



National Officers Academy
Mock Exams for CSS-2022
March 2022 (MOCK-8)
PHYSICS, PAPER-II

TIME ALLOWED: THREE HOURS
PART-I(MCQS): MAXIMUM 30 MINUTES

PART-I (MCQS)
PART-II

MAXIMUM MARKS = 20
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) Define and explain Gauss' Law. Deduce Coulomb's Law from Gauss' Law.
(b) Calculate the potential at a point on the axis of circular plastic disk of radius R , one surface of which carries a uniform charge density σ .
(c) In a microwave oven torque acting on an electric dipole is responsible for the production of heat. Comment.
- Q. No. 3.** (a) Derive an expression for capacitance of cylindrical and spherical capacitor.
(b) Show that the energy density of a parallel plate capacitor with dielectric medium between them is directly proportional to the square of electric field intensity.
(c) An isolated conducting sphere whose radius R is 6.85 cm has a charge $q=1.25$ nC. How much potential energy is stored in the electric field of this charged conductor?
- Q. No. 4.** (a) Derive an expression for the time-independent Schrodinger wave equation in one dimension for a single particle.
(b) Write the Maxwell's equations and explain the significance of each equation.
(c) What is index of refraction?
- Q. No. 5.** (a) What is Transistor? Briefly explain three types of Transistor Circuit Configurations.
(b) With neat diagram showing X-ray diffraction, derive an expression for Bragg's Law
(c) What is packing factor? Determine the Atomic Packing factor of FCC lattice.
- Q. No. 6.** (a) Explain construction and working of a Geiger Muller Counter.
(b) State and explain Half-life and Mean life of a radioactive element.
(c) What is Q-Value of a nuclear reaction?
- Q. No. 7.** (a) Briefly explain the construction and operation of a Bipolar Junction Transistor (BJT). How it can be used as an Amplifier?
(b) What do you mean by Eigen function and Eigen values? Briefly explain with examples.
(c) What do you understand by strange particles?
- Q. No. 8.** Write a note on any two of the following:
(a) Heisenberg Uncertainty Principle
(b) Cyclotron
(c) Barrier Tunneling

Best of Luck for CSS-2022