C

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
FIRST SEMESTER M.TECH DEGREE EXAMINATION, DECEMBER 2018

Branch: Electronics and Communication Engineering

Stream(s):

1. **Signal Processing**
2. **Microwave & TV Engineering**
3. **Optoelectronics**
4. **Telecommunication**

Course Code & Name: 01EC6205 ADVANCED DIGITAL COMMUNICATION

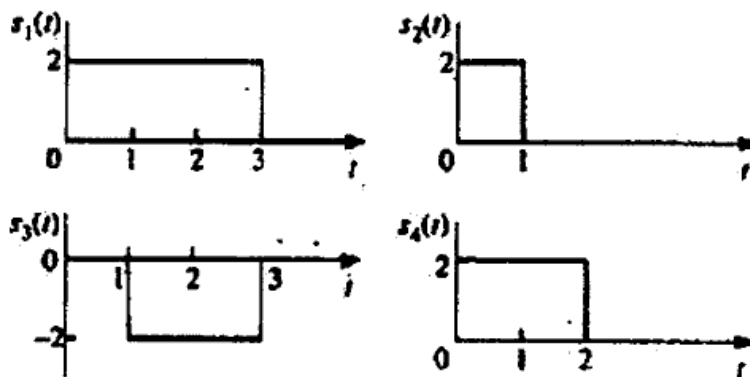Answer *any two full* questions from *each* part

Limit answers to the required points.

Max. Marks: 60   Duration: 3 hours

PART A

1. Perform the Gram Schmidt orthogonalization of the given signals and thus obtain the set   (9)
    of ortho-normal basis functions.

2. a. Explain the term power spectra and bandwidth efficiency.   (3)

    b. Consider the signal   (6)

    $$S(t)=\{ (A/T) t \cos 2\pi f_c t ; 0 \le t \le T)$$
    $$0 \quad : otherwise\}$$

    (i) Determine the impulse response of the matched filter for the signal.

    (ii) Determine the output of the matched filter at t=T.

    (iii) Suppose the signal S(t) is passed through a correlator that correlates the input S(t) with S(t). Determine the value of correlator output at t=T. Compare your result with that in (ii).

1

3. a. Explain correlation type demodulator with a neat diagram. (5)

     b. Determine the mean and variance of correlator output. (4)

PART B

4. State and prove the Nyquist criteria for band-limited signals with no ISI. (9)

5. a. Explain the mitigation of subcarrier fading using the coding with interleaving over time and frequency. (5)

     b. The binary sequence 111010010001101 is the input to a precoder whose output is used to modulate a duobinary transmitting filter. Find the precoded sequence, the transmitted amplitude levels, the received signal levels and the decoded sequence (4)

6. Explain multicarrier modulation with overlapping subchannels. (9)

PART C

7. Draw the block diagrams for the Direct Sequence Spread Spectrum signal and briefly explain its operation. (12)

8. Explain frequency- nonselective slowly fading channel. (12)

9. a. Explain about processing gain and jamming margin. (6)

     b. A DS binary PSK spread spectrum has a processing gain of 500. What is the jamming margin against a continuous – tone jammer if the desired error probability is 10^{-5} (6)