Council for Technical Education and Vocational Training

Office of the Controller of Examinations

Sanothimi, Bhaktapur

Regular/Scholarship/Back Exam – 2082 Shrawan/Bhadra

Program:	**Diploma in Engineering All**	**Full Marks: 60**
Year/Part:	**I/II (2021, 2022)**	**Pass Marks: 24**
Subject:	**Engineering Physics II**	**Time: 3 hrs.**

Candidates are required to give their answers in their own words as far as practicable. The figures in the margin indicate full marks.

Group 'A'

Attempt any FOUR questions. **[4×6=24]**

1. Describe the Wheatstone bridge circuit and deduce the condition for balance using Kirchhoff's law.
2. State Biot-Savart's law. Use this law to find the magnetic field at a point due to infinitely long straight current carrying conductor.
3. Define closed organ pipe and open organ pipe with examples. Describe various modes of vibration in a closed organ pipe.
4. Define capillary action. Derive the expression of surface tension by capillary rise method.
5. State Bohr's postulates and hence derive expression for energy of electron in n^{th} orbit of hydrogen atom.
6. What is radioactivity? State laws of radioactive disintegration and show $N = N_o e^{-\lambda t}$, where symbol carry their usual meanings.

Group 'B'

Attempt any FOUR questions. **[4×3=12]**

7. State and explain Coulomb's law in electrostatics.
8. Define galvanometer. How can you convert galvanometer into an ammeter? Explain.
9. Derive the Newton's formula for the velocity of sound in air. Explain. Why it was corrected by Laplace?

Cont. .....

10. State and prove Brewster's law.
11. What is x-ray? What are importance properties of x-ray?
12. What is semiconductor? Differentiate between N-type and P-type semiconductor.

Group 'C'

Attempt any SIX questions. **[6×4=24]**

13. Two charges each of $+5\mu C$ are located at two corners of an equilateral triangle of side 10 cm. What is the electric field intensity at third corner? (For air $\epsilon_o = 8.854\times10^{-12}\ C^2/Nm^2$)
14. An electron of kinetic energy 10 eV is moving in a circular orbit of radius 11 cm, in a plane at right angles to a uniform magnetic field. Determine value of flux density.
15. If the supply voltage were 10 V, the frequency 1 KHz and capacitance $2\mu F$. What value of 'R' in the circuit connection in series would allow a current of 0.10 A to flow?
16. At what temperature the velocity of sound is double of the velocity of sound at 27°C?
17. In a two slit interference pattern, the slits are 0.2 mm apart and the screen is at a distance of 1 m. The third bright fringe is found 9.49 mm from the center fringe. Find the wave length of light used.
18. A force of 50 N is applied to the ends of a wire 6 m long and produces extension of 0.25 mm. If the diameter of wire is 2 mm, calculate: (a) stress on wire (b) its strain and (c) value of Young's modulus.
19. Light of wavelength 6000 Å falls on a photosensitive plate of work function 1.9 eV. Find: (a) kinetic energy of the photo electron emitted and (b) stopping potential. ($h = 6.62\times10^{-34}$ JS)
20. Calculate the binding energy per nucleon of helium ($_2He^4$) nucleus. Given that: Mass of proton (m_p) = 1.007276 amu, Mass of neutron (m_n) = 1.008665 amu and Mass of helium ($_2He^4$) (M) = 4.001506 amu.

Good Luck !

Council for Technical Education and Vocational Training

Office of the Controller of Examinations

Sanothimi, Bhaktapur

Special Scholarship/Back Exam – 2082 Jestha

Program: Diploma in Engineering All | **Full Marks: 60**

Year/Part: I/II (2021) | **Pass Marks: 24**

Subject: Engineering Physics II | **Time: 3 hrs.**

Candidates are required to give their answers in their own words as far as practicable. The figures in the margin indicate full marks.

Group 'A'

Attempt any FOUR questions. **[4×6=24]**

1. Define potential difference between two points, Derive the expression for electric potential at a point.
2. State Biot-Savart's law. Use this law to find the magnetic field at a point due to infinitely long straight current carrying conductor.
3. Write Newton's formula for velocity of sound in air. Explain how Laplace corrected it.
4. Find the impedance of LCR circuit in series. What is resonance in LCR circuit?
5. Define interference of light. Explain Young's double slit experiment to show that fringe width for both dark and fright fringes is equal.
6. State Bohr's postulates of hydrogen atom. Derive an expression for radius of an electron in the n^{th} orbit of hydrogen atom.

Group 'B'

Attempt any FOUR questions. **[4×3=12]**

7. Define capacitor. Derive capacitance of a parallel plate capacitor.
8. Describe the variation of thermo emf with temperature of hot junction.
9. Derive an expression for the force on moving charge inside a magnetic field.

Cont. .....

10. State and prove Brewster's law.
11. Derive an expression for energy stored in a stretched wire.
12. Why is a diode used for rectification? Explain working of half wave rectifier.

Group 'C'

Attempt any SIX questions. **[6×4=24]**

13. Two charges 1μC and 2μC are placed at corners A and B of an equilateral triangle ABC of side 2 m. Calculate the electric field at C.
14. A copper wire has a diameter of 1.02 mm and carries a constant current of 1.67 A. If the density of free electrons in copper is $8.5\times10^{28}/m^3$. Calculate the current density and the drift velocity of the electron.
15. What is magnetic field intensity at center of circular coil of 100 turns and radius 2.5 cm carrying a current of 10 A?
16. The density of air at STP is 1.293 kg/m^3. Find its velocity at STP and 27°C. (γ for air = 1.4)
17. Find the height of water rise inside the capillary tube of diameter 5 mm when dipped into the water vessel if surface tension of water is 70.4 dyne cm^{-1} and angle of contact is 0°. (Given: Density of water is 1000 kgm^{-3} and acceleration due to gravity is 9.8 ms^{-2})
18. A ball of density 7.8 gcm^{-3} falls inside the viscous medium of density 0.97 gcm^{-3} with terminal velocity 2 cms^{-1}. Find coefficient of viscosity of the viscous medium if radius of ball is 0.3 mm ($g=9.8\ ms^{-2}$).
19. Work function of molybdenum is 5 eV, if ultraviolet light of wavelength 1000 A° falls upon it. Find the maximum velocity of ejected electron. ($h=6.62\times10^{-34}$ Js, $e=1.6\times10^{-19}$C, $Me=9.1\times10^{-31}$ kg)
20. If the half-life period of a radioactive substance is 2 days, after how many days will $\left(\frac{1}{128}\right)^{th}$ part of the substance be left behind.

Good Luck !

Council for Technical Education and Vocational Training

Office of the Controller of Examinations

Sanothimi, Bhaktapur

Regular/Scholarship/Back Exam – 2081 Bhadra/Ashwin

Program:	**Engineering ALL**	**Full Marks: 60**
Year/Part:	**I/II (2021)**	**Pass Marks: 24**
Subject:	**Engineering Physics II**	**Time: 3 hrs.**

Candidates are required to give their answers in their own words as far as practicable. The figures in the margin indicate full marks.

Group 'A'

Attempt any FOUR questions. **[4×6=24]**

1. Define electric potential. Derive an expression for potential due to point charges.
2. What is Wheatstone bridge? Using Kirchhoff's law, derive the principle of Wheatstone bridge.
3. What are Bohr's postulates of hydrogen atom? Derive an expression for the energy of electron in n^{th} orbit.
4. Describe Young's double slit experiment for the interference of the light. Show that width of bright and dark fringe are the same.
5. Sate Biot-Savart law. Derive expression for magnetic field at any point on the axis of circular coil.

Group 'B'

Attempt any FOUR questions. **[4×3=12]**

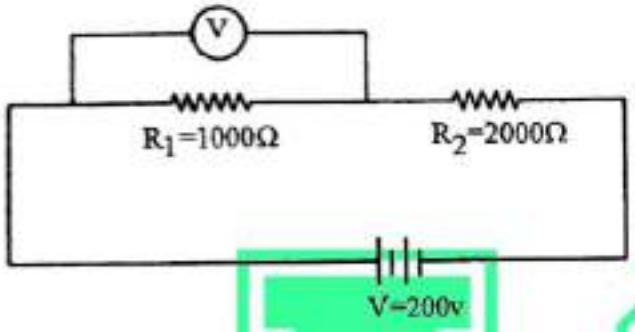
6. Derive an expression for the impedance of L-R in series.
7. Derive an expression for the energy stored in stretched wire.
8. How galvanometer is converted into voltmeter?
9. How is co-efficient of viscosity of given liquid determined by Stoke's method?
10. Define binding energy, mass defect and binding energy for nucleon.
11. Discuss how the semiconductor diodes are used as full wave rectifier.

Cont. .....

Group 'C' [6×4=24]

Attempt any SIX questions.

12. Point charges having values +5μc, +10μc and −10μc are placed in air at corner A, B and C of an equilateral triangle ABC having each side equal to 5 cm. Find the resultant force on charge A.
13. Two resistor 1000Ω and 2000Ω are connected in series and the combination is connected to 200 V main supply. When voltmeter having resistance 1000Ω connected parallel to 1000Ω resistance. Find the reading shown by it.



14. A capillary tube of 0.3 mm diameter is placed vertically inside a liquid of density 800 Kg/m^3, surface tension 5×10^{-4} N/m and angle of contact 30°. Calculate the height to which the liquid rises in capillary tube.
15. Light of wavelength 6000A° falls on a photosensitive plate of work function 1.8 eV. Find (a) kinetic energy of the emitted electron and (b) stopping potential. ($h=6.62\times10^{-34}$ JS)
16. The density of air at S.T.P .is 1.293 Kg/m^3. Find its velocity at S.T.P. and 27°C (γ for air 1.4).
17. Find the half-life period of the radioactive material if its activity has decayed to $\left(\frac{1}{128}\right)^{th}$ of its initial activity after 50 days.
18. The critical angle of transparent medium is 49°. What is the polarizing angle?

Good Luck !

Council for Technical Education and Vocational Training

Office of the Controller of Examinations

Sanothimi, Bhaktapur

Scholarship/Back Exam – 2081 Bhadra/Ashwin

Program: Engineering ALL | **Full Marks:** 60

Year/Part: I/II (Old + Very Old) | **Pass Marks:** 24

Subject: Engineering Physics II | **Time:** 3 hrs.

Candidates are required to gi
the margin indicate full marks

Group 'A' [4×6=24]

Attempt any FOUR questions.

1. Define potential difference between two points. Derive an expression for it. [2+4]
2. State and prove Ampere's circuital law. Use it to find magnetic field due to current carrying solenoid. [1+2+3]
3. Using Bohr's postulates, derive an expression for total energy of electron in n^{th} orbit of H-atom. [6]
4. Define interference of light. Describe Young's double slit experiment to determine the fringe width. [2+4]
5. Define Young's modulus of elasticity. Derive an expression for energy density in a stretched wire. [2+4]

Group 'B' [4×3=12]

Attempt any FOUR questions.

6. Define one farad capacitance. Derive expression of capacitance of parallel plate capacitor. [1+2]
7. Define drift velocity. Derive the relation between drift velocity and current density. [1+2]
8. What is P-N diode? Explain forward biasing of P-N junction diode with its characteristics curve. [1+2]
9. Discuss different modes of vibration in closed organ pipe. [3]
10. What is x-ray? Write important properties of x-ray. [1+2]
11. State and prove Brewster's law. [3]

Cont. .....

Group 'C' [6×4=24]

Attempt any SIX questions.

12. Two spheres of radii 10 cm and 15 cm are given charges of 200 c and 150 c respectively and then connected by a wire. Calculate the loss of energy after connection. Given: $\epsilon_o = 8.85 \times 10^{-12} c^2 N^{-1} m^{-2}$

13. A moving coil meter has resistance of 20Ω indicates full scale deflection when current of 5 mA flows through it. How could this meter be converted into (a) a voltmeter with (0-2) V range? (b) an ammeter with (0-4) A range?

14. A 2μF capacitor is in series with 30Ω resistor and the combination is connected to 220 V, 50 Hz. Find the impedance of circuit and current in the circuit.

15. An electron moves from rest with the potential of 500 V and enters inside magnetic field of flux density 0.4T. What is the radius of the orbit? (Given: $e = 1.6 \times 10^{-19} C$, $m_e = 9.1 \times 10^{-31}$ Kg)

16. Calculate the time required for 10% of sample of radium to disintegrate. Assume that the half-life of radium is 1500 years.

17. A wire of diameter 0.04 cm made of steel of density 8000 kgm^{-3} is acted under constant tension of 100 N. What length of wirer should plucked to cause it to vibrate with the fundamental frequency of 840 Hz?

18. At what temperature the velocity of sound in air is double of velocity of sound at 127°C?

19. Water rises to a height of 8 cm in a capillary tube when dipped in water. Calculate the diameter of tube (surface tension and density of water are 72×10^{-2} Nm^{-1} and 1000 kgm^{-3} with zero degree angle of contact).

Good Luck !

Council for Technical Education and Vocational Training

Office of the Controller of Examinations

Sanothimi, Bhaktapur

Special Scholarship Exam-2081 Jestha/Ashad,

Program:	**Engineering ALL**	**Full Marks: 60**
Year/Part:	**I/II (2021)**	**Pass Marks: 24**
Subject:	**Engineering Physics II**	**Time: 3 hrs.**

Candidates are required to give their answers in their own words as far as practicable. The figures in the margin indicate full marks.

Group 'A'

Attempt any Four questions. **[4×6=24]**

1. What is potential difference? Derive an expression for potential difference between two points.
2. What is Wheatstone bridge? Describe its balanced condition using Kirchoff's law
3. State Biot-Savart's law. Use this law to find magnetic field at the Centre of a current carrying circular coil.
4. Define interference of light. Derive an expression for fringe width in Young's double slit experiment.
5. Define beat and beat frequency. Derive an expression for beat frequency.
6. State Bohr's postulates and hence derive expression for the energy of electron in n^{th} orbit of hydrogen atom.

Group 'B'

Attempt any Four questions. **[4×3=12]**

7. Derive an expression for energy stored in a charged capacitor.
8. Differentiate between steam line flow and turbulent flow in liquid.
9. State Ohm's law. Verify it experimentally.
10. Discuss how semiconductor diodes are used as a full wave rectifier.
11. Derive an expression for energy stored in a stretched wire.
12. State and explain Faraday's law of electromagnetic induction.

Cont. .....

Group 'C'

Attempt any SIX questions. **[6×4=24]**

13. Three charges of 3×10^{-9}C, -3×10^{-9}C and 1.5×10^{-9}C are placed in air at the corners A, B and C of an equilateral triangle ABC having side 5 cm. Find the force acting on the charge 1.5×10^{-9}c. ($\epsilon_0 = 8.85 \times 10^{-12}\ C^2\ N^{-1}\ m^{-2}$)

14. A cell of emf 1.5 V and internal resistance 1Ω sends a current through wire of resistance 6Ω and 8Ω in parallel. Find the current flowing through each wire.

15. The critical angle of light in a certain substance is 45°. What is polarizing angle?

16. Calculate the work function in eV for sodium metal given that the threshold wavelength is 6800 Å. ($h = 6.62 \times 10^{-34}$ JS, $c = 3 \times 10^8$ m/s).

17. AC mains of 200 volts, 50 cycles are joined to a circuit containing an inductance of 100 mH and a resistance of 20 Ohms in series. Calculate the power consumed.

18. A radioactive source has decayed to $\left(\frac{1}{128}\right)^{th}$ of its initial activity after 50 days. What is its half-life?

19. The density of air at S.T.P. is 1.293 kg/m^3. Find its velocity at S.T.P. and at 27°C. (γ for air = 1.4).

20. A capillary tube of 0.4 mm diameter is placed vertically inside a liquid of density 1500 kg/m^3. surface tension 7×10^{-2} Nm^{-1} and the angle of contact 0°. Calculate the height to which the liquid rises in capillary tube.

Good Luck!

Council for Technical Education and Vocational Training

Office of the Controller of Examinations

Sanothimi, Bhaktapur

Regular/Back Exam-2080 Mangsir/Poush

Program:	**Engineering ALL**	**Full Marks: 60**
Year/Part:	**I/II (2021)**	**Pass Marks: 24**
Subject:	**Engineering Physics II**	**Time: 3 hrs.**

Candidates are required to give their answers in their own words as far as practicable. The figures in the margin indicate full marks.

Group 'A'

Attempt any FOUR questions. [4×6=24]

1. Define equipotential surfaces. Derive an expression for electric potential at a point due to an electric charge.
2. State Biot-Savart's law. Use this law to find the magnetic field at a point on the axis of current carrying circular coil.
3. State Bohr's postulates of hydrogen atom. Derive an expression for the energy of electron in the n^{th} orbit of hydrogen atom.
4. Define beat and beat frequency. Derive an expression for beat frequency.
5. State Stoke's law. Derive an expression for coefficient of viscosity of liquid for a spherical body falling inside the liquid.
6. What is specific charge of an electron? Explain with necessary theory, the J-J Thomson's experiment to determine specific charge of electron.

Group 'B'

Attempt any FOUR questions. [4×3=12]

7. Define capacitance of a capacitor. Derive equivalent capacitance when three capacitors are connected in parallel.
8. How will you convert galvanometer into ammeter?
9. Discuss the various modes of vibration in closed organ pipe.
10. Explain the motion of electron inside the electric field.
11. What is P-N junction diode? Explain the use of P-N diode as half wave rectifier.
12. Define polarization of light. State and prove Brewster's law.

Cont. .....

Group 'C'

Attempt any SIX questions. **[6×4=24]**

13. The half-life of $_{92}U^{238}$ is 4.5×10^{9} years. Calculate the activity of 1 gm sample of $_{92}U^{238}$.
14. Two parallel resistors 6Ω and 8Ω are connected with 4Ω resistor in series. The connection is supplied to a battery of emf 24 V. If a voltmeter is connected across 4Ω resistor, find the reading shown by voltmeter.
15. A 50Ω resistor, 2μF capacitor and a 30 mH inductor are connected in series with an AC source of voltage 200 V and frequency 50 Hz. Find the impedance and current flow in the circuit.
16. Light radiation of wavelength 6800 A° falls on a photosensitive metal plate of work function 1.8 eV. Find the velocity of ejected photoelectron. (Mass of electron is 1.6×10^{-31} kg, charge of electron is 1.6×10^{-19} and speed of light is 3×10^{8} ms^{-1})
17. At what temperature, the velocity of sound in air is increased by 40% to that at 30°C?
18. A capillary tube of 0.3 cm diameter is placed vertically inside a liquid of density 800 kg/m^3. Surface tension 5×10^{-4} N/m and angle of contact 30°. Calculate the height to which the liquid rises inside the capillary tube.
19. In a Young's double slit experiment, the separation of four bright fringes is 2.5 mm when the wavelength of light used is 6200 Å. The distance of screen from the slits is 0.8 m. Calculate the separation of two slits.
20. An electron is revolving in a uniform magnetic field of strength 1.5×10^{-2}T. The radius of circular path is 1.2×10^{-2} m. Through what potential difference was the electron initially accelerated from rest? (e/m for electron = 1.77×10^{11} c/kg)

Good Luck !

Council for Technical Education and Vocational Training

Office of the Controller of Examinations

Sanothimi, Bhaktapur

Regular/Back/Special Exam-2080, Mangshir/Poush

Program:	**Diploma in Engineering ALL**	**Full Marks: 60**
Year/Part:	**I/II (Old + Very Old Course)**	**Pass Marks: 24**
Subject:	**Engineering Physics II**	**Time: 3 hrs**

Candidates are required to give their answers in their own words as far as practicable. The figures in the margin indicate full marks.

Group 'A'

Attempt Any Four questions. [4x6=24]

1. State Kirchhoff's law. Hence, use it to deduce the balance condition of wheat stone bridge.
2. Define potential difference between two points. Derive the expression for the electric potential at a point.
3. State Biot-Savart's law use this law to find the magnetic field at any point on the axis of the circular coil.
4. What is interference of light? Derive the expression for the width of interference fringe in young's double slit experiment.
5. Define specific charge of an electron. Explain how can you determine the specific charge by Thomson's method.
6. Define rectifier. Explain the working of full wave rectifier.

Group 'B'

Attempt Any Four questions. [4x3=12]

7. Define work function and derive Einstein's photoelectric equation.
8. Define capacitor. Derive capacitance of a parallel plate capacitor.
9. Derive Newton's formula for velocity of sound in air.
10. State Faraday law's of electromagnetic induction. What is Lenz's law?
11. Differentiate between nuclear fission and fusion section.
12. How a galvanometer is converted into Ammeter.

Cont.....

Group 'C'

Attempt <u>Any Six</u> questions. [6x4=24]

13. The critical angle of light in a certain substance is 45°. What is the polarizing angle?
14. At what temperature, velocity of sound is 2/3 of velocity of sound at 127°c?
15. A cell of emf 1.5v and internal resistance 1Ω sends a current through wire of resistance 6Ω and 12Ω in parallel. Find the current flowing through each wire.
16. What is the impedance of a series combinations of a resistance of 1kΩ and a capacitance of a capacitor 2μF at a frequency of 50HZ?
17. The activity of radium decreases about 10% every 20 years. Calculate its half life.
18. Calculate the velocity of sound in air if two waves of wavelengths 0.5mm and 0.505m produce 5 beats persecond.
19. A wire of length 150cm and area of cross sectional $1mm^2$ is stretched by a weight of 3kg. Determine increase in length. Young's modulus of material of wire is $2x10^{11}$ N/m^{-2}, g = $9.8m/s^2$.
20. Calculate the binding energy per nucleon for a helium nucleus. Give that

    mass of helium nucleus = 4.001509 amu

    mass of proton = 1.007277 amu

    mass of neutron = 1.008666 amu

Good Luck !

Council for Technical Education and Vocational Training

Office of the Controller of Examinations

Sanothimi, Bhaktapur

Regular/Back Exam-2079, Falgun/Chaitra

Program:	**Diploma in Engineering ALL**	**Full Marks: 60**
Year/Part:	**I/II (2021)**	**Pass Marks: 24**
Subject:	**Physics II**	**Time: 3 hrs**

Candidates are required to give
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Group 'A'

Attempt Any Four questions. 4x6=24]

1. Define electric potential. Derive an expression for electric potential at a point with necessary diagram.
2. Define Surface Tension. Find an expression to calculate surface tension of a liquid by capillary rise method.
3. Define interference of light. Describe Young's double slit experiment for the measurement of wavelengths of monochromatic source.
4. Using Bohr's theory of Hydrogen atom, find the total energy of an electron in n^{th} orbit.
5. What is impedance? Derive an expression of impedance for LCR circuit.
6. Discuss the theory of Millikan's oil drop experiment to determine charge of an electron.

Group 'B' (Short Question)

Attempt Any Four questions. 4x3=12]

7. Derive an expression for energy stored in a capacitor.
8. Explain the working of halfwave rectifier.
9. What is galvanometer? How a galvanometer is converted into voltmeter?
10. Differentiate between N-type and P-type semiconductor.
11. Define mass defect and binding energy.
12. Derive Newton's formula for velocity of sound in air.

Cont.....

Group 'C' (Numerical Problems)

Attempt <u>Any Six</u> questions. 6x4=24]

13. The critical angle of light in a certain substance is 49°. What is the polarizing angle.

14. The work function of potassium is 2.3ev. If the photoelectrons are emitted with maximum velocity of 10^4m/s, calculate the frequency of incident radiation on metal.
(Given me = 9.1×10^{-31} kg h=6.62×10^{-34}js)

15 A radioactive source decayed to $\left(\frac{1}{128}\right)^{th}$ of its initial activity after 50 days. What is its half-life.

16. An electric lamp is rated as 220V-100W. What is its electric resistance? What power does it consume if it is used in a circuit of 110V

17. What force is required a wire 7m long and 2mm in diameter is extended by 1mm? (Y=2×10^{11} N/m²)

18. Two charges 1μc and 2μc are placed at the corners A and B of an equilateral triangle ABC of side 2m. Calculate the electric field at C.

19. Calculate the velocity of sound in air at 27°c if density of air at STP is 1.29 kg/m³, γ=1.4.

20. A battery of emf 4 volt and internal resistance 2Ω is joined to a resistor of 8Ω. Calculate the current and terminal potential difference across the resistor.

Good Luck !

Council for Technical Education and Vocational Train..

Office of the Controller of Examinations

Sanothimi, Bhaktapur

Regular/Back Exam-2079, Falgun/Chaitra

Program:	**Diploma in Engineering ALL**	**Full Marks: 60**
Year/Part:	**I/II (Old + Very Old Course)**	**Pass Marks: 24**
Subject:	**Physics II**	**Time: 3 hrs**

Candidates are required to give the

The figures in the margin indicate fu

Group 'A' (Long Question)

Attempt Any Four questions. [4x6=24]

1. Define electric potential. Find the expression for it.
2. State Biot and Savart law. Use this law to find the magnetic field due to straight current carrying conductor.
3. State Bohr's postulates and derive the expression for the energy of electron in n^{th} orbit.
4. What are the laws of Radioactive disintegration Prove $N = Noe^{-\lambda t}$ for decay equation, where symbols have their usual meanings.
5. What are coherent sources of light show that fringe width are equal for bright and dark fringes in Young's double slit experiment.

Group 'B' (Short Question)

Attempt Any Four questions. [4x4=16]

6. Find the capacitance of a parallel plate capacitor.
7. State and explain Faraday's law of electromagnetic induction.
8. What is wheatstone bridge? Obtain the balancing condition of wheatshone bridge using Kirchhoff's law.
9. Define surface tension. Derive an expression to calculate surface tension of liquid by capillary rise method.
10. Differentiate between p-type and N-type semiconductor
11. Find the impedance of LR circuit.

Cont.....

Group 'C' (Numerical Problems)

Attempt Any Four questions. [5x4=20]

12. Two charge of 2μc and 10c are located at two corners of an equilateral triangle of side 10cm. Find electric field intensity at third corner of the triangle.
13. Two resistors for 1200Ω and 800Ω are connected in series with battery of emf 24v and negligible internal resistance. A Voltmeter of resistance 600Ω is now connected across 800Ωresistor. Find potential difference recorded by voltmeter.
14. A Circular coil of radius 2cm and carrying current 10mA. Find the magnetic field at its centre. ($\mu 0 = 4\pi \times 10^{-7}\ N/A^2$)
15. One Junction of thermocouple is at 0°c and the other at θ°c. The thermos emf (in volts) is given by $E = 20 \times 10^{-6} - 0.02 \times 10^{-6}\theta^2$. Find the temperature and maximum value of emf.
16. Find the refractive index of a medium having angle of polarization 30°.
17. Find the force required to stretch a wire of length 10m and diameter 4mm by 2mm? ($Y = 2 \times 10^{"}N/m^2$)
18. Find the temperature at which velocity of sound is double than at 10°c.

Good Luck !

Council for Technical Education and Vocational Training

Office of the Controller of Examinations

Sanothimi, Bhaktapur

Regular/Back Exam-2078, Magh/Falgun (Scholarship+Regular)

Program: Diploma in Engineering ALL | **Full Marks: 60**

Year/Part: I/II (New + Old Course) | **Pass Marks: 24**

Subject: Physics II | **Time: 3 hrs**

Candidates are required to
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Group 'A'

Attempt Any Four questions. [4x6=24]

1. Define electric potential and intensity at a point due to a charge Obtain an expression for the potential difference between two points r_1 and r_2 from charge +Q.
2. Describe the Wheastone bridge circuit and deduce the condition for balance using Kirchhoff's law.
3. State Bio Savart's law. Use this law to find the magnetic field at a point due to current carrying long straight conductor.
4. Explain, why it is not possible to have interference with two head light of a motor car. Describe young's double slit experiment for the measurement of wavelength of monochromatic source of light.
5. Define work function and stopping potential. Derive Einstein's Photo electric equation.
6. State Bohr's postulates and hence derive expression for the energy of electron in n^{th} orbit of hydrogen atom.

Group 'B'

Attempt Any Four questions. [4x3=12]

7. Derive an expression for energy stored in a capacitor.
8. What is galvanometer? How is a galvanometer converted into Ammeter?
9. State and explain Lenz's law.
10. Explain the use of PN diodes as Half wave rectifier.
11. Write Newton's formula for velocity of sound in air. What correction was applied by Laplace and why?

Cont.....

12 State and prove Brewster's law.

Group 'C'

Attempt <u>Any Six</u> questions. [6x4=24]

13. Three charges of $3x10^{-9}c$, $-3x10^{-9}c$ and $1.5x10^{-9}c$ are placed in air at the corners A, B and C of an equilateral triangle ABC having side 5cm. Find the force acting on the charge $1.5x10^{-9}c$.

14 A metallic wire has a diameter of 4.12mm. When the current in the wire in 8.0 A, the drift velocity of electron is $5.40x10^{-5}$ m/s. What is the density of free electrons in the metal?

15. A 40Ω resistance, 3mH inductor and 2μf capacitor are connected in series to a 110V, 50Hz a.c. source. Calculate the value of current in the circuit.

16. Find the force and energy density when 2m long and 3mm thick wire is extended by 1.4mm (Young's modulus of wire is $2x10^{11}$ N m^{-2}).

17 Find the temperature at which velocity of sound is double to the velocity of sound at N.T.P.

18. A capillary tube of 0.3cm diameter is placed vertically inside a liquid of density 800 kg/m^3, surface tension $5x10^{-4}$ N/m and angle of contact 30°. Calculate to which the liquid rises in the capillary tube.

19. Light of wave length 6000Å falls on a photosensitive plate of work function 1.9 eV. Find i) Kinetic energy of the photo electron emitted and ii) Stopping potential. ($h=6.62x10^{-34}$Js)

20. The half-life of $_{92}U^{238}$ is $4.5x10^9$ years. Calculate the activity of 1 gm sample of $_{92}U^{238}$.

Good Luck !

Council for Technical Education and Vocational Training

Office of the Controller of Examinations

Sanothimi, Bhaktapur

Regular/Back Exam-2077, Chaitra

Program:	**Diploma in Engineering All**	**Full Marks: 60**
Year/Part:	**I/II (New+Old Course)**	**Pass Marks: 24**
Subject:	**Engineering Physics II**	**Time: 3 hrs**

Candidates are required to
The figures in the margin in

Group "A"

Attempt Any Four questions. [4x6=24]

1 Define electric potential at a point. Derived an expression for potential at a point due to a point charge.

2 What is Wheatstone bridge? Describe its balanced condition using Kirchhoff's low.

3 Write Newton's formula for velocity of sound in air and explain how Laplace corrected it?

4. State Bohr's postulates of hydrogen atom. Derive an expression for the energy of an electron in the n^{th} orbit of hydrogen atom.

5 Define stress and strain. Derived an expression for energy stored in stretched wire. Also find the energy density.

6 What is photoelectric effect? Discuss Einstein's photoelectric equation.

Group "B"

Attempt Any Four questions. [4x3=12]

7. How will you convert a galvanometer into an ammeter?

8 State and explain Faradays laws of electrolysis.

9. Discuss the various modes of vibration in closed organ pipe.

10. What is X-ray? What are the importance properties of X-rays?

11. Define semiconductor. Differentiate between intrinsic and extrinsic semiconductors.

Cont.....

12. Differentiate between interference and polarization of light.

Group "B"

Attempt Any Six questions. [6x4=24]

13. A constant voltage a.c. generator of 20V, 50Hz is connected with a resistor of resistance 2.0Ω, a coil of inductance 5.0H and a capacitor of capacitance 2.0μF. Calculate the current flowing through on circuit.
14. A battery of Emf 24V and internal resistance 'r' is connected to a circuit having two parallel resistance of 3Ω and 6Ω are series with 8Ω resistance. Current flowing in 3Ω resistor is 0.8A. Calculate the current in 6Ω resistance, internal resistance and p.d. of battery.
15. The critical angle of glass is 42°. What's the polarizing angle?
16. Find the half-life period of radioactive material if its activity has decayed to $1/128^{th}$ of its initial activity after 50 days.
17. An electron is revolving in a uniform magnetic field of strength 1.5×10^{-2}T. The radius of circular path is 1.2×10^{-2}m. Through what potential difference was the electron initially accelerated from rest? [$^{e}/_{m}$ for electron $= 1.76 \times 10^{11}$c/kg].
18. Find the height to which water will rise in capillary tube of 1.4mm diameter, surface tension of water is7.2×10^{-2}N/m and angle of contact is 10°.
19. Two capacitors of capacitance $4\mu F$ and 12μF respectively are connected in series and the combination connected momentarily across a 200V battery. The charged capacitors are now isolated and connected in parallel, similar charged plates connected together. What would be the common potential difference on the capacitor.
20. Velocity of sound in air at 0^{-c} is 332m/s. Find the change in velocity per degree raise in temp.

Good Luck !

Council for Technical Education and Vocational Training

Office of the Controller of Examinations

Sanothimi, Bhaktapur

Regular/Back Exam-2076, Shrawan/Bhadra

Program: Diploma in Civil/ DAE/DEE/DAE/DME/ Ref.A/C /DIT/ DCE/ DEEX/ DEX/ DGE/ Architecture/Hydro Engineering — **Full Marks: 60**

Year/Part: I/II (Old+New Course) — **Pass Marks: 24**

Subject: Engineering Physics-II — **Time: 3 hrs**

Candidates are required to gi
practicable. The figures in the

Group - "A"

Attempt Any Four Questions. [4 x 6 =24]

1. Define electric potential and derive the expression for potential due to point charge.
2. What is wheatstone bridge? Using Kirchoff's law, derive the principle of wheatstone bridge.
3. Find the impedance of LCR circuit in series.
4. Describe Young's double slits experiment for the interference of light and show that width of bright and dark fringes are the same.
5. What are Bohr's postulates of hydrogen atom? Derive an expression for the radius of Bohr's orbit.
6. What do you mean by elastic limit? Derive an expression for the energy stored in a stretched wire.

Group "B"

Attempt Any Four Questions. [4x3=12]

7. Derive an expression for the force experienced by a conductor carrying current when placed in a uniform magnetic field.
8. How a galvanometer is converted into an ammeter?
9. Obtain an expression of viscous force from Newton's law for viscosity.
10. What happens to the frequency of tranverse vibration of a stretched string if its tension is halved and the area of cross-section of the string is doubled?

Contd.....

11. Discuss how the semiconductor diodes are used as a full-wave rectifier.

12. State and prove Brewster's Law.

Group - "C"

Attempt Any Six Questions. [6x4=24]

13 Calculate the value of two equal charges if they repel one another with a force on 0.1N when situated 50cm apart in vaccum. What would be the distance between them if they are placed in an insulating medium of dielectric constant 10? (ϵ_0=8.85x10^{-12} C^{2}N^{-1}m^{-2})

14. A copper wire has a diameter of 1.02mm and carries a constant current of 1.67A. If the density of free electrons in copper is 8.5x10^{28}/m^3, Calculate the current density & the drift velocity of the electron.

15. A horizontal wire of length 5cm and carrying a current of 2A, is placed in the middle of a along solenoid at right angles to its axis. The solenoid has 1000 turns per meter and carries a steady current I. Calculate I if the force on the wire is equal to (10^{-4}N. $\mu_0 = 4\pi x10^{-7}$HM^{-1})

16. At what temperature the velocity of sound is double of the velocity of sound at 27°c?

17. Light of wave length 4x10^{-7}m falls on a sodium surface. What is the maximum energy of emitted electron in eV. (The work function of sodium is 2.3eV, h=6.62x10^{-34} JS, C =3x10^{8}m/s e = •1.6x10^{-19}C)

18. If the half life period of a radioactive substance is 2 days, after how many days will $\frac{1}{64}$ *th* part of the substance be left behind?

19 Calculate the binding energy per nuclear for a helium nucleus. Give that mass of helium nucleus=4.001509 amu, mass of proton=1 007277 amu and mass of neutron =1.008666 amu.

20 A capillary tube of 0.3m diameter is placed vertically inside a liquid of density 800 kg/m^3, surface Tension 5x10^{-4}Nm^{-1} and angle of contact 30°. Calculate the height to which the liquid rises in the capillary tube.

Good Luck!

Council for Technical Education and Vocational Training
Office of the Controller of Examinations
Sanothimi, Bhaktapur

Regular/ Back 2075 Shrawan / Bhadra

Program: Engineering All **Full Marks: 60**

Year/ Part: I/II (Old + New course) **Pass Marks: 24**

Subject: Physics II **Time: 3 hrs.**

Candidates are required ar as practicable. The f

Group A

Attempt Any Four Questions.[4x6]

1. Define capacitor and capacitance of a capacitor. Describe an expression for energy stored by a charged capacitor.
2. What is principle of potentiometer? Explain how would you use it to determine the internal resistance of call.
3. What is impedance? Find the impedance in LCR circuit when a.c. pass through its combination.
4. What are postulates of Bohr's atomic model for hydrogen atom? Derive an expression for total energy of electron in n^{th} orbit of H- atom
5. State stoke's law of viscosity. Derive an expression for the co-efficient of viscosity of viscous liquid by using stoke's method.
6. What do you mean by interference of light? Explain young's theory of interference fringes and show that widths of both bright and dark fringes are of same width.

Group B

Attempt Any Four Questions.[4x3]

7. State and explain coulomb's law in electrostatics.
8. Discuss the mechanism of metallic conduction. Derive $J = \eta e v_d$, Where J is current density, e is electronic charge and v_d is drift velocity.
9. Calculate the magnetic force experienced by a charge moving inside magnetic field.
10. Derive the Newton's formula for the velocity of sound in air and explain why it was corrected by Laplace?

Contd.....

11. What is elasticity? Prove that energy density in equal to half the product of stress and strain.
12. What is semiconductor? Explain the use of PN diode as a full wave rectifier.

Group C

Attempt Any Six Questions.[6x4]

13. Point charge having values +5μc, +10μc and -10μc are placed in air at corners A,B and C of an equilateral trangle ABC having each side equal to 5 cm. Find the resultant force on charge at A.
14. Two resistors of 1200Ω and 800Ω are connected in series with a battery of emf 24v and negligible internal resistance. A voltmeter of resistance 600Ω in now connected across 800Ω resistor. Find Potential Different (PD) recoded by the voltmeter.
15. What is the magnetic field intensity at center of a circular coil of 100 turn and radius 2.5 cm carrying a current of 10A.?
16. A capillary tube of inner radius 2.5mm is dipped in a liquid of density 13.6×10^{3} kg/m^{3}, surface tension 645 dyne/cm and angle of contact 120°. Find the depression or elevation in the tube.
17. The critical angle for a substance is 45°. Find refractive index and polarizing angle.
18. The density of air at s.t.p. is 1.293 kgm^{-3}. Find its velocity at s.t.p and 27°c (γ for air = 1.4)
19. Work function of molybdenum is 5eV. If ultraviolet light of wave length 1000 A^{0} falls upon it, Find maximum velocity of ejected electron. (h = 6.62×10^{-34}Js. E=1.6×10^{-19}c, me = 9.1×10^{-31} kg)
20. At certain instant a piece of radioactive material contained 10^{12} atoms. The half-life of the material is 15 days calculate the rate of decay after 30 days have elapsed.

Good luck !

Council for Technical Education and Vocational Training

Office of the Controller of Examinations

Sanothimi, Bhaktapur

Regular/Back Exam-2074, Shrawan/Bhadra

Program: Diploma in Mechanical/Automobile/IT/Computer/Electrical/E&E/Electronics/Geomatics/Civil/Architecture/

Full Marks: 60

Year/Part: I/II [Old + New Course]

Pass Marks: 24

Subject: **Physics II**

Time: 3:00 *hrs*

Candidates are required to g
acticable. The figures in th

Group "A"

Attempt **Any Four** Questions

1. What is electrical potential? Derive an expression for electrical potential due to a point charge. [1+5=6]
2. What is electric current? State and verify ohm's law. [1+5=6]
3. State and explain Biot-Savart's law. Use this law to find magnetic field at the centre of a current carrying circular coil. [2+4=6]
4. Define interference of light. Derive an expression for fringe width in young's double slit experiment. [1+5=6]
5. State and explain Hook's law. Derive an expression for energy stored in a stretched wire. [2+4=6]
6. What is radio-activity? State law of radio-active disintegration and show that $N=N^{o}e^{-\lambda t}$ where the symbols carry their usual meanings. [1+5=6]

Group "B"

Attempt **Any Four** Questions

7. Derive capacitance of a parallel plate capacitor. [3]
8. Derive an expression for the force on moving charge inside a magnetic field. [3]
9. State and explain Faraday's law of electrolysis. [3]

Contd....

10. Derive Newton's formula for velocity of sound in air. [3]

11. Define stream line and turbulent flow with example. [3]

12. What are the Bohr's postulates of H-atom? [3]

Group "C"

Attempt **Any Six** Questions

13. Assuming earth to be an isolated conducting sphere of radius 6400Km. What is the capacitance of the earth. [4]

14. The emf of a battery A is balanced by length 75 cm a potentiometer wire. The emf of a standard cell, 1.02 V. is balanced by the length of 50 cm. What is the emf of A? [4]

15. Calculate the frequency at which the inductive reactance of 0.7 H inductor is 220 Ω. [4]

16. Calculate the velocity of sound in a gas in which two waves of wave length 1 m and 1.01m produce 4 beats/sec. [4]

17. How high does water rise in a capillary tube of internal radius 0.3mm if the surface tension of water is $7.2x10^{-2}\,Nm^{-1}$? [4]

$(Take\ g = 10ms^{-2} and\ \delta = 1000\,Kgm^{-3})$

18. An electron having 500 ev of energy moves at right angle to uniform magnetic flux density of $20x10^{-3}$ T. Find the radius of its circular orbit. [4]

19. Calculate the work function of sodium in electron volt given that the threshold wave length is 6800A° and $h=6.625x10^{-34}$ js. [4]

Good Luck!

Council for Technical Education and Vocational Training

Office of the Controller of Examinations

Sanothimi, Bhaktapur

Regular/Back Exam-2073 Bhadra/Ashwin

Program: Diploma in Civil/Architecture/Mechanical/ Automobile/ Information Technology/ Computer/ Electrical/ Electrical & Electronics /Electronics/ Geomatics/Engineering — **Full Mark: 60**

Year/Part: I/II (New+Old Course) — **Pass Mark:24**

Subject: Physics II — *Time: 3 hrs.*

Candidates are required to ... practicable. The figures in th...

Group "A"

Attempt Any Four Question **(4X6=24)**

1. Define electric potential. Derive an expression for electric potential at a point with necessary diagram. [6]
2. What is wheat stone bridge? Describe its balanced condition using Kirchhoff's law. [6]
3. State and explain Biot-Savart's law. Use this law to find magnetic field at a point due to a long straight conductor. [6]
4. Write down the factors on which the velocity of sound in air depends with necessary explanation. [6]
5. Define surface tension. Find an expression to calculate surface tension of a liquid by capillary rise method. [6]
6. What is photoelectric effect? Derive Einstein's photoelectric equation. [6]

Group "B"

Attempt Any Four Question **(4X3=12)**

7. Derive an expression for energy stored in a capacitor. [3]
8. State Ohm's law. Verify it experimentally. [3]
9. Explain electrical resonance in LCR series circuit. [3]
10. Differentiate between interference and diffraction. [3]
11. How is coefficient of Viscosity of a given liquid determined by stoke's method. [3]
12. Explain the working of full wave rectifier. [3]

Group "C"

Attempt Any Six Question **(6x4=24)**

13. A thundercloud and earth can be regarded as a parallel plate capacitor. Taking the area of thundercloud to be 60 km^2, its height form the surface of earth of 1km and its [4]

potential is 10 KV, calculate (i) Capacitance (ii) Energy stored. (Permittivity of vacuum is $8.85 \times 10^{-12} c^2 N^{-1} m^{-2}$)

14. A moving coil meter has a resistance of 25Ω and indicates full scale deflection when current of 4mA flows through it. How could this meter be converted [4]
(i) to a voltmeter with (0-3v) range.
(ii) to an ammeter with (0-1A) range.

15. What is the impedance of a series combination of a resistance of 1 KΩ and a capacitance of capacitor 2μF at a frequency of 50Hz. [4]

16. A wire of diameter 0.04 cm and density $8000 kgm^{-3}$ is under constant tension of 80N. "What length of this wire should be plucked to cause it to vibrate with fundamental frequency of 840 Hz? [4]

17. The critical angle of a transparent medium is 49°. What is the polarizing angle? [4]

18. A force of 25N is applied to the ends of a wire 3m long and produces extension of 0.25mm. if the diameter of wore is 2mm. calculate (i)stress on wire (ii) its strain (iii) value of young's Modules. [4]

19. An electron is revolving in a uniform magnetic field of strength 1.5×10^{-2} T. The radius of the circle describe is 1.2×10^{-2} m. Through what potential difference was the electron initially accelerated from rest? [4]
($\frac{e}{m}$ for electron = 1.76×10^{11} c kg^{-1})

20. A radioactive source has decayed $\frac{1}{128} th$ of its initial activity in 100 days. What is its half-life? [4]

Good Luck!

Council for Technical Education and Vocational Training
Office of the Controller of Examinations
Sanothimi, Bhaktapur
Regular/ Back Exam-2072, Bhadra/Ashwin

Program: Diploma in Civil/ Electrical / Electrical & Electronics/Electronics/ Mechanical/ Automobile/ Computer /IT/ Geomatics Engineering
(New Course)

Full Marks: 60
Pass Marks: 24

Year/Part: I/II

Time: 3 hrs

bject: Physics -II

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andidates are required to give their answers in their own words as far as practicable. The figures in the margin indicate full marks.

Group - "A"

Attempt (Any Four) Questions. [4 x 6 =24]

ice pail experiment and write its conclusion.

2. State Kirchhoff's law. Hence, use it to deduce the balanced condition of Wheatstone bridge.

3. What is impedance in LR circuit? Derive an expression for it.

4. Define interference of light. Describe Young's double slit experiment for the measurement of wavelengths of monochromatic source.

5. Define stress and strain. Establish the relation among energy density, stress and strain.

6. What is photoelectric effect? Derive Einstein's photoelectric equation.

Group "B"

Attempt (Any Four) Questions. [4 x 3 =12]

7. Define capacitor. Determine capacitance of a parallel plate capacitor.

8. State Joule's law of heating. Deduce an expression for heat developed in a wire by passage of an electric current.

9. Write Newton's formula for velocity of sound in air. Explain why this formula has to be modified by Laplace?

10. Differentiate between steam line flow and turbulent flow of liquid.

11. Show that the motion of electron is parabolic in electric field.

12. Explain the working of half wave rectifier.

Group - "C"

Attempt (Any Six) Questions. [6 x 4 =24]

13. A 10 μF capacitor is charged by a 220 V supply. It is then disconnected form the supply and connected to another uncharged 4 μF capacitor. Find (i) common potential
(ii) Energy lost by the first capacitor.

14. A galvanometer can bear maximum current of 4 m A and a resistance 5Ω. Find suitable resistance to convert it into.
(i) a voltmeter to measure 2v

placed in the uniform magnetic field of strength 0.2T perpendicularly. Calculate the current in the rod if force acting on it just balances its weight. ($g=9.8ms^{-2}$).

16. Calculate the velocity of sound in air at 27°c. (Density for air at $s.t.p. = 1.29\ kgm^{-3}$, $C_P = 1.02\ KJ\ Kg^{-1}\ K^{-1}$, $C_V = 0.72\ KJKg^{-1}\ K^{-1}$.

17. The refractive index of a certain substance is 1.6. Find critical angle and polarizing angle.

18. A wire of length 150cm and area of cross section $1mm^2$ is stretched by a weight of 3kg. Determine increase in length. (Young's Modulus of material of wire is $2x10^{11}\ Nm^{-2}$, $g = 9.8ms^{-2}$)

19. How long will it take to decay 20% of a radioactive substance if its half-life is 4 days?

20. The mass of nucleus of the isotope ${}_3Li^7$ is 7.014351 u. find its binding energy and binding energy per nucleon. (Mass of proton = 1.007275 u Mass of neutron = 1.008665 u, 1u = 931 Mev.)