PAPER ID-310415

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**BTECH**
**(SEM V) THEORY EXAMINATION 2023-24**
**ANALOG & DIGITAL COMMUNICATION**

TIME: 3 HRS                                                                 M.MARKS: 100

Note: 1. Attempt all Sections. If require any missing data; then choose suitably.

## SECTION A

1.       Attempt *all* questions in brief.

| Q no. | Question | Marks | CO |
|---|---|---|---|
| a. | Draw block diagram of communication system. | 2 | 1 |
| b. | A 400W carrier is modulated to a depth of 75 percent. Compute the total power in the modulated wave. | 2 | 1 |
| c. | Describe Carson's formula for bandwidth calculation. | 2 | 2 |
| d. | If modulating frequency is 2KHz. and maximum deviation is 14 KHz. Calculate modulation index for FM wave. | 2 | 2 |
| e. | Describe pulse modulation. | 2 | 3 |
| f. | Discuss Nyquist criteria for sampling. | 2 | 3 |
| g. | Discuss the term ASK, FSK and PSK in digital modulation. | 2 | 4 |
| h. | Differentiate between coherent and non-coherent reception. | 2 | 4 |
| i. | Illustrate channel capacity theorem. | 2 | 5 |
| j. | Express the T1 carrier system. | 2 | 5 |

## SECTION B

2.       Attempt any *three* of the following:

| | | | |
|---|---|---|---|
| a. | Explain the method for Double side band suppressed carrier generation with the help of balanced modulator. | 10 | 1 |
| b. | Describe different types of noises present in receiver. | 10 | 2 |
| c. | Explain PWM generation and detection with suitable waveforms. | 10 | 3 |
| d. | Explain Binary phase Shift Keying Transmitter and Receiver diagram. | 10 | 4 |
| e. | Consider the five source symbols (messages) of a discrete memoryless source and their probabilities as shown in the table. Follow the Huffman's algorithm to express the code words for each message. Also express the average code word length and the average information per message. | 10 | 5 |

| Message | m1 | m2 | m3 | m4 | m5 |
|---|---|---|---|---|---|
| probability | 0.4 | 0.2 | 0.2 | 0.1 | 0.1 |

## SECTION C

3.       Attempt any *one* part of the following:

| | | | |
|---|---|---|---|
| a. | Explain Super heterodyne receiver and its advantages. | 10 | 1 |
| b. | Illustrate Frequency Division Multiplexing system with the help of suitable diagram. | 10 | 1 |

4.       Attempt any *one* part of the following:

| | | | |
|---|---|---|---|
| a. | Express Indirect Method of FM generation with block diagram. | 10 | 2 |
| b. | Express working of Balanced Slope Detector with diagram and S-shaped curve. | 10 | 2 |

5.       Attempt any *one* part of the following:

| | | | |
|---|---|---|---|
| a. | Explain Nyquist sampling theorem with derivation. | 10 | 3 |
| b. | Explain Delta modulation system with Transmitter and receiver and explain Slope overload and Granular distortion. | 10 | 3 |

6.       Attempt any *one* part of the following:

| | | | |
|---|---|---|---|
| a. | Explain ASK, FSK and PSK different Digital Modulation Techniques with suitable waveforms. | 10 | 4 |
| b. | Explain FSK generation and detection with diagram. | 10 | 4 |

7.       Attempt any *one* part of the following:

| | | | |
|---|---|---|---|
| a. | Evaluate Time Division Multiplexing used in communication system with suitable diagram. | 10 | 5 |
| b. | A discrete memoryless source have 5 symbols x1, x2, x3, x4 and x5 with probabilities p(x1)=0.4, p(x2)=0.19, p(x3)=o.16, p(x4)=0.15 and p(x5)=0.1. Evaluate the Shannon Fano code and code efficiency. | 10 | 5 |