BOARD OF INTERMEDIATE EDUCATION, KARACHI
H.S.C. Annual Examinations 2021

(MODEL QUESTION PAPER)

PHYSICS PAPER-II
(Science Group)

Total Duration: 02 Hours   **SECTION "A" (M.C.Qs)**   **Max Marks: 42**

NOTE:
    i)   This section consist of 42 part questions and all are to be answered each question carries one mark.

    ii)   Do not copy the part questions in your answer book. Write only the answer in full against the proper number of the question and its part.

    iii)   The code of your question paper is to be written <u>in bold letters</u> in the beginning of the answer script.

    iv)   The use of scientific calculator is allowed. All notations are used in their usual meanings.

1.   **Select the most appropriate answer for each from the given options:**

i)   **Which of the following statements does not represent ohm's law?**
* current / potential difference = constant   * potential difference / current = constant
* potential difference = current x resistance * current = resistance x potential difference

ii)   **Three resistors 2 ohm , 3 ohm and 4 ohm are connected so that the equivalent resistance is 9 ohm . The resistors are connected:**
* all in series   * all in parallel
* 2 Ohm and 3 Ohm in parallel and the combination in series with 4 Ohm
* 2 Ohm and 3 Ohm in series and the combination in parallel to 4 Ohm

iii)   **In order to increase the range of an ammeter. The shunt resistance should be:**
* Increased   * Decreased   * Kept constant   * zero

iv)   **The mass of fissionable material needed for self sustaining chain reaction is called the:**
* Atomic mass   * Fermi mass   * Critical mass   * Sub-critical mass

v)   **The working of all electrical instruments depends upon _____ effect of current.**
* Magnetic   * Chemical   * Electromagnetic   * Electrostatic

vi)   **For accurate measurement of current through a circuit the resistance of ammeter should be:**
* Slightly large compared to the circuit resistance
* Very small compared to the resistance
* Neither too small nor too large
* Very large compared to the circuit resistance

vii) **Amplitude Modulation in a signal means:**
   * Decrease in the time period of signal   * The increase in the vertical width of a signal
   * The increase un the horizontal width of signal   * All of them

viii) **Transistor is a device which has _____ terminals.**
   * One   * Two   * Three   * Four

ix) **Geiger counter is a device to detect:**
   * Mass   * Momentum   * Charge   * Radiation

x) **A Wilson cloud chamber uses:**
   * Super heated liquid   * Vapour's   * Supersaturated vapour   * Saturated vapour

xi) **At constant temperature, the graph between V and 1/p is:**
   * Hyperbola   * Parabola   * Straight line   * Ellipse

xii) **A set of coordinate axes with respect to which measurements are made is called:**
   * frame of reference   * inertial frame of reference
   * non-inertial frame of reference * Cartesian co-ordinate frame of reference

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

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

xv) **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:**
   * 0   * 90   * 60   * 45

xvi) **What is the capacity of a capacitor when a charge of one Coulomb raises its potential by one volt?**
   * 1 Farad   * 2 Farad   * – 2 Farad   * $\frac{1}{2}$ Farad

xvii) **In order to increase the number of electrons in photo electric effect, _____ should be increased**
   * Intensity of source of light   * Threshold frequency   * Velocity   * K. E

xviii) **Isobaric process is the process which takes place at constant:**

| * Pressure | * Volume | * Heat | * Area |

xix) Capacitors of capacitance upto 10µ F are usually made of alternate layers of aluminum foil and:

   * Tin   * Paper   * Waxed paper   * Carbon

xx) A current of 1.6 Amperes is drawn from a battery for 10 minutes. How much charge flows through the circuit in this time?

   * 96 C   * 960 C   * 69 C   * 690 C

xxi) According to Lenz law, the emf opposes the change that induces e.m.f. and it is therefore known as:

   * Forward emf   * Back emf   * conventional emf   * Motional emf

xxii) Transistor can never be used as a/an:

   * rectifier   * Amplifier   * Switcher   * Modulator

xxiii) _____ transfers energy to and from its surroundings by the process of heating (or cooling) and the process of mechanical work

   * closed system   * Open system   * Both a & b   * Isolated system

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

   * Zero   * Maximum   * Minimum   * Negative

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

   * 1°C   * 1°F   * 1K   * Absolute Zero

xxvi) Gas in a closed container at temperature of 27 C has pressure P. what will be the pressure if temperature is raised to 127 C?

   * 4 P / 3   * 27 / 127 P   * 3 P / 4   * 127 P / 27

xxvii) The average energy release per fission of U ^{235} is about:

   * 200 M eV   * 2 M eV   * 2 K eV   * 2 Ev

xxviii) The amount of energy required to break the nucleus into its constituent particles is called

   * Mass defect   * binding energy   * ionization energy   * ionization potential)

xxix) The sun which is largest source of heat energy gets its energy by the process of:

   * Nuclear Fusion   * Nuclear Fission   * Nuclear Chain reaction * all of them

xxx) **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:**

* proportional to n   * proportional to n^2

* inversely proportional to n   * inversely proportional to n^2

xxxi) **X-rays are a part of electromagnetic spectrum and are characterized by frequencies higher than those of:**

* visible radiation   * infrared radiation

* ultra violet radiations   * γ – radiations

xxxii) **The terminal voltage of a battery is observed to fall when the battery supplies a current to an internal resistor.**

* The battery's e.m.f. and its internal resistance.   * The battery's e.m.f. and the current.

* The current and the battery's internal resistance.   * The current and the external resistance.

xxxiii) **A spherical shape charged rubber balloon whose charge is distributed uniformly over the surface has Electric intensity inside the charged rubber balloon is:**

* Zero   * Infinite   * Same as outside   * More than outside charge

xxxiv) **An electron is moving along the axis of the solenoid carrying a current.**

* The force acts radially inwards   * The force acts radially outwards

* The force acts in the direction of motion   * No force acts.

xxxv) **The picture on a TV screen become distorted when a magnet is bought near the screen, because :**

* The beam of electron will not be deflected due to the magnetic field

* The beam of electron will be deflected due to the magnetic field

* The beam of electron will stop in electron gun

* Magnetic field will destroy the coating of screen

xxxvi) **The path along which a unit positive charge moves in an electric field is called:**

* Direction of charge   * path of charge

* An electric line of force   * Magnetic line of force

xxxvii) **The magnitude of drift velocity is of the order of:**

* 0.1 m/s   * 0.01 m/s   * 0.001 m/s   * 0.0001 m/s

xxxviii) **The charge moving perpendicular to the magnetic field 'B' with a certain velocity 'v' experiences**

* No force   * Maximum force   * Minimum Force   * Centripetal force

xxxix) **Boyle's law is an application of:**

* Isobaric process   * Isothermal process   * Isochoric process   * Adiabatic process

xL) **According to Bohr's theory of hydrogen atom, an electron can revolve around a proton indefinitely if its path is**
* a perfect circle of any radius   * a circle of constantly decreasing radius
* a circle of an allowed radius   * an ellipse

xLi) **Gieger Muller counter contains**
* Argon and Alcohol   * Alcohol Only
* ions   * super cooled water vapour

xLii) **Real gases obey general gas eq. at**
* low pressure high temp   * low temp high pressure
* low pressure low temp   * high pressure high temp

Max.Marks:43   **(25 Marks)**

SECTION B (SHORT-ANSWER QUESTION)

NOTE: Attempt any Five part questions from this section. All questions carry equal marks. The use of scientific calculator is allowed. All notations are used in their usual meanings. Draw diagram where necessary.

Q 2 (i). A galvanometer of resistance 50 Ω gives full scale deflection with a current of 5 mA resistance
of 0.1 M Ω is connected in series to convert it into volt meter. Find the range of voltmeter obtained.

(ii) An iron ball has a diameter of 5cm and is 0.01mm too large to pass through the hole in a brass plate when the ball and the plate are at a temperature of 30 ℃. At what temperature, will the ball just pass through the hole. For iron $\alpha = 1.2 \times 10^{-5} C^{-1}$, For Brass $\alpha = 1.9 \times 10^{-5} C^{-1}$

(iii) Give the principle, construction and working of Geiger Counter.

(iv) Determine the longest and shortest wavelength for Balmer's series ($R_H = 10967800$ m)

(v) What will be the relativistic speed and momentum of the particle if relativistic mass of the particle will be doubled than the rest mass?

(vi) A building has 5 electric bulbs of 100 watts each, 10 fans of 60 watts each, 10 tube lights of 40 watts each and one electric iron of 1000 watts. Find the number of units used in 30 days if all the appliances are used 4 hours a day. Find also the expenditure if the electric rate per unit is 90 paisa.

(vii) Explain working of transistor as an amplifier

(viii) State Boyle's Law and Charles's laws. Derive General Gas Equation

(ix) What is magnetic induction? State Faraday's law of electromagnetic induction and explain Lenz's law with the help of an experiment

SECTION C (DETAILED ANSWER QUESTIONS)   (18 Marks)

NOTE: Attempt any **One** question from this section. Draw diagrams, where necessary. The use of scientific calculator is allowed. All notations are used in their usual meanings.

Q3)   a) State the basic postulates of Bohar's atomic theory. Derive an expression for the nth radius of hydrogen atom.   (06)

b) State Gauss's law. Derive an expression for the electric intensity due to a charge sheet of infinite extent at a point.   (06)

c) Derive an expression for the force on a current carrying conductor in a uniform magnetic field   (06)

Q4)   a)   Describe Carnot's cycle. Establish the relation for its efficiency.   (06)

b)   Describe Compton's Effect. Derive the formula for Compton's shift   (06)

c)   How resistance of a conductor affected by its temperature. Derive related relation.
                                                                                                              (06)