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



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):

			إجابتك	الدال على ا	لليل فقط المستطيل	ة ثم قم بتظ	حل المسائل بورقة الإجاباً	
1	The velocity "	V " of	a body that e	executes	a SHM is give	en by		
	V=fλ		$V = \omega (A^2 - X^2)^{1/2}$		V=ωA		$V = \omega (X^2 - A^2)^{1/2}$	
۲	A body execu	tes a S	SHM if its acc	eleratior	า "a"			
	$a = \omega^2 X$		a= constant		$a=-\omega^2 X$		None of these	
٣	A body is exe	cuting	a SHM, wher	<u>n its disp</u>	placement is X	ement is X, its kinetic energy is		
	$(k/2)(X^2-A^2)$	)	(k/2)X	2	(k/2)(A <sup>2</sup> -2	<b>X</b> <sup>2</sup> )	(k/2)A <sup>2</sup>	
4	$\mathbf{X} + \boldsymbol{\omega}^2 X = F_0$	$sin(\Omega$	$(t+\phi)$ , this eq	uation c	lescribes			
	SHM Fi	ree-da	mped Osc.	Forced	d oscillation	Unda	mped-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 $F=sin(\Omega t)$ . The resonant frequency is equal to							
	Ω <sub>res</sub> =35 ra	d	Ω <sub>res</sub> =400	rad	Ω <sub>res</sub> =20 r	ad	$\Omega_{res}$ =40 rad	
6	In an undamped forced (mass-spring) oscillator, where $k=80 \text{ N/m}$ and $m=0.2 \text{kg}$ , the mass is subjected to a harmonic force $F=\sin(\Omega t)$ . The static amplitude is equal to							
	A <sub>st</sub> =0.029	m	A <sub>st</sub> =0.05	5 m	A <sub>st</sub> =0.025	5 m	A <sub>st</sub> =0.04 m	
7	Two sinusoida resultant amp	al wav litude	'es, y₁=sin(ωt is maximum \	+Φ₁) and when (Φ	l y₂=sin(ωt+ ⊄ ₂ – Φ₁) =	₽₂) are s	uperimposed. The	
	π		2π		π/2		π/4	
8	The distance	betwe	en two succe	ssive no	des of a stand	ding wa	ve is,	
	λ		λ/4		λ/2		3λ/2	
9	When light en	ters in	ito a denser n	nedium,	its frequency		n	
	increases	decreases	Re	mains unchanged		None of these		
10	A pipe open a end is close frequency is f	t both d and <sub>closed</sub> . I	ends resona the pipe is Which of the f	ites at a s again following	fundamental made to re expressions	frequen sonate, is corre	cy f <sub>open</sub> . When one the fundamental ect?	
	$f_{closed} = f_{opt}$	en	$f_{closed} = f_{o}$	<sub>pen</sub> /2	$f_{closed} = 2 f$	, open	$f_{closed} = 3 f_{open}/2$	

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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 $2.0*40^{-7}$ W/m <sup>2</sup> Find the sound level heard by the observer when both machines							
	$2.0^{*}10^{-7}$ W/m <sup>2</sup> . Find the sound level heard by the observer when both machines							
	are operating	56 db 25 db 65 db						
10	55 UD	30 UD						
12	A sound source $(I_0 - 500 \text{ Hz})$ is moving away from an observer at a speed equation to that of the sound wayes. The apparent frequency f heard by the observer							
	450 Hz	300 Hz 150 Hz None (						
13	A observer is appr	oaching a sound so	ource with an increa	sing velocity the				
10	apparent frequency	heard by the observe	er is	onig veroong, are				
	increasing	decreasing Re	emains unchanged	None of these				
14	The difference betw related to the ratio of	een two sound level of intensities I1 and I2	s (in db) ( $\Delta\beta=\beta_1 - \beta_2$ ) is given by	of a sound source				
	$\Delta\beta = 20 \log(I_1/I_2)$	<i>∆β</i> =10 log(l₁/l₂)	$\Delta\beta = 20 \log(I_2/I_1)$	$\Delta\beta = 10 \log(I_2/I_1)$				
15	When a monochron following will not oc	natic light hits a pie cur?	ece of glass at an ar	ngle, which of the				
	Reflection	refraction	Dispersion	All of them				
70	index of refraction of colors) is incident a light inside the glass	of 1.161 for red light. t an angle of 30', what s?.	If a a beam of white li at is the angle betwee	ight (containing all n the red and blue				
	0.22	<b>0.45</b> <sup>°</sup>	1.90	1.81				
17	A convex mirror she focal length of the magnification (M)	ows an image of an o mirror is 0.25 m,	object that is 3.0m fro find the image loca	om the mirror. The ation (q) and the				
	-0.23m, +0.077	3.67 <i>m</i> , -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 $\lambda$							
	560 nm	450nm	650 nm	600 nm				
19	A light is containing two lines of wavelengths ( $\lambda_1$ = 589nm, and $\lambda_2$ =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 polarizing angle for	for sapphire surrou sapphire	inded by air is 34.4	<sup>0</sup> . Calculate the				
	60.53 <sup>0</sup>	55.4 <sup>0</sup>	30 <sup>0</sup>	56.4 <sup>0</sup>				

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

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

	Solar cells thin film o index n=1 What is m to have de	s are often of silicon o .45, to min inimum thic estructive in	Air n = 1 Si $n = 3.5$ 100  phase $180^{\circ} \text{ p}$ $180^{\circ} \text{ p}$ $180^{\circ} \text{ p}$ $180^{\circ} \text{ p}$ $180^{\circ} \text{ p}$ $180^{\circ} \text{ p}$ $180^{\circ} \text{ p}$ $12^{\circ}$				
	94.8 nm	39.28 nm	189.7 ni	m 78.57r	nm		
22	Two narrov viewing scr	v parallel sli reen is 2.80 n	its separated n away from	l by 0.85 mm the slits.	are il	luminated by 600 nm light a	
	(a) What is a point 2.50	the phase di ) mm from th	fference (δ) e central brig	between the t ght fringe?	wo in	terfering waves on the screen	
	7.95 rad	π	3.5 rad	π/2			
	(b) The ration (b) center of the center of t	o of light inte e bright fring	ensity (I) at al ge (I₀) is give	ny point withii n by	n a bri	ight fringe to the intensity at t	
	sin(∂/2)	Cos²(δ/2)					
	(b) What is the ratio of the intensity at this point to the intensity at the cer fringe						
	(b) What is fringe	the ratio of	the intensity	/ at this point	t to th	e intensity at the central brig	
	(b) What is fringe 0.853	the ratio of 0.768	the intensity 0.453	at this point	t to th	e intensity at the central brig	
23	(b) What is fringe 0.853 A diffractio resolving p	the ratio of 0.768 on grating of ower of this	the intensity 0.453 width 4.0 cl grating in the	at this point 0.65 m has ruled w e third order	t to th	e intensity at the central brig 000 rulings/cm. (a) What is a	
23	(b) What is fringe 0.853 A diffractio resolving p 12000	the ratio of 0.768 on grating of ower of this 36000	the intensity 0.453 width 4.0 cl grating in the 9000	v at this point 0.65 m has ruled v e third order 18000	t to th	e intensity at the central brig 000 rulings/cm. (a) What is t	
23	<ul> <li>(b) What is fringe</li> <li>0.853</li> <li>A diffractio resolving p</li> <li>12000</li> <li>(b) If two wavelengt resolved in</li> </ul>	the ratio of 0.768 0.768 0 grating of ower of this 36000 0 monochro h $\lambda$ =400 nm h third orde	the intensity 0.453 width 4.0 cl grating in the 9000 omatic wave n . What is r	v at this point 0.65 m has ruled v e third order 18000 es are incic their wavel	vith 3	e intensity at the central brig 000 rulings/cm. (a) What is t on this grating have me h separation if they are ju	
23	(b) What is fringe 0.853 A diffractio resolving p 12000 (b) If two wavelengt resolved in 0.011nm	the ratio of 0.768 0.768 0 grating of ower of this 36000 monochro h $\lambda$ =400 nm h third orde 0.11nm	the intensity 0.453 width 4.0 cl grating in the 9000 omatic wave n . What is r 1.1nm	v at this point 0.65 m has ruled v e third order 18000 es are incic their wavel 11.0nm	t to th with 3 dent length	e intensity at the central brig 000 rulings/cm. (a) What is t on this grating have me h separation if they are ju	
23	(b) What is fringe 0.853 A diffractio resolving p 12000 (b) If two wavelengt resolved in 0.011nm	the ratio of 0.768 0.7788 0.7788 0.7	the intensity 0.453 width 4.0 cl grating in the 9000 omatic wave n . What is r 1.1nm	v at this point 0.65 m has ruled w e third order 18000 es are incic their wavel 11.0nm	t to th with 3 dent lengtl	e intensity at the central brig 000 rulings/cm. (a) What is a on this grating have me h separation if they are ju	

	parallel to t =10 units. (a) Find the function of $\theta$ $I_f = I_i \cos^2(\theta_1)$ $I_f = I_i \cos^2(\theta_1)$ (b) Calculate	he vertical transmitter $\theta_1$ , $\theta_2$ , and $\theta_2$ $0.\cos^2(\theta_2).\cos^2(\theta_2 - \theta_1)$ $0.\cos^2(\theta_2 - \theta_1)$ $0.\cos^2(\theta_1 = 2)$	direction wi d light interval $s^{2}(\theta_{3})$ $0.\cos^{2}(\theta_{3} - \theta_{2})$ $20^{0}, \theta_{2} = 40^{0}$					
	8.3 units	6.9 units						
<u></u>								
25	Given that t successive between the curvature of	he radii of order of the m. If the wa the lens.	two bright r ese rings is velength of	ings of the ne not known, w the light given	ewton's rings (2 mm, 2.4mm). If the while there exists four bright rings h by (500 nm). Find out the radius o			
	0.704 m	0.88 m	1.17 m	1.5 m				
26	A monochromatic light ( $\lambda$ =600 nm) is incident perpendicularly on the face of a gla wedge(n=1.5). Find the angle of this wedge (the angle that is subtended between t surfaces of the wedge) given that the distance between two successive dark fringes equal to 4.0 mm							
	0.0029 <sup>0</sup>	0.0045 <sup>0</sup>	0.0060	0.0008 <sup>0</sup>				

Good Luck

Dr. Maged Kassab

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



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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									
)	The velocity "V	" of a	a body that e	executes	a SHM is give	en by				
	V=fλ		$V=\omega(A^2-$	$(X^2)^{1/2}$	V=ωA		$V = \omega (X^2 - A^2)^{1/2}$			
۲	A body executes	s a S	HM if its acc	celeration	า "a"					
	$a = \omega^2 X$		a= cons	stant	$a=-\omega^2 X$		None of these			
٣	A body is execu	ting	a SHM, whe	when its displacement is X, its kinetic energy is						
	$(k/2)(X^2-A^2)$		(k/2))	<b>K</b> <sup>2</sup>	$(k/2)(A^2-2)$	<b>X</b> <sup>2</sup> )	(k/2)A <sup>2</sup>			
4	$X + \omega^2 X = F_0 \text{ si}$	$n(\Omega t)$	$(+\phi)$ , this eq	quation o	lescribes					
	SHM Fre	e-dai	mped Osc.	Force	d oscillation	Unda	mped-forced Osc.			
5	In an undamped	l ford	ed (mass-s	pring) o	scillator, whei	re k=80	N/m and m=0.2kg,			
	the mass is sub	jecte	ed to a harm	onic for	e F=sin(Ωt). 1	The reso	onant frequency is			
	equal to					_				
	Ω <sub>res</sub> =35 rad		$\Omega_{res}$ =400	) rad	Ω <sub>res</sub> =20 ι	rad	$\Omega_{res}$ =40 rad			
6	In an undamped	l ford	ed (mass-s	pring) o	scillator, when	re k=80	N/m and m=0.2kg,			
	the mass is sul equal to	bject	red to a har	monic fo	orce F=sin(Ωt)	). The s	static amplitude is			
	$A_{ct}=0.029 m$		A <sub>st</sub> =0.0	5 m	A <sub>st</sub> =0.025	5 m	A <sub>st</sub> =0.04 m			
7	Two sinusoidal	wave	es. v₁=sin(ω	t+Φ₁) and	l v₂=sin(ωt+ 4	) are s	uperimposed. The			
	resultant amplit	ude i	s maximum	when (Φ	$_{2}-\boldsymbol{\phi}_{1})=$	-7				
	π		2π		π/2		π/4			
8	The distance be	twee	n two succe	essive no	des of a stand	ding wa	ve is,			
	λ		λ/4		λ/2		3λ/2			
9	When light enter	rs int	to a denser i	medium,	its frequency					
	increases		decreases	Re	emains uncha	None of these				
10	A pipe open at l	both	ends resona	ates at a	fundamental	frequen	cy f <sub>open</sub> . When one			
	end is closed	and	the pipe i	is again	made to re	sonate,	the fundamental			
	frequency is f <sub>clos</sub>	<sub>sed</sub> . N	/hich of the	following	expressions	is corre	ect?			
	$f_{closed} = f_{open}$		$f_{closed} = f_{closed}$	open/2	f <sub>closed</sub> =2 f	open	f <sub>closed</sub> =3 f <sub>open</sub> /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 <sup>2</sup> . 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 <sub>0</sub> =	300 Hz) is moving a	way from an observer	r at a speed equals				
	to that of the sound waves. The apparent frequency f, heard by the observe							
	450 Hz	300 Hz	150 Hz	None of these				
13	A observer is approaching a sound source with an increasing velocity, th apparent frequency heard by the observer is							
	increasing	decreasing R	emains unchanged	None of these				
14	The difference betw related to the ratio of	een two sound level of intensities I1 and I2	s (in db) ( $\Delta\beta=\beta_1 - \beta_2$ ) is given by	of a sound source				
	$\Delta\beta = 20 \log(I_1/I_2)$	$\Delta\beta = 10 \log(I_1/I_2)$	$\Delta\beta = 20 \log(I_2/I_1)$	$\Delta\beta = 10 \log(I_2/I_1)$				
15	When a monochron following will not oc	natic light hits a pie ccur?	ce of glass at an ar	ngle, which of the				
	Reflection	refraction	Dispersion	All of them				
10	index of refraction c colors) is incident a light inside the glass	ass has an index of of 1.161 for red light. t an angle of 30°, wha s?.	If a a beam of white li at is the angle betwee	ight (containing all n the red and blue				
	0.22	0.45	1.90 °	1.81 <sup>°</sup>				
17	A convex mirror she focal length of the magnification (M)	ows an image of an o mirror is 0.25 m,	object that is 3.0m fro find the image loca	om the mirror. The ation (q) and the				
	-0.23m, +0.077	3.67 <i>m</i> , -1.22	3.67 <i>m</i> , 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 $\lambda$							
	563nm	450nm	650 nm	600 nm				
19	A light is containing two lines of wavelengths ( $\lambda_1$ = 589nm, and $\lambda_2$ =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 polarizing angle for	for sapphire surro	unded by air is 34.	.4º. Calculate the				
	60.53 <sup>0</sup>	55.4 <sup>0</sup>	30 <sup>0</sup>	56.4 <sup>0</sup>				

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

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

21	Solar cells	are often co	180° phase change 180° phase change change						
	index n=1.	45. to minin	nize the ref	) of refraction lective losse	ve S.				
	What is n	ninimum thi	Air n = 1						
	order to ha	ave destructi	ive interfere	ence for λ=5	50	n = 1.45			
	nm								
						Si $n = 3.5$			
	94.8 nm	39.28 nm	າ 189.7 nm 78.57 nm		n				
22	Two narrov viewing scr	v parallel slits reen is 2.80 m	s separated away from t	by 0.85 mm the slits.	are	illuminated by 600 nm light and			
	(a) What is	the phase diff	ference (δ)	between the	two	o interfering waves on the screen			
	at a point 2	.50 mm from t	the central b	right fringe?					
	7.95 rad	π	3.5 rad	π/2					
	(b) The rati	o of liaht inte	ensitv (I) at a	anv point with	nin a	a bright fringe to the intensity at			
	the center of	of the bright fr	ringe (I₀) is g	iven by					
	sin²(δ/2)	$\cos^2(\delta/2)$	sin²(δ/2)	Cot <sup>2</sup> (δ/2)					
	(b) What is fringe	the ratio of the	he intensity	at this point	to t	the intensity at the central bright			
	0.85	0.768	0.453	0.65					
23	A diffractio resolving p	n grating of v ower of this g	width 4.0 cm rating in the	1 has ruled w third order	<i>ith</i>	3000 rulings/cm. (a) What is the			
	12000	36000	9000	18000					
	(b) If two	(b) If two monochromatic waves are incident on this grating have mean							
	wavelengt	wavelength $\lambda$ =400 nm . What is their wavelength separation if they are just							
	resolved in	resolved in third order							
	0.011nm	0.11nm	1.1nm	11.0nm					
24	Three paral	llel polarizing	sheets who:	se polarizing					
	axes make	angle $\theta_1$ , $\theta_2$ ,	and $\theta_3$ with	the vertical					
	direction a	s shown in fi	gure. A plai	ne polarized					
	plane wave	e whose dire	ction of po	larization is					
			7						

	parallel to =10 units. (a) Find to function of $I_f = I_i \cos^2(t)$ $I_f = I_i \cos^2(t)$ (b) Calcula	the vertical c he transmitted f $\theta_1$ , $\theta_2$ , and $\theta_1$ $\theta_1$ ).cos <sup>2</sup> ( $\theta_2$ ).cos $\theta_1$ ).cos <sup>2</sup> ( $\theta_2 - \theta_1$ ) ate I <sub>f</sub> for $\theta_1 = 2$	direction with the direction with the direction with the direction with the direction of t		
	8.3 units	6.9 units	1.3 units	10 units	
25	Given that successive between th curvature	t the radii of t e order of the hem. If the way of the lens.	two bright ese rings is velength of	rings of the ne s not known, v f the light giver	ewton's rings (2 mm, 2.4mm). If the while there exists four bright rings n by (500 nm). Find out the radius of
	0.704 m	0.88 m	1.17 m	1.5 m	
26	A monoch wedge(n=1 surfaces o equal to 4.	romatic light ( 1.5). Find the a f the wedge) g 0 mm	$\lambda$ =600 nm, angle of thi given that th	rpendicularly on the face of a glass angle that is subtended between the ween two successive dark fringes is	
	0.0028	0.0045 <sup>0</sup>	0.006 <sup>0</sup>	0.0008 <sup>0</sup>	

Good Luck

Dr. Maged Kassab