Name of the Student:_____
Max. Marks : 17 Marks **Time : 17 Minutes**

Q1.

(a) State **two** characteristics of an operational amplifier.

_____

_____

(2)

(b) (i) Draw a circuit diagram showing an operational amplifier used as an inverting voltage amplifier.

(2)

(ii) Give suitable values for the components you have used in the circuit for a voltage amplification of magnitude 150.

_____

_____

_____

(2)

(c) When *negative feedback* is used with an amplifier the bandwidth increases.

(i) Explain what is meant by negative feedback as applied to the circuit drawn in part (b).

_____

_____

_____

(ii) Give **one** other advantage of using negative feedback in this application.

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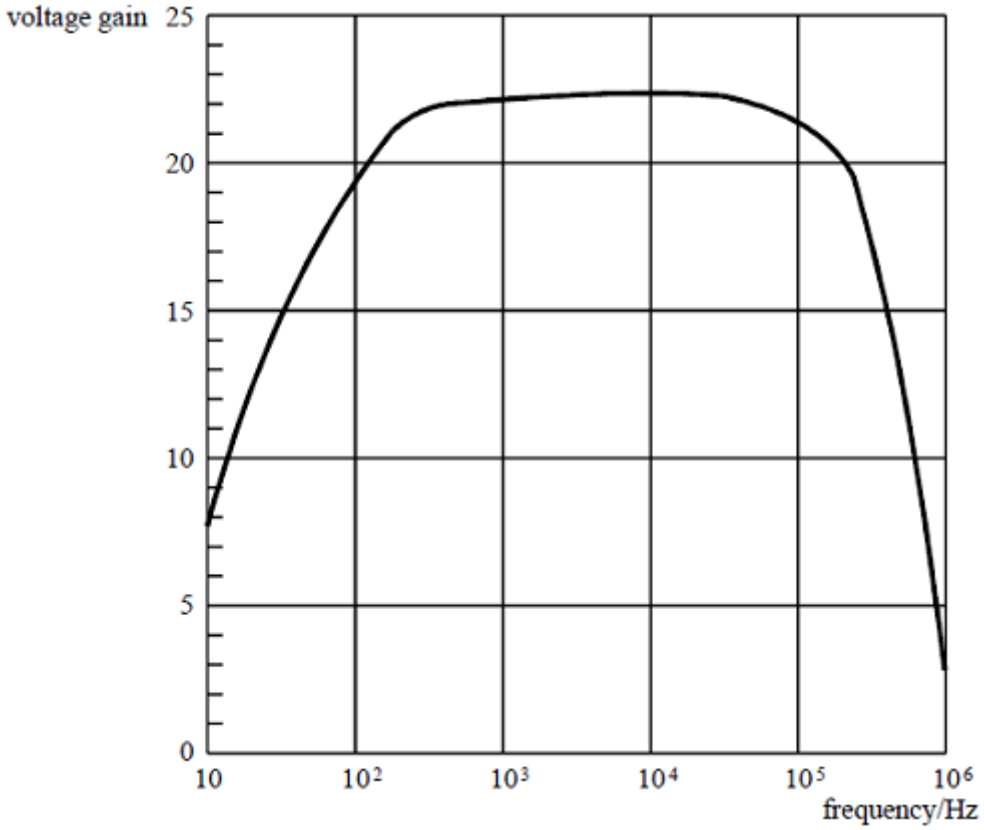
(iii) State what is meant by the bandwidth of an amplifier.

(iv) Indicate on the graph below, by means of a horizontal line, the bandwidth of the amplifier whose characteristic is shown.

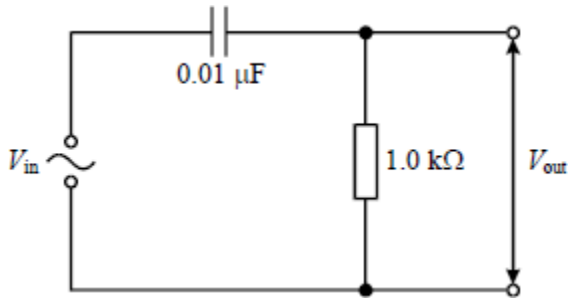


(5)

(Total 11 marks)

Q2.

The figure shows the circuit of a high-pass filter. The ac source has a variable frequency.



(a) (i) Calculate the frequency at which the reactance of the capacitor is $1.0 \times 10^3\ \Omega$.

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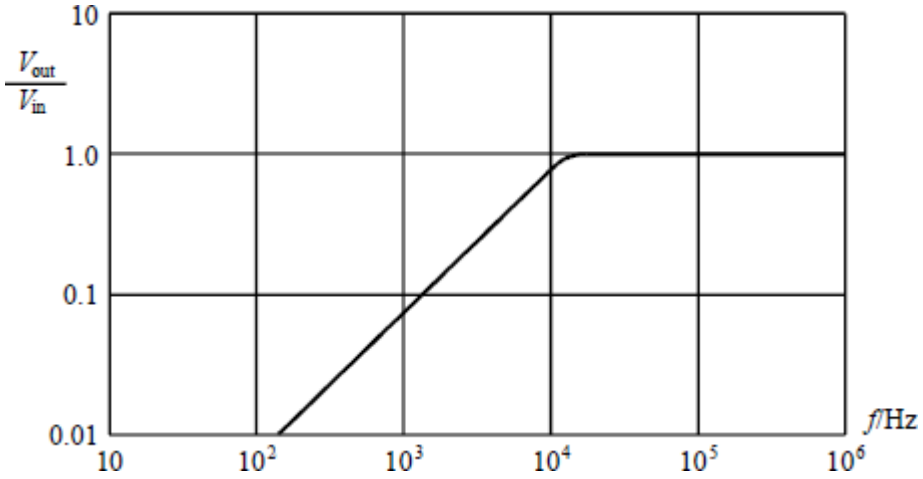
(ii) Explain why $\frac{V_{out}}{V_{in}}$ will have a low value at low frequencies.

(4)

(b) The variation of $\frac{V_{out}}{V_{in}}$ with frequency for the high-pass filter is shown below.



Explain, without further calculation, the form of the characteristic.

(2)

(Total 6 marks)

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