Roll No. | | | | | | | | | | |

ANNA UNIVERSITY (UNIVERSITY DEPARTMENTS)

B.E. / B. Tech / B. Arch (Full Time) - END SEMESTER EXAMINATIONS, NOV / DEC 2024

B.TECH INFORMATION TECHNOLOGY
VII Semester
IT5702 & Mobile Computing
(Regulation 2019)

Time: 3hrs Max.Marks: 100

CO 1	Have knowledge on the architecture and protocols of 2G, 3G, and 4G cellular system.
CO 2	Deploy various protocols that support mobility at network layer and transport layer.
CO 3	Design and implement the user interfaces for mobile applications.
CO 4	Design the mobile applications that are aware of the resource constraints of mobile devices.
CO 5	Develop advanced mobile applications that access the databases and the web
CO 6	Understand the intricacies in deploying cellular networks and developing mobile applications based on resilient programming practices.

BL – Bloom's Taxonomy Levels
(L1 - Remembering, L2 - Understanding, L3 - Applying, L4 - Analysing, L5 - Evaluating, L6 - Creating)

PART- A (10 x 2 = 20 Marks)
(Answer all Questions)

Q. No	Questions	Marks	CO	BL
1	What is the impact of delay spread in the wireless radio channel? Specify the GSM's delay spread tolerance time.	2	CO 1	L2
2	A cellular system has a total bandwidth of 30 MHz, with each channel occupying 200 kHz. If the system uses a frequency reuse factor of K=7, calculate the number of channels per cell	2	CO 1	L3
3	Mention the respective compatible interfaces used in UMTS-UTRAN and GSM architectures to communicate with their user devices and core network.	2	CO 2	L1
4	How the reliable and efficient data transmission is assured in LTE uplink shared channel?	2	CO2	L3
5	In Mobile IP, what is Co-located COA? When the Foreign Agent acts as a Proxy ARP?	2	CO3	L3
6	How M-TCP (mobile TCP) avoids unnecessary retransmissions and buffer forwarding when a mobile host gets disconnected?	2	CO3	L3
7	Compare Multimodal and Multichannel UI in the aspects of human computer interaction while designing a mobile application.	2	CO4	L2
8	What are the three different compression techniques used in design patterns for limited memory?	2	CO4	L1
9	How notifications and alarms are scheduled in Android and iOS mobile applications?	2	CO5	L2
10	List down few cross platform mobile application development tools that use JavaScript codes.	2	CO6	L1

PART- B (5 x 13 = 65 Marks)

(Restrict to a maximum of 2 subdivisions)

Q. No	Questions	Marks	CO	BL
11 (a) (i)	A wireless network employs Frequency Division Multiple Access (FDMA) with the following parameters: Total bandwidth available: 30 MHz, Guard band between adjacent channels: 10 kHz and Channel bandwidth: 200 kHz. a) Calculate the total number of channels that can be allocated. b) If each channel supports a data rate of 64 kbps, determine the total system capacity in terms of data rate. c) If the system switches to Time Division Multiple Access (TDMA) with 5 time slots per channel, calculate the effective data rate per user. d) Discuss the trade-offs between FDMA and TDMA for the given scenario.	8 (2+2+2+2)	CO1	L4
(ii)	What are the main benefits and demerits of a spread spectrum system? How can DSSS systems benefit from multi-path propagation?	5	CO1	L3
	OR			
11 (b) (i)	In a cellular network, assume you are given a total of 120 duplex channels for communication with frequency reuse factor of N=7. a) Determine the number of channels allocated per cell. b) Draw a cellular cluster with N=7, indicating each cell within the cluster. Use a hexagonal layout to represent the cells. c) Label the channels assigned to each cell and explain the frequency reuse pattern.	8 (2+3+3)	CO1	L4
(ii)	Compare 2G, 3G and 4G of cellular networks in terms of a) access techniques b) coverage and deployment.	5	CO1	L3
12 (a) (i)	Describe the components of the UMTS network architecture and explain how UMTS ensures seamless handover between cells and networks.	8	CO2	L2
(ii)	Explain the roles of the following key components in IP Multimedia Subsystem: a) Call Session Control Functions b) HSS and MGCF	5 (2.5+2.5)	CO2	L1
	OR			
12 (b) (i)	With respect to LTE, explain a) The role of E-UTRAN and EPC in LTE architecture. b) The Significance of Hybrid Automatic Repeat Request (HARQ) c) How does SC-FDMA improve the uplink performance in LTE?	8 (4+2+2)	CO2	L2
(ii)	Explain the technique deployed in UMTS to handle multiple users within the same frequency band.	5	CO2	L1
13 (a) (i)	Compare Mobile IPv4 and Mobile IPv6 in terms of a) Addressing and Tunneling b) Mobility support and address space management	8 (4+4)	CO3	L3
(ii)	Consider a network scenario that deploys Indirect TCP (I-TCP) setup where the mobile node (MN) connects to the gateway using a TCP connection experiences a one-way delay between MN and the gateway is 100 ms, RTT between MN and Correspondent node (CN) is 300ms and the handover delay is 100ms. Calculate the RTT between the MN and CN before and after the handover process.	5	CO3	L4
	OR			
13 (b) (i)	Consider a scenario where a mobile node is moving from Network A to Network B. Assume the following parameters: Home Agent IP address: 192.168.0.1 Foreign Agent IP address: 192.168.1.1	8 (3+2+3)	CO3	L3

ADDITIONAL CONTROLLER OF EXAMINATIONS AU CHENNAI 600 025

	Mobile Node's Home Address (HoA): 10.0.0.2 Mobile Node's Care-of Address (CoA): 192.168.1.2 The Correspondent Node (CN) is sending data to the Mobile Node at its HoA. a) Describe the process of data transmission and routing when the Mobile Node is in Network B. b) What is the role of the Home Agent in forwarding the data to the Mobile Node? c) What happens if the Mobile Node moves to another network while communication is ongoing?			
(ii)	Assume a Snoop TCP enabled wireless network link with RTT of 150 ms between the sender and receiver, data loss rate of 5%, maximum segment size (MSS) of 1kb and snoop agent buffer size of 30kb. Explain the variations (if any) in throughput with and without Snoop TCP.	5	CO3	L4
14 (a) (i)	Consider a mobile application of your choice and explain the workflow for its development by considering all the valid limiting factors such as memory, power consumption and display layout.	13	CO4	L3
	OR			
14 (b) (i)	Discuss how you would optimize the mobile application to handle a large catalog of products while minimizing the memory footprint. What strategies would you use for efficient data storage and caching? How would you handle local storage vs cloud storage for user preferences and data related to the products?	13	CO4	L3
15 (a) (i)	Discuss the Android application architecture with diagram.	8	CO5	L1
(ii)	With an example explain the design of Location Based Services.	5	CO4 CO5 CO6	L3
	OR			
15 (b) (i)	Write a note on a) Layer animation in mobile application development b) Significance of cross platform design tools	8(4+4)	CO5	L1
(ii)	With an example explain the design of Event Based Programming	5	CO4 CO5 CO6	L3

CONTROLLER OF EXAMINATIONS ADDITIONAL AU CHENNAI 600 025

PART- C (1 x 15 = 15 Marks)

(Q.No.16 is compulsory)

Q. No	Questions	Marks	CO	BL
16.(i)	Assume that you have been assigned to analyze the development strategies of a mobile application that serves a global audience, providing services such as social networking, messaging, or e-commerce. Analyze how the development process differs between Android and iOS platforms to ensure a consistent user experience across both platforms with respect to a) Development Approach and Technologies b) Performance Optimization Strategies c) Platform-Specific Features and Integration d) Deployment and Maintenance	15	CO4 CO5 CO6	L5