Date: January 2016

Duration: 120 minutes

SUBJECT: PHYSICS 3	
Chair of Department of Physics: Signature: Full name: Phan Bao Ngoc	Lecturer: Signature: Full name: Phan Bao Ngoc

INSTRUCTIONS: This is a closed book examination. Use of cell phones, laptops, dictionaries is not allowed.

1/ (15 pts) Determine the angle between a uniform magnetic field of 1 mT and the velocity of a proton, if the proton has an acceleration of 3.0×10^9 m/s^2 and a speed of 6.0×10^4 m/s? ($p = 1.6\times10^{-19}$ C; $m_p = 1.67\times10^{-27}$ kg)

2/ (20 pts) Two concentric coils 1 and 2, lying in the same plane, carry currents $i_1 = 10$ A and $i_2 = 5$ A in the same direction (Figure 1). Coil 1 has 100 turns and a radius of 4.0 cm, coil 2 has 200 turns and a radius of 2.0 cm: (a) Calculate the magnitude of the net magnetic moment of the two-coil system; (b) If the current in coil 1 is then reversed, what is the magnitude of the net magnetic moment of the two-coil system.

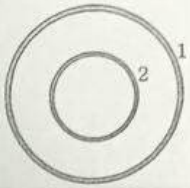


Figure 1

3/ (20 pts) Two wires carrying currents in the direction as shown in Figure 2. Wire 1 with $i_1 = 2.0$ A consists of a circular arc of radius R and two radial lengths. Wire 2 with $i_2 = 0.5$ A is long and straight at a distance R/2 from the center of the arc. For what value of arc angle ϕ (in degree) the net magnetic field B at point P due to the two currents is zero?

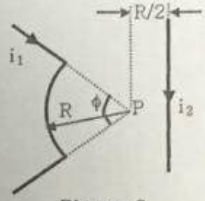


Figure 2

4/ (15 pts) A coil has 150 turns and each turn encloses an area of 1.0 m^2. Determine the rate of change of a magnetic field parallel to the axis of the coil in order to induce a current of 0.1 A in the coil. The resistance of the coil is 150 Ω.

5/ (15 pts) An LC circuit includes a capacitor of 25 μF. The circuit has a period of 5.0 ms. The peak current (the amplitude) is 25 mA. Determine: (a) the inductance; (b) the peak voltage.

6/ (15 pts) A series RLC circuit with L = 300 mH, C = 15 μF, and R = 50 Ω, is connected to an AC voltage source with amplitude 12.8 V and frequency 50 Hz. Find: (a) the current amplitude; (b) the phase difference between the voltage and the current; (c) sketch the phasor diagram of the circuit.

END OF QUESTION PAPER

THE INTERNATIONAL UNIVERSITY (IU) – VIETNAM NATIONAL UNIVERSITY - HCMC

FINAL EXAMINATION – CLASS

Student Name:_____ **Student ID:**_____

Date: August 2016

Duration: 90 minutes

SUBJECT: PHYSICS 3	
Chair of Department of Physics: Signature: Full name: Phan Bảo Ngọc	Lecturer: Signature: Full name: Dương Hoài Nghĩa

INSTRUCTIONS: This is a closed book examination. Use of cell phones, laptops, dictionaries is not allowed.

1) Three identical wires lie parallel to each other, separated by distances of a, so that in cross-section their centres form an equilateral triangle, as shown in Fig. 1. All three wires carry parallel currents I. Find the magnitude and direction of the force per unit length on the top wire due to the currents in the other two wires. (*25 marks*)

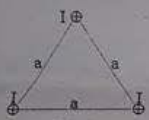


Fig. 1

Fig. 2

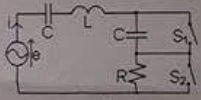


Fig. 3

2) In Fig.2, the current in the infinitely long wire is $i = 100\sin(1000t)$A, the rectangle has resistance $R = 0.1\Omega$. Find the value of the induced current in the rectangle. Where d = b = 2m, a = 1m. (*25 marks*)

3) Consider the circuit in Fig.3 with $e(t) = 12\sin(120\pi t)$ V. When S_1 and S_2 are open, i leads e by 30°. When S_1 is closed and S_2 is open, i lags e by 30°. When S_1 and S_2 are closed, i has amplitude 0.5A. What are R, L and C? (*25 marks*)

4) A plane electromagnetic wave, with frequency f = 100MHz, travels in vacuum in the positive direction of an x axis. The electric field, of amplitude $E_m = 100$V/m, oscillates parallel to the y axis.

a) Find the wave length λ and the angular wave number k of the wave. (*10 marks*)

b) Find the amplitude B_m of the magnetic field component. Parallel to which axis does the magnetic field oscillate? (*10 marks*)

c) Find the Poynting vector of the wave? (*5 marks*)

Ampère's law	Magnetic force	Faraday's law	Poynting vector	Speed of wave	Some constants
$\oint_{\text{closed path}} \vec{B}.d\vec{s} = \mu_0 i$	$\vec{F}_B = i\vec{L} \times \vec{B}$	$e = -\frac{d\Phi_B}{dt}$	$\vec{S} = \frac{1}{\mu_0}\vec{E} \times \vec{B}$	$\frac{E}{B} = \frac{\omega}{k} = c$	$\varepsilon_0 = 8.85 \times 10^{-12}$ C²/Nm² $\mu_0 = 1.26 \times 10^{-6}$ Tm/A $c = 3 \times 10^8$ m/s

END OF QUESTION PAPER

INTERNATIONAL UNIVERSITY (IU) – VIETNAM NATIONAL UNIVERSITY - HCMC

FINAL EXAMINATION – CLASS

Student Name:_____ Student ID:_____

Date: January 2017

Duration: 120 minutes

SUBJECT: PHYSICS 3	
Chair of Department of Physics: Signature: Full name: Phan Bảo Ngọc	Lecturer: Signature: Full name: Phan Bảo Ngọc

INSTRUCTIONS: This is a closed book examination. Use of cell phones, laptops and dictionaries is not allowed.

1/ (20 pts) A potential difference of 1000 V is applied to accelerate an electron from rest. The accelerated electron then enters a uniform magnetic field and completes one revolution in 10 ns. Determine the radius of the orbit of the electron. ($e = 1.6\times10^{-19}$ C; $m_e = 9.1\times10^{-31}$ kg)

2/ (15 pts) A closed loop with an area of 6.0×10^{-2} m^2 carries a current of 5.0 A. The loop is placed in an external magnetic field of 0.7 T. The dipole moment of the loop initially makes an angle of 60^0 with the magnetic field. Calculate the work done by the magnetic field as it rotates the loop from its initial orientation to a final one where the dipole moment is aligned with the magnetic field.

3/ (15 pts) Two infinite parallel wires are separated by 1.0 cm and carry currents of 5 A and 7 A in the opposite direction. Find the force (magnitude and direction) per unit length acting on each wire. ($\mu_0 = 4\pi\times10^{-7}$ T.m/A)

4/ (15 pts) A conducting loop of area 50 cm^2 is perpendicular to a magnetic field that increases uniformly in magnitude from 0.1 T to 7.5 T in 2.0 s. Find the resistance of the loop if the induced current has a value of 1.5 mA.

5/ (15 pts) The current in an RL circuit drops from 1.0 A to 10 mA in the first second after removing the battery from the circuit. Determine the inductance L if the resistance R is 40 Ω. (Decay of current $i = i_0 e^{-t/\tau_L}$)

6/ (20 pts) In an oscillating LC circuit, L = 3.0 mH and C = 2.7 μF. At t = 0 the charge on the capacitor is zero and the current is 2.0 A. **(a)** Find the maximum charge that will appear on the capacitor; **(b)** At what earliest time $t > 0$ is the rate at which energy is stored in the capacitor $\frac{dU_E}{dt}$ greatest, and **(c)** what is that greatest rate? (*Hint*: $q = Q\cos(\omega t + \phi); i = -I\sin(\omega t + \phi); U_E = \frac{q^2}{2C}$)

END OF QUESTION PAPER

THE INTERNATIONAL UNIVERSITY (IU) – VIETNAM NATIONAL UNIVERSITY - HCMC

FINAL EXAMINATION – CLASS

Student Name:_____ **Student ID:**_____

Date: January 2015

Duration: 120 minutes

SUBJECT: PHYSICS 3	
Chair of Department of Physics: Signature: Full name: Phan Bao Ngoc	Lecturer: Signature: Full name: Phan Bao Ngoc

INSTRUCTIONS: This is a closed book examination. Use of cell phones, laptops, dictionaries is not allowed.

1/ (15 pts) An electron moving along a circular path in a plane perpendicular to a uniform magnetic field of 60 μT. Determine the time needed to complete one revolution of the electron. ($e = 1.6\times10^{-19}$ C; $m_e = 9.1\times10^{-31}$ kg) 5.96×10^{-7}

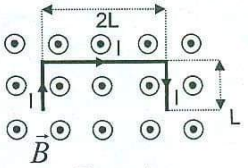


Figure 1

2/ (15 pts) A wire of total length 4L and carrying a current I is placed in a uniform magnetic field B that is directed out of the page as shown in Figure 1. Determine the net magnetic force (magnitude and direction) on the wire. $2ILB$

3/ (20 pts) In Figure 2, current i = 40 mA is set up in a loop having two radial lengths and two semicircles of radii a = 5 cm and b = 8 cm with a common center P. What are the (a) magnitude and (b) direction (into or out of the page) of the magnetic field at P and the (c) magnitude and (d) direction of the loop's magnetic dipole moment? ($\mu_0 = 4\pi\times10^{-7}$ T.m/A) $B = 1.4\times10^{-4}$ T, $\mu = 4.8\times10^{-4}$

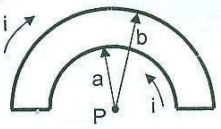


Figure 2

4/ (15 pts) Each turn of a 200-turn coil encloses an area of 0.85 m^2. Determine the rate of change of a magnetic field parallel to the coil's axis in order to induce a current of 0.2 A in the coil. The resistance of the coil is 500 Ω. 2.35×10^{-6}

5/ (15 pts) A coil has a resistance of R = 5.0 Ω and an inductance of L = 200 mH. At a particular instant in time after an ideal battery is connected across the coil, the current is i = 1.4 A, and is increasing at a rate of di/dt = 10 A/s. Calculate the emf ε of the battery, the inductive time constant of the circuit, and the final value of the current. (*Hint*: Use the loop rule to calculate ε) $\mathcal{E} = 9V$ $\tau_L = 40\times10^{-3}$.

6/ (20 pts) An alternating source drives a series RLC circuit with an emf amplitude of 12 V, at a phase angle of $\phi = +45^0$. When the potential difference across the capacitor reaches its maximum positive value of +4.5 V: (a) sketch the phasor diagram of the circuit; (b) determine the potential difference across the inductor (sign included).

END OF QUESTION PAPER

INTERNATIONAL UNIVERSITY (IU) – VIETNAM NATIONAL UNIVERSITY - HCMC

FINAL EXAMINATION – CLASS

Student Name:_____ Student ID:_____

Date: June 2017

Duration: 100 minutes

SUBJECT: PHYSICS 3	
Chair of Department of Physics: Signature: Full name: Phan Bảo Ngọc	Lecturer: Signature: Full name: Phan Bảo Ngọc

INSTRUCTIONS: This is a closed book examination. Use of cell phones, laptops and dictionaries is not allowed.

1/ (20 pts) A straight wire of linear mass density 0.08 kg/m is located perpendicular to a magnetic field of 0.7 T as shown in Figure 1. Find the magnitude and the direction of the current needed to balance the gravitational force on the wire. 1,142

Figure 1

2/ (20 pts) Determine the magnitude and the direction of the magnetic field at the center of the circular arcs, point O (Figure 2). The current in the loop is 6.0 A, $r_1 = 2$ cm and $r_2 = 4$ cm. ($B = \frac{\mu_0 I \theta}{4\pi R}$; $\mu_0 = 4\pi \times 10^{-7}$ T.m/A) $4,7.10^{-5}$

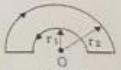


Figure 2

N A

3/ (20 pts) A coil consists of 200 turns. Each turn encloses an area of 0.65 m^2. Find the rate of change of a magnetic field parallel to the axis of the coil to induce a current of 0.12 A. The resistance of the coil is 300 Ω. 0,28

i R

4/ (20 pts) A battery is connected to a series RL circuit at time t = 0. If R = 10 Ω and L = 200 mH, at what time will the current be 47% less than its equilibrium value? (Rise of current $i = i_0(1 - e^{-t/\tau_L})$) 0,0151

5/ (20 pts) In Figure 3, R = 20.0 Ω, C = 10 μF, and L = 50.0 mH. The generator provides an emf with rms voltage 100.0 V and frequency 500 Hz. 31,83 500

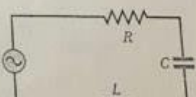


Figure 3

$V_{rms} = \frac{V}{\sqrt{2}} \Rightarrow V = 100\sqrt{2}$ $f = 500Hz$

(a) Find the rms current. 0,788 $\phi = 86,9$

(b) What is the rms voltage across R and C together. 40,84

(c) At what average rate is energy dissipated in R, in C, and in L? 12,41 19,76 97,54

END OF QUESTION PAPER

THE INTERNATIONAL UNIVERSITY (IU) – VIETNAM NATIONAL UNIVERSITY - HCMC

FINAL EXAMINATION – CLASS

Student Name:_____ Student ID:_____

Date: August 2017

Duration: 90 minutes

SUBJECT: PHYSICS 3	
Chair of Department of Physics:	Lecturer:
Signature:	Signature:
Full name: Phan Bảo Ngọc	Full name: Dương Hoài Nghĩa

INSTRUCTIONS: This is a closed book examination. Use of cell phones, laptops, dictionaries is not allowed.

1) A conducting rod of length d is free to slide on two parallel conducting bars. Two resistors R_1 and R_2 are connected across the ends of the bars (Fig.1). There is a uniform magnetic field B pointing into the page. An external agent pulls the bar to the right at a constant velocity v.

a) Find the magnitude and the direction of the currents through the resistors. (*15 marks*)

b) Find the applied force needed for the rod to maintain a constant velocity. (*10 marks*)

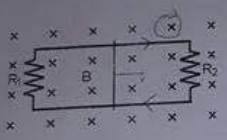


Fig. 1

Fig. 2

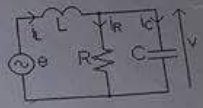


Fig. 3

2) A coaxial cable transmits DC power from a battery with emf ε to a load with resistance R. The cable consists of two concentric, long, hollow cylinders with radii a, b and length d (Fig.2). Assume that the internal resistance of the battery and the resistance of the cable can be neglected.

a) Find the electric field in the cable and the capacitance of the cable. (*15 marks*)

b) Find the magnetic field in the cable and the inductance of the cable. (*10 marks*)

3) Consider the circuits in Fig. 3 where e = 200sin(1000t) V, R = 100 Ω, L = 100 mH, C = 10 μF. Find the currents $i_R(t)$, $i_L(t)$, $i_C(t)$. (*25 marks*)

4) A plane electromagnetic wave, with wave length λ = 1 m travels in vacuum in the positive direction of the z axis. The electric field, of amplitude E = 100 V/m, oscillates parallel to the x axis.

a) Find the amplitude of the magnetic field component. Parallel to which axis does the magnetic field oscillate? (*15 marks*)

b) Find the Poynting vector and the time-averaged rate of the energy flow (*10 marks*)

END OF QUESTION PAPER

INTERNATIONAL UNIVERSITY (IU) – VIETNAM NATIONAL UNIVERSITY - HCMC

FINAL EXAMINATION – CLASS

Student Name:_____ Student ID:_____

Date: January 2018

Duration: 90 minutes

SUBJECT: PHYSICS 3	
Chair of Department of Physics: Signature: Full name: Phan Bảo Ngọc	Lecturer: Signature: Full name: Phan Bảo Ngọc

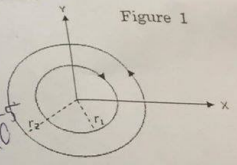
INSTRUCTIONS: This is a closed book examination. Use of cell phones, laptops and dictionaries is not allowed.

1/ (20 pts) Find the angle between a uniform magnetic field of 1.0 mT and the velocity of an electron if the magnetic force acting on the electron is 63.7×10^{-19} N and the electron has a speed of 7.0×10^{4} m/s. ($e = 1.6\times10^{-19}$ C)

2/ (20 pts) A square loop of 350 turns with a side length of 7 cm carries a current of 10 A. The loop is placed in a magnetic field of 5.0 T. Calculate the magnitude of the maximum torque exerted on the loop. ($\tau = NiAB\sin\theta$)

3/ (20 pts) Figure 1 shows two concentric wire loops of radii $r_1 = 5$ cm and $r_2 = 10$ cm that are located in the vertical *xy* plane. The inner loop carries a current of 5.0 A, and the outer loop carries a current of 12.0 A with the directions as shown in the figure. Find the magnitude and the direction of the net magnetic field at the center. ($B = \frac{\mu_0 i}{2R}; \mu_0 = 4\pi\times10^{-7}$ T.m/A)

Figure 1



4/ (20 pts) A circular coil has 100 turns of diameter of 16 cm with a total resistance of 10 Ω. The plane of the coil is perpendicular to a uniform magnetic field. At what rate should the magnetic field change for the power dissipated in the coil to be 1.2 W?

5/ (20 pts) An inductor with inductance 6.2 μH is connected in series with a 1.25 kΩ resistor.

(a) If a 12.0 V battery is inserted in the circuit, how long will it take for the current through the resistor to reach 75.0% of its final value?

(b) Find the current through the resistor at time $t = 1.0\ \tau_L$. ($\tau_L = \frac{L}{R}; i = \frac{\varepsilon}{R}\left(1 - e^{-t/\tau_L}\right)$)

END OF QUESTION PAPER

Date: June 2018

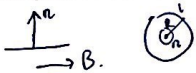
Duration: 90 minutes

SUBJECT: **PHYSICS 3**	
Chair of Department of Physics: Signature: Full name: Phan Bảo Ngọc	Lecturers: Dương Hoài Nghĩa, Phan Bảo Ngọc Signature:

INSTRUCTIONS: This is a closed book examination. Use of cell phones, laptops and dictionaries is not allowed.

1/ (20 pts) A potential difference of 300 V is applied to accelerate an electron from rest. The electron then enters a uniform magnetic field and it takes 12 ns to complete one revolution: **(a)** Calculate the speed of the electron; **(b)** Find the radius of the orbit of the electron. ($e = 1.6\times10^{-19}$ C; $m_e = 9.1\times10^{-31}$ kg)

2/ (20 pts) The plane of a circular loop wire is parallel to a 2.0-T magnetic field. The loop has a radius of 4.0 cm and carries a current of 6.0 A. Calculate the magnitude of the torque that acts on the loop. ($\tau = NiAB\sin\theta$)



3/ (20 pts) A segment of wire is formed into the shape as shown in Figure 1, and carries a current I = 2.0 A. Find the magnitude and the direction of the resulting magnetic field at point P if R = 10 cm.

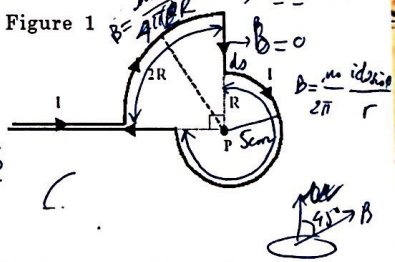


Figure 1

($B = \frac{\mu_0 i\phi}{4\pi r}$; $\mu_0 = 4\pi\times10^{-7}$ T.m/A)

4/ (20 pts) A 100-turn coil is placed in a magnetic field so that the normal to the plane of the coil makes an angle of 45^0 with the direction of the magnetic field. An induced emf of 100 mV appears in the coil if we increase the magnetic field from 300 μT to 600 μT in a time interval of 1.0 s. Find the cross sectional area of the coil.

5/ (20 pts) The resonant frequency of a series RLC circuit is 5.0 kHz. When it is driven at a frequency of 7.0 kHz, it has an impedance of 850 Ω and a phase constant of 45^0. Find R, L, and C for this circuit.

END OF QUESTION PAPER

THE INTERNATIONAL UNIVERSITY (IU) – VIETNAM NATIONAL UNIVERSITY - HCMC

FINAL EXAMINATION – CLASS

Student Name: _____ Student ID: _____

Date: August 2018

Duration: 90 minutes

SUBJECT: PHYSICS 3	Lecturer:
Chair of Department of Physics:	Signature:
Signature:	
Full name: Phan Bảo Ngọc	Full name: Dương Hoài Nghĩa

INSTRUCTIONS: This is a closed book examination. Use of cell phones, laptops, dictionaries is not allowed.

1) In Fig. 1, a metal wire of mass m = 25 mg can slide with negligible friction on 2 horizontal parallel rails separated by distance d = 4 cm. The track lies in a vertical uniform magnetic field of magnitude 50 mT. A source is connected to the rails, producing a constant current i = 10 mA in the wire and rails. Find the magnitude and the direction of the force acting on the wire. *(20 pts)*

2) The magnitude of the electric field between the two circular parallel plates is E = 100exp(-2t) V/m (Fig. 2). The plate area is A = 0.04 m². Determine

a) The magnitude and the direction of the displacement current between the plates. *(10 pts)*

b) The magnitude and the direction of the induced magnetic field between the plates. *(10 pts)*

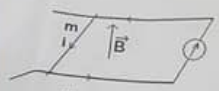


Fig. 1


Fig. 2

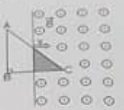


Fig. 3

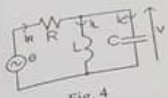


Fig. 4

3) In Fig.3, the triangle ABC is moving into a magnetic field B with velocity v. If the triangle has resistance R, find the magnitude and the direction of the current i in the triangle. Let AB = a, BC = b. *(20 pts)*

4) Given the circuit in Fig. 4 with e(t) = 100cos(1000t) V, R = 100 Ω, L = 0.1 H, C = 10 μF. Find the voltage v and the currents i_R, i_L, i_C. *(20 pts)*

5) The electric field component of an electromagnetic wave in vacuum is $\vec{E} = E_0 \sin(\omega t - kx)\vec{a}_y$. Find the magnetic field $\vec{B}$ and the Po ynting vector *(20 pts)*.

END OF QUESTION PAPER

INTERNATIONAL UNIVERSITY (IU) – VIETNAM NATIONAL UNIVERSITY - HCMC

FINAL EXAMINATION

Student Name:_____ Student ID:_____

Date: January, 2019

Duration: 90 minutes

SUBJECT: PHYSICS 3	
Head of Department of Physics: Signature: Full name: Phan Bao Ngoc	Lecturers: Signature: Full name: Phan Bao Ngoc, Dao Ngoc Hanh Tam

INSTRUCTIONS: This is a closed book examination. Use of cell phones, laptops and dictionaries is not allowed.

Q1 (20 pts):

A wire 230 cm long carries a current of 12.0 A is put in a uniform magnetic field of magnitude B = 3.0 T. The magnetic force on the wire is measured as 41.4 N. Find the angle of the wire with the magnetic field.

Q2 (20 pts):

A loop having two semicircles of radii a = 5.7 cm and b = 8.5 cm with a common center **P**. A current i = 50 mA is set up in that loop (as shown in ***Fig.1***). Find the ***magnitude*** and ***direction*** of the magnetic field at **P**. (the permeability constant $\mu_o = 4\pi \times 10^{-7}$ Tm/A)

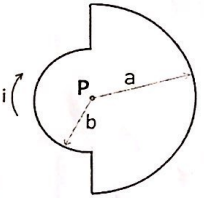


Fig. 2

Q3 (20 pts):

A metal rod is forced to move with constant velocity v = 65 cm/s along two parallel metal rails (***Fig.2***). A magnetic field with magnitude B = 0.35 T points out of the page. The rails are separated by L = 20 cm.

a) What emf is generated?

b) The rod has a resistance of 18.5 Ω (resistance of the rails and connector are negligible). What is the current in the rod?

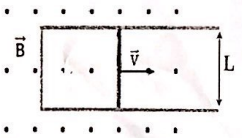


Fig. 2

Q4 (20 pts):

In an oscillating LC circuit with C = 64.0 mF, the current is given by $i = (1.6)\sin(2500t + 0.68)$, where t is in seconds, i in amperes, and the phase constant in radians.

a) How soon after t = 0 will the current reach its maximum value?

b) Find the inductance L and the total energy.

Q5 (20 pts):

The ac generator in ***Fig.3*** supplies 120 V at 60 Hz. When the switch ***S*** opens, the current leads the generator emf by 20°. When ***S*** is in position 1, the current lags the generator emf by 10°. When ***S*** is in position 2, the current amplitude is 2 A. Find R, L, and C.

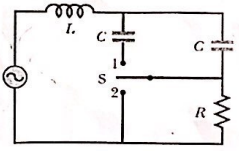


Fig. 3

- END OF QUESTION PAPER -

THE INTERNATIONAL UNIVERSITY (IU) – VIETNAM NATIONAL UNIVERSITY - HCMC

FINAL EXAMINATION

Student Name: _____ **Student ID:** _____

Date: 21 June 2021

Duration: 2 days

SUBJECT: **PHYSICS 3**	
Chair of Department of Physics: Signature: Full name: **Phan Bảo Ngọc**	Lecturer: Phạm Trung Kiên Signature:

INSTRUCTIONS: This is an online exam.

1/ (20 pts) *The conducting current curve can have arbitrary path so basically the current element should be defined to characterize the properties of current-carrying curve to compute the later magnetic field*. Consider the problem: For the current element $Idx(\vec{\imath} + 2\vec{\jmath})$ situated at the point (1, -2, 2). Find the magnetic field $\vec{B}$ at the point (2;-3;4)

2/ (20 pts) *The currents in any path can cause significant force on each other if they are close. To find the magnetic force of arbitrary current paths located in the space, the magnetic force should be found for current elements representing the current-carrying curve*. Consider the problem: Three identical current elements $Idz\vec{k}$ (A) are located at equally spaced points on a equilateral triangle centered at the origin and lying on the xy-plane. The first point is (0, $\frac{\sqrt{3}}{2}$, 0). Find the magnetic force on each current element.

3/ (20 pts) *The closed paths or loops located in the time-varying magnetic field can generate induced electromotive force (emf) due to the time-varying magnetic flux*. Consider the problem: The magnetic field is $\vec{B} = B_0(sin\omega t\,\vec{\imath} - cos\omega t\,\vec{\jmath})\ Wb/\mathrm{m}^2$. Find the magnetic flux and the induced emf around the triangular path from (1, 0, 0) to (0, 1, 0) to (0, 0, 1) to (1, 0, 0). If the path shape is remained, which plane the path can be placed in space so that the emf cannot exist over time?

4/ (20 pts)

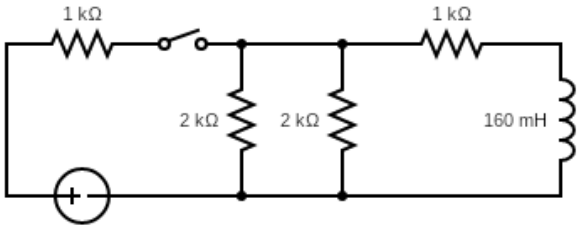
The switch in the circuit in the following figure has been closed for a long time before it is opened at $t = 0$. The voltage source is 40 V.

a) Find $i_L(0^-)$ at the time before switch is opened

b) Find $i_L(0^+)$ at the time after switch is opened

c) Find $i_L(t)$ for $t \geq 0$

d) Find $i_{2k\Omega}(t)$ for $t \geq 0$



5/ (20 pts)

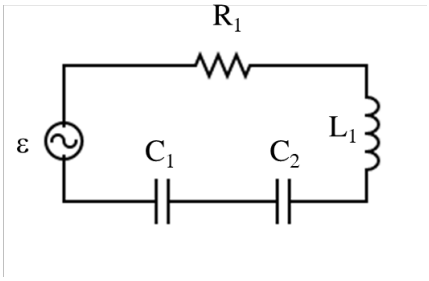
The below circuit is operated with driven angular frequency of $\omega_d = 120\pi\ (rad/s)$.The circuit has following parameters: ε(t) = 18sin(ω_dt) V; R_1 = 100 Ω; C_1= C_2= 70 μF; L_1 = 115 mH

a) Find the impedance of the circuit

b) Find the amplitude and phase of the voltage across R_1; C_1; C_2 and L_1

c) Sketch the phasor diagram of the circuit

d) How much inductance is added to maximize the power of circuit? Plot the new circuit diagram.



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