UNIT = 17 SECOND LAW OF THERMODYNAMICS

MULTIPLE CHOICE QUESTIONS (BOOK XII)

1. A frictionless heat engine can be 100% efficient only if its exhaust temperature is:
   (a) 0°C
   (b) Equal to its input temperature
   (c) 0 K
   (d) half of its input temperature
2. A refrigerator, with its door open. The temperature of the room will
   (a) Rise
   (b) Fall
   (c) Remains the same
   (d) Rise or fall depending on the area of the room
3. Which device is not used in a diesel engine
   (a) Outlet Valve
   (b) Piston
   (c) Sparking Plug
   (d) Injector
4. Which one of the following processes is irreversible?
   (a) Slow compression of an elastic spring
   (b) Slow evaporation of a substance in an isolated vessel
   (c) Slow compression of a gas
   (d) A chemical explosion
5. According to 2nd law of thermodynamics, 100% conversion of heat into mechanical work is:
   (a) Possible
   (b) Possible, if the conditions are ideal
   (c) Not possible
   (d) Possible, if the process is adiabatic
6. The change in entropy is given by
   (a) $\Delta S = \frac{\Delta Q}{T}$
   (b) $\Delta S = \Delta Q \, . T$
   (c) $\Delta S = \frac{\Delta U}{T}$
   (d) $\Delta S = \frac{\Delta W}{T}$
7. The net change in entropy as a system in a natural process is
   (a) Positive
   (b) Negative
   (c) Zero
   (d) infinity
8. The efficiency of diesel engines is
   (a) Greater than petrol engine
   (b) Less than petrol engine
   (c) Equal to petrol engine
   (d) both have efficiency 1
9. The second law of thermodynamics states that:
   (a) Energy can't be converted.
   (b) Entropy decreases over time.
   (c) Heat flows from cold to hot.
   (d) Entropy increases over time
10. The process violates the 2nd law of thermodynamics is:
    (a) Refrigerator cooling.
    (b) The heat engine working.
    (c) Gases mixing.
    (d) Heat flowing from cold to hot.

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EXAMS PRACTICE MULTIPLE CHOICE QUESTIONS

1 Second law of thermodynamics defines...
(a) Pressure (b) Enthalpy
(c) Entropy (d) Internal energy

2 The refrigerator and heat pump work on which principle?
(a) First law of thermodynamics
(b) Second law of thermodynamics
(c) Third law of thermodynamics
(d) Zeroth law of thermodynamics

3 Kelvin's plank statement shows the impossible of which type of machines.
(a) Perpetual motion machine 1
(b) Perpetual Motion Machines 2
(c) Perpetual motion machine 3
(d) None of the above

4 Which of the following has the minimum molecular mass,
(a) Oxygen (b) Nitrogen
(c) Hydrogen (d) methane

5 The change in entropy is negative when:
(a) Heat is absorbed
(b) Heat is evolved
(c) internal energy increases
(d) the temperature of the system increases

6 A refrigerator has a performance coefficient of 5. Calculate the ambient heat discharged if the temperature inside the freezer is -20oC
(a) 11 ℃ (b) 41 ℃
(c) 21℃ **(d) 31** ℃

7 A cyclic heat engine operates between a source temperature of 927 ºC and a sink temperature of 27 ºC. What will be the maximum efficiency of the heat engine?
(a) 100 % (b) 60 %
(c) 75 % (d) 10 %

8 The irreversibility in the system caused by friction is an example of
(a) internal irreversibility (b) external irreversibility
(c) frictional irreversibility (d) chemical irreversibility

9 The area of a Carnot cycle represents
(a) useful work (a) energy loss due to leakage
(a) heat rejected (a) heat absorbed

10 The efficiency of a Carnot engine is given by:
(a) $\left(1-\frac{T_1}{T_2}\right)$ (b) $\left(\frac{T_1}{T_2}-1\right)$
(c) $\left(\frac{T_2}{T_1}-1\right)$ (d) $\left(1+\frac{T_1}{T_2}\right)$

11 The efficiency of the Carnot engine operating with reservoir temperatures at 500 K and 100 K will be

(a) 20 % (b) 30 %

(c) 60 % **(d) 80 %**

12 The efficiency of the Carnot cycle may be increased by

(a) increasing the highest temperature

(b) decreasing the highest temperature

(c) increasing the lowest temperature

(d) decreasing the lowest temperature

13 The property of a working substance which increases or decreases as the heat is supplied or removed reversibly is known as

(a) enthalpy (b) internal energy

(c) entropy (d) external energy

14 A system that exchanges both mass and energy with its surroundings is called……..

(a) closed system **(b) open system**

(c) isolated system (d) equilibrium system

15 The correct sequence of the processes taking place in a Carnot cycle is…….

(a) adiabatic- adiabatic- isothermal- isothermal

(b) adiabatic- isothermal- adiabatic_ isothermal

(c) isothermal-isothermal adiabatic -adiabatic

(d) isothermal -adiabatic isothermal-adiabatic.

16 For irreversible process,

(a) $\Delta S = \frac{\Delta Q}{T}$ **(b)** $\boldsymbol{\Delta S > \frac{\Delta Q}{T}}$

(c) $\Delta S < \frac{\Delta Q}{T}$ (d) $\Delta S = \frac{T}{\Delta Q}$

17 For a reversible process,

(a) $\boldsymbol{\Delta S = \frac{\Delta Q}{T}}$ (b) $\Delta S > \frac{\Delta Q}{T}$

(c) $\Delta S < \frac{\Delta Q}{T}$ (d) $\Delta S = \frac{T}{\Delta Q}$

18 The enthalpy of a substance is defined as

(a) $\Delta H = \Delta U - P\,\Delta V$ **(b)** $\boldsymbol{\Delta H = \Delta U + P\,\Delta V}$

(c) $\Delta U = \Delta H + P\,\Delta V$ (d) $\Delta H = -\Delta U - P\,\Delta V$

19 Otto cycle is perfectly……

(a) Irreversible and reversible (b) Reversible

(c) irreversible (d) none of the above

20 The practical efficiency of diesel engines is about

(a) 55 % **(b) 45 %**

(c) 20% (d) 10%