

Department of Electronics & Communication Engineering

Course File

CELLULAR AND MOBILE COMMUNICATIONS
(Course Code: EC851PE)

IV B.Tech II Semester

2023-24

Md. Fareed Ahamad
Assistant Professor



CELLULAR AND MOBILE COMMUNICATIONS

Check List

S.No	Name of the Format	Page No.
1	Syllabus	3
2	Timetable	5
3	Program Educational Objectives	8
4	Program Objectives	8
5	Course Objectives	9
6	Course Outcomes	9
7	Guidelines to study the course	10
8	Course Schedule	11
9	Course Plan	13
10	Unit Plan	18
11	Lesson Plan	19
12	Assignment Sheets	28
13	Tutorial Sheets	32
14	Evaluation Strategy	38
15	Assessment in relation to COB's and CO's	39
16	Mappings of CO's and PO's	40
17	Rubric for course	41
18	Mid-I and Mid-II question papers	42
19	Mid-I mark	44
20	Mid-II mark	48
21	Sample answer scripts and Assignments	51
22	Course materials like Notes, PPT's, etc.	56

ANURAG ENGINEERING COLLEGE

(An Autonomous Institution)

IV Year B.Tech. ECE - II Sem

L T/P/D C

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(EC851PE) CELLULAR AND MOBILE COMMUNICATIONS

Int. Marks:25 Ext. Marks:75 Total Marks:100

(PROFESSIONAL ELECTIVE-V)

Prerequisites: COMMUNICATIONS

Course Objectives:

1. To understand concepts of cellular and mobile radio systems
2. To design cellular radio system and the required antennas
3. To learn about digital cellular networks
4. To understand concepts of cellular and mobile radio systems
5. To design cellular radio system and the required antennas

UNIT I:

Cellular Mobile Radio Systems: Introduction to Cellular Mobile System, Performance criteria, uniqueness of mobile radio environment, operation of cellular systems, Hexagonal shaped cells, Analog and Digital Cellular systems.

Elements of Cellular Radio System Design: General description of the problem, concept of frequency reuse, Co-channel Interference Reduction Factor, desired C/I from a normal case in an omni-directional Antenna system, Cell splitting, consideration of the components of Cellular system.

UNIT II:

Interference: Introduction to Co-Channel Interference, real time Co-Channel interference, measurement, design of Antenna system, Antenna parameters and their effects, diversity receiver, non-co-channel interference-different types.

Cell Coverage For Signal And Traffic :Signal reflections in flat and hilly terrain, effect of human made structures, phase difference between direct and reflected paths, constant standard deviation, straight line path loss slope, general formula for mobile propagation over water and flat open area, near and long distance propagation, path loss from of a point to point prediction model.

UNIT III:

Cell Site and Mobile Antennas: Sum and difference patterns and their synthesis, omni directional antennas, directional antennas for interference reduction, space diversity antennas, umbrella pattern antennas, minimum separation of cell site antennas, high gain antennas.

Frequency Management and Channel Assignment: Numbering and grouping, setup access and paging channels channel assignments to cell sites and mobile units, channel sharing and borrowing, sectorization, overlaid cells, non-fixed channels segment.

UNIT IV:

Handoffs and Dropped Calls:

Handoff, dropped calls and cell splitting, types of handoff, handoff initiation, delaying handoff, forced handoff, mobile assisted handoff, Intersystem handoff, micro cells, vehicle locating methods, dropped call rates and their evaluation.

UNIT V:

DIGITAL CELLULAR NETWORKS: GSM architecture, GSM channels, GSM Standards, multiple access schemes -TDMA, CDMA.

TEXTBOOKS

1. Mobile Cellular Telecommunications – W.C.Y. Lee, Tata McGraw Hill, 2nd Edition, 2006.
2. Principles of Mobile Communications – Gordon L. Stuber, Springer International 2nd Edition, 2007.



REFERENCES

1. Wireless Communications - Theodore. S. Rappoport, Pearson education, 2nd Edition, 2002.
2. Wireless Communication and Networking – Jon W. Mark and Weihua Zhqung, PHI, 2005.

Expected Course Outcomes: At the end of the course students should be able to

1. Discuss cellular mobile radio concepts.
2. Identify various propagation effects.
3. To have knowledge of the mobile antenna specifications.
4. Understand the concepts of handoffs and dropped calls.
5. Understand the GSM architecture and Classify multiple access techniques in mobile communication

Timetable

		ANURAG ENGINEERING COLLEGE																																																		
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Anantnagar(V&M), Suryapet(De)																																																				
DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING																																																				
IV B. TECH (ECE-A) II-SEMESTER CLASS TIME TABLE A.Y.:2023-24																																																				
Block - E																																																				
RoomNo. 304							W.E.F:			13-11-2023																																										
DAY	09:30-10:20	10:20-11:10	11:10-11:20	11:20-12:10	12:10-01:00	1:00-1:40	1:40-2:25	2:25-3:10	3:10-3:15	3:15-4:00																																										
MON	SEMINAR	WCN	BREAK	CTPM	CMC	LUNCH	PROJECT STAGE - II																																													
TUE	WCN	CTPM		SEMINAR	CMC		PROJECT STAGE - II																																													
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FRI	CTPM	WCN		SEMINAR	CMC		PROJECT STAGE - II		SPORTS																																											
SAT	CMC	SEMINAR		CTPM	WCN		PROJECT STAGE - II		LIBRARY																																											
<table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th>S.No.</th> <th>COURSE CODE</th> <th colspan="3">COURSE NAME</th> <th colspan="2">NAME OF THE FACULTY</th> </tr> </thead> <tbody> <tr> <td style="background-color: yellow;">1</td> <td style="background-color: yellow;">EC851PE</td> <td style="background-color: yellow;">PE-V: CMC</td> <td colspan="2" style="background-color: yellow;">CELLULAR & MOBILE COMMUNICATION</td> <td colspan="2" style="background-color: yellow;">Mr.MD.FAREED AHAMAD (AC)</td> </tr> <tr> <td>2</td> <td>EC863PE</td> <td>PE-VI: WCN</td> <td colspan="2">WIRELESS COMMUNICATIONS&NETWORKS</td> <td colspan="2">Dr.I.VEEARAGHAVA RAO</td> </tr> <tr> <td>3</td> <td>CE820E</td> <td>OE-III: CTPM</td> <td colspan="2">PROJECT MANAGEMENT</td> <td colspan="2">Mr.G.Narender</td> </tr> <tr> <td>5</td> <td>EC801PW</td> <td></td> <td colspan="2">SEMINAR</td> <td colspan="2">Mr.MD.FAREED AHAMAD (AC)</td> </tr> <tr> <td>6</td> <td>EC802PW</td> <td></td> <td colspan="2">PROJECT STAGE - II</td> <td colspan="2">Dr.I.VEEARAGHAVA RAO</td> </tr> </tbody> </table>											S.No.	COURSE CODE	COURSE NAME			NAME OF THE FACULTY		1	EC851PE	PE-V: CMC	CELLULAR & MOBILE COMMUNICATION		Mr.MD.FAREED AHAMAD (AC)		2	EC863PE	PE-VI: WCN	WIRELESS COMMUNICATIONS&NETWORKS		Dr.I.VEEARAGHAVA RAO		3	CE820E	OE-III: CTPM	PROJECT MANAGEMENT		Mr.G.Narender		5	EC801PW		SEMINAR		Mr.MD.FAREED AHAMAD (AC)		6	EC802PW		PROJECT STAGE - II		Dr.I.VEEARAGHAVA RAO	
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Ananthagiri(V&M), Suryapet(DT)



DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

IV B.TECH (ECE-B) II-SEMESTER CLASS TIME TABLE A.Y.:2023-24

Block - E

RoomNo. 304

W.E.F:

13-11-2023

DAY	09:30-10:20	10:20-11:10	11:10-11:20	11:20-12:10	12:10-01:00	1:00-1:40	1:40-2:25	2:25-3:10	3:10-3:15	3:15-4:00
MON	WCN	CMC	BREAK	SEMINAR	CTPM	LUNCH	PROJECT STAGE - II			
TUE	SEMINAR	CMC		CTPM	WCN		PROJECT STAGE - II			
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3	CE82OE	OE-III: CTPM	PROJECT MANAGEMENT	Mr.G.Narender
5	EC801PW		SEMINAR	Mr.MD.FAREED AHAMAD
6	EC802PW		PROJECT STAGE - II	Dr.I.Veeraraghava RAO(AC)

Vision of the Institute

To be a premier Institute in the country and region for the study of Engineering, Technology and Management by maintaining high academic standards which promotes the analytical thinking and independent judgment among the prime stakeholders, enabling them to function responsibly in the globalized society.

Mission of the Institute

To be a world-class Institute, achieving excellence in teaching, research and consultancy in cutting-edge Technologies and be in the service of society in promoting continued education in Engineering, Technology and Management.

Quality Policy

Department of Electronics and Communication Engineering Quality policy is to ensure and maintain a low risk status from planned monitoring, maintenance and improvement of the institutes Quality Framework.

Vision of the Department

Our vision is to develop the department into a full-fledged Centre of learning in various fields of Electronics & Communication Engineering keeping in view the latest developments.

Mission of the Department

The Mission of the department is to turn out full-fledged Engineers in the field of Electronics Communication Engineering with an overall background suitable for making a successful career either in industry/research or higher education in India and abroad. To inculcate professional behavior, strong ethical values, innovative research capabilities and leadership abilities in the young minds so as to work with a commitment to the progress of the nation.

Program Educational Objectives (B.Tech. – ECE)

Graduates will be able to

PEO1: Excel in professional career & higher education, by acquiring knowledge in related fields of Electronics & Communication Engineering.

PEO2: Exhibit leadership in their profession, through technological ability and contemporary knowledge for solving the real life problems appropriately that are technically sound, economically feasible & socially acceptable.

PEO3: Adapt to the emerging technologies for sustenance by exhibiting professionalism, ethical attitude & communication skills in their relevant areas of interest by engaging in lifelong learning.

Program Outcomes (B.Tech. – ECE)

At the end of the Program, a graduate will have the ability to

PO 1: An ability to apply knowledge of mathematics, science, fundamentals of engineering to solve electronics and communication engineering problems.

PO 2: An ability to identify, formulate and analyze and solve complex electronics and communication Engineering using the first principles of mathematics and engineering sciences.

PO 3: An ability to develop solutions to electronics and communication systems to meet the specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.

PO 4: An ability to design and perform experiments of electronic circuits and systems, analyze and interpret data to provide valid conclusions.

PO 5: An ability to learn, select and apply appropriate techniques, resources and modern engineering tools including prediction and modelling, to complex electronics and communication systems.

PO 6: An ability to assess the knowledge of contemporary issues to the societal responsibilities relevant to professional practice.

PO 7: An ability to understand the impact of professional engineering solutions in societal and environmental contexts and demonstrate knowledge for the need of sustainable development.

PO 8: An ability to demonstrate the understanding of professional, ethical responsibilities and norms of engineering practice.

PO 9: An ability to function effectively as an individual and as a member or leader in diverse teams and in multidisciplinary settings.

PO 10: An ability to communicate effectively with the engineering community and with society at large.

PO 11: An ability to demonstrate knowledge and understanding of engineering and management principles and apply these to manage projects.

PO 12: An ability to recognize the need for, and engage in lifelong learning in the broadest context of technological change.

COURSE OBJECTIVES

On completion of this Subject/Course the student shall be able to:

S.No	Objectives
1	To understand concepts of cellular and mobile radio systems
2	To design cellular radio system and the required antennas
3	To learn about digital cellular networks
4	To understand concepts of cellular and mobile radio systems
5	To design cellular radio system and the required antennas

COURSE OUTCOMES

The expected outcomes of the Course/Subject are:

S.No	Outcomes
1.	Discuss cellular mobile radio concepts.
2.	Identify various propagation effects.
3.	To have knowledge of the mobile antenna specifications.
4.	Understand the concepts of handoffs and dropped calls.
5.	Understand the GSM architecture and Classify multiple access techniques in mobile communication.

Signature of faculty

Note: Please refer to Bloom's Taxonomy, to know the illustrative verbs that can be used to state the outcomes.

GUIDELINES TO STUDY THE COURSE / SUBJECT**Course Design and Delivery System (CDD):**

- The Course syllabus is written into number of learning objectives and outcomes.
- Every student will be given an assessment plan, criteria for assessment, scheme of evaluation and grading method.
- The Learning Process will be carried out through assessments of Knowledge, Skills and Attitude by various methods and the students will be given guidance to refer to the text books, reference books, journals, etc.

The faculty be able to –

- Understand the principles of Learning
- Understand the psychology of students
- Develop instructional objectives for a given topic
- Prepare course, unit and lesson plans
- Understand different methods of teaching and learning
- Use appropriate teaching and learning aids
- Plan and deliver lectures effectively
- Provide feedback to students using various methods of Assessments and tools of Evaluation
- Act as a guide, advisor, counselor, facilitator, motivator and not just as a teacher alone

Signature of HOD

Signature of faculty

Date:

Date:

COURSE SCHEDULE

The Schedule for the whole Course / Subject is: CELLULAR AND MOBILE COMMUNICATIONS

S. No.	Description	Duration (Date)		Total No. of Periods
		From	To	
1.	<p>UNIT-I: Cellular Mobile Radio Systems: Introduction to Cellular Mobile System, Performance criteria, uniqueness of mobile radio environment, operation of cellular systems, Hexagonal shaped cells, Analog and Digital Cellular systems. Elements of Cellular Radio System Design: General description of the problem, concept of frequency reuse, Co-channel Interference Reduction Factor, desired C/I from a normal case in an omni-directional Antenna system, Cell splitting, consideration of the components of Cellular system.</p>	15.11.2023	16.12.2023	14
2.	<p>UNIT-II: Interference: Introduction to Co-Channel Interference, real time Co-Channel interference, measurement, design of Antenna system, Antenna parameters and their effects, diversity receiver, non-co-channel interference-different types. Cell Coverage For Signal And Traffic :Signal reflections in flat and hilly terrain, effect of human made structures, phase difference between direct and reflected paths, constant standard deviation, straight line path loss slope, general formula for mobile propagation over water and flat open area, near and long distance propagation, path loss from of a point to point prediction model.</p>	07.12.2023	29.12.2023	16
3.	<p>UNIT-III: Cell Site and Mobile Antennas: Sum and difference patterns and their synthesis, omni directional antennas, directional antennas for interference reduction, space diversity antennas, umbrella pattern antennas, minimum separation of cell site antennas, high gain antennas. Frequency Management and Channel Assignment: Numbering and grouping, setup access and paging channels channel assignments to cell sites and mobile units, channel sharing and borrowing, sectorization, overlaid cells, non-fixed channels segment.</p>	30.12.2023	01.02.2024	16
4.	<p>UNIT-IV: Handoffs and Dropped Calls: Handoff, dropped calls and cell splitting, types of handoff, handoff initiation, delaying handoff, forced handoff, mobile assisted handoff, Intersystem handoff, micro cells, vehicle locating methods, dropped call rates and their evaluation.</p>	02.02.2024	02.03.2024	17

5.	UNIT-V: DIGITAL CELLULAR NETWORKS: GSM architecture, GSM channels, GSM Standards, multiple access schemes -TDMA, CDMA.	04.03.2024	04.04.2024	18
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Total No. of Instructional periods available for the course: 81 Hours

SCHEDULE OF INSTRUCTIONS - COURSE PLAN

Unit No.	Lesson No.	Date	No. of Periods	Topics / Sub-Topics	Objectives & Outcomes Nos.	References (Textbook, Journal)
1.	1	15.11.2023	1	Cellular Mobile Radio Systems: Introduction to Cellular Mobile System	1,2 1	Mobile Cellular Telecommunications – W.C.Y. Lee, Tata McGraw Hill, 2ndEdition.
	2	16.11.2023	1	Performance criteria,	1,2 1	Mobile Cellular Telecommunications – W.C.Y. Lee, Tata McGraw Hill, 2ndEdition.
	3	17.11.2023	1	operation of cellular systems	1,2 1	Mobile Cellular Telecommunications – W.C.Y. Lee, Tata McGraw Hill, 2ndEdition.
	4	18.11.2023	1	Hexagonal shaped cells	1,2 1	Mobile Cellular Telecommunications – W.C.Y. Lee, Tata McGraw Hill, 2ndEdition.
	5	20.11.2023	1	Analog and Digital Cellular systems.	1,2 1	Mobile Cellular Telecommunications – W.C.Y. Lee, Tata McGraw Hill, 2ndEdition.
	6	22.11.2023	1	Elements of Cellular Radio System Design: General description of the problem	1,2 1	Mobile Cellular Telecommunications – W.C.Y. Lee, Tata McGraw Hill, 2ndEdition.
	7	23.11.2023	1	concept of frequency reuse	1,2 1	Mobile Cellular Telecommunications – W.C.Y. Lee, Tata McGraw Hill, 2ndEdition.
	8	24.11.2023	1	Co-channel Interference Reduction Factor	1,2 1	Mobile Cellular Telecommunications – W.C.Y. Lee, Tata McGraw Hill, 2ndEdition.
	9	25.11.2023	2	desired C/I from a normal case in an omni-directional Antenna system	1,2 1	Mobile Cellular Telecommunications – W.C.Y. Lee, Tata McGraw Hill, 2ndEdition.
	10	28.11.2023	1	Cell splitting, consideration of the components of Cellular system.	1,2 1	Mobile Cellular Telecommunications – W.C.Y. Lee, Tata McGraw Hill, 2ndEdition.
	11	02.12.2023	2	consideration of the components of Cellular system.	1,2 1	Mobile Cellular Telecommunications – W.C.Y. Lee, Tata McGraw Hill, 2ndEdition.
	12	04.12.2023	1	uniqueness of mobile radio environment	1,2 1	Mobile Cellular Telecommunications – W.C.Y. Lee, Tata McGraw Hill, 2ndEdition.
2.	1	05.12.2023	1	Interference: Introduction to Co-Channel Interference	3,4 2	Mobile Cellular Telecommunications – W.C.Y. Lee, Tata McGraw Hill, 2ndEdition.

	2	06.12.2023	1	real time Co-Channel interference	3,4 2	Mobile Cellular Telecommunications – W.C.Y. Lee, Tata McGraw Hill, 2ndEdition.
	3	07.12.2023	1	measurement	3,4 2	Mobile Cellular Telecommunications – W.C.Y. Lee, Tata McGraw Hill, 2ndEdition.
	4	08.12.2023	1	design of Antenna system	3,4 2	Mobile Cellular Telecommunications – W.C.Y. Lee, Tata McGraw Hill, 2ndEdition.
	5	11.12.2023	1	Antenna parameters and their effects	3,4 2	Mobile Cellular Telecommunications – W.C.Y. Lee, Tata McGraw Hill, 2ndEdition.
	6	12.12.2023	1	diversity receiver	3,4 2	Mobile Cellular Telecommunications – W.C.Y. Lee, Tata McGraw Hill, 2ndEdition.
	7	13.12.2023	1	non-co-channel interference- different types.	3,4 2	Mobile Cellular Telecommunications – W.C.Y. Lee, Tata McGraw Hill, 2ndEdition.
	8	14.12.2023	1	Cell Coverage for Signal and Traffic: Signal reflections in flat and hilly terrain	3,4 2	Mobile Cellular Telecommunications – W.C.Y. Lee, Tata McGraw Hill, 2ndEdition.
	9	15.12.2023	2	effect of human made structures	3,4 2	Mobile Cellular Telecommunications – W.C.Y. Lee, Tata McGraw Hill, 2ndEdition.
	10	18.12.2023	1	phase difference between direct and reflected paths	3,4 2	Mobile Cellular Telecommunications – W.C.Y. Lee, Tata McGraw Hill, 2ndEdition.
	11	19.12.2023	2	constant standard deviation, straight line path loss slope	3,4 2	Mobile Cellular Telecommunications – W.C.Y. Lee, Tata McGraw Hill, 2ndEdition.
	12	21.12.2023	2	general formula for mobile propagation over water and flat open area	3,4 2	Mobile Cellular Telecommunications – W.C.Y. Lee, Tata McGraw Hill, 2ndEdition.
	13	22.12.2023	1	near and long-distance propagation	3,4 2	Mobile Cellular Telecommunications – W.C.Y. Lee, Tata McGraw Hill, 2ndEdition.
	14	23.12.2023	1	path loss from of a point-to-point prediction model	3,4 2	Mobile Cellular Telecommunications – W.C.Y. Lee, Tata McGraw Hill, 2ndEdition.
3.	1	27.12.2023	1	Cell Site and Mobile Antennas: Sum and difference patterns and their synthesis	3,4 2	Mobile Cellular Telecommunications – W.C.Y. Lee, Tata McGraw Hill, 2ndEdition.
	2	29.12.2023	1	omni directional antennas	3,4 2	Mobile Cellular Telecommunications – W.C.Y. Lee, Tata McGraw Hill, 2ndEdition.

	3	30.12.2023	2	directional antennas for interference reduction	5,6 3	Mobile Cellular Telecommunications – W.C.Y. Lee, Tata McGraw Hill, 2ndEdition.
	4	02.01.2024	1	space diversity antennas	5,6 3	Mobile Cellular Telecommunications – W.C.Y. Lee, Tata McGraw Hill, 2ndEdition.
	5	03.01.2024	1	umbrella pattern antennas	5,6 3	Mobile Cellular Telecommunications – W.C.Y. Lee, Tata McGraw Hill, 2ndEdition.
	6	05.01.2024	2	minimum separation of cell site antennas, high gain antennas.	5,6 3	Mobile Cellular Telecommunications – W.C.Y. Lee, Tata McGraw Hill, 2ndEdition.
	7	06.01.2024	1	Frequency Management and Channel Assignment: Numbering and grouping	5,6 3	Mobile Cellular Telecommunications – W.C.Y. Lee, Tata McGraw Hill, 2ndEdition.
	8	08.01.2024	1	setup access and paging channels channel assignments to cell sites and mobile units	5,6 3	Mobile Cellular Telecommunications – W.C.Y. Lee, Tata McGraw Hill, 2ndEdition.
	9	09.01.2024	1	channel sharing and borrowing	5,6 3	Mobile Cellular Telecommunications – W.C.Y. Lee, Tata McGraw Hill, 2ndEdition.
	10	17.01.2024	1	sectorization	5,6 3	Mobile Cellular Telecommunications – W.C.Y. Lee, Tata McGraw Hill, 2ndEdition.
	11	18.01.2024	1	overlaid cells	5,6 3	Mobile Cellular Telecommunications – W.C.Y. Lee, Tata McGraw Hill, 2ndEdition.
	12	19.01.2024 & 20.01.2024	2	non-fixed channels segment.	5,6 3	Mobile Cellular Telecommunications – W.C.Y. Lee, Tata McGraw Hill, 2ndEdition.
4	1	22.01.2024 & 24.01.2024	1	Handoffs and Dropped Calls: Handoff	5,6 3	Mobile Cellular Telecommunications – W.C.Y. Lee, Tata McGraw Hill, 2ndEdition.
	2	27.01.2024	1	dropped calls and cell splitting	5,6 3	Mobile Cellular Telecommunications – W.C.Y. Lee, Tata McGraw Hill, 2ndEdition.
	3	01.02.2024 & 30.01.2024	2	types of handoffs	5,6 3	Mobile Cellular Telecommunications – W.C.Y. Lee, Tata McGraw Hill, 2ndEdition.
	4	02-02-2024	1	handoff initiation	7,8 4	Mobile Cellular Telecommunications – W.C.Y. Lee, Tata McGraw Hill, 2ndEdition.
	5	05-02-2024	1	delaying handoff	7,8 4	Mobile Cellular Telecommunications – W.C.Y. Lee, Tata McGraw Hill, 2ndEdition.

	6	06-02-2024	1	forced handoff	7,8 4	Mobile Cellular Telecommunications – W.C.Y. Lee, Tata McGraw Hill, 2ndEdition.
	7	07-02-2024 & 08-02-2024	2	mobile assisted handoff	7,8 4	Mobile Cellular Telecommunications – W.C.Y. Lee, Tata McGraw Hill, 2ndEdition.
	8	12-02-2024	1	Intersystem handoff	7,8 4	Mobile Cellular Telecommunications – W.C.Y. Lee, Tata McGraw Hill, 2ndEdition.
	9	13-02-2024 & 16-02-2024	2	micro cells	7,8 4	Mobile Cellular Telecommunications – W.C.Y. Lee, Tata McGraw Hill, 2ndEdition.
	10	17-02-2024	1	vehicle locating methods	7,8 4	Mobile Cellular Telecommunications – W.C.Y. Lee, Tata McGraw Hill, 2ndEdition.
	11	20-02-2024	1	dropped call rates and their evaluation.	7,8 4	Mobile Cellular Telecommunications – W.C.Y. Lee, Tata McGraw Hill, 2ndEdition.
5	1	22-02-2024	1	DIGITAL CELLULAR NETWORKS: Introduction	7,8 4	Mobile Cellular Telecommunications – W.C.Y. Lee, Tata McGraw Hill, 2ndEdition.
	2	26-02-2024	1	GSM architecture	7,8 4	Mobile Cellular Telecommunications – W.C.Y. Lee, Tata McGraw Hill, 2ndEdition.
	3	27-02-2024	1	GSM architecture	7,8 4	Mobile Cellular Telecommunications – W.C.Y. Lee, Tata McGraw Hill, 2ndEdition.
	4	04-03-2024	1	GSM channels	9 5	Mobile Cellular Telecommunications – W.C.Y. Lee, Tata McGraw Hill, 2ndEdition.
	5	06-03-2024	1	GSM channels	9 5	Mobile Cellular Telecommunications – W.C.Y. Lee, Tata McGraw Hill, 2ndEdition.
	6	07-03-2024	1	GSM Standards	9 5	Mobile Cellular Telecommunications – W.C.Y. Lee, Tata McGraw Hill, 2ndEdition.
	7	09-03-2024	1	GSM Standards	9 5	Mobile Cellular Telecommunications – W.C.Y. Lee, Tata McGraw Hill, 2ndEdition.
	8	12-03-2024	1	multiple access schemes -TDMA	9 5	Mobile Cellular Telecommunications – W.C.Y. Lee, Tata McGraw Hill, 2ndEdition.
	9	14-03-2024	1	multiple access schemes -TDMA	9 5	Mobile Cellular Telecommunications – W.C.Y. Lee, Tata McGraw

10	19-03-2024 & 20-03-2024	2	multiple access schemes -CDMA	9 5		Mobile Cellular Telecommunications – W.C.Y. Lee, Tata McGraw Hill, 2ndEdition.
11	22-03-2024	1	multiple access schemes -CDMA	9 5		Mobile Cellular Telecommunications – W.C.Y. Lee, Tata McGraw Hill, 2ndEdition.
12	23-03-2024	1	Revision			
13	26-03-2024 & 27-03-2024	2	Revision			
14	28-03-2024	1	Old Question Paper Discussions			
15	01-04-2024 & 02-04-2024	1	Old Question Paper Discussions			
16	04-04-2024	1	Old Question Paper Discussions			

Signature of HOD

Signature of faculty

Date:

Date:

Note:

1. Ensure that all topics specified in the course are mentioned.
2. Additional topics covered, if any, may also be specified in bold.
3. Mention the corresponding course objective and outcome numbers against each topic.

Lesson No: 01, 02

Duration of Lesson: 1hr 30 min

Lesson Title: Cellular Mobile Radio Systems

Instructional / Lesson Objectives:

- To make students understand Coulomb's Law, Electric Field Intensity
- To familiarize students on EFI due to point, line, surface and volume charge distributions
- To understand students the concept of Gauss Law, Absolute Electric potential and PD.
- To provide information on Electric Dipole- Electrostatic Energy density.

Teaching AIDS : PPTs, Digital Board

Time Management of Class :

5 mins for taking attendance 70 min for the lecture delivery 15 min for doubts session
--

Assignment / Questions:

(Note: Mention for each question the relevant Objectives and Outcomes Nos.1,2,3,4 & 1,3..)

Refer assignment – I & tutorial-I sheets

Signature of faculty

LESSON PLAN (U-I)

Lesson No: 03, 04

Duration of Lesson: 1hr30 MIN

Lesson Title: Cellular Mobile Radio Systems

Instructional / Lesson Objectives:

- To make students understand Coulomb's Law, Electric Field Intensity
- To familiarize students on EFI due to point, line, surface and volume charge distributions
- To understand students the concept of Gauss Law, Absolute Electric potential and PD.
- To provide information on Electric Dipole- Electrostatic Energy density.

Teaching AIDS : PPTs, Digital Board

Time Management of Class :

5 mins for taking attendance 70 min for the lecture delivery 15 min for doubts session
--

Assignment / Questions:

(Note: Mention for each question the relevant Objectives and Outcomes Nos.1,2,3,4 & 1,3..)

Refer assignment – I & tutorial-I sheets

Signature of faculty

LESSON PLAN (U-II)

Lesson No: 05, 06

Duration of Lesson: 1hr30 MIN

Lesson Title: Interference

Instructional / Lesson Objectives:

- To make students understand the concept of Dielectrics and Capacitance Current.
- To familiarize students on Boundary Conditions, Ohms Law, Continuity Equation
- To understand students the Poisson's & Laplace Equation's and capacitance in wire.
- To provide information on solution for Poisson's & Laplace Equation's.

Teaching AIDS : PPTs, Digital Board

Time Management of Class :

5 mins for taking attendance 70 min for the lecture delivery 15 min for doubts session
--

Assignment / Questions:

(Note: Mention for each question the relevant Objectives and Outcomes Nos.1,2,3,4 & 1,3..)

Refer assignment-II & tutorial-II sheets.

Signature of faculty

LESSON PLAN (U-II)

Lesson No: 05, 06

Duration of Lesson: 1hr30 MIN

Lesson Title: Interference

Instructional / Lesson Objectives:

- To make students understand the concept of Dielectrics and Capacitance Current.
- To familiarize students on Boundary Conditions, Ohms Law, Continuity Equation
- To understand students the Poisson's & Laplace Equation's and capacitance in wire.
- To provide information on solution for Poisson's & Laplace Equation's.

Teaching AIDS : PPTs, Digital Board

Time Management of Class :

5 mins for taking attendance 70 min for the lecture delivery 15 min for doubts session
--

Assignment / Questions:

(Note: Mention for each question the relevant Objectives and Outcomes Nos.1,2,3,4 & 1,3..)

Refer assignment-II & tutorial-II sheets.

Signature of faculty

LESSON PLAN (U-III)

Lesson No: 05, 06

Duration of Lesson: 1hr30 MIN

Lesson Title: Interference

Instructional / Lesson Objectives:

- To make students understand the concept of Dielectrics and Capacitance Current.
- To familiarize students on Boundary Conditions, Ohms Law, Continuity Equation
- To understand students the Poisson's & Laplace Equation's and capacitance in wire.
- To provide information on solution for Poisson's & Laplace Equation's.

Teaching AIDS : PPTs, Digital Board

Time Management of Class :

5 mins for taking attendance 70 min for the lecture delivery 15 min for doubts session
--

Assignment / Questions:

(Note: Mention for each question the relevant Objectives and Outcomes Nos.1,2,3,4 & 1,3..)

Refer assignment-II & tutorial-II sheets.

Signature of faculty

LESSON PLAN (U-III)

Lesson No: 05, 06

Duration of Lesson: 1hr30 MIN

Lesson Title: Interference

Instructional / Lesson Objectives:

- To make students understand the concept of Dielectrics and Capacitance Current.
- To familiarize students on Boundary Conditions, Ohms Law, Continuity Equation
- To understand students the Poisson's & Laplace Equation's and capacitance in wire.
- To provide information on solution for Poisson's & Laplace Equation's.

Teaching AIDS : PPTs, Digital Board

Time Management of Class :

5 mins for taking attendance 70 min for the lecture delivery 15 min for doubts session
--

Assignment / Questions:

(Note: Mention for each question the relevant Objectives and Outcomes Nos.1,2,3,4 & 1,3..)

Refer assignment-II & tutorial-II sheets.

Signature of faculty

LESSON PLAN (U-IV)

Lesson No: 05, 06

Duration of Lesson: 1hr30 MIN

Lesson Title: Interference

Instructional / Lesson Objectives:

- To make students understand the concept of Dielectrics and Capacitance Current.
- To familiarize students on Boundary Conditions, Ohms Law, Continuity Equation
- To understand students the Poisson's & Laplace Equation's and capacitance in wire.
- To provide information on solution for Poisson's & Laplace Equation's.

Teaching AIDS : PPTs, Digital Board

Time Management of Class :

5 mins for taking attendance 70 min for the lecture delivery 15 min for doubts session
--

Assignment / Questions:

(Note: Mention for each question the relevant Objectives and Outcomes Nos.1,2,3,4 & 1,3..)

Refer assignment-II & tutorial-II sheets.

Signature of faculty

LESSON PLAN (U-IV)

Lesson No: 05, 06

Duration of Lesson: 1hr30 MIN

Lesson Title: Interference

Instructional / Lesson Objectives:

- To make students understand the concept of Dielectrics and Capacitance Current.
- To familiarize students on Boundary Conditions, Ohms Law, Continuity Equation
- To understand students the Poisson's & Laplace Equation's and capacitance in wire.
- To provide information on solution for Poisson's & Laplace Equation's.

Teaching AIDS : PPTs, Digital Board

Time Management of Class :

5 mins for taking attendance 70 min for the lecture delivery 15 min for doubts session
--

Assignment / Questions:

(Note: Mention for each question the relevant Objectives and Outcomes Nos.1,2,3,4 & 1,3..)

Refer assignment-II & tutorial-II sheets.

Signature of faculty

LESSON PLAN (U-V)

Lesson No: 05, 06

Duration of Lesson: 1hr30 MIN

Lesson Title: Interference

Instructional / Lesson Objectives:

- To make students understand the concept of Dielectrics and Capacitance Current.
- To familiarize students on Boundary Conditions, Ohms Law, Continuity Equation
- To understand students the Poisson's & Laplace Equation's and capacitance in wire.
- To provide information on solution for Poisson's & Laplace Equation's.

Teaching AIDS : PPTs, Digital Board

Time Management of Class :

5 mins for taking attendance 70 min for the lecture delivery 15 min for doubts session
--

Assignment / Questions:

(Note: Mention for each question the relevant Objectives and Outcomes Nos.1,2,3,4 & 1,3..)

Refer assignment-II & tutorial-II sheets.

Signature of faculty

LESSON PLAN (U-V)

Lesson No: 05, 06

Duration of Lesson: 1hr30 MIN

Lesson Title: Interference

Instructional / Lesson Objectives:

- To make students understand the concept of Dielectrics and Capacitance Current.
- To familiarize students on Boundary Conditions, Ohms Law, Continuity Equation
- To understand students the Poisson's & Laplace Equation's and capacitance in wire.
- To provide information on solution for Poisson's & Laplace Equation's.

Teaching AIDS : PPTs, Digital Board

Time Management of Class :

5 mins for taking attendance 70 min for the lecture delivery 15 min for doubts session
--

Assignment / Questions:

(Note: Mention for each question the relevant Objectives and Outcomes Nos.1,2,3,4 & 1,3..)

Refer assignment-II & tutorial-II sheets.

Signature of faculty

ASSIGNMENT – 1

This Assignment corresponds to Unit No. 1

Question No.	Question	Objective No.	Outcome No.
1	Explain the operation of Cellular mobile	1	1
2	Illustrate the Co-channel Interference Reduction Factor	1	1

Signature of HOD

Signature of faculty

Date:

Date:

ASSIGNMENT – 2

This Assignment corresponds to Unit No. 2

Question No.	Question	Objective No.	Outcome No.
1	Explain Antenna parameters and their effects.	2	2
2	Discuss about the Signal reflections in flat and hilly terrain.	2	2
3	Explain the general formula for mobile propagation over water and flat open area.	2	2

Signature of HOD

Signature of faculty

Date:

Date:

ASSIGNMENT – 3

This Assignment corresponds to Unit No. 3

Question No.	Question	Objective No.	Outcome No.
1	Explain space diversity antennas.	3	3
2	What is channel sharing and borrowing	3	3

Signature of HOD

Signature of faculty

Date:

Date:

ASSIGNMENT – 4

This Assignment corresponds to Unit No. 4

Question No.	Question	Objective No.	Outcome No.
1	Illustrate the dropped calls and cell splitting.	4	4
2	Discuss about dropped call rates and their evaluation	4	4

Signature of HOD

Signature of faculty

Date:

Date:

ASSIGNMENT – 5

This Assignment corresponds to Unit No. 5

Question No.	Question	Objective No.	Outcome No.
1	Explain GSM architecture	5	5
2	Compare TDMA, CDMA.	5	5

Signature of HOD

Signature of faculty

Date:

Date:

TUTORIAL – 1

This tutorial corresponds to Unit No. 1 (Objective Nos.: 1, Outcome Nos.: 1)

Q1. _____ is the maximum number of channels that can be provided in a fixed frequency band.

- a) **Channel capacity**
- b) Radio capacity
- c) Spectral capacity
- d) Carrier capacity

Q2. Which of the following measures spectrum efficiency of a wireless system?

- a) Channel capacity
- b) **Radio capacity**
- c) Spectral capacity
- d) Carrier capacity

Q3. Define frequency reuse.

Signature of HOD

Signature of faculty

Date:

Date:

TUTORIAL – 2

This tutorial corresponds to Unit No. 2 (Objective Nos.: 2, Outcome Nos.: 2)

Q1. _____ is the interference at a base station receiver that comes from the subscriber units in the surrounding cells.

- a) Forward channel interference
- b) Carrier interference
- c) Receiver interference
- d) **Reverse channel interference**

Q2. different types of non-co-channel interference

Signature of HOD

Signature of faculty

Date:

Date:

TUTORIAL SHEET – 3

This tutorial corresponds to Unit No. 3 (Objective Nos.: 3, Outcome Nos.: 3)

Q1. The term EIRP refers to

- a) **Effective isotropic radiated power**
- b) Effective radiated power
- c) Effective isolated radiated power
- d) Effective isotropic related power

Q2. In a start-up system an omnidirectional transmitting antennas are

- a) Directional
- b) **Omnidirectional**
- c) Yagi-uda pattern
- d) None of these

Q3. Which device can be used to reduce the number of transmitting antennas in mobile communication?

- a) multiplexers
- b) **Hybrid ring combiner**
- c) Attenuators
- d) Location antennas

Signature of HOD

Signature of faculty

Date:

Date:

TUTORIAL – 4

This tutorial corresponds to Unit No. 4 (Objective Nos.: 3, Outcome Nos.: 3)

Q1. What is the condition for handoff?

- a) **A mobile moves into a different cell while in conversation**
- b) A mobile remains in the same cell while in conversation
- c) A mobile moves to different cell when idle
- d) A mobile remains in the same cell and is idle

Q2. The time over which a call can be maintained within a cell without handoff is called _____

- a) Run time
- b) Peak time
- c) **Dwell time**
- d) Cell time

Q3. Which of the following is associated with the handoff in first generation analog cellular systems?

- a) **Locator receiver**
- b) MAHO
- c) Cell dragging
- d) Breathing cell

Signature of HOD

Signature of faculty

Date:

Date:

TUTORIAL SHEET – 5

This tutorial corresponds to Unit No. 5 (Objective Nos.: 5, Outcome Nos.: 5)

Q1. Which of the following is the world's first cellular system to specify digital modulation and network level architecture?

- a) **GSM**
- b) AMPS
- c) CDMA
- d) IS-54

Q2. Who sets the standards of GSM?

- a) ITU
- b) AT & T
- c) **ETSI**
- d) USDC

Q3. Which of the following feature makes impossible to eavesdrop on GSM radio transmission?

- a) SIM
- b) **On the air privacy**
- c) SMS
- d) Packet switched traffic

Signature of HOD

Signature of faculty

Date:

Date:

EVALUATION STRATEGY

Target (s)

- a. Percentage of Pass : 99%

Assessment Method (s) (Maximum Marks for evaluation are defined in the Academic Regulations)

- a. Daily Attendance
- b. Assignments
- c. Online Quiz (or) Seminars
- d. Continuous Internal Assessment
- e. Semester / End Examination

List out any new topic(s) or any innovation you would like to introduce in teaching the subjects in this semester

Case Study of any one existing application

Signature of HOD

Signature of faculty

Date:

Date:

COURSE COMPLETION STATUS

Actual Date of Completion & Remarks if any

Units	Remarks	Objective No. Achieved	Outcome No. Achieved
Unit 1	completed on 04.12.2023	1	1
Unit 2	completed on 23.12.2023	2	2
Unit 3	completed on 20.01.2024	3	3
Unit 4	completed on 20-02-2024	4	4
Unit 5	completed on 22-03-2024	5	5

Signature of HOD

Signature of faculty

Date:

Date:

Mappings

1. Course Objectives-Course Outcomes Relationship Matrix

(Indicate the relationships by mark “X”)

Course-Objectives \ Course-Outcomes	1	2	3	4	5
1	H				
2		H			
3			H	M	
4	M			H	
5					H

2. Course Outcomes-Program Outcomes (POs) & PSOs Relationship Matrix

(Indicate the relationships by mark “X”)

P-Outcomes \ C-Outcomes	a	b	c	d	e	f	g	h	i	j	k	l	PSO 1	PSO 2
1	L	L	M	L		L	L	L	L	H	L	L	H	
2	L	L	L	L	L	L	L	L	L	M	L	L	H	H
3	M	L	L	L	L	L		L	L	L	L	L		M
4	L	L			M		L	L	L	M	L	L	M	
5	L	L	L		L	L	L			L	L			

Rubric for Evaluation

Performance Criteria	Unsatisfactory	Developing	Satisfactory	Exemplary
	1	2	3	4
<i>Research & Gather Information</i>	Does not collect any information that relates to the topic	Collects very little information some relates to the topic	Collects some basic Information most relates to the topic	Collects a great deal of Information all relates to the topic
<i>Fulfill team role's duty</i>	Does not perform any duties of assigned team role.	Performs very little duties.	Performs nearly all duties.	Performs all duties of assigned team role.
<i>Share Equally</i>	Always relies on others to do the work.	Rarely does the assigned work - often needs reminding.	Usually does the assigned work - rarely needs reminding.	Always does the assigned work without having to be reminded
<i>Listen to other team mates</i>	Is always talking— never allows anyone else to speak.	Usually doing most of the talking-- rarely allows others to speak	Listens, but sometimes talks too much.	Listens and speaks a fair amount.



ANURAG Engineering College

(An Autonomous Institution)

Ananthagiri (V&M), Suryapet (Dt), Telangana – 508206.

IV B.Tech II Semester I MID Examinations, Jan 2024

Branch: ECE

Max. Marks: 20

Date: 10.01.2024 AN

Subject: Cellular and Mobile Communications

Time: 90 Min.

PART-A

Answer all the questions

5 X 1M=5 Marks

<u>Q.NO</u>	<u>Question</u>	<u>Course Outcome</u>	<u>Bloom's Level</u>
1.	Mention the Elements of basic Cellular Systems?	CO1	L1
2.	Define Cell Splitting?	CO1	L1
3.	Define Path Loss?	CO2	L1
4.	Define Cochannel Interference?	CO2	L1
5.	What is Space Diversity?	CO3	L1

PART-B

Answer the following

3 X 5M=15 Marks

<u>Q.NO</u>	<u>Question</u>	<u>Course Outcome</u>	<u>Bloom's Level</u>
6.	Explain the Concept of Frequency Reuse?	CO1	L3
	OR		
7.	Explain the Operation of Cellular Mobile System?	CO1	L3
8.	Explain Signal Reflections in flat and hilly terrain?	CO2	L3
	OR		
9.	Design an Omni directional Antenna System in K=4 Cell Pattern worst case?	CO2	L3
10.	Illustrate the Umbrella Pattern Antenna Types?	CO3	L3
	OR		
11.	Describe the Minimum Separation of Cell Site Antennas?	CO3	L3



ANURAG Engineering College

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Ananthagiri (V&M), Suryapet (Dt), Telangana – 508206.

IV B. Tech II Semester II MID Examinations, April 2024

Branch: ECE

Max. Marks: 20

Date: 08.04.2024 FN

Subject: Cellular and Mobile Communications

Time: 90 Min.

PART-A

Answer all the questions

5 X 1M=5 Marks

<u>Q.NO</u>	<u>Question</u>	<u>Course Outcome</u>	<u>Bloom's Level</u>
1.	What is Channel Borrowing?	CO3	L1
2.	What is Forced Handoff?	CO4	L1
3.	List different types of Handoffs?	CO4	L1
4.	Write the GSM Channels?	CO5	L1
5.	What is BTS?	CO5	L1

PART-B

Answer the following

3 X 5M=15 Marks

<u>Q.NO</u>	<u>Question</u>	<u>Course Outcome</u>	<u>Bloom's Level</u>
6.	Explain non-fixed channel Assignment?	CO3	L3
	OR		
7.	Discuss about Sectorization?	CO3	L3
8.	What are the various methods of delaying Handoff. Explain briefly?	CO4	L3
	OR		
9.	Discuss the Dropped call rates and their evaluation?	CO4	L3
10.	Explain about GSM Stations?	CO5	L3
	OR		
11.	Compare TDMA and CDMA?	CO5	L3

ANURAG ENGINEERING COLLEGE

IV B.Tech II Semester Mid I Marks List

S. No	Roll No	Name of the Student	Mid - I	Assignment - I	Mid - I Total
1	20C11A0402	AKHILA B	20	5	25
2	20C11A0403	ALEKYA AGGADI	17	5	22
3	20C11A0404	ALEKYA KOLA	20	5	25
4	20C11A0406	ARYAN MADDINENI	17	5	22
5	20C11A0407	BHAVANA KALANGI	20	5	25
6	20C11A0408	BRAMHARAJU KOLAHALAM	20	5	25
7	20C11A0409	CHANDANA THIRUMALAREDDY	18	5	23
8	20C11A0410	CHARAN SAI PONUGOTI	20	5	25
9	20C11A0411	CHARITHA CHITTURI	16	5	21
10	20C11A0412	DURGA SAI ADDANKI	16	5	21
11	20C11A0413	GANESH BHUMA	18	5	23
12	20C11A0414	GAYATHRI PRIYA POKKULA	20	5	25
13	20C11A0416	GOWTHAM VEMULA	19	5	24
14	20C11A0418	KARTHIK MUTHINENI	18	5	23
15	20C11A0419	KARTHIK THOTA	20	5	25
16	20C11A0420	KARTHIKEYA KANDE	16	5	21
17	20C11A0421	KAVYA MATHANGI	20	5	25
18	20C11A0422	KEERTHI MUDIMANIKYAM	20	5	25
19	20C11A0423	KIRANKUMAR MADHAMSHETTY	14	5	19
20	20C11A0424	LAKSHMI KRISHNA VAMSI BOMMINI	19	5	24

21	20C11A0426	LIKHITHA SATHULOORI	18	5	23
22	20C11A0428	MANOJ KUMAR KOLLU	18	5	23
23	20C11A0429	MOUNIKA PODILA	20	5	25
24	20C11A0430	NAGA GAYATHRI MUNDRA	20	5	25
25	20C11A0431	NAGENDRABABU BADAVATH	16	5	21
26	20C11A0432	NANDHA VIHARI GUNTURU	20	5	25
27	20C11A0433	NANDHU BHARGAVI BILLUPALLY	20	5	25
28	20C11A0434	NANDINI GUDIDHI	AB	5	5
29	20C11A0435	NANDITHA POTHUGANTI	16	5	21
30	20C11A0436	NASREEN MOHAMMAD	20	5	25
31	20C11A0437	NAVEEN KUMAR VEGINATI	18	5	23
32	20C11A0438	NAVYA GUJJULA	19	5	24
33	20C11A0439	PAVAN KARISHA	13	5	18
34	20C11A0440	PAVAN KUMAR ADDANKI	12	5	17
35	20C11A0441	PRAGATHI BOWDHODI	19	5	24
36	20C11A0443	RAVICHANDRA THIPIRISETTI	19	5	24
37	20C11A0444	RENUKA GUNDEBOINA	20	5	25
38	20C11A0445	REVATHI CHERUKURI	20	5	25
39	20C11A0446	RIZWAN SHAIK	18	5	23
40	20C11A0447	SAI CHARAN KONDAGADAPA	19	5	24
41	20C11A0448	SAI NITHIN YARRABOYNA	15	5	20
42	20C11A0449	SAI TEJA KANDIBANDA	12	5	17
43	20C11A0450	SAJID SK	17	5	22
44	20C11A0451	SAMEER MOHAMMAD	12	5	17
45	20C11A0452	SANDHYA KANAKAM	20	5	25

46	20C11A0453	SATHWIKA DEEKONDA	19	5	24
47	20C11A0455	SHAMINI PEDDOJU	20	5	25
48	20C11A0456	SHAMSHAD SHAIK	20	5	25
49	20C11A0457	SHARATH CHANDRA PILLALA	10	5	15
50	20C11A0458	SHIRISHA EEDA	20	5	25
51	20C11A0459	SHIRISHA JWALAM	20	5	25
52	20C11A0460	SHIVA KUMARI BADETI	20	5	25
53	20C11A0461	SHYAMALA GOURI THANGELLAPALLY	20	5	25
54	20C11A0462	SNEHA MALYALA	19	5	24
55	20C11A0463	SNEHA NALLA	19	5	24
56	20C11A0464	SONIYA MULAKALAPALLI	18	5	23
57	20C11A0465	SRI HARI RAJU DENUVUKONDA	9	5	14
58	20C11A0466	SRIKANTH YADAPALLI	16	5	21
59	20C11A0467	SRIYA ANNEM	18	5	23
60	20C11A0468	SUPRIYA KANTU	19	5	24
61	20C11A0469	SWATHI RAVILALA	20	5	25
62	20C11A0470	TILAK SAI NELAVELLI	10	5	15
63	20C11A0471	TIRUMALA VENU GOPAL DARAGANI	14	5	19
64	20C11A0472	TRINAINI REDDEM	15	5	20
65	20C11A0474	UPENDERA REDDY GOGIREDDY	11	5	16
66	20C11A0475	VEERAJANAKI USTHELA	18	5	23
67	20C11A0477	VINAY KUMAR DANDA	AB	AB	AB
68	20C11A0478	VINEELA PALLA	19	5	24
69	20C11A0479	YASHWANTH REDDY CHALLA	19	5	24

70	20C11A0480	YASHWITHA DONGARI	18	5	23
71	21C15A0401	DEEKSHITHA MUMMADI	20	5	25
72	21C15A0402	DIVYA JAMMALAMUDI	17	5	22
73	21C15A0403	JAYANTH GOULIKAR	19	5	24
74	21C15A0404	KULAVARDHAN REDDY SAMA	16	5	21
75	21C15A0405	LAKSHMI SOWMYA CHENNAKESHA	18	5	23
76	21C15A0406	MANISHA BANDI	20	5	25
77	21C15A0407	MOUNIKA VELISHALA	20	5	25
78	21C15A0408	PRUDHVI LAVUDYA	17	5	22
79	21C15A0409	RANJITH REDDY NUKALA	19	5	24
80	21C15A0410	SAI PRAKASH THANNERU	18	5	23
81	21C15A0412	SHAIK KHALID	16	5	21
82	21C15A0413	SRIYA YANNAM	20	5	25
83	21C15A0414	VENNELA KANAPARTHI	14	5	19
84	21C15A0415	YAMUNA GOVINDA	19	5	24
85	16C11A0463	PRAVALLIKA KARNATI	20	5	25

ANURAG ENGINEERING COLLEGE

IV B.Tech II Semester Mid II Marks List

S. No	Roll No	Name of the Student	Mid - II	Assignment - II	Mid - II Total
1	20C11A0402	AKHILA B	20	5	25
2	20C11A0403	ALEKYA AGGADI	20	5	25
3	20C11A0404	ALEKYA KOLA	20	5	25
4	20C11A0406	ARYAN MADDINENI	16	5	21
5	20C11A0407	BHAVANA KALANGI	20	5	25
6	20C11A0408	BRAMHARAJU KOLAHALAM	19	5	24
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9	20C11A0411	CHARITHA CHITTURI	18	5	23
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11	20C11A0413	GANESH BHUMA	18	5	23
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15	20C11A0419	KARTHIK THOTA	17	5	22
16	20C11A0420	KARTHIKEYA KANDE	18	5	23
17	20C11A0421	KAVYA MATHANGI	20	5	25
18	20C11A0422	KEERTHI MUDIMANIKYAM	20	5	25
19	20C11A0423	KIRANKUMAR MADHAMSHETTY	15	5	20

20	20C11A0424	LAKSHMI KRISHNA VAMSI BOMMINI	20	5	25
21	20C11A0426	LIKHITHA SATHULOORI	19	5	24
22	20C11A0428	MANOJ KUMAR KOLLU	17	5	22
23	20C11A0429	MOUNIKA PODILA	20	5	25
24	20C11A0430	NAGA GAYATHRI MUNDRA	20	5	25
25	20C11A0431	NAGENDRABABU BADAVATH	12	5	17
26	20C11A0432	NANDHA VIHARI GUNTURU	20	5	25
27	20C11A0433	NANDHU BHARGAVI BILLUPALLY	20	5	25
28	20C11A0434	NANDINI GUDIDHI	20	5	25
29	20C11A0435	NANDITHA POTHUGANTI	20	5	25
30	20C11A0436	NASREEN MOHAMMAD	20	5	25
31	20C11A0437	NAVEEN KUMAR VEGINATI	18	5	23
32	20C11A0438	NAVYA GUJJULA	20	5	25
33	20C11A0439	PAVAN KARISHA	13	5	18
34	20C11A0440	PAVAN KUMAR ADDANKI	11	5	16
35	20C11A0441	PRAGATHI BOWDHODI	19	5	24
36	20C11A0443	RAVICHANDRA THIPIRISETTI	18	5	23
37	20C11A0444	RENUKA GUNDEBOINA	20	5	25
38	20C11A0445	REVATHI CHERUKURI	20	5	25
39	20C11A0446	RIZWAN SHAIK	17	5	22
40	20C11A0447	SAI CHARAN KONDAGADAPA	19	5	24
41	20C11A0448	SAI NITHIN YARRABOYNA	17	5	22

42	20C11A0449	SAI TEJA KANDIBANDA	13	5	18
43	20C11A0450	SAJID SK	15	5	20
44	20C11A0451	SAMEER MOHAMMAD	15	5	20
45	20C11A0452	SANDHYA KANAKAM	20	5	25
46	20C11A0453	SATHWIKA DEEKONDA	20	5	25
47	20C11A0455	SHAMINI PEDDOJU	19	5	24
48	20C11A0456	SHAMSHAD SHAIK	20	5	25
49	20C11A0457	SHARATH CHANDRA PILLALA	18	5	23
50	20C11A0458	SHIRISHA EEDA	18	5	23
51	20C11A0459	SHIRISHA JWALAM	19	5	24
52	20C11A0460	SHIVA KUMARI BADETI	20	5	25
53	20C11A0461	SHYAMALA GOURI THANGELLAPALLY	20	5	25
54	20C11A0462	SNEHA MALYALA	20	5	25
55	20C11A0463	SNEHA NALLA	20	5	25
56	20C11A0464	SONIYA MULAKALAPALLI	18	5	23
57	20C11A0465	SRI HARI RAJU DENUVUKONDA	9	5	14
58	20C11A0466	SRIKANTH YADAPALLI	16	5	21
59	20C11A0467	SRIYA ANNEM	19	5	24
60	20C11A0468	SUPRIYA KANTU	18	5	23
61	20C11A0469	SWATHI RAVILALA	20	5	25
62	20C11A0470	TILAK SAI NELAVELLI	9	5	14
63	20C11A0471	TIRUMALA VENU GOPAL DARAGANI	9	5	14
64	20C11A0472	TRINAINI REDDEM	17	5	22
65	20C11A0474	UPENDERA REDDY GOGIREDDY	16	5	21

66	20C11A0475	VEERAJANAKI USTHELA	20	5	25
67	20C11A0477	VINAY KUMAR DANDA	AB	AB	AB
68	20C11A0478	VINEELA PALLA	20	5	25
69	20C11A0479	YASHWANTH REDDY CHALLA	19	5	24
70	20C11A0480	YASHWITHA DONGARI	20	5	25
71	21C15A0401	DEEKSHITHA MUMMADI	20	5	25
72	21C15A0402	DIVYA JAMMALAMUDI	17	5	22
73	21C15A0403	JAYANTH GOULIKAR	19	5	24
74	21C15A0404	KULAVARDHAN REDDY SAMA	17	5	22
75	21C15A0405	LAKSHMI SOWMYA CHENNAKESHA VA	19	5	24
76	21C15A0406	MANISHA BANDI	20	5	25
77	21C15A0407	MOUNIKA VELISHALA	20	5	25
78	21C15A0408	PRUDHVI LAVUDYA	19	5	24
79	21C15A0409	RANJITH REDDY NUKALA	19	5	24
80	21C15A0410	SAI PRAKASH THANNERU	17	5	22
81	21C15A0412	SHAIK KHALID	20	5	25
82	21C15A0413	SRIYA YANNAM	20	5	25
83	21C15A0414	VENNELA KANAPARTHI	20	5	25
84	21C15A0415	YAMUNA GOVINDA	20	5	25
85	16C11A0463	PRAVALLIKA KARNATI	20	5	25



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Program			YEAR	SEMESTER	MID EXAMINATION							
<input checked="" type="checkbox"/> B.Tech.	<input type="checkbox"/> M.Tech.	<input type="checkbox"/> M.B.A.	IV	II	44							
HALL TICKET NO.			Regulation : R18 Branch or Specialization: ECE - A									
20011AD414			Signature of Student: Gayathri priya P									
Course: cellular & mobile communication			Signature of invigilator with date: [Signature]									
Q.No. and Marks Awarded			Signature of the Evaluator: [Signature]									
1	2	3	4	5	6	7	8	9	10	11	Maximum Marks	Marks Obtained
1	1	1	1	1	5	-	-	5	5	-	20	20

(Start Writing From Here)

PART-A

1A) channel Borrowing :- Channel borrowing is a normal FCS condition when all the channels are occupied then the channel is borrowed from neighbouring cell is called channel borrowing.

2A) Forced handoff is the type of handoff. It should not happen. But it should be happening forcibly.

3A) Types of handoff

- 1) Intersector or soft handoff
- 2) Inter cell or soft hand off
- 3) soften - soft handoff
- 4) hard handoff

4A) There are two types of GSM channels

- 1) Traffic channel (TCH)
- 2) control channel (CCH)

- Traffic channel carries encoded speech and user data.
- control channel carries transmit and mobile signals & signalling.
- control channel is sub categorized into 3 types:-
 - 1) Frequency correction channel
 - 2) Synchronization channel
 - 3) Broad band control channel.

5A) BTs - Base transceiver station. It the term BTs is denoted as Base station in GSM terminology.

→ It contains radio equipment and antenna necessary to communicate radio with mobile station.

PART - B

6A) Fixed channel assignment :- Fixed channel assignment algorithm is most commonly adopted in cellular system.

→ In this algorithm each channel is assigned to each cell in higher vehicle in its cell.

Dynamic channel assignment :- In dynamic channel assignment no fixed channel is assigned to cell.

→ so, all channels has N composite cell. In Des channel is directly assigned to mobile unit.

Hybrid channel assignment :- Hybrid channel assignment is the combination of fixed channel assignment and dynamic channel assignment.

→ The total number of frequencies one portion is occupied by fixed channel assignment and rest is used by dynamic channel assignment.

Channel Borrowing assignment :- Channel borrowing assignment is normal condition.

→ When fixed channel assignment is occupied by all channels in a cell then channel is borrowed from neighbouring cell.

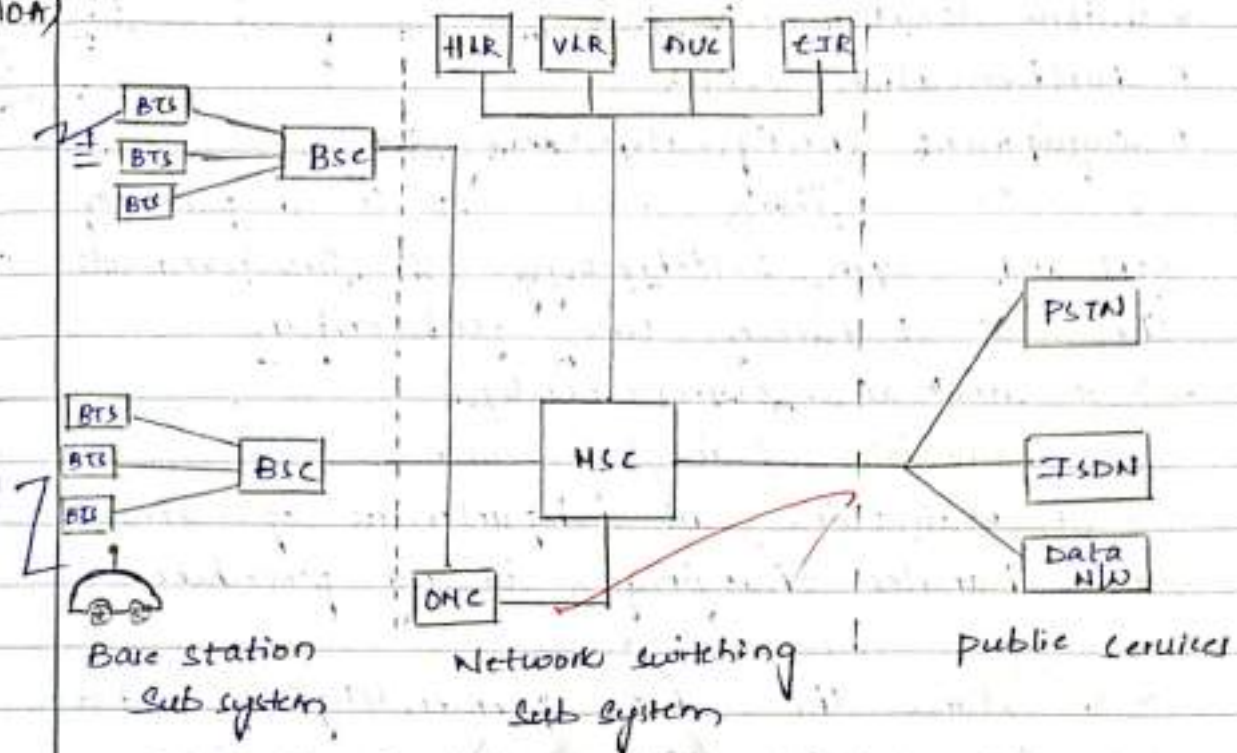
Forcible channel borrowing :- In forcible channel borrowing if the channel is in operation then situation warrants it. The channel is borrowed from neighbouring cell.

→ Forcible channel borrowing has a chance to reduce co-channel interference.

→ The distance between to reuse channel should be minimum to avoid co-channel and adjacent channel interference.

- 9A) Dropped call rates :- Dropped call rate is measured in percentage that number of calls discontinued permanently compared to total number of calls attempted.
- ⇒ Dropped call :- Dropped call is occurred when two parties is in conversation unexpectedly the call is terminated before two parties end the call intentionally.
 - ⇒ Measurement :- Dropped call rates is crucial in telecommunication industry and mobile network.
 - Dropped call rates is measured in terms of percentage.
 - ⇒ causes :- There are various causes for dropped calls including network congestion, signal strength, issue between two cell towers.
 - ⇒ Network performance monitoring :- Network performance monitoring is crucial in telephone companies. These companies has sophisticated tools to track the dropped calls rates.
 - ⇒ Quality of service :- Quality of service is a telephone regulatory access to monitor service providers.
 - QoS provides service level agreement.
 - ⇒ Customer experience :- Sometimes dropped call rates negatively impact the customer experience if it is not addressed promptly.
 - ⇒ Service providers provides customer feedbacks.
 - ⇒ Benchmarking :- Benchmarking is often service providers to identify competitiveness and improvement areas.
-

10A)



⇒ GSM architecture consists of 3 parts

- 1) Base station subsystem
- 2) Network switching subsystem
- 3) public services.

⇒ Base station subsystem - BSC is a selection of traditional cellular system

⇒ It consists of BSC and BTS

⇒ Base station controller :- BSC is a mobile network component. It controls one or more BTS's.

⇒ Base transceiver station - It is termed as Base station in GSM technology.

→ It contains antenna and radio equipment necessary to communicate with radio and mobile station.

⇒ Network switching subsystem

- * Mobile switching center.
- * operational & Managing center.
- * Home location register.

* Visitor location register.

* Authentication center.

* Equipment identification register.

⇒ Mobile switching center :- It is a part of GSM and CDMA technology. It interconnects the call between two subscribers.

→ It acts as control center.

⇒ Operational & Managing center :-

→ It maintains all department operations.

→ It handles charging & billing procedures.

⇒ Home location Register :-

→ It stores the data permanently of subscriber like profile, status and information.

⇒ Visitor location register :-

→ It stores temporary data of a subscriber.

→ It works co-ordinates with VLR.

⇒ Authentication center :-

→ It provides security.

→ Contains secret code.

→ protects from frauds.

→ provides authentications.

⇒ Public service telephone network :-

→ PSTN is a worldwide collection of telephone networks.

⇒ It uses SS7 as signalling protocol.

→ It is used as analog at past but present used for digital systems.

⇒ Integrated service digital network :-

→ It is a international communication.

→ It is used to transmit voice, image, data b/w Tx and Rx.



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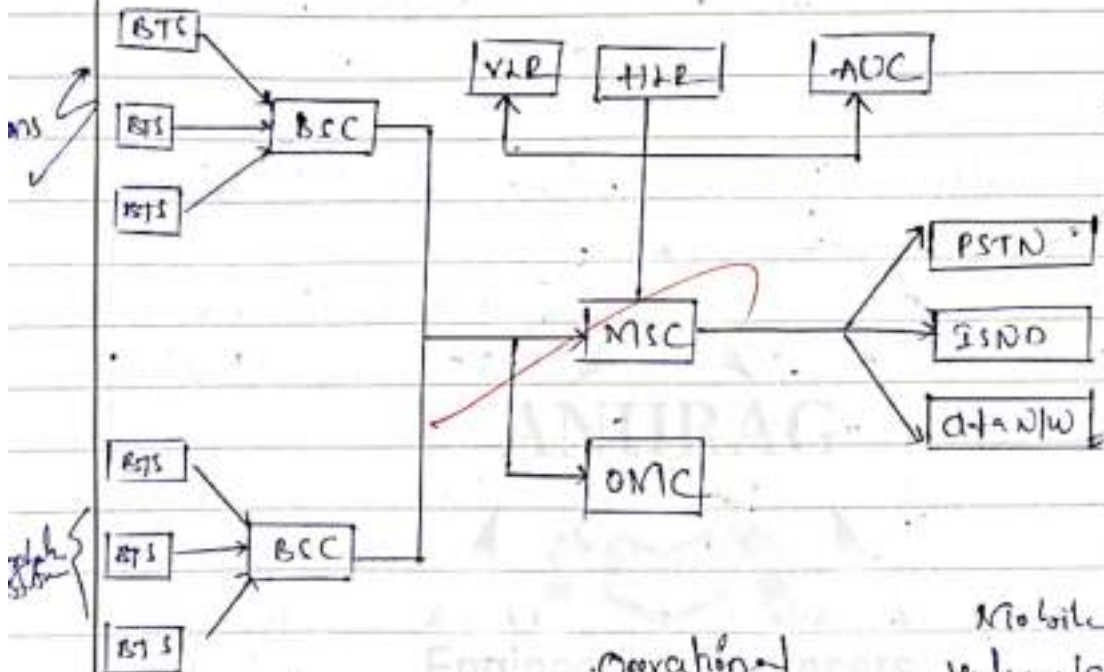
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Program			YEAR	SEMESTER	MID EXAMINATION					
B.Tech.	M.Tech.	M.B.A.	IV	II	II					
HALL TICKET NO.			Regulation: D-18		Branch or Specialization: ECE					
20011A0431			Signature of Student: <i>S. Nayan Chandra</i>							
Course: Cellular and Mobile Communications			Signature of invigilator with date: <i>[Signature]</i>							
Q.No. and Marks Awarded			Signature of the Evaluator: <i>[Signature]</i>							
1	2	3	4	5	6	7	8	9	10	11
1	-	-	0	1	4	-	-	2	4	-
			Maximum Marks	20	Marks Obtained	12				

(Start Writing From Here)

10 Explain about GSM stations?

GSM stations :-



Base station sub system

Operational station sub system

GSM stations

Mobile network

about GSM stations :-

→ Base station Ctr which is connected to the base-transmitting station and which is directly connected to the mobile station.

→ Base station Ctr are Base station sub systems which are part of the and directly connected to the mobile station Ctr

which are part of the Operation station sub system and this part are directly connected to the Home location register

which is used to permanent calls and

also connected to visitor location register

→ which is used for only temporary calls.

→ and also connected to the authentication stations.

→ which are directly connected to the three parts this are PSTN and ISDN and data networks.

→ ISDN are used for all connecting are to the interface to the base station sub system and also occupied many no. of sub system areas they are generally connected to the main of the center.

Q6 What are the various Methods of Channel Assignment. Explain briefly. Non-Fixed Channel Assignment.

They are 5 types :-

01. Fixed Channel Assignment.
02. dynamic Channel Assignment
03. hybrid Channel Assignment
04. Borrowing Channel Assignment.
05. Flexible Channel Assignment.

→ Fixed Channel Assignment :-

Fixed Channel Assignment are algorithm. This algorithm used for collect many devices.

→ dynamic Channel Assignment :-

dynamic Channel Assignment are 1st algorithm used. in this algorithm only

no fixed Channel Assignment.

→ hybrid Channel Assignment :-

hybrid Channel Assignment are combination of both fixed Channel Assignment and dynamic Channel Assignment.

→ Borrowing Channel Assignment :-

Borrowing Channel Assignment are only have fixed Channel Assignment.

→ Flexible Channel Assignment :-

Flexible Channel Assignment are combination of all Channel Assignment. they are fixed, dynamic, hybrid and borrowing Channel Assignment.

07 Discuss the Dropped Call rates and its Evaluation:

Dropped Call rates are generally divided into the connection between a dropped Call rates are generally divided into 20 May by a. by a.

01. Measurement:-

In dropped Call rates are used by Measurement into automatically cut the Call and disconnect the Call. will be out put after time.

02. Caused:-

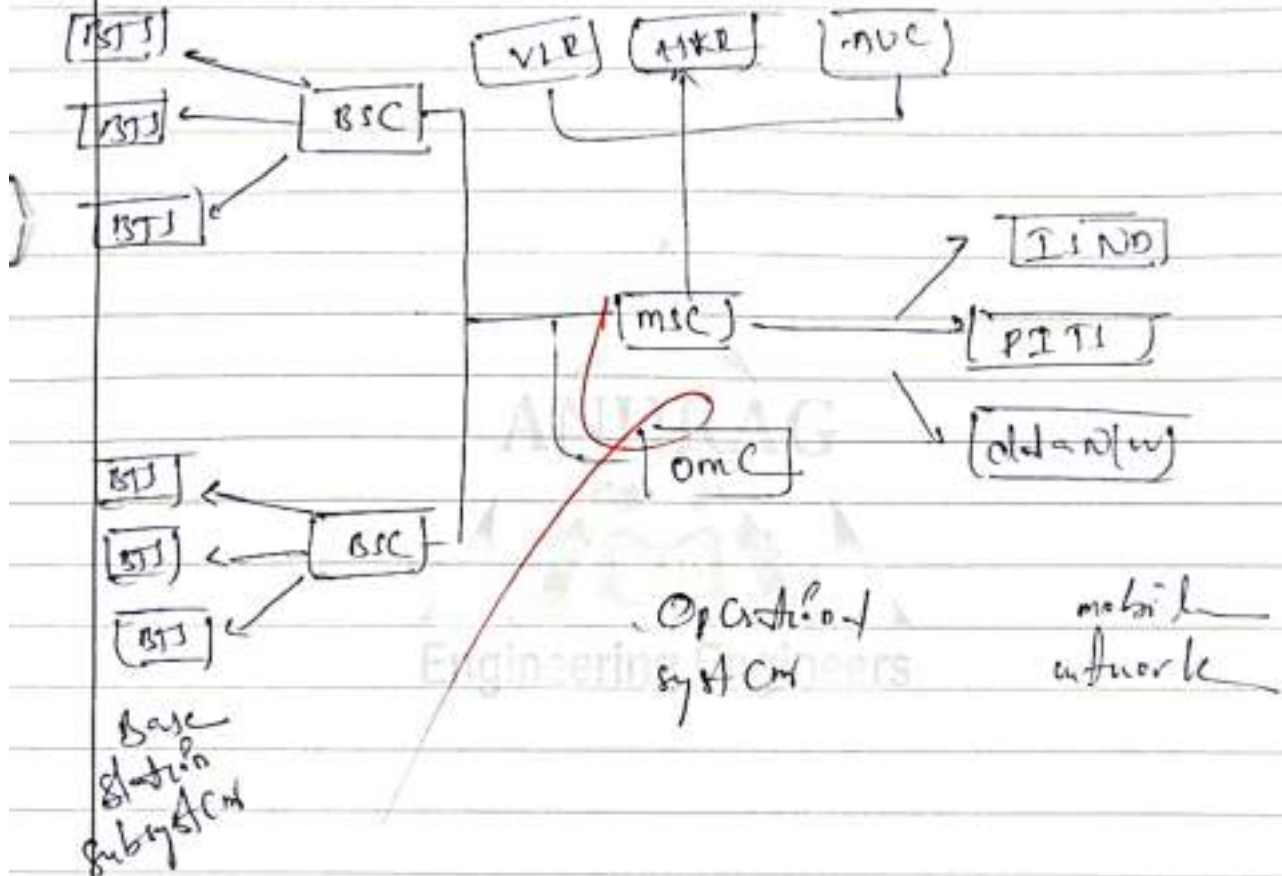
Dropped Call rates caused by connection b/w caused Call & so many times without interference.

03.

Q5) what is BTS?

Base Transmitted system which is directly connected to the Base station Ctr. which is connected to the mobile communication.

Q4) write the GSM channel?



Q1) what is Channel Borrowing?

Borrowing Channel Assignment have only fixed Channel assignment is known as Channel Borrowing.

① Explain Non-fixed channel Assignment?

1. Fixed channel Assignment: The fixed channel Assignment Algorithm is the most common algorithm adopted in many cellular systems. In this algorithm, each cell assigns its own radio channels to the vehicles within its cell.

2. Dynamic channel Assignment: In DCA no. fixed channels are assigned to each cell. Therefore, any channel in a composite of 'N' radio channels can be assigned to the mobile unit on the basis of overall system performance. DCA can also be used during a call.

3. Hybrid channel Assignment: Hybrid channel Assignment is a combination of FCA and DCA. A portion of the total frequency channels will use FCA and the rest will use DCA.

4. Borrowing channel Assignment: (BCA) uses FCA as a normal assignment condition. When all the fixed channels are assigned then the cell borrows channels from the neighbouring cells.

5. Forcible Borrowing channel Assignment: In forcible borrowing channel (FBCA) if a channel is in operation and the situation warrants it, channels must be borrowed from the neighbouring cell & at the same time, another voice channels will be assigned to continue the call in the neighbouring cell. There are many different ways of implementing FBCA. In a general sense, FBCA can also be applied with accounting for the forcible borrowing of the channels the role of reuse distance.

② Illustrate dropped calls and cell splitting?

Cell Splitting

It is the process of subdividing congested cells into smaller cells with following considerations.

- Ⓐ having own base station
- Ⓑ reduction in antenna height
- Ⓒ Reduction in transmit power

⇒ Splitting of the cell provides no. of clusters, more no. of RF channels and high capacity.

⇒ The following diagram shows the cell splitting where the base station covered by new base stations called micro cells.

These micro cells follow frequency re-use process.



⇒ In the above fig micro cells 'B' placed at half way and utilizing the same channel

$$P_{r1} = P_{t1} (R)^{-n}$$

P_{t1} → transmitted power at major base station
 R - radius of the major base station

∴ amount of power received by micro cell

$$P_{r2} = P_{t2} \left(\frac{R}{2}\right)^{-n}$$

P_{t2} - transmitted power by micro cell

R_2 - Radius of micro cell

∴ the amount power in a cell must be equal

$$P_{r1} = P_{r2}$$

$$P_{t1} (R)^{-n} = P_{t2} \left(\frac{R}{2}\right)^{-n}$$

$$\boxed{P_{t2} = P_{t1} 2^n}$$

Dropped calls

2

1. Network congestion: When too many users are simultaneously accessing the network in a specific area, it can overload the network's capacity, leading to dropped calls.
2. Weak Signal Strength: If you're in an area with poor reception or weak signal coverage, your phone may struggle to maintain a stable connection to the cellular network.
3. Interference: Interference from buildings, terrain, weather conditions, or electronic devices can disrupt the signal and cause ~~dropped calls~~.

③ Discuss the dropped call rates and their evaluation?

Dropped call rates are a crucial metric in the telecommunications industry, particularly in mobile networks.

⇒ A dropped call occurs when a connection between two parties is unexpectedly terminated before either party ends the call intentionally.

1. Measurement: Dropped call rates are typically measured as the percentage of calls that are disconnected prematurely compared to the total number of calls attempted.

2. Causes: Dropped calls can be caused by various factors including network congestion, signal interference, hand-over failure between cell towers, addressing the problem.

3. Network performance monitoring: Telecommunication companies employ sophisticated network performance monitoring tools to track dropped call rates in real-time. These tools provide insight into network performance and dropped call occurrences.

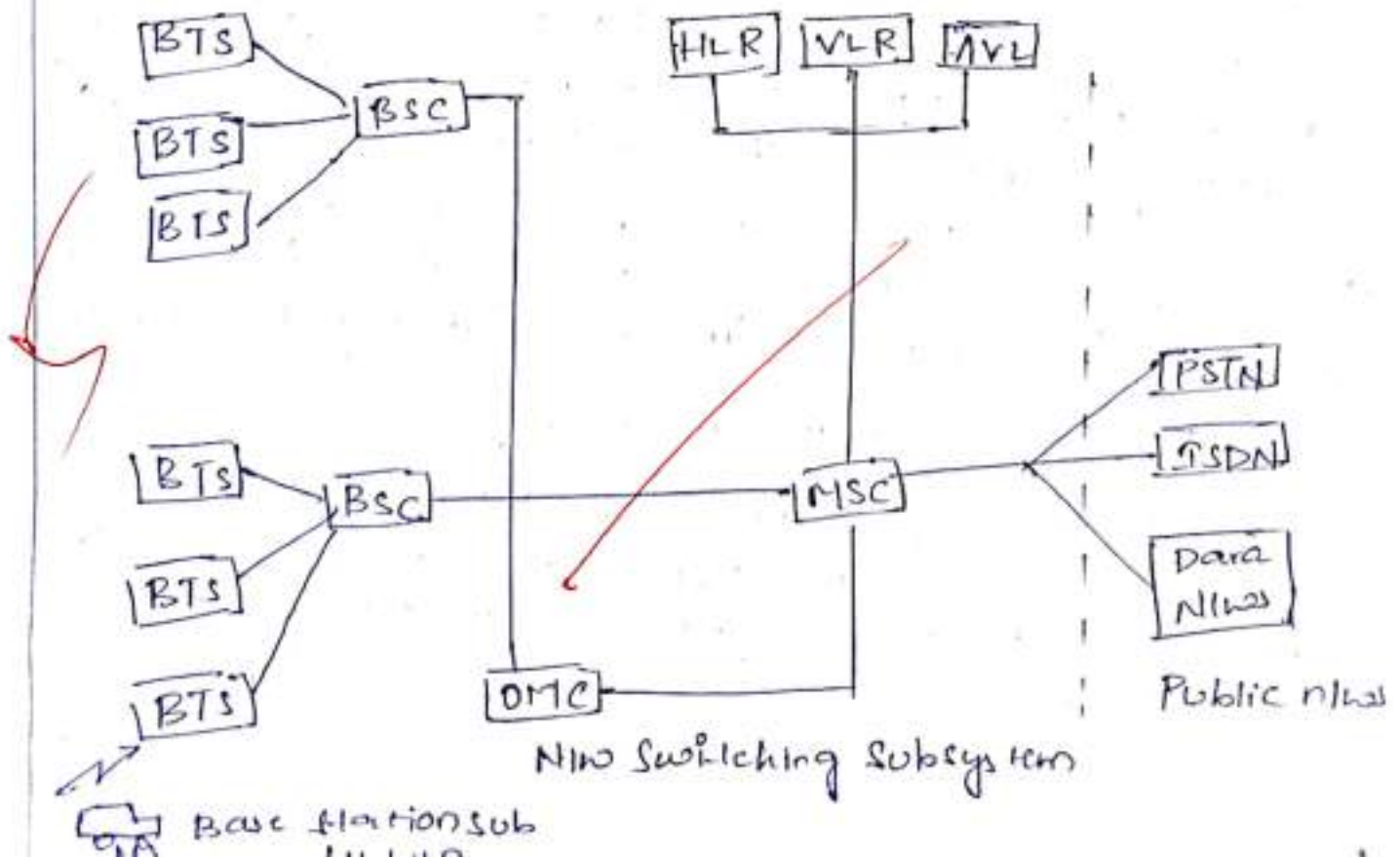
4. Quality of Service: Dropped call rates are a key component call QoS metrics used by telecommunication regulatory bodies often establish thresholds for acceptable dropped call rates and providers Service level agreements (SLAs)

5. Customer Experience: Dropped calls negatively impact the customer experience and can lead to churn if not addressed promptly. Service providers use customer feedback accordingly.

6. Benchmarking: Service providers often benchmark their dropped call rates against industry peers to gauge their competitiveness and identify areas for improvement.

④ Explain GSM architecture?

1. Base Station System (BSS)
2. N/w Switching subsystem (NSS)
3. Public network



1. Base Station System (BSS) :-

- ⇒ The Base Station System is the station of a traditional cellular telephone n/w.
- ⇒ It is responsible for handling traffic and signalling b/w a mobile phone and the n/w switching system.
- ⇒ Base Station controller
- ⇒ Base Transceiver Station.

2. N/w Switching Subsystem

- ⇒ Mobile Switching Centre parts are below are:
 - * The home location register
 - * The visitor location register
 - * The Authentication Centre
 - * The equipment identity register

3. Public Network

- * The public switched telephone n/w
- * The Integrated Services Digital n/w

5) explain multiple access schemes - TDMA?

- ⇒ In digital systems, continuous transmission is not required because users do not use the allotted bandwidth all the time.
- ⇒ In such cases, TDMA is a complementary access technique to FDMA.
- ⇒ Global system for mobile communications uses the TDMA.
- ⇒ In TDMA, for the entire bandwidth is available to the user but only for a entire period of time.
- ⇒ The most cases the available bandwidth is divided into fewer channels compared to FDMA.
- ⇒ The users are allotted time slots during which they have the entire channel bandwidth in the frequency domain. The no. of channels are less. inter channel interference is almost negligible.

Time Division Multiple Access

TDMA is a channel access method for shared medium networks. It permits several users to share the same frequency channel through dividing the signal into special time slots.

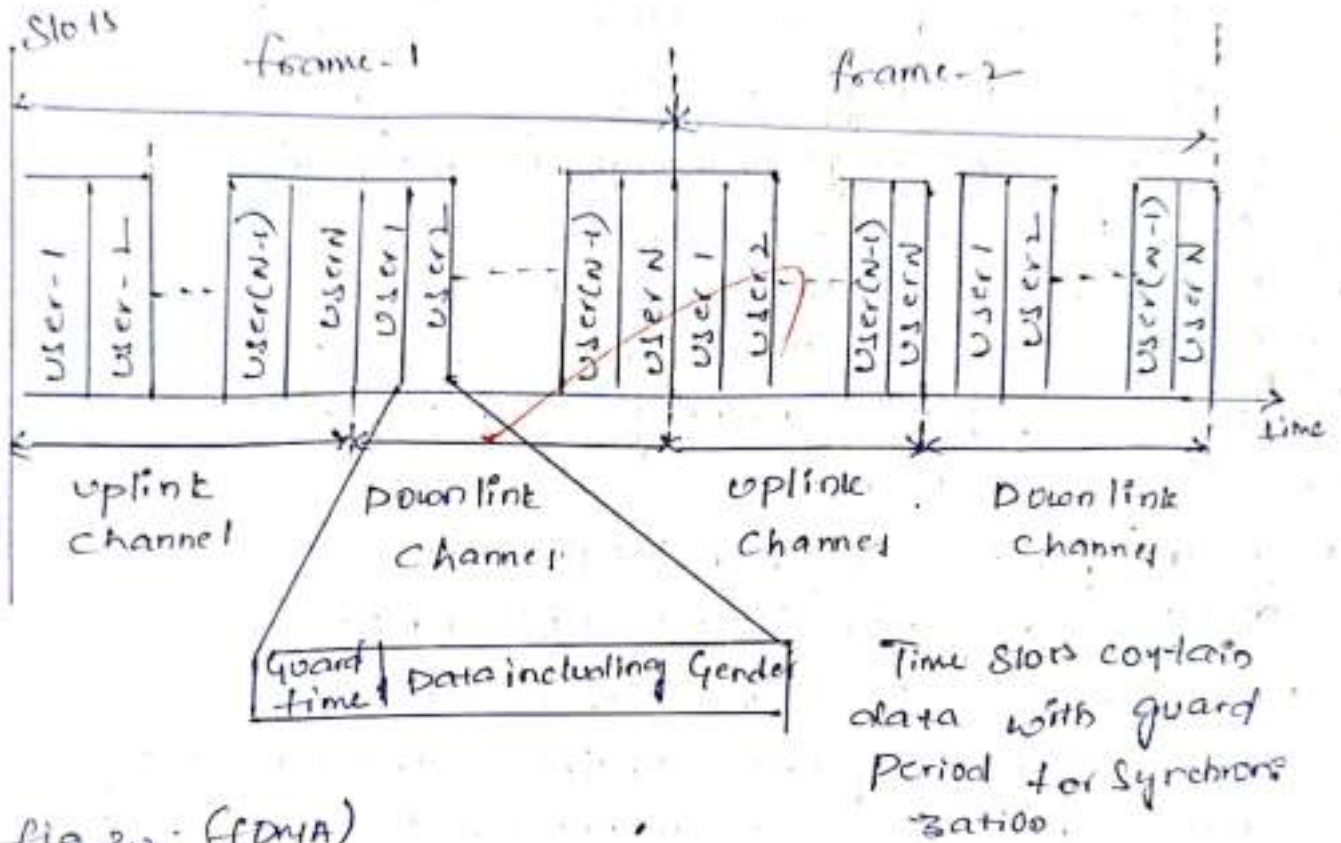


Fig 3.2: (FDMA)

There are however two problems in such systems which are discovered in the services

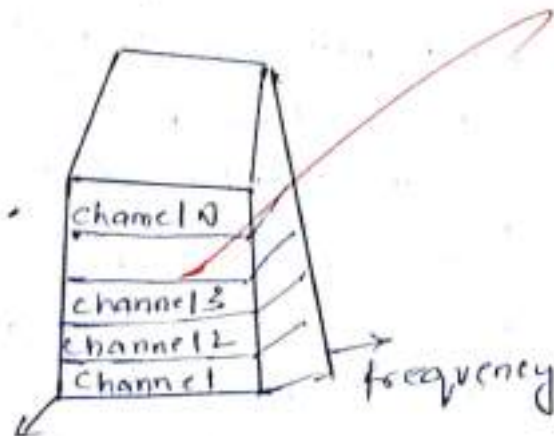


Fig: The basic concept of CDMA

COURSE MATERIALS

WEB REFERENCES

YEAR/SEM: IV B.TECH. II SEM ECE

CODE: EC851PE

SUBJECT: CELLULAR AND MOBILE COMMUNICATIONS

- 1) <https://nptel.ac.in/courses/106106167>
- 2) <https://archive.nptel.ac.in/courses/108/106/106106167/>
- 3) <https://www.digimat.in/nptel/courses/video/106106167/L01.html>
- 4) <https://www.youtube.com/watch?v=4R1qHE0E8IE>
- 5) <https://www.youtube.com/watch?v=whYljse4Abc>
- 6) <https://archive.nptel.ac.in/courses/108/106/106106167/>
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- 8) https://www.nptelvideos.com/communications/wireless_communications.php
- 9) <https://nptel.ac.in/courses/117104099>
- 10) https://onlinecourses.nptel.ac.in/noc21_ee66/preview

LECTURE NOTES

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SUBJECT: CELLULAR AND MOBILE COMMUNICATIONS

- 1) <https://www.slideshare.net/slideshow/lecture-notes-on-mobile-communication/88778023>
- 2) https://mrcet.com/downloads/digital_notes/ECE/IV%20Year/3.Cellular%20&%20Mobile%20Communications.pdf
- 3) https://vemu.org/uploads/lecture_notes/27_01_2024_434362317.pdf
- 4) <https://www.studocu.com/row/document/hajee-mohammad-danesh-science-and-technology-university/electronics/cellular-and-mobile-communications/27666293>
- 5) https://www.academia.edu/36444987/Cellular_Mobile_Communication_Lecture_Notes

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- 1) <https://www.slideshare.net/slideshow/cellular-communication-43914550/43914550>
- 2) <https://slideplayer.com/slide/12863741/>
- 3) <https://www.slideteam.net/0914-different-designs-of-cellular-radio-mobile-towers-for-wireless-communication-ppt-slide.html>