National Officers Academy

Mock Exams for CSS-2022

April 2022(Final Mock)

PHYSICS, PAPER-II

TIME ALLOWED: THREE HOURS	**PART-I (MCQS)**	**MAXIMUM MARKS = 20**
PART-I(MCQS): MAXIMUM 30 MINUTES	**PART-II**	**MAXIMUM MARKS = 80**

NOTE:

i. **Part-II** is to be attempted on the separate **Answer Book**.
ii. Attempt **ONLY FOUR** questions from **PART-II**. **ALL** questions carry **EQUAL** marks.
iii. Write Q. No. in the Answer Book in accordance with Q. No. in the Q. Paper.
iv. Use of Calculator is allowed.

SUBJECTIVE PART — PART-II

Q. No. 2. a) What is dipole moment? Obtain the expression for the potential and field due to an electric dipole.
b) State and prove Ampere's law. Apply it to calculate the magnetic field due to a solenoid.

Q. No. 3. a) Distinguish between photoelectric effect and Compton Effect. Also show that the Compton shift depends only on the scattering angle and not on the initial wavelength.
b) The threshold frequency for photoelectric emission in copper is 1.1x15sec3, Find the maximum energy of the photoelectrons (in joules and electron volts) when light of frequency 1.5×15 sec is directed on a copper surface.

Q. No. 4. a) Discuss origin of magnetism by considering processes that creates magnetic field in an atom.
b) What are ferromagnetic domains? How a typical ferromagnetic material does is investigated by Hysteresis loop for technological applications?
c) What is Biot Savart Law?

Q. No. 5. a) Explain de Broglie's hypothesis of matter wave.
b) Explain the terms wave function, probability density and normalization condition associated with quantum mechanics.
c) What is the physical significance of the three quantum numbers n, 1, and m in the labelling of the hydrogenic wave functions?

Q. No. 6. a) What is rectification? How diodes act as rectifier? Explain half and full wave rectifications in detail, support your answer by drawing circuits.
b) What is common-emitter configuration of a transistor? Explain in detail.

Q. No. 7. a) What is a nuclear reactor? How does it work? Discuss the major difficulties that stand in the way of a working reactor.
b) The half-life of a radioactive isotope is 140 days. How many days it would take for the decay rate of a sample of this isotope to fall to one-fourth of its initial value.
c) Explain the purpose of moderator in nuclear reactor.

Q. No. 8. Write a note on the following:
a) Zeeman effect
b) Pair Production
c) Pauli's Exclusion Principle
d) Mass Spectrometer

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Best of Luck for CSS-2022