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General Certificate of Education (A-level)
June 2011

Electronics ELEC5

(Specification 2430)

Unit 5: Communications Systems

Final

Mark Scheme

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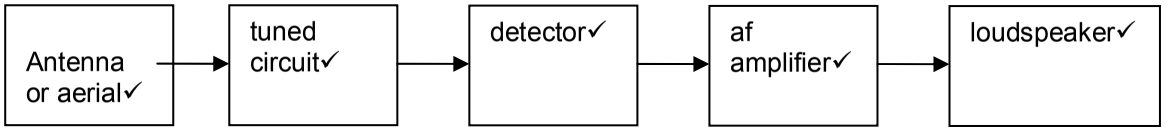
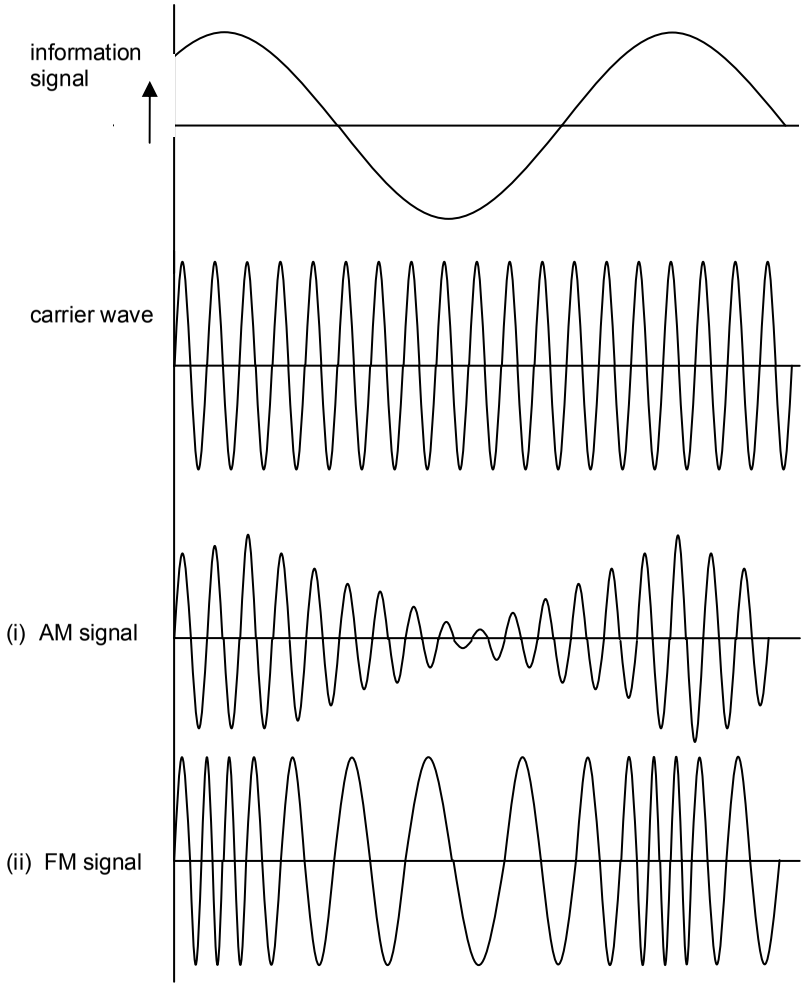
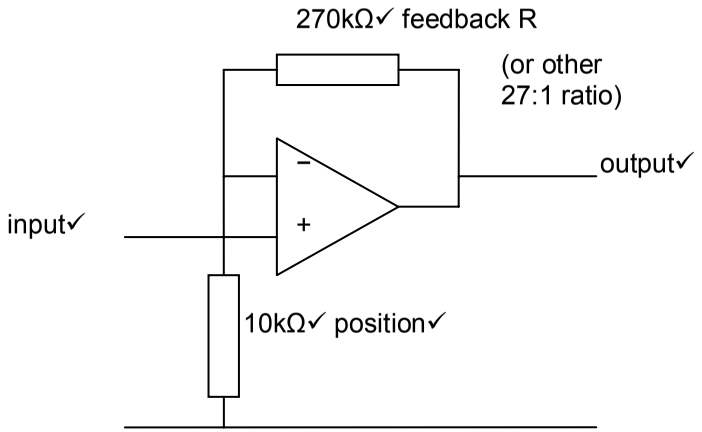
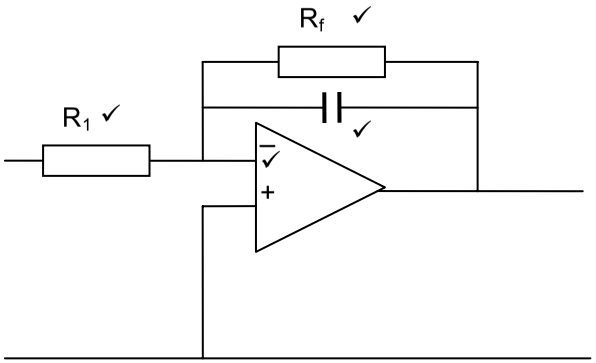
Question	Part	Subpart	Marking guidance		Mark
1	(a)				**5**
1	(b)	(i)	detector✓		**1**
1	(b)	(ii)	tuned circuit✓		**1**
1	(b)	(iii)	loudspeaker✓		**1**
1	(b)	(iv)	af amplifier✓		**1**
1	(c)		obtains af signal from modulated wave OR rectifies modulated carrier wave filters out rf signal passes af signal Max 2 ✓✓		**2**

2	(a)		 const freq✓ amplitude varies✓ in phase with info sig✓ const ampl✓ frequency varies✓ in phase with info sig✓		**6**

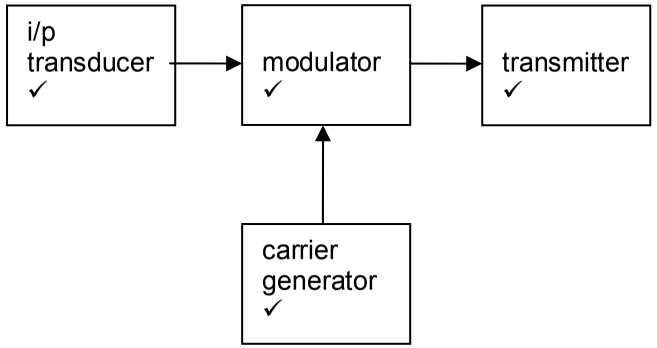
2	(b)	(i)	2 × 3 kHz = 6kHz✓		**1**

2	(b)	(ii)	2(3 + 5)✓ = 16kHz✓		**2**

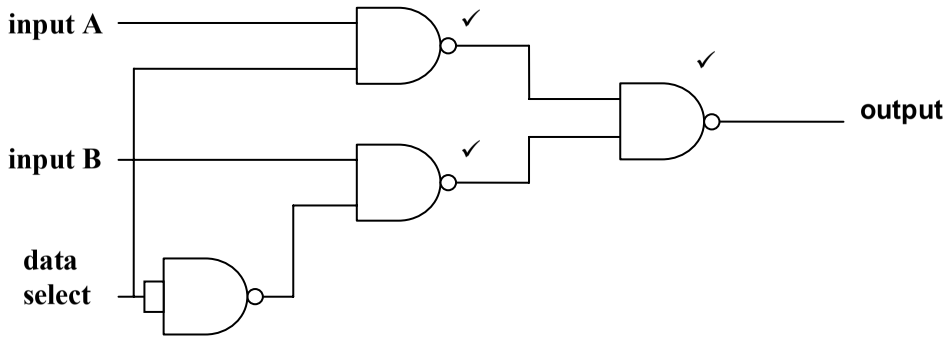
3	(a)	(i)	so it does not load the demodulator✓		**1**
3	(a)	(ii)	non-inverting amplifier✓		**1**
3	(a)	(iii)			**5**
3	(a)	(iv)	10mV × +28 ✓ = 280mV✓		**2**
3	(b)		$(1 \times 10^6) \div 28 = 35.7$kHz✓ ✓ suitable for audio sigs (max 20kHz) ✓		**3**
3	(c)		push-pull source follower diagram✓ correct n channel symbol upper✓ correct p channel symbol lower✓ diode/resistor biasing ✓		**4**
4	(a)		to prevent aliasing (or description of the effects of aliasing)✓		**1**
4	(b)		256 ÷ 8 ÷ 2✓ = 16kHz✓		**2**

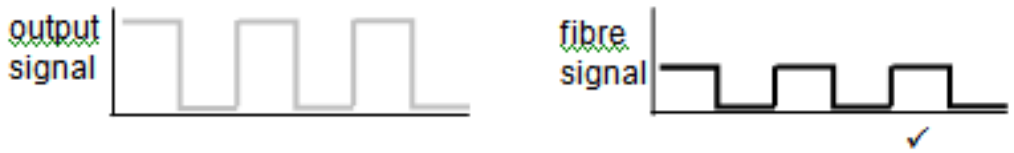
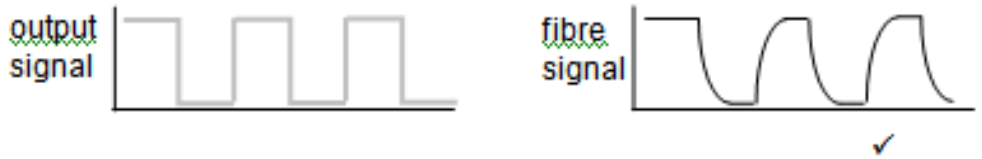
4	(c)				**4**

4	(d)		C = 1 ÷ (2 π R f)✓ = 1 ÷ (6.28 × 1.5 × 10^4 × 1.6 × 10^4) ✓ = 663pF✓		**3**

5	(a)				**4**

5	(b)	(i)	carrier generator✓		**1**

5	(b)	(ii)	use of f = 1 ÷ 2π √LC✓ $1 \div 2\pi\sqrt{10^{-7} \times 5 \times 10^{-12}}$ ✓ 225 MHz✓		**3**
5	(c)		calc leading to λ = 1.32m✓ 1.33 ÷ 2 = 0.66m✓		**2**
6	(a)		several signals ✓ being sent one after the other in time (or diagram) ✓		**2**
6	(b)				**3**
6	(c)		data input to first D input✓ clock to all clock inputs in parallel✓ all Q's to following D input✓ all Q's as parallel outputs✓		**4**
7	(a)	(i)	to check whether data has been corrupted✓		**1**
7	(a)	(ii)	to specify to where the data is to be sent✓		**1**
7	(a)	(iii)	2 of source address, length of data, protocol used, (packet number, total number of packets, time etc.) ✓✓		**2**

7	(b)	(i)	routed via another machine some explanation, e.g. C-D or CE, tries another of its links, etc. ✓		**1**
7	(b)	(ii)	B sends request to A to retransmit packet✓		**1**
7	(c)		e.g. better use of bandwidth, allows multiplexing, data often occurs in short bursts, security ✓		**1**
8	(a)	(i)	LED or laser diode✓		**1**
8	(a)	(ii)	photo diode✓		**1**
8	(b)	(i)	 ✓		**1**
8	(b)	(ii)	any two from absorption, radiation or scattering✓✓		**2**
8	(c)	(i)	 ✓		**1**
8	(c)	(ii)	signals of different frequencies travelling at different velocities along the fibre✓ Multipath dispersion✓		**2**

UMS conversion calculator: www.aqa.org.uk/umsconversion