



MANAV RACHNA  
VidyaNagarikshali

MANAV RACHNA  
UNIVERSITY   
FORMERLY MANAV RACHNA COLLEGE OF ENGINEERING  
NAAC ACCREDITED A GRADE INSTITUTION

Dclared as State Private University under section 2f of the UGC act, 1956

## DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

"T2 Examination, March-2019"

Semester: IV

Subject: WIRELESS COMMUNICATION

Branch: CSE

Course Type: Core

Time: 90 Minutes

Program: B.Tech

Date of Exam: 16/03/19

Subject Code: ECH 251 B-T

Session: II

Course Nature: Hard

Max. Marks: 30

Signature: HOD/Associate HOD: 

*Note: Part A: All questions are compulsory. Each Question carries 2 marks.*

*Part B: Attempt any two questions. Each Question carries 10 marks.*

### PART-A

Q1. (a) Summarize the reasons why hexagonal geometry is preferred to represent cell coverage in cellular networks  
(b) Categorize the radio frequency spectrum with respect to various frequencies.  
(c) Assume a cellular system of 32 cells with 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, the number of channels per cell and total system capacity.  
(d) Define dwell time and MAHO.  
(e) Illustrate umbrella cell approach in cellular networks.

### PART-B

Q2. a. State the need for frequency reuse technique. Develop a honeycomb structure to locate Co-channels in the cellular system for  $i=3$  and  $j=2$ . (5)  
b. Illustrate hand off scenarios at cell boundary and also discuss how handoffs can be prioritized. (5)

Q3. a. i. Discuss about interference occurring in cellular structure (3)  
ii. If there are C channels in a trunked system, Estimate the traffic intensity per channel (2)

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b. i. Define grade of service and trunking (2)

ii. Calculate the number of times the cluster size of 4 have to be replicated in order to approximately cover the entire service area of  $1765 \text{ Km}^2$  with adequate number of uniform sized cells of  $7 \text{ Km}^2$  each. (3)

Q4.

- a. Describe how coverage and capacity can be improved when demand for wireless service increases. (5)
- b. An urban area has a population of 2 million residents. Three competing trunked mobile networks (M1, M2, and M3) provide cellular service in this area. M1 has 394 cells with 19 channels, M2 has 98 cells with 57 channels, and M3 has 49 cells with 100 channels. Estimate the number of users that can be supported by each network at 2% blocking. If each user averages 2 calls per hour at an average call duration of 3 minutes. Assuming that all three trunked systems are operated at maximum capacity estimate the market penetration of each cellular provider. (5)