Ministry of Higher Education Manzala Higher Institute for Engineering and Technology		
First Semester Mid-term Exam Department : Electronic Eng. Total mark :		Date: 15/12/2020 Level: 1 Time allowed: 60 mins. Code: BS111
Course title : Physics 3		

Answer all of the following questions

Q1: a: A thin film with refractive index equal 1.32 is surrounded by air. What is the minimum thickness of thin film such that the reflection of normally incident light with wave length 500nm is maximized?

b- White light, with a uniform intensity across the visible wavelength range of 400 to 690 nm, is perpendicularly incident on a water thin film, of index of refraction 1.33 and thickness 320 nm, that is suspended in air. At what wavelength λ in water is the light reflected by the film brightest to an observer?

Q2: a: A standard optical diffraction grating cannot be used to discriminate between different wavelengths in the x-ray wavelength range. For $\lambda = 1\ A^0$ and a grating spacing 3000nm. Shows that for the first-order maximum?

b- A disc A and B have radii 2cm and 3cm are coated with carbon black on their outer surfaces. The wavelengths corresponding to maximum intensity are 300 nm and 400nm. Calculate the **ratio** of the power radiated A: the power radiated B.

Q3: What is the energy of an electron whose de Broglie wavelength is that of a photon of yellow light with wavelength 590 nm? .Then what is the de Broglie wavelength of an electron whose energy is that of the photon of yellow light? Where $h = 6.625\times 10^{-34}$, $m_e = 9.1\times 10^{-31}$ Kg and speed of light 3×10^8 m/s .

The end of exam

Good luck

Dr. Ali Samir Awad

فيزياء (٣)

Ministry of Higher Education

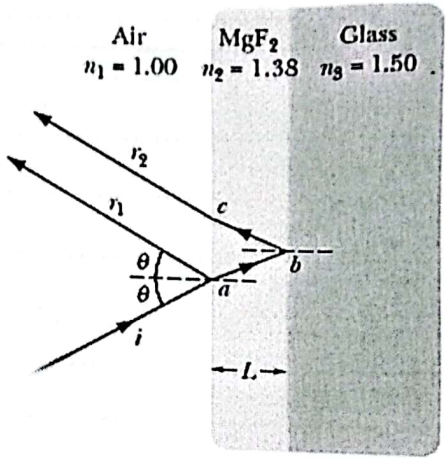
Higher Institute for Engineering and Technology at Manzala

First Semester		Date:7 /12/2020
Mid-term Exam		Year: 1
Department: Civil & electronic Eng.		Time allowed: 60 mins.
Total mark:		Code: BS111

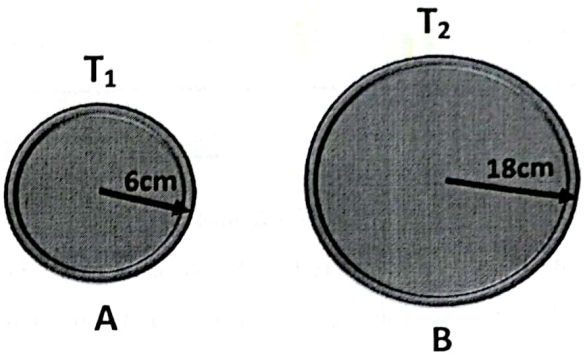
Course title : Physics 3..... اسم الطالب : .....

Answer all of the following questions

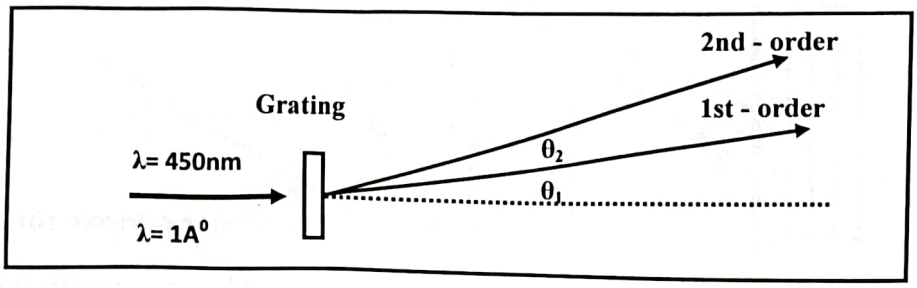
Q1: Glass lens is coated on one side with a thin film of magnesium fluoride (MgF_2) to reduce reflection from the lens surface. The index of refraction of MgF_2 is 1.38; that of the glass is 1.50. What is the least coating thickness that eliminates (via interference) the reflections at the middle of the visible spectrum (λ= 550 nm)? Assume that the light is approximately perpendicular to the lens surface.



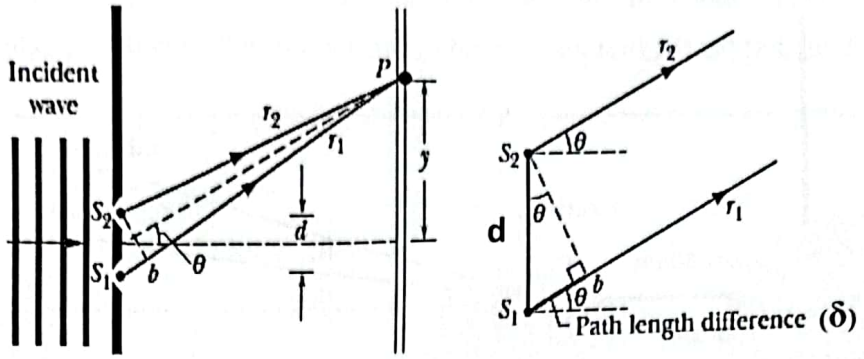
Q2: Two spherical bodies A (radius 6 cm) and B (radius 18 cm) are at temperatures T_1 and T_2, respectively. The maximum intensity in the emission spectrum of A is at 500 nm and in that of B is at 1500 nm. Considering them to be black bodies, What will be the ratio of the rate of total energy radiated by A to that of B? Then draw the relation between the rate of total energy and wavelength (Planck's theory) for two bodies.



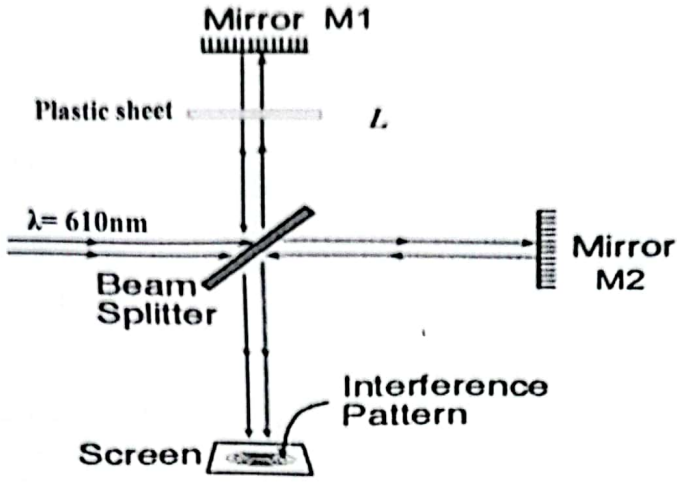
Q3: A standard optical diffraction grating can be used to discriminate between different wavelengths in the visible range ($\lambda = 450$ nm) but can't be used in case of x-ray wavelength range ($\lambda = 1\ A^0$). Show that for the first and second order maximum? a grating spacing d=5000nm.



Q4: Derive an expression for the intensity in double-slit interference, Then calculate the intensity of laser beam (λ=625nm) fringe at point P. In case of d = 0.5μm, θ =30 and I_0 = 20 Lux.



Q5: Into one arm of a Michelson interferometer, a plastic sheet (n = 1.4) is inserted, which causes a shift in the interference pattern by 86 fringes. The light source has wavelength of 610 nm in air. What is the thickness of this plastic (L)?



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The end of exam

Good luck

Dr. Ali Samir Awad