

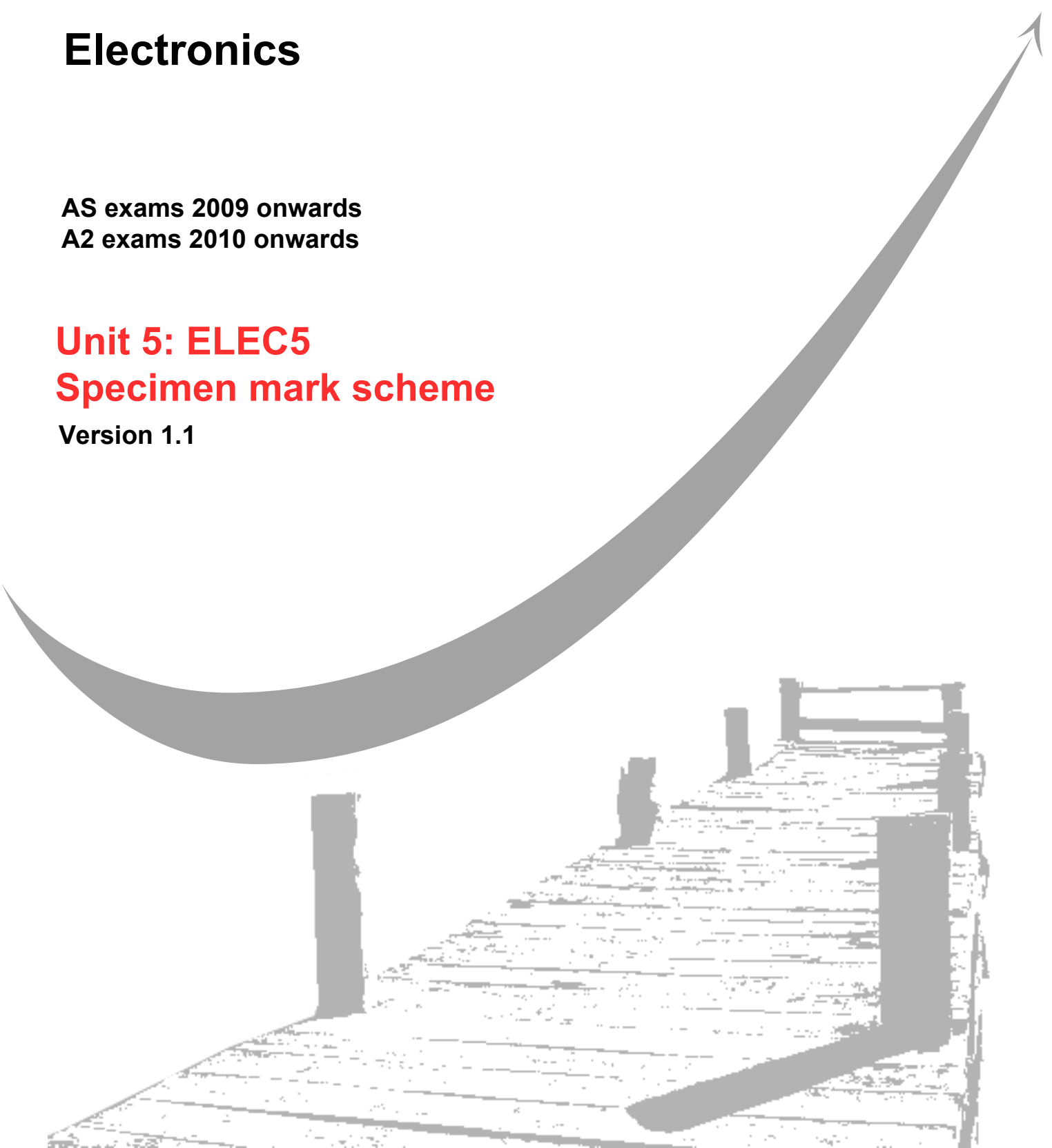
GCE
AS and A Level

Electronics

AS exams 2009 onwards
A2 exams 2010 onwards

Unit 5: ELEC5 **Specimen mark scheme**

Version 1.1



The specimen assessment materials are provided to give centres a reasonable idea of the general shape and character of the planned question papers and mark schemes in advance of the first operational exams.

For operational papers, mark schemes are prepared by the Principal Examiner and considered, together with the relevant questions, by a panel of subject teachers. The mark scheme includes any amendments made at the standardisation meeting attended by all examiners and is the scheme which was used by them in this examination. The standardisation meeting ensures that the mark scheme covers the candidates' responses to questions and that every examiner understands and applies it in the same correct way. As preparation for the standardisation meeting each examiner analyses a number of candidates' scripts: alternative answers not already covered by the mark scheme are discussed at the meeting and legislated for. If, after this meeting, examiners encounter unusual answers which have not been discussed at the meeting they are required to refer these to the Principal Examiner.

It must be stressed that a mark scheme is a working document, in many cases further developed and expanded on the basis of candidates' reactions to a particular paper. Assumptions about future mark schemes on the basis of one year's document should be avoided; whilst the guiding principles of assessment remain constant, details will change, depending on the content of a particular examination paper.

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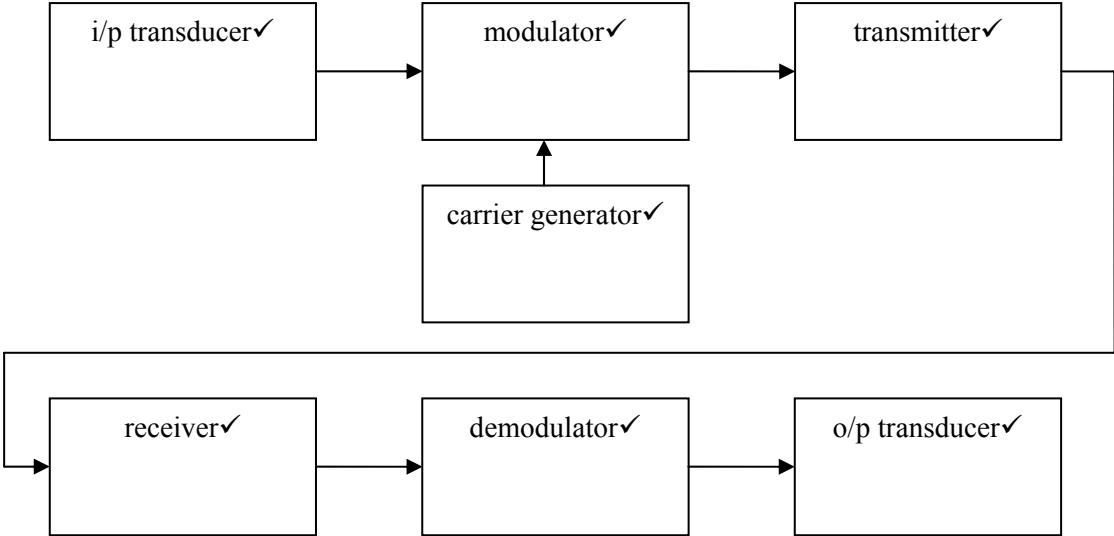
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Mark Scheme

1 (a)

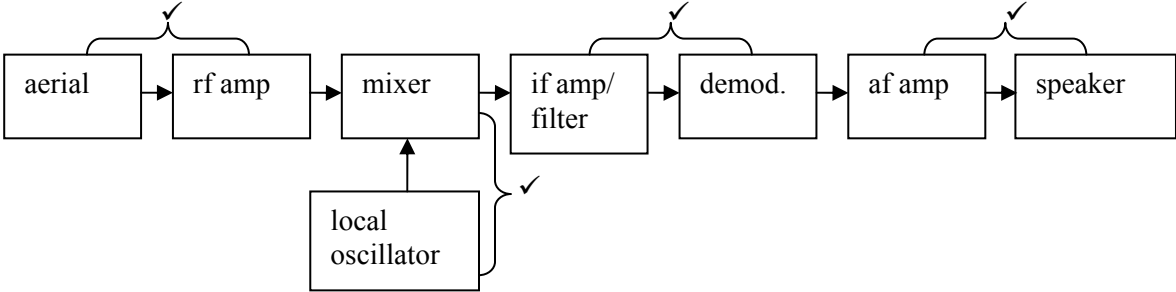


(7 marks)

- (b) (i) transfer of meaningful information✓
from one location to another✓
- (ii) amount of information that can be sent✓
in a given time✓ (or rate ✓✓)
greater bandwidth results in greater capacity to carry
information✓

(5 marks)
(question total 12 marks)

2 (a)



(4 marks)

- (b) (i) 98.1 – 87.4✓ 10.7MHz✓
98.1 + 87.4✓ 185.5MHz✓

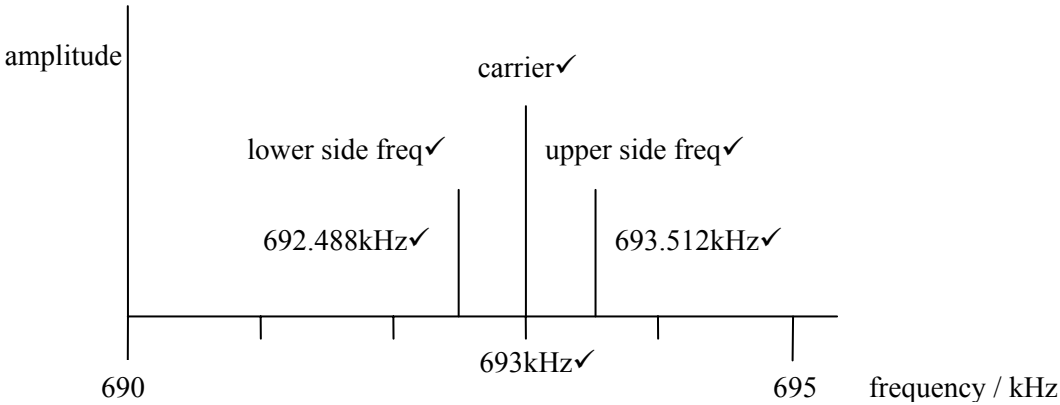
- (ii) 10.7MHz✓
- (iii) 76.7MHz✓
- (iv) image or second channel✓

(7 marks)
(question total 11 marks)

- 3 (a) amplitude of carrier wave✓
rate of change of amplitude of carrier wave✓
- (b) frequency of carrier wave✓
rate of change of frequency of carrier wave✓
- (c)

(2 marks)

(2 marks)



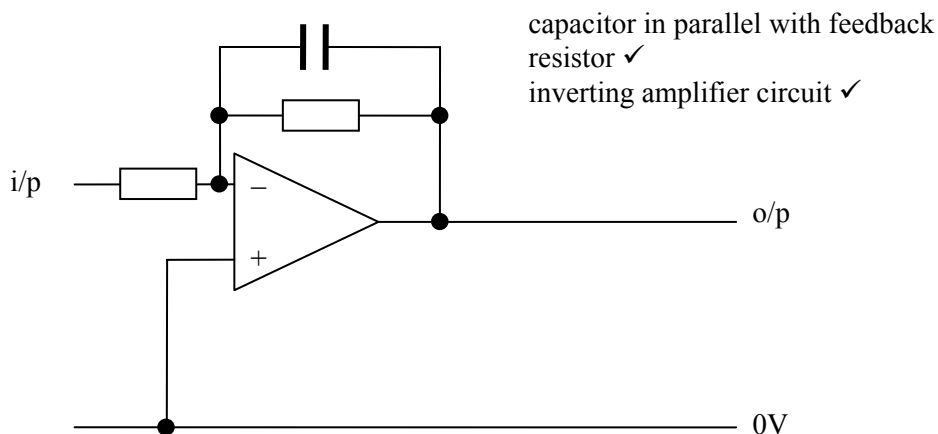
(6 marks)

- (d) e.g. VHF stereo broadcast FM radio ✓
less noise/stereo/bandwidth ✓

(2 marks)
(question total 12 marks)

- 4 (a) 12.5kHz ✓ (1 mark)
- (b) Wavelength calculation 67 cm, when compared to 5 cm aerial length leading to conclusion that the aerial is inefficient. ✓
 Factors could include power, absorption of signal by bodies/ buildings, sensitivity of receiver. ✓✓
 Range issues, line of sight, altitude etc. ✓ (4 marks)
- (c) Range of CTCSS signals is 67 to 254 Hz, audio voice frequency range is 300Hz to 3000Hz, so the two do not overlap. ✓ (1 mark)
- (d) Low pass filter ✓
 parameter, breakpoint frequency ✓
 value, between 254Hz and 300Hz ✓
 Circuit, correct circuit diagram ✓, resistors in correct ratio, values above 1kΩ ✓
 correct value for capacitor ✓ (6 marks)
(question total 12 marks)

5 (a)



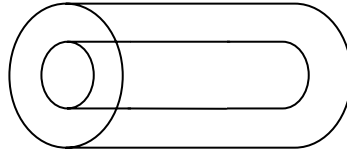
A treble cut filter based on a non-inverting amplifier would gain equal credit. (2 marks)

- (b) convert $f_0 = 1 \div (2\pi RC)$ into $R = 1 \div (2\pi f_0 C)$ ✓
 $R = 1 \div (6.28 \times (4 \times 10^3) \times (2.2 \times 10^{-9}))$ showing $R = 18 \text{ k}\Omega$ ✓ (2 marks)
- (c) $G_V = 18 \div 10 = 1.8$ ✓ (2 marks)
- (d) 8kHz ✓
 to avoid ✓ aliasing ✓ (mention of Nyquist ect, equal credit) (3 marks)

- (e) mention of number of channels ✓
multiplexing 8 cells onto one channel ✓
size of cell and frequency re-use ✓

(3 marks)
(question total 12 marks)

6 (a)



Coaxial nature of fibre
with higher refractive
index in centre ✓

Alternative diagrams that show the coaxial nature of the fibre would gain equal credit.

(1 mark)

- (b) (i) total internal reflection ✓
- (ii) LED or laser diode ✓
- (iii) photodiode or PIN photodiode ✓

(3 marks)

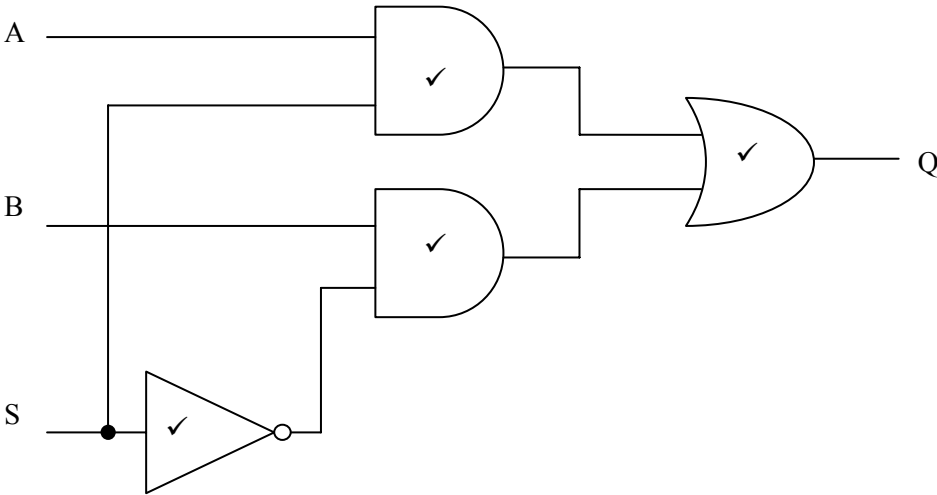
- (c) (i) attenuation ✓
- (ii) dispersion ✓
- (iii) radiation ✓

(3 marks)

- (d) Suitable range of advantages and disadvantages
eg. more security, harder to tap into ✓ no electromagnetic field ✓
or more bandwidth ✓, higher carrier frequency ✓ capacity to carry
much more information ✓
or not susceptible, to electromagnetic interference ✓
other responses are possible here also

(max 4 marks)
(question total 11 marks)

7 (a)



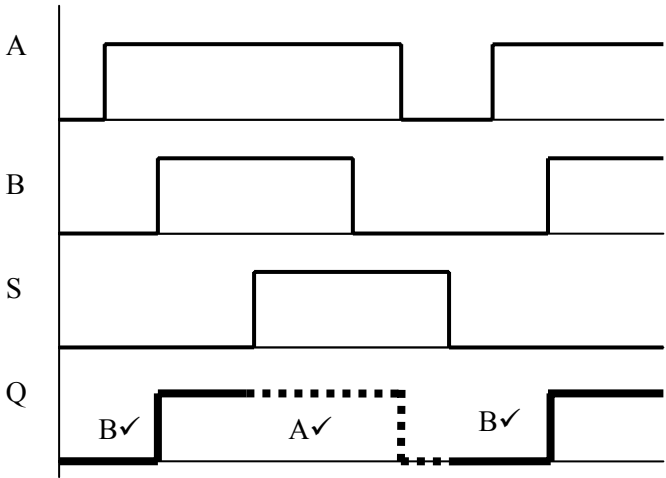
Other logic diagrams that have the same function would gain equal credit.

(3 marks)

(b) to allow inputs A and B to be alternately switched to Q
depending on the state of S
A with S and B with \overline{S}

(3 marks)

(c)



(3 marks)
(question total 10 marks)

Paper = 80