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Class: XI
Subject: Physics
Topic: Thermodynamics
No. of Questions: 30

Q1. Equal masses of He and O_2 gases are given equal quantities of heat. Which will undergo a greater temperature rise?

a. He gas
b. O_2 gas
c. Same in both gases
d. None of these

Q2. An engine absorbs 1200 calories of heat from the sources and rejects 1000 calories of heat to the sink per cycle. What is the thermal efficiency?

a. 15%
b. 17%
c. 19%
d. 21%

Q3. What does the area under P-V diagram represent?

a. The conduction of a system
b. Work done on or by the system
c. A thermodynamic process
d. All of the above

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Q4. The first law of thermodynamics is a special case of _____

a. Newton's law

b. Law of conservation of energy

c. Charle's law

d. The law of heat exchange

Q5. The energy emitted per second by a black body at 1227°C is B. If the temperature of the black body is increased to 2727°C. The energy emitted per second in terms of B is _____

a. 16 B

b. 10 B

c. 8 B

d. 5 B

Q6. Which instrument is used to measure thermal radiation?

a. Thermocouple

b. Hygrometer

c. Bolometer

d. Galvanometer

Q7. A comfortable room temperature is 72°F. What is the temperature in degree Celsius?

a. 36°C

b. 144°C

c. 22°C

d. 11°C

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Q8. In a thermodynamic process, 500 J of heat is given to a gas and 200 J of work is also done on it. What is the change in internal energy of the gas?

a. 400 J

b. 500 J

c. 600 J

d. 700 J

Q9. An engine absorbs 2000 calories of heat from source and rejects 1800 calories of heat to the sink per cycle. What is its thermal efficiency?

a. 10%

b. 20%

c. 30%

d. 40%

Q10. The pressure and density of a diatomic gas $\left(r = \frac{7}{5}\right)$ change adiabatically from (P, ρ) to (P', ρ). If $\left(\frac{\rho'}{\rho}\right)$ = 32, then (P'/ P) would be _____

a. $\frac{1}{28}$

b. 128

c. 32

d. $\frac{1}{64}$

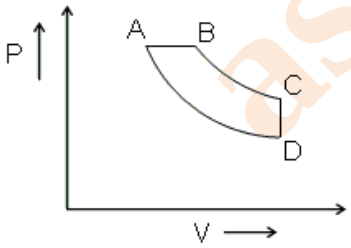
Q11. A ball of mass 2 kg falls from a height of 20 m on the ground and it rebounds to a height of 0.2 m. If the loss in P.E. is absorbed by the ball as heat, then what will be the temperature rise? (Specific heat of material = 0.09 cal $gm^{-1}°C^{-1}$)

a. $\frac{5}{3}$ °C
b. $\frac{4}{11}$ °C
c. $\frac{8}{2}$ °C
d. $\frac{11}{21}$ °C

Q12. In an isobaric process

a. pressure is constant
b. volume is constant
c. temperature is constant
d. internal energy is constant

Q13. In the given P-V diagram, the isochoric and thermal parts are represented by _____



a. BC, CD
b. AD, CD
c. CD, DA
d. AB, AD

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Q14. What is the coefficient of performance of a refrigerator between 10 °C and 42 °C?

a. 8.84

b. 7.87

c. 10.79

d. 6.74

Q15. A car of mass 2000 kg is stopped by applying the brakes and the heat produced is 50 kCals. The speed of the car before applying the brakes was _____

a. 14.5 m/s

b. 29 m/s

c. 42 m/s

d. 33.7 m/s

Q16. Two kilocalories of heat are supplied to a system. The internal energy of the system rises by 5030 J and external work done is 3350 J. What is the value of J?

a. 2.21×10^3 J/Kcal

b. 3.12×10^3 J/Kcal

c. 4.19×10^3 J/Kcal

d. 5.21×10^3 J/Kcal

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Q17. In a thermodynamic process, pressure of a fixed mass of gas is changed in such a manner that the gas releases 30 J of heat and 8 J of work is done on the gas. If the initial internal energy of the gas is 40 J, what will be the final internal energy?

a. 15 J

b. 18 J

c. 21 J

d. 24 J

Q18. A box with rigid insulating walls is divided into 2 parts by a partition. An ideal gas occupies half the box and the other half is completely evacuated. The partition is suddenly removed. What happens to the temperature of the gas?

a. Increases

b. Decreases

c. First increases then decreases

d. Remains the same

Q19. Which of the following statements is/are true?

a. The internal energy of an ideal gas changes by heating or cooling.

b. When a piece of lead is hammered its internal energy decreases.

c. When a hot piece of iron is immersed in water, it decreases the internal energy of water.

d. All of the above

Q20. A substance absorbs an amount of heat θ_1 in going from one state to another and releases an amount of heat θ_2 in coming back from the second state to the first state. How much work is done by the substance?

a. $\frac{\theta_1}{\theta_2}$

b. $\theta_1 - \theta_2$

c. $\frac{\theta_2}{\theta_1}$

d. $\theta_1 + \theta_2$

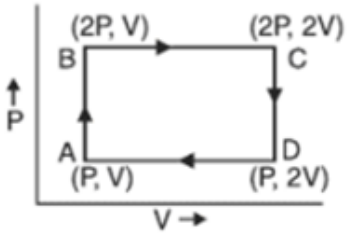
Q21. On what factors, does the efficiency of Carnot engine depend?

Q22. Plot a graph between internal energy U and Temperature (T) of an ideal gas.

Q23. What is the specific heat of a gas in an adiabatic process.

Q24. Write two limitation of the first law of thermodynamics.

Q25. An ideal monatomic gas is taken round the cycle ABCDA as shown.



Q26. Two bodies at different temperatures T_1 and T_2. If brought in thermal contact do not necessarily settle to the mean temperature $(T_1 + T_2) / 2$ Explain?

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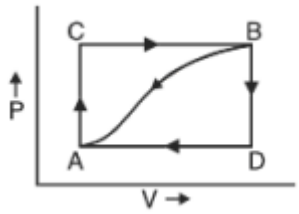
Q27. When a system is taken from state A to state B along the path ACB, 80 Kcal of heat flows into the system and 30 kcal of work done.

a. How much heat flows into the system along path ADB if the work done is 10 kcal?

b. When the system is returned from B to A along the curve path. The work done is 20 kcal. Does the system absorb or liberate heat.

c. If $U_A = 0$ and $U_D = 40$ kcal, find the heat absorbed in the process AD



Q28. A perfect cannot engine utilizes an ideal gas the sources temperature is 500k and sink tempertature is 375k. If the engine takes 600k cal per cycle

(i) The efficiencty of engine

(ii) Work done per cycle

(iii) Heat rejected to sink per cycle.

Q29. $\frac{1}{2}$ mole of helium is contained in a container at S.T.P. How much heat energy is needed to double the pressure of the gas, keeping the volume constant? Heat capacity of gas is 3 J$g^{-1}k^{-1}$.

Q30. The temperature T_1 and T_2 of the two heat reservoirs in an ideal cannot engine be 1500°C and 500°C respectively. Which of these increasing T_1 by 100°C or decreasing T_2 by 100°C would result in a greater important in the efficiency of the engine.