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**NATIONAL OPEN UNIVERSITY OF NIGERIA**

**14-16 AHMADU BELLO WAY, VICTORIA ISLAND LAGOS**

**SEPTEMBER/OCTOBER 2015 EXAMINATION**

**SCHOOL OF SCIENCE AND TECHNOLOGY**

**COURSE CODE: PHY 311**

**COURSE TITLE: KINETIC THEORY AND STAT MECHANICS**

**Time: 2hrs**

**Instructions: Answer any five questions**

1. (a) An unbiased die is rolled write down the sample space for the experiment (ii) n coins are tossed, what is the sample space? (b) Two coins are tossed. What is the probability that (i) two head appears (ii) at least one tail appears.
2. (a) Four coins are flipped in succession. Find the total number of possible outcomes. (b) Seven physicists assembled for a meeting shake hands with one another. How many handshakes take place?
3. (a) State the Fermi temperature, TF (b) Calculate Fermi heat capacity, CFfor copper, given density= 9g/cm3 , atomic weight = 63.5 and valency equal to one
4. Prove that (i) K.E. = (3/2)KT (ii) U = 1/2KT using equipartition theorem.
5. The partition function of an ideal monoatomic gas is given by $Z\_{N}=\frac{V^{N}}{h^{3N}}(2πmK\_{B}T)^{^{3N}/\_{2}}$. Calculate (i) the free energy (iii) entropy (iv) Cv and Cp.
6. Shows that sacker-Tetrode equation is free from Gibbs paradox.
7. Given that the Helmholtz free energy is $F=-\left(\frac{8π^{5}K\_{B}^{4}}{45h^{3}C^{3}}\right)V$, Calculate (a) radiation pressure (b) entropy of an assembly of photons and (c) show from the result that CV =3S.