Reg. No.									

प्रज्ञानं ब्रह्म

Manipal
INSPIRED BY LIFE

MANIPAL INSTITUTE OF TECHNOLOGY, MANIPAL 576104

(Constituent College of Manipal University)

KNOWLEDGE IS POWER
MANIPAL INSTITUTE OF TECHNOLOGY

SEVENTH SEMESTER B.E (IT) DEGREE END SEMESTER EXAMINATIONS, NOV/ DEC – 2015
SUBJECT: MOBILE COMMUNICATIONS– ICT 401
(REVISED CREDIT SYSTEM)

TIME: 3 HOURS **26/11/2015** **MAX. MARKS: 50**

Instructions to candidates

- Answer any **FIVE FULL** questions.
- Missing data, if any, may be suitably assumed.

1A. Assume the IEEE 802.11 LAN operates at 2 Mbps using frequency-hopping physical layer. Sketch a time diagram showing the frames transmitted including the final ACK frame. Show the appropriate interframe spacing and NAV values. Assume that the data frame is 2000 bytes long. (Consider $data_{preamble} = 96x10^{-6}$ Seconds and $data_{PLCPheader} = 32x10^{-6}$ Seconds)

1B. "It is difficult to satisfy QoS requirements of delay-sensitive real-time applications." Identify and explain a MAC protocol that provides solution to the above-mentioned statement.

1C. A cellular system uses FDMA with a spectrum allocation of 12.5 MHz in each direction. The guard band at the edge of the allocated spectrum is 10 KHz with a channel bandwidth of 30 KHz. Calculate the total number of available channels.

(5+3+2)

2A. List and explain four methods that has been used to reduce the co-channel interference in cellular networks.

2B. "Power saving mechanisms is crucial for the commercial success of battery powered wireless devices". Justify the statement and explain the methods used for power management.

2C. Collisions can occur in IEEE 802.11 and Bluetooth. Justify the statement.

(5+3+2)

3A. Identify and explain the inefficiencies of mobile IP while forwarding the data from a Correspondent Node (CN) to a Mobile Node (MN). Also explain the optimization technique used to solve that inefficiency.

3B. IEEE 802.11 tries to solve the hidden node problem using RTS/CTS message exchange. Give a scenario where RTS/CTS message exchange cannot solve the hidden node problem.

3C. Draw a typical scenario that shows how packet data is transmitted from a Public Data Network (PDN) to the Mobile Station (MS) by using the appropriate interfaces in GPRS.

(5+3+2)

4A. With necessary diagrams explain the sequence of events taking place in the following communication:

a. Call from mobile node to fixed subscriber

b. Call from fixed subscriber to mobile node

4B. Consider a 7-cell system covering an area of 3100 km^2. The traffic in the 7-cells is as follows:

Cell number	1	2	3	4	5	6	7
Traffic in Erlangs	30.8	66.7	48.6	33.2	38.2	37.8	32.6

Each user generates an average of 0.03 Erlangs of traffic per hour with a mean holding time of 120 seconds. The system consists of a total of 395 channels and is designated for a GOS of 0.02.

i. Determine the number of subscribers in each cell

ii. Determine the number of calls per hour per subscriber

iii. Determine the number of calls per hour in each cell

iv. Determine the total number of subscribers.

v. Determine the total traffic in 7-cell.

vi. What is the radius of each cell?

4C. How higher data rate can be achieved in GSM? What are the additional schemes used to improve the data rate in GPRS and LTE?

(5+3+2)

5A. Explain the system architecture of GSM with a neat diagram.

5B. With an illustration explain how security has been achieved in Bluetooth.

5C. Assume that two antennas are half-wave dipoles and each has a directive gain of 3 dB. If the transmitted power is 1 Watt and a distance of 10 km separates the two antennas. Calculate the received power. Assume that the antennas are aligned and the frequency used is 100 MHz.

(5+3+2)

6A. With the help of appropriate diagrams explain a technique that has been used to improve the data rate, cell edge and system throughput in LTE.

6B. Discuss the effect of noise in CDMA for the following scenario:

Consider a CDMA system, with two nodes A and B wants to communicate, with base station. The keys for node A and B are A_k=010011, B_k=110101 respectively. Sender A wants to send bit A_d=1, sender B wants to send B_d=0. Find the spreading signal of A and B and signal received at the base station assuming communication environment adds a noise of (-2, 0, 0, -2, +2, 0).

6C. Show the Minimum Shift Keying (MSK) output signal for the binary data 1011010 that is transmitted using MSK modulation technique.

(5+3+2)