FACULTY OF ENGINEERING & TECHNOLOGY

SYLLABUS

FOR

DIPLOMA COURSE IN REFRIGERATION AND AIR-CONDITIONING

(SEMESTER – I & II)

SESSION: 2019–20

GURU NANAK DEV UNIVERSITY,
AMRITSAR

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(ii) Subject to change in the syllabi at any time.
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Diploma Course in Refrigeration and Air-Conditioning (Semester System)

Eligibility: The admission shall be open to a candidate who has passed 10+2 (Any Stream) examination with at least 40% marks in aggregate.

**SCHEME OF COURSE**

**Semester – I:**

<table>
<thead>
<tr>
<th>Sr.No.</th>
<th>Subject</th>
<th>Theory</th>
<th>Practical</th>
<th>Total Marks</th>
</tr>
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<tbody>
<tr>
<td>I.</td>
<td>Communication Skills-I</td>
<td>50</td>
<td>50</td>
<td>100</td>
</tr>
<tr>
<td>II.</td>
<td>Computer Fundamentals-I</td>
<td>50</td>
<td>50</td>
<td>100</td>
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<tr>
<td>III.</td>
<td>Refrigeration and Air Conditioning- 1 (Theory + Practical)</td>
<td>100</td>
<td>--</td>
<td>100</td>
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<tr>
<td>IV.</td>
<td>Refrigeration and Air Conditioning- 2 (Practical)</td>
<td>--</td>
<td>100</td>
<td>100</td>
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<tr>
<td>V.</td>
<td>Refrigeration and Air Conditioning- 3 (Practical)</td>
<td>--</td>
<td>100</td>
<td>100</td>
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<tr>
<td></td>
<td><strong>Total Marks:</strong></td>
<td></td>
<td></td>
<td><strong>500</strong></td>
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**Semester – II:**

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<th>Theory</th>
<th>Practical</th>
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<tr>
<td>I.</td>
<td>Communication Skills-II</td>
<td>50</td>
<td>50</td>
<td>100</td>
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<tr>
<td>II.</td>
<td>Computer Fundamentals-II</td>
<td>50</td>
<td>50</td>
<td>100</td>
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<tr>
<td>III.</td>
<td>Refrigeration and Air Conditioning–I (Theory + Practical)</td>
<td>100</td>
<td>--</td>
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<td>IV.</td>
<td>Refrigeration and Air Conditioning–II (Practical)</td>
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<td>100</td>
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<tr>
<td>V.</td>
<td>Refrigeration and Air Conditioning–III (Practical)</td>
<td>--</td>
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<td><strong>Total Marks:</strong></td>
<td></td>
<td></td>
<td><strong>500</strong></td>
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PAPER – I: COMMUNICATION SKILLS-I
(THEORY)

Time: 3 Hrs.  
Max. Marks: 100
Theory Marks: 50
Practical Marks: 50

Instructions for the Paper Setters:
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

SECTION–A

Writing Skills:
Formatting personal and business letters:
1. Standard informal personal letters such as letters to parents, friends, social pillars.
2. Standard formal letters to Govt. Officers, superiors, utility purposes, News Paper Editors etc.
3. Standard Business Letters: Introducing and Promoting business activities, Placing an order, Cancelling an order, Reporting defects in receipt of ordered goods, Reporting delay in receipt of ordered goods, Responding to delay in supply of goods and services, Maintaining good customer relationships, Making customers give feedback to your services, Creating catalogue of your goods and services, Acknowledging services rendered by others,

SECTION–B

1. Resume Writing.
2. Writing of memos, notices and customer-friendly information.
3. Basic punctuation.
4. Blog writing

SECTION–C

Speaking Skills:
1. Using courtesy words and expressions
2. Storing standard day to day usages sentences, words and expressions in mind.
3. Creating similar new sentences
4. Using declarative, imperatives, interrogative and exclamatory sentences.

SECTION–D

1. Speaking catchy phrases, proverbs and expressions
2. Differentiating confusing words
3. Making PowerPoint presentation
4. Making short speech
5. Group Discussion/ Conversation
Suggested Readings/ Books:
3. S.P. Dhanavel English and Communication Skills for Students of Science and Engineering (with audio CD)
Instructions for Practical Exam: Entire syllabus will be covered for practical.

1. Speaking Skills
2. Using courtesy words and expressions
3. Storing standard day to day usages sentences, words and expressions in mind.
4. Speaking catchy phrases, proverbs and expressions
5. Making PowerPoint presentation
6. Making short speech
7. Group Discussion/ Conversation
PAPER – II: Computer Fundamentals-I
(THEORY)

Time: 3 Hrs.

Max. Marks: 100
Theory Marks: 50
Practical Marks: 50

Instructions for the Paper Setters:-
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

SECTION–A

Interacting with the computer:
Computer Components/ Input/ Output Devices: Input devices; keyboard, mouse, scanner, output devices; VDU and printer (impact and non-impact printers), plotter etc. Primary and secondary storage (auxiliary storage), secondary storage; magnetic disks – tracks and sectors, optical disk (CD, CD-RW and DVD memory).

Computer Software concept: System software, application software, operating systems, and advantages of software and application packages. Introduction to operating systems such as ms-dos and windows, difference between dos and windows

Operating system-MS-Windows
Operating system-Definition & functions, basics of Windows, Basic components of windows, icons, types of icons, taskbar, activating windows, using desktop, title bar, running applications, exploring computer, managing files and folders, copying and moving files and folders, Control panel – display properties, adding and removing software and hardware, setting date and time, screensaver and appearance, Using windows accessories.

SECTION–B

Word Processor using Microsoft Office
Introduction to Word, Introduction to Parts of Word Window (Title Bar, Menu Bar, Tool Bar, The Ruler, Status Area), Page Setup, Creating New Documents, Saving Documents, Opening an Existing documents, insert a second document into an open document, Editing and formatting in document, Headers and Footers, Spell Checking, Printing document, Creating a Table Using the Table Menu and table formatting, Borders and Shading, Templates and Wizards, Mail Merge, importing, exporting and inserting files, formatting pages, paragraphs and sections, indents and outdents, creating lists and numbering, Headings, styles, fonts and font size Editing, positioning and viewing texts, Finding and replacing text, inserting page breaks, page numbers , book marks, symbols and dates.
Diploma Course in Refrigeration and Air-Conditioning (Semester – I)

SECTION–C

**Presentation Software using Microsoft Office**
Introduction to MS Power point, Power point elements, Templates, Wizards, Views, Exploring Power Point Menu, Working with Dialog Boxes, Adding Text, Adding Title, Moving Text Area, Resizing Text Boxes, Adding Art, Starting a New Slide, Starting Slide Show, Saving presentation; Printing Slides, Views (View slide sorter view, notes view, outlines view)
Formatting and enhancing text formatting, Creating Graphs (Displaying slide show and adding multi – media)

SECTION–D

**Spreadsheet using Microsoft Office**
Elements of Electronics Spread Sheet and Ms-Excel: Application/usage of Electronic Spread Sheet, Opening of Spread Sheet, and menu bar, Creation of cells and addressing of cells, Cell inputting.
Manipulation of cells: Enter texts numbers and dates, Creation of tables, Cell Height and Widths, Copying of cells.
Spread sheets for Small accountings: Maintaining invoices/budgets, Totaling of various transactions, maintaining daily and monthly sales reports.
Charts: drawing different types of charts.

**Reference Books:**

1. Andrew S. Tanenbaum, David J. Wetherall Computer Networks (5th Edition), PHI.
3. A. Goel, Computer Fundamentals, Pearson Education.
4. Will Train, Gini Corter, Annette Marquis “Microsoft Office” BPB
Instructions for Practical Exam: Entire syllabus will be covered for practical.

1. Operating system-MS-Windows
   Basic components of windows, icons, types of icons, taskbar, activating windows, using desktop, title bar, running applications, exploring computer, managing files and folders, copying and moving files and folders, Control panel – display properties, adding and removing software and hardware, setting date and time, screensaver and appearance, Using windows accessories.

2. Word Processor using Microsoft Office
   Parts of Word Window (Title Bar, Menu Bar, Tool Bar, The Ruler, Status Area), Page Setup, Creating New Documents, Saving Documents, Opening an Existing documents, insert a second document into an open document, Editing and formatting in document, Headers and Footers, Spell Checking, Printing document, Creating a Table Using the Table Menu and table formatting, Borders and Shading, Templates and Wizards, Mail Merge, importing, exporting and inserting files, formatting pages, paragraphs and sections, indents and outdents, creating lists and numbering, Headings, styles, fonts and font size Editing, positioning and viewing texts, Finding and replacing text, inserting page breaks, page numbers , book marks, symbols and dates.

3. Presentation Software using Microsoft Office
   Power point elements, Templates, Wizards, Views, Exploring Power Point Menu, Working with Dialog Boxes, Adding Text, Adding Title, Moving Text Area, Resizing Text Boxes, Adding Art, Starting a New Slide, Starting Slide Show, Saving presentation; Printing Slides, Views (View slide sorter view, notes view, outlines view) Formatting and enhancing text formatting, Creating Graphs (Displaying slide show and adding multi – media)

4. Spreadsheet using Microsoft Office
   Elements of Electronics Spread Sheet and MS-Excel: Opening of Spread Sheet, menu bar, Creation of cells and addressing of cells, Cell inputing.
   Manipulation of cells: Enter texts numbers and dates, Creation of tables, Cell Height and Widths, Copying of cells.
   Spread sheets for Small accountings: Maintaining invoices/budgets, Totaling of various transactions, maintaining daily and monthly sales reports.
   Charts: drawing different types of charts.
PAPER – III: REFRIGERATION AND AIR CONDITIONING
(THEORY)

Time: 3 Hrs.  
Max. Marks: 100  
Theory Marks: 100

Instructions for the Paper Setters:-
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

SECTION–A

Introduction of Refrigeration & Air-conditioning
Principles of Refrigeration, Principles of Air Conditioning.
Fundamentals of Electricity
Voltage, current, resistance, Watt, Series and parallel connections
Fundamental Science related to Refrigeration/Air Conditioning

SECTION–B

Components of a Refrigerator
Refrigeration cycle, Functions of compressor, Functions of condenser & cooling tower, Functions of receiver, Functions of Filter/Drier, Functions of Refrigerant., Control, Valve/Devices., Functions of cooling coil.

Refrigerants
Gases used in refrigerator/Air conditioner AA/after Cooler.

SECTION–C

Tools & Equipments Use:
Description of Tools & equipments and used in this trade and their proper use.
Gasket Making:
Gasket, its function, uses and method of making

SECTION–D

A.C. Electric Motors
Electric motors, Types of motors, working of motors, Sealed Unit compressor

Suggested Readings/Books:
1. Refrigeration and Air Conditioning Theory Book, N. Singh Technical Publishers
2. Refrigeration And Air-conditioning Paperback – 2010 by Sur (Author) Vayu Education of India;
Diploma Course in Refrigeration and Air-Conditioning (Semester – I)

PAPER – IV: REFRIGERATION AND AIR CONDITIONING
(PRACTICAL)

Max. Marks: 100

Instructions for Practical Exam: Entire syllabus will be covered for practical.

1. Use of Ammeter, test lamp and other related equipment, marking of series and Parallel connections. Making of testing board. Soldering.

2. Dismantling of compressor, Checking the working of each part, Assembling of compressor, Displaying different types of condensers, Displaying Receiver, Removing and fixing of filter/drier, Displaying types of RCV, Capillary tube removing & Re-fixing, Removing & fixing of cooling coil.

3. Gas charging in Refrigerator/AC/Water cooler.
Instructions for Practical Exam: Entire syllabus will be covered for practical.

1. Displaying all the tools, Use of tools, cutting of copper tube with tube cutter, Flaring of copper tube, Swaging of copper tube, Joining of capillary tube, and Brazing of copper to copper Joint.

2. Making of gasket with the help of a gasket sheet 1 1/32" & 1/64".

3. Testing of Electric motor used in sealed compressors, Removing & fixing of stator in seal unit, Identification of common starting a running terminals of compressor motor
Diploma Course in Refrigeration and Air-Conditioning (Semester – II)

PAPER – I: COMMUNICATION SKILLS-II
(THEORY)

Time: 3 Hrs.  
Max. Marks: 100
Theory Marks: 50
Practical Marks: 50

Instructions for the Paper Setters:-
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

SECTION–A

Reading Skills
1. Newspaper reading skills
2. Content reading through internet sources
3. Comprehension Passages

SECTION–B

Listening Skills
1. Receiving voice calls
2. Attending active phone calls and responding
3. Daily news listening exercises (Audio and Video)
4. Note taking
5. Listening to native speakers conversations.

SECTION–C

Common Mistakes:
1. How to avoid common mistakes in: Nouns, Pronouns, Adjectives, Adverbs, Prepositions, word usage, helping verbs, verbs, phrases, clauses and sentences

Foreign Words:
1. Frequently used foreign words.

SECTION–D

Advertisement Writing:
Classified, Display, Boxed, Billboard, Online

Suggested Readings/Books:
3. S.P. Dhanavel English and Communication Skills for Students of Science and Engineering (with audio CD)
PAPER – I: COMMUNICATION SKILLS-II
(PRACTICAL)

Instructions for Practical Exam: Entire syllabus will be covered for practical.

1. Receiving voice calls
2. Attending active phone calls and responding
3. Daily news listening exercises (Audio and Video)
4. Note taking
5. Listening to native speakers conversations.
6. Advertisements Writing
7. Frequently used foreign words.
PAPER – II: COMPUTER FUNDAMENTALS-II
(THEORY)

Time: 3 Hrs.  Max. Marks: 100
Theory Marks: 50  Practical Marks: 50

Instructions for the Paper Setters:-
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four
Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are
required to attempt five questions, selecting at least one question from each Section. The fifth
question may be attempted from any Section.

SECTION–A

Introduction to networks: Network Definition, Basic Components of a Network, Network
types and topologies, Uses of Computer Networks, Network Architecture.
Transmission Media: Coaxial cable, twisted pair cable, fiber optics & satellites. OSI reference
model, TCP/IP reference model, comparison of OSI and TCP reference model.

Computer Communication

Basic of Computer networks: LAN, WAN, MAN.
Internet: Introduction to internet and its application/services.
Service on Internet: WWW and web-sites, Electronic mails, Communication on Internet.

SECTION–B

Web Browsers: Internet Explorer, Chrome and Firefox
Surfing the Internet: Giving the URL address, Search, Moving Around in a web-site, Printing or
saving portion of web pages, down loading/uploading
Chatting on Internet
Email: Basic of electronic mail, Creating Email id, Mailbox: Inbox and outbox. Using Emails:
Viewing an email, sending an Email, Saving mails, sending same mail to various users,
Document handling: Sending soft copy as attachment, Enclosures to email, sending a Portion of
document as email

SECTION–C

Tally:

Introduction to financial accounting: accounting concepts.
Financial accounting basics: company creation, accounts configuration, accounts classification,
accounts master, creations of voucher, types and classes, accounts vouchers.
Financial accounting advanced: final accounts, bank reconciliation statement

SECTION–D

Inventory: introduction to inventory, stock groups, stock categories, stock item, reorder levels,
locations / go downs, units of measure, price list, tariff classification, dealer excise, opening
stock, pure inventory voucher, entry of pure inventory voucher, bill of material, purchase and
sales order, foreign exchange transactions.
Business management: New Year books, MIS reports, budget management, scenario
management.

Suggested Readings/ Books
1. Tanenbaum A. S., “Computer Networks”, PHI.
2. TALLY ERP 9 TRAINING GUIDE - 4TH REVISED & UPDATED EDITION – 2018
Instructions for Practical Exam: Entire syllabus will be covered for practical.

1. Network types and topologies.
2. Electronic mails.
3. Communication on Internet.
4. Surfing the Internet: Giving the URL address, Search, Moving Around in a web-site, Printing or saving portion of web pages, downloading/uploading.
5. Chatting on Internet.
7. Financial accounting basics: company creation, accounts configuration, accounts classification, accounts master, creations of voucher, types and classes, accounts vouchers.
9. Inventory: introduction to inventory, stock groups, stock categories, stock item, reorder levels, locations / go downs, units of measure, price list, tariff classification, dealer excise, opening stock, pure inventory voucher, entry of pure inventory voucher, bill of material, purchase and sales order, foreign exchange transactions.
PAPER – III: REFRIGERATION AND AIR CONDITIONING–I
(THEORY)

Time: 3 Hrs.  Max. Marks: 100
Theory Marks: 100

Instructions for the Paper Setters:-
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

SECTION–A

Starting Relay:
Types of relay: Current types, Voltage type

Temperature Control:
Thermostat: its principle functioning

Capacitors:
Capacitors, their functions and types: starting capacitors, running capacitors

Safety Device:
Over loading and over load protectors: its, Functions Uses, Types

SECTION–B

Efficiency of compressor:
Efficiency in a sealed Unit, Method of testing efficiency of a sealed Unit, Method to rectify defects in case of no pressure, Grinding, Lapping Polishing of valve plate, reeds etc

Compressor Oil:
Oil used for lubricating a sealed unit Method of lubricating

SECTION–C

Wiring of Refrigerator:
Knowledge of wiring of different types of Refrigerators

Gas Charging:
Method of gas charging in Refrigerator

Safety Precautions:
Precautions to be taken while handling refrigerant cylinders, to avoid electric shock, to avoid fire.

Faults and Remedies:
Procedure of locating faults, checking of: Compressor, Relay Thermostat, Door switch, Cabinet light, Capillary Filter/Drier

Door Gasket:
Types of Door gasket used in Refrigerators (ordinary & magnetic door), its importance, Method of changing
SECTION-D

Air-conditioning System:
Principles of air conditioning, Types of Air conditioners (Window/Split)

Water Coolers:
Types of water coolers, Storage type, Instant type

Selector Switches:
Type of selector switches, Piano, Rotary type

Wiring of Air Conditioners:
Complete wiring of all electrical components of A.C.

Gas Charging:
Method of gas charging in water cooler/ Air Conditioner.

Installation:
Method of Installing window type and split A.C., A.C Proper insulation of window with thermocol/glass wood.

Locating Faults:
Checking of: Capacitor, Blower Motor, Overload protector, Selector switch (not in water cooler

Sketching:
Preparing simple sketching of units & reading

Suggested Readings/Books
1. Refrigeration and Air Conditioning Theory Book, N. Singh Technical Publishers
2. Refrigeration And Air-conditioning Paperback – 2010 by Sur (Author) Vayu Education Of India;
Instructions for Practical Exam: Entire syllabus will be covered for practical.

1. Testing of current type relay, Testing of Voltage type relay.
2. Testing of thermostat fixing of thermostat in Refrigerator.
3. Displaying various types of capacitors, testing of capacitors.
4. Testing of two point & three point overload protector.
5. Making the efficiency of compressor by grinding/ lapping/ polishing of valve plate, reed etc.
Instructions for Practical Exam: Entire syllabus will be covered for practical.

1. Practice of wiring, testing after wiring
2. Gas charging in refrigerator accurately.
3. Demonstration on careful handling.
5. Fixing of door gasket in Refrigerators (ordinary type and magnetic type)
6. Demonstration of window type & split A.C.
7. Demonstration of working of water coolers, Proper fitting of parts
8. Testing of selector switches
10. Charging accurate gas, in water cooler, in Air Conditioner
11. Installation of A.C. and power point (MCB) with proper earthing, Actual demonstration.
12. Checking & repairing, repairing of compressor, repairing of capacitor, Repairing of Blower motor, Repairing of Overload protector, Replacement of selector switch
13. Simple sketch making