**POORNIMA UNIVERSITY, JAIPUR.**

**END SEMESTER EXAMINATION, April 2023**

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|  | **6BT3157** | Roll No. | Total Printed Pages: 2 |
| **6BT3157** |  |
| B. Tech. III Year VI Semester (Back) End Semester Examination, April 2023  **(EC)** | |
| **BEC06102 : Analog & Digital Communication Systems** | | | |

# Max. Time: **3** Hours. Max. Marks: **60**

Min. Passing Marks: **21**

Attempt **five** questions selecting one question from each Unit. There is internal choice from Unit I to Unit V. Marks of each question or its parts are indicated against each question / parts. Draw neat sketches wherever necessary to illustrate the answer. Assume missing data suitably (if any) and clearly indicate the same in the answer.

Use of following supporting material is permitted during examination for this subject.

# **1.----------------------------------------------** **2.-----------------------------------------**

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|  |  | **UNIT-I (CO1)** | **Marks** | **Bloom Level** |
| **Q.1** | **(a)** | Explain the DSBSC modulation in detail with plot. | **(6)** | Applying |
|  |  |  |  |  |
|  | **(b)** | A carrier signal of is amplitude modulated by a message signal of with of modulation. The antenna resistance is given by 5 ohm. Find all the parameter w.th respect to AM like bandwidth, carrier power, transmitted power, sideband power, upper side band power power, lower sideband power, and efficiency. | **(6)** | Analyzing |
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|  |  | **OR** |  |  |
|  |  |  |  |  |
| **Q.2** | **(a)** | An FM Signal is given by  Find bandwidth, and power.  Repeat above if message signal frequency is doubled. | **(6)** | Analyzing |
|  |  |  |  |  |
|  | **(b)** | Explain the difference between angle modulation and phase modulation with example. | **(6)** | Analyzing |
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|  |  | **UNIT-II (CO2)** |  |  |
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| **Q.3** | **(a)** | Write a short note on –   1. pulse width modulation 2. delta modulation 3. Source coding and line coding | **(6)** | Applying |
|  |  |  |  |  |
|  | **(b)** | An input signal is applied to PCM has a maximum frequency of 4kHz and the input range varies from -4.8 to +4.8 V. The average power of input signal is 30mW. The target output SNR is 20 dB. Assume uniform quantization and PCM produces binary output.   1. Calculate the number of bits required to represent each sample. 2. Find the transmission bandwidth. | **(6)** | Applying |
|  |  |  |  |  |
|  |  | **OR** |  |  |
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| **Q.4** | **(a)** | A message signal of  is passed through Delta Modulator whose pulse rate is 5000 pulses/sec. Find minimum value of required to overcome slope over load error. | **(6)** | Applying |
|  |  |  |  |  |
|  | **(b)** | Explain the slope overload and granular noise in delta modulator. | **(6)** | Analyzing |
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|  |  | **UNIT-III (CO3)** |  |  |
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| **Q.5** | **(a)** | A message signal of is given to 10 bit PCM system. The resulting PCM signal is transmitted through free space by using band pass modulation scheme. Find the transmission bandwidth of modulation scheme for ASK and PSK. | **(6)** | Analyzing |
|  |  |  |  |  |
|  | **(b)** | Draw the constellation diagram of PSK scheme. | **(6)** | Analyzing |
|  |  |  |  |  |
|  |  | **OR** |  |  |
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| **Q.6** | **(a)** | What is the advantage of DPSK scheme over PSK scheme? | **(6)** | Applying |
|  |  |  |  |  |
|  | **(b)** | Draw the block diagram of 4-array PSK or QPSK transmitter. | **(6)** | Applying |
|  |  |  |  |  |
|  |  | **UNIT-IV (CO4)** |  |  |
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| **Q.7** |  | Design Shanon Fano code for given message whose probabilities are given below:  P(A) = 0.5, P(B) = 1/6, P(C) = 1/12, P(D) = 1/6, P(E) = 1/12. Find the efficiency for the above Shanon Fano code. | **(12)** | Analyzing |
|  |  |  |  |  |
|  |  | **OR** |  |  |
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| **Q.8** | **(a)** | A discrete memory less source has an alphabet (a1, a2, a3, a4) with corresponding probabilities (1/2, 1/4, 1/8, 1/8). Find the minimum required average code word length in bits to represent this source for error-free reconstruction. | **(6)** | Applying |
|  |  |  |  |  |
|  | **(b)** | Design Huffman code for given message whose probabilities are given below:  P(A) = 0.48, P(B) = 0.08, P(C) = 0.12, P(D) = 0.02, P(E) = 0.12, P(F) = 0.04, P(G) = 0.06, P(H) = 0.08. Find the efficiency for the above Huffman code. | **(6)** | Applying |
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|  |  | **UNIT V (CO5)** |  |  |
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| **Q.9** | **(a)** | Consider GSM which is a TDMA/FDD system that uses 25MHz for the forward link, which is broken in radio channels of 200 kHz. If 8 speech slots are supported on a single radio channel and if no guard band is assumed, find the number of simultaneous users that can accommodated in GSM. | **(6)** | Applying |
|  |  |  |  |  |
|  | **(b)** | Write short note on GSM. | **(6)** | Analyzing |
|  |  |  |  |  |
|  |  | **OR** |  |  |
|  |  |  |  |  |
| **Q.10** | **(a)** | Write short note on CDMA. | **(6)** | Analyzing |
|  |  |  |  |  |
|  | **(b)** | Find the theoretical maximum data capacity for a mobile radio link that operates with SNR of 30 dB and utilizes a 200 kHz channel. Compare and contrast the capacity with GSM standard, which operates at a channel rate 270.833 kbps. | **(6)** | Analyzing |