Mark Scheme Interference Past Paper Questions

Jan 2002 to Jan 2009

1(a) graph to show:

maxima of successively smaller intensity ✓ **Q1 Jan 2002**
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)

2(a) slits act as coherent sources ✓   **Q2 Jan 2003**
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 ✓ $(2.92 \pm 0.04$ 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 $w = \dfrac{58}{20} = 2.9\,\text{mm}$ ✓	
	(ii)	$\lambda = \dfrac{ws}{D}$ gives $\dfrac{w}{D} = \dfrac{w'}{D'}$ (since λ and s are constant) ✓ $\dfrac{2.9}{D} = \dfrac{3.7}{D+0.80}$ gives $D = 2.9\,\text{m}$ ✓	5
	(iii)	$\lambda = \dfrac{2.9\times10^{-3}\times0.60\times10^{-3}}{2.9}$ ✓ $= 6.0\times10^{-7}\,\text{m}\ (600\,\text{nm})$ ✓	
		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	