

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

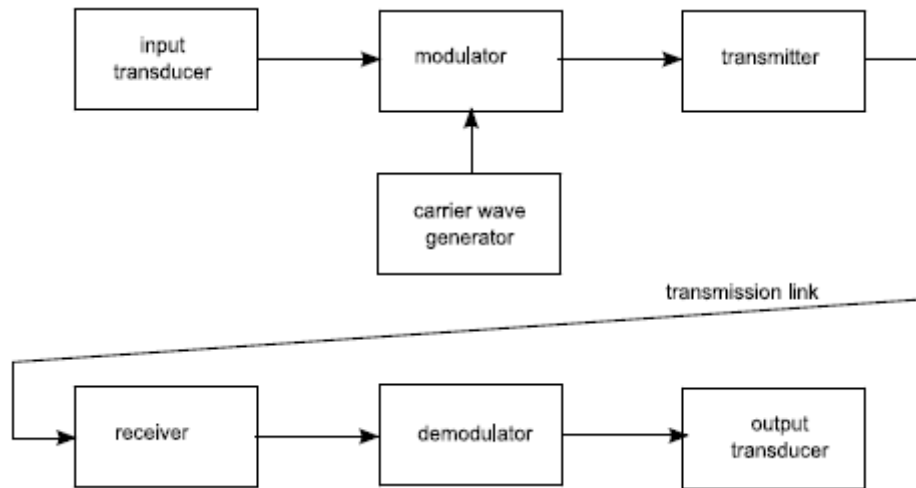
B1

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

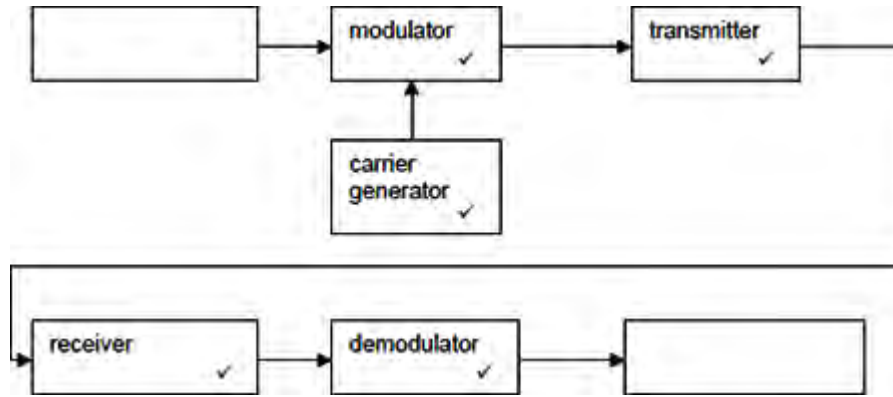
4

[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 22.1m ✓
dipole = 11.05m ✓
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 80ms ✓

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]