M1. (a) 3 kHz **(1)**

1

(b) (i) (age related) as *f* increases, loss increases **(1)**

(ii) (noise related) loss is maximum at 4 kHz **(1)**

2

(c) (i) (use of *intensity level* = 10 log $\frac{I}{I_0}$ gives)

$I = 1.0 \times 10^{-12} \times 10^{86/10}$ **(1)**

$= 3.98 \times 10^{-4}$ W m^{-2} **(1)**

(ii) (use of same equation gives)

intensity level = 10 log $\left(\frac{3.98 \times 10^{-4} - 7.0 \times 10^{-5}}{1.0 \times 10^{-12}}\right)$

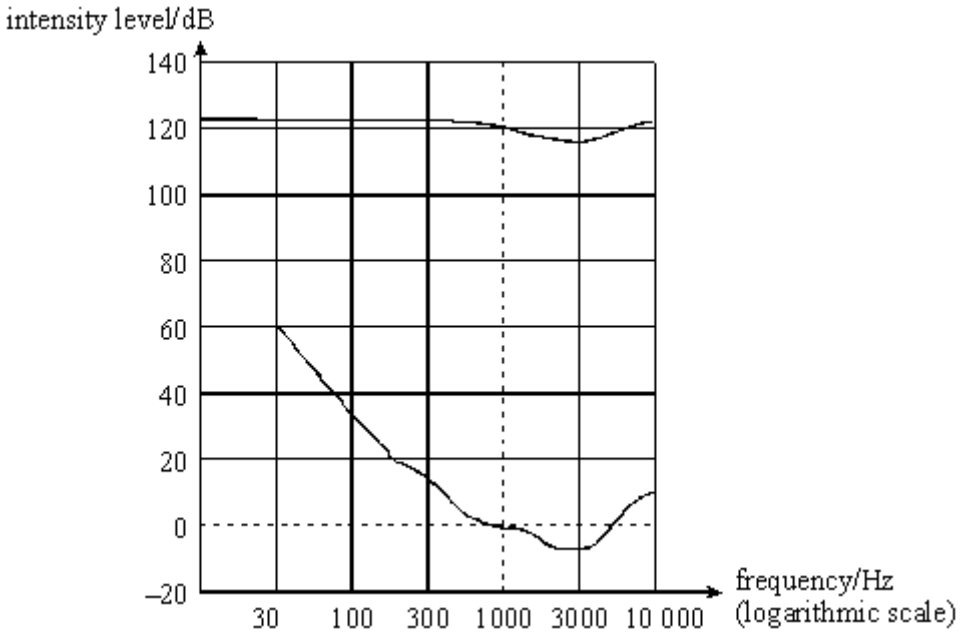
= 85(.2) dB **(1)**

(allow C.E. for incorrect *I* from (i)) **(1)**

4

[7]

M2. (a) (i)

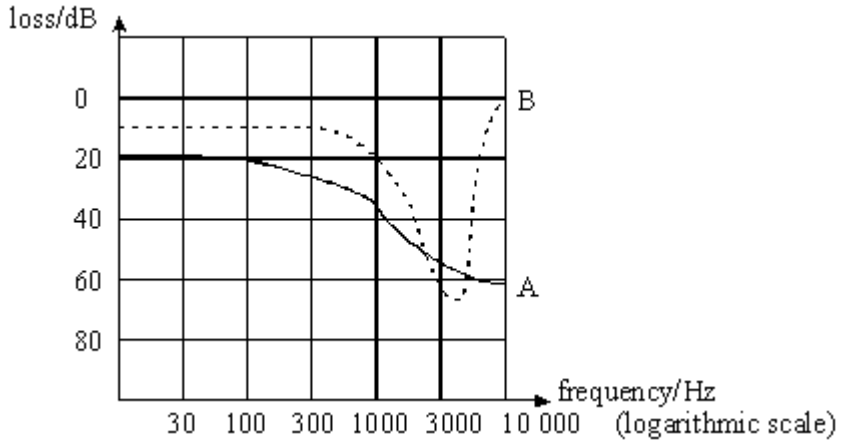


general shape flatter and passing through 120, 1000 **(1)**

(ii) both most sensitive at ≈ 3000 Hz **(1)**

2

(b)



(i) trace A (_____), basic shape correct **(1)**

(ii) trace B (------), basic shape correct **(1)**

(iii) loss due to age increases with frequency **(1)**
loss due to noise is maximum at 4000 Hz **(1)**

4

[6]