MAULANA ABUL KALAM AZAD UNIVERSITY OF TECHNOLOGY, WEST BENGAL

Paper Code : EC-701

WIRELESS COMMUNICATION AND NETWORK

Time Allotted : 3 Hours | *Full Marks* : 70

The figures in the margin indicate full marks.
Candidates are required to give their answers in their own words as far as practicable.

GROUP – A

(Multiple Choice Type Questions)

1. Choose the correct alternatives for any *ten* of the following : $10 \times 1 = 10$

i) In wireless ad-hoc network
   a) access point is not required
   b) access point is must
   c) nodes are not required
   d) none of these.

ii) Which multiple access technique is used by IEEE 802.11 standard for wireless LAN ?
   a) CDMA
   b) CSMA/CA
   c) ALOHA
   d) None of these.

iii) When a fraction of assigned channel is reserved for handoffs, it is
   a) Guard channel concept
   b) Fixed channel assignment
   c) Dynamic channel assignment
   d) None of these.

iv) The interference between the neighbouring base stations is avoided by
   a) assigning different groups of channels
   b) using transmitters with different power level
   c) using different antennas
   d) all of these.

v) Hexagon shape is used for radio coverage for a cell because
   a) it uses the maximum area for coverage
   b) fewer number of cells are required
   c) it approximates circular radiation pattern
   d) all of these.

vi) Cell phone receives in the band from

a) 860 to 880 MHz b) 870 to 890 MHz

c) 870 to 880 MHz d) 860 to 890 MHz.

vii) The multiple access used by Digital European Cordless Telephone (DECT) is

a) CDMA b) FDMA

c) TDMA d) CDMA/FDMA.

viii) When the message is transferred from one cell site transmitter to another cell site transmitter as the caller crosses a boundary ..... process takes place.

a) Hand-off b) Shifting

c) Give-off d) Turn over.

ix) What is an Erland ?

a) It is a unit of magnetic field intensity measured around a conductor

b) It is the number of erroneous bits received per unit of time

c) It a unit of electrical energy radiated in space

d) It is equal to the number of simultaneous calls originated during a specific hourly period.

x) Fading of the received radio signals in a mobile communication environment occurs because of

a) direct propagation

b) multipath propagation

c) bi-path propagation

d) none of these.

xi) The basic GSM is based on ..... traffic channels.

a) Connection-oriented

b) Connection-less

c) Packet switching

d) Circuit switching.

xii) What is the maximum data rate for the 802.11g standard ?

a) 6 Mbps b) 11 Mbps

c) 22 Mbps d) 54 Mbps.

xiii) The free space model of propagation refers to

I. unobstructed line of sigh between the transmitter and receiver

II. satellite communication systems and microwave line of sight radio links

III. propagation along the ground surface.

a) (I) and (II) are correct

b) All the three are correct

c) (I) and (III) are correct

d) (II) and (III) are correct.

GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following. 3 × 5 = 15

2. a) What is the frequency reuse concept useful in cellular communication ?

b) How are co-channel cells determined in a cellular system ? Explain with pictorial representation. 3 + 2

3. What is mobility management in wireless network ?

4. How does a wireless LAN with 802.11 standards try to solve collisions or minimize the probability of collisions ?

5. What are the Frequency Hopping Spread Spectrum technique and Direct Sequence Spread Spectrum technique ?

6. What is Near and Far problem in CDMA ?

GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following. 3 × 15 = 45

7. a) Draw and explain GSM architecture.

b) Draw the GSM frame structure.

c) Write down the names of the different channels used in GSM. 6 + 6 + 3

8. a) What is handoff strategy ? What are the methods for giving priority to handoffs ?

b) What is fixed and dynamic channel assignment strategy ?

c) What is cell splitting ? (4 + 3) + 5 + 3

9. a) Discuss different types of fading.

b) Describe two-ray propagation model. On what factors does the loss depend for this model ?

c) Find the Fraunhofer distance for an antenna with maximum dimension of 1 m and operating frequency of 900 MHz. If the antennas have unity gain, calculate the path loss. 5 + (5 +2) + 3

10. a) Discuss briefly the relative advantages and disadvantages of WLAN network.

b) What is internet protocol ? Explain IP class and addressing. Explain the concept of MIPV4 and MIPV6. 5 + (1 + 3 + 6)

11. a) In the AMPS system, the system bandwidth is 12·5 MHz, the channel spacing is 30 kHz and the edge guard spacing is 10 kHz. The number of channels allocated for control signalling is 21. Find, (i) the number of channels available for message transmission, (ii) the spectral efficiency is FDMA.

b) Differentiate between co-channel and adjacent channel interference. What are the methods available to reduce the co-channel interference in cellular communication ? Explain each method.

c) In cell splitting, prove that $\frac{P_{t1}}{P_{t2}} = 12$ dB, for K = 4. (K→Path loss exponent, P_{t1} and P_{t2} be the transmitted power of the large base station and the medium cell base station. (3 + 3) + 4 + 5

12. Write short notes on any *three* of the following : 3 × 5

a) Comparison between TDMA and FDMA

b) Digital European Cordless Telephone (DECT)

c) Forward and reverse link in CDMA based IS-95 system

d) Cell sectoring

e) Umbrella cell approach.