1. A Carnot engine working between $300\ K$ and 600*K* has work output of 800 *J* per cycle. What is amount of heat energy supplied to the engine from source per cycle

(a) 1800 *J/cycle* (b) 1000 *J/cycle*
(c) 2000 *J/cycle* (d) 1600 *J/cycle*

2. The coefficient of performance of a Carnot refrigerator working between $30^o C$ and $0^o C$ is

(a) 10 (b) 1
(c) 9 (d) 0

3. Irreversible process is

(a) Adiabatic process
(b) Joule-Thomson expansion
(c) Ideal isothermal process
(d) None of the above

4. For a reversible process, necessary condition is

(a) In the whole cycle of the system, the loss of any type of heat energy should be zero
(b) That the process should be too fast
(c) That the process should be slow so that the working substance should remain in thermal and mechanical equilibrium with the surroundings
(d) The loss of energy should be zero and it should be *quasistatic*

5. In a cyclic process, work done by the system is

(a) Zero
(b) Equal to heat given to the system
(c) More than the heat given to system
(d) Independent of heat given to the system

6. An ideal gas heat engine operates in a Carnot's cycle between $227^o C$ and $127^o C$. It absorbs 6 × 10^4 *J* at high temperature. The amount of heat converted into work is ....

(a) $4.8 \times 10^4\ J$ (b) $3.5 \times 10^4\ J$
(c) $1.6 \times 10^4\ J$ (d) $1.2 \times 10^4\ J$

7. An ideal heat engine exhausting heat at $77^o C$ is to have a 30% efficiency. It must take heat at

(a) $127^o C$ (b) $227^o C$
(c) $327^o C$ (d) $673^o C$

8. A Carnot's engine used first an ideal monoatomic gas then an ideal diatomic gas. If the source and sink temperature are $411^o C$ and $69^o C$ respectively and the engine extracts 1000 *J* of heat in each cycle, then area enclosed by the *PV* diagram is

(a) 100 *J* (b) 300 *J*
(c) 500 *J* (d) 700 *J*

9. A Carnot engine absorbs an amount *Q* of heat from a reservoir at an abosolute temperature *T* and rejects heat to a sink at a temperature of *T*/3. The amount of heat rejected is

(a) $Q/4$ (b) $Q/3$
(c) $Q/2$ (d) $2Q/3$

10. The temperature of sink of Carnot engine is $27^o C$. Efficiency of engine is 25%. Then temperature of source is

(a) $227^o C$ (b) $327^o C$
(c) $127^o C$ (d) $27^o C$

11. In a Carnot engine, when $T_2 = 0^o C$ and $T_1 = 200^o C$, its efficiency is η_1 and when $T_1 = 0\ ^o C$ and $T_2 = -200\ ^o C$, Its efficiency is η_2, then what is η_1 / η_2

(a) 0.577 (b) 0.733
(c) 0.638 (d) Can not be calculated

12. A Carnot engine operates between $227^o C$ and $27^o C$. Efficiency of the engine will be

(a) $\frac{1}{3}$ (b) $\frac{2}{5}$
(c) $\frac{3}{4}$ (d) $\frac{3}{5}$

13. A measure of the degree of disorder of a system is known as

(a) Isobaric (b) Isotropy
(c) Enthalpy (d) Entropy

14. Efficiency of a Carnot engine is 50% when temperature of outlet is 500 K. In order to increase efficiency up to 60% keeping temperature of intake the same what is temperature of outlet

(a) 200 K (b) 400 K
(c) 600 K (d) 800 K

15. Even Carnot engine cannot give 100% efficiency because we cannot

(a) Prevent radiation
(b) Find ideal sources
(c) Reach absolute zero temperature
(d) Eliminate friction

16. "Heat cannot by itself flow from a body at lower temperature to a body at higher temperature" is a statement or consequence of

(a) Second law of thermodynamics
(b) Conservation of momentum
(c) Conservation of mass
(d) First law of thermodynamics

17. A Carnot engine takes $3\times10^6\,cal$. of heat from a reservoir at 627°C, and gives it to a sink at 27°C. The work done by the engine is

(a) $4.2\times10^6\,J$ (b) $8.4\times10^6\,J$
(c) $16.8\times10^6\,J$ (d) Zero

18. The efficiency of Carnot engine when source temperature is T_1 and sink temperature is T_2 will be

(a) $\frac{T_1-T_2}{T_1}$ (b) $\frac{T_2-T_1}{T_2}$
(c) $\frac{T_1-T_2}{T_2}$ (d) $\frac{T_1}{T_2}$

19. An ideal refrigerator has a freezer at a temperature of $-13°C$. The coefficient of performance of the engine is 5. The temperature of the air (to which heat is rejected) will be

(a) 325°C (b) 325K
(c) 39°C (d) 320°C

20. In a mechanical refrigerator, the low temperature coils are at a temperature of – 23°C and the compressed gas in the condenser has a temperature of 27°C. The theoretical coefficient of performance is

(a) 5 (b) 8
(c) 6 (d) 6.5