

CBSE | DEPARTMENT OF SKILL EDUCATION

Air Conditioning and Refrigeration (SUBJECT CODE - 827)

Blue-print for Sample Question Paper for Class XI (Session 2024 - 2025)

Max. Time: 3 Hours

Max. Marks: 60

PART A- EMPLOYABILITY SKILLS (10 MARKS):

UNIT NO.	NAME OF THE UNIT	OBJECTIVE TYPE QUESTIONS	SHORT ANSWER TYPE QUESTIONS	TOTAL QUESTIONS
		1 MARK EACH	2 MARKS EACH	
1	Communication Skills- III	1	1	2
2	Self-Management Skills- III	2	1	3
3	ICT Skills- III	1	1	2
4	Entrepreneurial Skills- III	1	1	2
5	Green Skills- III	1	1	2
TOTAL QUESTIONS		6	5	11
NO. OF QUESTIONS TO BE ANSWERED		Any 4	Any 3	07
TOTAL MARKS		1 x 4 = 4	2 x 3 = 6	10 MARKS

PART B – SUBJECT SPECIFIC SKILLS (50 MARKS):

UNIT NO.	NAME OF THE UNIT	OBJECTIVE TYPE QUESTIONS	SHORT ANS.TYP EQUES.-I	SHORT ANS. TYPE QUES.- II	DESCRIPTIVE/LONG ANS. TYPE QUESTIONS	TOTAL QUESTIONS
		1 MARK EACH	2 MARKS EACH	3 MARKS EACH	4 MARKS EACH	
1	Meaning of Air conditioning and Refrigeration etc.	6	1	1	1	9
2	Vapour Compression Cycle, Working of a Domestic	5	1	1	1	8
3	Meaning of Compressors, Compressor construction	5	1	1	1	8
4	Meaning of Alternating Current etc., Wiring circuit diagrams	6	1	-	-	7
5	Psychometrics– Composition of air, Human comfort, etc	5	1	-	1	7
6	Applications of Air Conditioning, Measurement of Air Velocity	5	-	-	1	6
TOTAL QUESTIONS		32	5	3	5	45
NO. OF QUESTIONS TO BE ANSWERED		26	Any 3	Any 2	Any 3	34
TOTAL MARKS		1 x 26= 26	2 x 3 = 6	3 x 2 = 6	4 x 3 = 12	50 MARKS

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General Instructions:

1. Please read the instructions carefully.
2. This Question Paper consists of **24 questions** in two sections – Section A & Section B.
3. Section A has Objective type questions whereas Section B contains Subjective type questions.
4. **Out of the given (6 + 18 =) 24 questions, a candidate has to answer (6 + 11 =) 17 questions in the allotted (maximum) time of 3 hours.**
5. All questions of a particular section must be attempted in the correct order.
6. **SECTION A - OBJECTIVE TYPE QUESTIONS (30 MARKS):**
 - i. This section has 06 questions.
 - ii. There is no negative marking.
 - iii. Do as per the instructions given.
 - iv. Marks allotted are mentioned against each question/part.
7. **SECTION B – SUBJECTIVE TYPE QUESTIONS (30 MARKS):**
 - i. This section contains 18 questions.
 - ii. A candidate has to do 11 questions.
 - iii. Do as per the instructions given.
 - iv. Marks allotted are mentioned against each question/part.

SECTION A: OBJECTIVE TYPE QUESTIONS

Q.1	Answer any 4 out of the given 6 questions on Employability Skills (1x4=4 marks)	
i.	Which of the following is an example of giving information in communication? A) Reading B) Listening C) Writing D) Understanding	1
ii.	Which shortcut key is used to create a new document? (a) Ctrl+ c (b) Ctrl + n (c) Ctrl + m (d) Ctrl + d	1
iii.	What are values? A) Things you dislike doing B) Feelings of certainty without proof C) Principles or standards of behaviour influencing attitude and actions D) Opinions formed about someone's career choice	1
iv.	Who is an entrepreneur? a) A person who works for a company b) A person who tries to meet customer needs through new ideas or ways of doing business and makes a profit c) A person who only sells products d) A person who avoids taking risks	1
v.	Why is personal hygiene important? A) It helps us stay fashionable. B) It keeps us entertained. C) It helps us stay healthy and creates a good image. D) It makes us feel tired.	1
vi.	What type of problems does India's green economy policy aim to solve? a) Financial market fluctuations b) Air and water pollution, waste management, and biodiversity conservation c) Increased urbanization d) Technological advancements	1
Q.2	Answer any 5 out of the given 7 questions (1x 5= 5marks)	
i	Which component provides storage for the condensed liquid refrigerant? a) Suction line b) Hot-gas line c) Receiver tank d) Refrigerant flow control	1
ii	What is the primary focus of thermodynamics? a) The study of motion b) The relationship between heat and other forms of energy c) The behaviour of light d) The properties of solids	1
iii	Which type of compressor is considered suitable for refrigerants with high molecular weights and specific volumes? a) Reciprocating compressor b) Rotary compressor c) Centrifugal compressor d) Scroll compressor	1
iv	Psychrometry primarily deals with the study of which of the following? a) Dry air only b) Water vapor only c) Dry air mixed with water vapor (moist air) d) The composition of pure dry air	1
v	What is the unit of electromotive force (EMF)?	1

	a) Ampere b) Ohm c) Volt d) Watt	
vi	What is required to sustain the process of cooling when using a heat pump? a) Only mechanical energy b) Only chilled water or ice c) Mechanical or heat energy to operate the heat pump d) Only chemical reactions	1
vii	Which instrument is used to measure AC voltage, DC voltage, DC current, and resistance in ohms? a) Ampere meter b) Voltmeter c) Multi-meter d) Ohmmeter	1
Q.3	Answer any 6 out of the given 7 questions (1x 6= 6marks)	
i	Which type of reciprocating compressor is typically part of a condensing unit and mounted with an electric motor using a pulley and belt system? a) Open compressor b) Semi-hermetic compressor c) Hermetically sealed compressor d) Vertical reciprocating compressor	1
ii	What term describes the difference between the dry bulb temperature and the wet bulb temperature? a) Dew point temperature b) Absolute humidity c) Wet bulb depression d) Dew point depression	1
iii	Which of the following defines electric current? a) The opposition to the flow of electrons b) The potential difference across two points c) The flow of electrons through a circuit d) The capacity to do work	1
iv	Which material is commonly used in evaporating and condensing units due to its high heat conductivity? a) Steel b) Copper c) Plastic d) Wood	1
v	What is a significant deviation of the actual vapor compression cycle from the theoretical cycle regarding compression? a) Isentropic compression b) Adiabatic compression c) Polytropic compression d) Reversible compression	1
vi	Which feature of central air conditioning systems allows for the recirculation of air as a measure of economy? a) Occupying a basement b) Year-round control c) Connection by ducts with various rooms d) Heating and refrigerating equipment located at a distance	1
vii	Which of the following best describes the process of refrigeration? a) Converting heat energy into work. b) Removing heat from a substance under controlled conditions. c) Creating energy from nothing. d) Transferring heat from a hot body to a cold body without external aid.	1
Q.4	Answer any 5 out of the given 6 questions (1x 5= 5marks)	

i	<p>What does the Zeroth Law of Thermodynamics state?</p> <p>a) Energy can neither be created nor destroyed. b) Heat and mechanical work are mutually convertible. c) There is a limit to the mechanical energy obtained from heat energy. d) If two bodies are in thermal equilibrium with a third body, they are in thermal equilibrium with each other.</p>	1
ii	<p>What is the primary function of a thermal overload relay (OLR) in a refrigerator?</p> <p>a) To start the compressor motor b) To automatically cut off the supply when the temperature reaches a set point c) To protect the compressor motor by disconnecting the supply when the temperature exceeds safe limits d) To measure the voltage of the main supply</p>	1
iii	<p>What is one advantage of rotary compressors over reciprocating compressors?</p> <p>a) Higher noise levels b) Suitable for high specific volume refrigerants c) Preferable for low-temperature applications d) Larger floor space requirement</p>	1
iv	<p>Which factor is not one of the important factors affecting human comfort.</p> <p>a) Effective temperature b) Light intensity c) Heat and moisture losses from the human body d) Quality and quantity of air</p>	1
v	<p>What is the function of the starting relay in a refrigerator motor?</p> <p>a) To disconnect the motor from the power supply b) To regulate the speed of the motor c) To put auxiliary windings in the circuit at startup d) To control the thermostat switch</p>	1
vi	<p>Which type of air conditioning system is designed for assembly in the field and can serve several rooms requiring individual control?</p> <p>a) Packaged air conditioners b) Window air conditioners c) Split air conditioners d) Central air conditioning plants</p>	1
Q.5	Answer any 5 out of the given 6 questions (1x 5= 5marks)	
i	<p>The evaporator in a refrigeration system is also known as</p> <p>(A) heating coil (B) cooling coil (C) electric coil (D) magnetic coil</p>	1
ii	<p>Who is known as the father of modern air conditioning?</p> <p>a) William Cullen b) John Gorrie c) Willis Haviland Carrier d) Thomas Midgley, Jr.</p>	1
iii	<p>Which of the following statements correctly defines power in an electrical circuit?</p> <p>a) It is the potential difference across two points. b) It is the capacity to do work. c) It is the rate of doing work. d) It is the opposition to the flow of electrons.</p>	1
iv	<p>How does a pressure-type water cooler operate?</p> <p>a) By mixing hot and cold water b) By using a storage tank for water cooling c) By running refrigerant coils alongside water tubes d) By utilizing a heating element</p>	1
v	<p>Where is the condensing unit located in a console type packaged air conditioner?</p> <p>a) At the top of the cabinet b) In the middle of the cabinet</p>	1

	c) Below the window sill d) At the bottom of the console	
vi	Which factor affects the optimum effective temperature by requiring a lower temperature for people in colder climates compared to those in warmer regions? a) Clothing b) Age and Sex c) Climatic and seasonal differences d) Density of occupants	1
Q.6	Answer any 5 out of the given 6 questions (1x 5= 5marks)	
i	How does the type of clothing affect the optimum effective temperature? a) Heavier clothing requires a lower optimum temperature b) Lighter clothing requires a higher optimum temperature c) Heavier clothing requires a higher optimum temperature d) Clothing has no effect on optimum temperature	1
ii	What is the practical unit of refrigeration known as? a) Kelvin b) Joule c) Ton of Refrigeration (TR) d) Watt	1
iii	Which component is used to provide extra torque to a sealed compressor motor at the time of start in an air conditioner? a) Overload protector b) Running capacitor c) Starting capacitor d) Selector switch	1
iv	Which tool is used to detect leaks in refrigeration systems by sensing halides? a) Gauge manifold set b) Electronic leak detector c) Tube cutter d) Swaging tool	1
v	The expansion device used in domestic refrigerators is (A) Expansion valve (B) Thermostatic expansion valve (C) Open-type expansion valve (D) Capillary tube.	1
vi	What is latent heat? a) The heat which changes the temperature of a substance. b) The heat which brings about a change of state with no change in temperature. c) The heat which increases the pressure of a substance. d) The heat which changes the color of a substance.	1

SECTION B: SUBJECTIVE TYPE QUESTIONS

**Answer any 3 out of the given 5 questions on Employability Skills (2x3=6 marks)
Answer each question in 20 – 30 words.**

Q.7	How do you change the font style and size of text in a document?	2
Q.8	Why is correct pronunciation important in communication?	2
Q.9	What is the National Action Plan on Climate Change (NAPCC)?	2
Q.10	Why is it important to know your identity?	2
Q.11	Explain with an example what a manufacturing business is.	2

Answer any 3 out of the given 5 questions in 20–30 words each (2 x3 =6marks)

Q.12	What happens to the refrigerant in the condenser?	2
Q.13	What is the role of surroundings in a thermodynamic system?	2
Q.14	Describe the function of the evaporator in the vapor compression refrigeration system.	2
Q.15	Explain the role of a thermostat in a refrigerator.	2
Q.16	Explain the concept of relative humidity	2

Answer any 2 out of the given 3 questions in 30–50 words each(3x2=6marks)

Q.17	What role does the suction line play in the vapour compression system?	3
Q.18	Explain the significance of boundaries in a thermodynamic system with an example.	3
Q.19	What are the key differences between vertical and horizontal reciprocating compressors?	3

Answer any 3 out of the given 5 questions in 50–80 words each (4x3=12 marks)

Q.20	What are the primary differences between single-acting and double-acting reciprocating compressors, and how do these differences impact their performance?	4
Q.21	Describe the operational principle of a winter air conditioning system with a Diagram.	4
Q.22	Different Types of Tools Used in Basic Refrigeration and Air Conditioning.	4
Q.23	Explain the working mechanism of a domestic refrigerator with the help of a labeled diagram.	4
Q.24	What is the significance of psychrometry in engineering science, particularly in relation to moist air?	4