GOVERNMENT DEGREE COLLEGE GANDERBAL

Department of Physics

Question Paper/Assignment for B.Sc. 3rd Semester

Regular/Backlog

Course: Thermal Physics & Statistical Mechanics **Course Code: PHY3U16**

Marks: 60 **Subject: Physics**

Attempt any six questions. Each question carries equal weightage.

Q1. State first law of thermodynamic and discuss its physical significance.

Q2. Show that for an adiabatic change in a perfect gas $PV^{\gamma} =$ constant, where γ is the ratio of specific heats at constant pressure and constant volume, respectively.

Q3. Define and explain four fundamental thermodynamic potentials, U (internal energy), F (Helmholtz free energy), H (enthalpy) and G (Gibbs free energy).

Q4. Starting from four thermodynamic potentials derive Maxwell's thermodynamic relations.

Q5. A Carnot engine has the same efficiency between $1000\ K$ and $500\ K$ and between $x\ K$ and $1000\ K$ (this being the temperature of the sink in this case); calculate x.

Q6. Prove that $S = kln\Omega$. What can be inferred from this result?

Q7. What are the basic postulates of statistical mechanics? What are the difficulties with classical statistics?

Q8. What do you mean by mean free path of a gas molecule? Show that the mean free path of a gas molecule is inversely proportional to the density of the gas.

Q9. Assuming M.B. distribution of molecular speeds, show that for the molecules of an ideal gas, average speed = $\sqrt{8kT/\pi m}$

Q10. Calculate the number of macrostates and microstates for three particles distributed in two compartments, treating particles as (a) distinguishable (b) indistinguishable.

Q11. Derive Wien's displacement law as applied to black body radiation from Planck's law.

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Instructions:

1. The assignment is to be submitted through google class room having code ***2iycqxq***
2. The students who have not joined the G-classroom can mail assignment on ***shifs237@gmail. com***.
3. Last date of assignment submission is ***10/08/20***
4. The assignment must be *handwritten.*
5. Students must write page no., Roll No., Registration No. on the top right corner of each page.
6. A4 size ruled paper with not more than *10* pages converted into a single PDF file using. *camscanner* will be only accepted.
7. Students are advised to preserve hard copy of Assignment.
8. Do not copy answers from other students.
9. Assignments should be scanned properly for clear visibility.

Title page of assignment must contain

- Name of the candidate .....
- Semester.....
- Category:Fresh/Backlog.....
- Batch:.....
- Roll No.....
- Regd no .....
- Subject .....
- Cell no .....
- e-mail address ...
- Date of Submission
- Signature of Candidate,