Cut-Off Date: Based on the Published Deadline.
Total Marks: 100   (marks turned to 15 marks)

Contents

Plagiarism Warning:

As per AOU rules and regulations, all students are required to submit their own TMA work and avoid plagiarism. The AOU has implemented sophisticated techniques for plagiarism detection. You must provide all references in case you use and quote another person's work in your TMA. You will be penalized for any act of plagiarism as per the AOU's rules and regulations.

Declaration of No Plagiarism by Student (to be signed and submitted by student with TMA work):

I hereby declare that this submitted TMA work is a result of my own efforts and I have not plagiarized any other person's work. I have provided all references of information that I have used and quoted in my TMA work.

Name of Student:……………………………..

Signature:………………………………………..

Date:……………………………………

Question 1: (70 marks)

In your study of communications systems, you have studied different types of communications channels that can be used to send signals from a transmitter to a receiver. You have met the optical fibre, copper cable, and radio waves, where you studied their properties, merits and limitations. In this question, you will study another important type of communication channels that has wide applications. In this context, and with reference to reliable resources, write a report on this subject discussing and elaborating on the following items:

1) Explain what is meant by waveguide. Provide a sketch describing its construction.
(10 marks)
2) Explain how signals are introduced to and extracted from waveguides. (10 marks)
3) Discuss the usage of waveguides as a transmission line. (10 marks)
4) Explain the Transverse Electric and Magnetic (TEM) mode, and discuss how it is related to wave propagation in a waveguide. (10 marks)
5) With reference to the above point, discuss the modes that may propagate in a waveguide. (10 marks)
6) In the context of waveguides design, discuss the term "Cavity Resonator". (10 marks)

You should adhere to the following guidelines in your answers:
o The report MUST be written in **YOUR OWN WORDS**. You should grasp the idea and show your understanding. Any act of plagiarism **WILL NOT BE** tolerated.
o The word count of your report should be between **(700 – 800)** words. You should adhere to this limit. (3 marks)
o Use cross-referencing and citation (3 marks)
o All the references must be cited in proper format. (4 marks)

Question 2: (30 Marks)

Suppose a system uses bipolar symbols such that a data 1 is transmitted as a period at 1 V and a data 0 is transmitted as a period at −1 V, and that at the signal detector the data is recovered using threshold detection at 0 V.

Suppose, furthermore, that the system is using the (7, 4) Hamming code and that a received code word on one particular occasion is that shown in Fig. 1.

a) What binary data would you get after threshold detection at 0 V? (5 marks)
b) Without checking if the received code has an error or not, what would this code be decoded to? (5 marks)
c) Now check whether there have been any errors in the received code of part (a), and give the decoded output. (Assume that the probability of there being more than one error in a received code word is negligible.) (20 marks)
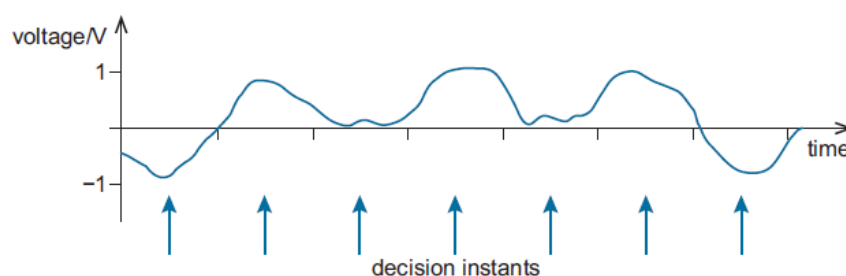

Figure 1. The received code word

End of Questions