

GUJARAT TECHNOLOGICAL UNIVERSITY**M. E. - SEMESTER – I • EXAMINATION – WINTER 2012****Subject code: 714102N****Date: 09-01-2013****Subject Name: Modern Digital and Wireless Communication****Time: 02.30 pm – 05.00 pm****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

Q.1 (a)

1. Define random variable with reference to information theory and List out properties of Probability density function. (4)
2. Briefly explain Correlated Noise with reference to Communication Systems. (3)

(b)

1. Write short note on Delta Modulation. (4)
A signal $m(t) = 2 \cos 6000\pi t + 4 \cos 8000\pi t + 6 \cos 10000\pi t$, what is the
2. minimum sampling rate required according to band pass sampling theorem to represent the signal by its samples ? (3)

Q.2 (a)

1. Briefly explain various 3G standards used in Cellular Communication systems. (4)
In the following case, state the two-ray plane earth loss model could be applied
2. at 900MHz and also explain why or why not: (3)
(i) $h_t = 35\text{m}$, $h_r = 3\text{m}$, $d = 250\text{m}$

(b)

1. State Comparisons between Circuit switching and Packet Switching in Communication Systems (4)
2. If a transmitter produces 50 W of power (a) express the transmit power in dBm.(b) If 50 W is applied to a unity gain antennas with 900 MHz carrier frequency ,find the received power in dBm at a free space distance of 100 m from the transmitting antenna. (3)

OR

- (b) Write short note Okumura' path loss model. (7)

Q.3 (a) Explain Small scale fading in detail. (7)**(b)**

1. Briefly explain term “Doppler spread” and “Coherence time” with reference to wireless communication systems. (4)
2. Determine the maximum Doppler shift for a mobile moving at 50km/h at frequencies of 1 GHz (3)

OR**Q.3 (a)**

1. State the effects of small scale fading in wireless communication systems. (3)
2. Write short note on COST-231 Model for path loss prediction. (4)

(b)

1. Explain Longley Rice Model in very brief. (3)
2. The channel PDP is given as 0 dB at $\tau = 0$, -6 dB at $\tau = 2 \mu\text{s}$, -12 dB at $\tau = 4 \mu\text{s}$, and -16 dB at $\tau = 7 \mu\text{s}$. Draw the channel PDP. Determine the mean excess delay, rms delay spread of the channel. (4)

- Q.4 (a)**
1. Write short note on frequency diversity (7)
- (b)**
1. List out desirable properties of any digital modulation schemes. (3)
2. Briefly explain term (i) Bandwidth efficiency (ii) Power efficiency with reference to digital modulation techniques (4)

OR

- Q.4 (a)**
1. Write short note on Angular Diversity (4)
2. Briefly explain OQPSK modulation technique. (3)
- (b)**
1. Write short note on MSK digital Modulation Technique. (7)

- Q.5 (a)** Write short note on Error correction coding Techniques. (7)
- (b)**
1. Explain method of target ranging using DS spread spectrum system. (4)
2. State advantages of spread spectrum modulation technique. (3)

OR

- Q.5 (a)**
1. Write short note on Burst error detecting and correcting codes. (3)
2. Apply Huffman coding on six message sequence with probability 0.30,0.25,0.15, 0.12,0.08,0.10, find out average code length ? (4)
- (b)** List out comparisons between Direct sequence spread spectrum and frequency spread spectrum systems. (7)
