# KUMARAGURU
## college of technology
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## M.E DEGREE EXAMINATIONS: JUNE 2017

(Regulation 2015)

Second Semester

## COMMUNICATION SYSTEMS

P15COTE28:Mobile Communication Systems and Standards

## COURSE OUTCOMES

**CO1:** Explain the basic cellular communication concepts.

**CO2:** Appreciate different channel models.

**CO3:** Compare and analyze different cellular standards

**CO4:** Analyze various access techniques used in wireless communication networks

**Time: Three Hours**          **Maximum Marks: 100**

**Answer all the Questions:-**

**PART A (10 x 1 = 10 Marks)**

1. Match the following      CO1   [$K_2$]

| Generation | Technology |
|---|---|
| A. 2G | i. WiMax |
| B. 2.5G | ii. WCDMA |
| C. 3G | iii. GSM |
| D. 4G | iv. EDGE |

|    | A | B | C | D |
|----|---|---|---|---|
| a) | iii | iv | ii | i |
| b) | iv | ii | i | iii |
| c) | ii | iii, | i | iv |
| d) | iii | iv | i | ii |

2. Assertion (A): Communication between the base station to the mobile is defined by   CO1   [$K_2$] standard common air interface.

Reason (R): The channel used for transmission of signal from mobile to the bae station is called forward channel.

   a) both A and R are individually true and R is the correct explanation of A    b) both A and R are individually true but R is not the correct explanation of A

   c) A is true but R is false    d) A is false but R is true

3. Control channels are used for CO1 [K2]

   1) Call setup

   2) Transmitting of information from base station to mobile

   3) Call initialization

   4) Transmitting information from mobile to base station

   Which of the following are true?

   a)   1,2,3,4                      b)   1,3

   c)   2,4                          d)   1,2,3

4. Assertion (A): Adjacent channel interference can be minimized by proper channel CO1 [K2] assignment

   Reason (R): Interference between the signals with different frequency is called adjacent channel interference

   a)   both A and R are individually true and R is    b)   both A and R are individually true but R is
        the correct explanation of A                        not the correct explanation of A

   c)   A is true but R is false                       d)   A is false but R is true

5. Small scale fading is influenced by CO2 [K2]

   1. Speed of the mobile

   2. Transmitter receiver separation distance

   3. Multipath propagation

   4. Speed of the surrounding objects

   a)   2,3                          b)   1,2,3,4

   c)   1,3,4                        d)   1,4

6. Match List I with List II CO2 [K3]

| List I | List II |
|---|---|
| A. Flat Fading | i.   BW of signal>BW of channel |
| B. Frequency Selective Fading | ii.   Coherence time > symbol period |
| C. Fast Fading | iii.   BW of signal< BW of channel |
| D. Slow fading | iv.   Coherence time < symbol time |

|   | A | B | C | D |
|---|---|---|---|---|
| a) | iii | i | ii | iv |
| b) | i | iii | iv | ii |
| c) | iv | ii | iii | i |
| d) | iii | i | iv | ii |

7. In GSM, the forward and reverse channel pair is separated by _____ CO3 [K2]

   a)   45MHz                        b)   200MHz

   c)   45 KHz                       d)   200KHz

8.  MAC Layer supports the following operations      CO4   [K$_2$]

    1. Broadcast

    2. Connection oriented services

    3. Mobility management

    4. Authentication management

Which of the following are correct

| a) | 1,2 | b) | 1,2,4 |
|----|-----|----|-------|
| c) | 3,4 | d) | 2,3,4 |

9.  Which of the following statements are correct      CO4   [K$_2$]

    1. High frequency signals subject to molecular absorption.

    2. Waves with frequency < 10GHz is called millimeter waves

    3. Millimeter waves attenuates due to rain

    4. There is no multipath effect for millimeter waves.

| a) | 1,3,4 | b) | 1,3 |
|----|-------|----|-----|
| c) | 1,2,4 | d) | 2,3 |

10. For voice digitization, DECT standard uses _____      CO4   [K$_1$]

| a) | Differential PCM | b) | PCM |
|----|------------------|----|-----|
| c) | Delta modulation | d) | Adaptive Differential PCM |

## PART B (10 x 2 = 20 Marks)

| | | | |
|---|---|---|---|
| 11. | A spectrum of 30 MHz is allocated to a wireless FDD cellular system which uses two 25 KHz channels to provide full duplex voice and control channels. Compute the number of channels available per cell with a seven cell reuse system. | CO1 | [K$_3$] |
| 12. | Compare fixed and dynamic channel allocation strategies. | CO1 | [K$_3$] |
| 13. | What is trunking? | CO1 | [K$_2$] |
| 14. | Why do paging systems provide low data rate and better coverage? | CO1 | [K$_3$] |
| 15. | Compare the large scale propagation models with small scale models. | CO2 | [K$_3$] |
| 16. | Write the probability density function of Reyleigh distribution. | CO2 | [K$_2$] |
| 17. | What is the multiple access technique used in GSM. | CO3 | [K$_2$] |
| 18. | What are the functions of SGSN and GGSN in GPRs architecture? | CO3 | [K$_2$] |
| 19. | Compare Multichannel Multipoint Distribution Service (MMDS) with Local Multipoint Distribution Service (LMDS). | CO4 | [K$_3$] |
| 20. | Define tunneling in Mobile IP operation. | CO4 | [K$_2$] |

**PART C (10 x 5 = 50 Marks)**

21. How the coverage and capacity of a cellular system is improved using cell splitting.    CO1   [K$_2$]

22. Briefly explain the importance and the methods of handoff?    CO1   [K$_2$]

23. Derive the expression for signal to co channel interference ratio for a mobile receiver. Explain how co channel interference affects the capacity of the system.    CO1   [K$_2$]

24. Explain cells and channels in a mobile network providing cellular service.    CO1   [K$_2$]

25. Describe the physical circumstances that relate to a stationary transmitter and a moving receiver such that the Doppler shift at the receiver is  i) 0Hz    ii) $f_d \max$   iii) $-f_d \max$   iii) $f_d \max/2$ .    CO2   [K$_3$]

26. Briefly explain Coherence bandwidth and coherence time.    CO2   [K$_2$]

27. Explain the UMTS architecture in detail.    CO3   [K$_2$]

28. How the Control channels of GSM is grouped? Explain each of them in detail.    CO3   [K$_2$]

29. Explain frame efficiency of GSM time slot.    CO4   [K$_2$]

30. What is Wireless Local Loop?  What is the frequency range used for WLL. Write the merits and demerits of this range of frequency.    CO4   [K$_2$]


**Answer any TWO Questions**
**PART D (2 x 10 = 20 Marks)**

31. Explain Clarke's statistical Model for Multipath fading channel.    CO2   [K$_2$]

32. With neat diagram, explain the architecture and various interfaces used in GSM.    CO3   [K$_2$]

33. Explain the schematic of OFDM transmitter and receiver. Explain the merits of OFDM.    CO4   [K$_2$]


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