

C 43200

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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—II

(2020—2022 Admissions)

Time : Two Hours

Maximum : 60 Marks

The symbols used in the 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. Define Lorentz contraction.
2. Differentiate between phase velocity and group velocity.
3. With example, define inertial frame of references.
4. State law of equal areas. How is it related to angular momentum ?
5. Define central force motion and list any two features of central force motion.
6. What is forced damped harmonic oscillator ? Write the expression.
7. Give the characteristics of Simple Harmonic Motion.
8. What are the condition for nondispersive wave.
9. State Fourier's theorem ?
10. A famous magic trick involves a performer singing a note toward a crystal glass until the glass shatters. Explain why the trick works in terms of resonance and natural frequency.
11. Explain the term resonance.
12. Define superposition of wave pulses.

(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. The equation of a damped simple harmonic motion is $m \frac{d^2x}{dt^2} + b \frac{dx}{dt} + kx = 0$. Then find the angular frequency of oscillation.
14. Derive the equation for Energy Dissipation in the Damped Oscillator.
15. 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 ?
16. Define central force. Give some examples of central forces and Examples of central forces are.
17. Define Q factor. Explain Q factor of any harmonic oscillator.
18. Write a note on normal modes.
19. With necessary derivations explain the energy in a mechanical wave.

(Ceiling - 30)

Section C (Essay Type)

Essays.

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

20. Briefly explain the physics in a rotating system. Define Coriolis force.
21. Explain central force motion as a one body problem. Derive the general solution.

(1 × 10 = 10 marks)