MEMORIAL UNIVERSITY OF NEWFOUNDLAND
DEPARTMENT OF PHYSICS AND PHYSICAL OCEANOGRAPHY

PHYSICS 3600 FINAL EXAMINATION – WINTER 2006 – APRIL 19, 2006

NAME:_____STUDENT NUMBER:_____

INSTRUCTIONS:

1. Put your name and student number on each page.
2. Do any 5 of the 6 questions.
3. Each question is worth 20 marks.
4. Equations and constants are provided on the next page.
5. Use only the paper provided. No other books, notes or papers are permitted.
6. Do not remove examination papers from the examination room.

CONSTANTS AND FORMULAE

$c = 2.998\times10^{8}\, m/s$

$n_1 \sin\theta_1 = n_2 \sin\theta_2$

$\frac{1}{s}+\frac{1}{s'}=\frac{1}{f}$ $\qquad f=-\frac{R}{2}$ $\qquad m=-\frac{s'}{s}$

$\frac{n_1}{s}+\frac{n_2}{s'}=\frac{n_2-n_1}{R}$ $\qquad m=-\frac{n_1 s'}{n_2 s}$

$\frac{1}{s}+\frac{1}{s'}=\frac{1}{f}$ $\qquad \frac{1}{f}=\frac{n_2-n_1}{n_1}\left(\frac{1}{R_1}-\frac{1}{R_2}\right)$ $\qquad m=\frac{h_i}{h_o}=-\frac{s'}{s}$

$I = I_1 + I_2 + 2\sqrt{I_1 I_2}\cos\delta$

$I = 4I_0 \cos^2\left(\frac{\pi\Delta}{\lambda}\right) = 4I_0 \cos^2\left(\frac{\pi a y}{\lambda s}\right)$

$I = I_o\left(\frac{\sin^2\beta}{\beta^2}\right), \quad \beta=\frac{1}{2}kb\sin\theta$

$I = 4I_o\left(\frac{\sin^2\beta}{\beta^2}\right)\cos^2\alpha, \quad \beta=\frac{1}{2}kb\sin\theta, \quad \alpha=\frac{1}{2}ka\sin\theta$

$I = I_o\left(\frac{\sin^2\beta}{\beta^2}\right)\left(\frac{\sin^2 N\alpha}{\sin^2\alpha}\right), \quad \beta=\frac{1}{2}kb\sin\theta, \quad \alpha=\frac{1}{2}ka\sin\theta$

$l_t = c\tau_0, \qquad l_t=\frac{c}{\Delta f}, \qquad l_t \equiv \frac{\lambda^2}{\Delta\lambda}, \qquad \Delta\lambda \equiv \frac{\lambda^2}{l_t}$

$e^{i\alpha} = \cos\alpha + i\sin\alpha, \qquad \sin^2\theta+\cos^2\theta=1, \qquad \sin^2\theta=\frac{1-\cos 2\theta}{2}, \qquad \cos^2\theta=\frac{1+\cos 2\theta}{2}$