

Assignment

Course title: Physics II

Course code: PHY-123

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Problem 1

```
#include <stdio.h>
#include <math.h>

int main() {
    int m;
    double theta, d;
    double wavelength;
    // Input the order of the maxima
    printf("Enter the order m: ");
    scanf("%d", &m);

    printf("Enter the angle theta (degrees): ");
    scanf("%lf", &theta);
    printf("Enter the distance between slits d (μm): ");
    scanf("%lf", &d);

    // degrees to radians
    double theta_rad = theta * M_PI / 180.0;

    // micrometers to meters
    d *= 1e-6;

    // Calculate the wavelength in meters
    wavelength = (d * sin(theta_rad)) / m;

    // wavelength from meters to nanometers
    wavelength *= 1e9;
    printf("The wavelength is: %.2f nm\n", wavelength);

    if (wavelength >= 380 && wavelength < 450) printf("The color of the light is violet\n");
    if (wavelength >= 450 && wavelength < 485) printf("The color of the light is blue\n");
    if (wavelength >= 485 && wavelength < 500) printf("The color of the light is cyan\n");
    if (wavelength >= 500 && wavelength < 565) printf("The color of the light is green\n");
    if (wavelength >= 565 && wavelength < 590) printf("The color of the light is yellow\n");
    if (wavelength >= 590 && wavelength < 625) printf("The color of the light is orange\n");
    if (wavelength >= 625 && wavelength <= 750) printf("The color of the light is red\n");
    else printf("The color of the light is unknown\n");

    return 0;
}
```

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Enter the order m: 5
Enter the angle theta (degrees): 65
Enter the distance between slits d (m): 0.7
The wavelength is: 126.88 nm
The color of the light is unknown

Process returned 0 (0x0) execution time : 13.299 s
Press any key to continue.
|

Problem 2

```
#include <stdio.h>
#include <math.h>

int main() {
    double lambda_green = 530e-9; // 530 nm to meters
    double theta_green = 65.0;
    int m_green = 3;

    double lambda_red = 700e-9; // 700 nm to meters
    int m_red = 2;

    // degrees to radians
    double theta_green_rad = theta_green * M_PI / 180.0;

    // Calculate grating spacing d using green light data
    double d = (m_green * lambda_green) / sin(theta_green_rad);

    // Calculate the angle for the red light
    double sin_theta_red = (m_red * lambda_red) / d;

    // Check if the calculated sin_theta_red is within the valid range [-1, 1]
    if (sin_theta_red > 1.0 || sin_theta_red < -1.0) {
        printf("No valid angle for the given parameters.\n");
    } else {
        // Calculate the angle in degrees
        double theta_red_rad = asin(sin_theta_red);
        double theta_red = theta_red_rad * 180.0 / M_PI;

        // Output the result
        printf("The angle for the second-order bright spot for red light is: %.2f\n", theta_red);
    }

    return 0;
}
```

```
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The angle for the second-order bright spot for red light is: 52.94 degrees  
Process returned 0 (0x0)   execution time : 0.046 s  
Press any key to continue.  
|
```