Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY
Manipal University

SIXTH SEMESTER B.TECH (E & C) DEGREE END SEMESTER EXAMINATION
MAY/JUNE 2016
SUBJECT: MOBILE COMMUNICATION (ECE - 330)

TIME: 3 HOURS **MAX. MARKS: 50**

Instructions to candidates
- Answer **ANY FIVE** full questions.
- Missing data may be suitably assumed.

1A. Draw the timing diagram illustrating how a call to a mobile user initiated by a landline subscriber is established.

1B. Bangalore has an area of 2000 sq km and is covered by a cellular system having allowed S/I as 15 dB with n=3. Each cell has a radius of 4km and using total BW as 40MHz with full duplex. Find the number of channels per cell.

1C. Find S/I for a worst case user in a 7-cell cluster size cellular system having n=4.

(5+3+2)

2A. Explain the various Hand-off assignment strategies. Also write about Umbrella cell approach in cellular design.

2B. If a transmitter produces 50 watts of power, express the transmit power in units of (a) dBm, and (b) dBW. If 50 watts is applied to a unity gain antenna with a 900 MHz carrier frequency, find the received power in dBm at a free space distance of 100 m from the antenna. What is the power received at 10 km distance? Assume unity gain for the receiver antenna.

2C. How MACAW protocol addresses the hidden and exposed terminal problems in wireless communication. Mention the steps.

(5+3+2)

3A. Derive the equation for E-field at a distance 'd' using ground reflection (2-ray) model.

3B. Write the path loss equation and antenna height gain factors for the Okamura model. Also mention the disadvantages of this model.

3C. Base station located on top of building radiates a carrier frequency of 1850 MHz and a vehicle is moving with a velocity of 60 mph, compute the received carrier frequency if the MS is moving

(a) Directly towards the BS (b) Directly away from the BS (c) In a direction which is perpendicular to the direction of arrival of the transmitted signal.

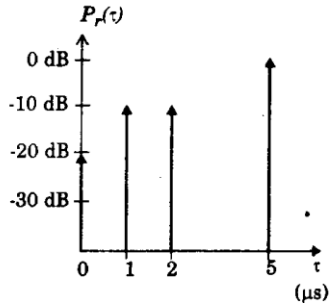
(5+3+2)

4A. Let a discrete channel impulse response is used to model urban RF radio channels with excess delays as large as 100 μs and microcellular channels with maximum excess delay as 4 μs. If the number of multipath bins is fixed at 64, find (a) $\Delta\tau$ (b) the maximum RF BW which the SMRCIM models can accurately represent. Repeat the problem for an indoor channel model with excess delays as large as 500 ns.

Given: The channel model used to analyze transmitter RF signals having BWs < $2/\Delta\tau$

4B. A zero mean sinusoidal message is applied to a transmitter that radiates an AM signal with 10 kW power. Compute the carrier power if the message signal is with 60% modulation. What percentage of the total power is in the carrier? Calculate the power in each sideband.

4C. Compute the RMS delay spread for the following power delay profile:



(5+3+2)

5A. Explain the architecture of GSM with neat sketches.

5B. Find the 3dB bandwidth for a Gaussian LPF used to produce 0.25GMSK with a channel data rate of R_b = 270 kbps. What is the RF channel bandwidth for GMSK as $0.57R_b$ containing a 90% of power? Specify the value of Gaussian filter parameter α for both the cases.

5C. Draw the GSM frame structure.

(5+3+2)

6A. Explain the various proposals to modify TCP to work in mobile environments. Mention the advantages and disadvantages of each.

6B. Draw the GPRS network architecture and mention the functions of GGSN and SGSN.

6C. Draw and explain the architecture of IEEE 802.11 for an infrastructure network and ad hoc networks

(5+3+2)