Fayoum University
Faculty of Engineering
First Year – Department of Civil Engineering
First-Term Exam in Physics(2)
Allowed Time: 3 hours
Wednesday 20th January, 2010

جامعة الفيوم
Fayoum University

تعليمات الإختبار:

١ . لاتستخدم القلم الرصاص في حل المسائل و يستخدم فقط في تظليل الإجابة

٢ . لن يلتفت لأي سؤال يحتوي على أكثر من إجابة وكذلك لن يلتفت لأي مسألة لايوجد لها حل في كراسة الإجابة

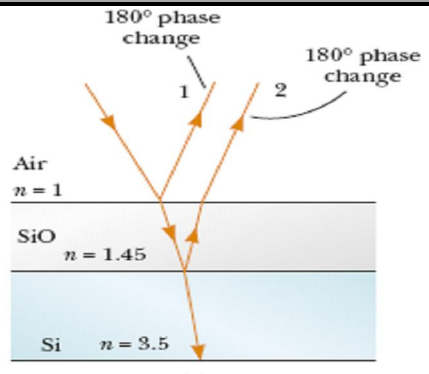
Question (1):

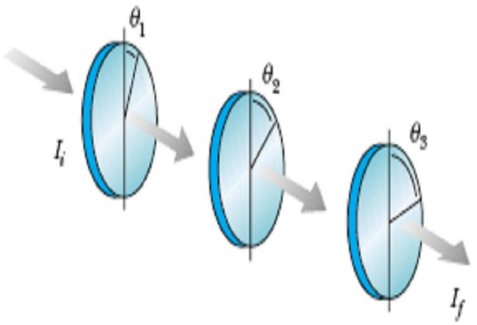
حل المسائل بورقة الإجابة ثم قم بتظليل فقط المستطيل الدال على إجابتك				
١	The velocity "V " of a body that executes a SHM is given by			
	$V=f\lambda$	$V=\omega(A^2-X^2)^{1/2}$	$V=\omega A$	$V=\omega(X^2-A^2)^{1/2}$
٢	A body executes a SHM if its acceleration "a"			
	$a=\omega^2 X$	a= constant	$a=-\omega^2 X$	None of these
٣	A body is executing a SHM, when its displacement is X, its kinetic energy is			
	$(k/2)(X^2-A^2)$	$(k/2)X^2$	$(k/2)(A^2-X^2)$	$(k/2)A^2$
4	$\ddot{X}+\omega^2 X=F_0\sin(\Omega t+\phi)$, this equation describes			
	SHM	Free-damped Osc.	Forced oscillation	Undamped-forced Osc.
5	In an undamped forced (mass-spring) oscillator, where k=80 N/m and m=0.2kg, the mass is subjected to a harmonic force F=sin(Ωt). The resonant frequency is equal to			
	Ω_{res}=35 rad	Ω_{res}=400 rad	Ω_{res}=20 rad	Ω_{res}=40 rad
6	In an undamped forced (mass-spring) oscillator, where k=80 N/m and m=0.2kg, the mass is subjected to a harmonic force F=sin(Ωt). The static amplitude is equal to			
	A_{st}=0.029 m	A_{st}=0.05 m	A_{st}=0.025 m	A_{st}=0.04 m
7	Two sinusoidal waves, $y_1=\sin(\omega t+\Phi_1)$ and $y_2=\sin(\omega t+\Phi_2)$ are superimposed. The resultant amplitude is maximum when $(\Phi_2-\Phi_1)$ =….			
	π	2π	$\pi/2$	$\pi/4$
8	The distance between two successive nodes of a standing wave is,			
	λ	$\lambda/4$	$\lambda/2$	$3\lambda/2$
9	When light enters into a denser medium, its frequency			
	increases	Decreases	Remains unchanged	None of these
10	A pipe open at both ends resonates at a fundamental frequency f_{open}. When one end is closed and the pipe is again made to resonate, the fundamental frequency is f_{closed}. Which of the following expressions is correct?			
	$f_{closed}=f_{open}$	$f_{closed}=f_{open}/2$	$f_{closed}=2\,f_{open}$	$f_{closed}=3\,f_{open}/2$
11	Two identical machines are positioned the same distance from an observer. The intensity of sound delivered by each machine at the location of the			

	observer is $2.0*10^{-7}$ W/m^2. Find the sound level heard by the observer when both machines are operating			
	53 db	***56 db***	***35 db***	***65 db***
12	***A sound source (f_0 =300 Hz) is moving away from an observer at a speed equals to that of the sound waves. The apparent frequency f, heard by the observer***			
	450 Hz	***300 Hz***	***150 Hz***	***None of these***
13	***A observer is approaching a sound source with an increasing velocity, the apparent frequency heard by the observer is***			
	increasing	***Decreasing***	***Remains unchanged***	***None of these***
14	***The difference between two sound levels (in db) ($\Delta\beta=\beta_1 - \beta_2$) of a sound source related to the ratio of intensities I_1 and I_2 is given by***			
	$\Delta\beta$ =20 log(I_1/I_2)	***$\Delta\beta$ =10 log(I_1/I_2)***	***$\Delta\beta$ =20 log(I_2/I_1)***	***$\Delta\beta$ =10 log(I_2/I_1)***
15	***When a monochromatic light hits a piece of glass at an angle, which of the following will not occur?***			
	Reflection	***refraction***	***Dispersion***	***All of them***
16	***A certain kind of glass has an index of refraction of 1.65 for blue light and an index of refraction of 1.161 for red light. If a a beam of white light (containing all colors) is incident at an angle of $30^{\cdot}$, what is the angle between the red and blue light inside the glass?.***			
	$0.22^{\cdot}$	***$0.45^{\cdot}$***	***$1.90^{\cdot}$***	***$1.81^{\cdot}$***
17	***A convex mirror shows an image of an object that is 3.0m from the mirror. The focal length of the mirror is 0.25 m, find the image location (q) and the magnification (M)***			
	-0.23m, +0.077	***3.67m, -1.22***	***3.67m, 0.077***	***0.23m, -0.077***
18	***In a double-slits interference experiment where (D=1.2m , and d=0.03mm), the second order bright fringe is 0.045m from the center of the screen. Find the wave length λ***			
	560 nm	***450nm***	***650 nm***	***600 nm***
19	***A light is containing two lines of wavelengths (λ_1 = 589nm, and λ_2=589.59 nm), what a resolving power must a grating have if these wavelengths are to be resolved?***			
	R=999	***R=1100***	***R=950***	***900***
20	***The critical angle for sapphire surrounded by air is 34.4^0. Calculate the polarizing angle for sapphire***			
	60.53^0	***55.4^0***	***30^0***	***56.4^0***

<u>Question (2):</u>

حل المسائل بورقة الإجابة ثم قم بتظليل فقط المستطيل الدال على إجابتك

21	Solar cells are often coated with a transparent, thin film of silicon dioxide (SiO_2) of refractive index n=1.45, to minimize the reflective losses. What is minimum thickness of SiO_2 layer in order to have destructive interference for λ=550 nm				
	94.8 nm	39.28nm	189.7 nm	78.57 nm	
22	Two narrow parallel slits separated by 0.85 mm are illuminated by 600 nm light and viewing screen is 2.80 m away from the slits.				
	(a) What is the phase difference (δ) between the two interfering waves on the screen at a point 2.50 mm from the central bright fringe?				
	7.95 rad	π	3.5 rad	$\pi/2$	
	(b) The ratio of light intensity (I) at any point within a bright fringe to the intensity at the center of the bright fringe (I_0) is given by				
	$\sin(\delta/2)$	$\text{Cos}^2(\delta/2)$	$\sin^2(\delta/2)$	$\text{Cot}^2(\delta/2)$	
	(b) What is the ratio of the intensity at this point to the intensity at the central bright fringe				
	0.85	0.768	0.453	0.65	
23	A diffraction grating of width 4.0 cm has ruled with 3000 rulings/cm. (a) What is the resolving power of this grating in the third order				
	12000	36000	9000	18000	
	(b) If two monochromatic waves are incident on this grating have mean wavelength λ=400 nm . What is their wavelength separation if they are just resolved in third order				
	0.011nm	0.11nm	1.1nm	11.0nm	
24	Three parallel polarizing sheets whose polarizing axes make angle θ_1 , θ_2 , and θ_3 with the vertical				

	direction as shown in figure. A plane polarized plane wave whose direction of polarization is parallel to the vertical direction with intensity I_i =10 units. ***(a) Find the transmitted light intensity I_f as a function of θ_1 , θ_2 , and θ_3***	
	$I_f = I_i \cos^2(\theta_1).\cos^2(\theta_2).\cos^2(\theta_3)$	
	$I_f = I_i \cos^2(\theta_1).\cos^2(\theta_2 - \theta_1).\cos^2(\theta_3 - \theta_2)$	
	(b) Calculate I_f for $\theta_1 = 20^0$, $\theta_2 = 40^0$, and $\theta_3 = 60^0$	
	8.3 units ***6.9 units*** ***1.3 units*** ***10 units***	
25	***How much energy is released in the following Alpha decay reaction*** $^{238}_{92}U \rightarrow {}^{234}_{90}Th + {}^{4}_{2}He$ ***Take the masses to be m(U)= 238.050784 amu, m(Th)= 234.043593 amu, m(He) =4.002603 amu***	
	4.27 Me.v. ***5.33 Me.v.*** ***6.55 Me.v.*** ***1.5 Me.v.***	
26	***A monochromatic light (λ =600 nm) is incident perpendicularly on the face of a glass wedge(n=1.5). Find the angle of this wedge (the angle that is subtended between the surfaces of the wedge) given that the distance between two successive dark fringes is equal to 4.0 mm***	
	0.0029^0 ***0.0045^0*** ***0.006^0*** ***0.0008^0***	

Good Luck

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