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

End Term (Odd) Semester Examination November 2025

Roll no.....

Name of the Program: B.Tech(ECE) Semester: VII
Name of the Course: Wireless Communication Course Code: TEC 701

Time: 3 Hours Maximum Marks: 100

Note:
(i) All the questions are compulsory.
(ii) Answer any two sub questions from a, b and c in each main question.
(iii) Total marks for each question is 20 (twenty).
(iv) Each sub-question carries 10 marks.

Q1. **CO1** (2X10=20 Marks)

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

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

c. (i) Why an umbrella cell approach is needed?
(ii) A cluster has 4 cells each with 7 km^2 coverage area. The cellular system has to provide coverage over an area of 1765 km^2. Find the number of times the cluster has to be repeated.

Q2. **CO2** (2X10=20 Marks)

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

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.

c. (i)Find the Fraunhofer distance for a transmitting antenna having the maximum dimension of 1m operating at 900 MHz frequency.

(ii) Define Fraunhofer region.

Q3. **CO3** (2X10=20 Marks)

a. What do you mean Distorted transmission? Explain the term constructive and destructive interference.
b. What do you mean by coherence time and Doppler spread? Use suitable mathematical derivations to explain.
c. Explain different types of small scale fading using suitable diagrams.

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Q4. **CO4** (2X10=20 Marks)

a. What do you mean by Rayleigh fading Model? Derive an expression to represent PDF of SNR under Rayleigh fading Model.

b. How does Maximal Ratio Combining function? Derive an expression to represent mean SNR improvement realized in Maximal Ratio Combining.

c. What is a Rake receiver and why is it used? How do the "fingers" in a Rake receiver work?

Q5. **CO5** (2X10=20 Marks)

a. State and explain the properties of maximum length sequence?

b. Draw the block diagram of direct sequence spread spectrum (DSSS) system transmitter and receiver and explain the function of each block.

c. Explain CDMA multiplexing (MUX) and demultiplexing (DEMUX) processes, and discuss their key features.