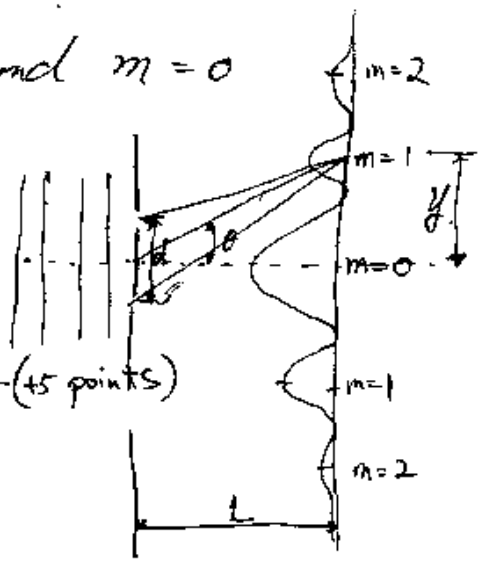
FINAL EXAM
suggested ANSWER

a) Let y be the distance between $m = 1$ and $m = 0$ bright fringes.



$$\begin{cases} d\sin\theta = m\lambda, & m = 0, 1, 2, 3 \text{ (Interference maxima)} \\ \tan\theta = \dfrac{y}{L}, & \text{for } \theta \text{ is very small.} \end{cases}$$

$$\sin\theta \doteq \theta \doteq \frac{y}{L} \doteq \tan\theta.$$

— (+5 points)

$$\text{or} \begin{cases} y = \dfrac{m\lambda L}{d} \\ y = (L)\tan\left[\sin^{-1}\left(\dfrac{m\lambda}{d}\right)\right] \end{cases} \quad \text{—— (+5 points)}$$

$$\text{or} \begin{cases} y = \dfrac{(1)(550\times10^{-9})(4)}{(0.30\times10^{-3})} = 7.33\times10^{-3}\,(m) \\ y = (4.0)\tan\left[\sin^{-1}\left(\dfrac{1\times550\times10^{-9}}{0.30\times10^{-3}}\right)\right] = 7.33\times10^{-3}\,(m) \end{cases} \quad \text{— (+5 points)}$$

Question (a) sub total = (+15 points)

b) For orange – Red light : $d\sin\theta = (11)(\lambda_{\text{orange-Red}})$
For Green light : $d\sin\theta = (13)(\lambda_{\text{green}})$
— (+5 points)

$$\lambda_{\text{orange-Red}} = \frac{(13)\lambda_{\text{green}}}{(11)} = \frac{(13)(550\times10^{-9})}{(11)} \quad \text{—— (+5 points)}$$

$$\lambda_{\text{orange-Red}} = 650\,(nm) \text{ or } 6.50\times10^{-7}\,(m) \text{ or } 0.65\,\mu m \quad \text{— (+5 points)}$$

Question (b) sub-total = (+15 points)

Total = (+30 points)

Note: Wrong Unit costs (-1) point.