M.TECH/ECE/2ND SEM/ECEN 5203/2015
2015

Mobile Communication
(ECEN 5203)

Time Allotted : 3 hrs **Full Marks : 70**

Figures out of the right margin indicate full marks.

Candidates are required to answer Group A and any 5 (five) from Group B to E, taking at least one from each group.

Candidates are required to give answer in their own words as far as practicable.

Group – A
(Multiple Choice Type Questions)

1. Choose the correct alternative for the following: **10 x 1=10**

(i) AMPS is a cellular system with ..... technology
(a) 1G (b) 2G (c) 2.5G (d) 3G.

(ii) In GSM, a frequency pair may be repeated in :
(a) another cell of same cluster (b) any cell of adjoining cluster
(c) same cell of adjoining cluster (d) all(a,b,c) are possible.

(iii) Rake receivers are designed to nullify:
(a) Frequency shift (b) amplitude variation
(c) time delay (d) code corruption.

(iv) CDMA applies:
(a) DSSS (b) FHSS (c) FDMA (d) either (a) or (b).

(v) The duplex distance for a GSM BTS is:
(a) 25 MHz (b) 45 MHz
(c) 45 KHz (d) either 25 MHz or 45 MHz.

(vi) When changing between networks, which of these form of handovers occurs?
(a)Intra-BTS handover (b) Inter-BTS Intra BSC handover
(c) Inter-BSC handover (d) Inter-MSC handover.

(vii) The 3G UMTS System has
(a) higher spectrum efficiency than GSM (b) lower spectrum efficiency
(c) almost the same as GSM (d) none of these.

(viii) Handoff controlling is done by
(a) PSTN (b) MTSO (c) BSC (d) cell site.

(ix) IEEE 802.11b standard supports data speed upto:
(a) 1 Kbps (b) 11 Kbps (c) 1 Mbps (d) 11 Kbps.

(x) In Bluetooth, bandwidth per channel is
(a) 10Mhz (b) 1 Mhz (c) 79 Mhz (d) 2.4 Ghz.

Group – B

2.(a) Why 1G technology was called hybrid technology? What is co-channel interference? Describe two methods by which this problem can be reduced?

(b) Prove that a cluster dimension of 7 cells is required for a C/I of 18dB.

6 + 6 = 12

3.(a) Why is hand-off in GSM called break-before-make? Find out the maximum number of subscribers in a GSM system if reuse is not applied.

(b) A total of 40 MHz BW is allocated to an FDD cell system which uses two 30 KHz simplex to provide full duplex voice and control channels. Calculate the number of channels/cell if the system uses 7-cell reuse.

(2+4)+6=12

Group – C

4.(a) What are the specific properties of CDMA that have made this scheme very useful? What is IMT 2000?

(b) What are the various functional groups in GPRS as per the required functions?

(5+2)+5=12

5.(a) Prove that for a DSSS system,
$(E_b / N_o)_o = G_p . (E_b / N_o)_i$, where the symbols have their usual meanings.

(b) A GSM system has 3 start bits, 3 stop bits, 26 TS bits, 8.25 guard bits and 2 bursts of 58 bits of data bits. The transmission speed is 270.833 Kbps. Find the frame efficiency.

8+4=12

Group – D

6.(a) What is cross-over distance? Find out the expression for cross-over distance using Friis' equation and two-ray model. Why have so many RF propagation models have been devised?

(b) Assume a receiver is located at 10Kms from a 50W transmitter. The carrier frequency is 900MHz and free space propagation is applied. Determine (i) the power at the receiver, (ii) the magnitude of the E-field at receiver antenna, (iii) the rms voltage applied to the receiver input. Consider the receiver antenna to be purely resistive with an impedance of 50ohms and to be matched to the receiver circuit. (G_t=1 and G_r=2).

(1+2+2)+(2+2+3)=12

7.(a) What are the topologies used in WLAN? Explain AP-based topology with suitable diagram. What are the different physical layers defined in 802.11b? Explain their differences.

(b) Indicate the differences between Piconet and Scatternet in Bluetooth network. What are the error correction schemes applied in Bluetooth?

8+4=12

Group – E

8.(a) Explain why hidden nodes pose a serious problem for the networks.

(b) Explain how the routes are established and maintained in DSR protocol.

(c) Compare IR LAN and RF LAN. Describe the types of IR LAN briefly.

2+6+4=12

9.(a) Explain the requirements of tunnelling and reverse tunnelling clearly with diagrams.

(b) What is snooping TCP? Why is it used? Explain.

7+(2+3)=12