20U204 (Pages: 2) Name: .....

Reg.No: .....

SECOND SEMESTER B.Sc. DEGREE EXAMINATION, APRIL 2021

(CBCSS - UG)

CC19U PHY2 B02 - MECHANICS

(Physics - Core Course)

(2019 Admission - Supplementary/Improvement)

Time : 2.00 Hours Maximum : 60 Marks

Credit : 2

Part A (Short answer questions)

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

1. Write down the Galilean transformation equations.
2. What is centrifugal force? Give an example.
3. What is Foucault pendulum?
4. What are central forces? Give an example
5. What is meant by non-interacting particles?
6. Explain the terms perigee and apogee.
7. Define Simple Harmonic Motion. Give examples.
8. Write the differential equation of a forced harmonic oscillator and explain the terms involved in it.
9. What is a transmission line?
10. What is meant by a harmonic wave?
11. Define bandwidth.
12. Write down the Fourier series for the periodic function F(t).

(Ceiling: 20 Marks)

Part B (Short essay questions - Paragraph)

Answer ***all*** question. 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. Periods of revolution of the Planets Earth, Mercury and Mars are 365.26, 87.97 and 687.05 days. Find the major axes of the orbits of Mercury and Mars if the major axis of earth is 300×10^6km.

16. Show by direct calculation that $< sin^2(\omega t) >= \frac{1}{2}$ where the time average is taken over any complete period $t1 \leq t \leq (t1 + 2\pi/\omega)$. Also show that $< sin(\omega t)\cos(\omega t) >= 0$ when the average is over a complete period.

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. Starting from the equation $k=2\pi/\lambda$, prove that phase velocity$=\lambda/T$

19. Use the Fourier analysis of pulses to analyse the square frequency spectrum.

(Ceiling: 30 Marks)

Part C (Essay questions)

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

20. Find an expression for orbits of planets around the sun.

21. Show that only under the action of damping force, (i) the velocity of a particle decreases exponentially and (ii) its kinetic energy decreases exponentially but with a relaxation time half to that for velocity

(1 × 10 = 10 Marks)

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