Seat No.: _____ Enrolment No._____

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)**

2. A signal $m(t) = 2\cos 6000\pi t + 4\cos 8000\pi t + 6\cos 10000\pi t$, what is the 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)**

2. In the following case, state the two-ray plane earth loss model could be applied at 900MHz and also explain why or why not: **(3)**

(i) ht = 35m , hr = 3m , d = 250m

(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 $\tau = 2\ \mu$s, -12 dB at $\tau = 4\mu$s,and -16 dB at $\tau = 7\mu$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 hope spread spectrum systems. **(7)**

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