

C 43199

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Name.....

Reg. No.....

**SECOND SEMESTER (CBCSS—UG) DEGREE EXAMINATION
APRIL 2023**

Physics/Applied Physics

PHY 2B 02/APH 2B 02—MECHANICS

(2019 Admissions)

Time : Two Hours

Maximum : 60 Marks

*The symbols used in this question paper have their usual meanings.***Section A (Short Answer Type)***Answer **all** questions in two **or** three sentences.**Each correct answer carries a maximum of 2 marks.*

1. Explain what is meant by the Galilean transformations.
2. Write the equation of a forced damped harmonic oscillator and describe the terms involved.
3. Define central force motion.
4. List any two features of central force motion.
5. Briefly explain about the two types of wave motion.
6. What is a Pulse ?
7. Show that the motion of a particle under central force is always confined to a single plane.
8. Define non-inertial frame of references with examples.
9. Explain the terms : (a) apogee ; and (b) perigee.
10. Write the equation of a forced damped harmonic oscillator and describe the terms involved.
11. Write down the general expression for a plane progressive wave and explain the terms.
12. What are stationary satellites ?

(Ceiling - 20)

Turn over

Section B (Paragraph / Problem Type)

Answer all questions in a paragraph of about half a page to one page.

Each correct answer carries a maximum of 5 marks.

13. Write note on index of refraction and dispersion.
14. Calculate the energy needed to put the satellite into orbit by neglecting losses due to friction.
15. Calculate the height at which a stationary satellite must revolve in its orbit around the earth.
16. Evaluate the time average values of the potential and kinetic energies of a frictionless harmonic oscillator.
17. Discuss Newton's model to determine the velocity of sound in air ? Account for the correction required to obtain observed result.
18. A bead slides without friction on a rigid wire rotating at constant angular speed ω . Find the force exerted by the wire on the bead.
19. The centre of mass of a 1600 kg car is midway between the wheels and 0.7 m above the ground. The wheels are 2.6 m apart :
 - (a) What is the minimum acceleration A of the car so that the front wheels just begin to lift off the ground ?
 - (b) If the car decelerates at rate g , what is the normal force on the front wheels and on the rear wheels ?

(Ceiling - 30)

Section C (Essay Type)

Essays.

Answer in about two pages, any one question. Answer carries 10 marks.

1. What is a Pulse ? Discuss Fourier analysis of a non-periodic function with suitable plots.
2. State and prove Kepler's laws of planetary motion. Show that the areal velocity of a planet around the sun is constant.

(1 × 10 = 10 marks)