

ISRO **Mechanical Engineering**

1. Which one of the following represents open thermodynamic system ?

- (a) Manual ice cream freezer
- (b) Centrifugal pump **(Ans)**
- (c) Pressure cooker
- (d) Bomb calorimeter

2. A thermodynamic system is considered to be an isolated one if

- (a) Mass transfer and entropy change are zero
- (b) Entropy change and energy transfer are zero
- (c) Energy transfer and mass transfer are zero **(Ans)**
- (d) Mass transfer and volume change are zero

3. Reduced pressure is

- (a) Always less than atmospheric pressure
- (b) Always unity
- (c) An index of molecular position of a gas **(Ans)**
- (d) Dimensionless

4. Match List - I with List - II and select the correct answer using the code given below the lists :

List - I

- (A) $n = \gamma$
- (B) $n = 1.4$
- (C) $n = 1.0$
- (D) $n = 0$

Codes :

- | | (A) | (B) | (C) | (D) | |
|-----|-----|-----|-----|-----|--------------|
| (a) | 4 | 3 | 2 | 1 | (Ans) |
| (b) | 1 | 3 | 2 | 4 | |
| (c) | 4 | 2 | 3 | 1 | |
| (d) | 1 | 2 | 3 | 4 | |

5. Match List-I with List - II and select the correct answer using the code given below the lists:

List - I

- (A) Interchange of matter is not possible in a
 (B) Any processes in which the system returns to its original condition or state is called
 (C) Interchange of matter is possible in a
 (D) The quantity of matter under consideration in thermodynamics is called

List - II

1. Open system
 2. System
 3. Closed system
 4. Cycle

Codes :

- | | (A) | (B) | (C) | (D) | |
|-----|-----|-----|-----|-----|--------------|
| (a) | 2 | 1 | 4 | 3 | |
| (b) | 3 | 1 | 4 | 2 | |
| (c) | 2 | 4 | 1 | 3 | |
| (d) | 3 | 4 | 1 | 2 | (Ans) |

6. A closed system is one in which

- (a) Mass does not cross boundaries of the system, though energy may do so **(Ans)**
 (b) Mass crosses the boundary but not the energy
 (c) Neither mass nor energy cross the boundary of the system
 (d) Both energy and mass cross the boundaries of the system

7. Work transfer between the system and the surroundings

- (a) Is a point function
 (b) Is always given by $\int P dv$
 (c) is a function of pressure only
 (d) Depends on the path followed by the system **(Ans)**

8. Air is being forced by the bicycle pump into a tyre against a pressure of 4.5 bars. A slow downward movement of the piston can be approximated as

- (a) Isobaric process
 (b) Adiabatic process
 (c) Throttling process
 (d) Isothermal process **(Ans)**

9. Isentropic flow is

- (a) Irreversible adiabatic flow
- (b) Reversible adiabatic flow **(Ans)**
- (c) Ideal fluid flow
- (d) Frictionless reversible flow

10. Increase in entropy of a system represents

- (a) Increase in availability
- (b) Increase in temperature
- (c) Decrease in pressure
- (d) Degradation of energy **(Ans)**

11. The value of $\oint dQ/T$ for an irreversible cycle is

- (a) Equal to zero
- (b) Greater than zero **(Ans)**
- (c) Less than zero
- (d) Unity

12. Lowest COP is of vapour

- (a) Compression cycle with superheated vapour
- (b) Compression cycle with dry compression
- (c) Compression cycle with wet compression
- (d) Absorption cycle **(Ans)**

13. The cycle in which heat is supplied at constant volume and rejected at constant pressure is known as

- (a) Dual combustion cycle
- (b) Diesel cycle
- (c) Atkinson cycle **(Ans)**
- (d) Rankine cycle

14. The boundary layer separation occurs when

- (a) Pressure gradient is positive
- (b) Pressure gradient is zero

(c) Pressure gradient is negative **(Ans)**

(d) None of the above

15. For minimum work input in a two-stage compression process the intermediate pressure is the

(a) Arithmetic mean of suction and discharge pressures

(b) Logarithmic mean of suction and discharge pressures

(c) Geometric mean of suction and discharge pressures **(Ans)**

(d) Hyperbolic mean of suction and discharge pressures

16. Air injection in IC engine refers to injection of

(a) Air only

(b) Liquid fuel only

(c) Liquid fuel and air **(Ans)**

(d) Supercharging air

17. Supercharging is the process of

(a) Supplying the intake of an engine with air at a density greater than the density of the surrounding atmosphere **(Ans)**

(b) Providing forced cooling air

(c) Injection of compressed air to remove combustion products fully

(d) Raising exhaust pressure

18. Turbo prop-engine has the following additional feature over the turbojet

(a) Propeller **(Ans)**

(b) Diffuser

(c) Starting engine

(d) Turbine and combustion chamber

19. In the SI engine, highest concentration of unburned hydrocarbon is observed during

(a) Maximum load **(Ans)**

(b) Acceleration

(c) Deceleration

(d) Idling

20. Match List-I with List - II and select the correct answer using the code given below the lists:

List - I

- (A) The rich mixture which provides maximum power gives large amounts of
- (B) The condition like wall quenching and wall deposits result in
- (C) Addition of tetraethyl lead is being eliminated because of
- (D) The normal compression ratio is dropped from 10.5 : 1 to 8 : 1

List - I

- 1. Hydrocarbon emission
- 2. NO_x in exhaust gases
- 3. CO and hydrocarbons in exhaust gases
- 4. Adverse effects on exhaust emission

Codes :

- | | (A) | (B) | (C) | (D) | |
|-----|-----|-----|-----|-----|--------------|
| (a) | 2 | 4 | 1 | 3 | |
| (b) | 3 | 4 | 1 | 2 | |
| (c) | 2 | 1 | 4 | 3 | |
| (d) | 3 | 1 | 4 | 2 | (Ans) |