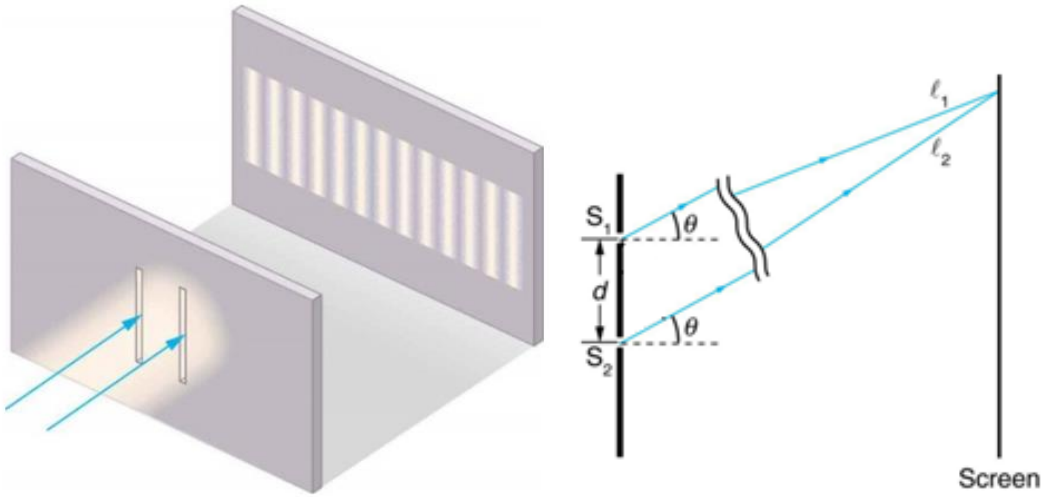
10. Consider Young's double slit experiment as shown in the below figure (a). Monochromatic light is being used. Further assume that the screen distance ℓ is much larger than the slit separation d (Figure (b)).

(a) (b)



(a) Under what condition does Young's experiment show interference pattern?
[0.5 marks]

(b) Determine the conditions for obtaining constructive and destructive interference.
[2 marks]

(c) Determine the distance Δy between adjacent fringes (maxima), assuming that θ (Figure (b)) is small.
[2 marks]

(d) Determine the intensity I of the diffraction pattern's maxima. You may use $sin\alpha + sin\beta = 2cos\frac{1}{2}(\alpha - \beta)sin\frac{1}{2}(\alpha + \beta)$.
[4.5 marks]