ROLL NO

B PUBLIC SERVICE COMMISSION

MBINED COMPETITIVE EXAMINATION
OR RECRUITMENT TO THE POSTS OF
AL MANAGEMENT SERVICE, ETC -2023
CASE NO. 1C2024

SUBJECT: PHYSICS (PAREST-I)

URS **MAXIMUM MARKS: 100**

estion must be attempted at one place instead of at different places.
ii. k in accordance with Q. No. in the Q. Paper.
iii. No Page/Space be left blank between the answers. All the blank pages of Answer Book must be crossed.
iv. Extra attempt of any question or any part of the question will not be considered.

NOTE: **Attempt any FIVE Questions in All. Attempt in Urdu or English.**

Q. No.1 **a)** What is conical pendulum? Give its two uses. Derive a relation for its period of revolution.

b) Define and explain angular momentum in detail. Derive a correlation between angular momentum and torque. **(10+10=20 Marks)**

Q. No.2 **(a)** State and prove Kepler's law of periods for planetary motion.

(b) Define and explain moment of inertia. Calculate the rotational inertia of a solid sphere about its diameter. **(8+12=20 Marks)**

Q. No.3 **a)** How do fluid properties like viscosity, surface tension, and elasticity affect fluid flow and fluid motion?

b) Water is flowing through a pipe with a diameter of 10 cm. The pipe narrows down to a diameter of 5 cm at a constriction. If the pressure in the wide section is 100 kPa and the velocity of the water is 2 m/s, what is the pressure in the narrow section of the pipe if the water is incompressible and there is no energy loss due to friction? **(12+8=20 Marks)**

Q. No.4 **a)** An upward thrust is used to lift the rocket. Explain this phenomenon analytically and mathematically. Derive a relationship to find this upward thrust using Bernoulli's equation.

b) What is Poiseuille's law? Derive mathematical formulation of this law. **(8+12=20 Marks)**

Q. No.5 **(a)** What is an interferometer, and how does it work in the context of observing Newton's rings?

(b) How can the phase difference between the interfering waves be measured using Newton's rings, and what is its significance? **(10+10=20 Marks)**

Q. No.6 **(a)** What are Lissajous figures and how are they formed?

(b) Explain what is meant by free oscillation with two degrees of freedom. Give an example and discuss the factors that affect the natural frequencies of the system. **(10+10=20 Marks)**

Q. No.7 **(a)** Explain distinctive features of Maxwellian distribution of molecular velocities.

(b) Differentiate between Bose-Einstein and Fermi-Dirac statistics. **(10+10=20 Marks)**

Q. No.8 **a)** Differentiate between a heat engine and refrigerator on the basis of their construction, working principle and efficiencies.

b) What do you understand by low temperature physics? Describe different mechanism of production of low temperatures. **(10+10=20 Marks)**