21U204A   (Pages: 2)   Name: ....

Reg.No: ....

SECOND SEMESTER B.Sc. DEGREE EXAMINATION, APRIL 2022
(CBCSS - UG)
CC19U PHY2 B02 - MECHANICS - II
(Physics - Core Course)
(2019 Admission - Supplementary/Improvement)

Time : 2.00 Hours   Maximum : 60 Marks

Credit : 2

Part A (Short answer questions)
Answer *all* questions. Each question carries 2 marks.

1. How does the path of a point on the rim of a rolling wheel look like to an observer (a)standing at the centre of the wheel (b)standing on the ground?

2. What is coriolis force? Give an example

3. What happens to a freely falling body under the coriolis force of earth?

4. Define eccentricity of an orbit.

5. What is meant by a bounded and unbounded orbits?

6. State Kepler's laws of planetary motion.

7. What is the relaxation time of a damped harmonic oscillator?

8. What is the Quality factor of an oscillator?

9. Differentiate between mechanical and non-mechanical waves.

10. Distinguish between dispersive and non-dispersive media.

11. What is characteristics impedance ? Write its expression for transverse waves travelling on a string.

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. Explain the working of Foucault pendulum.

15. How can we reduce a two body problem to a one body problem?

16. A mass of 10 kg falls 50 cm onto the platform of a spring scale, and sticks. The platform eventually comes to rest 10 cm below its initial position. The mass of the platform is 2 kg. Find the spring constant.

17. Calculate the average energy stored in a 20 gm mass attached to a spring and vibrating with an amplitude 1 cm in resonances with a periodic force whose frequency is 20 Hz. If the quality factor of the oscillator is 160, how much energy is dissipated per second?

18. The dispersion relation for a wave is given by the equation $\omega = Ak^2$, where A is a constant. Find phase and group velocities for the wave.

19. Obtain the exact equation for a pulse wave form.

(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. Write the equation of motion of the forced oscillator. Derive an expression for amplitude of the forced oscillator. Explain its dependence on the frequency of the applied force.

(1 × 10 = 10 Marks)

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