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# Daffodil International University

**Faculty of Science & Information Technology**
**Department of Computer Science & Engineering**
**Final Semester Examination, Fall 2024**
**Course Code: PHY 101, Course Title: Physics I**
**Level:1 Term: 1 Batch: 67**

**Time: 2:00 Hour** **Marks: 40**

## Answer ALL Questions

***[The figures in the right margin indicate the full marks and corresponding course outcomes. All portions of each question must be answered sequentially.]***

| | | | | |
|---|---|---|---|---|
| **1.** | ***a)*** | Write down the significance of critical angle in total internal reflection. | 2 | **CO1** |
| | ***b)*** | What is diffraction grating and grating constant? | 2 | |
| | ***c)*** | Identify the Van der Waals equation with its significance. | 2 | |
| | ***d)*** | Listed the distinctions between adiabatic and isothermal processes. | 2 | |
| | ***e)*** | State the second law of thermodynamics. | 1 | |
| | ***f)*** | Define the concept of Polarization of light. | 1 | |
| **2.** | ***a)*** | Describe the association between the pressure and volume of a gas in adiabatic change in a mathematical form. | 4 | **CO2** |
| | ***b)*** | Explain the isothermal and adiabatic process of a Carnot's engine system. | 4 | |
| | ***c)*** | Write the statement of the Fermat's principle of light and hence derive the angle of incidence is equal to the angle of reflection. | 4 | |
| | ***d)*** | Review the mechanism of signal transmission through an optical fiber. | 3 | |
| **3.** | ***a)*** | The refractive index of core glass is 1.53 and cladding glass is 1.48 of a fiber optic cable. Find the minimum angle of incident light for total internal reflection. | 3 | **CO3** |
| | ***b)*** | Determine the temperature whose value is the same in Fahrenheit scales and Kelvin scales | 3 | |
| | ***c)*** | The heat energy $5.8 \times 10^4$ J is supplied to a Carnot engine working between $30^0$C and $120^0$C. Calculate the efficiency of the engine. How many heats engine will be converted into work by the engine? | 3 | |
| | ***d)*** | The specific rotation of a material solution is $66^0$. When a solution was put into the solution tube of 10cm, the rotation was measured $13.2^0$ in a polarimeter. What was the concentration of the solution? | 3 | |
| | ***e)*** | In Young's double slit experiment, an interference spectrum is formed in the screen at 2.55m from two slits having separation of 0.4mm. If the wavelength of used light is 600 nm. Determine the width of the fringe. | 3 | |