

**M1.(a)** Balances the relative strength / voltages / currents / intensity / signal / loudness / output from the two microphones / combines the signals to form one signal

*Condone power*

*Not 'sorts the relative strengths'*

*Allow merges*

B1

1

(b) CD or named digital recorder

*Only allow magnetic media if clear mention of digital*

B1

(A to D converter means) digital recorder is needed

*Computer / mobile phone / ipad / MP3 because it processes digital data*

B1

2

(c) Noise reduction

When recovering of original digital signal during playback  
or

Less storage per file or shorter download time per file  
due to compression of digital signal

*Allow for 1 mark*

- *concept of restoring the original signal more easily*
- *'faithful' multiple copies*
- *ease of manipulation of data*

*Not easier to store*

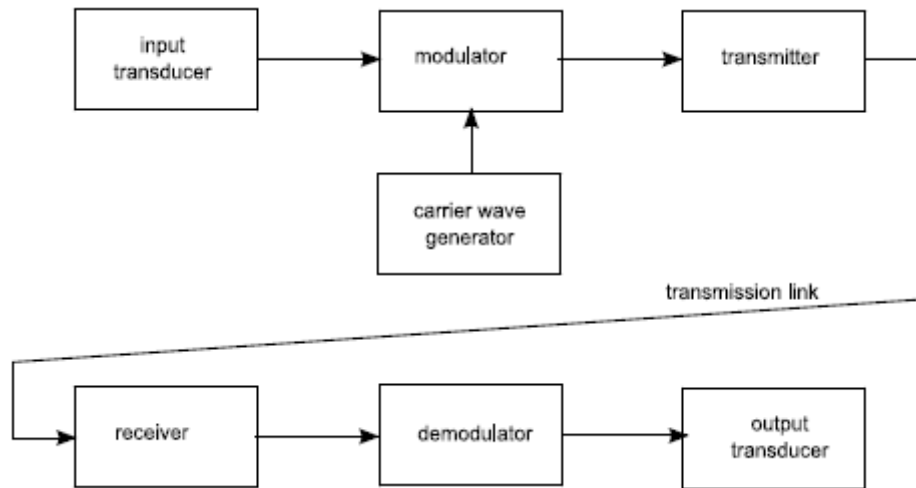
B1

B1

2

[5]

**M2.(a)**



transmitter & receiver, carrier wave gen ✓  
 demodulator & modulator ✓

2

- (b) e.g. free space  
 optical fibre  
 twisted pair  
 coax cable (any 3 ✓✓✓ )

3

- (c) (i) superimpose the information signal onto the carrier wave ✓
- (ii) AM – constant frequency sinusoidal wave matching carrier wave ✓  
 amplitude varies in phase with information signal ✓  
 FM – constant amplitude sinusoidal wave ✓  
 frequency varies in phase with information signal ✓

1

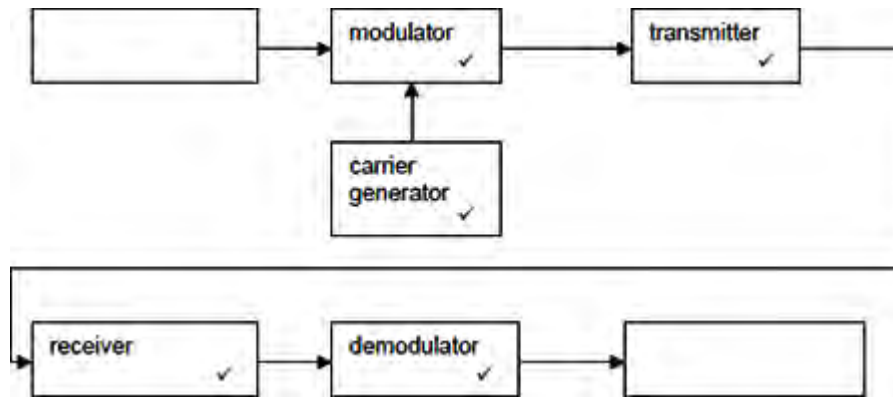
4

[10]

- M3.(a)** (any order)
- 1 free space ✓
  - 2 wires (twisted pair, coaxial etc.) ✓
  - 3 fibre ✓

3

(b)



5

[8]

M4.(a) (i) unmodulated carrier wave / sine wave / blank carrier etc ✓

1

(ii) electromagnetic signal / modulated radio wave / ray in fibre etc ✓

1

(iii) modulated carrier wave ✓

1

(iv) information signal / recovered information signal / baseband signal etc ✓

1

(b) (i) demodulator (could also be modulator) ✓

1

(ii) carrier generator (may also be demodulator) ✓

1

(iii) output transducer ✓

1

(iv) carrier generator / transmitter / receiver ✓

1  
[8]

**M5.(a)** use of  $f = 1 / 2\pi\sqrt{LC}$ , change subject to  $L = 1 / 4\pi^2f^2C$   
substitute values, calculation, leading to  $6.9\mu\text{H}$  ✓✓✓✓

4

(b) use of  $\lambda = c / f$ , substitute values leading to  $22.1\text{m}$  ✓  
dipole =  $11.05\text{m}$  ✓  
too large for desk operation ✓

3

(c)  $13.56 / 0.1 = 136$  ✓ (could be rounded down to 135)

1

(d)  $1\text{KB} = 8192$  bits (allow 8000) ✓  
 $8192 / 100000 = 0.082\text{s}$   
(or allow values based on 8000, 0.08s) regardless of these variations, time to  
download centres on  $80\text{ms}$  ✓

2

[10]

**M6.(a)**



5

(b) (i) detector ✓

1

(ii) tuned circuit ✓

1

(iii) loudspeaker ✓

1

(iv) af amplifier ✓

1

(c) obtains af signal from modulated wave OR  
rectifies modulated carrier wave  
filters out rf signal  
passes af signal

Max 2 ✓ ✓

2

[11]