Enrolment No./Seat No_____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE- SEMESTER–VII (NEW) EXAMINATION – WINTER 2024

Subject Code:2171004 Date:11-12-2024

Subject Name: Wireless Communication

Time:10:30 AM TO 01:00 PM Total Marks:70

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **Simple and non-programmable scientific calculators are allowed.**

Q.1	**(a)**	Define the following terms regarding wireless communication: Half duplex channel, Base station, Mobile Switching Centre.	**03**
	(b)	With figure explain Frequency Reuse concept in detail. Define cluster size and write the equation for system capacity.	**04**
	(c)	Draw a neat sketch of GSM architecture and state the functions of the following: BSC, MSC, VLR, HLR, AUC.	**07**
Q.2	**(a)**	Explain the concept of trunking and grade of service.	**03**
	(b)	Why hexagonal cell shape is preferred in cellular architecture?	**04**
	(c)	What is ZigBee? Explain in details ZigBee networks.	**07**
		OR	
	(c)	Calculate the worst-case carrier to interference ratio for a mobile receiver located at the boundary of its serving cell if it is under the influence of interfering signals from two nearest co-channels cells in a cellular system. Assume 3-sectors per cell and a reuse pattern of 4.	**07**
Q.3	**(a)**	Explain the concept of umbrella cell and cell dragging in brief.	**03**
	(b)	Explain the factors influencing small scale fading.	**04**
	(c)	Explain :(1) Cell splitting (2) Microcell Zone concept. To improve coverage and capacity of a system.	**07**
		OR	
Q.3	**(a)**	Explain Time Division Multiple Access (TDMA) in wireless communication with figure.	**03**
	(b)	Explain the Frequency diversity techniques briefly.	**04**
	(c)	Derive an expression for a ground reflection model assuming distance between transmitter and receiver antenna is very large compare to heights of the antennas.	**07**

Q.4 (a) Explain paging system. **03**

(b) Compare FDMA with CDMA technique. **04**

(c) Briefly discuss security threats in wireless network and suggest possible ways of protection. **07**

OR

Q.4 (a) A Wi-Fi system operates at 1 Mbps. Calculate the data transfer time required for a 20 KB file. **03**

(b) Describe evolution of 2G and 3G mobile phone system in brief. **04**

(c) Assume a cellular system of 32 cells with a cell radius of 1.6km, a total spectrum allocation that supports 336 traffic channels, and a reuse pattern of 7. Calculate the total service area covered with this configuration and number of channels per cell. **07**

Q.5 (a) Define mean excess delay, rms delay spread and excess delay spread. **03**

(b) Explain briefly how a RAKE receiver improves the received signal strength. **04**

(c) If a total of 33 MHz of band width is allocated to a particular FDD cellular telephone system which uses two 25 KHz simplex channels to provide full duplex voice and control channels, compute the number of channels available per cell if a system uses: (1) four cell reuse (2) seven cell reuse and (3) 12 cell reuse. **07**

OR

Q.5 (a) List types of diversity techniques and explain any one of them in 3-4 sentences. **03**

(b) Define following terms: **04**
(i) Dwell time (ii) Soft handoff (iii) mobile assisted handoff (iv) Transceiver

(c) In a cellular radio operating at 800 MHz, the transmitter and the receiver are separated by 500m from each other. The knife-edge diffraction object between them has a height of 30 m. The diffraction object is 100 m from transmitter. **07**
Find: (i) The excess path length (ii) The phase difference corresponding to the excess path length. (iii) The Fresnel-Kirchhoff diffraction parameter.

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