9. (a) Compare infrastructure-based network and Ad Hoc networks. Differentiate between reactive and pro-active routings. How are routes established in DSDV protocol?

   (b) Why is power saving very critical in Ad Hoc networks? What are the different operating modes of a microcontroller?

8 + 4 = 12

M.TECH/ECE/2ND SEM/ECEN 5203/2018

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 × 1 = 10**

   (i) The commonly used mode for 3G Network is
   (a) TDMA (b) FDMA
   (c) TDD (d) FDD.

   (ii) The interference between the neighbouring base stations is avoided by
   (a) assigning different group of channels
   (b) using transmitters with different power level
   (c) using different antennas
   (d) all of the above.

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

   (iv) For CDMA cellular systems, the chip codes are not repeated in a
   (a) cell (b) cluster
   (c) total coverage area (d) no restriction at all.

   (v) In Global Service for Mobile (GSM), each band is divided into 124 channels of
   (a) 200 KHz (b) 150 KHz
   (c) 300 KHz (d) 250 KHz.

   (vi) The total number of channels in the up-band for GSM is
   (a) 125 (b) 124
   (c) 1000 (d) none of these

(vii) Piconet can support up to ..... nodes
(a) 7 (b) 8
(c) 16 (d) 79.

(viii) Shadowing model is more realistic in
(a) rural areas (b) urban areas
(c) long distances (d) none of these.

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

(x) The receiver performance can be improved by
(a) increasing transmit power level
(b) increasing transmitter antenna height
(c) increasing receiver antenna height
(d) any of these

Group - B

2. (a) Categorize the distinguishing features of 2G, 2.5G, 3G and 4G

(b) If a cellular operator is allocated 12.5 Mhz for each simplex band and if Bt is 12.5 Mhz, Bguard is 10khz and B_c i is 30khz find the number of channels available in a FDMA system.

8 + 4 = 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 25 MHz BW is allocated to an FDD cell system which uses two 25 KHz simplex to provide full duplex voice and control channels. Calculate the number of channels/cell if the system uses 3-cell reuse.

2 + 4 + 6 = 12

Group - C

4. (a) The frame number requires 28 bits for its representation in GSM system whereas RFN has brought it down to 19 bits. Show this translation.

(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.

6 + 6 = 12

5. (a) Explain the concepts of large and small scale fading with examples.

(b) Derive an expression for Free space propagation model considering a clear and undisturbed LOS path between the transmitter and receiver.

6 + 6 = 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 are some RF propagation models suitable for urban areas and some models are suitable for rural areas?

(b) Assume a receiver is located at 1 Km from a 5 W transmitter. The carrier frequency is 900 MHz 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 50 ohms and to be matched to the receiver circuit.($G_t = 2$ and $G_r = 2$).

2 + 5 + 5 = 12

7. (a) What are the essential features of Medium Access Control (MAC) which is one of the aspects of IEEE802.11?

(b) What are the salient feature of a Bluetooth network? Describe its setup and operation procedure.

6 + 6 = 12

Group - E

8. (a) Explain the concept of tunnelling and reverse tunnelling clearly with proper diagrams.

(b) In mobile IP IETF standard, what is the concept of "care of address"? What are the four basic entities of MIPv4?

6 + 6 = 12