

Jahangirnagar University
Institute of Information Technology
Assignment 1
Course No. ICT 1007, Course Title: Physics
Full Marks: 20, **Last Date of Submission: 08/01/2021**

Answer the Following Questions

Important notes: Please read these carefully*

- Only clear handwritten answers will be accepted, for submission please use single pdf file with multiple pages.
 - Scan the answers using a scanner or your phone.
 - In the cover page of your assignment, please write up your full name, student ID, and course No etc clearly.
 - This not a group assignment but individual assignment and you must write it up with honesty and integrity.
 - You should not share your answers with others, at any stage either before or after the submission of the assignment.**
 - Submit the assignment soon once you complete it. Please submit the completed assignment through Google Classroom Drive Folder.
 - It may go through 'plagiarism test' on your assignment, significant similarity (**copying from others and/or copying from the internet**) would severely reduce marks from both. All forms of plagiarism, cheating, and unauthorized collusion are regarded seriously by the University and could result in penalties including failure in the course and possible exclusion from the University. So please be careful about copying from anywhere either from internet or from your friend.
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1. Describe a platinum resistance thermometer. How would you calibrate and use it for measuring temperature of an object. Mention its advantages over a thermoelectric thermometer. (Please include all the necessary and clear diagrams).
2. What is a Seebeck effect? How can it be used for the measurements of high temperature? Explain the terms: thermocouple, neutral temperature, and temperature of inversion.
3. Define Brownian motion with its essential features. Explain the basis of Brownian motion. (Please include all the necessary and clear diagrams).
4. Distinguish between a real gas and an ideal gas. How is the ideal gas equation modified when mutual attraction between molecules and the finite size of the molecules are taken

into considerations? Obtain the relations among the critical constants and the Van der Waal's constants.

5. What is meant by entropy? Show that the entropy of a reversible process remains invariant and it gets increased in an irreversible process. (Please include all the necessary and clear diagrams).
6. A particle execute simple harmonic motion about the point $x = 0$. At $t = 0$, it has displaced $y = 0.37$ cm, and zero velocity. If the frequency of motion is 0.25/s. Calculate the period, amplitude, the maximum speed and the maximum acceleration.
7. Calculate the mechanical energy of a particle executing SHM, and show that it remains conserved. Also show that its energy, on average, half kinetic and half potential.
8. Calculate the average kinetic and total energy of a particle executing SHM. Show that the principle of conservation of energy is obeyed by a harmonic oscillator.
9. What are free, damped, and forced vibrations? A particle showing damped harmonic motion is subjected to an external periodic force. Establish the differential equation of motion of the particle, explain each terms and solve it to obtain an expression for the displacement of the oscillator.
10. What is meant by reverberation and reverberation time? Derive Sabine's reverberation formula.