

Reg. No. :

| | | | | | | | | | | | | | | |
|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| | | | | | | | | | | | | | | |
|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|

Question Paper Code:U4B03

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

Fourth Semester

Biomedical Engineering

21UBM403 - COMMUNICATION SYSTEMS

(Regulations 2021)

Duration: Three hours

Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 2 = 20 Marks)

1. Define Direct and Indirect Method of FM generation. CO1-U
2. Write down the Function of LPF in communication systems. CO1-U
3. Define sampling. CO1-U
4. List out the advantages of the digital communication systems. CO1-U
5. Define FSK, bit rate and baud rate. CO1-U
6. Label the PSK signal for the given input message signal 101101 CO1-U
7. State Shannon's channel coding theorem. CO1-U
8. Why is error control code important? CO2-App
9. Compare TDMA and FDMA. CO1-U
10. Define OFDMA. CO1-U

PART – B (5 x 16= 80 Marks)

11. (a) Define the concept of AM wave and explain its generation and detection using the balanced Modulators. CO1 U (16)
- Or
- (b) Discuss and analyze the generation and detection of DSBSC. CO1-U (16)

12. (a) The information in an analog signal voltage waveform is to be transmitted over a PCM system with an accuracy of $\pm 0.1\%$. The analog voltage waveform has a bandwidth of 100Hz and an Amplitude range of -10 to +10 volts. CO2- App (16)
- i) Determine the Maximum number of sampling rate required
 - ii) Determine number of bits in each PCM word.
 - iii) Determine the number of Bit rate required in PCM signal.
 - iv) Determine the minimum absolute channel bandwidth required for the transmission of PCM signal.

Or

- (b) A television signal with a bandwidth of 4.2MHz is transmitted using binary PCM. The number of Quantization level is 512. Calculate: CO2- App (16)
- i) Code word length
 - ii) Transmission Bandwidth
 - iii) Final bit rate
 - iv) What is the Minimum sampling rate.

13. (a) (i) Define Binary phase shift keying. Discuss in detail the BPSK transmitter and Receiver. CO1- U (8)

- (ii) Discuss the operation of ASK transmitter with neat diagram. CO1- U (8)

Or

- (b) (i) Discuss the operation of FSK transmitter and receiver with neat diagram and waveform. CO1- U (8)

- (ii) Compare ASK ,FSK and PSK modulation techniques. CO1- U (8)

14. (a) The generator Matrix for a (6,3) block code is given below . find all code vectors of this code. CO3- Ana (16)

$$G = \begin{bmatrix} 1 & 0 & 0 & 1 & 1 \\ 0 & 1 & 0 & 0 & 1 \\ 0 & 0 & 1 & 1 & 0 \end{bmatrix}$$

- i) Find the parity check matrix.
- ii) Find Minimum weight of this code.

Or

- (b) A rate 1/3 convolution encoder has generating vectors as CO3- Ana (16)
 $g_1 = (1\ 0\ 0)$, $g_2 = (1\ 1\ 1)$, $g_3 = (1\ 0\ 1)$.
 I) Sketch the encoder configuration.
 II) Draw the code tree, state diagram, and trellis diagram
15. (a) (i) Describe in brief the Frequency hopping spread spectrum technique. CO1- U (8)
 (ii) Describe the operation of the OFDMA system with example. CO1- U (8)
- Or
- (b) (i) Describe in brief the operation of FDMA multiplexing system. CO1- U (8)
 (ii) Compare the different Multiple access techniques. CO1- U (8)

