

NEB - GRADE XII**2076 (2019)****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 (Only for partial students)

Group 'A'

1. Answer in brief, any **four** questions. 4x2=8
 - a) State the principle of potentiometer and write down its one application.
 - b) What is thermoelectric effect ?
 - c) Distinguish between ionic and electronic conduction.
 - d) An electron beam and a proton beam are moving parallel to each other in the beginning. Do they always maintain this status ? Justify your answer.
 - e) Define one ampere current in terms of force.
 - f) 220V A.C. is more danger than 220V D.C., why ?
2. Answer in brief, any **four** questions. 4x2=8
 - a) Why discharge does not take place at very low pressure ?
 - b) What do you mean by hole in a semiconductor ?
 - c) Which has more energy- a photon in the infrared or photon in the ultraviolet ? Give reasons.
 - d) All the radioactive series terminate at lead as their final product. Why ?
 - e) What do you mean by greenhouse effect ? Write its effects.
 - f) Does the universe have a centre ? Explain.
3. Answer in brief, any **one** question. 2
 - a) Can longitudinal wave be polarized ? Explain.
 - b) An empty vessel sounds more than a filled one when it is struck. Why ?
4. Answer in brief, any **one** question. 2
 - a) State Huygen's principle. Does it apply to sound wave in air ?
 - b) Differentiate unpolarized and polarized light. ©notes/anjal.com

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Group 'B'

5. Answer any **three** questions. 3x4=12
- a) What do you mean by shunt ? Describe its use in converting a galvanometer into an ammeter.
 - b) State Joule's law of heating and verify it experimentally.
 - c) State Biot and Savart law. Derive an expression for the magnetic field at a point due to a long straight conductor carrying current.
 - d) An alternating current passes through a circuit containing an inductor and a resistor in series. Derive expressions for the current flowing and phase relation between the current and the voltage.
6. Answer any **three** questions. 3x4=12
- a) What is quantization of charge ? Describe the theory of Millikan's oil drop experiment to determine the number of charges on an oil drop.
 - b) What is P-N junction diode ? Discuss its applications as full wave rectifier.
 - c) List out the laws of radioactive disintegration. Deduce the expression $N = N_0 e^{-\lambda t}$ where symbols have their usual meaning.
 - d) What are sources of energy ? Discuss global energy consumption pattern and demands.
7. Answer any **one** question. 4
- a) Does the propagation of sound wave cause change in thermodynamic condition of medium ? Derive Laplace formula of velocity of sound in air.
 - b) What is Doppler's effect ? Derive an expression for the apparent frequency received by a stationary observer when a source of sound is moving away from the observer.
8. Answer any **one** question. 4
- a) Describe Newton's ring experiment and derive expression for wavelength of light.
 - b) Describe Foucault's method of determining the speed of light.

Group 'C'

9. Answer any **two** numerical questions. 2x4=8
- Two resistors of resistance 1000Ω and 2000Ω are joined in series with a $100V$ supply. A voltmeter of internal resistance 4000Ω is connected to measure the potential difference across 1000Ω resistor. Calculate the reading shown by the voltmeter.
 - Two galvanometers, which are otherwise identical, are fitted with different coils. One has a coil of 50 turns and resistance 10Ω while the other has 500 turns and a resistance of 600Ω . What is the ratio of the deflection when each is connected in turns to a cell of e.m.f. $25V$ and internal resistance 50Ω ?
 - The magnetic flux passing perpendicular to the plane of coil is given by $\phi = 4t^2 + 5t + 2$ where ϕ is in weber and t is in second. Calculate the magnitude of instantaneous emf induced in the coil when $t = 2\text{sec}$.
10. Answer any **two** numerical questions. 2x4=8
- An ion for which the charge per unit mass is $4.40 \times 10^7 \text{ C/kg}$ has velocity of $3.52 \times 10^5 \text{ m/s}$ and moves in a circular orbit in a magnetic field of flux density $0.4T$. What will be the radius of this orbit?
 - Obtain the de Broglie wavelength of neutron of kinetic energy 150eV .
(mass of neutron = $1.675 \times 10^{-27} \text{ kg}$, Planck's constant = $6.6 \times 10^{-34} \text{ Js}$, $1\text{eV} = 1.6 \times 10^{-19} \text{ J}$)
 - Calculate the binding energy per nucleon of ${}_{26}^{56}\text{Fe}$. Atomic mass of ${}_{26}^{56}\text{Fe}$ is $55.9349u$ and that of ${}_1^1\text{H}$ is $1.00783u$. Mass of $\text{on}^1 = 1.00867u$ and $1u = 931 \text{ MeV}$.
11. A wire whose mass per unit length is 10^{-3} kg/m is stretched by a load of 4kg over the two bridges of a sonometer wire 1m apart. It is struck at its middle point, what would be the wavelength and frequency of its fundamental vibration? 4
12. How wide is the central diffraction peak on a screen 5m behind a 0.01mm slit illuminated by 500 nm light source? 3