

NORTH GAUHATI COLLEGE
DEPARTMENT OF PHYSICS
B.SC. 2ND SEMESTER (MAJOR) CBCS
SUB: WAVES & OPTICS (PHY-HC-2026)
ASSIGNMENT

LAST DATE OF SUBMISSION: October 19, 2021

TOTAL MARKS: 30

The figures in the brackets indicate the full marks for each question

1. A block weighing 14 N, which can slide without friction on an incline at angle $\theta=40^\circ$, is connected to the top of the incline by a massless spring of unstretched length 0.45 m and spring constant 120 N/m.
(a) How far from the top of the incline is the block's equilibrium point?
(b) If the block is pulled slightly down the incline and released, what is the period of the resulting oscillations? **[10]**

2. Construct the Lissajous figures for the following component oscillations. If you are using a graphical method, you may have to take more than 9 points to get the complete graph in some cases.
(a) $x = 2 \sin t, y = \cos 2t$
(b) $x = \sin t, y = \cos (t+\pi/4)$
(c) $x = \sin \pi t, y = 2 \sin (\pi t+\pi/2)$ **[10]**

3. The pitch of the whistle of an engine moving at 72 km/hr appears to drop by 40 Hz as it passes a stationary observer on the railway platform. Find the frequency of the whistle (velocity of sound in air is 350 m/s). **[10]**

General instructions for submission:

- ★ Write your answers in **A4 size paper** clearly mentioning your **name, GU roll number, registration number, paper code, email address**, etc. on the **first page** of your answer sheets.
- ★ You need to make a **single PDF file** of your assignments and **upload** them on the **online portal of our college** (by clicking the 'upload' button next to the 'view' button on the assignment page).
- ★ Only if you are **unable to upload** on the website, you may send the assignment mentioning proper **course code and assignment number as subject** to the email: **ngcphysicsdept@gmail.com**