



Sample Test Project

Regional Skill Competition – Level 3

Skill 38 – Refrigeration & Air conditioning

Category: Construction & Building Technology

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SAMPLE

Section - A

A. Preface

Skill Explained:

A refrigeration and air conditioning engineer works on commercial, residential, public and industrial projects, including transportation and storage. There is a direct relationship between the nature and quality of the product and service required and the resulting cost and price; therefore, this branch of engineering covers a wide range of products and services. It is also essential for the refrigeration and air conditioning engineer to meet high and growing standards of service in order to comply with the requirements of the customer and maintain and grow the business. Refrigeration and air conditioning is closely associated with other parts of the construction and transportation industries at all stages and is equally affected by rapid change in these sectors, including growing environmental trends and requirements. The refrigeration and air conditioning engineer generally works inside domestic, commercial or public buildings during and after construction and production, and on projects of all sizes and types. He or she will plan and design, install, test, commission, report, maintain, fault find and repair systems to a high standard. Work organization and self-management, communication and interpersonal skills, problem solving, flexibility and a deep body of knowledge are the universal attributes of the outstanding practitioner. Whether the refrigeration and air conditioning engineer is working alone or in a team the individual takes on a high level of personal responsibility and autonomy. From ensuring a safe and reliable installation and maintenance service, in accordance with relevant standards, through to diagnosing malfunctions, upgrading and commissioning, and fault finding and correction, the skills of concentration, precision, accuracy and attention to detail at every step in the process are crucial. Mistakes may be very expensive and damaging, while substandard work will significantly undermine the performance of the building or equipment that it is intended to serve. In broad terms, the most talented and skilled refrigeration and air conditioning engineers will work on larger and more complex projects, and the most challenging refrigeration and air conditioning issues. These personnel are most likely to help lead the industry in resolving issues relating to climate and environment. Affecting economies and community well being and development, including health, the modern refrigeration and air conditioning engineer has immense scope for make a positive impact locally and globally. 

Eligibility Criteria (for India Skills 2018 and World Skills 2019):

Competitors born on or after 01 Jan 1997 are only eligible to attend the Competition.

Total Duration: 12 Hrs

Section - B

B. Test Project

Task A – BLOCK DIGRAM AND SCHEMATIC

Assembling Window AC 1.5 Ton using Napoleon Kit

Competitor Instruction Sheet

You have **80 Minutes** to complete this task

You are to complete designs, keep in the mind the following observations

1. Please complete the Block diagram of Window A.C.
2. In Task B, you will be required to use the components provided.
3. You have to make a wiring diagram for the A.C.

Task B – Fixing the parts in the AC Cabinet

Competitor Instruction Sheet

You have **180 Minutes** to complete this task

1. Take the Napoleon Window AC kit.
2. Fix the Compressor in this.
3. Connect the Compressor Discharge line to the Condensor Coil form the top.
4. Connect the compressor to the filter and to the capillary.
5. Connect the Capillary to the Evaporator Coil.
6. Do the insulation for Suction line.

Task C – Check for leaks. Do the Vacuum. Gas Charging and Checking cooling

Competitor Instruction Sheet

You have **60 Minutes** to complete this task.

1. Check form leaks using an electronic leak detector.
2. Vacuum the system.
3. Gas Charging and checking cooling.

Task D – Answer the questions related to this project (MCQ)

You have **60 Minutes** to complete this task

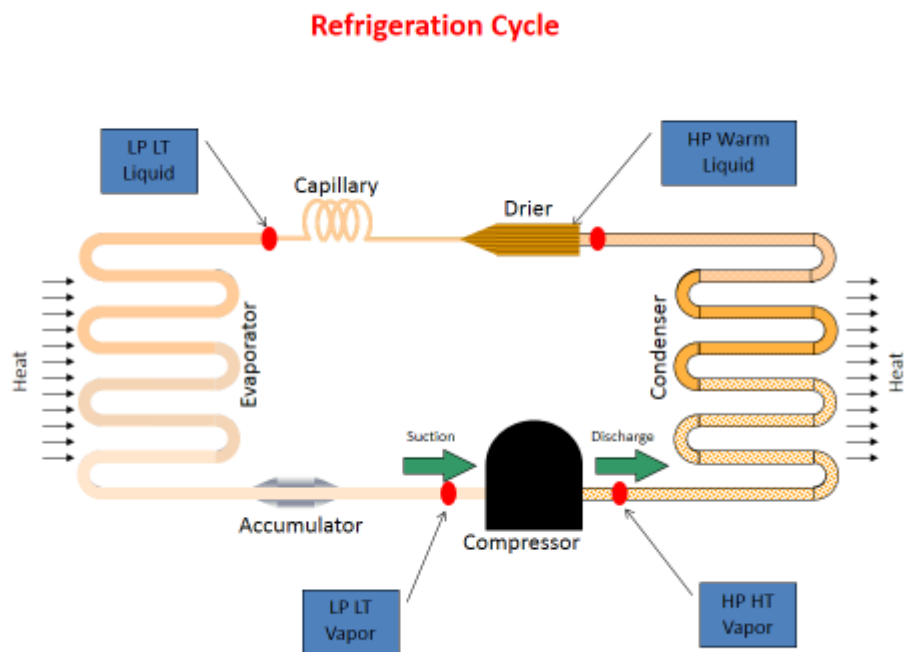
Re Check the circuit and answer the given questions.

Note: Answer sheet provided for writing the answer.

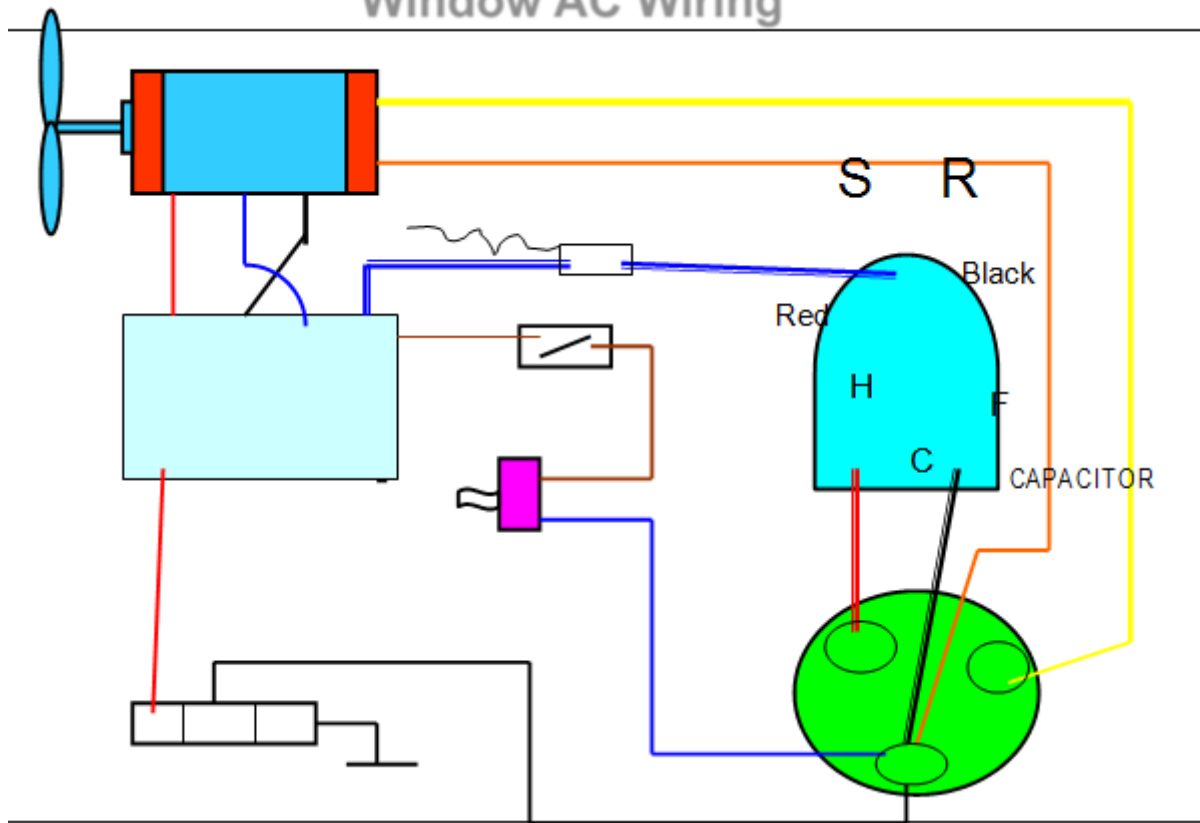
TEST MATERIAL FOR COMPETITION EXAMINER

DESCRIPTION OF PROJECT AND TASKS

Assembling 1.5 Ton Window Air Conditioner



Window AC Wiring



QUESTIONS FOR THE PROJECT SIMPLE INVERTOR CIRCUTE USING IC CD4047WITH 12V BATTERY CHARGER CIRCUIT WITH AUTO CUT OFF

1. Draw the block Diagram for the given project.
2. Draw the schematic diagram.
3. Check and write the voltages of test point on sheet A.
4. Describe the working principal of the project in 10 lines Max.

QUESTION AND ANSWER MCQ. (Basic Refrigeration and Air Conditioning)

Section – C

C. Marking Scheme

Block Diagram & Schematic Design:

Aspect ID	Marking Criteria or Description	Requirement	Max Mark	Mark Awarded
1.1	Block diagram	For both the section.	10	
1.2	Wiring Diagram	Invertor only	10	
		Total Marks :	20	

Preparing the A.C.:

Aspect ID	Marking Criteria or Description	Requirement	Max Mark	Mark Awarded
1.1	Fixing Compressor		1	
1.2	Connecting Compressor to condenser coil		1	
1.3	Connecting Coil to capillary through filter		1	
1.4	Connecting capillary to evaporator coil.		1	
1.5	Flaring and swezing		7	
1.6	Brazing joints.		7	
1.7	Checking Leaks		6	
1.8	Vacuuming system		6	
	Total		30	

Checking leaks, vacuuming and gas charging in the system:

Aspect ID	Marking Criteria or Description	Requirement	Max Mark	Mark Awarded
1.1	Checking leak		7	
1.2	Vacuuming		7	
1.3	Gas Charging		10	
1.4	Checking cooling		6	
	Total :		30	

Answer the questions related to this project (MCQ)

Aspect ID	Marking Criteria or Description	Requirement	Max Mark	Mark Awarded
1.1	Safe working practices adhered to throughout task		1	
1.2	MCQ		18	
1.3	Task completed in allocated time.		1	
	Total Marks		20	

SAMPLE

Section - D

D. Infrastructure List

Infrastructure List (Tool and equipment including raw material)

The quantity is given for each candidate.

S. No.	Item	Requirements/Specification	Qty
1	Workbench	5'x4'	1
2	Plier		1
3	Screw Drivers Philips		1
4	Screw Driver		1
5	Plier		1
6	Crimping Plier		1
7	Cutter		1
8	Tube Bender		1
9	Copper Tubes $\frac{1}{4}$, $\frac{1}{2}$ and $\frac{3}{8}$ "		1 set.
10	Clamp Meter		1
11	Vacuum Pump		4
12	Flaring Tool		1
13	Swezing Tool		1
14	Electronic leak detector		3
15	Brazing Kit		2
16	Nitrogen Cylinder		2
17	Socket Set		1
18	Drill Machine		1
19	R22 Refrigerant		1 Kg.
20	Brazing Rods and flux		

Section – E

E. Instructions for candidates

General Rules

- Competitor should reach venue 15 minute before the entry time.
- Competitor should carry the id proof and birth date proof
- No Group work is permitted, it's individual competition.
- Module briefing will be done before the start of competition
- Module Briefing duration is 15 minutes
- Open communication / Q&A will be conducted after module briefings.
- Module related queries will not be entertained after the start of competition.

Section – F

F. Health, Safety, and Environment

- All accredited participants and supporting volunteers will abide by rules and regulations with regards to Health, Safety, and Environment of the Competition venue.
- All participants, technicians and supporting staff will wear the appropriate / required protective Personnel clothing.
- All participants will assume liability for all risks of injury and damage to property, loss of property, which might be associated with or result from participation in the event. The organizers will not be liable for any damage, however in case of Injury the competitor will immediately inform the immediate organizer for medical attention.
- For any electrical or technical support contact the expert/supervision staff.
- Do not plugin/plugin out any eclectic & electronics connections, seek for assistance.
- Be careful while working on workstation so that feet should not strike to electric board or CPU system.

Health & Safety Requirements

- During the competition, all Competitors MUST follow the safety rules listed below along with the
- local Health, Safety and Environment requirements of the host country.

SHOES

- Fully enclosed work shoes or boots must be worn at all times.

CLOTHING

- Legs must be covered at all times, by either long work trousers or overalls.
- Upper body must be covered at all times.
- Arms must be covered with long sleeves, when brazing and using refrigerant.

CLEAR SAFETY GLASSES

- Must be worn when necessary to protect your eyes.
- Must be worn when brazing, soldering, filing, reaming, hack-sawing, drilling, grinding and using refrigerant, dry nitrogen and compressed air.

GLOVES

- Must be worn when brazing and using refrigerants
- All Electrical work involving live testing will require wearing of approved gloves

ELECTRICAL

- Competitors must NOT switch on (apply power) to any electrical equipment until they receive permission from an Expert, except for hand power tools.
- Any Competitor that is identified as not wearing the correct safety attire or is engaging in any unsafe practice will be stopped and advised on the correct safety practice by an Expert. If the unsafe working practice is repeated the Expert may STOP the Competitor and report the issue to the chief or Deputy Chief Expert.
- The Competitor may not be allowed to continue until the safety issue is resolved. The Competitor will lose associated safety marks.
- If the Competitor continues to ignore the safe working practice they may be removed from the competition area for a safety briefing for ten minutes by the host country health, safety and environment representative, the time taken to complete the safety briefing will be considered to be a part of the Competitor's competition time

Module Rules

- When you have finished the current module, you can proceed to the requirements for the next module.
- Competition Test Project will be in English language

Infrastructure Rules

- Any hardware failure during the completion may get extra time subject to approval of Jury/Experts.
- Candidates should not carry any devices, cell phones, material at competition desk.

Rules of competition

- Competitor will be disqualifying for any misbehaviour.
- All the rights of the competition are reverved with State Skill Competition Committee.