Reg. No.										

प्रज्ञानं ब्रह्म

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MANIPAL INSTITUTE OF TECHNOLOGY, MANIPAL 576104

(Constituent College of Manipal University)

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MANIPAL INSTITUTE OF TECHNOLOGY

SIXTH SEMESTER B.TECH (CCE) DEGREE END SEMESTER EXAMINATIONS, MAY– 2016
SUBJECT: WIRELESS COMMUNICATIONS AND COMPUTING – ICT 352
(REVISED CREDIT SYSTEM)

TIME: 3 HOURS **04/05/2016** **MAX. MARKS: 50**

Instructions to candidates

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

1A. The one-way bandwidth available to a single operator in the AMPS system is 12.5 MHz with a channel bandwidth of 30 kHz and 21 control channels. Calculate the efficiency with which this system utilizes bandwidth for a particular installation. Use the following parameters:

Cell area = 8 km^2, Total coverage area = 4000 km^2, Frequency reuse factor = 7, Average number of calls per user during the busy hour = 1.2, Average holding time of a call = 100 s, Call blocking probability = 2%, total offered traffic intensity = 87.97 Erlangs

i. How many voice channels are there per cell?
ii. Determine the total traffic carried per cell in Erlangs/cell. Then convert that to Erlangs/km^2.
iii. Calculate the number of calls/hour/cell and the number of calls/hour/km^2.
iv. Calculate the number of users/hour/cell and the number of users/hour/channel.
v. Determine the modulation efficiency for this system.

1B. Explain the following

i. IP-within-IP Encapsulation
ii. Minimal Encapsulation
iii. GRE Encapsulation

1C. Explain the concept of multipath propagation and inter-symbol interference.

(5+3+2)

2A. Describe the sequence of events for the following scenarios with suitable illustrations.

i. A call from a mobile unit to a fixed subscriber
ii. A call from a fixed subscriber to a mobile unit

2B. Explain Co-channel and Adjacent channel interference.

2C. GSM has defined three different categories of service. Explain in detail.

(5+3+2)

3A. 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)

3B. Explain reverse tunnelling and what are the three problems associated with it?

3C. Diagrammatically explain how MACA solves the hidden and exposed terminal problem?

(5+3+2)

4A. With neat diagrams explain the steps required for the following scenarios:

i. Suppose 1800-3000-2800 is the toll-free number of Flipkart customer care and a user wants to call the customer care.

ii. Suppose a telephone user is making a call to a number +91-820-2925361.

4B. Explain with a neat diagram how A3, A5 and A8 algorithms guarantee security in GSM architecture.

4C. Discuss how infrastructure networks are different from ad-hoc networks.

(5+3+2)

5A. Draw the protocol architecture of IEEE 802.11 and explain each layer in detail?

5B. Spreading the spectrum can be achieved in two ways. Explain.

5C. What are the two basic reasons for a handover in GSM and also explain the four possible handover scenarios in GSM.

(5+3+2)

6A. Define the following terms with respect to trunking theory.

i. Set-up Time

ii. Blocked Call

iii. Holding Time

iv. Traffic Intensity

v. Grade of Service

6B. Derive the frame efficiency of a TDMA system to measure the percentage of data transmitted that contains information as opposed to providing overhead for the access scheme.

6C. Radio waves can exhibit three fundamental propagation behaviours depending on their frequency. Explain.

(5+3+2)