

Name of the Student: _____

Max. Marks : 22 Marks

Time : 22 Minutes

Q1.

In order to reduce the bandwidth needed for transmission of an audio speech signal, the signal is filtered to remove high frequencies.

- (a) Explain what is meant by the **bandwidth** of a signal.

(2)

- (b) Name the type of filter needed to remove high frequencies.

(1)

- (c) (i) Draw the circuit diagram of a passive filter to remove high frequencies, using a resistor and a capacitor.

Label the input and the output.

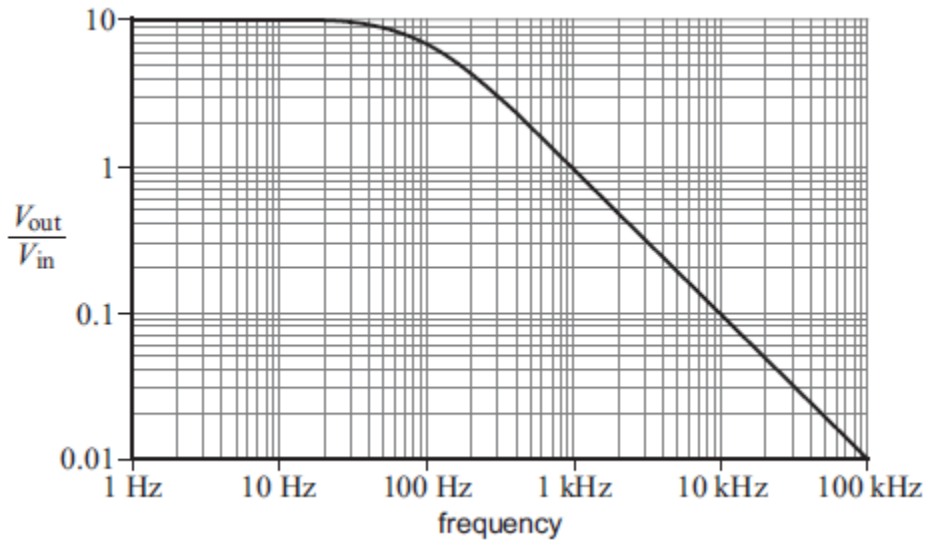
(2)

- (ii) The resistor in the filter has a value of 1 k Ω .

Calculate the capacitor value required to give a breakpoint frequency of 4.0 kHz.

(3)

(d) The graph shows the response of a different filter to remove high frequencies.



(i) State how the graph shows that this must be an **active** filter.

(1)

(ii) Circle the value closest to the breakpoint frequency of this filter.

30 Hz 100 Hz 200 Hz 1 kHz

(1)

(iii) A 2 V, 5 kHz signal is applied to the input of this filter.

Calculate the output signal voltage.

(2)

(Total 12 marks)

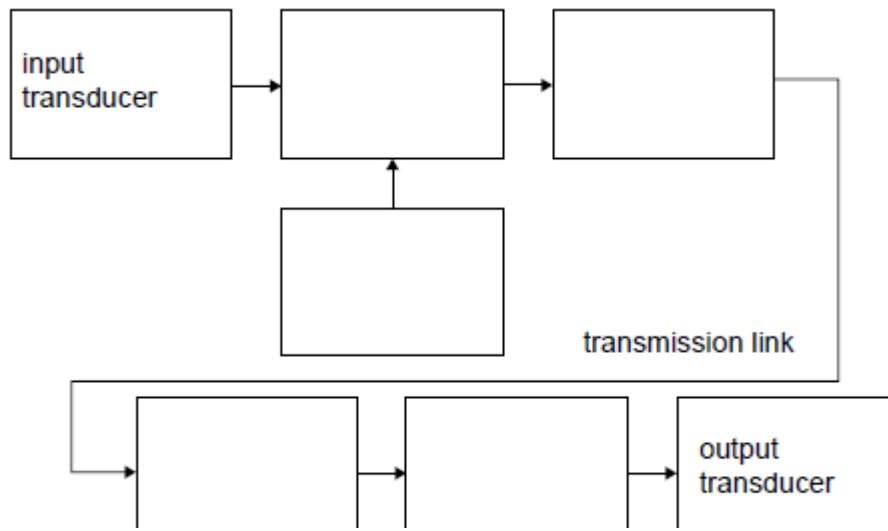
Q2.

Figure 1 shows a block diagram of a generalised communications system.

(a) Complete the labelling of the block diagram, using the following terms:

carrier wave generator demodulator modulator receiver transmitter

Figure 1



(2)

(b) Name **three** different media suitable for the transmission link.

1. _____
2. _____
3. _____

(3)

(c) (i) State the function of the modulator.

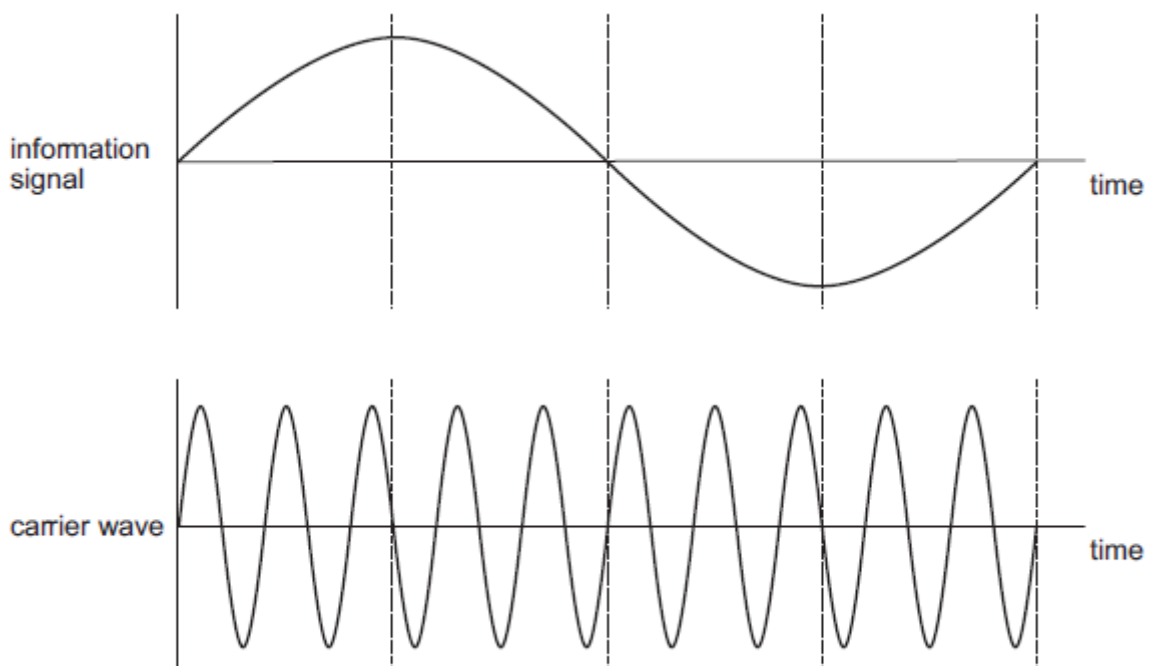
(1)

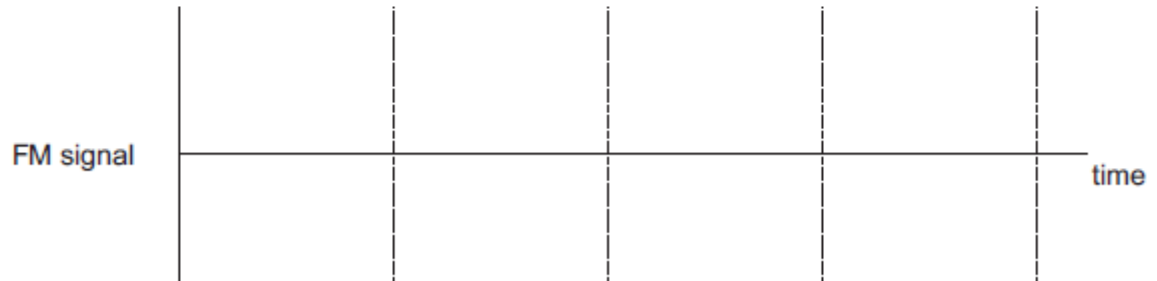
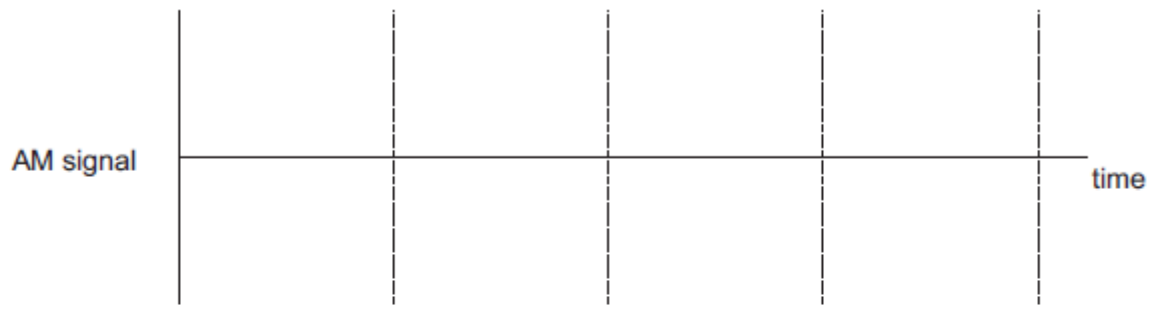
(ii) AM and FM are two types of modulation.

An information signal and a carrier wave are shown on the upper axes of **Figure 2**.

Draw on the lower axes the AM signal and the FM signal that these would produce.

Figure 2





(4)
(Total 10 marks)