Seat No.: _____ *Enrolment No._____*

GUJARAT TECHNOLOGICAL UNIVERSITY

M. E. - SEMESTER – I • EXAMINATION – SUMMER • 2014

Subject code: 714102N Date: 17-06-2014

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 mark.**

Q.1 **(a)**

1. Explain Cumulative distribution function in detail. **(4)**

2. Find the value o *a* for the given probability distribution function **(3)**

$$f_x(x) = a.e^{-0.2x}, \text{ for } x \geq 0$$
$$= 0 \text{ , for } x < 0$$

(b)

1. Explain differential Pulse Position Modulation in detail. **(4)**

2. A single tone 4KHz message signal is sampled with (i) 10KHz signal (ii) 7KHz signal. Describe the frequency components presents in frequency spectrum for each case. **(3)**

Q.2 **(a)**

1. Give the brief overview of various wireless Personal Area Networks. **(4)**

2. If P_t = 10W, G_t = 0dB and f_c = 900MHz, find received power P_r in Watts at free space distance of 1km. **(3)**

(b)

1. In the following cases, state the two-ray plane earth loss model could be applied and explain why or why not: **(4)**

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

(ii) ht = 30m , hr = 1.5m , d = 450m.

2. Explain COST-231 Hata Model in brief. **(3)**

OR

(b) Explain Two ray-Plane earth loss model in detail **(7)**

Q.3 **(a)** Briefly explain different types of channel fading in communication system.. **(7)**

(b)

1. Briefly explain Coherence bandwidth and Doppler Spread with reference to Communication systems. **(4)**

2. Assume that a laptop computer moves at a speed of 20 km/h in an IEEE 802.11g wireless LAN operating at 2.45 GHz band. Determine the maximum Doppler shift. **(3)**

OR

Q.3 **(a)**

1. Briefly explain frequency selective fading. **(3)**

2. List out factors which can influence small scale fading **(4)**

(b)

1. Find the average fade duration for threshold level ɟ=0.01, when the Doppler frequency is 200Hz **(3)**

2. Briefly explain frequency diversity in communication system. **(4)**

Q.4 **(a)**

1. State the advantages of digital modulation techniques. **(2)**

2. Briefly explain QPSK digital modulation technique. **(5)**

(b)

1. How does the phase of carrier vary for message {m(n)} = {1,0,1,1,0,1é } in (a) BPSK (b) DPSK **(3)**

2. Write short note on Convolution Coding. **(4)**

OR

Q.4 **(a)**

1. Briefly explain Systematic cyclic code with suitable example. **(5)**

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2. Explain the term bandwidth efficiency in digital modulation. **(2)**

(b)

1. Write short note on BFSK digital modulation technique in communication system. **(7)**

Q.5 **(a)** Write short note on Spread spectrum system. **(7)**

(b)

1. Explain Pseudorandom sequence generation in communication system in very brief. **(4)**

2. Briefly explain HALO Network **(3)**

OR

Q.5 **(a)**

1. List out advantages of spread spectrum modulation techniques. **(4)**

2. Briefly explain the working of jammers in spread spectrum communication system. **(3)**

(b) State comparison between Direct sequence spread spectrum system and frequency hoped spread spectrum system. **(7)**

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