Practice Question Set For A-Level
Subject : Physics
Paper-3 Topic: Section B (Section 13_ Electronics)

Name of the Student:_____
Max. Marks : 19 Marks **Time : 19 Minutes**

Mark Schemes

Q1.

The mark scheme gives some guidance as to what statements are expected to be seen in a 1 or 2 mark (L1), 3 or 4 mark (L2) and 5 or 6 mark (L3) answer. Guidance provided in section 3.10 of the '*Mark Scheme Instructions*' document should be used to assist in marking this question.

Mark	Criteria	QoWC
6	All three aspects (physical, interference and signal carrying properties) covered: A clear discussion of the advantages / disadvantages of the two systems in terms of weight (and in some cases cost). There may also be a suggestion that optical fibres are harder to join together. A comparison of their relative vulnerability to external interference and security. A comparison of the two systems in terms of signal degredation, bandwidth and speed of transmission.	The student presents relevant information coherently, employing structure, style and sp&g to render meaning clear. The text is legible.
5	Two of the three aspects fully covered, with some detail missing from the third.	
4	One aspect fully covered, with some detail missing from the other two Or Two aspects fully covered, with little or no relevant	The student presents relevant information and in a way which assists the communication of meaning. The text is legible. Sp&g are sufficiently accurate not

	information about the third.	to obscure meaning.
3	All three aspects partially covered, with some detail missing from each Or One aspect fully covered, with little or no relevant information about the other two	
2	Two aspects partially covered, with little or no relevant information about the third.	The student presents some relevant information in a simple form. The text is usually legible. Sp&g allow meaning to be derived although errors are sometimes obstructive.
1	One aspect partially covered, with little or no relevant information about the other two.	
0	Little or no relevant information about any of the three aspects.	The student's presentation, spelling punctuation and grammar seriously obstruct understanding.

		copper	***optic fibre***
Physical	*corrosion*	*Will corrode unless well-protected*	*Glass doesn't corrode*
	weight / cost etc	*Copper heavier / more expensive / easy to join*	*Thinner and less expensive. Harder to join*
External interference	*security*	*Can be 'tapped' without breaking cable*	*Cannot be tapped (unless cable broken into)*
	electromagnetic interference	*Can pick up noise / cross talk*	*Immune from noise / can be used in 'noisy' environments*
Signal carrying properties	*signal degradation / attenuation*	*High attenuation*	*Low attenuation but pulses can suffer smearing*
	bandwidth / info carrying capacity	*Relatively low / fewer channels*	*greater info-carrying capacity / more channels / possibility of*

			sending more than one signal on optic fibre eg data + talk

[6]

Q2.

(a)

A	B	$\overline{A}$	$\overline{B}$	A.B	$\overline{A}$. $\overline{B}$	Q
0	0	1	1	0	1	1
0	1	1	0	0	0	0
1	0	0	1	0	0	0
1	1	0	0	1	0	1

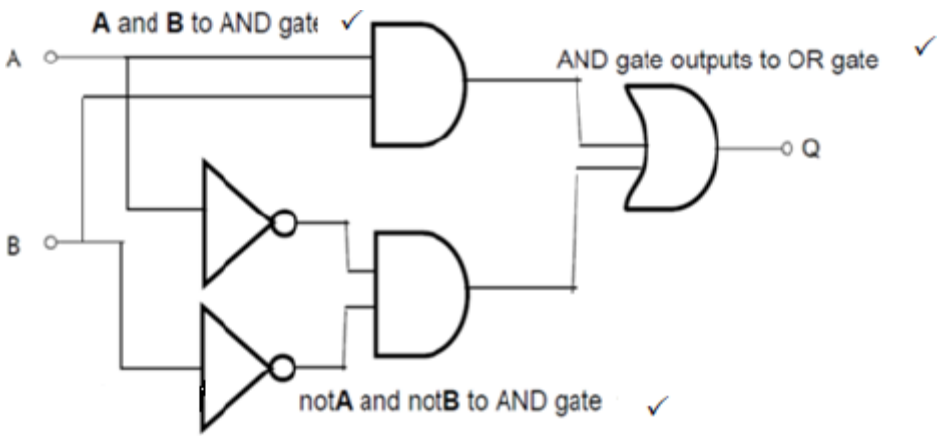
Both correct

First line Q = 1

Third line Q = 0

1

(b)



3

[4]

Q3.

(a) (i) inverting (amplifier) **(1)**

1

(b) use of $V_{out} = (-)\frac{R_f}{R_i} \times V_{in}$ **(1)**

$= (-)\frac{120}{30} \times 0.5 = -2.0$ V **(1)**

2

(c) (i) $V_{peak\ (input)} = 2.0 \times \sqrt{2} = 2.8(3)$ V **(1)**

(ii) input trace (A): sinusoidal with T = 20 ms **(1)**
and peak = 2.8 V **(1)**

for output voltage, $V_{\text{peak (out)}} = (-)\frac{120}{30} \times 2.8(3) = (\pm)11.3$ (V) **(1)**

(allow C.E. for value of $V_{\text{peak (input)}}$ from (i)

trace B: inversion w.r.t. trace A **(1)**
same period as trace A **(1)**
flat region (saturates) at ± 5 V **(1)**

max 6

[9]