

مباراة الدخول 2020 - 2021

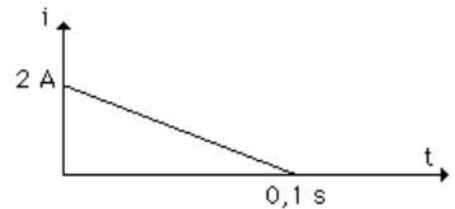
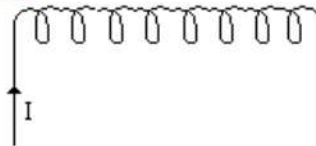
مسابقة في مادة الفيزياء

عدد الصفحات: 2

المدة: ٤٥ دقيقة

**For each question, circle the correct answer (only one answer is correct):**

١. An object of mass  $m = 80 \text{ kg}$  travels a distance of  $10 \text{ m}$  in free fall in air with a speed  $V = 10 \text{ m/s}$ . Take  $g = 10 \text{ m/s}^2$ .
  - a. The variation of the kinetic energy is  $\Delta E_k = 4000 \text{ J.T}$
  - b. The variation of the gravitational potential energy is  $\Delta E_p = -\Delta E_k$ .
  - c. The variation of the mechanical energy is  $\Delta E_m = -8.10^3 \text{ J}$ .
٢. A skater of mass  $M = 70 \text{ kg}$  is at rest in the center of a place. A ball of mass  $m = 2 \text{ kg}$  is launched with a speed  $v = 10 \text{ m/s}$  toward him. The ball is caught by the skater and the system (skater, ball) starts its motion without friction. The speed of the system (skater-ball), after the collision is:
  - a.  $V = 0.28 \text{ m/s}$
  - b.  $V = 10 \text{ m/s}$
  - c.  $V = 3.6 \text{ m/s}$
٣. The characteristics of an elastic horizontal oscillator are:  
Stiffness  $k = 10 \text{ N/m}$ , mass  $m = 400 \text{ g}$ , maximum speed  $V_{\max} = 0.5 \text{ m/s}$ . All types of friction are neglected. Its amplitude is:
  - a.  $A = 10 \text{ cm}$
  - b.  $A = 20 \text{ cm}$
  - c.  $A = 5 \text{ cm}$
4. The induced flux in a surface varies according to the following equation:  $\phi = -5t^2 + 20t - 5$ . The induced e.m.f. at  $t = 2 \text{ s}$  is:
  - a.  $e = 0 \text{ V}$
  - b.  $e = 8 \text{ V}$
  - c.  $e = 0.8 \text{ V}$
5. A coil of inductance  $L = 30 \text{ mH}$ , is traveled by a current that varies by a current that varies as shown in the adjacent figure:

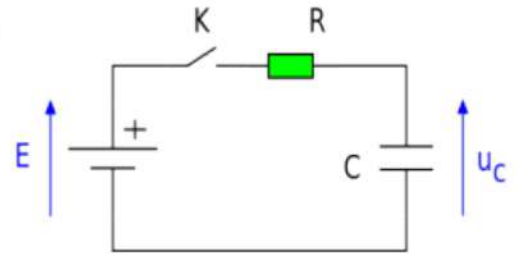


The induced electromotive force e.m.f. that appears across the coil is:

- a.  $e = 0.6 \text{ V}$
- b.  $e = -0.6 \text{ V}$
- c.  $e = 0.06 \text{ V}$

6. A capacitor of capacitance  $C = 1000 \mu\text{F}$  is charged with a battery having a voltage  $E = 10 \text{ V}$  using a resistance  $R = 10 \text{ k}\Omega$ . At  $t = 0$ , the switch is closed. At  $t = 10 \text{ s}$ , the potential difference across the capacitor  $u_c$  is:

- $u_c = 3 \text{ V}$
- $u_c = 6.3 \text{ V}$
- $u_c = 10 \text{ V}$



7. A circuit is fed by a generator having alternating sinusoidal voltage  $u = 10\sqrt{2} \sin(100\pi t + \pi/4)$ , ( $u$  in V and  $t$  in s). The instantaneous intensity is  $i = 20\sqrt{2} \sin(100\pi t)$  ( $i$  in A and  $t$  in s). The average power delivered to the circuit is:

- $P = 100 \text{ W}$
- $P = 200 \text{ W}$
- $P = 100\sqrt{2} \text{ W}$

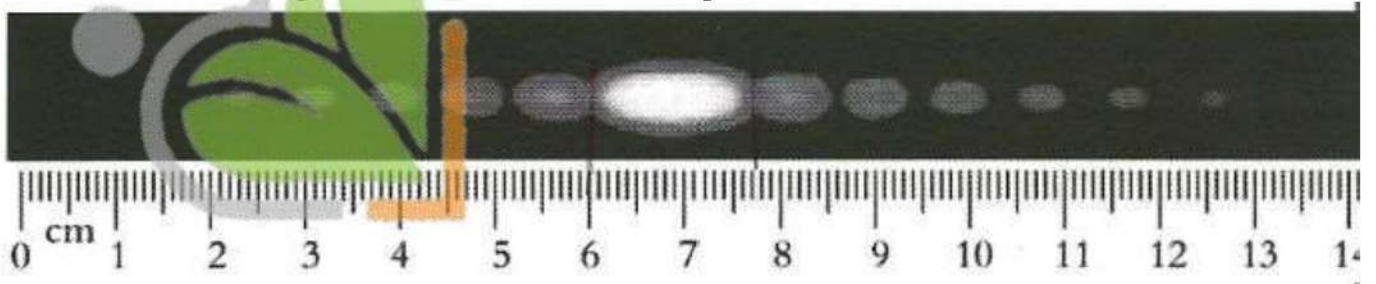
8. A RLC circuit is fed by a generator having an alternating sinusoidal voltage  $u$ . The intensity of the current passes by a maximum at a resonance frequency of  $1000 \text{ Hz}$ . Given that the capacitance of the capacitor is  $10 \mu\text{F}$  (Take  $\pi^2 = 10$ ), the inductance  $L$  of the coil is:

- $L = 10 \text{ mH}$
- $L = 25 \text{ mH}$
- $L = 2.5 \text{ mH}$

9. When light passes from a medium to another medium having a different refraction index:

- The frequency of light is changed.
- The wavelength of light is changed.
- The color of light is changed.

10. The diffraction in the adjacent figure is obtained by lighting a slit with a laser of wave length  $\lambda = 632 \text{ nm}$ . This figure is realized on a screen placed at a distance  $D = 70 \text{ cm}$  from the slit.



The width of the slit is:

- $a = 26 \mu\text{m}$
- $a = 34 \mu\text{m}$
- $a = 52 \mu\text{m}$