



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

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) What is grating? Describe in detail diffraction grating.
(b) What are the limitations of Newton's laws?
- Q. No. 3.** (a) Explain Hooke's law in simple harmonic motion. Draw the graph to show the change in energy of a simple pendulum.
(b) In an electric shaver, blade moves back and forth over a distance of 2mm. The motion is simple harmonic motion with frequency of 120Hz. Find
a) Amplitude b) Max. blade speed c) Max. blade acceleration
- Q. No. 4.** (a) Find the expression for the time dilation in relativity.
(b) A particle has a speed of 0.99C in laboratory reference frame. What is its Kinetic energy and momentum if particle is proton?
- Q. No. 5.** (a) Explain Kepler's law of area in detail.
(b) Show that angular momentum is equal to "Iw" where 'I' is moment of inertia and 'w' is angular velocity.
- Q. No. 6.** (a) Write angular momentum for:
i) Hoop about central axis ii) Solid cylinder iii) Solid sphere
iv) Rectangular plate v) Rod about axis through one end.
(b) A particle is located at $r = 0\hat{i} + 3\hat{j} + 0\hat{k}$ in meters. A constant force 'F'
 $F = 0\hat{i} + 0\hat{j} + 4\hat{k}$ begins to act on the particle. What is the torque?
- Q. No. 7.** (a) Write a short note on the following:
(i) Helium-Neon Laser (ii) Vector Triple Product
(b) Find the expression for range of a projectile.
- Q. No. 8.** (a) State 3-laws of Thermodynamics. Explain entropy in detail.
(b) The turbine in a steam power plant takes steam from a boiler at 520° c and exhausts at 100° c. Find the efficiency of turbine.

Best of Luck for CSS-2022