

Government College of Engineering, Aurangabad
(An Autonomous Institute of Government of Maharashtra)

T. E. (E &TC) Examination (2016-17)
ET 344 DIGITAL COMMUNICATION

Time: Three Hours

22 NOV 2016

Max Marks 60

Note:

- All questions are compulsory
- Assume suitable data wherever necessary

Q1 Solve any six

(1x6)

1. A band-limited signal with a maximum frequency of 5 kHz is to be sampled. According to the sampling theorem, the sampling frequency which is not valid is
(A) 5 kHz (B) 12 kHz (C) 15 kHz (D) 20 kHz
2. State Shannons Theorem
3. Quantization Noise of PCM depends upon number of quantization levels (True/False)
4. Minimum Bandwidth for line code is (True/False)
$$\text{URZ} : \frac{1}{T} \quad \text{and} \quad \text{BNRZ} : \frac{1}{2T}$$
5. Which statement is true
 - a) ASK : Maximum probability of error and PSK : Minimum Probability of error
 - b) PSK : Maximum probability of error and ASK : Minimum Probability of error
 - c) FSK : Maximum probability of error and PSK : Minimum Probability of error
 - d) ASK : Maximum probability of error and FSK : Minimum Probability of error
6. Bandwidth requirement of BPSK is double of Bandwidth requirement of QPSK (True or False)
7. Source encoding in data communication is done in order to
 - a) Enhance the information rate
 - b) Reduce the transmission power
 - c) Conserve transmitted power
 - d) Facilitate quick recovery

- Q2 Solve any two 6
- a Explain with diagram Digital Communication Link. Explain each block. 6
 - b Explain various types of Pulse Amplitude Modulation. 6
 - c Explain any three types of line coding and comment on their frequency spectrum.
- Q3 Solve any two 9
- a Explain with block diagram BPSK transmitter and receiver. 9
 - b Draw block diagram of PCM transmitter and explain in detail. 9
 - c Explain with diagram, distortions in DM and how it is removed in ADM? 9
- Q4 Solve any two 6
- a Draw and explain geometric space representation of QPSK and derive an expression for output of QPSK. 6
 - b What is EYE PATTERN? Explain procedure to observe it on CRO? Also explain information it carries about signal and channel. 6
 - c Derive an expression for output signal to noise ratio in DM and compare it with PCM. 6
- Q5 Solve any two 6
- a A signal $x(t) = 100\cos(24\pi \times 10^3)t$ is ideally sampled with a sampling period of 50 μsec and then passed through an ideal low pass filter with cutoff frequency of 15 KHz. Draw the waveforms and explain which frequency is/are present at the filter output? 6
 - b Prove for binary system, maximum value of entropy (H) is 0.5. 6
 - c Find Huffman code for five source messages with probability $p_1 = 0.4$, $p_2 = 0.15$, $p_3 = 0.15$, $p_4 = 0.15$, $p_5 = 0.15$. Find out coding efficiency. 6
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