Experimental Competition
27 April 2010

Student Code ☐☐☐–☐

Question Number 1

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ANSWER SHEET

Exp. I-A、Measuring the resonance frequency

(1) Measure the amplitude A of the oscillating laser beam by tuning the frequency f of the sine wave generator. Record the measured data in the data table.

f	A	

f	A	

ANSWER SHEET

(2) Plot a proper data in the graph paper to determine the resonance frequency f_{RO} and the quality factor Q. Record f_{RO} and Q in the following blank.

f_{RO} = ; Q=

ANSWER SHEET

Exp. I-B、Resonance frequency versus the external force.

(1) Measure and record the measured data z_0 in the data table.

z_0 =

(2) Determine the position z of the top plane of the N-pole of M_C. Calculate the nominal distance d by defining $d = z_0 - z$. Record z and d in the data table.

(3) Determine the resonance frequency f_R for the distance d by tuning the frequency of the sine wave generator until the maximum amplitude is reached. Record the determined resonance frequency f_R in the data table.

(4) Change the vertical position of the magnet M_C and repeat the steps (2) and (3) for a number of measurements of different distance d and the corresponding resonance frequency f_R.

z	d	f_R	Δf_R	$\ln(\Delta f_R)$

(5) Plot a graph of f_R as a function of distance d using a graph paper.

(6) Define $\Delta f_R = f_R - f_{RO}$, and plot $\ln(\Delta f_R)$ as a function of d using another graph paper.

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ANSWER SHEET

Exp. I-C、Find the positions and depths of magnets in a black box.

(1) Record z_0 and z_{box} on the answer sheet.

z_0 = ; z_{box} =

(2) Move the black box along the longer line and observe the variation in resonance frequency f_R of the reed to find the position of M_B. Record the measured distances y and their corresponding resonance frequencies f_R in the data table.

y	f_R

y	f_R

Question Number 1

ANSWER SHEET

(3) Plot f_R as a function of y on a graph paper to determine the position of magnet M_B. Mark the positions of magnets M_A and M_B on the y-axis of your graph, and write down the value of $\overline{AB}$ on the answer sheet.

$\overline{AB}$ =

(4) Determine the depths d_A and d_B of the magnets M_A and M_B from the top surface of the black box using the results in Exp. I-B. Write down the values of d_A and d_B on the answer sheet.

d_A = ; d_B =