ZIAUDDIN UNIVERSITY
EXAMINATION BOARD

Total Time 3.5 hours
Total Marks: 100

Class: XII **MODEL PAPER EXAMINATION 2025**
Time Allowed: 35 minutes **SUBJECT: PHYSICS**
Q1: **SECTION "A"** **Marks: 17**

Note: Attempt **All** questions from this section. Each question carries **ONE** mark.

1. A practical application of mutual induction is:
   A. AC generator B. Transformer C. Rectifier D. Dynamo
2. This particle has no charge, no rest mass, and can interact with all charged and neutral particles:
   A. Alpha particles B. Neutron C. Photon D. Positron
3. The ratio of molar specific heat at constant pressure to molar specific heat at constant volume is:
   A. Less than one B. Greater than one C. Equal to one D. Equal to zero
4. In the phenomenon of the photoelectric effect, if the frequency of incident radiation increases, the required stopping potential:
   A. Decreases B. Does not change C. Increases D. None of these
5. The number of energy levels required for laser production is:
   A. 2 B. 3 C. 4 D. 4
6. Resistors of 3Ω, 5Ω and 7Ω are connected in parallel. If the P.D. across 5Ωresistor is 6V, the P.D. across the 7Ω resistor is:
   A. 3V B. 6V C. 7V D. 8V
7. The Balmer series of the hydrogen atom spectrum lies in the:
   A. Infrared B. Ultraviolet C. Visible D. Radio wave
8. The most suitable material for making the core of an electromagnet is:
   A. Air B. Steel C. Copper and nickel alloy D. Soft iron
9. A voltmeter is ideal if its internal resistance is:
   A. Very large B. Large C. Small D. Infinite
10. A transformer steps down:
    A. Energy B. AC only C. DC only D. Both AC & DC
11. The section of a transistor that supplies charge carriers (electrons or holes) is called the:
    A. Collector B. Base C. Emitter D. Junction
12. A 2.2 kW electric iron operates at 220 volts; the current it draws is:
    A. 20 Ampere B. 22 Ampere C. 10 Ampere D. 5 Ampere
13. Lenz's law is a direct consequence of:
    A. Ohm's law B. Coulomb's law C. Faraday's law D. Law of conservation of energy
14. A frame of reference is called inertial if it is:
    A. Rotating B. Accelerating C. Vibrating D. Moving with uniform velocity
15. An ammeter is used to measure:
    A. Current B. Potential difference C. Resistance D. Capacitance
16. If the current passing through a wire in a uniform magnetic field is doubled, the force acting on the wire will become:
    A. Half B. Double C. Four times D. Six times
17. De Broglie's wavelength is given as:
    A. $\lambda = \frac{mv}{h}$ B. $\lambda = \frac{h}{mv^2}$ C. $\lambda = \frac{h}{mv}$ D. $\lambda = \frac{mh}{v}$

(Practical Based Assessment) **Marks: 15**

Q2: Attempt **ALL** questions.

1. A hospital is upgrading its medical equipment. One of the machines requires a capacitor rated at 500 µF. The capacitor is charged with 0.25 C of charge.
   A. Define capacitance and the SI unit (farad) in simple terms. [2 marks]
   B. Convert 500 µF to farads. [1 mark]
   C. Use the formula $C = \frac{Q}{V}$ to calculate the potential difference (V) required to store 0.25 C of charge on this capacitor. [2 marks]
   D. A second capacitor has a capacitance of 100 µF and is connected to a 9V battery. Calculate the amount of charge stored on this capacitor. [2 marks]
   E. Explain one practical application of capacitors in medical or electronic equipment. [2 marks]
2. During a school trip to a nuclear science exhibition, students watch a video showing how uranium-235 undergoes nuclear fission when struck by a neutron, releasing energy and more neutrons.
   A. Describe what happens during nuclear fission using uranium-235 as an example. [2 marks]
   B. Explain the concept of a fission chain reaction and how it sustains itself. [2 marks]
   C. List any two safety mechanisms used in nuclear reactors to control chain reactions. [2 marks]

END OF SECTION A

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Total Time 3.5 hours

Class: XII **MODEL PAPER EXAMINATION 2025**
Time: 2 hours 55 minutes **SUBJECT: PHYSICS SECTION "B" AND SECTION "C"** **Total Marks 68**
Q3: **SECTION "B" SHORT ANSWER QUESTIONS** **36 Marks**

NOTE: Attempt any **NINE**-part questions from this section. All questions carry equal marks.

i. Derive an expression for the force experienced by a current-carrying conductor placed in a uniform magnetic field.
ii. What is electric flux? Derive an expression for the electric flux produced by a point charge.
iii. Determine the velocity and momentum of a particle with rest mass m and kinetic energy equal to its rest mass energy.
iv. Demonstrate that the coefficient of linear expansion is one-third of the coefficient of volume expansion.
v. How many electrons pass through the cross-section of a wire per second if it carries a current of 0.7 amperes?
vi. With the help of a diagram, explain the normal working of an NPN transistor.
vii. What is an equipotential surface? Describe two properties of equipotential surfaces.
viii. A Carnot engine operates between 800°C and 400°C. If the source temperature is increased by 50°C or the sink temperature is decreased by 50°C, which change will result in greater efficiency? Justify your answer.
ix. Define electrical potential difference (V) and electric field intensity (E). Derive the relation $V = E \cdot d$.
x. A coil of 400 turns in an AC generator has an area of $0.1\ m^2$ and rotates in a magnetic field of 50 T. To generate a maximum voltage of 220 V, how fast should the coil rotate? Express your answer in revolutions per second.
xi. A sodium surface is illuminated with light of wavelength $3 \times 10^{-7}\ m$. If the work function of sodium is 2.46 eV, find the kinetic energy of the photoelectrons and the cutoff wavelength.
xii. What is a semiconductor diode? Explain the working of a full-wave rectifier using a semiconductor diode, supported by a circuit diagram.

SECTION "C" DETAILED ANSWER QUESTIONS **32 Marks**

Note: Attempt any **TWO** questions from this section. All questions carry equal marks. Draw diagram where necessary.

Q4.

a) State Ampère's Law and apply it to derive the expression for the magnetic field induction inside a solenoid.
b) Explain the Compton effect and derive the expression for the increase in the wavelength of the scattered photon.

Q5.

a) Define a Carnot engine and derive the expression for its efficiency.
b) What is a transformer? Explain the principle on which it operates and derive the mathematical relationship between the induced EMF and the number of turns in the coils.

Q6.

a) Describe the construction and working of a moving coil galvanometer. Also, prove that the deflection produced in the coil is proportional to the current passing through it.
b) Define radioactivity. Explain the law of radioactive decay and write the equation for the change in the parent nucleus during alpha, beta, and gamma decay.

Q7.

a) Derive the pressure formula for an ideal gas using the kinetic molecular theory.
b) State Gauss's law and write the mathematical expression. Apply this law to determine the electric field at a point near a thin, infinite sheet of positive charges.

END OF PAPER