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

Mark Schemes

Q1.

(a) (i) (use of $n = \frac{\sin\theta_1}{\sin\theta_2}$ gives) $1.45 = \frac{\sin\theta_1}{\sin 15.5^\circ}$ **(1)**

$\theta 1 = 22.8^\circ$ **(1)**

(ii) $n = \frac{1}{\sin\theta_c}$ **(1)**

$n = \left(\frac{1}{\sin 38.7^\circ}\right) = 1.6(0)$ **(1)**

use of $_1n_2 = \frac{\sin\theta_1}{\sin\theta_2}$ and $_1n_2 = \frac{n_2}{n_1}$ **(1)**

[or $n_1 \sin\theta_1 = n_2 \sin\theta_1$]

$1.45 \sin\theta_3 = 1.60 \sin 51.3$ **(1)**

$\theta_3 = 59.4^\circ$ **(1)**

(allow C.E. for value of *n* from (ii))

7

(b) block 1 **(1)**(requires some explanation)

reference to $\frac{\sin\theta_1}{\sin\theta_2} = \frac{c_1}{c_2}$ **(1)**

[or statement such as light refracts/bends towards normal as it enters a denser/higher refractive index material, or block 1 has lower refractive index]

2

(c) reflection at boundary with i = r **(1)**

refraction (at bottom surface) bending away from normal **(1)**

2

[11]

Q2.

(a) diagram to show:
total internal reflection on side face **(1)**
ray emerging at base bent away from normal **(1)**
with ≈ correct angles **(1)**

3

(b) $n = \frac{1}{\sin\theta_c}$ **(1)**

$= \frac{1}{\sin 45}$ with calculation **(1)** (= 1.41)

2

(c) $\sin\theta_i = n \sin\theta_r$ **(1)**
$\sin\theta_i = 1.41 \times \sin 40$ **(1)**
$\theta_i = 65°$ **(1)**

3

[8]