Sub.Code : 210

## NEB - GRADE XII

## **Physics**

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

Time: 3 hrs.

#### Full Marks: 75

Pass Marks: 27(For partial students only)

## Group 'A'

1. Answer, in brief, any **four** questions.

- a) Two wires, one of copper and other of iron, have the same diameter and carry the same current. In which wire the drift velocity of the free electrons will be more ?
- b) Draw a circuit diagram of meter bridge to determine the resistance of a wire. Give the formula used.
- c) Mention any two factors on which thermo electric emf produced in thermocouple depends.
- d) How does the conduction of electricity in a metallic conductor differ from that in electrolyte ?
- e) When a charged particle moves in a magnetic field, does its kinetic energy always remain constant ? Explain.
- f) If the number of turns of a solenoid is doubled, keeping the other factors constant, how does the self inductance of the solenoid change ?
- 2. Answer, in brief, any **four** questions.
  - a) A discharge tube is filled with different gases turn by turn under the same pressure. Will the discharge occur for the same voltage across the electrodes ?
  - b) Draw a logic symbol and write a truth table for a two input NAND gate.
  - c) An electron and proton travel at the same speed. Which has the shorter wavelength ?
  - d) What are the units of activity of radioactive elements ?
  - e) Distinguish between leptons and quarks.
  - f) Explain the significance of Hubble's constant.

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4x2=8

4x2=8

### 210

3.	Answer, in brief, any <b>one</b> question.	2
	a) Distinguish between light waves and sound waves.	
	b) Whistle of an approaching train is shriller. Why?	
4.	Answer, in brief, any <b>one</b> question.	2
	a) State and explain Huygen's construction.	
	b) Diffraction of audible sound is easily observable, why?	
	Group 'B'	
5.	Answer any <b>three</b> questions.	3x4=12
	a) State and explain principle of potentiometer Describe with th	a haln af

- a) State and explain principle of potentiometer. Describe with the help of circuit diagram, the use of potentiometer to compare the emf of two primary cells.
- b) Derive an expression for the force acting between two parallel current carrying conductors and hence explain why two straight conductors carrying current in the same direction attract each other.
- c) Define relative permeability and susceptibility of a substance. Compare Para and ferro-magnetic materials on the basis of these quantities.
- d) Derive an expression for the impedance of an ac circuit containing a resistor, an inductor and a capacitor in series. Also, obtain an expression for the resonant frequency of the circuit.

#### 6. Answer any three questions.

3x4=12

4

4

- a) What is a zener diode ? With the help of circuit diagram, explain the use of zener diode as a voltage regulator.
- b) Describe the construction and working principle of He-Ne laser. Also write its important uses.
- c) Derive the relation,  $N = No e^{-\lambda t}$  for radioactive decay. Obtain the relation between disintegration constant and half life.
- d) What do you mean by energy crisis ? Discuss energy consumption scenario of Nepal.

7. Answer any **one** question.

- a) Explain why and how Laplace corrected the Newton's formula for the velocity of sound in air. Also, discuss the effect of temperature on the velocity of sound in a gas medium.
- b) What is intensity of sound ? Prove that intensity of sound is proportional to the square of amplitude of vibration for the given source of sound.
- 8. Answer any **one** question.
  - a) Describe Michelson's experimental method for the measurement of velocity of light with necessary theory.

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# (3)

b) What is polarization of light ? Discuss polarization by reflection and prove Brewster's law.

### Group 'C'

- 9. Answer any **two** numerical questions.
  - a) A heating coil is to be made from nichrome wire which will operate on 12 V supply and will have power 25 W. Calculate the length of nichrome wire needed if the cross sectional area of the wire is 10 mm<sup>2</sup> and the resistivity of the nichrome is  $10^{-6}\Omega$ m.
  - b) A solenoid is to be designed to produce a magnetic field of 0.027 T at its centre. It has radius 1.4 cm, length 40 cm and carries a maximum current of 12 A. Find the minimum number of turns the solenoid must have and total length of the wire required.
  - c) A conductor of length 2 m moves making an angle of 45° with the direction of uniform magnetic field 0.2 T with a velocity of 5 m/s. Calculate the induced emf in it.

#### 10. Answer any **two** numerical questions.

- a) An electron is accelerated through a potential difference of 20 KV and is then allowed to circulate at right angles to uniform magnetic field of 0.1 T. What is the radius of the path? ( $e/m = 1.8 \times 10^{11} \text{ c/kg}$ )
- b) Light of wavelength 600 nm falls on a photosensitive plate of work function 1.9 eV. Find the kinetic energy of photoelectrons emitted and stopping potential. ( $h = 6.62 \times 10^{-34}$  Js,  $c = 3 \times 10^8$  m/s,  $e = 1.6 \times 10^{-19}$  C)
- c) The energy liberated in the fission of a single atom of uranium-235 is  $3.2 \times 10^{-11}$  J. Calculate the power production corresponding to the fission of 2 gm of uranium per day. (Avogadro constant =  $6.023 \times 10^{23}$  /mol)
- 11. A steel wire of length 40 cm and diameter 0.025 cm vibrates transversely in resonance with a tube, open at both ends and of effective length 60 cm, when each is sounding its fundamental note. Find the tension in the wire if velocity of sound in air is 340 m/s and density of steel is 7800 kg/m<sup>3</sup>.
- 12. In double slit experiment, the slits are 0.3 mm apart and interference is observed on a screen placed at a distance of 90 cm from the slits. The second dark band is 0.3 cm from the central bright fringe. Calculate the wavelength of light used.

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2x4=8

2x4 = 8