

First Semester 2022/2023

Mid-term Exam

Department: Civil &amp; electronic Eng.

Total mark:

Course title : Physics 3



Date: 28 /11/2022

Year: 1

Time allowed: 60 mins.

Code: BS111

Examiner: Dr. Ali Samir Awad

رقم المسلسل : .....

اسم الطالب : .....

Answer all of the following questions

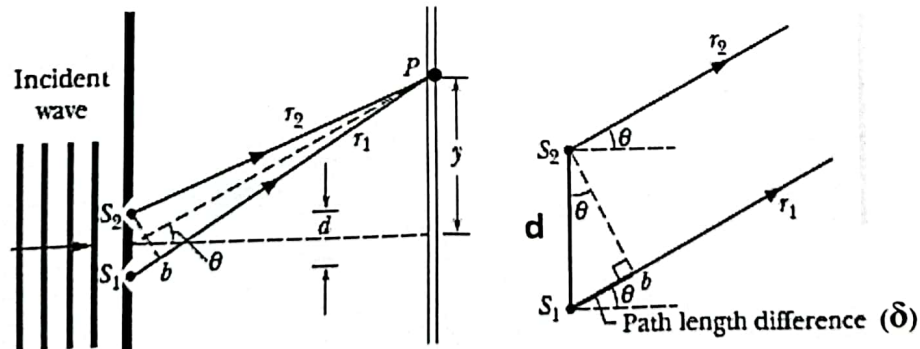
Q1: Two bodies  $A$  and  $B$  have thermal emissivities of 0.4 and 0.8 respectively. The outer surface area of the two bodies are the same. The two bodies emit total radiant power at the same rate. The wavelength  $\lambda_B$  corresponding to maximum spectral radiance in the radiation from  $B$  is shifted from the wavelength corresponding to maximum spectral radiance in the radiation from  $A$  by  $1.00\mu\text{m}$ . If the temperature of  $A$  is  $5802\text{ K}$ . calculate  $\lambda_B$  and  $T_B$ .

Q2: What is the energy of an electron whose de Broglie wavelength is that of a photon of yellow light with wavelength  $590\text{ nm}$ ? Then, what is the de Broglie wavelength of an electron whose energy is that of the photon of yellow light?  $h=6.625\times 10^{-34}\text{ J.S}$ ,  $c=3\times 10^8\text{ m/s}$  and  $m_e=9.1\times 10^{-31}\text{ kg}$ .

Q3: White light, with a uniform intensity across the visible wavelength range of  $400$  to  $690\text{ nm}$ , is perpendicularly incident on a water film, of index of refraction  $1.33$  and thickness  $320\text{ nm}$ , that is suspended in air. At what wavelength  $\lambda$  is the light reflected by the film brightest to an observer?

Q4: Into one arm of a Michelson interferometer, a plastic sheet of thickness  $75\text{mm}$  is inserted, which causes a shift in the interference pattern by  $86$  fringes. The light source has wavelength of  $610\text{ nm}$  in air. What is the index of refraction of this plastic?

Q5: Calculate the intensity of laser beam ( $\lambda=625\text{nm}$ ) fringe at point  $P$ . In case of  $d = 0.5\mu\text{m}$ ,  $\theta=30^\circ$  and  $I_0 = 20\text{ Lux}$ .

The end of exam

Good luck,