

19U204

(Pages: 2)

Name : .....

Reg.No : .....

**SECOND SEMESTER B.Sc. DEGREE EXAMINATION, APRIL 2020**

(CBCSS - UG)

**CC19U PHY2 B02 : MECHANICS**

(Physics - Core Course)

(2019 Admission - Regular)

Time: 2.00 Hrs

Max. Marks: 60

Credit: 2

(Draw diagram wherever necessary. The students can answer all questions in sections A & B)

**A. Short answer questions. Each question carries 2 marks.**

1. What are tides and how are they formed?
2. What is the effect of centrifugal acceleration due to Earth's rotation on acceleration due to gravity?
3. What are isobars and what is its importance?
4. Show that when a particle moves under a central force, its angular momentum is conserved.
5. What is an energy diagram?
6. Define impact parameter and the distance of closest approach.
7. Write down the differential equation for a simple harmonic oscillator and its standard solution.
8. What is the Quality factor of an oscillator?
9. Differentiate between mechanical and non-mechanical waves.
10. What is dispersion?
11. Define impedance of a medium. What is its unit?
12. Write down the Fourier series for the periodic function  $F(t)$ .

**(Ceiling: 20 Marks)**

**B. Short essay questions (Paragraph). Each question carries 5 marks.**

13. Calculate the fictitious force on a body of mass of 5 kg in a frame of reference moving vertically up with an acceleration  $4\text{m/s}^2$
14. 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.
15. A planet moves faster when it passes close to the sun. How will you understand this on the basis of the relevant Kepler's law?
16. 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 be 160, how much energy is dissipated per second
17. A damped vibrating system starting from rest reaches a first amplitude of 50cm, which reduces to 5cm after 100 oscillations, each of period 2.3 seconds. Find the damping constant, relaxation time and correction for the first displacement for damping
18. What is modulation? Why do we need modulation?
19. Use the Fourier analysis of pulses to analyse the square frequency spectrum.

**(Ceiling: 30 Marks)**

**C. Essay questions. Answer any one question.**

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)**

\*\*\*\*\*