D 142747 **(Pages : 2)** **Name.....**

Reg. No.....

SECOND SEMESTER (CBCSS-UG) DEGREE EXAMINATION, APRIL 2026

Physics/Applied Physics

PHY 2B 02/APH 2B 02—MECHANICS—II

(2020 Syllabus)

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 question carries 2 *marks.*

1. State the principle of equivalence.
2. Distinguish between Inertial and Non-intertial frames of references.
3. Define Coriolis force.
4. Why is angular momentum conserved in central force motion ?
5. Under what conditions does a particle follow a parabolic trajectory in a central force field ?
6. Express Kepler's third law Mathematically.
7. Write the standard solution for the frictionless harmonic oscillator and explain the terms involved in it.
8. What is the time average of a function ?
9. Distinguish between lightly damped and heavily damped motions.
10. What are standing waves ?
11. What is the general expression for the speed of waves travelling in (a) Solid bars ; (b) Liquid columns.
12. How does a wave pulse differ from a continuous wave ?

(Ceiling 20 marks)

Section B (Paragraph/Problem Type)

Answer **all** *questions in* **a paragraph** *of about* **half a page** *to* **one** *page,*
Each question carries 5 *marks.*

13. A 0.3 kg. mass is attached to a spring and oscillates at 2 Hz with a Q of 60. Find the spring constant and damping constant.

Turn over

14. The equation of a transverse wave travelling along a string is given by $y = 0.3 \sin \pi(0.5x - 50t)$, where y and x are in centimetres and t is in seconds. Find the wavelength, wave number, frequency and velocity of the wave. Also find the maximum transverse speed of any particle in the string.

15. A small weight of mass m hangs from a string in an automobile which accelerates at rate A. What is the static angle of the string from the vertical, and what is its tension ? Analyze the problem both in an inertial frame and in a frame accelerating with the car.

16. A particle of mass m moves under an attractive central force Kr^4 with angular momentum l. For what energy will the motion be circular, and what is the radius of the circle ?

17. State Einstein's principle of equivalence. How does it help to distinguish between uniform acceleration and a gravitational field ?

18. Explain how a straight line motion appears to be circular motion due to Earth's rotation. Show the direction of motion in the northern hemisphere.

19. Obtain the relation between group velocity and phase velocity.

(Ceiling 30 marks)

Section C (Essay Type)

Answer any **one** *question in* **two** *pages.*
The question carries 10 *marks.*

20. Derive the expression for the equation of motion for a damped harmonic oscillator. Show that the total energy of damped harmonic oscillator decrease exponentially in time.

21. Derive an equation for the orbit of a particle moving under the influence of an inverse square central force field.

(1 × 10 = 10 marks)