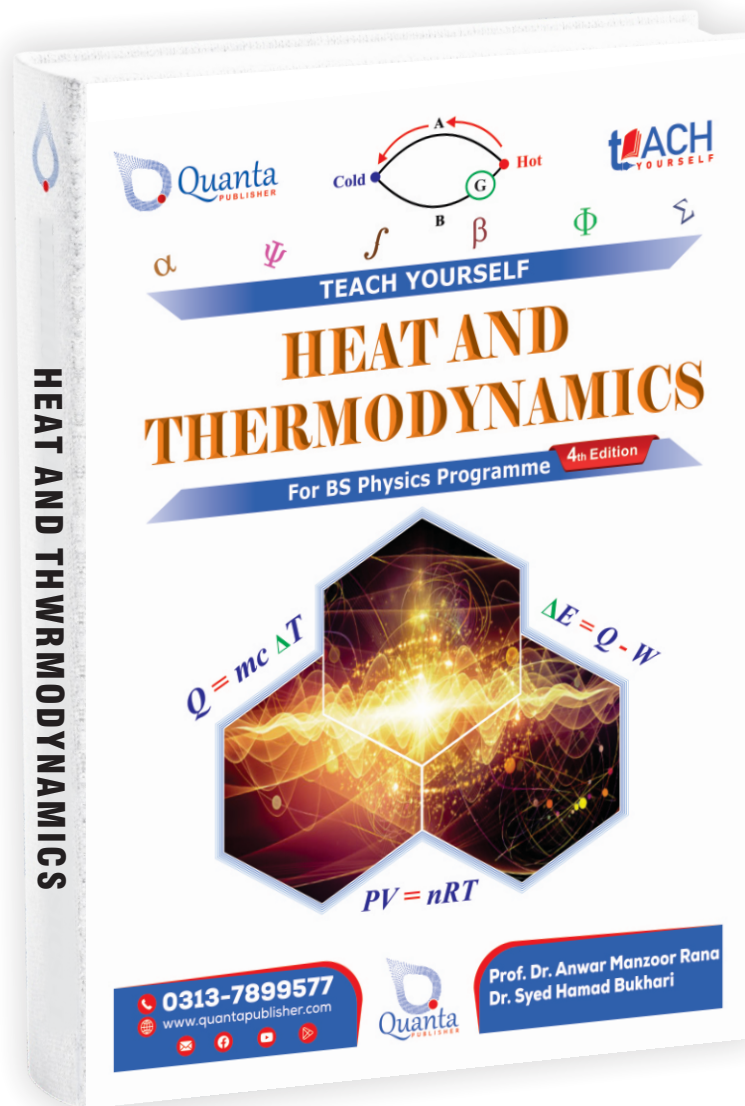




# PAST PAPERS



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BSSPH-17-06

BS Physics

4<sup>th</sup> Semester

(Press copy)

Session(2017-2021)

Final Term Exam. Paper

Course Code: PHY-204

Course Title: Heat &amp; Thermodynamics

Max. Marks: 60

Time Allowed: 2.5 hours

Q.1

Short Questions

(2\*10=20)

- 1) Explain why the latent heat of vaporization of a substance might be expected to be considerably greater than its latent heat of fusion?
- 2) Apply 1<sup>st</sup> law of thermodynamics on isochoric and isobaric process.
- 3) What is significance of Thermodynamic temperature scale?
- 4) Why does the boiling temperature of a liquid increase with pressure?
- 5) Define the term internal energy and give its unit.
- 6) Explain why your finger sticks to a metal tray just taken out from your refrigerator.
- 7) What is a thermocouple?
- 8) What is meant by most probable value of statistical mechanics?
- 9) Define Brownian motion.
- 10) Explain why the temperature of a gas drops in an adiabatic expansion?

Long Questions

Q.2 (a) Define and explain Joule-Thomson Effect by an experiment. Also discuss it for an ideal gas and real gas. (10)

Q.3 Define and derive 'TdS' equations and give their physical importance. (10)

Q.4 (a) Write a brief note on molecular view of pressure also prove that (05)

$$V_{rms} = \sqrt{3p/\rho}$$

(b) Prove that the number of molecules in a small volume element at any height is (05)

proportional to the pressure  $p(y) = p_0 e^{-gy\rho_0/p_0}$

Q.5 What is a Carnot heat engine? Derive and discuss its efficiency by Carnot cycle. (06)

(b) The turbine in a steam power plant takes steam from a boiler at 520 C and exhausts it to a condenser at 100 C. What is the maximum efficiency of the turbine? (04)

BS Maths 4<sup>th</sup> Semester, *physics.*

BS-252-15-19

(press copy)

(2015-2019)

**Final Term Paper**

Course Code: PHY-204

Course Title: Heat &amp; Thermodynamics

Max. Marks: 50

Time Allowed: 2 hr

Q.1

(2\*10=20)

- i. Differentiate between heat and temperature.
- ii. What is meant by Isothermal process?
- iii. Apply 1<sup>st</sup> law of thermodynamics on isochoric and isobaric process.
- iv. What is significance of Thermodynamic temperature scale?
- v. Define the Coefficient of performance of refrigerator.
- vi. Define the term internal energy and give its unit.
- vii. On which principle a heat engine works.
- viii. What is a thermocouple?
- ix. What is meant by most probable value of statistical mechanics?
- x. Define Brownian motion.

Q.2 What is heat engine? Also define and derive its efficiency by Carnot cycle. (10)

Q.3 Define and derive 1<sup>st</sup> and 2<sup>nd</sup> Maxwell's relations also give their physical importance (10)

Q.4 Define and derive Van der Waals Equation of State of a real gas by applying volume correction and pressure correction also compare it with ideal gas equation. (10)

BS-252-15-19-212

B.S.S.P-16-35

BZU Multan

BS-252-16-20

Final Paper BS Maths 4<sup>th</sup> Semester (2016-2020)

(Press copy)

Course Code: PHY-204

*BS. Physics.*

Course Title: Heat & Thermodynamics

Max. Marks: 50

Time Allowed: 2 hr

Q.1

(2\*10=20)

- i. What is Peltier Coefficient?
- ii. What is meant by free expansion of gas?
- iii. Apply 1<sup>st</sup> law of thermodynamics on isochoric and isobaric process.
- iv. Why Thermodynamic temperature scale is used?
- v. Define the Coefficient of performance of refrigerator.
- vi. Define the term degree of freedom of a system?
- vii. On which principle a heat engine works.
- viii. What is a thermocouple?
- ix. What is meant by most probable value of statistical mechanics?
- x. Define Brownian motion.

Q.2 What is heat engine? Also define and derive its efficiency by Carnot cycle. (10)

Q.3 What is thermoelectricity? Also describe detailed difference between Seebeck effect & Peltier's effect. (10)

Q.4 Define and derive Van der Waals Equation of State of a real gas by applying volume correction and pressure correction also compare it with ideal gas equation. (10)

.....  
*BS. 252-16-20-20.*

Department of Physics, GC University, Faisalabad.

Final Examination 2018

BS Physics 2nd  
PHY-304

Course Title: Heat &amp; thermodynamics

Subjective

Time Allowed: 2.30h

Roll no: 364612

- Q2. Write down consequences of Maxwell speed distribution? (6)
- Q3. What is Carnot engine? Illustrate diagrammatically its working operations? (6)
- Q4. Given the speeds of ten particles in m/s are 0, 1.0, 2.0, 3.0, 3.0, 3.0, 4.0, 4.0, 5.0 and 6.0 find (6)
- (a) the average speed
  - (b) the root mean square speed and
  - (c) the most probable speed of particles?
- Q5. Why the average velocity of molecules in a gas is zero but the average of the square of velocities is not zero? (3)
- Q6. Prove entropy as a state property? (3)
- Q7. Derive the values for constants  $C_v$ ,  $C_p$  and  $C$  with necessary conditions? (6)

GOVERNMENT COLLEGE UNIVERSITY FAISALABAD  
DEPARTMENT OF PHYSICS

Course Title: Heat & Thermodynamics Course Code: PHY-304 Degree: Bs-Physics  
Semester-II Time Allowed: 1 hour

Subjective Part

Name: [REDACTED] Roll. No. [REDACTED]

Answer the following questions

Marks Distribution (15×2=30)

- Q2- (a) Calculate pressure of a gas taking into account Kinetic Theory of gases. (8)  
(b) At what temperature is the translational kinetic energy of molecule in an ideal gases is equal 1 eV. (7)
- Q3- (a) Define adiabatic process and prove that  $PV^\gamma = \text{constant}$  for an adiabatic process. (8)  
(a) In an experiment 1.35 mole oxygen is heated at constant pressure starting at  $11^\circ\text{C}$ . How much heat must be added to the gas to double its volume. (7)

**GOVERNMENT COLLEGE UNIVERSITY FAISALABAD**Discipline: -BS-PHY (304)

Timing: -

Total Marks: -50

One Hour

Course Title: -Heat & Thermodynamics

Final term Spring-2020

Credit Hours: -3(3-0)

ROLL NO: \_\_\_\_\_

Name &amp; Signature: \_\_\_\_\_

**OBJECTIVE PART**

Q. SELECT THE CORRECT OPTION.

| SR# | STATEMENT   | A                                   | B                                      | C  | D   |
|-----|---|-------------------------------------|--|--|---|
| 1   | Net energy changes in Carnot cycle  | Zero                                | Negative                               | Positive   | None of these   |
| 2   | If pressure is constant the process is  | Isobaric                            | Isochoric                              | Adiabatic  | Isothermal  |
| 3   | $C_p - C_v$   | E                                   | R                                      | H  | G   |
| 4   | The triple point of water   | 0 K                                 | 0°F                                    | 273.16 K   | 273.16°F  |
| 5   | The normal temperature of human   | 37°C                                | 98.6°F                                 | 310 K  | All of these  |
| 6   | The correct value of 0°C on Kelvin Scale is   | 273.15 K                            | 272.85 K                               | 273 K  | 273.2 K   |
| 7   | If an ideal gas isothermally expanded, its internal energy will                           | Increase                            | Decrease                               | Remain the same                                    | Decrease or increase depends upon the nature of the gas |
| 8   | In an isothermal change an ideal gas obeys:   | Boyle's Law                         | Charle's Law                           | Both (a) & (b)                                     | None of these   |
| 9   | The SI unit of Mechanical equivalent of heat is   | Joules-Calories                     | Joule/Calorie                          | Calorie-Ergs                                       | Ergs/Calorie  |
| 10  | During adiabatic compression of a gas its temperature                                     | Remains constant                    | Becomes zero                           | Falls  | Rises   |
| 11  | A bicycle pump works in accordance with   | Newton's first law of motion        | First law of thermodynamics            | Pascal's Law                                       | Stoke's Law   |
| 12  | Environmental crises is   | Entropy crises                      | Disorder crises                        | Randomness crises                                  | All of these  |
| 13  | If 20 J work is done in compressing a gas adiabatically, the change in internal energy is | 20 J                                | -20 J                                  | 10 J   | 200 J   |
| 14  | The ideal gas law is expressed as   | $PV=nRT$                            | $PV=1/NKT$                             | $PV=NT$  | $P=RT$  |
| 15  | All real heat engines are less efficient than carnot engine due to                        | Friction                            | Energy dissipation                     | Heat losses  | All of the above  |
| 16  | $PV=RT$ represents  | Gas equation for one mole           | Gas equation for n mole                | Boyle's Law  | Charle's Law  |
| 17  | In adiabatic process  | No heat enters or leaves the system | Entropy of the system remains constant | $-\Delta U=W$ , represents the adiabatic expansion | All of these  |

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|    |  |  |   |   |                                       |
|----|--|--|---|---|---------------------------------------|
| 18 | The difference between $C_p$ and $C_v =$   | Planck's constant                                      | Gravitational constant                      | Boltzmann constant                      | Universal gas constant                |
| 19 | Efficiency of Carnot engine becomes 100 percent if:  | Temperature of source and the sink are equal           | Temperature of the source is 0 K            | Temperature of the sink is 0 K          | None of these                         |
| 20 | When heat will face death  | Temperature of source & sink of heat will become equal | All the heat energy will become unavailable | Entropy of the universe will be maximum | All of these                          |
| 21 | Adiabatic changes occurs when the gas expands or is compressed   | Very slowly  | Slowly                                      | Rapidly                                 | Both slowly and rapidly               |
| 22 | The first law of thermodynamics states that  | Momentum is conserved                                  | Energy is conserved                         | Charge is conserved                     | Weight is conserved                   |
| 23 | The internal energy of an ideal gas system is generally the  | Rotational energy of its molecules                     | Vibrational energy of its molecules         | Translational K.E of its molecules      | P.E of its molecules                  |
| 24 | The pressure of gas is measured in units of  | Pascal   | $\text{Nm}^{-2}$                            | Atmosphere                              | All of the above                      |
| 25 | Which quantity must be the same for two bodies if they are to be in thermal equilibrium?   | Internal energy  | Potential energy                            | Temperature                             | Mass                                  |
| 26 | Identify the irreversible process  | Explosion of a bomb                                    | Slow expansion of a gas                     | Slow compression of a gas               | Slow compression of an elastic spring |
| 27 | The efficiency of diesel engine roughly ranges from  | 25% to 35%   | 35% to 40%                                  | 45% to 65%                              | 65% to 85%                            |
| 28 | The temperature scaled based upon triple point of water was given by   | Rumford  | Carnot                                      | Kelvin                                  | Celsius                               |
| 29 | Entropy of universe is increasing day by day due to  | Depletion of ozone                                     | Energy use into work                        | Power generating process                | All of these                          |
| 30 | A gas receives an amount of heat equal to 110 Joules and performs 40 Joules of work. The change in the internal energy of gas is | 70 J   | 150 J                                       | 110 J                                   | 40 J                                  |
| 31 | In the gas equation $PV=RT$ , V is the volume of   | 1 mol of gas   | 1 g of gas                                  | gas                                     | 1 liter of gas                        |
| 32 | One calorie is equal to  | 4.18 erg   | 4.18 J                                      | 41.8 J                                  | 4.35 J                                |
| 33 | At constant pressure, the graph between V (volume) & T (absolute temp.) is   | Hyperbola  | Parabola                                    | Straight line                           | Ellipse                               |
| 34 | If the pressure is increased, the boiling point of the liquid  | Decrease   | Remains unchanged                           | Increases                               | Decreases first and then increases    |
| 35 | No entropy change is associated  | Isothermal   | Adiabatic                                   | Isochoric                               | Isobaric                              |



|    |  |                                    |   |   |   |
|----|--|------------------------------------|---|---|---|
| 36 | with<br>Food is cooked quicker in a pressure cooker because  | process<br>Cooker is made of metal | process<br>It is a good conductor of heat | process<br>No heat is lost                | process<br>High steam pressure raises the boiling point of liquid |
| 37 | At 0K which of the following properties of a gas will be zero  | Kinetic energy                     | Potential energy                          | Vibrational energy                        | Density   |
| 38 | Average velocity of molecules of a gas   | Zero                               | Positive                                  | Negative                                  | Infinity  |
| 39 | A system does 600 J of work and at the same time has its internal energy increased by 320 J .How much heat has been supplied | 280 J                              | 920 J                                     | 600 J                                     | 20 J  |
| 40 | The efficiency of a Carnot engine depends upon   | The temperature of the sink only   | The temperature of the source only        | The temperature of the source & sink only | The working substance   |
| 41 | If the temperature the sink is decreased the efficiency of a carnot engine   | Decreases                          | Increases                                 | Remains constant                          | First increases and then decreases                                |
| 42 | Entropy is the measure of  | Perfect order                      | Disorder                                  | Available energy                          | All of these  |
| 43 | The Gibbs Energy   | $H=G-TS$                           | $G=H-TS$                                  | $T=H-TG$                                  | None of these   |
| 44 | if $C_p$ and $C_v$ represents molar specific heats at constant pressure and at constant volume respectively ,then            | $C_p < C_v$                        | $C_p > C_v$                               | $C_p = C_v$                               | $C_p - 1/2 C_v$   |
| 45 | First law of thermodynamics when applied to an adiabatic process becomes   | $W= \Delta U$                      | $W= - \Delta U$                           | $Q= \Delta U$                             | $Q=W$   |
| 46 | The ideal gas equation $PV=$   | $nRT$                              | $NKT$                                     | $RK$                                      | $E_k$   |
| 47 | Internal energy is a unique function of state because change in internal energy  | Does not depend on path            | Depends on path                           | Corresponds to an adiabatic process       | Corresponds to an isothermal process                              |
| 48 | For a gas obeying Boyle's Law ,if the pressure is doubled ,the volume becomes  | One half                           | Double                                    | Three fourth                              | Remains constant  |
| 49 | The first law of thermodynamics is concerned with the conservation of  | Number of molecules                | Energy                                    | Number of moles                           | temperature   |
| 50 | Which of the following flows from a hot body to a cool body  | Energy                             | Temperature                               | Specific heat                             | Heat  |

**SUBJECTIVE PART**

*ALLOCATED TIME:-50 Minutes*

*TOTAL MARKS:-25*

**SHORT QUESTIONS**

**QUESTION#1:** Described the relation of different temperature scale

**QUESTION#2:** Write down the two versions of 2<sup>nd</sup> Law of Thermodynamics.

**QUESTION#3:** What is low temperature physics.

**QUESTION#4:** Define Entropy emphasize it with two examples.

**QUESTION#5:** Define the following: -

1-Calorie, how many Joules are present in one calorie.

2- Entropy in term of second law of thermodynamics.