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**GARISSA UNIVERSITY**

**UNIVERSITY EXAMINATION 2018/2019 ACADEMIC YEAR ONE**

**SECOND SEMESTER EXAMINATION**

**SCHOOL OF BIOLOGICAL AND PHYSICAL SCIENCES**

**FOR THE DEGREE OF BACHELOR OF EDUCATION**

**COURSE CODE: PHY 113**

**COURSE TITLE: HEAT AND THERMODYNAMICS**

**EXAMINATION DURATION: 2 HOURS**

**DATE: 05/02/2020 TIME: 09.00-11.00 AM**

**INSTRUCTION TO CANDIDATES**

* **The examination has FIVE (5) questions**
* **Question ONE (1) is COMPULSORY**
* **Choose any other TWO (2) questions from the remaining FOUR (4) questions**
* **Use sketch diagrams to illustrate your answer whenever necessary**
* **Do not carry mobile phones or any other written materials in examination room**
* **Do not write on this paper**

**This paper consists of THREE (3) printed pages *please turn over***

**QUESTION ONE (COMPULSORY)**

1. What do you understand by the following terms as applied to thermodynamics
2. System **[3 marks]**
3. Process **[3 marks]**
4. State of system **[3 marks]**
5. Define the following terms
6. Heat **[2 marks]**
7. Specific heat capacity **[2 marks]**
8. Entropy **[2 marks]**
9. What are (i) 200 C on a Fahrenheit scale **[3 marks]**

(ii) Normal body temperature 98.60F on the Celsius scale **[3 marks]**

1. State the assumption made from the microscopic point of view in defining an ideal gas. **[4 marks]** (i) Distinguish between an heat engine and a heat pump. **[2 marks]**

(ii) What is the change in entropy when 0.25 kg of ethyl alcohol ($L\_{0}=1.0 ×10^{5}\frac{J}{KG}$) Vaporizes at its boiling point of 780C. **[3 marks]**

**QUESTION TWO**

1. Show that thermal coefficient os area is given by $\frac{∆A}{A\_{0}}=2α∆T$ where symbols have their usual meaning. **[10 marks]**
2. An aluminium rod has a length of 1.0 cm at 300C. The temperature is decreased to 100C and the raised back to 300. Is the length of the coil still the 1.0 cm

 $(α=24×10^{-6}C^{0})$ **[10 marks]**

**QUESTION THREE**

1. Briefly using Pv diagrams, explain the following thermo dynamical processes
2. Isometric process **[5 marks]**
3. Isothermal process **[5 marks]**
4. Adiabatic process **[5 marks]**
5. A quantity of an ideal gas has a volume of 22.4L at STP. While absorbing 315 cal of heat from the surroundings, the gas expands isobarically to 32.4L. What is the change in the internal energy of the gas. **[5 marks]**

**QUESTION FOUR**

1. Using kinetic theory of gases, show that the pressure of an ideal gas is given by

$P=\frac{1}{3}ρ\overbar{V^{2}}$ **[12 marks]**

1. Assume that the speed of sound in a gas is the same as the root-mean-square speed of the molecules, show how the speed for an ideal gas depends on the temperature. **[8 marks]**

**QUESTION FIVE**

1. State the first law of thermodynamics **[3 marks]**
2. What is a Carnot Cycle? **[3 marks]**

From the cycles Show

1. How temperature and heat are related **[7 marks]**
2. The Carnot efficiency. **[7 marks]**