



General Certificate of Education

Electronics 5431/6431

ELE5 Communications Systems

Mark Scheme

2008 examination – June series

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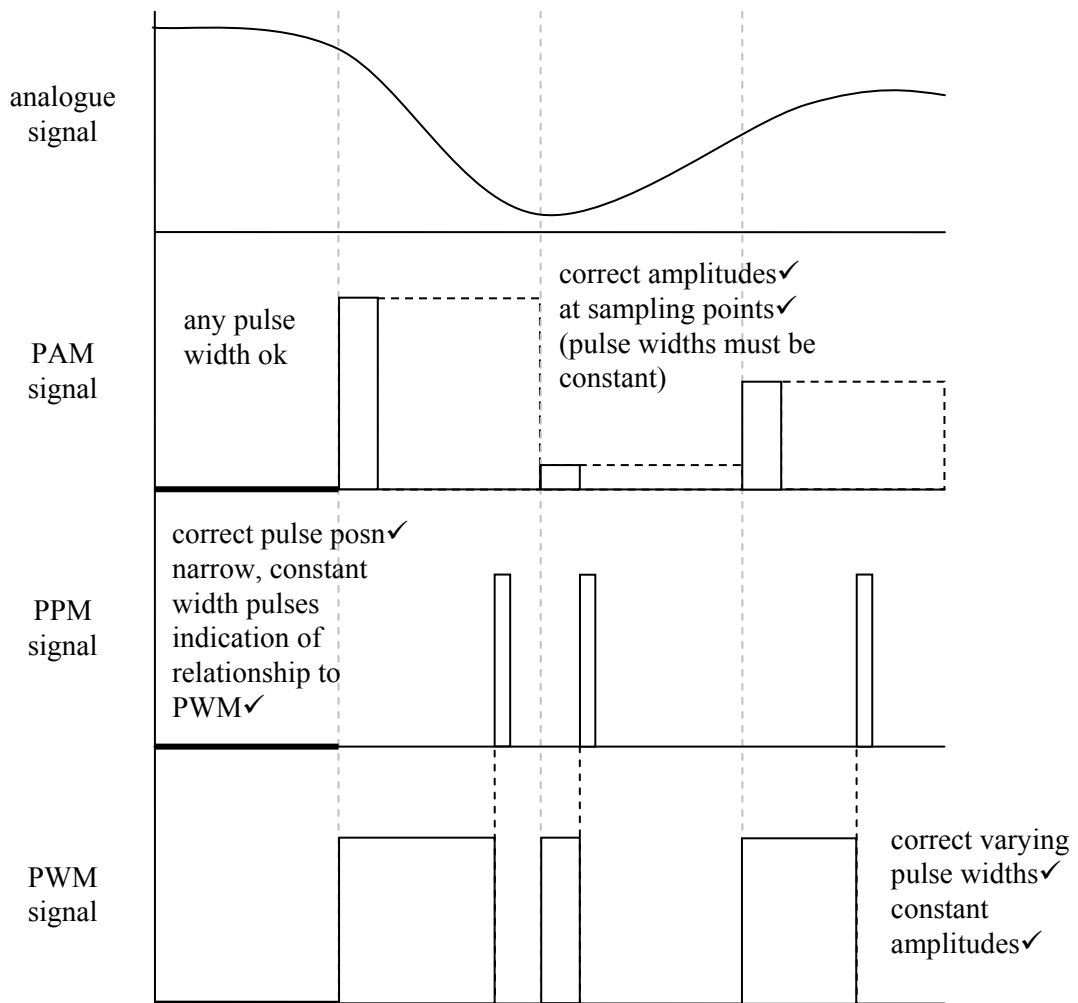
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- 1 (a) (i) 2✓
 (ii) 3✓
 (iii) 5✓
 (iv) 4✓
 (v) 1✓
 (vi) 6✓
- (b) (i) free space✓ optical fibre✓
 (ii) any two from: open wire, twisted pair, coaxial cable✓✓

Total – 10

- 2 (a)

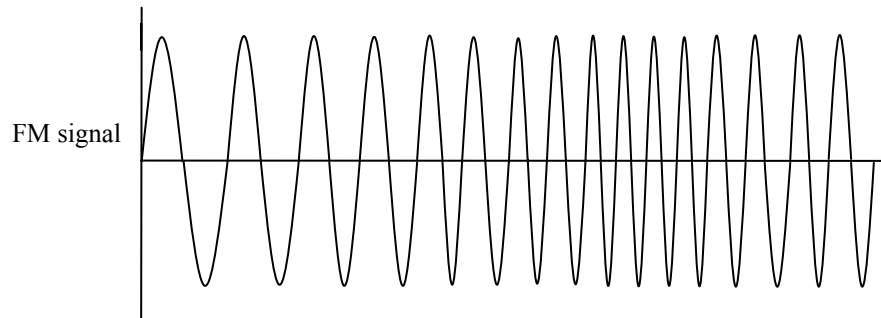


- (b) sample and hold✓

- (c) (i) low pass✓
 (ii) $10 \div 2 = 5\text{kHz}$ ✓
 (iii) parallel to serial converter ✓
 (iv) $10000 \times 8 \text{ bits} = 80\text{kbs}^{-1}$ ✓
 (v) to tell when data is to be sent, when it is complete,
 and check if errors have been received✓
 (vi) $8 + 1 + 1 + 2 = 12, 12 \times 10000 = 120\text{kbs}^{-1}$ ✓

Total – 13

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



- (b) (i) $2 \times (15 + 75) \checkmark = 180 \text{ kHz}$ ✓
 (ii) $108 - 88 = 20 \text{ MHz}$ ✓ $20 \text{ MHz} \div 200 \text{ kHz} = 100 \text{ channels}$ ✓
 (ii) $\lambda = v \div f = 300 \div 90 = 3.3\text{m}$ ✓ $\lambda \div 2 = 1.65\text{m}$ ✓
 (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

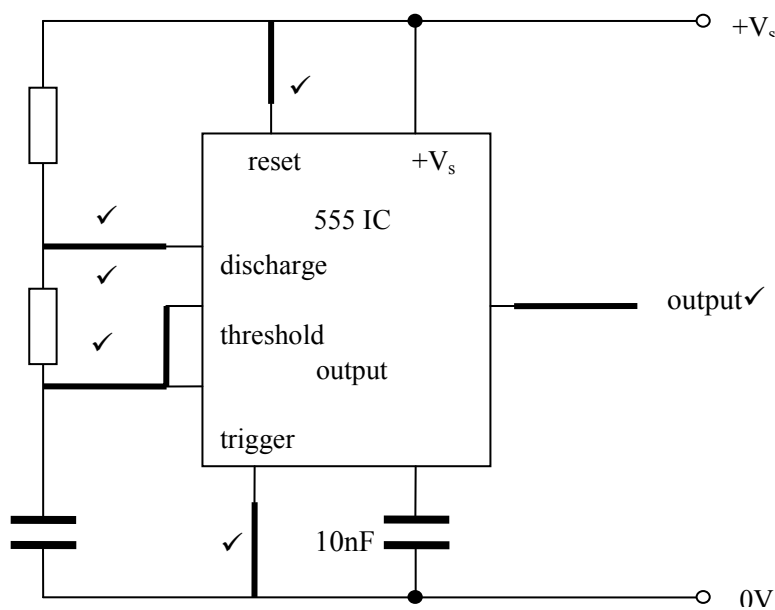
- (d) (i) Time division multiplex
 (ii) Frequency division multiplex

Total – 12

5 (a) (i) total internal reflection

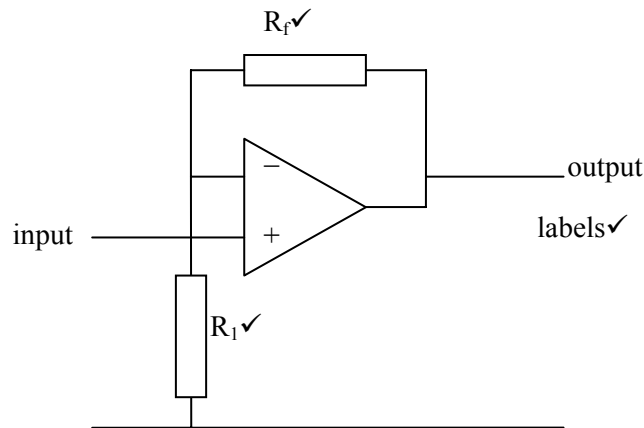
(ii) any two of: more information carrying capacity
 more secure, less attenuation, less interference

(b) (i)



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

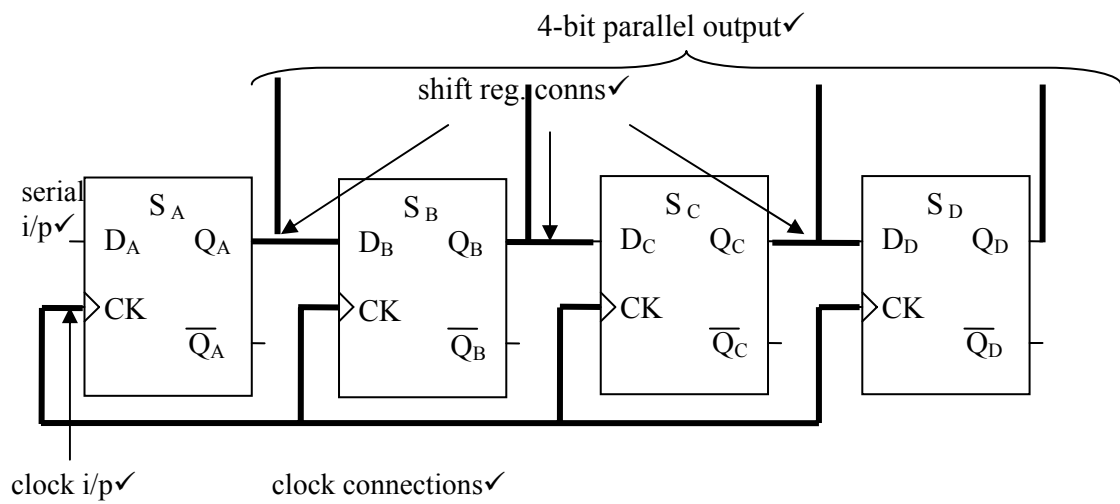
- (c) (i) photodiode \checkmark
 (ii) non-inverting amplifier \checkmark
 (iii)



- (iv) gain-bandwidth product \checkmark

Total – 18

- 6** (a) (i) Digital to Analogue Converter \checkmark
 (ii) Pulse Code Modulation \checkmark
 (b)



(c) (i) $5 \times 8 = 40$ users in the cell ✓

(ii)

1	2	3	4	5	6	7	8	1	2	3	4	5✓
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Total – 9

Paper Total – 72