Physics University Entrance Exam

Compiled for Grade 11 Students

Attending Cluster-Centered Tutorial

Program

Prepared for fourth Month

Feb. 2026

Addis Ababa

Choose the correct answer for the following questions

1. How much heat would be absorbed by 2 g of ice at 0^0C dropped into water at 0^0C, to melt it totally to water of 0₀C? (Latent heat of melting, L = 340,000J/Kg) (UEE: 2011).

   A. 680J. B. 840J. C. 340J. D. 420J

2. The direction of hat flow is from: (UEE: 2011).

   A. High pressure to low pressure. C. high density to low density.

   B. High temperature to low temperature. D. A point of higher emissivity to lower one.

3. The Zeroth law of thermodynamics states that: (UEE: 2003)

A. Two bodies that are separately in thermal equilibrium with a third body must be in thermal equilibrium with each other.

B. The increase in internal energy of a system is equal to the sum of the energy entering the system through heating, and the work done on the system.

C. No process is possible in which there is an overall decrease in the entropy of the universe.

D. No process or cycle is perfectly reversible and no refrigerator or heat engine can be perfectly efficient.

4. The second law of thermodynamics does **NOT** imply that :(UEE: 2003)

A. There is not any process in which there is an overall decrease in the entropy of the universe.

B. The complete conversion of energy from a hot source into work is not possible.

C. Heat flows from colder body to hotter body as in the refrigerator without work done on the system

D. Perfectly reversible processes are impossible.

5. Which of the following statement follows from kinetic theory of gases? (UEE:2003)

   A. The pressure of the gas is proportional to the average of square of molecular speed of particles.

   B. The molecules undergo inelastic collisions with each other & with the walls of the container.

   C. The forces between molecules of gas are strong at all times.

   D. Newton laws of motion are a consequence of kinetic theory of gases.

6. Which statement is NOT among the assumption made in the kinetic theory of gases? (UEE: 2004)

A. There is no interaction between particles or between particles and the wall except during collision.

B. Collisions between particles and between particles and the walls are perfectly elastic.

C. The volume occupied by the particle is negligible compared to the volume of the gas as a whole.

D. The distribution of velocities of particles is uniform.

7. The temperature of a gas is due to (UEE: 2004)

A. The kinetic energy of the molecules. C. The attractive force b/n the molecules.

B. The potential energy of the molecules. D. The repulsive force b/n the molecules.

8. An ordinary refrigerator is turned on and its door is left open in a thermally insulated kitchen. What is the temperature of the room? (UEE: 2005)

A. Increase according to the first law of thermodynamics.

B. Decrease according to the first law of thermodynamics.

C. Remains constant according to the first law of thermodynamics.

D. Remains constant according to the second law of thermodynamics.

9. Gas at a pressure P is contained in a vessel. If the masses of all the molecules are doubled and their speeds halved, then what will be the resulting pressure? (UEE:2005)

A. 2P B. P/3 C. P/2. D. 3P

10. Suppose two molecules of different mass are kept at the same temperature. Which one of the following statement is **NOT** true? (UEE: 2005)

A. Both remains at rest. C. The lighter molecules move faster.

B. Both move with the same speed. D. The heavier molecules move faster.

11. A given weight of a gas has a temperature of 27^0C and volume V. Keeping the pressure constant, the volume is increase to 3V by varying the temperature. What is the final temperature of the gas? (UEE: 2007)

A. 81^0C. B. 546^0C. C. 627^0C. D. 900^0C.

12. A device for transforming heat energy to mechanical energy is referred to as: (UEE: 2008)

A. transformer. C. generator

B. refrigerant. D. engine

13. Two bodies that are separately in thermal equilibrium with the third body must be in thermal equilibrium with each other. This statement is statement of: (UEE: 2008)

A. The first law of thermodynamics. C. The second law of thermodynamics

B. The zeroth law of thermodynamics. D. The third law of thermodynamics

14. If the internal energy of the system decreases, then what can be concluded about the heat and the work done? (UEE: 2010)

A. Heat is added to the system and work is done by system.

B. Heat is removed from the system and work is done on the system.

C. Heat is added to the system and work is done on the system.

D. Heat is removed from the system and work is done by system.

15. If a thermodynamic system undergoes a process in which its internal energy increased by 400J while doing 200J of work on its surrounding, then what is the energy absorbed in or extracted from it in the form of heat? (UEE: 2010)

A. -600J B. 600J. C. 200J. D. -200J

16. The amount of heat energy required to change a substance from liquid to gaseous state is known as:(UEE:2015)

A. Latent heat of fusion C. Latent heat of vaporization

B. Specific heat capacity D. quantity of heat

17. An inclined plane is 20m long and is inclined at an angle of 15^0 to the horizontal. If the effort required to push a block of weight 3,000N up the slope is 900N, what is the efficiency of the inclined plane? (UEE:2015)

A.25.9% B.30.0% C.100% D.86.7%

18. Which of the following activities of experiment is not necessary to determine the specific latent heat of vaporization of water? (UEE:2015)

A. measuring volume B. measuring time

C. measuring mass D. measuring temperature.

19. The length of an aluminum rod at a temperature of 20^0C is 3m. What will be the ratio of change in the length of the rod to its original length if its temperature is raised to 120^0C? The coefficient of linear expansion of aluminum is $2.31x10^{-5}k^{-1}$. (UEE: 2005)

A. 23%. B. 3.2%. C. 3%. D. 0.23%.

20. A cup of coffee at a temperature of 80^0C is placed on a table in a 20^0C room. What happens to the thermal energy and molecular motion of the coffee when it is left on the table? (UEE: 2006).

A. The thermal energy decrease and the molecules move slowly.

B. The thermal energy increase and the molecules move slowly.

C. The thermal energy decrease and the molecules move faster.

D. The thermal energy increase and the molecules move slowly.

21. Which of the following combination of properties would be most desirable for a heat sink in a machine? (UEE: 2006).

A. High specific heat and low conductivity. C. High specific heat and high conductivity.

B. Low specific heat and high conductivity. D. Low specific heat and low conductivity.

22. A glass flask whose volume is exactly 1000 cm^3 at 0^0C is totally filled with 1000 cm^3 of mercury at this temperature. When flask and mercury are heated to 100^0C, 15.2 cm^3 of mercury overflow. If the coefficient of volume expansion of mercury is 1.82×10^{-4} per Celsius degree, what should be the coefficient of volume expansion of the glass? (UEE:2006)

A. 1.52×10^{-4}/**0**C. C. 3.00×10^{-5}/**0**C

B. 1.82×10^{-4}/**0**C D. 1.00×10^{-5}/**0**C

23. The amount of heat required to raise the temperature of an object of mass m = 1 kg by 1 Kelvin is known as--------. (UEE:2007)

A. Specific heat capacity. C. Expansion coefficient

B. Heat capacity D. Internal energy.

24. The number of joules oh heat energy required to raise the temperature of a body by 1 K is:(UEE: 2008)

A. Heat capacity. C. Expansion coefficient.

B. Specific heat capacity. D. calorific value.

25. A metal ball has a diameter that is slightly greater than the diameter of a hole that has been cut into a metal plate. The coefficient of linear expansion for the metal from which the ball is made is greater than for the metal of the plate. Which one of the following procedures can be used to make the ball pass through the hole? (UEE:2008)

A. Raise the temperature of the ball and the plate by the same amount.

B. Heat the ball and cool the plate.

C. Lower the temperature of the ball and the plate by the same amount.

D. There is no way of passing the ball through the hole.

26. On an unknown scale *X*, the ice-point temperature is 50^0X and the steam-point temperature is 200^0X. If the temperature is 60^0C, then what is the reading in ^0X? (UEE:2009)

A. 90^0X. B. 140^0X. C. 15^0X. D. 333^0X.

27. Metal **A** has a coefficient of linear expansion that is three times the coefficient of linear expansion of metal **B**. How does their coefficient of the area expansion, Y, compare? (UEE:2009)

A. $Y_A = 2Y_B$. B. $Y_A = 3Y_B$. C. $Y_A = 4Y_B$. D. $Y_A = 6Y_B$.

28. Three metals are in contact and are in thermal equilibrium. The metals have different specific heat capacity. What can be concluded about the temperature of the metals? (UEE:2009)

A. Since they have different specific heat capacity, they must have different temperature at thermal equilibrium.
B. They must have the same temperature at thermal equilibrium.
C. They must have different internal energy.
D. They must have different kinetic energy.

29. A wheel and axle of radii 40cm and 8cm, respectively, is used to lift a bucket of 6kg of water from a well by applying an effort of 20N on the wheel. The percentage efficiency of this simple machine is (UEE:2017)

A.60% B.66.7% C.30% D.80%

30. The amount of heat energy required to raise the temperature of a given substance by 1^0C is (UEE:2017)

A. Latent heat C. heat capacity
B. Quantity of heat D. specific heat capacity

31. A square metal plate of coefficient of linear expansion α, has a surface area A_0 at a temperature T_0. If the temperature is raised by an amount ΔT, then the plate surface area is changed to A which is expressed as(UEE:2017)

A. $A= A_0(1 + \alpha\Delta T)$ C. $A = A_0(1 + 2\alpha\Delta T)$
B. $A= A_0(1 +3\alpha\Delta T)$ D. $A = 2A_0(1 + \alpha\Delta T)$

32. How much heat energy is required to change 5kg of ice at -20^0C to water at 10^0C? (Specific heat capacities of water in liquid and solid phases are 4.2KJ/kg^{0}C and 2.1KJ/kg^{0}C, respectively, and latent heat of fusion of water, L_f = 33600J/kg) (UEE:2017)

A. 2.10×10^6J B. 1.89×10^6J C. 4.20×10^5J D. 1.68×10^6J

33. Which one of the following phenomena occurs during change of phases of a matter? During a phase change from: (UEE:2017)

A. Solid to liquid, heat energy is released from a substance while its temperature remains constant.
B. Gas to liquid, heat energy is absorbed by a substance while its temperature remains constant.
C. liquid to gas, heat energy is absorbed by a substance while its temperature remains constant.
D. Liquid to solid, heat energy is released from a substance while its temperature changes uniformly.

34. At normal condition, solids are almost incompressible compared to liquids and gases. The reason is that (UEE:2017)

A. Their atoms are relatively fixed distance apart and held together.
B. Their atoms are free to slide about and interact with neighbors.
C. There is much space and little force between atoms.
D. Their atoms vibrate and free to move.