	DPG Institute of Technology and Management **Sector 34, Gurugram HR 122004**
	Lesson Plan
	Course Name: Mobile and Communication Networks
	Faculty Name: Dr. Sonu Rana

No. of Lectures Hours/Week	**3**	**Exam Hours**	**3**
Total No of lectures	**36**	**Exam Marks**	**75**
Course Code	**PEC-ECE-410-G**		

Lecture No.	Topics to be Covered	Teaching Methodology/Pedagogy	Class Activity	Remarks
Section-A, Unit-1, CO-C410.1				
1	Introduction to Mobile Communication	Simple talk with applications	Group discussion on mobile networks	
2	Cellular concept – Cell structure and frequency reuse	Diagram and example explanation	Draw cell structure	
3	Cell splitting and channel assignment	Board explanation with examples	Q&A session	
4	Handoff and types of handoff	Diagram explanation	Identify types of hand off	
5	Interference and capacity improvement	**By Numerical**	Solve interference examples	
6	Power control and cell sectoring	**By Diagram**	Class discussion	
7	Wireless standards – Overview of 2G, 3G	PPT and video	Comparison table	
8	Overview of 4G and 5G cellular mobile standards	Real-world examples	Discussion on 5G applications	

9	Unit Test / Quiz	**Verbal**	Worksheet	
Section-B, Unit-2, CO-C410.2				
10	Propagation mechanism, reflection	Diagram explanation	Draw reflection diagram	
11	Refraction, diffraction, scattering	Board Diagram	Q&A	
12	Large-scale propagation & shadowing	Concept explanation	Case example	
13	Fading channels – multipath & small-scale	Animated PPT	Group talk	
14	Doppler shift, delay spread	**Board Explanation**	Solve numerical	
15	Coherence bandwidth & time	Derivation	Worksheet	
16	Fading types – flat, selective, slow, fast	Comparison chart	Prepare table	
17	Okumura and Hata models	Formula derivation	Practice problem	
18	PCS and microcell models	Board work	Case study	
19	Indoor propagation, partition loss	Diagram discussion	Notes writing	
20	Log-distance path loss model	Numerical solving	Practice sheet	
Section-3, Unit-2, CO-C410.3				
21	Multiple access – FDMA, TDMA,	**Comparison Chart**	Comparison activity	
22	CDMA, SDMA	**Board Discussion**		
23	BPSK, QPSK and variants	Derivation + diagram	Q&A	

24	QAM, MSK, GMSK	Stepwise explanation	Solve examples	
25	Multicarrier modulation – OFDM,	PPT + board		
26	OFDMA	With diagram		
27	Diversity – need and types	Explanation	Short notes	
28	Polarization, frequency, time diversity	Diagram derivation		
29	Unit-3 test / problems	Revision quiz		
Section-D, Unit-4, CO-C410.4, C410.5				
30	LTE – history and architecture	Diagram + study	Discussion	
31	MIMO systems, space-time processing	Real-life examples	Write key points	
32	GSM, EDGE	Comparison chart		
33	GPRS, IS-95,	With board explanation		
34	CDMA2000, WCDMA	Board Explaination		
35	UMTS architecture; 3G, 4G, 5G overview	PPT with examples	Debate – 4G vs 5G	
36	Revision and unit test	Oral recap	Worksheet	

Text/Reference Books:

1. WCY Lee, Mobile Cellular Telecommunications Systems, McGraw Hill, 1990.
2. WCY Lee, Mobile Communications Design Fundamentals, Prentice Hall, 1993.

3. Raymond Steele, Mobile Radio Communications, IEEE Press, New York, 1992.
4. AJ Viterbi, CDMA: Principles of Spread Spectrum Communications, Addison Wesley, 1995.
5. VK Garg &JE Wilkes, Wireless & Personal Communication Systems, Prentice Hall, 1996.
6. Erik Dahlman , 4G, LTE-Advanced Pro and The Road to 5G
7. Sassan Ahmadi, 5G NR: Architecture, Technology, Implementation, and Operation of 3GPP New Radio Standards Hardcover – 1 June 2019
8. T.S.Rappaport, "Wireless Communications Principles and Practice", PHI, II Edition, 2006.

Course Outcomes:

1. Understand cellular concepts and signal propagation in mobile communication.
2. Perform small simulations and plot results on modulation techniques.
3. Analysis performance of different generations of mobile communications.
4. Solve numerical problems on different multi-access and modulation schemes of mobile communications
5. Evaluate the performance of mobile communication systems through key parameters such as handoff, interference, and traffic engineering for effective network design.

CO-PO/PSO Mapping:

CO's	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO 410.1	3	-	-			2	2	-	2	3	2	3	3	-	2
CO 410.2	3	3	-		2	3		-	3	2	1	3	3	-	3
CO 410.3	3	3	3	4	3	3	3	-	2	3	-	3	3	-	2
CO 410.4	3	-	-					-		3	-	2	3	--	1
CO 410.5	3	3	3		3			-	1	1	-	1	3		-

3 = Strong correlation
2 = Moderate correlation
1 = Low correlation
- = No correlation

Signature of Staff In charge Signature of HoD