



SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS):: PUTTUR

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Grade & ISO 9001 : 2008 Certified Institution)

QUESTION BANK (DESCRIPTIVE)

Subject with Code : Cellular & Mobile Communications (23EC0437)

Course & Branch: B. Tech –ECE

Year & Semester: IV- B. Tech. & I-Semester

Regulation: R23

UNIT-1
CELLULAR MOBILE RADIO SYSTEMS

1	a	List the basic components of a cellular system.	[L1 CO1 2M]
	b	Define fading.	[L1 CO3 2M]
	c	Give two examples of analog cellular systems.	[L1 CO1 2M]
	d	What is a base station?	[L1 CO1 2M]
	e	Define a cell in a cellular communication system	[L1 CO1 2M]
2		Explain the basic cellular mobile communication system with a neat diagram.	[L2 CO1 10M]
3	a	Describe the performance criteria of mobile communication systems.	[L2 CO1 7M]
	b	Write a brief note on hexagonal shape of cell?	[L2 CO1 3M]
4	a	Discuss the uniqueness of Mobile radio environment	[L2 CO3 7M]
	b	Why is handoff required in cellular communication?	[L2 CO5 3M]
5	a	Explain about consideration of the components of Cellular system	[L2 CO1 7M]
	b	Explain the role of MSC in cellular operation.	[L2 CO1 3M]
6		Explain the operation of a cellular mobile communication system from call initiation to call termination.	[L2 CO1 10M]
7	a	What are the limitations of conventional mobile telephone system	[L1 CO1 7M]
	b	Let the maximum calls per hour Q_i in one cell be 3000 and an average calling time T be 1.76 min. Find the offered load A .	[L3 CO1 3M]
8		Describe the call initialization, call progress and call termination process.	[L2 CO1 10M]
9	a	Write the history of 800MHz spectrum allocation to cellular systems?	[L1 CO1 7M]
	b	Explain the working principle of AMPS.	[L2 CO1 3M]
10		Write short note on analog and digital cellular system?	[L2 CO1 10M]

UNIT-2
ELEMENTS OF CELLULAR RADIO SYSTEM DESIGN

1	a	What is the significance of the carrier-to-interference ratio (C/I) in cellular system design?	[L2, CO2 2M]
	b	Define co-channel interference (CCI).	[L1 CO2 2M]
	c	What is near-end–far-end interference?	[L1 CO2 2M]
	d	Define adjacent-channel interference.	[L1 CO2 2M]
	e	Define the co-channel interference reduction factor.	[L1 CO2 2M]
2		Explain the designing of the directional antenna under the practical case conditions for $K=4$, $K=7$ and $K=12$ with all suitable values and explaining each of them.	[L3 CO4 10M]
3		Describe the frequency reuse concept in cellular communication system and derive the expression for the frequency reuse ratio.	[L2 CO4 10M]
4		Explain the designing of an Omni directional antenna system in the worst case scenario.	[L4 CO4 10M]
5	a	What is the need of frequency reuse and explain the concept of frequency reuse.	[L2 CO2 5M]
	b	Explain the concept of Diversity receiver.	[L2 CO4 5M]
6		Write a short note on	
	a	Cell splitting	[L2 CO2 5M]
	b	Sectoring.	[L2 CO2 5M]
7		Identify and explain the different types of non-co-channel interference.	[L2 CO2 10M]
8		Explain about the co-channel interference reduction factor and derive the general formula for C/I.	[L4 CO2 10M]
9		Write short notes on	
	a	Adjacent channel interference	[L2 CO2 5M]
	b	Near end far end interference	[L2 CO2 5M]
10		Determine the real time co-channel interference measurement of mobile radio trans receivers.	[L3 CO3 10M]

UNIT-3
CELL COVERAGE FOR SIGNAL AND TRAFFIC

1	a	State any two effects of man-made structures on cellular signal coverage.	[L1 CO3 2M]
	b	State any two factors that influence mobile radio signal coverage.	[L1 CO3 2M]
	c	What is meant by multipath propagation?	[L1 CO3 2M]
	d	Define signal reflection in mobile radio propagation.	[L1 CO3 2M]
	e	What is path loss, and why is it important in cellular coverage prediction?	[L2 CO3 2M]
2		Derive the expression for phase difference between direct and reflected paths.	[L4 CO3 10M]
3		List different antenna parameters and then describe their effects.	[L2 CO3 10M]
4		Derive general formula for mobile propagation for water and flat open area.	[L4 CO3 10M]
5		Explain how signal reflections can impact the quality and reliability of wireless communication in flat and hilly terrains	[L4 CO3 10M]
6	a	Discuss the effects of human made structures on cell coverage	[L4 CO3 5M]
	b	Let a distance between two fixed stations be 30 km. The effective antenna height at one end h_1 is 150 m above sea level. Find the h_2 at the other end so that the received power always meets the condition $P_r < P_0$ at 850-MHz transmission ($\lambda = 0.35$ m).	[L3 CO3 5M]
7		Explain point-to-point model and mention the types of point-to-point model	[L2 CO3 10M]
8		Explain the concept of antenna height gain in mobile radio propagation. Analyze the effect of base-station and mobile antenna heights on signal coverage	[L4 CO3 10M]
9		Explain the straight-line path-loss model and derive the relationship between path loss and propagation distance.	[L4 CO3 10M]
10	a	Explain the concept of constant standard deviation in mobile radio propagation.	[L2 CO3 5M]
	b	Discuss the concept of path-loss slope in mobile radio propagation	[L2 CO3 5M]

UNIT-4
CELL SITE AND MOBILE ANTENNAS

1	a	Define channel sharing in cellular systems.	[L1 CO2 2M]
	b	What is channel borrowing?	[L1 CO2 2M]
	c	What are overlaid cells?	[L1 CO2 2M]
	d	State the function of a setup channel in a cellular system.	[L1 CO1 2M]
	e	Define sectorization in a cellular system.	[L1 CO2 2M]
2		Explain sum and difference radiation patterns and their synthesis with suitable diagrams.	[L4 CO4 10M]
3		Discuss the role of antenna radiation patterns in cellular system design. Compare omni-directional and directional antennas and justify the use of directional antennas for reducing co-channel interference.	[L5 CO4 10M]
4		Analyze the working principle of space-diversity antennas in cellular communication systems.	[L4 CO4 10M]
5		Discuss the role of umbrella-pattern and high-gain antennas in cellular system design. Analyze how their radiation characteristics influence coverage and interference.	[L4 CO4 10M]
6		Analyze the functions of setup, access, and paging channels in a cellular communication system. Discuss their roles in call establishment, mobile access, and delivery of control information.	[L4 CO1 10M]
7		Analyze the principles of channel sharing and channel borrowing in cellular systems. Illustrate their operation with suitable examples and discuss how these techniques improve channel utilization and system capacity.	[L4 CO2 10M]
8		Analyze the concept of sectorization in cellular systems and evaluate its effectiveness in reducing co-channel interference and improving frequency reuse and system capacity.	[L5 CO2 10M]
9	a	Evaluate the factors that determine the minimum separation between cell-site antennas.	[L5 CO4 5M]
	b	With a suitable diagram, analyze the concept of overlaid cells	[L4 CO2 5M]
10		Explain the concept of Non-Fixed Channel Assignment (NFCA) in cellular communication systems. Describe its working procedure.	[L2 CO2 10M]

UNIT-5
HANDOFF & SYSTEM EVALUATIONS

1	a	Define handoff in a cellular communication system.	[L1 CO6 2M]
	b	Define dropped-call rate (DCR).	[L1 CO5 2M]
	c	Why is handoff required in a cellular communication system?	[L2 CO6 2M]
	d	Define Mobile-Assisted Handoff (MAHO).	[L1 CO6 2M]
	e	Define intersystem handoff.	[L1 CO6 2M]
2		Describe the complete handoff procedure in a cellular system with a suitable flow diagram. Explain the parameters used to initiate a handoff.	[L2 CO6 10M]
3		Analyse the causes of dropped calls during handoff and discuss techniques for improving handoff reliability.	[L4 CO5 10M]
4		Classify the different types of handoffs used in cellular systems. Compare their operating principles, advantages and limitations.	[L4 CO6 10M]
5		Explain handoff invitation, delayed handoff and forced handoff. Compare their impact on call quality and network performance.	[L4 CO6 10M]
6		Explain Mobile-Assisted Handoff (MAHO) in detail. Describe the sequence of measurements, handoff decision and channel transfer with a suitable diagram.	[L3 CO6 10M]
7		Explain intersystem handoff and analyze the technical challenges involved when a mobile subscriber moves between two different cellular systems.	[L4 CO6 10M]
8		Explain the principle of cell splitting with suitable diagrams. Analyze its effect on cell radius, frequency reuse, traffic capacity, interference and handoff frequency.	[L4 CO2 10M]
9		Analyze the role of vehicle location information in cellular network management, handoff and emergency services.	[L4 CO6 10M]
10		Discuss the significance of performance evaluation in a cellular communication system. Explain the key parameters used to assess system performance.	[L2 CO5 10M]