

**GANDHI INSTITUTE OF ENGINEERING AND TECHNOLOGY UNIVERSITY, ODISHA, GUNUPUR
(GIET UNIVERSITY)**

M.Tech. (First Semester) Regular/Supplementary Examinations, January - 2026
24MECPC11001 –Wireless and Mobile Communication
ECE



Time: 3 hrs

Maximum: 60 Marks

**Answer ALL questions
(The figures in the right hand margin indicate marks)**

PART – A**(2 x 5 = 10 Marks)**

| Q.1. Answer <i>ALL</i> questions | CO # | Blooms Level |
|---|------|--------------|
| a. What are the power-limited and bandwidth-limited channels? | CO2 | K1 |
| b. What is small-scale fading, and why is it a critical factor in wireless communication systems? | CO1 | K2 |
| c. Define Slotted ALOHA. | CO4 | K2 |
| d. Define spatial diversity and provide an example. | CO3 | K1 |
| e. What is adjacent channel interference? How can it be minimized? | CO1 | K2 |

PART – B**(10 x 5 = 50 Marks)**Answer *ALL* the questions

| | Marks | CO # | Blooms Level |
|--|-------|------|--------------|
| 2. a. Explain the concept of small-scale fading in wireless communication and discuss two prominent types: Rayleigh fading and Rician fading. Provide insights into the characteristics, causes, and implications of each type. | 5 | CO1 | K2 |
| b. Explain the multiple access methods with neat diagrams. | 5 | CO1 | K3 |
| (OR) | | | |
| c. How does interleaving play a crucial role in mitigating the impact of burst errors and improving the performance of wireless communication systems? | 5 | CO1 | K1 |
| d. What role does angular scattering play in the design and optimization of beamforming techniques in millimeter-wave and massive MIMO wireless systems? | 5 | CO1 | K3 |
| 3.a. Explain the paging system with the help of a block diagram. | 5 | CO2 | K2 |
| b. Explain different methods of priority handoff. | 5 | CO2 | K4 |
| (OR) | | | |
| c. Compare and construct three major multiple access technologies used in wireless communication. | 5 | CO2 | K4 |
| d. Calculate the capacity and spectral efficiency of a TDMA system using the following parameters: bandwidth efficiency factor $\eta_b = 0.9$, bit efficiency (with QPSK) $m = 2$, voice activity factor $\eta_v = 1.0$, one-way system bandwidth $B_w = 12.5$ MHz, information bit rate $R = 16.2$ kbps, and frequency reuse factor $N = 19$. | 5 | CO2 | K3 |
| 4.a. How do satellites contribute to wireless communication, and what advantages do they offer in terms of global coverage and connectivity? | 5 | CO3 | K2 |
| b. If a GSM system uses a frame structure where each frame consists of 8 time slots, and each time slot contains 156.25 bits, and data is transmitted at 270.833 kbps in the channel, find (i) the time duration of a bit, (ii) the time duration of a | 5 | CO3 | K3 |

slot, (iii) the time duration of a frame, (iv) how long must a user occupying a single time slot wait between two successive transmissions?

(OR)

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|------|---|---|-----|----|
| c. | Compare the principle and throughput of Slotted and Pure ALOHA. | 5 | CO3 | K2 |
| d. | Explain the working principle of Forward and Reverse Link. | 5 | CO3 | K3 |
| 5.a. | We consider a cellular system in which the total available voice channels to handle the traffic are 960. The area of each cell is 6 km ² and the total coverage area of the system is 2000 km ² . Calculate (a) the system capacity if the cluster size, N (reuse factor), is 4 and (b) the system capacity if the cluster size is 7. How many times would a cluster of size 4 have to be replicated to cover the entire cellular area? Does decreasing the reuse factor N increase the system capacity? Explain. | 5 | CO4 | K4 |
| b. | What is a basic cellular system? Explain with the help of a block diagram. | 5 | CO4 | K3 |
| (OR) | | | | |
| c. | Explain the Least Mean Square (LMS) algorithm for adaptive equalization. | 5 | CO4 | K1 |
| d. | Explain Practical Link Budget Design using Path Loss Models. | 5 | CO4 | K2 |
| 6.a. | Provide a detailed overview of the IS-95 (cdmaOne) system architecture. | 5 | CO2 | K3 |
| b. | Describe the architecture of the GSM network, emphasizing the interfaces between different components. | 5 | CO1 | K3 |
| (OR) | | | | |
| c. | Explain the various methods that increase the channel capacity and coverage. | 5 | CO1 | K1 |
| d. | Write short notes on (a) Polarization, (b) Frequency diversity. | 5 | CO3 | K3 |

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