Registration No : | | | | | | | | | | |

Total Number of Pages : 03 **B.Tech.**
PET6J003

6th Semester Regular Examination 2017-18
MOBILE COMMUNICATION
BRANCH : ECE, ETC
Time : 3 Hours
Max Marks : 100
Q.CODE : C364
Answer Part-A which is compulsory and any four from Part-B.
The figures in the right hand margin indicate marks.

Part – A (Answer all the questions)

Q1. **Answer the following questions : *multiple type or dash fill up type :*** **(2 x 10)**

a) _____ is a first-generation and_____is a second-generation cellular phone system.
(1) AMPS
(2) D-AMPS
(3) GSM
(4) None of the above

b) In a _____ handoff, a mobile station can communicate with two base stations at the same time.
(1) hard
(2) soft
(3) medium
(4) none of the above

c) The technique adopted to increase the system capacity and reduce co-channel interference is
(1) High power BTS
(2) By installing the Omnidirectional antenna
(3) Sectorisation
(4) None of the above

d) In IEEE 802.11, communication between two stations in two different BSSs usually occurs via two _____.

e) What is the frequency reuse factor in CDMA?
(1) 0
(2) 1
(3) 10
(4) infinity

f) The IEEE 802.11 standard for wireless LANs defines two services: _____ and _____.
(1) BSS; ASS
(2) ESS; SSS
(3) BSS; ESS
(4) BSS; DCF

g) _____ is used for cellular phone, satellite, and wireless LAN communications.
(1) Radio waves
(2) Microwaves
(3) Infrared waves
(4) None of the above

h) What is the multiple access scheme used in GSM?
(1) Time Division Multiple Access (TDMA)
(2) Code Division Multiple Access (CDMA)
(3) Frequency Division Multiple Access (FDMA)
(4) A combination of TDMA and FDMA

i) The cluster size of the frequency reuse pattern of a hexagonal cellular system can only take on a particular value. Namely
(1) 1,3,5,7,9, ...
(2) 1,4,9,16, 25...
(3) 1,3,4,7,9,11, ...
(4) 1,3,4,6,7,9, 10...

j) When transmitting over a perfectly reflecting, smooth, plane earth, the path loss tends to
increase
(1) Linearly with distance
(2) With the square of distance
(3) With distance cube
(4) With the fourth power of distance

Q2. Answer the following questions : *Short answer type :* **(2 x 10)**

a) What is the function of control channels? What do you mean by forward and reverse type of it?

b) What is co-channel reuse ratio and frequency reuse factor?

c) Name the wireless access techniques used in 1G, 2G, and 3G wirelesssystems.

d) Write the expression for both received power and path loss in two-ray model.

e) What is near-far effect in wireless network? Explain.

f) If a cellular system requires an S/I ratio of 18dB in terms of co-channel interference only, then find an acceptable value of frequency reuse factor. Assume path loss exponent as 4.

g) Differentiate between small scale fading and large scale fading.

h) Write the advantages and drawbacks of sectoring.

i) Write advantages of TDMA over FDMA.

j) What is the value of the distance between two adjacent hexagonal cells in terms of cell radius R? Derive it.

Part – B (Answer any four questions)

Q3. a) Differentiate between cell splitting and cell sectoring. How they help in increasing the capacity of cellular system. **(10)**

b) Write short note on WLAN topologies. **(5)**

Q4. a) Briefly discuss the signal fading statistics in cellular system. **(10)**

b) Name the physical channels of the GPRS and discuss their functions. **(5)**

Q5. a) What is the IEEE standard for WiMAX. Discuss its applications and mess mode with neat diagram. Give a brief comparison between Wi-Fi and WiMAX. **(10)**

b) Calculate the received power at a distance of 3 km from the transmitter if the path-loss exponent γ is 4. Assume the transmitting power of 4 W at 1800 MHz, a shadow effect of 10.5 dB, and the power at reference distance (d_0 = 100 m) of -32 dBm. What is the allowable path loss? **(5)**

Q6. **a)** Discuss free wave attenuation. Derive the path loss when the attenuation is over reflecting surface **(10)**

b) Calculate the capacity and spectral efficiency of the DS-CDMA system with an omnidirectional cell using the following data: **(5)**

- bandwidth efficiency η_b= 0.9,
- frequency reuse efficiency η_f = 0.45,
- capacity degradation factor c_d= 0.8 ,
- voice activity factor v_f= 0.4,
- information bit rate R= 16.2 kbps,
- E_b/I_0= 7 dB one-way system bandwidth B_w =12.5 MHz,

Neglect other sources of interference.

Q7. **a)** We consider a cellular system in which 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 thesystem is 2000 km^2. Calculate **(10)**
(a) the system capacity if the cluster size, *N* (reusefactor), 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.

b) Why is cell splitting needed? Define 4:1 and 3:1 cell splitting. **(5)**

Q8. **a)** Discuss the spectral efficiency of different multiple access techniques. What is the overall spectral efficiency of FDMA and TDMA systems? **(10)**

b) Discuss the cellular system design in worst case scenario with omnidirectional antenna. **(5)**

Q9. **a)** Explain in detail the system architecture of IEEE 802.11. **(10)**

b) Show how 2G GSM systems are moving to achieve 3G services.List the main features of 3G systems. **(5)**