

FACULTY OF ENGINEERING & TECHNOLOGY

SYLLABUS

FOR

DIPLOMA COURSE IN REFRIGERATION AND AIR-CONDITIONING

(SEMESTER – I & II)

SESSION: 2019–20



GURU NANAK DEV UNIVERSITY, AMRITSAR

- Note:** (i) Copy rights are reserved.
Nobody is allowed to print it in any form.
Defaulters will be prosecuted.
- (ii) Subject to change in the syllabi at any time.
Please visit the University website time to time.

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:**

Sr.No.	Subject	Theory	Practical	Total Marks
I.	Communication Skills-I	50	50	100
II.	Computer Fundamentals-I	50	50	100
III.	Refrigeration and Air Conditioning- 1 (Theory + Practical)	100	--	100
IV.	Refrigeration and Air Conditioning- 2 (Practical)	--	100	100
V.	Refrigeration and Air Conditioning- 3 (Practical)	--	100	100
Total Marks:				500

Semester – II:

Sr.No.	Subject	Theory	Practical	Total Marks
I.	Communication Skills-II	50	50	100
II.	Computer Fundamentals-II	50	50	100
III.	Refrigeration and Air Conditioning–I (Theory + Practical)	100	--	100
IV.	Refrigeration and Air Conditioning–II (Practical)	--	100	100
V.	Refrigeration and Air Conditioning–III (Practical)	--	100	100
Total Marks:				500

**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:

1. KK Ramchandran, et al Business Communication, Macmillan, New Delhi
2. Swati Samantaray, Business Communication and Communicative English, Sultan Chand, New Delhi.
3. S.P. Dhanavel English and Communication Skills for Students of Science and Engineering (with audio CD)
4. Computer Mediated Communication 1st Edition by Crispin Thurlow Lara Martin Lengel, Alice Tomic.
5. Collins, Patrick. Speak with Power and Confidence. New York: Sterling, 2009.
6. Fitikides, T. J. Common Mistakes in English. London: Orient Longman.

**PAPER – I: COMMUNICATION SKILLS-I
(PRACTICAL)**

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.

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.

Functions: Using functions: mathematical, statistical and financial function.

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.
2. P. K.Sinha, P. Sinha, Fundamentals of Computers, BPB Publishers.
3. A. Goel, Computer Fundamentals, Pearson Education.
4. Will Train, Gini Corter, Annette Marquis “Microsoft Office” BPB

**PAPER – II: Computer Fundamentals-I
(PRACTICAL)**

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 inputting.

Manipulation of cells: Enter texts numbers and dates, Creation of tables, Cell Height and Widths, Copying of cells.

Functions: Using functions: mathematical, statistical and financial function.

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

Heat, Unit of Heat, Temperature C to F, Effect of heat, Latent heat, Transfer of heat.,

Condensation and evaporation, Pressure, Effect of Pressure, Unit of pressure, Vacuum.

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;
3. Refrigeration and Air-conditioning Paperback – 2003 by P L Ballaney (Author), Khanna Pub.

**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.

**PAPER – V: REFRIGERATION AND AIR CONDITIONING
(PRACTICAL)****Max. Marks: 100****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 $1/32''$ & $1/64''$.
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

**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. News paper 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:

1. KK Ramchandran, et al Business Communication, Macmillan, New Delhi
2. Swati Samantaray, Business Communication and Communicative English, Sultan Chand, New Delhi.
3. S.P. Dhanavel English and Communication Skills for Students of Science and Engineering (with audio CD)
4. Computer Mediated Communication 1st Edition by Crispin Thurlow (Lara Martin Lengel , Alice Tomic.
5. Collins, Patrick. Speak with Power and Confidence. New York: Sterling, 2009.
6. Fitikides, T. J. Common Mistakes in English. London: Orient Longman.

**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

**PAPER – II: COMPUTER FUNDAMENTALS-II
(PRACTICAL)**

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, down loading/uploading
5. Chatting on Internet
6. Introduction to financial accounting: accounting concepts.
7. Financial accounting basics: company creation, accounts configuration, accounts classification, accounts master, creations of voucher, types and classes, accounts vouchers.
8. Financial accounting advanced: final accounts, bank reconciliation statement
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.
10. Business management: New Year books, MIS reports, budget management, scenario management.

**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;
3. Refrigeration and Air-conditioning Paperback – 2003 by P L Ballaney (Author), Khanna Pub.

PAPER – IV: REFRIGERATION AND AIR CONDITIONING–II**(PRACTICAL)****Max. Marks: 100**

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.
6. Changing oil in a compressor.

**PAPER – V: REFRIGERATION AND AIR CONDITIONING–III
(PRACTICAL)****Max. Marks: 100****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.
4. Practice in : Checking and generating of compressor, Replacement of relay, Replacement of Door switch, Replacement of Cabinet light holder and bulb, Flushing/Checking of Capillary tube, Checking of filter/drier.
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
9. Wiring of A.C. with single speed motor, Wiring of A.C. with two speed motor, Starting of A.C. with complete wiring, Removing & re-fixing of blower & condenser fan with blower motor, Replacing of blower motor.
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