

23U204

(Pages: 2)

Name: .....

Reg.No: .....

**SECOND SEMESTER B.Sc. DEGREE EXAMINATION, APRIL 2024**

(CBCSS - UG)

(Regular/Supplementary/Improvement)

**CC19U PHY2 B02 / CC20U PHY2 B02 - MECHANICS - II**

(Physics - Core Course)

(2019 Admission onwards)

Time : 2.00 Hours

Maximum : 60 Marks

Credit : 2

**Part A** (Short answer questions)

Answer *all* questions. Each question carries 2 marks.

1. When a small mass  $m$  hanging on a string in a car, which accelerates at rate  $A$ , draw force diagram in both inertial frame and in a frame accelerating with the car.
2. What are the effects of acceleration of a lift on the weight of a person inside it?
3. What are the consequences of coriolis force due to spin rotation of earth on the water and air flow on earth?
4. A planet moves faster when it passes close to the sun. Why?
5. Draw the energy diagram of a meteor passing near a planet in different energy cases.
6. Write the condition for an elliptic orbit to become circle.
7. Which are the factors on which the total energy of a particle executing SHM depend?
8. What is meant by a forced harmonic oscillator. Give examples.
9. Differentiate between travelling wave and standing wave.
10. What is snell's law?
11. What is meant by a harmonic wave?
12. Write down the Fourier series for the periodic function  $F(t)$ .

**(Ceiling: 20 Marks)**

**Part B** (Short essay questions - Paragraph)

Answer *all* questions. Each question carries 5 marks.

13. Explain the motion of a pendulum in a car from the point of view of a passenger in the car and from an inertial frame outside car.
14. Derive a relation for the deflection of body of mass  $m$  dropped from a height  $h$  at the equator.

15. The mean diameter of moon's orbit around the earth is  $7.6 \times 10^5$  km and orbital period is 27 days. Using these data calculate the period of revolution of an artificial satellite in an orbit of radius  $10^4$  km around the earth.
16. Write the expressions for time period, frequency, angular frequency and displacement of a particle executing SHM.
17. The logarithmic decrement  $\delta$  is defined to be the natural logarithm of the ratio of successive maximum displacements (in the same direction) of a free damped oscillator. Show that  $\delta = \pi/Q$ .
18. Prove that group velocity is given by  $\frac{dw}{dk}$ .
19. Check whether the following functions can be solutions to the 1-dimensional wave equation:  
(a)  $x^2 + v^2 t^2$   
(b)  $x^2 - v^2 t^2$   
(c)  $2\sin x \cos vt$

**(Ceiling: 30 Marks)**

**Part C (Essay questions)**

Answer any *one* question. The question carries 10 marks.

20. Discuss the problem of two non-interacting particles moving parallel to each other. What is the effective potential. Draw the energy level diagram.
21. Solve the differential equation of damped harmonic oscillator with all cases and discuss in detail the under-damped case

**(1 × 10 = 10 Marks)**

\*\*\*\*\*