NIAZI XII PHYSICS TARGET PAPER 2025

CLASS XII (SCIENCE GROUP)

Total Marks: 85
Time: 3 Hours

SECTION "A"

MULTIPLE CHOICE QUESTIONS (MCQs) (17 Marks)

Q.1. Choose the correct answer from the given option. Each carries 1 Mark.

1. Which of the following statements does not represent ohm's law?
   (a) current / potential difference = constant
   (b) potential difference / current = constant
   (c) potential difference = current × resistance
   (d) current = resistance × potential difference

2. In order to increase the range of an ammeter. The shunt resistance should be:
   (a) increased (b) decreased (c) kept constant (d) zero

3. Transistor is a device which has _____ terminals.
   (a) one (b) two (c) three (d) four

4. Geiger counter is a device to detect:
   (a) mass (b) momentum (c) charge (d) radiation

5. At constant temperature, the graph between V and 1/p is:
   (a) hyperbola (b) parabola (c) straight-line (d) ellipse

6. The photoelectrons emitted from a metal surface _____.
   (a) are all at rest
   (b) have the same kinetic energy
   (c) have the same momentum
   (d) have speeds varying from zero up to a certain maximum value

7. When we try to stop a very high photon it loses its identify and disintegration into an electron and a positron. This is called:
   (a) Pair production (b) Annihilation (c) X-rays production (d) Compton effect

8. The force acting on a charged particle projected into a magnetic field of induction 'B' is maximum when the angle between B and the velocity of the particle is:
   (a) 0° (b) 45° (c) 60° (d) 90°

9. In order to increase the number of electrons in photoelectric effect, _____ should be increased.
   (a) intensity of source of light (b) threshold frequency
   (c) velocity (d) K.E

10. Isobaric process is the process which takes place at constant:
    (a) pressure (b) volume (c) heat (d) area

11. According to Lenz law, the emf opposes the change that induces emf and it is therefore known as:

(a) forward emf (b) back emf (c) conventional emf (d) motional emf

12. _____ Transfers energy to and from its surroundings by the process of heating (or cooling) and the process of mechanical work.

(a) closed system (b) open system (c) both A and B (d) isolated system

13. When the temperature of source and sink of a heat engine become equal, the efficiency will be:

(a) zero (b) maximum (c) minimum (d) negative

14. The temperature at which the gases if they remain in gaseous state exert zero pressure and have zero volume is called:

(a) 1°C (b) 1°F (c) 1K (d) absolute zero

15. The amount of energy required to break the nucleus into its constituent particles is called

(a) mass defect (b) binding energy (c) ionization energy (d) ionization potential

16. The sun which is largest source of heat energy gets its energy by the process of:

(a) nuclear fusion (b) nuclear fission
(c) nuclear chain reaction (d) all of them

17. According to Bohr's theory of the hydrogen atom, the total energy of the hydrogen atom with its electron revolving in the nth stationary orbit is:

(a) proportional ton (b) proportional ton^2
(c) inversely proportional ton (d) inversely proportional ton^2

SECTION "B"

SHORT ANSWERS QUESTIONS (36 Marks)

Q.2. Answer any Nine (9) part questions from this section. Each carries 4 marks.

i) Give the construction and working of Wilson Cloud chamber.

ii) Find the binding energy and the packing fraction in MeV of $_{52}Te^{126}$ given that $m_p = 1.0078u$, $m_n = 1.0086u$, $m_{Te} = 125.9033u$ and $1u = 931.5MeV$.

iii) What is LASER? Discuss metastable state and population inversion in a lasing material.

iv) In a hydrogen atom an electron experiences transition from a state whose binding energy is $0.54eV$ to state whose excitation energy is $10.2eV$. ($R_H = 1.097\times10^7 m^{-1}$).

Calculate: (a) The quantum numbers of the two states.
(b) The wavelength of the photon emitted.

v) If the electron beams in a TV picture tube is accelerated by $10K$ volt. What will be the De-Broglie wavelength of an electron? ($h = 6.63\times10^{-34}JS$, $e = 1.6\times10^{-19}C$, $m = 9.11\times10^{-31}kg$)

vi) A $300V$ voltmeter has a total resistance of $20K\Omega$. What additional is required to convert it into a voltmeter reading up to a maximum of $600V$?

vii) A 50Ω resistor is required from a copper wire, $0.2mm$ in diameter. What is the length of the wire needed? ($\rho = 1.6\times10^{-8}\Omega$-$m$)

viii) A proton of mass $1.67\times10^{-27}kg$ and charge $1.6\times10^{-19}C$ is to be held motionless between two horizontal parallel plates. The potential difference applied between plates is 1.02×10^{-8} volts. Calculate the distance between plates.

ix) A cylinder of diameter 1.00 cm at 30°C is to be slid into a hole in a steel plate. The hole has a diameter of $0.99970cm$ at 30°C. To what temperature must the plate be heated?
($\propto$ for steel $= 1.1\times10^{-5}\ °C^{-1}$)

x) An iron core solenoid with 500 turns has a cross section of $5cm^2$. A current of 2.3 ampere passing through it produces a flux of $B = 0.53$ tesla. How large an EMF is induced in it, if the current is turned off in 0.1 sec? What is the self-inductance of the solenoid?

xi) With the help of a diagram, explain the working of a full wave rectifier.

xii) What do you understand by Thermal Expansion? What is the relation between coefficient of linear expansion & the coefficient of volume expansion? Derive the relation for the length of a rod at a given temperature t °C when L_o is its length at 0°C.

xiii) State ampere's law. Use it to derive the relation for the magnetic field of induction B at my point inside a current-carrying toroid.

xiv) Define resistance and write down its units. How does the resistance of a conductor depend upon temperature? Derive the equation for the resistance at a given temperature.

xv) An emf of $45mv$ is induced in a coil of 500 turns. When the current in a neighboring coil changes from $15A$ to 4A in 0.2 seconds.
(a) What is the mutual inductance of the coils?
(b) What is the rate of change of flux in the secondary coil?

SECTION "C"

DESCRIPTIVE ANSWER QUESTIONS (32 Marks)

Note: Answer any Two (2) questions from this section. Each carries 16 marks.

Q.3. (a) Using the First Law of Thermodynamics in two isotherms of an ideal gas at different temperatures, show that $C_P - C_V = R$.

OR

What is Carnot engine? Describe its construction, working and derive an expression for its efficiency.

(b) Give the construction and working of a moving coil galvanometer. Prove that the deflection is directly proportional to the current in radial magnetic field.

OR

What is Nuclear Fission? Explain fission chain reaction.

Q.4. (a) What is a perfect black body? What are Max Planck's assumptions to explain black body radiation? Also write Planck's law of black body radiation.

OR

Explain Compton's effect. Derive an expression of shift in wavelength of scattered photon.

(b) What is meant by the capacitance of a capacitor? Derive an expression for the capacitance of a parallel plate capacitor in the presence of air is dielectric between plates.

OR

State Gausses Law derive an expression for electric intensity at a point close to a thin infinite sheet of positive charge.

Q.5. (a) Draw a labeled diagram of an A.C generator and derive expression for the alternating voltage produced.

OR

State and explain the postulates of the special theory of relativity.

(b) Differentiate between electromotive force and terminal potential difference of a battery when an external resistance is connected and not connected across it.

OR

Give the postulates of Bohr's atomic theory. Derive expression for the radius of n^{th} orbit of hydrogen atom.