks on VANET ?Pg -137	C310.4	BTL5
14	Explain about the multicast routing protocol Pg -128	C310.4	BTL5
15	Differentiate VANET and MANET Pg -139	C310.4	BTL4

UNIT V

MOBILE PLATFORMS AND APPLICATIONS

Mobile Device Operating Systems – Special Constrains & Requirements – Commercial Mobile Operating Systems – Software Development Kit: iOS, Android, BlackBerry, Windows Phone – M-Commerce – Structure – Pros & Cons – Mobile Payment System – Security Issues

S. No.	Question	Course Outcome	Blooms Taxonomy Level
1	What are the layers of Operating System? The operating system is usually structured into a kernel layer and a shell layer. The shell essentially provides facilities for user interaction with the kernel. The kernel executes in the supervisor mode and can run privileged instructions that could not be run in the user mode.	C310.5	BTL1
2	Why is kernel mode called memory resident part? During booting, the kernel gets loaded first and continues to remain in the main memory of the device. This implies that in a virtual memory system, paging does not apply to the kernel code and kernel data. For this reason, the kernel is called the <i>memory resident</i> part of an operating system.	C310.5	BTL1

3	What is monolithic kernel design? In a monolithic kernel OS design, the kernel essentially constitutes the entire operating system code, except for the code for the shell. The principal motivation behind this monolithic design was the belief that in the supervisor mode, the operating system services can run more securely and efficiently.	C310.5	BTL1
4	What is microkernel design ? The microkernel design approach tries to minimize the size of the kernel code. Only the basic hardware-dependent functionalities and a few critical functionalities are implemented in the kernel mode and all other functionalities are implemented in the user mode. The main advantage of this approach is that it becomes easier to port, extend, and maintain the operating system code.	C310.5	BTL1
5	What are Special Constraints of Mobile O/S <u>APR/MAY 2017, NOV/DEC 2017, APR/MAY 2018</u> Limited memory Limited screen size Miniature keyboard Limited processing power Limited battery power Limited and fluctuating bandwidth of the wireless medium	C310.5	BTL1
6	What are the requirements of Mobile O/S <u>APR/MAY 2017</u> Support for specific communication protocols Support for a variety of input mechanisms Compliance with open standards Extensive library support	C310.5	BTL1
7	<u>list the important features of the Windows mobile OS NOV/DEC 2018</u> • The Graphics/Window/Event manager (GWE) component handles all input and output. • Provides a virtual memory management. • Supports security through the provision of a cryptographic library. • Application development is similar to that in the Win32 environment. support true multitasking in the future versions of the Windows Phone operating system.	C310.5	BTL1
8	List the important features of Palm OS • It is essentially a simple single-tasking operating system. As a result, only one application can run at a time. The implications of this are many and easily noticeable. • It has an elementary memory management system. • Palm supplies Palm emulator, which emulates the Palm hardware on a PC. • It supports a handwriting recognition-based system for user input. • It supports a facility called HotSync technology for data synchronization with desktop computers. • It supports sound playback and recording capabilities.	C310.5	BTL1

	<ul style="list-style-type: none"> • It incorporates a very simple and rudimentary security model in which a device can be locked by password. • It uses a proprietary format to store calendar, address, task and note entries and yet are accessible by third-party applications. 		
9	What is Symbian OS? Symbian OS is a real time, multitasking, pre-emptive, 32-bit operating system that runs on ARM-based processor designs. The inherent design of the Symbian operating system is microkernel-based.	C310.5	BTL1
10	What are the flavours of Symbian OS Series 60 UIQ interface: UIQ (earlier known as User Interface Quartz)	C310.5	BTL1
11	What is Series 60? The series-60 platform was until recently the leading smartphone platform in the world. The relatively large sized colourscreen, easy-to-use interface and an extensive suite of applications make it well-suited to support advanced features such as rich content downloading and MMS (Multimedia Messaging Service). Series 60 was mainly being used on Nokia's smartphones and Samsung handsets.	C310.5	BTL1
12	What is UIQ interface: UIQ (earlier known as User Interface Quartz) is a software package developed by UIQ Technology for Symbian OS. This is a graphical user interface layer that provides capabilities for third-party application developers to develop applications and effortlessly create user interfaces.	C310.5	BTL1
13	Mention the important features supported by the Symbian operating system <ul style="list-style-type: none"> • It supports a number of communication and networking protocols including TCP, UDP, PPP, DNS, FTP, WAP. For personal area networking, it supports Bluetooth, InfraRed and USB connectivity. • It supports pre-emptive multitasking scheduling and memory protection. • CPU is switched into a low-power mode when the application is not responding to an event. • It is optimized for low-power and memory requirements. Applications, and the OS itself, follow an object-oriented design paradigm. • All Symbian programming is event-based, and the CPU is switched into a low-power mode when the applications are not directly dealing with an event. This is achieved through a programming idiom called active objects. 	C310.5	BTL4
14	What is Carbide? Carbide is an Integrated Development Environment (IDE) toolkit that is available for C++ application development on Symbian OS. It essentially works as an Eclipse plug-in and contains editor, compiler, emulator, libraries and header files required for Symbian OS development. Development kits are available at Nokia and the Symbian Foundation websites.	C310.5	BTL1

15	What is iOS? iOS is a closed and proprietary operating system fully owned and controlled by Apple and not designed to be used by various mobile phone vendors on their systems.	C310.5	BTL1
16	Structure of ANDROID stack: <div style="border: 1px solid black; padding: 5px; margin: 5px 0; text-align: center;">Application Layer</div> <div style="border: 1px solid black; padding: 5px; margin: 5px 0; text-align: center;">Application Framework</div> <div style="border: 1px solid black; padding: 5px; margin: 5px 0; text-align: center;">Libraries and Runtime</div> <div style="border: 1px solid black; padding: 5px; margin: 5px 0; text-align: center;">Kernel</div>	C310.5	BTL1
17	Define Dalvik VM: Dalvik translates a Java application program into machine code of the mobile device and executes it by invoking the operating system. These can be compiled to ARM native code and installed using the Android native development kit (SDK).	C310.5	BTL1
18	Define Android kernel Android kernel has been developed based on a version of Linux kernel. It has excluded the native X Window System and does not support the full set of standard GNU libraries. This makes it difficult to reuse the existing Linux applications or libraries on Android. Based on the Linux kernel code, Android implements its own device drivers, memory management, process management and networking functionalities. Android is multitasking and allows applications to run concurrently.	C310.5	BTL1
19	What is Business-to-consumer (B2C)? Business-to-consumer (B2C) is a form of commerce in which products or services are sold by a business firm to a consumer. B2C is an important category of mobile commerce applications and is reported to be nearly half of the total M-commerce market	C310.5	BTL1
20	List the Examples of B2C? Advertising Comparison shopping Information about a product Mobile ticketing Loyalty and payment services Interactive advertisements Catalogue shopping	C310.5	BTL1
21	What is Radio Frequency Identification A Radio Frequency Identification (RFID) tag attached to a product, animal, or person for the purpose of identification and tracking, makes use of radiowaves. Some tags can be read from several metres away and beyond the line of sight of the reader.	C310.5	BTL1
22	What is Business-to-business (B2B) Business-to-business (B2B) is a form of commerce in which products or services are sold from a company to its dealers a company that	C310.5	BTL1

	manufactures TV sets would normally sell it through a dealer network rather than selling the product directly to the consumers. Here, the manufacturer and the dealers are said to be the B2B partners.		
23	<p><u>list the pros & cons of M- commerce? APR/MAY 2017,APR/MAY 2018</u></p> <ul style="list-style-type: none"> • Providing a wider reach or Accessibility • Reducing the transaction cost • Ubiquity • Personalization. • Reducing time. <p><u>Cons:</u></p> <ul style="list-style-type: none"> • Limited Speed • Small Screen SizeNo standard for M-commerce • Technology constraints of devices • Risky investment. 	C310.5	BTL1
24	<p>List the Features required of a mobile device to enable mobile commerce</p> <ul style="list-style-type: none"> • Good Internet connectivity • Ability to display rich content such as images • Have a good quality camera with auto focus • Screen should be able to properly display the bar codes • Ability to read the RFID tags • MMS (Multimedia Message Service), SMS (Short Message Service) • Ability to communicate between the mobile device and the supporting network • Ability to scan bar codes • Ability to interact with the Point-of-Sale (PoS) terminals. 	C310.5	BTL1
25	<p><u>What is POS? NOV/DEC 2016</u></p> <p>Point-of-Sale (PoS) usually means a checkout counter in a shop or supermarket. More specifically, the point-of-sale often refers to the hardware and software used for handling customer purchases at the checkout desks. An example of a PoS terminal is an electronic cash register. Nowadays, the point-of-sale systems are used in almost every supermarket and are used in many retail stores too.</p>	C310.5	BTL1
26	<p>State the types of M-payment schemes are currently being used</p> <p>(a) Bank account based</p> <p>(b) Credit card based</p> <p>(c) Micropayment</p>	C310.5	BTL1
27	<p>List the Examples of mobile OS? MAY/JUNE 2016</p> <p>Palm OS</p> <p>Symbian OS</p>	C310.5	BTL1

	iOS android OS		
28	What are the advantages and disadvantages of BlackBerry OS? <u>NOV/DEC 2017</u> <i>Pros</i> Excellent Connectivity (Messengers viz BBM, yahoo, gtalk, whatsapp work seamlessly) Amazing email client (can also sync with your enterprise server) Most user friendly qwerty keyboard (easy typing) Very fast and snappy <i>Cons</i> Battery life not great in some models Camera quality not great Application support is bad Almost all models have similar utility and features. (Minor change in visuals cz of the new OS)	C310.5	BTL1
29	What is M- commerce? <u>MAY/JUNE 2016,APR/MAY 2018</u> Mobile e-commerce (m-commerce) is a term that describes online sales transactions that use wireless electronic devices such as hand-held computers, mobile phones or laptops. These wireless devices interact with computer networks that have the ability to conduct online merchandise purchases. Any type of cash exchange is referred to as an e-commerce transaction. Mobile e-commerce is just one of the many subsets of electronic commerce. Mobile e-commerce may also be known as mobile commerce	C310.5	BTL1
30	Differentiate E – commerce and M- commerce? E-commerce or electronic commerce, is the process of buying and selling goods, products and services over electronic systems such as internet, telephone and e-mail. M-Commerce or mobile commerce is process of buying and selling products and services through wireless handheld devices such as cell phones or PDAs.	C310.5	BTL4
31	What is the use of WCMP? The wireless control message protocol provides error handling mechanisms for WDP. WCMP is used for diagnostic and informational purposes. It is used by WDP nodes and gateways to report errors.	C310.5	BTL1
32	What are the features offered by WSP/B? In addition to the general features of WSP, WSP/B offers the following features adapted to web browsing: HTTP/1.1 functionality Exchange of session headers Push and pull data transfer Asynchronous requests	C310.5	BTL1
33	Define XHTML XHTML is the extensible hypertext mark-up language developed by the w3c to replace and enhance the currently used HTML	C310.5	BTL1
34	State whether standard TCP alone support mobile users or wireless links and why?	C310.5	BTL1

	No, standard TCP alone cannot support wireless links because wireless links have much higher error rates compared to wired links. The link layer may try to correct errors which results in higher delays and mobility (Handover between access points) may result in packet loss. In both cases standard TCP goes into slow start state		
35	What is the function of transport layer in WAP? The transport layer offers a bearer independent, consistent datagram-oriented service to the higher layers of the WAP architecture. Communication is done transparently over one of the available bearer services.	C310.5	BTL1
36	How is reliability achieved in WTP? WTP achieves reliability using duplicate removal, retransmission, acknowledgements and unique transaction identifiers	C310.5	BTL1
37	Distinguish TCP& UDP ? TCP UDP 1) Connection oriented protocol Connection less protocol 2) TCP is network friendly UDP is not network friendly 3) TCP guarantees in-order delivery or reliable data transmission using Retransmission techniques. Does not pull back in case of congestion to send packets in to an already congested network	C310.5	BTL4
38	What are the two functions of transport layer in the internet ? 1) Checksumming over user data. 2) Multiplexing/Demultiplexing from /to applications.	C310.5	BTL1
39	What are the capabilities of WMLScript? WMLScript offer several capabilities: Validity check of user input Access to device facilities Local user interaction Extension to the device software	C310.5	BTL1
40	Why do we need WCMP? The wireless control message protocol provides error handling mechanisms for WDP. WCMP is used for diagnostic and informational purposes. It is used by WDP nodes and gateways to report errors.	C310.5	BTL1
41	What are the features of BlackBerry OS? <u>NOV/DEC2018</u> <ul style="list-style-type: none"> • touchscreen • Multitasking. • BlackBerry Hub • Third-party applications • Released Devices • Canceled devices 	C310.5	BTL1
42	What are the disadvantages of BlackBerry OS? Cons Battery life not great in some models . Camera quality not great. Application support is bad. Almost all models have similar utility and features.	C310.5	BTL1

	(Minor change in visuals cz of the new OS)		
43	What is E-Commerce? E-commerce or electronic commerce, is the process of buying and selling goods, products and services over electronic systems such as internet, telephone and e-mail	C310.5	BTL1
44	list the pros of M- commerce? <ul style="list-style-type: none"> • Providing a wider reach or Accessibility • Reducing the transaction cost • Ubiquity • Personalization. • Reducing time. 	C310.5	BTL1
45	list the Cons of M- commerce? <ul style="list-style-type: none"> • Limited Speed • Small Screen SizeNo standard for M-commerce • Technology constraints of devices • Risky investment. 	C310.5	BTL1
46	Mention the responsibilities of Linux Kernel. <ul style="list-style-type: none"> • Device drivers • Power management • Networking Functionalities • Memory management • Device management • Resource access 	C310.5	BTL1
47	What do you mean by MMS? The multimedia messaging service (MMS) transfers asynchronous multi-media content. MMS supports different media types such as JPEG, GIF, text and AMR coded audio. There is no fixed upper bound for the message size. Depending on the network operator and device capabilities typical sizes are 30100 Kbytes.	C310.5	BTL1
48	List the Advantages of Monolithic Kernel OS design. <ul style="list-style-type: none"> <input type="checkbox"/> Provides good performance <input type="checkbox"/> Always runs in supervisor mode <input type="checkbox"/> More efficient and secure 	C310.5	BTL1
49	Specify the motivation of Monolithic Kernel OS design. Kernel contains the entire OS operations except shell code Motivation o OS services can run more securely and efficiently in supervisor mode	C310.5	BTL1
50	How is the operating system structured? <ul style="list-style-type: none"> <input type="checkbox"/> Kernel Layer <input type="checkbox"/> Shell Layer 	C310.5	BTL1
<u>PART B</u>			
1	Explain about Android OS , features, software stack , SDK and their layers (Pg No:177) <u>MAY/JUNE 2016, NOV/DEC 2017,NOV/DEC 2018</u>	C310.5	BTL5
2	Compare & contrast various popular mobile OS (Pg No:180) <u>NOV/DEC2016, APR/MAY 2017</u>	C310.5	BTL5
3	What is RFID? Explain the few applications in which RFID is useful? (notes) <u>NOV/DEC2016</u>	C310.5	BTL1

4	Explain the special constraints and requirements, components of Mobile OS (Pg No:169) <u>MAY/JUNE 2016</u>	C310.5	BTL5
5	Explain in detail about M Commerce, its applications, advantages and disadvantages (Pg No:199) <u>MAY/JUNE 2016 , NOV/DEC2016, APR/MAY 2017, NOV/DEC2018</u>	C310.5	BTL5
6	Explain the mobile payment systems and payment schemes (Pg No:206) <u>MAY/JUNE 2016 , NOV/DEC2016, NOV/DEC2017, APR/MAY2018, NOV/DEC2018</u>	C310.5	BTL5
7	Explain in detail components of iphone OS? List the special features of a Mobile OS? (Pg No:172) <u>APR/MAY2018</u>	C310.5	BTL5
8	Explain the features of Andriod OS? (Pg No:177)	C310.5	BTL5
9	Explain the features of Mobile OS (Pg No:169) <u>NOV/DEC2018</u>	C310.5	BTL5
10	Discuss about the constraints of Mobile OS (Pg No:167)	C310.5	BTL6
11	Explain about the various payment schemes (Pg No:209)	C310.5	BTL5
12	Explain android software stack with neat diagram? (pg no:195) <u>NOV/DEC 2018</u>	C310.5	BTL5
13	List the Features required of a mobile device to enable mobile commerce(Pg No:190)	C310.5	BTL1
14	Explain the types of M-payment schemes ? (Pg No:207)	C310.5	BTL5
15	Explain in detail about iphone OS? (Pg No:175)	C310.5	BTL5