Graphic Era
HILL UNIVERSITY
Established by an Act of the State Legislature of Uttarakhand (Adhiniyam Sankhya 12 of 2011)
University under section 2(f) of UGC Act, 1956

Term Evaluation (Odd) Semester Examination September 2025

Roll no.....

Name of the Course:B.Tech(ECE)
Semester: VII
Name of the Paper: Wireless Communication
Paper Code: TEC 701
Time: 1.5 hour **Maximum Marks: 50**

Note:
(i) Answer all the questions by choosing any one of the sub-questions
(ii) Each question carries 10 marks.

Q1. (10 Marks) **CO1**

a. Derive an expression to show the relationship between co-channel reuse ratio (Q) and the cluster size(N).

OR

b. (i) Explain meaning of the terms 'universal frequency reuse' and 'fractional frequency reuse'.

(ii) Define dwell time and the factors on which the dwell time depends?

Q2. (10 Marks) **CO1**

a.(i) A cellular system has a total of 32 cells, with radius of 1.6 km for each cell, using 7 cells in a cluster. It has been assigned a total of 336 duplex channels to handle the voice traffic. What is the area covered by the cellular system? Find the number of channels per cell and state how many simultaneous calls are possible over the cellular system.

(ii) Why a hexagon is preferred to represent a cell?

OR

b. Assuming 7 cell cluster and UE at the cell boundary, find an expression to indicate SIR in co-channel cells in the downlink.

Q3. (10 Marks) **CO1**

a. What do you mean by hand-off in a cellular system? Use power level consideration to explain the concept.

OR

b. How cell splitting is performed? Why it can increase the system capacity?

Q4. (10 Marks) **CO2**

a. Describe free space propagation model for mobile radio wave propagation.

OR

b. Consider a transmitter operating at 1800 MHz transmits 4 watt power. Assume path loss exponent to be 4, shadow effect of 10.5 dB and the power at reference point (d_0= 100m) is - 32 dB. Find the received power at a distance of 3 km from transmitter and the allowable path loss.

Q5. (10 Marks) **CO1/2**

a. State significance of two-ray ground reflection model. Explain using suitable diagrams and obtain an expression for the received signal power.

OR

b. Find SIR at the boundary of a cell in case of 7, 9, and 12 cells in a cluster. If the minimum required SIR for acceptable voice quality is 18 dB then which one cannot be preferred? Assume path loss exponent to be 4.