A. Environmental & Safety Aspects in Car HVAC Systems

1. Which refrigerant replaced R-134a in most modern car HVAC systems due to environmental concerns?
   A) R-12
   B) R-22
   C) R-1234yf
   D) R-410A
   ✓**Answer: C**
2. The main environmental problem caused by old refrigerants like R-12 was:
   A) Global warming only
   B) Ozone layer depletion
   C) Acid rain
   D) Water pollution
   ✓**Answer: B**
3. Which gas from car AC systems contributes to global warming?
   A) Oxygen
   B) Carbon dioxide
   C) Refrigerant gas
   D) Nitrogen
   ✓**Answer: C**
4. The Global Warming Potential (GWP) of R-1234yf is:
   A) Very high
   B) Moderate
   C) Very low
   D) Zero
   ✓**Answer: C**
5. Which safety device protects the AC system from over-pressure?
   A) Evaporator
   B) Condenser
   C) Pressure relief valve
   D) Receiver dryer
   ✓**Answer: C**
6. Which of the following is a personal safety precaution for AC servicing?
   A) Wearing loose clothes
   B) Avoiding goggles
   C) Wearing gloves and safety glasses
   D) Disconnecting battery is unnecessary
   ✓**Answer: C**
7. Refrigerant leaks are dangerous mainly because they:
   A) Smell bad
   B) Are expensive
   C) Reduce oxygen level in closed areas
   D) Make engine noisy
   ✓**Answer: C**
8. Which tool is used to detect refrigerant leakage?
   A) Thermostat
   B) Manifold gauge

C) Leak detector
D) Ammeter
✓**Answer: C**

9. Why should refrigerant never be vented into the atmosphere?
A) It damages compressor
B) It increases cooling
C) It harms the environment
D) It reduces airflow
✓**Answer: C**
10. Which component removes moisture from the refrigerant?
A) Condenser
B) Receiver-drier
C) Compressor
D) Expansion valve
✓**Answer: B**

B. Fundamentals of Refrigeration and Air Conditioning

11. Refrigeration is the process of:
A) Heating a space
B) Cooling a space below atmospheric temperature
C) Removing humidity
D) Supplying hot air
✓**Answer: B**
12. The working fluid in refrigeration is called:
A) Coolant
B) Refrigerant
C) Lubricant
D) Water
✓**Answer: B**
13. In an air conditioning system, the main function of the evaporator is to:
A) Compress gas
B) Absorb heat
C) Reject heat
D) Pump refrigerant
✓**Answer: B**
14. Which component increases the pressure of the refrigerant?
A) Condenser
B) Compressor
C) Evaporator
D) Expansion valve
✓**Answer: B**
15. Air conditioning controls all except:
A) Temperature
B) Humidity
C) Air cleanliness

D) Fuel consumption
✓**Answer: D**

16. The SI unit of refrigeration capacity is:
A) Watt
B) Joule
C) Watt or kW
D) Pascal
✓**Answer: C**
17. The function of a condenser in an AC system is to:
A) Absorb heat
B) Reject heat to atmosphere
C) Increase pressure
D) Reduce temperature only
✓**Answer: B**
18. The device used to measure temperature is:
A) Hygrometer
B) Barometer
C) Thermometer
D) Anemometer
✓**Answer: C**
19. Relative humidity is defined as:
A) Amount of dry air
B) Amount of moisture compared to maximum moisture air can hold
C) Air pressure difference
D) Cooling capacity
✓**Answer: B**
20. Air-conditioning is different from refrigeration because it also controls:
A) Pressure
B) Only temperature
C) Humidity and air purity
D) Speed of air
✓**Answer: C**

C. Vapour Compression Cycle

21. The vapour compression cycle has how many main components?
A) 2
B) 3
C) 4
D) 5
✓**Answer: C**
22. The function of the expansion valve is to:
A) Increase pressure
B) Decrease pressure
C) Absorb heat
D) Reject heat
✓**Answer: B**

23. In which component does refrigerant absorb heat?
    A) Condenser
    B) Compressor
    C) Evaporator
    D) Expansion valve
    ✓**Answer: C**
24. Which process occurs in the compressor?
    A) Heat absorption
    B) Condensation
    C) Isentropic compression
    D) Throttling
    ✓**Answer: C**
25. Heat rejection occurs in the:
    A) Evaporator
    B) Compressor
    C) Condenser
    D) Expansion device
    ✓**Answer: C**
26. In a vapour compression cycle, the refrigerant leaves the evaporator as:
    A) Liquid
    B) Superheated vapour
    C) Subcooled liquid
    D) Wet vapour
    ✓**Answer: B**
27. The expansion process occurs at:
    A) Constant pressure
    B) Constant temperature
    C) Constant enthalpy
    D) Constant volume
    ✓**Answer: C**
28. The refrigerant enters condenser as:
    A) Low pressure liquid
    B) High pressure vapour
    C) Low pressure vapour
    D) High pressure liquid
    ✓**Answer: B**
29. Which cycle is used in car AC systems?
    A) Steam power cycle
    B) Vapour absorption cycle
    C) Vapour compression cycle
    D) Rankine cycle
    ✓**Answer: C**
30. COP of a refrigeration system is defined as:
    A) Work done / Heat absorbed
    B) Heat rejected / Work input
    C) Heat absorbed / Work input
    D) Work input / Heat rejected
    ✓**Answer: C**

A. Components of Car Air Conditioning System

1. The main function of the compressor in a car AC system is to:
   A) Store refrigerant
   B) Increase pressure of refrigerant
   C) Cool the refrigerant
   D) Absorb heat from cabin
   ✓**Answer: B**
2. Which component converts high-pressure refrigerant gas into liquid?
   A) Evaporator
   B) Compressor
   C) Condenser
   D) Receiver drier
   ✓**Answer: C**
3. The expansion valve in the AC system:
   A) Increases refrigerant temperature
   B) Reduces refrigerant pressure
   C) Removes moisture
   D) Compresses gas
   ✓**Answer: B**
4. The evaporator is usually located:
   A) In front of the radiator
   B) Inside the dashboard
   C) Near the engine block
   D) Under the car
   ✓**Answer: B**
5. Which component removes moisture from refrigerant?
   A) Condenser
   B) Receiver-drier
   C) Expansion valve
   D) Compressor
   ✓**Answer: B**
6. Refrigerant in a car AC absorbs heat inside the:
   A) Condenser
   B) Compressor
   C) Evaporator
   D) Receiver drier
   ✓**Answer: C**
7. Which of the following is NOT a part of a car AC system?
   A) Condenser
   B) Evaporator
   C) Fuel injector
   D) Compressor
   ✓**Answer: C**

B. Layout and Operation of HVAC System

8. The blower motor is used to:
   A) Cool engine
   B) Circulate air in the cabin
   C) Reduce fuel consumption
   D) Lubricate compressor
   ✓**Answer: B**
9. The cabin air filter is located:
   A) Before the compressor
   B) In air intake duct
   C) Inside the condenser
   D) In refrigerant pipe
   ✓**Answer: B**
10. The mode door in HVAC system controls:
    A) Refrigerant flow
    B) Engine speed
    C) Direction of airflow
    D) Pressure of refrigerant
    ✓**Answer: C**
11. In heating mode, warm air is produced using:
    A) Hot exhaust gases
    B) Hot engine coolant
    C) Hot compressor oil
    D) Hot radiator fan air
    ✓**Answer: B**
12. Recirculation flap helps to:
    A) Increase fuel efficiency
    B) Prevent refrigerant leakage
    C) Recirculate cabin air
    D) Increase compressor speed
    ✓**Answer: C**
13. In defrost mode, air is mainly directed towards:
    A) Rear seats
    B) Side doors
    C) Windshield
    D) Floor
    ✓**Answer: C**

C. Heating System

14. The heater core works as:
    A) A compressor
    B) A small radiator
    C) An expansion valve
    D) A condenser
    ✓**Answer: B**
15. Hot engine coolant flows from which part to the heater core?
    A) Fuel tank
    B) Exhaust pipe
    C) Engine block / cylinder head
    D) Brake lines
    ✓**Answer: C**
16. The main source of heat for automobile heating system is:
    A) Battery
    B) Engine waste heat
    C) Outside air
    D) Exhaust muffler
    ✓**Answer: B**
17. The function of heater control valve is to:
    A) Control refrigerant pressure
    B) Control coolant flow to heater core
    C) Control speed of blower
    D) Control temperature sensor
    ✓**Answer: B**

D. Ventilation System

18. The purpose of ventilation in a car is to:
    A) Heat the engine
    B) Supply fresh air
    C) Increase tyre pressure
    D) Improve acceleration
    ✓**Answer: B**
19. Which component removes dust before air enters the cabin?
    A) Expansion valve
    B) Condenser
    C) Cabin air filter
    D) Radiator
    ✓**Answer: C**
20. The blower motor in ventilation system is used to:
    A) Push refrigerant into condenser
    B) Draw in and circulate air
    C) Compress air
    D) Cool engine oil
    ✓**Answer: B**

A. MCQs on Human Comfort Conditions

1. The comfortable temperature range for most people is:
   A) 10–15°C
   B) 18–27°C
   C) 30–40°C
   D) 0–10°C
   ✓**Answer: B**
2. The ideal relative humidity for human comfort lies between:
   A) 10–20%
   B) 20–30%
   C) 40–60%
   D) 80–100%
   ✓**Answer: C**
3. High air velocity in a room causes:
   A) Better comfort
   B) Skin dryness
   C) Feeling of cold discomfort
   D) No effect
   ✓**Answer: C**
4. Human comfort mainly depends on:
   A) Temperature only
   B) Humidity only
   C) Air motion only
   D) Temperature, humidity and air motion
   ✓**Answer: D**
5. Which of the following reduces body heat through evaporation?
   A) Radiation
   B) Conduction
   C) Evaporation of sweat
   D) Convection
   ✓**Answer: C**
6. The ideal air velocity for human comfort in air conditioning is:
   A) 0.1 – 0.25 m/s
   B) 1 – 2 m/s
   C) 4 – 5 m/s
   D) 10 m/s
   ✓**Answer: A**
7. High relative humidity causes:
   A) Faster sweat evaporation
   B) Slower sweat evaporation
   C) Body cooling increases
   D) No effect on comfort
   ✓**Answer: B**
8. Which factor does NOT affect human comfort directly?
   A) Air temperature
   B) Noise level

C) Relative humidity
D) Air movement
✓**Answer: B**

9. Human body loses maximum heat through:
A) Evaporation
B) Radiation
C) Conduction
D) Respiration
✓**Answer: B**

10. The comfort zone is shown on:
A) T–S diagram
B) P–V diagram
C) Psychrometric chart
D) Mollier diagram
✓**Answer: C**

✓B. MCQs on Refrigerants Used in Car Air Conditioning & Their Properties

11. Which refrigerant is most commonly used in modern car AC systems?
A) R-12
B) R-134a
C) R-22
D) R-410A
✓**Answer: B**

12. Which refrigerant is widely used now due to its low global warming potential (GWP)?
A) R-12
B) R-1234yf
C) R-404A
D) R-717
✓**Answer: B**

13. The main reason R-12 was banned is because it:
A) Is expensive
B) Causes ozone depletion
C) Has low efficiency
D) Causes corrosion
✓**Answer: B**

14. Which property is important for a good refrigerant?
A) High boiling point
B) High toxicity
C) High latent heat of vaporization
D) High viscosity
✓**Answer: C**

15. Which of the following refrigerants is ozone-friendly?
A) R-12
B) R-22

C) R-1234yf
D) R-11
✓**Answer: C**

16. Which refrigerant has *zero Ozone Depletion Potential (ODP)*?
A) R-12
B) R-134a
C) R-1234yf
D) Both B and C
✓**Answer: D**
17. The chemical name of R-134a is:
A) Dichlorodifluoromethane
B) Tetrafluoroethane
C) Chlorodifluoromethane
D) Ammonia
✓**Answer: B**
18. Which refrigerant has very low Global Warming Potential compared to R-134a?
A) R-22
B) R-12
C) R-1234yf
D) R-407C
✓**Answer: C**
19. The refrigerant used should be:
A) Highly flammable
B) Highly toxic
C) Chemically stable
D) Highly corrosive
✓**Answer: C**
20. Which refrigerant is non-toxic and non-flammable?
A) R-717 (Ammonia)
B) R-12
C) R-134a
D) R-600a
✓**Answer: C**

A. MCQs on Refrigerant Charging Process for Car AC System

1. Before charging refrigerant, the system should be:
   A) Heated
   B) Pressurized
   C) Evacuated
   D) Oiled
   ✓**Answer: C**
2. Why is vacuum created before charging refrigerant?
   A) To increase pressure
   B) To remove air and moisture
   C) To cool the pipes
   D) To test compressor speed
   ✓**Answer: B**
3. Which instrument is used to measure high and low side pressure during charging?
   A) Thermometer
   B) Manifold gauge set
   C) Hydrometer
   D) Voltmeter
   ✓**Answer: B**
4. Undercharging the AC system results in:
   A) Excess cooling
   B) Compressor damage
   C) Reduced cooling effect
   D) Frost on condenser
   ✓**Answer: C**
5. Overcharging the refrigerant causes:
   A) Low pressure
   B) No cooling
   C) Higher system pressure
   D) Freezing of evaporator
   ✓**Answer: C**
6. Refrigerant should be charged in which state through the low-pressure side?
   A) Solid
   B) Liquid
   C) Vapor
   D) Plasma
   ✓**Answer: C**
7. Which component indicates correct refrigerant level in older systems?
   A) Sight glass
   B) Thermostat
   C) Clutch coil
   D) Fan motor
   ✓**Answer: A**
8. Which safety precaution is necessary during refrigerant charging?
   A) Keep system near fire
   B) Wear safety gloves and goggles
   C) Touch refrigerant directly

D) Work in closed room
✓**Answer: B**

9. The standard method of charging refrigerant in car AC is based on:
   A) Time method
   B) Pressure method
   C) Weight method
   D) Temperature method
   ✓**Answer: C**
10. After charging, which step should be performed?
   A) Disconnect compressor belt
   B) Check for leaks
   C) Switch off blower
   D) Open expansion valve
   ✓**Answer: B**

✓B. MCQs on Temperature Control System

11. The main function of the temperature control system is to:
   A) Control vehicle speed
   B) Maintain desired cabin temperature
   C) Control fuel injection
   D) Reduce engine load
   ✓**Answer: B**
12. The temperature sensor in a car HVAC system senses:
   A) Engine temperature
   B) Outside temperature only
   C) Cabin air temperature
   D) Tyre temperature
   ✓**Answer: C**
13. In automatic climate control, temperature is controlled by:
   A) Driver manually
   B) ECU and sensors
   C) Expansion valve only
   D) Radiator
   ✓**Answer: B**
14. Which component controls mixed hot and cold air?
   A) Compressor
   B) Condenser
   C) Blend door
   D) Evaporator
   ✓**Answer: C**
15. The thermostat in an HVAC system is used to:
   A) Control refrigerant pressure
   B) Sense cabin temperature
   C) Control compressor ON/OFF
   D) Control blower speed
   ✓**Answer: C**

16. Increasing blower speed will generally:
    A) Decrease cooling
    B) Increase cooling
    C) Stop compressor
    D) Increase humidity
    ✓**Answer: B**

✓C. MCQs on Humidity Control Systems

17. Which component helps in dehumidification in AC?
    A) Condenser
    B) Evaporator
    C) Compressor
    D) Expansion valve
    ✓**Answer: B**
18. Dehumidification occurs when:
    A) Air passes over warm coil
    B) Air passes over cold evaporator coil
    C) Air passes through radiator
    D) Air flows at high speed
    ✓**Answer: B**
19. Moist air loses its moisture due to:
    A) Increase in pressure
    B) Condensation of vapor
    C) Increase in temperature
    D) Air compression
    ✓**Answer: B**
20. High humidity inside car cabin causes:
    A) Better comfort
    B) Faster cooling
    C) Fogging of glass
    D) Lower temperature
    ✓**Answer: C**
21. The device used to measure relative humidity is:
    A) Barometer
    B) Hygrometer
    C) Anemometer
    D) Manometer
    ✓**Answer: B**
22. Which of these increases humidity control efficiency?
    A) Higher evaporator temperature
    B) Lower evaporator temperature
    C) Lower blower speed always
    D) Turning off AC
    ✓**Answer: B**
23.

A. Keyless Entry System – Purpose & Operation

1. The main purpose of a keyless entry system is to:
   A) Improve engine power
   B) Enable remote locking/unlocking of doors
   C) Increase fuel efficiency
   D) Control HVAC system
   ✓**Answer: B**
2. Which component sends the signal in a keyless entry system?
   A) Door actuator
   B) Car ECU
   C) Key fob (Transmitter)
   D) Receiver motor
   ✓**Answer: C**
3. Keyless entry systems generally operate using:
   A) Infrared waves
   B) Bluetooth only
   C) Radio Frequency (RF) signals
   D) Sound waves
   ✓**Answer: C**
4. In a keyless entry system, the receiver is located:
   A) Inside the key
   B) Inside the door lock
   C) Inside the vehicle body
   D) Near the battery
   ✓**Answer: C**
5. Rolling code technology is used in keyless systems to:
   A) Increase signal range
   B) Reduce battery usage
   C) Prevent theft by code duplication
   D) Improve door motor speed
   ✓**Answer: C**

✓B. Common Anti-Theft System

6. The main function of an anti-theft system is to:
   A) Increase car speed
   B) Prevent unauthorized vehicle use
   C) Improve braking
   D) Improve suspension
   ✓**Answer: B**
7. An engine immobilizer works by:
   A) Locking the steering wheel
   B) Cutting fuel or ignition system
   C) Locking the doors
   D) Activating the horn
   ✓**Answer: B**

8. Which of the following is an active anti-theft device?
   A) Steering wheel lock
   B) Gear lock
   C) Car alarm system
   D) Sunshade
   ✓**Answer: C**
9. Which sensor detects unauthorised entry into a car?
   A) Oxygen sensor
   B) Door sensor
   C) Temperature sensor
   D) MAF sensor
   ✓**Answer: B**
10. A vehicle immobilizer compares the:
    A) Engine RPM
    B) Fuel pressure
    C) Key code with ECU data
    D) Door position
    ✓**Answer: C**

✓C. Automatic Door Lock System

11. Automatic door lock system function is to:
    A) Lock doors when car reaches a certain speed
    B) Lock only driver's door
    C) Prevent engine overheating
    D) Increase tyre pressure
    ✓**Answer: A**
12. In many cars, automatic door locking activates when speed crosses:
    A) 5 km/h
    B) 10–15 km/h
    C) 40 km/h
    D) 80 km/h
    ✓**Answer: B**
13. Which sensor supports automatic door locking?
    A) Oxygen sensor
    B) Speed sensor
    C) Rain sensor
    D) Temperature sensor
    ✓**Answer: B**
14. The central locking system is controlled by:
    A) Radiator
    B) Body Control Module (BCM)
    C) Alternator
    D) ECU only
    ✓**Answer: B**
15. Automatic unlocking usually happens:
    A) When AC is turned off

B) When airbags deploy
C) When speed increases
D) When headlights turn on
✓**Answer: B**

✓D. Park Assist System

16. The main function of a park assist system is to:
    A) Increase braking power
    B) Help driver park safely
    C) Increase engine RPM
    D) Boost battery power
    ✓**Answer: B**
17. Park assist system uses which type of sensor most commonly?
    A) Temperature sensor
    B) Ultrasonic sensor
    C) Pressure sensor
    D) Oxygen sensor
    ✓**Answer: B**
18. The park assist system gives warning through:
    A) Engine sound
    B) Dashboard lights only
    C) Beeps and display indication
    D) Horn only
    ✓**Answer: C**
19. In automatic park assist, steering is controlled by:
    A) Driver
    B) Steering ECU
    C) Brake system
    D) GPS
    ✓**Answer: B**
20. Park assist sensors are usually mounted on:
    A) Roof of the car
    B) Side mirrors
    C) Front and rear bumpers
    D) Inside tyres
    ✓**Answer: C**

A. Automatic Headlight Dimming

1. The main purpose of automatic headlight dimming is to:
   A) Increase battery voltage
   B) Prevent dazzling of oncoming vehicles
   C) Make headlights brighter
   D) Improve fuel economy
   ✓**Answer: B**
2. Automatic headlight dimming mainly works based on:
   A) Vehicle speed
   B) Ambient light and oncoming vehicle light intensity
   C) Engine temperature
   D) Steering angle
   ✓**Answer: B**
3. Which sensor is used in automatic headlight dimming?
   A) Ultrasonic sensor
   B) Light sensor / Photodiode
   C) Oxygen sensor
   D) Speed sensor
   ✓**Answer: B**
4. When an oncoming vehicle is detected, the headlight system automatically switches from:
   A) Low beam to fog beam
   B) Low beam to parking light
   C) High beam to low beam
   D) High beam to off
   ✓**Answer: C**
5. The control of automatic dimming is handled by:
   A) Ignition switch
   B) Driver manually
   C) Body Control Module (BCM)
   D) Dashboard switch only
   ✓**Answer: C**

✓B. Automatic On/Off Headlights with Time Delay

6. Automatic headlight ON/OFF system automatically switches headlights:
   A) Based on fuel level
   B) According to light intensity
   C) Based on engine temperature
   D) Based on battery voltage only
   ✓**Answer: B**
7. The time delay in automatic headlight system is mainly used to:
   A) Save fuel
   B) Prevent frequent switching due to sudden light changes

C) Increase headlamp brightness
D) Reduce engine load
✓**Answer: B**

8. Which sensor supports automatic ON/OFF headlights?
   A) Rain sensor
   B) Light sensor
   C) Speed sensor
   D) Temperature sensor
   ✓**Answer: B**
9. The headlight usually turns ON automatically when:
   A) Sunlight is strong
   B) Car is parked
   C) Ambient light falls below a set level
   D) Speed increases
   ✓**Answer: C**
10. The "Follow-me-home" headlight feature is related to:
    A) Fog lights operation
    B) Automatic delay OFF headlight
    C) Brake light operation
    D) Turn signal system
    ✓**Answer: B**

✓C. Navigation Systems: GPS & GPRS

11. GPS stands for:
    A) Global Position Sensor
    B) Global Position System
    C) Geographical Position Satellite
    D) General Position System
    ✓**Answer: B**
12. GPS system helps in:
    A) Engine tuning
    B) Vehicle location tracking
    C) Fuel injection
    D) Airbag deployment
    ✓**Answer: B**
13. GPRS is mainly used in cars for:
    A) Wireless braking system
    B) Mobile data communication
    C) Cooling system control
    D) Engine lubrication
    ✓**Answer: B**
14. GPRS stands for:
    A) Global Packet Radio Service
    B) General Packet Routing System
    C) Global Position Radio Service

D) General Position Routing System
✓**Answer: A**

15. Which component receives GPS signals from satellites?
A) ECU
B) GPS receiver/antenna
C) BCM
D) Engine sensor
✓**Answer: B**
16. GPS requires how many satellites minimum for accurate positioning?
A) 1
B) 2
C) 3
D) 4
✓**Answer: D**
17. GPRS mainly helps in:
A) Offline navigation only
B) Real-time traffic updates and internet services
C) Headlamp brightness control
D) Fuel pressure regulation
✓**Answer: B**
18. Which system works without mobile network?
A) GPRS
B) Bluetooth
C) GPS
D) Wi-Fi
✓**Answer: C**
19. GPS navigation uses:
A) Sound waves
B) Radio waves
C) Infrared waves
D) Magnetic waves
✓**Answer: B**
20. GPS system accuracy mainly depends on:
A) Vehicle color
B) Number of satellites visible
C) Battery voltage
D) Tyre pressure
✓**Answer: B**

1. Environmental & Safety Aspects in Car HVAC

1. Which refrigerant is banned due to high ozone depletion potential?
   A) R134a
   B) R12
   C) R1234yf
   D) R410a
2. What is the main environmental issue caused by CFC refrigerants?
   A) Global warming
   B) Noise pollution
   C) Ozone layer depletion
   D) Water pollution
3. Which safety device prevents over-pressure in the AC system?
   A) Expansion valve
   B) Pressure relief valve
   C) Receiver drier
   D) Accumulator
4. Which component traps moisture to avoid acid formation?
   A) Compressor
   B) Condenser
   C) Receiver drier
   D) Evaporator
5. Refrigerant leakage in car AC can cause:
   A) Increased cooling
   B) Corrosion of system
   C) Engine overheating
   D) Fuel wastage

Answers: 1-B, 2-C, 3-B, 4-C, 5-B

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2. Fundamentals of Refrigeration & Vapour Compression Cycle

1. Refrigeration means _____.
   A) Heating of space
   B) Cooling below atmospheric temperature
   C) Increasing temperature
   D) Ventilation
2. Main function of refrigerant is to:
   A) Absorb heat
   B) Increase pressure
   C) Reduce humidity
   D) Provide ventilation

3. The vapour compression cycle consists of:
   A) Compressor, condenser, expansion valve, evaporator
   B) Fan, blower, motor, filter
   C) Heater, vents, ducts, blower
   D) Battery, alternator, motor, fan
4. In which component does refrigerant change from vapour to liquid?
   A) Evaporator
   B) Condenser
   C) Compressor
   D) Dryer
5. COP of a refrigeration system is:
   A) Power input / Cooling effect
   B) Cooling effect / Power input
   C) Heat rejected / Work done
   D) Work done / Heat absorbed

Answers: 1-B, 2-A, 3-A, 4-B, 5-B

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3. Components of Car Air Conditioning System

1. Which compresses refrigerant gas?
   A) Condenser
   B) Evaporator
   C) Compressor
   D) Receiver
2. Which component cools and condenses refrigerant?
   A) Compressor
   B) Evaporator
   C) Condenser
   D) Blower
3. Function of expansion valve is to:
   A) Increase pressure
   B) Control refrigerant flow
   C) Absorb heat
   D) Compress gas
4. Which device stores liquid refrigerant?
   A) Receiver drier
   B) Evaporator
   C) Fan
   D) Compressor
5. Which removes dust and pollen?
   A) Cabin air filter
   B) Evaporator
   C) Condenser
   D) Compressor

Answers: 1-C, 2-C, 3-B, 4-A, 5-A

4. Layout & Operation of HVAC System

1. HVAC stands for:
   A) Heating, Ventilation and Air Conditioning
   B) High Voltage Air Cooling
   C) Heating, Vapour and AC
   D) Heater Ventilation Application
2. Blower motor function is:
   A) Flow refrigerant
   B) Circulate air
   C) Compress refrigerant
   D) Heat coolant
3. Evaporator is located in:
   A) Engine bay
   B) Condenser area
   C) Cabin dashboard
   D) Fuel tank
4. Which controls airflow direction?
   A) Expansion valve
   B) Air vents
   C) Condenser
   D) Compressor
5. Recirculation mode:
   A) Brings fresh air always
   B) Reuses inside air
   C) Stops blower
   D) Heats engine

Answers: 1-A, 2-B, 3-C, 4-B, 5-B

5. Heating & Ventilation System

1. Car heating system uses heat from:
   A) Exhaust gas
   B) Battery
   C) Engine coolant
   D) Radiator fan
2. Heater core acts like:
   A) Condenser
   B) Evaporator
   C) Radiator
   D) Compressor
3. Ventilation system helps in:
   A) Increasing engine power

   B) Air circulation and fresh air supply
   C) Fuel injection
   D) Improving mileage
4. Blend door is used for:
   A) Mixing hot and cold air
   B) Compressing refrigerant
   C) Filtering air
   D) Cooling engine
5. Heater valve controls:
   A) Fuel supply
   B) Coolant flow
   C) Air flow
   D) Oil pressure

Answers: 1-C, 2-C, 3-B, 4-A, 5-B

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6. Human Comfort Conditions

1. Comfortable temperature range for car occupants is:
   A) 5–10°C
   B) 18–26°C
   C) 30–40°C
   D) Above 45°C
2. Comfort humidity range is:
   A) 10–20%
   B) 30–60%
   C) 70–90%
   D) 90–100%
3. Human comfort depends on:
   A) Temperature only
   B) Humidity only
   C) Temperature, humidity, air movement
   D) Sunlight only
4. High humidity causes:
   A) Excess cooling
   B) Sweating and discomfort
   C) Cold sensation
   D) No effect
5. Air movement improves comfort by:
   A) Increasing sweating
   B) Increasing evaporation of sweat
   C) Increasing humidity
   D) Stopping heat loss

Answers: 1-B, 2-B, 3-C, 4-B, 5-B

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7. Refrigerants Used in Car AC

1. Which refrigerant is currently used in most modern cars?
   A) R12
   B) R22
   C) R134a
   D) Ammonia
2. Eco-friendly refrigerant is:
   A) R1234yf
   B) R12
   C) R500
   D) R11
3. Main property of refrigerant:
   A) Non-toxic
   B) Non-flammable
   C) High latent heat
   D) All of the above
4. Which refrigerant has very low GWP?
   A) R134a
   B) R1234yf
   C) R22
   D) R410A
5. Refrigerant should have:
   A) High boiling point
   B) Low boiling point
   C) High density
   D) Poor heat transfer

Answers: 1-C, 2-A, 3-D, 4-B, 5-B

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8. Refrigerant Charging Process

1. Refrigerant charging is done:
   A) In liquid form
   B) In gaseous form
   C) Both
   D) Solid form
2. Overcharging results in:
   A) Poor cooling
   B) High compressor load
   C) Both A and B
   D) Engine stall
3. Undercharging causes:
   A) Ice formation
   B) Reduced cooling
   C) Compressor noise
   D) All of the above

4. Which tool is used for charging?
   A) Vacuum pump
   B) Manifold gauge set
   C) Screwdriver
   D) Multimeter
5. Before charging, system should be:
   A) Washed
   B) Dried and evacuated
   C) Filled with oil
   D) Heated

Answers: 1-C, 2-C, 3-B, 4-B, 5-B

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9. Temperature & Humidity Control Systems

1. Thermostat is used to:
   A) Control engine speed
   B) Control cabin temperature
   C) Control blower speed
   D) Control fuel flow
2. Humidity is reduced by:
   A) Heater core
   B) Evaporator
   C) Compressor
   D) Condenser
3. Climate control system is:
   A) Manual control
   B) Automatic control
   C) Mechanical only
   D) Electrical only
4. Cabin temperature sensor measures:
   A) Engine temp
   B) Outside temp
   C) Inside temp
   D) Refrigerant temp
5. Dehumidification occurs when:
   A) Air passes through evaporator
   B) Air passes through heater
   C) Fan stops
   D) Air is recirculated

Answers: 1-B, 2-B, 3-B, 4-C, 5-A

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10. Advanced Accessories & Driver Assistance Systems

A. Keyless Entry, Anti-theft & Auto Door Lock

1. Keyless entry works using:
   A) Bluetooth only
   B) Infrared or RF signal
   C) Wired connection
   D) Mechanical link
2. Immobilizer prevents:
   A) Door locking
   B) Engine starting without authorized key
   C) Fuel filling
   D) Brake operation
3. Auto door lock system locks doors when:
   A) Engine starts
   B) Speed exceeds set limit
   C) Brake applied
   D) AC switch ON
4. Central locking system:
   A) Locks all doors together
   B) Locks only driver door
   C) Locks engine
   D) Locks boot only
5. Anti-theft alarm activates when:
   A) Ignition ON
   B) Unauthorized attempt detected
   C) AC ON
   D) Door closed normally

Answers: 1-B, 2-B, 3-B, 4-A, 5-B

B. Park Assist System

1. Parking sensors use:
   A) Infrared waves
   B) Ultrasonic waves
   C) Radio waves
   D) Microwave
2. Park assist helps in:
   A) Lane changing
   B) Accurate parking
   C) Fuel control
   D) Suspension control
3. Reverse gear activates:
   A) Wiper
   B) Parking sensors

C) Headlights
D) AC

Answers: 1-B, 2-B, 3-B

C. Automatic Headlight Systems

1. Automatic headlight sensor detects:
   A) Engine temperature
   B) Light intensity
   C) Vehicle speed
   D) Obstacle distance
2. Automatic dimming works using:
   A) Ultrasonic sensor
   B) Light sensor
   C) Speed sensor
   D) Temperature sensor
3. Delay off headlight means:
   A) Light stays ON after ignition OFF
   B) Light stays ON while driving
   C) Light OFF immediately
   D) Light blinks

Answers: 1-B, 2-B, 3-A

D. GPS & GPRS

1. GPS stands for:
   A) Global Positioning System
   B) General Packet System
   C) Global Power Steering
   D) Graphical Position System
2. GPRS is used for:
   A) Navigation calculation
   B) Data transmission
   C) Vehicle braking
   D) Parking
3. GPS works using:
   A) Mobile towers
   B) Satellites
   C) Radar
   D) Infrared

Answers: 1-A, 2-B, 3-B

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11. Sealed Beam Headlight & Anti-Dazzle System

1. Sealed beam headlamp means:
   A) Bulb can be replaced separately
   B) Entire unit is sealed and replaced together
   C) Only lens is sealed
   D) Reflector is open
2. Main parts of sealed beam headlamp are:
   A) Bulb & battery
   B) Lens, reflector, filament
   C) Switch & relay
   D) Fuse & horn
3. Dazzle occurs due to:
   A) Low beam
   B) High beam
   C) Parking light
   D) Fog lamp
4. Anti-dazzle mirror helps reduce:
   A) Engine noise
   B) Glare from rear vehicles
   C) Fuel consumption
   D) Headlight brightness
5. Beam control is achieved by:
   A) Adjusting headlamp angle
   B) Changing colour
   C) Changing battery
   D) Changing horn

Answers: 1-B, 2-B, 3-B, 4-B, 5-A

1. Air Bag System

1. Air bag inflates mainly during:
   A) Side impact
   B) Rear collision
   C) Frontal collision
   D) Minor vibration
2. Air bags inflate within:
   A) 1 second
   B) 0.1 to 0.3 seconds
   C) 2 seconds
   D) After engine stops
3. Which sensor is used to detect crash?
   A) Temperature sensor
   B) Impact sensor
   C) Oxygen sensor
   D) Speed sensor
4. Which gas is commonly used for airbag inflation?
   A) Nitrogen
   B) Oxygen
   C) Hydrogen
   D) Carbon monoxide
5. SRS stands for:
   A) Safety Restraint System
   B) Supplemental Restraint System
   C) Secure Restrain System
   D) Safety Response System

✓Answers: 1-C, 2-B, 3-B, 4-A, 5-B

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2. Seat Belt System

6. Seat belt prevents:
   A) Vehicle rollover
   B) Occupant ejection during crash
   C) Engine failure
   D) Tyre burst
7. Three-point seat belt includes:
   A) Lap belt only
   B) Shoulder belt only
   C) Lap and shoulder belt
   D) Neck support
8. Seat belt pretensioner function is to:
   A) Loosen belt
   B) Tighten belt during collision

C) Protect engine
D) Activate air bag only

9. Which material is used in seat belts?
   A) Rubber
   B) Nylon
   C) Steel
   D) Cotton
10. Load limiter helps to:
   A) Increase belt force
   B) Reduce chest injury
   C) Increase speed
   D) Prevent engine overheating

✓Answers: 6-B, 7-C, 8-B, 9-B, 10-B

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3. Central Locking System

11. Central locking allows:
   A) Only driver door locking
   B) All doors to be locked/unlocked together
   C) Only boot door locking
   D) Engine locking
12. Central locking system works using:
   A) Hydraulic actuators
   B) Pneumatic actuators
   C) Electrical actuators
   D) Mechanical rods only
13. Remote key system transmits signals via:
   A) Wires
   B) RF waves
   C) Sound waves
   D) Light waves

✓Answers: 11-B, 12-C, 13-B

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4. Collapsible Steering Column

14. Main purpose of collapsible steering is to:
   A) Improve steering efficiency
   B) Absorb impact energy during crash
   C) Increase vehicle speed
   D) Reduce fuel consumption
15. In a frontal crash, rigid steering column can:
   A) Protect driver
   B) Increase driver injuries

C) Lock the brakes
D) Control vehicle direction

16. Collapsible steering column uses:
    A) Solid steel rod
    B) Breakaway sleeve / telescopic arrangement
    C) Plastic shaft
    D) Rubber coupling only

✓Answers: 14-B, 15-B, 16-B

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5. Anti-Lock Braking System (ABS)

17. Purpose of ABS is to:
    A) Increase brake wear
    B) Prevent wheel locking during braking
    C) Increase stopping distance
    D) Reduce fuel consumption
18. ABS works by:
    A) Locking all wheels
    B) Pumping the brakes manually
    C) Modulating brake pressure automatically
    D) Switching off brakes
19. Which sensor is used in ABS?
    A) Pressure sensor
    B) Wheel speed sensor
    C) Temperature sensor
    D) Oxygen sensor
20. ABS mainly improves:
    A) Steering control during braking
    B) Engine power
    C) Air conditioning
    D) Mileage

✓Answers: 17-B, 18-C, 19-B, 20-A

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6. Electronic Stability Control (ESC)

21. ESC is used to:
    A) Prevent engine overheating
    B) Prevent skidding and loss of control
    C) Improve air conditioning
    D) Increase speed
22. ESC functions by:
    A) Applying brakes to individual wheels
    B) Turning off engine

C) Locking steering
D) Increasing tyre pressure

23. ESC uses which sensors?
    A) Engine RPM sensor only
    B) Yaw rate, steering angle and wheel speed sensors
    C) Fuel sensors only
    D) Temperature sensors only
24. ESC mainly helps during:
    A) Straight driving
    B) Driving in curves/slippery roads
    C) Vehicle washing
    D) Parking

✓Answers: 21-B, 22-A, 23-B, 24-B

BONUS: Mixed Safety System Questions

25. Which system works together with ABS to improve control?
    A) Power steering
    B) ESC
    C) AC system
    D) Horn
26. Which safety device reduces head and chest injuries?
    A) Air bag
    B) Fuse
    C) GPS
    D) Tyre
27. Which provides *primary safety*?
    A) Seat belt
    B) Air bag
    C) ESC
    D) Central locking
28. Which prevents car from rolling back on slopes?
    A) Hill Hold Control
    B) Central locking
    C) ABS
    D) Air bag

✓Answers: 25-B, 26-A, 27-A, 28-A