AL Physics MC Answers

Year:1983

Question Number:7,10,22,23,25,39,

1983MC (7)

From Y to Z,

Vertical motion: $y = gt^2/2$ $t = \sqrt{2 \times 2/10} = 0.632s$

Horizontal motion; $x = u_x t$, u_x 3/0.632=4.74 ms^{-1}

From X to Y

$mgh = mu_x^2/2$ $h = 4.74^2/(2 \times 10) = 1.125$ m

1983MC (10)

Total momentum must be conserved: D and E are impossible.

Total KE after collision is equal (elastic) or less than (inelastic) that before collision: A is impossible

B or C ?

X behind Y cannot move faster than Y.   C is impossible

1983 MC(22)

By symmetry, current through X = current through Y = I

Current through the 8Ω resistor =2I

Loop around X and the 8Ω resistor

$10V = I(4Ω)+2I(8Ω)$

$I = 0.5$ A

Current through the 8Ω resistor =1 A

1983MC(23)

No current through G, so

      current through' 40Ω = current through 50Ω and

        p.d. across R = p.d. across the 40Ω   …..……..(1)

        p.d. across 50 Ω = 2 V.   …………·(2)

From (2), current thru' 50 Ω = 0.04 A

From (1), $(0.4 – 0.04)R = 0.04(40)$

 $R = 4.4$ Ω

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1983 MC (25)

To a motor, $V - \varepsilon = IR$, where ε is the back emf, which is proportional to speed.

At the beginning, $\omega = 0$, so $\varepsilon = 0$, so current should be the large.   However, **the inductance of the armature coil prevents a sudden rise of the current**. It needs a certain time for the current to rise to its maximum value. When the coil gains speed, the back emf increases with time, so the current drops. A steady current finally flows in the coil to produce a torque to do the work against the load or friction.

1983 MC (39)

Some facts about standing waves in a pipe

(1)   At notes, molecules do not vibrate

(2)   We hear a sound coming from a closed pipe ➜ energy comes out.

(3)   "closed pipe"----a pipe with one end closed and one end open.
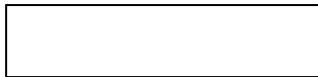
    In the fundamental mode, the maximum amplitude of oscillation occurs at the open end, not at the middle.