C Reg. No. :

Question Paper Code: 54405

B.E. / B.Tech. DEGREE EXAMINATION, APRIL 2024

Fourth Semester

Electronics and Communication Engineering

15UEC405 - DIGITAL COMMUNICATION

(Regulation 2015)

Duration: Three hours   Maximum: 100 Marks

Answer ALL Questions

PART A - (5 x 1 = 5 Marks)

1. The channel capacity of mutual information is   CO1- R

    (a) C=supI(X;Y)   (b) C=Blog(1+S/N)   (c) C=Bln(S/N)   (d) C=sup B(X:Y)

2. The maximum error correction of hamming code is.   CO2- R

    (a) d≤k+1   (b) d≥2k+1   (c) d=k+1   (d) none of these

3. Which type is used and preferred in digital logic circuits   CO3- R

    (a) NRZ-M   (b) NRZ-L   (c) Bipolar RZ   (d) RZ-AMI

4. The matched filter is a baseband signal receiver, which works in   CO4- R
    presence of.

    (a) Thermal noise   (b) white Gaussian noise   (c) Pepper noise   (d) None of these

5.   The multiple symbols are transmitted in one frequency hop is called as   CO5- R

    (a) DSSS   (b) Frequency hopping

    (c) Slow frequency hopping   (d) Fast frequency hopping

PART – B (5 x 3= 15 Marks)

6. Define Entropy..   CO1- R

7. State the advantages of convolutional codes?   CO2- R

8. A signal is sampled at Nyquist rate of 6 KHz and is quantized using 8 bit   CO3- R
    uniform quantizer. Assuming SNR for a sinusoidal signal, calculate the bit rate,
    SNR and BW.

9. Why Non coherent detection is preferred over Coherent detection?   CO4- R

10. Define processing gain and jamming margin..   CO5- R

PART – C (5 x 16= 80 Marks)

11. (a) Apply Shannon-Fano encoding procedure to find the code word   CO1- App   (16)
    for the messages A1, A2, A3, A4 and A5 with respective
    probabilities 0.35, 0.25, 0.20, 0.15 and 0.05. Also find the
    redundancy of the code

                                    Or

    (b) Use the LZW algorithm to compress the string BABAABAAA.   CO1- App   (16)
    Also comment on the code efficiency. Write the advantages of
    LZW coding over Huffman coding.

12. (a) For a systematic linear block code, the three parity check digits   CO2- App   (16)
    P1, P2,P3 are given by $P_{k,n-k}$ =[101 111 110 011]
     (i) Construct generated matrix.
    (ii) Assess the t code generated by the matrix.
    (iii) Determine error correcting capacity.
     (iv) Decode the received words with an example

                                    Or

    (b) A convolutional code is described by g1=[1 0 0], g2=[1 0 1],   CO2- App   (16)
    g3=[1 1 1]
     (i) Build the encoder corresponding to the code.
    (ii) Develop the state transition diagram for this code.
    (iii) Draw the trellis diagram.
    (iv) Estimate the transfer function

13. (a) For the sequence 10111001, sketch the waveform supporting the   CO3- U   (16)
    following data formats.
    (i) Unipolar RZ
    (ii) Polar NRZ
    (iii) Alternate mark inversion
    (iv) Split Phase Manchester coding.
    Draw the corresponding spectrum of the above formats and
    explain.

                                    Or

    (b) Outline the process of sampling and how the message can be   CO3- U   (16)
    reconstructed from its samples. Also illustrate the effect of
    aliasing with neat sketch

54405

14. (a) Discuss the transmitter, receiver and signal space diagram of QPSK and describe how it produces the original sequence with the minimum probability of error with neat sketch   CO4- Ana   (16)

Or

(b) Summarize the transmitter, receiver and generation of non-coherent version of PSK with neat sketch and obtain the probability of error   CO4- Ana   (16)

15. (a) Discuss about the Direct Sequence Spread Spectrum Techniques with necessary diagrams and write its applications   CO5- U   (16)

Or

(b) Explain the different types of synchronization techniques with necessary diagrams.   CO5- U   (16)

54405