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ASSESSMENT and QUALIFICATIONS ALLIANCE

General Certificate of Education

Electronics 5431/6431

ELE5 Communications Systems

Mark Scheme

2008 examination – June series

Mark schemes are prepared by the Principal Examiner and considered, together with the relevant questions, by a panel of subject teachers. This 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.

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1 (a) (i) 2✓

(ii) 3✓

(iii) 5✓

(iv) 4✓

(v) 1✓

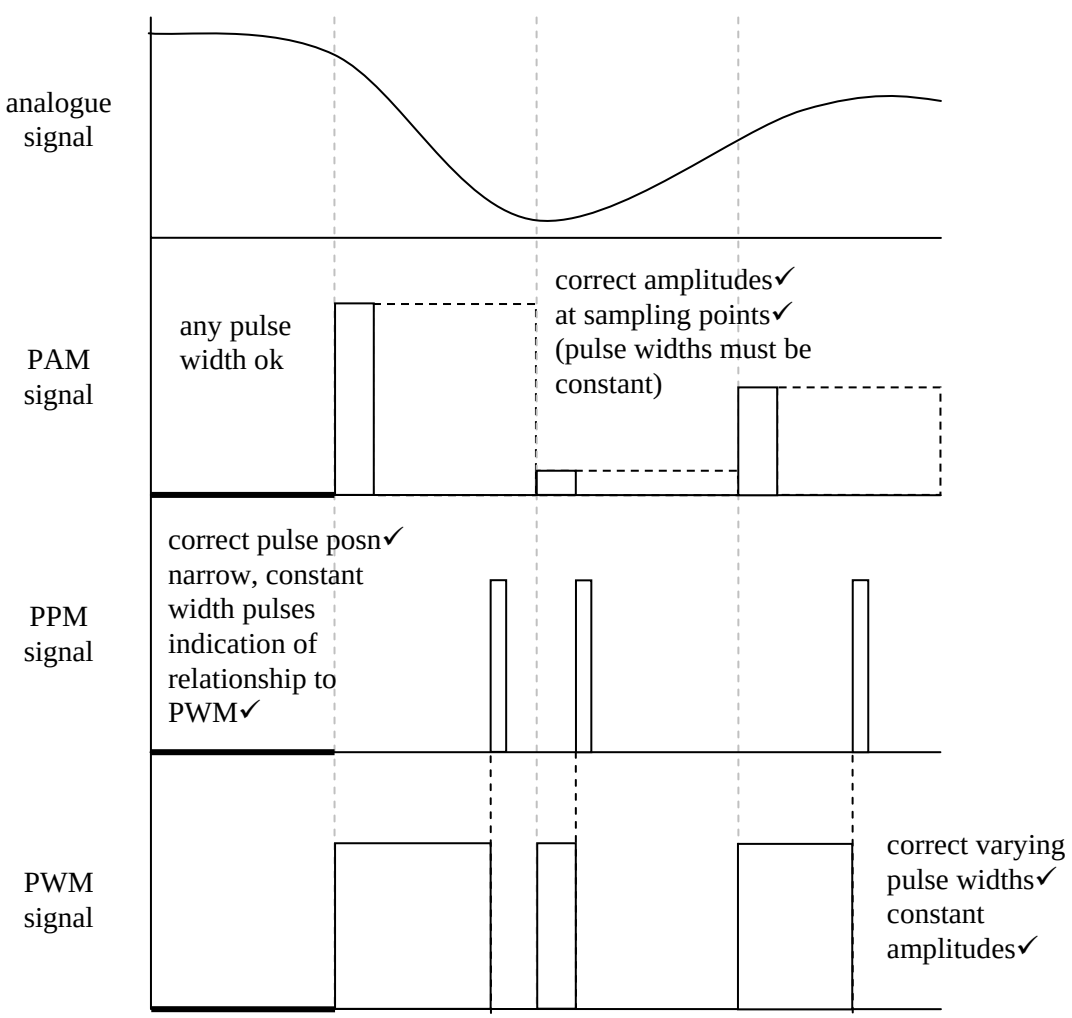
(vi) 6✓

(b) (i) free space✓ optical fibre✓

(ii) any two from: open wire, twisted pair, coaxial cable✓✓

Total – 10

2 (a)



(b) sample and hold✓

(c) (i) low pass✓

(ii) 10 ÷ 2 = 5kHz✓

(iii) parallel to serial converter ✓

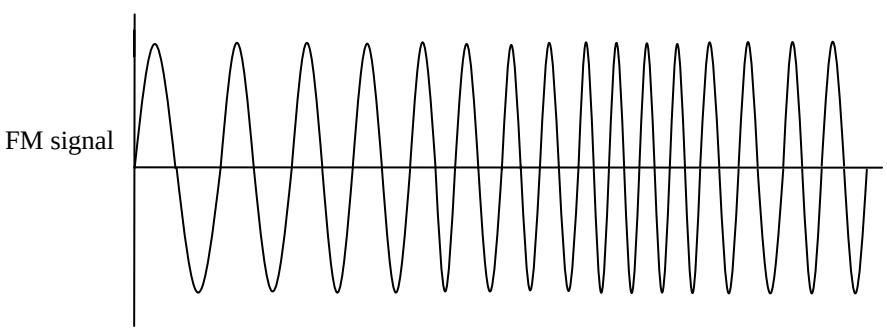
(iv) 10000 × 8 bits = 80kbs^{-1}✓

(v) to tell when data is to be sent, when it is complete, and check if errors have been received✓

(vi) 8 + 1 + 1 +2 = 12, 12 × 10000 = 120kbs^{-1}✓

Total – 13

3 (a) constant amplitude✓
frequency varies✓
frequency related to info signal✓



(b) (i) 2 × (15 + 75) ✓ = 180 kHz✓

(ii) 108 − 88 = 20 MHz✓ 20 MHz ÷ 200 kHz = 100 channels✓

(ii) λ = v ÷ f = 300 ÷90 = 3.3m✓ λ÷2 = 1.65m✓

(c) less noise, or wide bandwidth, or stereo (any one) ✓

Total – 10

4 (a)

A	B	S	Q	
0	0	0	**0**	✓
0	1	0	**1**	
1	0	0	**0**	✓
1	1	0	**1**	
0	0	1	**0**	✓
0	1	1	**0**	
1	0	1	**1**	✓
1	1	1	**1**	

(b) $Q = S.A$✓ +✓ $\bar{S}.B$✓

(c) Allows two different information sources to be connected to one communication link✓
When S = 1, signal A is connected to the link✓
When S = 0, signal B is connected to the link✓

(d) (i) Time division multiplex✓

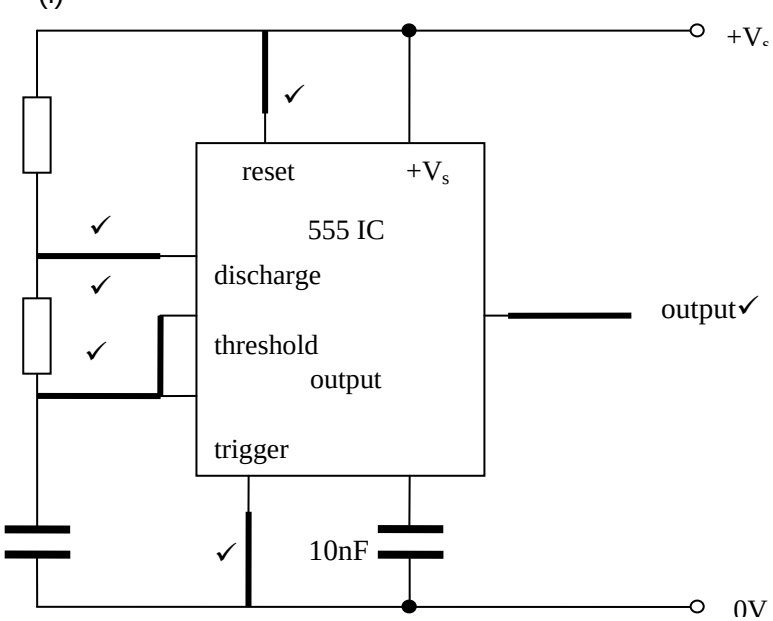
(ii) Frequency division multiplex✓

Total – 12

5 (a) (i) total internal reflection ✓

(ii) any two of: more information carrying capacity
more secure, less attenuation, less interference✓✓

(b) (i)

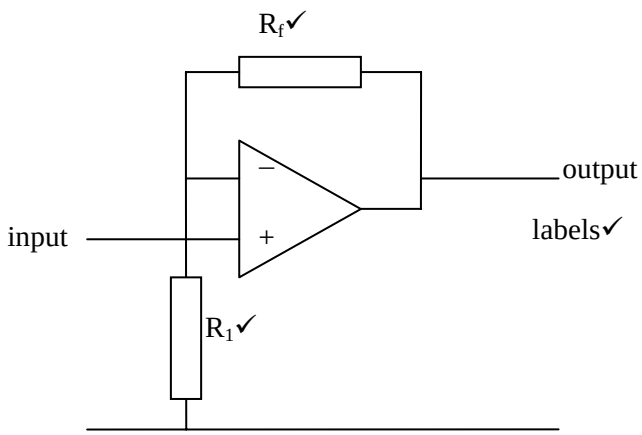


(ii) $C = 1.44 \div (R_A + 2R_B)f$ ✓ $= 1.44 \div (3 \times 4.7\times 10^3 \times 50\times 10^3)$✓
$= 2.0nF$✓

(c) (i) photodiode✓

(ii) non-inverting amplifier✓

(iii)



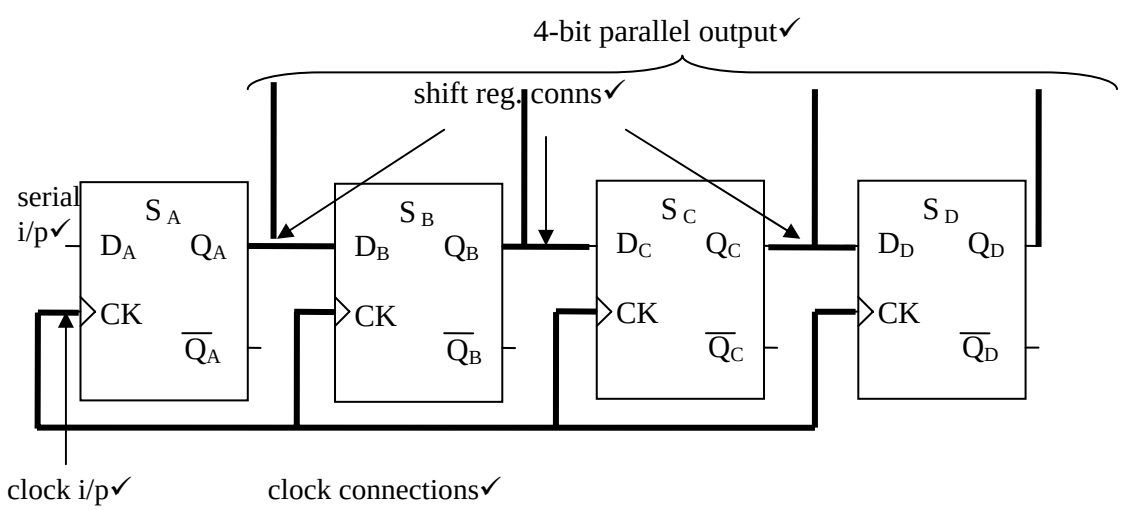
(iv) gain-bandwidth product✓

Total – 18

6 (a) (i) Digital to Analogue Converter✓

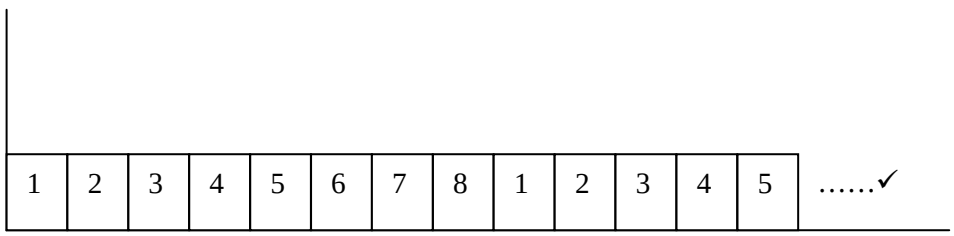
(ii) Pulse Code Modulation✓

(b)



(c) (i) 5 × 8 = 40 users in the cell ✓

(ii)



Total – 9

Paper Total – 72