

SECOND SEMESTER B.Sc. DEGREE EXAMINATION, APRIL 2023
(Regular/Improvement/Supplementary)

PHYSICS
GPHY2B02T: MECHANICS II

Time: 2 Hours

Maximum Marks: 60

SECTION A: Answer the following questions. Each carries *two* marks.

(Ceiling 20 Marks)

1. What is an inertial frame of reference? Give an example.
2. What is principle of equivalence?
3. What is a Foucault's pendulum?
4. Give vector equation relating the acceleration in inertial and rotating frames of reference. What is each term signify?
5. Briefly explain the relation between plane polar and Cartesian coordinates using equations and diagrams.
6. Derive an expression for average value of potential energy of a simple harmonic oscillator.
7. What is the differential equation for simple harmonic oscillator? Find the expressions for its velocity, displacement and period.
8. Define quality factor in terms of resonant frequency of lightly damped forced harmonic oscillator.
9. Graphically represent simple harmonic oscillator; lightly and heavily damped oscillator.
10. Distinguish between closed system and open system. Give one example each.
11. What is meant by Lower Side Band and Upper Side Band, in case of amplitude modulation? Write down its expressions.
12. Write down the mathematical form of Fourier theorem

SECTION B: Answer the following questions. Each carries *five* marks.

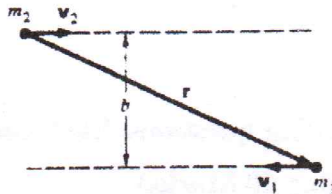
(Ceiling 30 Marks)

13. Show that the length or distance between two points is invariant under Galilean transformation.
14. Explain centrifugal force. Obtain the expression for centrifugal force due to rotating frames of reference.
15. Show that the law of equal area is valid in the case of all central force motions.
16. Starting from the orbit equation for a central force motion, show that energy depends only on the major axis, in the case of an elliptical orbit.
17. Show that for a simple harmonic oscillator the mechanical energy remains conserved.
18. What is quality factor of an oscillator? Derive its expression in damped harmonic oscillator.
19. State and prove Snell's law

(PTO)

SECTION C: Answer any one question. Each carries ten marks.

20. Obtain the energy equation from the equations of motion for a central force motion and hence apply this to study the motion of two non-interacting particles m_1 and m_2 which is moving towards each other with velocities v_1 and v_2 whose paths are offset by distance b as shown in the figure by using energy diagram .



21. Obtain the dispersion relation for travelling wave setup in a linear array of coupled pendulums and hence discuss the case of a sinusoidal travelling wave.

(1 x 10 = 10 Marks)