Mark Scheme Interference Past Paper Questions

Jan 2002 to Jan 2009

Q1 Jan 2002

1(a) graph to show:
maxima of successively smaller intensity ✓
subsidiary maxima/minima equally spaced ✓
(at least two each side of central axis)
width of subsidiary sections half width of central section ✓
symmetrical pattern each side of central axis ✓ (*4*)

(b)(i) broader maxima or pattern ✓ [or fringes wider apart]
dimmer pattern ✓

(ii) maxima are closer ✓ [or narrower fringes]
green and dark regions ✓ max (*3*)

(*7*)

Q2 Jan 2003

2(a) slits act as coherent sources ✓
waves/light diffract at slits ✓
waves overlap/superpose/meet/cross ✓
bright patches : constructive/waves in phase/reinforce ✓
dark patches : destructive/waves out of phase/cancel ✓ $_{max}(3)$

(b)(i) spacing $w = \dfrac{76 \pm 1(\text{mm})}{26} = 3.0$ or 2.9 mm ✓ (2.92 ± 0.04 mm)
15 or more fringes used ✓

(b)(ii) (use of $\lambda = \dfrac{ws}{D}$ gives) $\lambda = \dfrac{2.92 \times 10^{-3} \times 0.90 \times 10^{-3}}{4.2}$ ✓
$= 6.26 \times 10^{-7}$ ✓
(allow C.E. for sensible value of *w* from (i)) (*4*)

(*7*)

Question 2			
(a)	(i)	bright and dark bands (or fringes) ✓ **Q2 Jun 2008** equally spaced ✓ of similar intensity to each other (or suitable comment about decrease of intensity outwards from centre) ✓	**max 4**
	(ii)	central band wider than others ✓ intensity decreases greatly away from centre of pattern ✓	
(b)	(i)	fringe width $w = \frac{58}{20}$ = 2.9 mm ✓	**5**
	(ii)	$\lambda = \frac{ws}{D}$ gives $\frac{w}{D} = \frac{w'}{D'}$ (since λ and s are constant) ✓ $\frac{2.9}{D} = \frac{3.7}{D + 0.80}$ gives D = 2.9 m ✓	
	(iii)	$\lambda = \frac{2.9 \times 10^{-3} \times 0.60 \times 10^{-3}}{2.9}$ ✓ = 6.0 × 10^{-7} m (600 nm) ✓	
		Total	**9**

Question 2			
(a)		same wavelength or frequency ✓ **Q2 Jun 2005** (same phase or) constant phase difference ✓	**2**
(b)	(i)	narrow slit gives wide diffraction ✓ (to ensure that) both S_1 and S_2 are illuminated ✓	**Max 4**
	(ii)	slit S acts as a point source ✓ S_1 and S_2 are illuminated from same source giving monochromatic/same λ ✓ paths to S_1 and S_2 are of constant length giving constant phase difference ✓ [or $SS_1 = SS_2$ so waves are in phase]	
(c)		graph to show: maxima of similar intensity to central maximum ✓ [or some decrease in intensity outwards from centre] all fringes same width as central fringe ✓	**2**

Section A: Objective test keys **Q5 Jan 2002**

1-D; 2-C; 3-B; 4-C; 5-B; 6-D; 7-B; 8-A; 9-D; 10-C; 11-B; 12-B; 13-A; 14-D; 15-B.

Section A

Q5 Jun 2002

Key to Objective Test Questions

1-B; **2**-B; **3**-D; **4**- C; **5**-A; **6**-C; **7**-B; **8**-B; **9**-D; **10**-A; **11**-C; **12**-C; **13**-D; **14**-A; **15**-C.

Key to Objective Test Questions

Q6 Jun 2003

1-A; **2**-B; **3**-A; **4**-B; **5**-A; **6**-B; **7**-A; **8**-A; **9**-D; **10**-C; **11**-C; **12**-D; **13**-A; **14**-C; **15**-D.

Unit 4: Section A

Q4 Jan 2004

Key to Objective Test Questions

1-C; **2**-A; **3**-D; **4**-D; **5**-B; **6**-A; **7**-C; **8**-D; **9**-C; **10**-C; **11**-A; **12**-C; **13**-C; **14**-B; **15**-B.

Section A

Q5 Jan 2006

This component is an objective test for which the following list indicates the correct answers used in marking the candidates' responses.

	Keys to Objective Test Questions															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
	C	**C**	**B**	**C**	**A**	**D**	**B**	**B**	**A**	**D**	**C**	**A**	**D**	**B**	**D**	

Unit 4: PA04 Section A
Waves, Fields and Nuclear Energy

Q5 Jan 2005

Key to Objective Test Questions

1-B; **2**-A; **3**-D; **4**-A; **5**-C; **6**-C; **7**-D; **8**-D; **9**-C; **10**-D; **11**-C; **12**-B; **13**-B; **14**-A; **15**-C.

PA04 Section A: Waves, Fields and Nuclear Energy

Q5 Jun 2006

	Keys to Objective Test Questions														
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**
	B	C	A	C	A	D	B	C	D	D	B	C	D	B	B

Section A

Q5 Jan 2008

Q6 Jan 2008

This component is an objective test for which the following list indicates the correct answers used in marking the candidates' responses.

	Keys to Objective Test Questions														
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**
	D	B	C	B	A	C	B	C	D	C	A	C	D	B	A

Section A

Q5 Jun 2007

Q6 Jun 2007

This component is an objective test for which the following list indicates the correct answers used in marking the candidates' responses.

	Keys to Objective Test Questions														
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**
	C	B	A	C	A	B	D	C	B	C	D	B	D	C	A