



PHYSICS

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(ASSAMESE ENGLISH)

THERMODYNAMICS

Example

1. write down about applications of first law of thermodynamics .



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2. What is reversible and irreversible processes ?



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3. what are the conditions for reversible process ?



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4. what is refrigerator ?



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5. What is carnot's theorem .



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6. what is kelvin-planck statement .



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7. what is clausius statement .



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Exercise

1. State the first law of thermodynamics .



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2. What is meant by internal energy of a thermodynamical system ?



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3. What is an irreversible change ?



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4. Why is the efficiency of a Carnot's engine not 100%?



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5. state the factors upon which the efficiency of a heat engine depends .



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6. can a heat engine convert full intake of heat into work ?



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7. An ideal gas is compressed isothermally .

Does its internal energy increase ?



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8. what do you mean by thermal equilibrium ?



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9. how can you define temperature in thermodynamics ?





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10. how is a heat engine different from a refrigerator?



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11. state the second law of thermodynamics .



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12. what do you mean by thermal equilibrium ?



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13. what is guasi-static process ?



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14. how guasi-static achieved ?



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15. what is reversible process ?under what condition can a process be reversible ?



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16. Establish the relation $T^\gamma P^{(1-\gamma)}$
=constant for adiabatic variation .



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17. State and explain zeroth law of thermodynamics .



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18. State the first law of thermodynamics .



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19. what are limitations of first law of thermodynamics.



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20. What is an adiabatic process ?



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21. obtain the adiabatic equation $PV^\gamma = \text{constant}$ from the first law of thermodynamics .



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22. From the first law of thermodynamics derive the relation $C_p - C_v = R$ where the symbols have their usual meanings .



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23. Define efficiency of a heat engine .can you design an engine which has the 100% efficiency ?



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24. Obtain an expression for work done in an isothermal expansion .



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25. obtain the expression for work done in adiabatic expansion .



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26. What is reversible and irreversible processes ?



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27. Describe the various operation of a carnot's reversible engine and obtain and expression its efficiency .



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28. What is reversible and irreversible processes ?



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29. state the second law of thermodynamics .



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30. Assuming that the working substance of a carnot's engine is a perfect gas show that the ratio of heat rejected at the sink to that extracted from the source equals the ratio of absolute temperature of the sink and the source .



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31. On what does the efficiency of a heat engine depends ?



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32. How can the efficiency of a reversible engine be 100%?



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33. How does a gas do work when its expands adiabatically ?



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34. An amount of heat Q is supplied to a monatomic ideal gas to expand at constant volume .calculate the ratio of work w done by the gas and the heat supplied .



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35. Can the whole of work be converted into heat ?



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36. Can the whole of heat be converted into work ?



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37. can two isothermal curves intersect each other ?



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38. What happens when a thermoflask containing some gas is shaken vigorously ?



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39. can a room be cooled by leaving the door of a refrigerator open ?



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40. During adiabatic expansion a gas cools - explain the reason .



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41. Find the efficiency of a carnot's engine working between 500K and 300K



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42. An inventor claims to have developed an engine working between 600k and 300k of having an efficiency of 52% . Comment on his claims .



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43. An ideal heat engine takes in heat at 1520K and rejects heat at 380K . What is the efficiency of that engine?



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44. An ideal engine takes in heat at 1000K and rejects heat 300K . Calculate its efficiency.



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45. A Carnot's engine has an efficiency of 50% when its sink's temperature is 27 degree C. What must be the change in its source temperature for increasing its efficiency to 60%?



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46. Find the efficiency of a Carnot's engine that works between the temperatures 427 degree C and 27 degree C of the source and the sink.

respectively . If the 140 calories of heat are absorbed from the source by the engine in one cycle calculate the heat rejected into the sink .



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47. Find the efficiency of a Carnot's engine that works between the temperature 427 degree C and 27 degree C of the source and the sink respectively . If the 140 calories of heat are absorbed from the source by the engine in

one cycle calculate the heat rejected into the sink .



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48. The internal energy of a perfect gas does not change during

- A. Isothermal process
- B. adiabatic process
- C. isobaric process
- D. isochoric process

Answer: A



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49. Which of the following phenomena are reversible ?

A. Water fall

B. rusting of iron

C. producing of heat by rubbing

D. charging a battery

Answer: D



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50. The first law of thermodynamics is a law of conversion of

A. enegy

B. momentum

C. both energy and momemtum .

D. neither nergy nor momemtum

Answer: A



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51. In reversible process the entropy of the universe

- A. increases
- B. decreases
- C. remains constant
- D. fluctuates

Answer: C



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52. To melt 1gm of ice completely the amount of work to be done is

A. 42J

B. 4.2J

C. 336J

D. 80J

Answer: C



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53. The temperature of source and sink of a carnot engine are 400K and 300k respectively its efficiency is

A. 1

B. 0.333

C. 0.75

D. 0.25

Answer: D



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54. 110J of heat is supplied to a gaseous system whose internal energy increases by 40J . The amount of external work done is

A. 150J

B. 70J

C. 110J

D. 40J

Answer: B



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55. A sample of gas expands from volume V_1 to V_2 the amount of work done by the gas is greatest . When the expansion is

- A. Isothermal process
- B. isobaric
- C. adiabatic
- D. equal in all cases

Answer: B



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56. Efficiency of an engine is η_1 at $T_1 = 200$ degree C and $T_2 = 0$ degree C and η_2 at $T_1 = 0$ degree C and $T_2 = -200$ degree C find the ratio of $\frac{\eta_1}{\eta_2}$

A. 1

B. 0.721

C. 0.577

D. 0.34

Answer: C



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57. The ratio of specific heat of a gas at constant pressure to that constant volume is γ . The change in internal energy of one mole of a gas when volume changes from V to $2V$ at constant pressure P is

A. $\frac{R}{\gamma - 1}$

B. PV

C. $P \frac{V}{\gamma - 1}$

D. $\gamma P \frac{V}{\gamma - 1}$

Answer: C



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58. The latent heat of vaporisation of water is 2240J if the work done in the process of vaporisation of 1g is 168J the increase in internal energy is

A. 2072J

B. 1904J

C. 2408J

D. 2240J

Answer: A



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59. A refrigerator with its power on, is kept in a closed room with its door open. The temperature of the room will

A. rise

B. fall

C. remains same

D. depend on the area of the room

Answer: A



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