الامتحان الوطني الموحد للبكالوريا
المسالك الدولية – خيار أنجليزية
الدورة الاستدراكية 2018
-عناصر الإجابة-

RR30E

المملكة المغربية
وزارة التربية الوطنية والتكوين المهني والتعليم العالي والبحث العلمي

المركز الوطني للتقويم والامتحانات والتوجيه

4	مدة الإنجاز	الفيزياء والكيمياء	المادة
7	المعامل	شعبة العلوم الرياضية : " أ" و " ب" – خيار أنجليزية	الشعبة أو المسلك

Chemistry (7 points)

Part I

Question	Answers	Marking scale	Question reference in the framework
1-1	Table of reaction progress	0,5	-Draw the progress table of a reaction and exploit it.
1-2	Reach to $\frac{C_0}{2}$; $t_{1/2}=4$semaines	0,5+0,25	-Define the half-life $t_{1/2}$ of a chemical reaction. -Determine the half-life $t_{1/2}$ of the chemical reaction graphically or through exploiting the experimental results.
1-3	The process ; $v\approx 2,1.10^{-2}\ mol.L^{-1}.semaine^{-1}$	0,25 0,25	-Know the expression of the volume rate of reaction. -Determine graphically the value of the volumetric rate of reaction
1-4	$\theta_2>\theta_1$	0,25	-Know the effect of reactant concentration and the temperature on the volumetric rate of reaction.
2-1	The chemical equation the reaction.	0,5	-Write the equation of the acid-base reaction and identify the two pairs involved.
2-2	$C=10^{-pH}\left(1+\frac{10^{-pH}}{K_A}\right)$; $C\approx 2.10^{-4}\ mol.L^{-1}$.	0,5 0,25	-Write and use the expression of the acid dissociation constant K_A associated with the reaction of an acid with water.
2-3	Reach to the expression	0,5	
2-4-1	The curve is associated to acid .	0,25	-Exploit the predominance and distribution diagrams of acidic and basic chemical species existing in aqueous solution. -Determine the equilibrium constant associated to the equation of acid-base reaction using the acid dissociation constants of existing pairs. -Indicate the predominant chemical specie taking into consideration pH of aqueous solution and pK_A of pair acid/base.
2-4-2	$HClO$ is the predominant specie ;justification	0,25 0,25	
2-5-1	The process ; $K=5.10^6$.	0,25+0,25	
2-5-2	$\frac{[HClO]_{éq}}{[ClO^-]_{éq}}=1$, conclusion.	0,25+0,25	

Part II			
1	$2Ag^{+}_{(aq)} + Fe_{(s)} \rightarrow 2Ag_{(s)} + Fe^{2+}_{(aq)}$.	**0,5**	-Write the half-equation that occurred in each electrode (use double arrows) and write the overall equation of the reaction during the battery functioning (use one arrow).
2	Reach to the expression.	**0,5**	Establish the relationship between the amount of substance of chemical specie produced or consumed, the current intensity and the operating duration of a battery. Use this relationship to determine other quantities (quantity of charge, progress of the reaction, change of the mass...).
3	$t_d \approx 1,29.10^4\ s$. $\left[Fe^{2+}_{(aq)}\right]_f = 0,3\ mol.L^{-1}$.	**0,25** **0,25**	

Physics (13 points)				
Ex1	**Question**	**Answers**	**Marking scale**	**Question reference in the framework**
(2,25 points)	**1-1**	Definition .	**0,25**	Define sinusoidal progressive wave, period, frequency and wavelength.
	1-2	b	**0,25**	-Know (Recall) and use the relationship $\lambda = v.T$ - Exploit experimental documents and data in order to determine:distance; time delay; wave speed. Define sinusoidal progressive wave, period, frequency and wavelength. -Know the boundaries of wavelengths and their colours for the visible spectrum in the vacuum.
	1-3	The method ; $v = 340\ m.s^{-1}$.	**0,25+0,25**	
	2	$\ell_2 = \frac{v_c}{2}(t_2 - t_1)$; $\ell_2 = 38,5\ mm$.	**0,25** **0,25**	
	3-1	Same wavelength.	**0,25**	Know (Recall) the characteristics of the diffracted wave.
	3-2	$S = \frac{r.\lambda}{a}$; $S \simeq 13,1\ cm$.	**0,25+0,25**	Know (Recall) and exploit the relationship $\theta = \lambda/a$; and know the units and the meaning of θ and λ .

Ex2	Question	Answers	Marking scale	Question reference in the framework
Electricity (5,25 points)	**I- 1-1**	Differential equation.	**0,25**	-Know and exploit the voltage expression $u = r.i + L.\frac{di}{dt}$ between the inductor (coil) terminals using the receiver convention. -Find out the differential equation and verify its solution when the RL dipole is submitted to a step voltage.
	1-2	$i(t)=\frac{E}{R+r}\left(1-e^{-\left(\frac{R+r}{L}\right).t}\right)$	**0,5**	Determine the current intensity expression $i(t)$ when the RL dipole is submitted to a step voltage, and deduce the voltage expressions between the inductor terminals and the resistor terminals.
	1-3-1	$R_1=8\Omega, r=4\Omega.$	**0,25+0,25**	Recognise and represent the variation curves of current intensity $i(t)$ in terms of time across the inductor and different physical quantities associated to it, and exploit them.
	1-3-2	The process	**0,5**	- Know and exploit the time-constant expression.
	2-1	The process	**0,25**	- Know and exploit the expression of the magnetic energy stored in a inductor. Know and exploit the expression of the electric energy stored in a capacitor.
	2-2	The process; $C=2\mu F$, $U_0=20V$.	**0,25 ;0,25** **0,25**	- Know and exploit the natural period expression. - Know and exploit the energetic diagrams.
	II-1-	$N_p=2.10^5$ Hz	**0,25**	-Know that the amplitude modulation process is to transform the modulated amplitude voltage to affine function of the modulating voltage. - know the required conditions to avoid over modulation. - Recognise the stages of the amplitude modulation. -Know the conditions allowing to get an amplitude modulation and a high quality detection envelope. -Know and exploit the frequency spectrum. -Know the selective role of the LC (bung circuit) for the modulated voltage.
	2	b	**0,5**	
	3	The conditions are verified ; justification	**0,25+0,25**	
	4	$u_s(t)=3.\cos(4.10^5\pi t)+0,6.\cos(4,08.10^5\pi t)+0,6.\cos(3,92.10^5\pi t).$ +spectrum	**0,25** **0,5**	
	5	Can't detect the studied wave, justification	**0,25+0,25**	

Exercice 3		Question	Answers	Marking scale	Question reference in the framework
Mechanics (5,5 points)	Part I	1-1	Reach to the differential equation	0,5	Know the selective role of the LC (bung circuit) for the modulated voltage. Apply Newton's second law to determine the kinetic quantities $\overrightarrow{v_G}$ and $\overrightarrow{a_G}$ and dynamic quantities and exploit them. Exploit the velocity-time graph: $v_G = f(t)$. - Apply Newton's second law to find out the differential equation of a system's centre of inertia motion in horizontal or inclined plane and determine the characteristics of kinetic and dynamic quantities of motion.
		1-2-1	$a_G = 0,5\,m.s^{-2}$.	0,25	
		1-2-2	$F \approx 4,25.10^{2}\ N$	0,25	
		1-3	$k = \dfrac{f}{mg\cos\alpha - F\sin(\beta-\alpha)}$; $k \approx 0,28.$	0,25 0,25	
		2-1	$x(t) = 9,2t$, $y(t) = -4,9.t^2 + 3,9.t$	0,25 0,25	- Apply Newton's second law in the case of a projectile to: * find out differential equation of motion; * deduce the parametric equations of motion and exploit them; * establish the equation of the path (trajectory), find out the expressions of the range and the maximum height of the path and exploit them;
		2-2	Deduction of the equation of the path.	0,5	
		2-3	Process, $SB \approx 34,6\,m$.	0,25 0,25	
	Part II	1-1	Reach to $E_{pp} = \dfrac{m.g.\ell}{2}.\theta^2$	0,5	-Exploit the energy diagrams. -Exploit the expression of the gravitational potential energy and the expression of the kinetic energy to determine the mechanical energy of the physical pendulum in the small oscillations case. - Exploit the conservation of the mechanical energy of a physical pendulum in the small oscillations case. -Know the expression of the natural period for the simple pendulum.
		1-2	$E_m \approx 4,7.10^{-4}\ J$.	0,25	
		1-3	Process; $\ddot{\theta} + \dfrac{g}{\ell}\theta = 0$.	0,25 0,25	
		2-1	$T_0 = 2\pi\sqrt{\dfrac{\ell}{g}}$; Verification.	0,25 0,25	
		2-2	$T_0 \approx 1s$, $n = 20$.	0,25 0,25	
		3	Reach to the expression	0,25	