FACULTY OF ENGINEERING AND TECHNOLOGY

Syllabus

For

BACHELOR OF VOCATION (B.VOC.)
(REFRIGERATION AND AIR CONDITIONING)
(Semester: I – VI)

Session: 2016–17

GURU NANAK DEV UNIVERSITY
AMRITSAR

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Bachelor of Vocation (B.Voc.)
(Refrigeration and Air Conditioning) Semester System

Scheme of Syllabus

Semester – I:

Paper No.	**Paper**	**Max Marks**
Paper – I	Fundamentals of Computer – I	100 (75 theory +25 Practical)
Paper – II	Communicative Skills in English – I	50
Paper – III	Punjabi Compulsory/ **ਮੁੱਢਲੀ ਪੰਜਾਬੀ**	50
Paper – IV	Thermodynamics in Refrigeration & Air Conditioning	100 (60 theory +40 Practical)
Paper – V	Basics of Refrigeration & Air Conditioning–I	100 (60 theory +40 Practical)
	Total :	**400**

Semester – II:

Paper No.	**Paper**	**Max Marks**
Paper – I	Fundamentals of Computer – II	100 (75 theory +25 Practical)
Paper – II	Communicative Skills in English – II	50 (35 theory +15 Practical)
Paper – III	Punjabi Compulsory / **ਮੁੱਢਲੀ ਪੰਜਾਬੀ**	50
Paper – IV	Basics of Refrigeration & Air Conditioning–II	100 (60 theory +40 Practical)
Paper – V	Physics	100 (75 theory +25 Practical)
	Total :	**400**

Bachelor of Vocation (B.Voc.)
(Refrigeration and Air Conditioning) Semester System

Semester – III:

Paper No.	**Paper**	**Max Marks**
Paper – I	Fundamentals of Computer – III	100 (75 theory +25 Practical)
Paper – II	Refrigeration & Air Conditioning – III	100 (60 theory +40 Practical)
Paper – III	Refrigeration & Air Conditioning – IV	100 (60 theory +40 Practical)
Paper – IV	Workshop Practice	100
Paper – V *	Environmental Studies – I	050
	Total :	**400**

Semester – IV:

Paper No.	**Paper**	**Max Marks**
Paper – I	Fundamentals of Computer – IV	100 (75 theory +25 Practical)
Paper – II	Refrigeration & Air Conditioning – V	100 (60 theory +40 Practical)
Paper – III	Refrigeration & Air Conditioning – VI	100 (60 theory +40 Practical)
Paper – IV	Refrigeration and Air Conditioning Components Lab	100
Paper – V *	Environmental Studies–I	050
	Total :	**400**

* Marks of Paper EVS will not be included in Grand Total.

Bachelor of Vocation (B.Voc.)
(Refrigeration and Air Conditioning) Semester System

Semester – V:

Paper No.	**Paper**	**M. Marks**
Paper – I	Fundamentals of Computer – V	100 (75 theory +25 Practical)
Paper – II	Refrigeration and Air Conditioning–VII	100
Paper – III	Project Lab–I	(120 Project–work+80 Viva–voce=200)
	Total :	**400**

Semester – VI:

Paper No.	**Paper**	**M. Marks**
Paper – I	Fundamentals of Computer – VI	100 (75 theory +25 Practical)
Paper – II	Refrigeration and Air Conditioning–VIII	100
Paper – III	Project Lab–II	(120 Project–work+80 Viva–voce=200)
	Total :	**400**

Bachelor of Vocation (B.Voc.)
(Refrigeration and Air Conditioning) Semester – I

Paper–I: Fundamentals of Computer – I
(Theory)

Max. Marks: 100
Theory Marks: 75
Time: 3 Hours **Practical Marks: 25**
Periods Per Week: Theory: 6

Instructions for the Paper Setters:

a) Ten compulsory very short answer questions of 2 marks each. 10x02=20
b) Eight short answer questions of 5 marks each, students are required attempt any five questions. 05x05=25
c) Four long answer questions of 15 marks each, students are required to attempt any two. 02x15=30

UNIT – I

- What is Computer, Block Diagram (Components), Application of Computer, Booting of Computer System
- Elements of Computer System (Input devices (Keyboard, Scanner, Mouse), Output devices– (Printer, Monitor), Storage Devices– (Magnetic Disk, Optical Disks)
- What is Operating System, Types of Operating System (Multitasking, Multiprogramming, Multiprocessing)

UNIT – II

- Introduction to Windows Vista
- Parts of Windows Screen (Desktop icons, Windows (Application Window, Document window)
- Introduction to MS Office

❖ Introduction to MS Word (Word 2003)
❖ Parts of Word Window (Title Bar, Menu Bar)
❖ Opening, Closing and saving a word Document
❖ Font Dialog Box
❖ Page Setup
❖ Editing a word document (Cut, Copy, Paste, Bold, Italic, Underline)
❖ Print Dialog Box
❖ Creating a Table, Operations on Table in MS Word

Bachelor of Vocation (B.Voc.)
(Refrigeration and Air Conditioning) Semester – I

Practical

Max.Marks: 25

Practical based on Fundamentals of Computer

- MS Word and
- Window Vista

References:

1. Introduction to Computer by P.K. Sinha
2. Fundamental of Information technology by Lakhanpal Publishers
3. Windows Based Computer Courses by Gurvinder Singh & Rachpal Singh, Kalyani Publishers.
4. Fundamentals of Computer by Unimax Pub.

Bachelor of Vocation (B.Voc.)
(Refrigeration and Air Conditioning) Semester – I

Paper–II: Communication Skills in English – I

Time: 3 Hours **Max. Marks: 50**

Course Contents:

1. Reading Skills: Reading Tactics and strategies; Reading purposes–kinds of purposes and associated comprehension; Reading for direct meanings; Reading for understanding concepts, details, coherence, logical progression and meanings of phrases/ expressions.

Activities:

a) Active reading of passages on general topics
b) Comprehension questions in multiple choice format
c) Short comprehension questions based on content and development of ideas

2. Writing Skills: Guidelines for effective writing; writing styles for application, resume, personal letter, official/ business letter, memo, notices etc.; outline and revision.

Activities:

a) Formatting personal and business letters.
b) Organising the details in a sequential order
c) Converting a biographical note into a sequenced resume or vice-versa
d) Ordering and sub-dividing the contents while making notes.
e) Writing notices for circulation/ boards

Suggested Pattern of Question Paper:
The question paper will consist of five skill–oriented questions from Reading and Writing Skills. Each question will carry 10 marks. The questions shall be phrased in a manner that students know clearly what is expected of them. There will be internal choice wherever possible.

10x5=50 Marks

i) Multiple choice questions on the language and meanings of an unseen passage.
ii) Comprehension questions with short answers on content, progression of ideas, purpose of writing etc. of an unseen passage.
iii) Personal letter and Official/Business correspondence
iv) Making point-wise notes on a given speech/ technical report OR
Writing notices for public circulation on topics of professional interest
v) Do as directed (10x1= 10 Marks) (change of voice, narration, combination of 2 simple sentences into one, subject-verb agreement, using appropriate tense, forms of verbs.

Recommended Books:

1. *Oxford Guide to Effective Writing and Speaking* by John Seely.
2. *English Grammar in Use* (Fourth Edition) by Raymond Murphy, CUP

Bachelor of Vocation (B.Voc.)
(Refrigeration and Air Conditioning) Semester – I

Paper-III: ਪੰਜਾਬੀ (ਲਾਜ਼ਮੀ)

ਸਮਾਂ : 3 ਘੰਟੇ **ਕੁਲ ਅੰਕ : 50**

ਪਾਠ-ਕ੍ਰਮ ਅਤੇ ਪਾਠ-ਪੁਸਤਕਾਂ

1. **ਗਿਆਨ ਮਾਲਾ** (ਵਿਗਿਆਨਕ ਤੇ ਸਮਾਜ-ਵਿਗਿਆਨਕ ਲੇਖਾਂ ਦਾ ਸੰਗ੍ਰਹਿ), (ਸੰਪਾ. ਡਾ. ਸਤਿੰਦਰ ਸਿੰਘ, ਪ੍ਰੋ. ਮਹਿੰਦਰ ਸਿੰਘ ਬਨਵੈਤ), ਗੁਰੂ ਨਾਨਕ ਦੇਵ ਯੂਨੀਵਰਸਿਟੀ, ਅੰਮ੍ਰਿਤਸਰ।
   ਲੇਖ : ਪਹੀਆ ਪ੍ਰਦੂਸ਼ਣ, ਭਰੂਣ ਹੱਤਿਆ ਦੇ ਦੇਸ਼ ਵਿਚ, ਨਾਰੀ ਸ਼ਕਤੀ, ਵਾਤਾਵਰਣੀ ਪ੍ਰਦੂਸ਼ਣ ਅਤੇ ਮਨੁੱਖ, ਏਡਜ਼ : ਇਕ ਗੰਭੀਰ ਸੰਕਟ।
2. **ਆਤਮ ਅਨਾਤਮ** (ਸੰਪ. ਸੁਹਿੰਦਰ ਬੀਰ ਅਤੇ ਵਰਿਆਮ ਸਿੰਘ ਸੰਧੂ)
   (ਪ੍ਰੋ. ਮੋਹਨ ਸਿੰਘ, ਅੰਮ੍ਰਿਤਾ ਪ੍ਰੀਤਮ, ਸ਼ਿਵ ਕੁਮਾਰ ਬਟਾਲਵੀ, ਸੁਰਜੀਤ ਪਾਤਰ, ਪਾਸ਼)
   ਗੁਰੂ ਨਾਨਕ ਦੇਵ ਯੂਨੀਵਰਸਿਟੀ, ਅੰਮ੍ਰਿਤਸਰ।

3. **ਪੈਰ੍ਹਾ ਰਚਨਾ**
4. **ਪੈਰ੍ਹਾ ਪੜ੍ਹ ਕੇ ਪ੍ਰਸ਼ਨਾਂ ਦੇ ਉੱਤਰ**।
5. (ੳ) **ਪੰਜਾਬੀ ਧੁਨੀ ਵਿਉਂਤ** : ਉਚਾਰਨ ਅੰਗ, ਉਚਾਰਨ ਸਥਾਨ ਤੇ ਵਿਧੀਆਂ, ਸਵਰ, ਵਿਅੰਜਨ, ਸੁਰ।
   (ਅ) **ਭਾਸ਼ਾ ਵੰਨਗੀਆਂ** : ਭਾਸ਼ਾ ਦਾ ਟਕਸਾਲੀ ਰੂਪ, ਭਾਸ਼ਾ ਅਤੇ ਉਪ-ਭਾਸ਼ਾ ਦਾ ਅੰਤਰ, ਪੰਜਾਬੀ ਉਪ-ਭਾਸ਼ਾਵਾਂ ਦੇ ਪਛਾਣ-ਚਿੰਨ੍ਹ।
6. **ਮਾਤ ਭਾਸ਼ਾ ਦਾ ਅਧਿਆਪਨ**
   (ੳ) ਪਹਿਲੀ ਭਾਸ਼ਾ ਦੇ ਤੌਰ ਉੱਤੇ
   (ਅ) ਦੂਜੀ ਭਾਸ਼ਾ ਦੇ ਤੌਰ ਉੱਤੇ

ਅੰਕ-ਵੰਡ ਅਤੇ ਪਰੀਖਿਅਕ ਲਈ ਹਦਾਇਤਾਂ:

1.	ਕਿਸੇ ਨਿਬੰਧ ਦਾ ਸਾਰ ਜਾਂ ਉਸਦਾ ਵਿਸ਼ਾ ਵਸਤੂ (ਦੋ ਵਿਚੋਂ ਇਕ) ।	10 ਅੰਕ
2.	**ਆਤਮ ਅਨਾਤਮ** : ਸਾਰ, ਵਿਸ਼ਾ-ਵਸਤੂ, ਪ੍ਰਸੰਗ ਸਹਿਤ ਵਿਆਖਿਆ, ਕਲਾ ਪੱਖ	10 ਅੰਕ
3.	ਪੈਰ੍ਹਾ ਰਚਨਾ : ਤਿੰਨ ਵਿਸ਼ਿਆਂ ਵਿਚੋਂ ਕਿਸੇ ਇਕ ਉਤੇ ਪੈਰ੍ਹਾ ਲਿਖਣ ਲਈ ਕਿਹਾ ਜਾਵੇ ।	05 ਅੰਕ
4.	ਪੈਰ੍ਹਾ ਦੇ ਕੇ ਉਸ ਬਾਰੇ ਪੰਜ ਪ੍ਰਸ਼ਨਾਂ ਦੇ ਉੱਤਰ।	05 ਅੰਕ
5.	ਨੰਬਰ 5 ਉਤੇ ਦਿੱਤੀ ਵਿਆਕਰਣ ਦੇ ਆਧਾਰ 'ਤੇ ਵਰਣਨਾਤਮਕ ਪ੍ਰਸ਼ਨ।	10 ਅੰਕ
6.	ਨੰਬਰ 6 ਵਿਚ ਮਾਤ ਭਾਸ਼ਾ ਦੇ ਪਹਿਲੀ ਭਾਸ਼ਾ ਅਤੇ ਦੂਜੀ ਭਾਸ਼ਾ ਵਜੋਂ ਅਧਿਆਪਨ, ਮਹੱਤਵ ਅਤੇ ਸਮੱਸਿਆਵਾਂ ਬਾਰੇ ਚਾਰ ਪ੍ਰਸ਼ਨ ਪੁੱਛੇ ਜਾਣਗੇ, ਜਿਨ੍ਹਾਂ ਵਿਚੋਂ ਵਿਦਿਆਰਥੀ ਨੇ ਦੋ ਦਾ ਉੱਤਰ ਦੇਣਾ ਹੋਵੇਗਾ।	5×2=10 ਅੰਕ

Bachelor of Vocation (B.Voc.)
(Refrigeration and Air Conditioning) Semester – I

PAPER–III: ਮੁੱਢਲੀ ਪੰਜਾਬੀ
(In lieu of Punjabi Compulsory)

ਸਮਾਂ : 3 ਘੰਟੇ **ਕੁਲ ਅੰਕ: 50**

ਪਾਠ-ਕ੍ਰਮ

1. ਪੈਂਤੀ ਅੱਖਰੀ; ਪੈਰ ਬਿੰਦੀ ਵਾਲੇ ਵਰਣ ਅਤੇ ਪੈਰ ਵਿਚ ਪੈਣ ਵਾਲੇ ਵਰਣ, ਲਗਾਂ ਮਾਤਰਾਂ
2. ਲਗਾਖਰ (ਬਿੰਦੀ, ਟਿੱਪੀ, ਅੱਧਕ)
3. (ੳ) ਵਿਸ਼ਰਾਮ ਚਿੰਨ੍ਹਾਂ ਦੀ ਵਰਤੋਂ,
   (ਅ) ਨਾਂਵ, ਪੜਨਾਂਵ, ਕਿਰਿਆ, ਵਿਸ਼ੇਸਣ, ਲਿੰਗ ਅਤੇ ਵਚਨ

ਅੰਕ ਵੰਡ ਤੇ ਪੇਪਰ ਸੈਟਰ ਲਈ ਹਦਾਇਤਾਂ

1. ਪੈਂਤੀ ਅੱਖਰੀ ਦੀ ਬਣਤਰ ਅਤੇ ਤਰਤੀਬ ਨਾਲ ਸੰਬੰਧਿਤ ਪ੍ਰਸ਼ਨ। **10 ਅੰਕ**
   (ਦੋ ਪ੍ਰਸ਼ਨਾਂ ਵਿਚੋਂ ਇੱਕ ਕਰਨਾ ਹੋਵੇਗਾ)
   ਕਵਰਗ, ਚਵਰਗ, ਤਵਰਗ, ਟਵਰਗ ਆਦਿ ਸੰਬੰਧੀ ਪ੍ਰਸ਼ਨ ਪੁੱਛਿਆ ਜਾ ਸਕਦਾ ਹੈ। ਪੈਰ ਵਿਚ ਪੈਣ ਵਾਲੇ ਵਰਣ ਅਤੇ ਲਗਾਂ ਮਾਤਰਾਂ ਦੀ ਵਰਤੋਂ ਨਾਲ ਸੰਬੰਧਿਤ ਪ੍ਰਸ਼ਨ (ਦੋ ਵਿਚੋਂ ਇੱਕ ਕਰਨਾ ਹੋਵੇਗਾ) **10 ਅੰਕ**

2. ਬਿੰਦੀ, ਟਿੱਪੀ ਅਤੇ ਅੱਧਕ ਦੀ ਵਰਤੋਂ ਸੰਬੰਧੀ ਪ੍ਰਸ਼ਨ **10 ਅੰਕ**

3. (ੳ) ਵਿਸ਼ਰਾਮ ਚਿੰਨ੍ਹਾਂ ਦੀ ਵਰਤੋਂ ਸੰਬੰਧੀ ਪ੍ਰਸ਼ਨ **10 ਅੰਕ**
   (ਅ) ਨਾਂਵ ਪੜਨਾਂਵ, ਕਿਰਿਆ, ਵਿਸ਼ੇਸ਼ਣ ਅਤੇ ਲਿੰਗ ਵਚਨ ਸੰਬੰਧੀ ਮੁੱਢਲੀ
4. ਕਿਸਮ ਦੇ ਪ੍ਰਸ਼ਨ (ਦੋ ਵਿਚੋਂ ਇੱਕ ਕਰਨਾ ਹੋਵੇਗਾ) **10 ਅੰਕ**

Bachelor of Vocation (B.Voc.)
(Refrigeration and Air Conditioning) Semester – I

Paper–IV: Thermodynamics in Refrigeration & Air Conditioning

Time: 3 Hours **Max. Marks: 100**
Periods/week: 6 **Theory Marks: 60**
Practical Marks: 40

Instructions for the Paper Setters:

Section–A: It will consist of 10 very short answer questions with answer to each question upto five lines in length. All questions will be compulsory. Each question will carry one & half marks i.e. (1½ marks); total weightage of the section being 15 Marks.

Section–B: It will consist of short answer questions with answer to each question upto 2 pages in length. Eight questions will be set by the examiner and 5 will be attempted by the candidates. Each question will carry 4 marks; total weightage of the section being 20 marks.

Section–C: It will consist of essay type question with answer to each question upto 5 pages in length. Four questions will be set by the examiner & candidates will be required to attempt two. Each question will carry 12 ½ marks; total weightage of the section being 25 marks.

Note: Attempt of question paper may be made either in English or Punjabi.

UNIT–I

Definition of thermodynamic terms: System, surroundings, Types of systems, intensive and extensive properties, Thermodynamic processes: isothermal, isobaric, isochoric, adiabatic, temperature, different scales of temperature, instruments used for measuring temperature, reversible and irreversible processes, first and second law of thermodynamics.

UNIT–II

Applications of Thermodynamics: Carnot cycle, refrigerator and heat pump, refrigeration, equipments used in refrigeration, application of RAC, methods of refrigeration, terminology of refrigeration, definition of TON as applied to refrigeration, C.O.P., refrigeration effect.

List of Reference Books:

1. Ref & AC S. Domkundwar Dhanpat Rai
2. Ref & AC S.C. Arora —do—
3. A Course in P.L. Batlaney Khanna Ref. & A.C. M. Singh Khurmy Publishers Royal Pub.

Bachelor of Vocation (B.Voc.)
(Refrigeration and Air Conditioning) Semester – I

Practical: Thermodynamics in Refrigeration & Air Conditioning–I
PRACTICAL: LAB–I

Time: 3 Hours
Period/week: 6 **Marks: 40**

List of Experiments:

1. To study the basic tools eg. spanners, cutting & Throading tools, bending tools etc.
2. Cutting, flatting & joining of tubes.
3. Bending of tubes of diff. sizes**.**

List of Reference Books:

1. Ref & AC S. Domkundwar Dhanpat Rai
2. Ref & AC S.C. Arora —do—
3. A Course in P.L. Batlaney Khanna Ref. & A.C. M. Singh Khurmy Publishers Royal Pub.

Bachelor of Vocation (B.Voc.)
(Refrigeration and Air Conditioning) Semester – I

Paper–V: Basics of Refrigeration & Air Conditioning – I

Time: 3 Hours **Max. Marks: 100**
Periods/week: 6 **Theory Marks: 60**
Practical Marks: 40

Instructions for the Paper Setters:

Section–A: It will consist of 10 very short answer questions with answer to each question upto five lines in length. All questions will be compulsory. Each question will carry one & half marks i.e. (1½ marks); total weightage of the section being 15 Marks.

Section–B: It will consist of short answer questions with answer to each question upto 2 pages in length. Eight questions will be set by the examiner and 5 will be attempted by the candidates. Each question will carry 4 marks; total weightage of the section being 20 marks.

Section–C: It will consist of essay type question with answer to each question upto 5 pages in length. Four questions will be set by the examiner & candidates will be required to attempt two. Each question will carry 12 ½ marks; total weightage of the section being 25 marks.

Note: Attempt of question paper may be made either in English or Punjabi.

UNIT–I

Heat, work, various methods of heat flow: conduction, convection, radiation, specific heat, sensible heat, latent heat of vapour & fusion, specific heat of gases & units of heat, melting and boiling point, absolute temperature, difference between heat and temperature, condensation, vaporisation.

UNIT–II

Refrigerants: Introduction to Refrigerant, Classification of Refrigerants, desirable properties of Ideal Refrigerant.

Bachelor of Vocation (B.Voc.)
(Refrigeration and Air Conditioning) Semester – I

Practical: Basics of Refrigeration & Air Conditioning – I
PRACTICAL: LAB–II

Time: 3 Hours
Period/week: 6 **Marks: 40**

List of Experiments:

1. Soldering, brazing & pinching of tubes.
2. Cutting of G.I. & Copper tubes.

List of Reference Books:

1. Ref & AC S. Domkundwar Dhanpat Rai
2. Ref & AC S.C. Arora —do—
3. A Course in P.L. Batlaney Khanna Ref. & A.C. M. Singh Khurmy Publishers Royal Pub.

Bachelor of Vocation (B.Voc.)
(Refrigeration and Air Conditioning) Semester – II

Paper–I: Fundamentals of Computer – II
(Theory)

Max. Marks: 100
Theory Marks: 75
Time: 3 Hours **Practical Marks: 25**
Periods per week: Theory: 6

Instructions for the Paper Setters:

a) Ten compulsory very short answer questions of 2 marks each. 10x02=20
b) Eight short answer questions of 5 marks each, students are required attempt any five questions. 05x05=25
c) Four long answer questions of 15 marks each, students are required to attempt any two. 02x15=30

UNIT – I

- Internet (Understanding its Basics, Evolution)
- World Wide Web (WWW)
- Email(Structure and Working)
- LAN, WAN, MAN
- Client Server System
- Types of software, Translators (compiler, interpreter, assembler)

UNIT – II

- Introduction to MS Power Point
- ❖ Elements of Power Point
- ❖ Staring, Saving, Printing of Slides
- ❖ Diff Views in Power Point
- ❖ Formatting of Slides
- ❖ Creation of graphs
- ❖ Printing Presentations

Bachelor of Vocation (B.Voc.)
(Refrigeration and Air Conditioning) Semester – II

Paper–I: Fundamentals of Computer – II
(PRACTICAL)

Max.Marks: 25

Practical based on fundamentals of Computer – II

- MS Power Point
- Internet

References:

1. Norton's P. (2001). Introduction to Computing Fundamental, McGraw Hill Education, New Delhi.
2. Introduction to Computer by P.K. Sinha.
3. Windows Based Computer Courses by Gurvinder Singh & Rachpal Singh, Kalyani Publishers.

Bachelor of Vocation (B.Voc.)
(Refrigeration and Air Conditioning) Semester – II

PAPER – II: COMMUNICATION SKILLS IN ENGLISH – II

Time: 3 Hours **Max. Marks: 50**
Theory Marks: 35
Practical Marks: 15

Course Contents:

1. **Listening Skills:** Barriers to listening; effective listening skills; feedback skills. Attending telephone calls; note taking.

   Activities:
   a) Listening exercises – Listening to conversation, News and TV reports
   b) Taking notes on a speech/lecture

2. **Speaking and Conversational Skills**: Components of a meaningful and easy conversation; understanding the cue and making appropriate responses; forms of polite speech; asking and providing information on general topics.
   The study of sounds of English, stress
   Situation based Conversation in English
   Essentials of Spoken English

   Activities:
   a) Making conversation and taking turns
   b) Oral description or explanation of a common object, situation or concept
   c) Giving interviews

Suggested Pattern of Question Paper:

The question paper will consist of seven questions related to speaking and listening Skills. Each question will carry 5 marks. The nature of the questions will be as given below:-

Two questions requiring students to give descriptive answers.

Three questions in the form of practical exercises requiring students to give an appropriate response to a question, a proposal, a proposition, an invitation etc. For example, the paper setter may give a proposition and ask the students to agree or disagree with it or introduce a character giving invitations and ask the students to accept or refuse it etc.

Two questions requiring students to transcribe simple words in IPA symbols, marking stress.

Bachelor of Vocation (B.Voc.)
(Refrigeration and Air Conditioning) Semester – II

PRACTICAL / ORAL TESTING

Marks: 15

Course Contents:

1. Oral Presentation with/without audio visual aids.
2. Group Discussion.
3. Listening to any recorded or live material and asking oral questions for listening comprehension.

Questions:

1. Oral Presentation will be of 5 to 10 minutes duration. (Topic can be given in advance or it can be of student's own choice). Use of audio visual aids is desirable.

2. Group discussion comprising 8 to 10 students on a familiar topic. Time for each group will be 15 to 20 minutes.

Note: Oral test will be conducted by external examiner with the help of internal examiner.

Bachelor of Vocation (B.Voc.)
(Refrigeration and Air Conditioning) Semester – II

PAPER-III: ਪੰਜਾਬੀ (ਲਾਜ਼ਮੀ)

ਸਮਾਂ : 3 ਘੰਟੇ **ਕੁਲ ਅੰਕ : 50**

ਪਾਠ–ਕ੍ਰਮ ਅਤੇ ਪਾਠ–ਪੁਸਤਕਾਂ

1. **ਗਿਆਨ ਮਾਲਾ** (ਵਿਗਿਆਨਕ ਤੇ ਸਮਾਜ–ਵਿਗਿਆਨਕ ਲੇਖਾਂ ਦਾ ਸੰਗ੍ਰਹਿ)
(ਸੰਪ. ਡਾ. ਸਤਿੰਦਰ ਸਿੰਘ, ਪ੍ਰੋ. ਮਹਿੰਦਰ ਸਿੰਘ ਬਨਵੈਤ), ਗੁਰੂ ਨਾਨਕ ਦੇਵ ਯੂਨੀਵਰਸਿਟੀ, ਅੰਮ੍ਰਿਤਸਰ, 2007
ਲੇਖ : ਸਾਹਿਤ ਤੇ ਲੋਕ ਸਾਹਿਤ, ਅੱਖਾਂ, ਅਚੇਤਨ ਦਾ ਗੁਣ ਤੇ ਸੁਭਾਅ, ਕੰਪਿਊਟਰ ਅਤੇ ਇੰਟਰਨੈੱਟ, ਮਨੁੱਖੀ ਅਧਿਕਾਰ।
2. **ਆਤਮ ਅਨਾਤਮ** (ਸੰਪ. ਸੁਹਿੰਦਰ ਬੀਰ ਅਤੇ ਵਰਿਆਮ ਸਿੰਘ ਸੰਧੂ) (ਕਹਾਣੀਆਂ)
ਪਠਾਣ ਦੀ ਧੀ (ਸੁਜਾਨ ਸਿੰਘ), **ਸਾਂਵੀ ਕੰਧ** (ਸੰਤੋਖ ਸਿੰਘ ਧੀਰ), **ਉਜਾੜ** (ਕੁਲਵੰਤ ਸਿੰਘ ਵਿਰਕ), **ਘੋਟਣਾ** (ਮੋਹਨ ਭੰਡਾਰੀ), **ਦਲਦਲ** (ਵਰਿਆਮ ਸਿੰਘ ਸੰਧੂ)
ਗੁਰੂ ਨਾਨਕ ਦੇਵ ਯੂਨੀਵਰਸਿਟੀ, ਅੰਮ੍ਰਿਤਸਰ।

3. **ਸ਼ਬਦਫ਼ਬਣਤਰ ਅਤੇ ਸ਼ਬਦ ਰਚਨਾ** : ਪਰਿਭਾਸ਼ਾ, ਮੁੱਢਲੇ ਸੰਕਲਪ
4. **ਸ਼ਬਦ ਸ਼੍ਰੇਣੀਆਂ**
5. **ਪੈਰ੍ਹਾ ਰਚਨਾ**
6. **ਪੈਰ੍ਹਾ ਪੜ੍ਹ ਕੇ ਪ੍ਰਸ਼ਨਾਂ ਦੇ ਉੱਤਰ**
7. **ਮੁਹਾਵਰੇ ਅਤੇ ਅਖਾਣ**

ਅੰਕ–ਵੰਡ ਅਤੇ ਪਰੀਖਿਅਕ ਲਈ ਹਦਾਇਤਾਂ:

1.	ਕਿਸੇ ਨਿਬੰਧ ਦਾ ਸਾਰ ਜਾਂ ਉਸਦਾ ਵਿਸ਼ਾ ਵਸਤੂ (ਦੋ ਵਿਚੋਂ ਇਕ) ।	10 ਅੰਕ
2.	**ਆਤਮ ਅਨਾਤਮ** : ਸਾਰ, ਵਿਸ਼ਾ ਵਸਤੂ, ਪਾਤਰ ਚਿਤਰਣ, ਸਾਹਿਤ ਨੂੰ ਦੇਣ	10 ਅੰਕ
3–4.	3–4 ਨੰਬਰ ਉੱਤੇ ਦਿੱਤੀ ਵਿਆਕਰਣ ਦੇ ਆਧਾਰ ਤੇ ਵਰਣਨਾਤਮਕ ਪ੍ਰਸ਼ਨ।	10 ਅੰਕ
5.	ਪੈਰ੍ਹਾ ਰਚਨਾ : ਤਿੰਨ ਵਿਸ਼ਿਆਂ ਵਿਚੋਂ ਕਿਸੇ ਇਕ ਉਤੇ ਪੈਰ੍ਹਾ ਲਿਖਣ ਲਈ ਕਿਹਾ ਜਾਵੇ ।	05 ਅੰਕ
6.	ਪੈਰ੍ਹਾ ਦੇ ਕੇ ਉਸ ਬਾਰੇ ਪੰਜ ਪ੍ਰਸ਼ਨਾਂ ਦੇ ਉੱਤਰ	05 ਅੰਕ
7.	ਨੰਬਰ 7 ਵਿਚ ਅੱਠ ਅਖਾਣ ਅਤੇ ਅੱਠ ਮੁਹਾਵਰੇ ਪੁੱਛੇ ਜਾਣਗੇ, ਜਿਨ੍ਹਾਂ ਵਿਚੋਂ ਵਿਦਿਆਰਥੀ ਨੇ ਪੰਜ-ਪੰਜ ਨੂੰ ਵਾਕਾਂ ਵਿਚ ਵਰਤ ਕੇ ਅਰਥ ਸਪੱਸ਼ਟ ਕਰਨੇ ਹੋਣਗੇ।	5+ 5=10 ਅੰਕ

Bachelor of Vocation (B.Voc.)
(Refrigeration and Air Conditioning) Semester – II

PAPER–III: ਮੁੱਢਲੀ ਪੰਜਾਬੀ
(In lieu of Punjabi Compulsory)

ਸਮਾਂ: 3 ਘੰਟੇ **ਕੁਲ ਅੰਕ: 50**

ਪਾਠ – ਕ੍ਰਮ

1. ਪੰਜਾਬੀ ਸ਼ਬਦ-ਬਣਤਰ
   ਸੰਯੁਕਤ ਅਤੇ ਮਿਸ਼ਰਤ ਸ਼ਬਦ
   ਨਿੱਤ ਵਰਤੋਂ ਦੀ ਪੰਜਾਬੀ ਸ਼ਬਦਾਵਲੀ **20 ਅੰਕ**
2. ਭਾਸ਼ਾ ਅਤੇ ਪੰਜਾਬੀ ਭਾਸ਼ਾ ਮੁੱਢਲੀ ਜਾਣ ਪਛਾਣ
   ਗੁਰਮੁਖੀ ਲਿਪੀ ਦੀਆਂ ਵਿਸ਼ੇਸ਼ਤਾਵਾਂ **15 ਅੰਕ**
3. ਪੰਜਾਬੀ ਵਾਕ ਬਣਤਰ
   ਸਾਧਾਰਨ ਵਾਕ: ਕਿਸਮਾਂ
   ਸੰਯੁਕਤ ਵਾਕ: ਕਿਸਮਾਂ
   ਮਿਸ਼ਰਤ ਵਾਕ: ਕਿਸਮਾਂ
   ਪੰਜਾਬੀ ਵਾਕਾਂ ਦੀ ਵਰਤੋਂ ਦੇ ਵਿਭਿੰਨ ਸਮਾਜਿਕ ਪ੍ਰਸੰਗ **15 ਅੰਕ**

ਯੂਨਿਟ ਅਤੇ ਥੀਮ

1. **ਪੰਜਾਬੀ ਸ਼ਬਦ ਬਣਤਰ:** ਸੰਯੁਕਤ ਸ਼ਬਦ; ਸਮਾਸੀ ਸ਼ਬਦ (ਜਿਵੇਂ ਲੋਕ ਸਭਾ); ਦੋਹਰੇ ਸ਼ਬਦ / ਦੁਹਰਰੁਕਤੀ (ਜਿਵੇਂ ਧੂੜ ਧਾੜ / ਭਰ ਭਰ), ਮਿਸ਼ਰਤ ਸ਼ਬਦਾਂ ਦੀ ਬਣਤਰ/ਸਿਰਜਨਾ; ਅਗੇਤਰਾਂ ਰਾਹੀਂ (ਜਿਵੇਂ ਉਪ ਭਾਸ਼ਾ), ਪਿਛੇਤਰਾਂ ਰਾਹੀਂ (ਜਿਵੇਂ ਰੰਗਲਾ), ਪੰਜਾਬੀ ਸ਼ਬਦ ਰਚਨਾ: ਪੜਨਾਵੀਂ ਰੂਪ, ਕਿਰਿਆ/ਸਹਾਇਕ ਕਿਰਿਆ ਦੇ ਰੂਪ; ਨਿੱਤ ਵਰਤੋਂ ਦੀ ਪੰਜਾਬੀ ਸ਼ਬਦਾਵਲੀ: ਰੁੱਤਾਂ, ਮਹੀਨਿਆਂ, ਮੌਸਮਾਂ, ਗਿਣਤੀ ਨਾਲ ਸੰਬੰਧਿਤ ।

2. I. ਭਾਸ਼ਾ ਅਤੇ ਮਾਤ ਭਾਸ਼ਾ ਦੇ ਮਹੱਤਵ ਸੰਬੰਧੀ ਪ੍ਰਸ਼ਨ
   II. ਗੁਰਮੁਖੀ ਲਿਪੀ ਦੀਆਂ ਵਿਸ਼ੇਸ਼ਤਾਵਾਂ ਸੰਬੰਧੀ ਪ੍ਰਸ਼ਨ

3. **ਪੰਜਾਬੀ ਵਾਕ ਬਣਤਰ:** ਕਰਤਾ ਕਰਮ ਕਿਰਿਆ; ਸਾਧਾਰਨ ਵਾਕ, ਬਿਆਨੀਆ, ਪ੍ਰਸ਼ਨਵਾਚਕ, ਆਗਿਆਵਾਚਕ, ਸੰਯੁਕਤ ਅਤੇ ਮਿਸਰਤ ਵਾਕਾਂ ਦੀਆਂ ਕਿਸਮਾਂ; ਸੁਤੰਤਰ ਅਤੇ ਅਧੀਨ ਉਪਵਾਕ; ਸਮਾਨ (ਤੇ/ਅਤੇ) ਅਤੇ ਅਧੀਨ (ਜੋ/ਕਿ) ਯੋਜਕਾਂ ਦੀ ਵਰਤੋਂ; ਪੰਜਾਬੀ ਵਾਕਾਂ ਦੀ ਵਰਤੋਂ: ਵਿਭਿੰਨ ਸਮਾਜਕ/ਸਭਿਆਚਾਰਕ ਪ੍ਰਸੰਗ; ਘਰ ਵਿਚ, ਬਾਜ਼ਾਰ ਵਿਚ, ਮੇਲੇ ਵਿਚ, ਸ਼ੋਪਿੰਗ ਮਾਲ/ਸਿਨਮੇ ਵਿਚ, ਵਿਆਹ ਵਿਚ, ਧਾਰਮਿਕ ਸਥਾਨਾਂ ਵਿਚ, ਦੋਸਤਾਂ ਨਾਲ ਆਦਿ।

Bachelor of Vocation (B.Voc.)
(Refrigeration and Air Conditioning) Semester – II

ਅੰਕ–ਵੰਡ ਅਤੇ ਪਰੀਖਿਅਕ ਲਈ ਹਦਾਇਤਾਂ

1. ਪਹਿਲੇ ਯੂਨਿਟ ਵਿੱਚੋਂ ਪੰਜਾਬੀ ਸ਼ਬਦ ਬਣਤਰ ਅਤੇ ਸ਼ਬਦ ਰਚਨਾ ਨਾਲ ਸਬੰਧਿਤ 5-5 ਅੰਕਾਂ ਦੇ ਤਿੰਨ ਵਿਹਾਰਕ ਪ੍ਰਸ਼ਨ ਪੁੱਛੇ ਜਾਣਗੇ। ਅੰਕਾਂ ਦੀ ਵੰਡ ਅੱਗੋਂ ਇਕ-ਇਕ ਜਾਂ ਦੋ-ਦੋ ਅੰਕਾਂ ਦੇ ਛੋਟੇ ਪ੍ਰਸ਼ਨਾਂ ਵਿਚ ਕੀਤੀ ਜਾ ਸਕਦੀ ਹੈ।
   ਨਿੱਤ ਵਰਤੋਂ ਦੀ ਸ਼ਬਦਾਵਲੀ ਨਾਲ ਸਬੰਧਿਤ ਇਕ-ਇਕ ਅੰਕ ਦੇ ਪੰਜ (ਆਬਜੈਕਟਿਵ) ਪ੍ਰਸ਼ਨ ਪੁੱਛੇ ਜਾਣਗੇ।

   20 ਅੰਕ

2. ਦੂਸਰੇ ਯੂਨਿਟ ਵਿੱਚ ਭਾਸ਼ਾ ਅਤੇ ਪੰਜਾਬੀ ਭਾਸ਼ਾ ਮੁੱਢਲੀ ਜਾਣ ਪਛਾਣ ਨਾਲ ਸੰਬੰਧਿਤ 5-5 ਅੰਕਾਂ ਦੇ ਤਿੰਨ ਵਿਹਾਰਕ ਪ੍ਰਸ਼ਨ ਪੁੱਛੇ ਜਾਣਗੇ। ਅੰਕਾਂ ਦੀ ਵੰਡ ਅੱਗੋਂ ਇੱਕ-ਇੱਕ ਜਾਂ ਦੋ-ਦੋ ਅੰਕਾਂ ਦੇ ਛੋਟੇ ਪ੍ਰਸ਼ਨਾਂ ਵਿੱਚ ਕੀਤੀ ਜਾ ਸਕਦੀ ਹੈ।

   15 ਅੰਕ

3. ਤੀਜੇ ਯੂਨਿਟ ਵਿੱਚ ਪੰਜਾਬੀ ਵਾਕ-ਬਣਤਰ ਨਾਲ ਸਬੰਧਿਤ 5-5 ਅੰਕਾਂ ਦੇ ਦੋ ਵਿਹਾਰਕ ਪ੍ਰਸ਼ਨ ਪੁੱਛੇ ਜਾਣਗੇ। ਅੰਕਾਂ ਦੀ ਵੰਡ ਅੱਗੋਂ ਇਕ-ਇਕ ਜਾਂ ਦੋ-ਦੋ ਅੰਕਾਂ ਦੇ ਛੋਟੇ ਪ੍ਰਸ਼ਨਾਂ ਵਿਚ ਕੀਤੀ ਜਾ ਸਕਦੀ ਹੈ।
   ਪੰਜਾਬੀ ਵਾਕਾਂ ਦੀ ਵਿਹਾਰਕ ਵਰਤੋਂ ਨਾਲ ਸਬੰਧਿਤ 5 ਅੰਕਾਂ ਦਾ ਇਕ ਪ੍ਰਸ਼ਨ ਪੁੱਛਿਆ ਜਾਵੇਗਾ, ਜਿਸ ਵਿਚ ਵਿਦਿਆਰਥੀ ਨੂੰ ਕਿਸੇ ਸਮਾਜਿਕ/ਸਭਿਆਚਾਰਕ ਪ੍ਰਸੰਗ ਵਿਚ ਵਰਤੇ ਜਾਂਦੇ ਪੰਜ ਵਾਕ ਲਿਖਣ ਲਈ ਕਿਹਾ ਜਾਵੇਗਾ।
   ਪ੍ਰਸ਼ਨਾਂ ਦੀ ਭਾਸ਼ਾ ਸਰਲ ਅਤੇ ਸਪਸ਼ਟ ਰੱਖੀ ਜਾਵੇ।

   15 ਅੰਕ

Bachelor of Vocation (B.Voc.)
(Refrigeration and Air Conditioning) Semester – II

Paper–IV: Basics of Refrigeration & Air Conditioning–II

Time: 3 Hours **Max. Marks: 100**
Periods/week: 6 **Theory Marks: 60**
Practical Marks: 40

Instructions for the Paper Setters:

Section–A: It will consist of 10 very short answer questions with answer to each question upto five lines in length. All questions will be compulsory. Each question will carry one & half marks i.e. (1½ marks); total weightage of the section being 15 Marks.

Section–B: It will consist of short answer questions with answer to each question upto 2 pages in length. Eight questions will be set by the examiner and 5 will be attempted by the candidates. Each question will carry 4 marks; total weightage of the section being 20 marks.

Section–C: It will consist of essay type question with answer to each question upto 5 pages in length. Four questions will be set by the examiner & candidates will be required to attempt two. Each question will carry 12 ½ marks; total weightage of the section being 25 marks.

Note: Attempt of question paper may be made either in English or Punjabi.

UNIT–I

Air Refrigeration System: Introduction, Carnot cycle, Bell Coleman Cycle, Advantages & disadvantages of Air Refrigeration System, Necessity of cooling the aeroplane

UNIT–II

Thermal insulation of Air–conditioning System: Inroduction, Desired properties of an ideal insulating material, Factors affecting the thermal conductivity, types of insulating materials.

Bachelor of Vocation (B.Voc.)
(Refrigeration and Air Conditioning) Semester – II

Practical: Basics of Refrigeration & Air Conditioning–II
PRACTICAL: LAB–III

Time: 3 Hours **Marks: 40**
Period/week: 6

List of Experiments:

1. To make different types of joints with help of elbows. T's socket etc.
2. To study different types of comp. eg open & sealed type.
3. To study different types of condensers eg. Air cooled & Water cooled.
4. To study the various types of expansion devices. Capillary tube Exp. Values. Thermostatic Exp. value.
5. To study pressure & Temperature measuring instruments.

List of Reference Books:

1. Ref & AC S. Domkundwar Dhanpat Rai
2. Ref & AC S.C. Arora —do—
3. A Course in P.L. Batlaney Khanna Ref. & A.C. M. Singh Khurmy Publishers Royal.

Bachelor of Vocation (B.Voc.)
(Refrigeration and Air Conditioning) Semester – II

Paper–V: Physics

Time: 3 Hours **Max. Marks: 100**
Periods per week: Theory: 6 **Theory Marks: 75**
Practical Marks: 25

Instructions for the Paper Setters:

a) Ten compulsory very short answer questions of two marks each. 10x02=20
b) Eight short answer questions of five marks each, students are required attempt any five questions. 05x05=25
c) Six long answer questions of ten marks each, students are required to attempt any three. 03x10=30

Note: Set only one Numerical Question in the question paper.

UNIT – I

Scalar, vectors: dot product, cross product, Vector addition, subtraction, triangle law of vector addition, parallelogram law of vector addition, unit vectors

UNIT – II

Distance, displacement, velocity, speed, acceleration, derivation of equation of motions v= u+at, v2–u2=2as, s = ut+ 2 1 at2 by algebraic method.

UNIT – III

Binary number system, addition and subtraction of binary numbers, truth tables, OR, AND, NOT, NAND, NOR, XOR operations.

Practical based on Physics

Max. Marks: 25

1. Use of Vernier Callipers (i) to measure diameter of a small spherical/cylindrical body.
2. Use of screw gauge (i) To measure diameter of a given wire, (ii) To measure thickness of a given sheet.
3. Verify truth tables of OR, AND, NOT logic gates.
4. To plot a graph for a given set of data, with proper choice of scales and error bars.
5. To measure the force of limiting friction for rolling of a roller on a horizontal plane.

References:

1. Kalyani Systematic Physics +1 by K. N. Sharma, Rajesh Kumar, Kalyani Pub. Lud.
2. Modern abc Physics +2 Sem – I & II by Achal Gopta, Chavi Gupta, Modern Pub. Jal.
3. JBD Effectual Physics +1 Sem I & II by S. K. Gupta K. L. Gosian, J. K. Junega & B. S. Satyal.

Bachelor of Vocation (B.Voc.)
(Refrigeration and Air Conditioning) Semester – III

Paper–I: Fundamentals of Computer – III (Theory)

Time: 3 Hours **Max. Marks: 100**
Theory Marks: 75
Practical Marks: 25

Instructions for the Paper Setters:

a) Ten compulsory very short answer questions of 2 marks each. 10x02=20
b) Eight short answer questions of 5 marks each, students are required attempt any five questions. 05x05=25
c) Four long answer questions of 15 marks each, students are required to attempt any two. 02x15=30

UNIT–I

Fundamentals:

Computer Number System BIT, Byte, binary, Decimal, Hexadecimal, Octal system, Conversion from one System to another,

Memories (Primary and Secondary), (RAM, PROM, EPROM, EEROM), Storage Devices (Floppy disk, hard Disk, Compact Disk, tape),

Computer Languages: machine Language, assembly language, High level languages.

UNIT–II

Worksheets: MS–Excel: Creating worksheets, entering data into worksheet, saving & quitting Worksheet, opening and moving around in an existing worksheet, Toolbars and menus, working With single and multiple workbook, working with formulae, formatting of worksheet.

Bachelor of Vocation (B.Voc.)
(Refrigeration and Air Conditioning) Semester – III

PRACTICAL

1. On the basis of Computer Fundamental & Office Automation: Marks: 25

Books Recommended:

1. M.S. Office, The Complete Reference by Keitel, McGraw Hill.
2. Office XP the Complete Reference by Kelly, Edition 2001, McGraw Hill.
3. B.RAM, "Computer Fundamental" First Edition, Dhanpat Rai & Sons Pub.
4. Peter Norton, "Introduction to Computers" 6th Edition 2004, McGraw Hill, HTML, DHTML Java Script, "Gyan Bayrose" 3rd Edition BPB.

Bachelor of Vocation (B.Voc.)
(Refrigeration and Air Conditioning) Semester – III

Paper-II: Refrigeration & Air Conditioning-III

Time: 3 Hours **Max. Marks: 100**
Periods/week: 6 **Theory Marks: 60**
Practical Marks: 40

Instructions for the Paper Setters:

Section–A: It will consist of 10 very short answer questions with answer to each question upto five lines in length. All questions will be compulsory. Each question will carry one & half marks i.e. (1½ marks); total weight age of the section being 15 Marks.

Section–B: It will consist of short answer questions with answer to each question upto 2 pages in length. Eight questions will be set by the examiner and 5 will be attempted by the candidates. Each question will carry 4 marks; total weight age of the section being 20 marks.

Section–C: It will consist of essay type question with answer to each question upto 5 pages in length. Four questions will be set by the examiner & candidates will be required to attempt two. Each question will carry 12 ½ marks; total weightage of the section being 25 marks.

Note: Attempt of question paper may be made either in English or Punjabi.

UNIT – I

Compressors: Introduction, Types Hermetic, Semi Hermetic open compressors. Centrifugal & Rotary Compressors: construction features and volumetric Efficiencies. Multicylinder Compression & Capacity control.

UNIT – II

Compressor Lubrication: Methods of Lubrication & the properties of a Lubricating oil Identifications of sources of problem in operation Value failure, Shaft Seals 3- way Values cylinder to head gascats.

UNIT – III

Condensers: Definition, Basic Principle, Types of Condenser: Air cooled Condenser, Water Cooled Condenser, Evaporative Condenser and their Constructional features. Comparison between Waters & Air cooled condenser & their Advantages & disadvantages.

Bachelor of Vocation (B.Voc.)
(Refrigeration and Air Conditioning) Semester – III

Practical: Refrigeration & Air Conditioning-III
PRACTICAL: LAB–II

Time: 3 Hours **Marks: 40**
Period/week: 6

List of Experiments:

1. To Study the various control devices e.g. Thermostat, Relays & dryers etc.
2. To Study the vapour compression System.
3. To assemble & operate a small vapour compression system.

List of Books Recommended:

Name of Book	Author	Publisher
Refrigeration & Air Conditioning	S.C. Arora	Dhanpat Rai
Refrigeration & Air Conditioning	Dowkundwar Khurmi	Katson Publication
Refrigeration & Air Conditioning	Sarao, Gaabi Singh	Satya Prakashan.

Bachelor of Vocation (B.Voc.)
(Refrigeration and Air Conditioning) Semester – III

Paper-III: Refrigeration & Air Conditioning-IV

Time: 3 Hours **Max. Marks: 100**
Periods/week: 6 **Theory Marks: 60**
Practical Marks: 40

Instructions for the Paper Setters:

Section–A: It will consist of 10 very short answer questions with answer to each question upto five lines in length. All questions will be compulsory. Each question will carry one & half marks i.e. (1½ marks); total weightage of the section being 15 Marks.

Section–B: It will consist of short answer questions with answer to each question upto 2 pages in length. Eight questions will be set by the examiner and 5 will be attempted by the candidates. Each question will carry 4 marks; total weightage of the section being 20 marks.

Section–C: It will consist of essay type question with answer to each question upto 5 pages in length. Four questions will be set by the examiner & candidates will be required to attempt two. Each question will carry 12 ½ marks; total weightage of the section being 25 marks.

Note:Attempt of question paper may be made either in English or Punjabi.

UNIT – I

Cooling Towers: Definition, types: natural & Mechanical Draft, cooling pond, shell & tube shell of coil chillers. Fouling & de-scaling of condensers. Brine System.

UNIT – II

Expansion Devices: Capillary Tube, Constant Pressure, Thermo Static Exp. Values, Sizing of Capillary. Standard Sizes, testing & adjustment of expansion devices. High & Low sides float value. Refrigerant receivers. Dryers Filters.

UNIT – III

Refrigeration & Air Conditioning System Practice: Piping layout Selection of pip material & size for various Refrigerant, Methods of joining, flairing & brazing System, evacuation, depyartation, charging balancing, leak testing, Use of Solenoid values pressure equalizers.

Bachelor of Vocation (B.Voc.)
(Refrigeration and Air Conditioning) Semester – III

Practical: Refrigeration & Air Conditioning – IV
PRACTICAL: LAB–V

Time: 3 Hours **Marks: 40**
Period/week: 6

List of Experiments:

1. To Study an Electrolux Refrigerator.
2. To Study the Window Type Air Conditioner, Split Type air Conditioner.
3. To Study Ammonia-Water Plant.

List of Books Recommended:

Name of Book	Author	Publisher
Refrigeration & Air Conditioning	S.C. Arora	Dhanpat Rai
Refrigeration & Air Conditioning	Dowkundwar Khurmi	Katson Publication
Refrigeration & Air Conditioning	Sarao, Gaabi Singh	Satya Prakashan.

Bachelor of Vocation (B.Voc.)
(Refrigeration and Air Conditioning) Semester – III

Paper–IV: Workshop Practice

Max.Marks: 100

Introduction to workshop. Maintenance of workshop tools and machinery. Safety precautions.

Usage of various gauges to measure length, mass, volume, speed, temperature and pressure, like: diameter of wire by wire gauge, external and internal diameter by vernier caliper, micrometer, screw gauge, pressure by pressure gauge, etc.

1. Carpentry Shop Introduction to various types of woods and carpentry tools.
2. Sheet Metal Shop - Practice of measuring, marking, cutting, bending, folding, riveting, soldering, etc.
3. Electrical Shop Practice of wire joints, soldering and de–soldering, brazing, familiarization of voltmeter, ammeter, multi meter, etc.
4. Welding Shop Practice of various joints by Arc Welding, Gas Welding, TIG, MIG and Gas cutting. Types of flames, fluxes, filler rods. Soldering.
5. Machine Shop
   Inroduction and Practice on Lathe machine, Drilling machines.

Recommended Books:

1. Basic Workshop Practice Manual by T Jeyapoovan; Vikas Publishing House (P) Ltd., New Delhi
2. Workshop Technology by Manchanda Vol. I,II,III India Publishing House, Jalandhar.
3. Workshop Technology I,II,III, by S K Hajra, Choudhary and A K Chaoudhary. Media Promoters and Publishers Pvt. Ltd., Bombay
4. Manual on Workshop Practice by K Venkata Reddy, KL Narayana et al; MacMillan India Ltd. New Delhi
4. Workshop Technology by HS Bawa, Tata McGraw Hill Publishers, New Delhi
5. Workshop Technoogy by B.S. Raghuwanshi, Dhanpat Rai and Co., New Delhi

Bachelor of Vocation (B.Voc.)
(Refrigeration and Air Conditioning) Semester – III

Paper–V: ENVIRONMENTAL STUDIES–I
(Theory)

Time: 3 Hrs. **Max. Marks: 50**
Theory Lectures: 1½ Hours/ Week

Section–A: (15 Marks): It will consist of five short answer type questions. Candidates will be required to attempt three questions, each question carrying five marks. Answer to any of the questions should not exceed two pages.
Section–B: (20 Marks): It will consist of four essay type questions. Candidates will be required to attempt two questions, each question carrying ten marks. Answer to any of the questions should not exceed four pages.
Section–C: (15 Marks): It will consist of two questions. Candidate will be required to attempt one question only. Answer to the question should not exceed 5 pages.

1. **The Multidisciplinary Nature of Environmental Studies:** Definition, scope & its importance, Need for public awareness.
2. **Natural Resources**: Natural resources and associated problems. Role of an individual in conservation of natural resources, Equitable use of resources for sustainable lifestyles.
   - **a)** **Forest Resources**: Use of over exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forests and tribal people.
   - **b)** **Water Resources**: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.
   - **c)** **Mineral Resources**: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.
   - **d)** **Food Resources**: World food problems, change caused by agriculture and overgrazing, effects or modern agriculture, fertilizer-pesticide problem, salinity, case studies.
   - **e)** **Energy Resources**: Growing of energy needs, renewable and non-renewable energy resources, use of alternate energy sources, case studies.
   - **f)** **Land Recourses**: Land as a resource, land degradation, soil erosion and desertification.

3. **Ecosystem:**
   Concept of an ecosystem, Structure and function of an ecosystem; Producers, consumers and decomposers, Energy flow in the ecosystem, Ecological succession, Food chains, food webs and ecological pyramids.
   Types, characteristic features, structure and function of - forest ecosystem, grassland ecosystem, desert ecosystem and aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries).

Bachelor of Vocation (B.Voc.)
(Refrigeration and Air Conditioning) Semester – III

4. Social Issues and Environment:

- From unsustainable to sustainable development
- Water conservation, rain water harvesting, watershed management; Wasteland reclamation.
- Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents
- Environmental Protection Act; Air (prevention and Control of Pollution) Act ; Water (prevention and Control of Pollution) Act; Wildlife Protection Act; Forest Conservation Act; Issues involved in enforcement of environmental legislation.

***** Road Safety Rules & Regulations: Use of Safety Devices while Driving, Do's and Don'ts while Driving, Role of Citizens or Public Participation, Responsibilities of Public under Motor Vehicle Act, 1988, General Traffic Signs

***** Accident & First Aid: First Aid to Road Accident Victims, Calling Patrolling Police & Ambulance

5. National Service Scheme

- **Introduction and Basic Concepts of NSS:** History, philosophy, aims & objectives of NSS; Emblem, flag, motto, song, badge etc.; Organizational structure, roles and responsibilities of various NSS functionaries.
- **Health, Hygiene & Sanitation:** Definition, needs and scope of health education; Food and Nutrition; Safe drinking water, water borne diseases and sanitation (Swachh Bharat Abhiyan); National Health Programme; Reproductive health.

References/Books:

1. Agarwal, K. C. 2001. Environmental Biology, Nidhi Publications Ltd. Bikaner.
2. Bharucha, E. 2005. Textbook of Environmental Studies, Universities Press, Hyderabad.
3. Down to Earth, Centre for Science and Environment, New Delhi.
4. Jadhav, H. & Bhosale, V. M. 1995. Environmental Protection and Laws. Himalaya Pub.
5. Joseph, K. and Nagendran, R. 2004. Essentials of Environmental Studies, Pearson Education (Singapore) Pte. Ltd., Delhi.
6. Kaushik, A. & Kaushik, C. P. 2004. Perspective in Environmental Studies, New Age International (P) Ltd, New Delhi.
7. Miller, T. G. Jr. 2000. Environmental Science, Wadsworth Publishing Co.
8. Sharma, P. D. 2005. Ecology and Environment, Rastogi Publications, Meerut.
9. Booklet on Safe Driving. Sukhmani Society (Suvidha Centre), District Court Complex, Amritsar
10. Kanta, S., 2012. Essentials of Environmental Studies, ABS Publications, Jalandhar.

Bachelor of Vocation (B.Voc.)
(Refrigeration and Air Conditioning) Semester – IV

Paper–I: Fundamentals of Computer – IV (Theory)

Time: 3 Hours **Max. Marks: 100**
Theory Marks: 75
Practical Marks: 25

Instructions for the Paper Setters:

a) Ten compulsory very short answer questions of 2 marks each. 10x02=20
b) Eight short answer questions of 5 marks each, students are required attempt any five questions. 05x05=25
c) Four long answer questions of 15 marks each, students are required to attempt any two. 02x15=30

UNIT–I

Internet: Internet Applications, Domain Name System, Electronic Mail the World Wide Web, Multimedia Audio, Video, File transfer Protocol,Telnet, HTTP.

UNIT–II

Introduction to HTML: HTML and the World Wide Web, HTML elements, basic structure of elements, creating HTML pages, viewing pages in different browsers, rules for nesting the HTML tags, colour and fonts.

UNIT–III

Computer Networks: Network Hardware, Network Categorization–LAN, MAN,WAN, Transmission Media, Wireless Transmission.

Bachelor of Vocation (B.Voc.)
(Refrigeration and Air Conditioning) Semester – IV

PRACTICAL

On the basis of Internet & Data Communication **Marks: 25**

Books Recommended:

1. D.H. Sanders, "Computers Today", McGraw Hill, 1998.

2. Complete Network by Andrew Tanenbaum, 4th Edition, Prentice Hall India.

Bachelor of Vocation (B.Voc.)
(Refrigeration and Air Conditioning) Semester – IV

Paper-II: Refrigeration & Air Conditioning-V

Time: 3 Hours **Max. Marks: 100**
Periods/week: 6 **Theory Marks: 60**
Practical Marks: 40

Instructions for the Paper Setters:

Section–A: It will consist of 10 very short answer questions with answer to each question upto five lines in length. All questions will be compulsory. Each question will carry one & half marks i.e. (1½ marks); total weightage of the section being 15 Marks.

Section–B: It will consist of short answer questions with answer to each question upto 2 pages in length. Eight questions will be set by the examiner and 5 will be attempted by the candidates. Each question will carry 4 marks; total weightage of the section being 20 marks.

Section–C: It will consist of essay type question with answer to each question upto 5 pages in length. Four questions will be set by the examiner & candidates will be required to attempt two. Each question will carry 12 ½ marks; total weightage of the section being 25 marks.

Note: Attempt of question paper may be made either in English or Punjabi.

UNIT–I

Domestic Refrigerators: Introduction, Construction & Operational features of domestic Refrigerators. Defrosting Automatic Pressure & Electric Defrosting etc.

UNIT–II

Cold Storages: Introduction, Construction, Sealing & Insulation of Cold Storages. Refrigeration, Requirements for various food items.

UNIT–III

Water coolers : Storage & Pressure type Water Coolers and their filtering, Constructional features. Insulation Bottle Coolers, Ice Creams.

Bachelor of Vocation (B.Voc.)
(Refrigeration and Air Conditioning) Semester – IV

Practical: Refrigeration & Air Conditioning-V
PRACTICAL: LAB–VI

Time: 3 Hours **Marks: 40**
Period/week: 6

List of Experiments:

1. To Study a cooling Tower.
2. To Study a desert cooler & Pump used for this type.
3. Gas charging in the Refrigerator System & Testing for leakage.

List of Books Recommended:

Name of Book	Author	Publisher
Refrigeration & Air Conditioning	S.C. Arora	Dhanpat Rai
Refrigeration & Air Conditioning	Dowkundwar Khurmi	Katson Publication
Refrigeration & Air Conditioning	Sarao, Gaabi Singh	Satya Prakashan.

Bachelor of Vocation (B.Voc.)
(Refrigeration and Air Conditioning) Semester – IV

Paper-III: Refrigeration & Air Conditioning-VI

Time: 3 Hours **Max. Marks: 100**
Periods/week: 6 **Theory Marks: 60**
Practical Marks: 40

Instructions for the Paper Setters:

Section–A: It will consist of 10 very short answer questions with answer to each question upto five lines in length. All questions will be compulsory. Each question will carry one & half marks i.e. (1½ marks); total weightage of the section being 15 Marks.

Section–B: It will consist of short answer questions with answer to each question upto 2 pages in length. Eight questions will be set by the examiner and 5 will be attempted by the candidates. Each question will carry 4 marks; total weightage of the section being 20 marks.

Section–C: It will consist of essay type question with answer to each question upto 5 pages in length. Four questions will be set by the examiner & candidates will be required to attempt two. Each question will carry 12 ½ marks; total weightage of the section being 25 marks.

Note: Attempt of question paper may be made either in English or Punjabi.

UNIT–I

Air Conditioning Machines & Components: Types of cooling. Humidification & Dehumidification coils, heating coils. Fans & blowers, filters & dampers.

UNIT–II

Duct Construction: Built systems. Loop perimeter, Radial Perimeter & Exunded Plenum Duct System. Water Pumps: Vertical Types & Horizontal Type.

UNIT–III

Evaporators: Introduction, Types of Evaporator Flooded Type Evaporator. Dry Expansion type Evaporator Baudelot cooler Bare Tube, Plate Surface, Finned Evaporator, Their construction & Operational features.

Bachelor of Vocation (B.Voc.)
(Refrigeration and Air Conditioning) Semester – IV

Practical: Refrigeration & Air Conditioning-VI
PRACTICAL: LAB–VII

Time: 3 Hours **Marks: 40**
Period/week: 6

List of Experiments:

1. To test check the capacitors, Relays, automatic Value, Solenoid value, high & low pressure cut off etc.
2. To find the C.O.P. of a water cooler.
3. To find the C.O.P. of an Ammonia Ice Plant.

List of Books Recommended:

Name of Book	Author	Publisher
Refrigeration & Air Conditioning	S.C. Arora	Dhanpat Rai
Refrigeration & Air Conditioning	Dowkundwar Khurmi	Katson Publication
Refrigeration & Air Conditioning	Sarao, Gaabi Singh	Satya Prakashan.

Bachelor of Vocation (B.Voc.)
(Refrigeration and Air Conditioning) Semester – IV

PAPER–IV: Refrigeration and Air Conditioning Components Lab
Max.Marks: 100

Introduction to general and special type of tools for refrigeration and air conditioning. Identification of various Refrigeration equipments, components of vapour compression system like compressor, condenser, expansion valve and evaporator etc

Refrigerant:

Practical demonstration of refrigerant cylinders, testing of leakage, evacuation and charging refrigerants in refrigerators. Practice to identify unknown refrigerants and safe handling of cylinders and valves.

Refrigerator Components:

Demonstration, method of installation, fault finding and fault rectification/servicing of compressors, condensers, drier, expansion valve, evaporator and motors.

Thermal Insulation:

Practice of filling thermal insulation materials in refrigeration systems.

Recommended Books:

1. Refrigeration and Air Conditioning by. P.L. Ballaney; Khanna Publishers, Delhi
2. Refrigeration and Air Conditioning by. S.C. Arora and S. Domkundwar; Dhanpat Rai and Sons, Delhi.
3. Refrigeration and Air Conditioning by Manohar Prasad; Wiley Eastern Limited, New Delhi.
4. Refrigeration & Air Conditioning by Sandeep Bajaj.

Bachelor of Vocation (B.Voc.)
(Refrigeration and Air Conditioning) Semester – IV

PAPER–V: ENVIRONMENTAL STUDIES–II
(Theory)

Time: 3 Hrs. **Max. Marks: 50**
Theory Lectures: 1½ Hours/ Week

Section–A: (15 Marks): It will consist of five short answer type questions. Candidates will be required to attempt three questions, each question carrying five marks. Answer to any of the questions should not exceed two pages.

Section–B: (20 Marks): It will consist of four essay type questions. Candidates will be required to attempt two questions, each question carrying ten marks. Answer to any of the questions should not exceed four pages.

Section–C: (15 Marks): It will consist of two questions. Candidate will be required to attempt one question only. Answer to the question should not exceed 5 pages.

1. **Biodiversity and its Conservation:**

   Definition: Genetic, species and ecosystem diversity, Biogeographical classification of India.

   Value of Biodiversity: Consumptive use; productive use, social, ethical, aesthetic and option values.

   Biodiversity at global, National and local levels. India as mega-diversity nation; Hot-spots of biodiversity.

   Threats to Biodiversity: Habitat loss, poaching of wild life, man wildlife conflicts

   Endangered and endemic species of India.

   Conservation of Biodiversity: *In situ* and *Ex-situ* conservation of biodiversity.

2. **Environmental Pollution:** Definition, Causes, effects and control measures of - air pollution, water pollution, soil pollution, marine pollution, noise pollution, thermal pollution, nuclear hazards.

   Solid Waste Management: Causes, effects and control measures of urban and industrial wastes.

Bachelor of Vocation (B.Voc.)
(Refrigeration and Air Conditioning) Semester – IV

3. Human Population and the Environment

1. Environment and human health
2. Population growth, variation among nations
3. Population explosion-Family welfare programme
4. HIV / AIDS
5. Value education
6. Women and child welfare

4. National Service Scheme

- **Entrepreneurship Development:** Definition & Meaning; Qualities of good entrepreneur; Steps/ ways in opening an enterprise; Role of financial and support service Institutions.
- **Civil/Self Defense:** Civil defense services, aims and objectives of civil defense; Needs for self defense training.

5. Drug Use and Abuse in Society:

- Concept and Overview, extent of the problem, drug use as a social problem, causes of drug uses-Biological, socio-cultural, psychological
- Types of Drugs and Identification of Abuse: Familiar drugs-tobacco, caffeine, over the counter drugs; Restricted drugs- opiates, hallucinogens, marijuana; Performance enhancing drugs; Uppers and downers- stimulants and depressants
- Impact of Drug Abuse: Individual level-biological and psychological, family, social and national.
- Management and Prevention of Drug Abuse: Medical and psychological; role of family, schools, media and legislation.

References/Books:

1. Agarwal, K. C. 2001. Environmental Biology, Nidhi Publications Ltd. Bikaner.
2. Bharucha, E. 2005. Textbook of Environmental Studies, Universities Press, Hyderabad.
3. Down to Earth, Centre for Science and Environment, New Delhi.
4. Jadhav, H. & Bhosale, V. M. 1995. Environmental Protection and Laws. Himalaya Pub.
5. Joseph, K. and Nagendran, R. 2004. Essentials of Environmental Studies, Pearson Education (Singapore) Pte. Ltd., Delhi.
6. Kaushik, A. & Kaushik, C. P. 2004. Perspective in Environmental Studies, New Age International (P) Ltd, New Delhi.
7. Miller, T. G. Jr. 2000. Environmental Science, Wadsworth Publishing Co.
8. Sharma, P. D. 2005. Ecology and Environment, Rastogi Publications, Meerut.
9. Booklet on Safe Driving. Sukhmani Society (Suvidha Centre), District Court Complex, Amritsar
10. Kanta, S., 2012. Essentials of Environmental Studies, ABS Publications, Jalandhar.
11. Espejo, R. (2002). Drug Abuse, Greenhaven Press.
12. Sussman, S and Ames, S.L. (2008). Drug Abuse: Concepts, Prevention and Cessation, Cambridge University Press.

Bachelor of Vocation (B.Voc.)
(Refrigeration and Air Conditioning) Semester – V

Paper–I: Fundamentals of Computer–V
(Theory)

Time: 3 Hours **Max. Marks: 100**
Theory Marks: 75
Practical Marks: 25

Instructions for the Paper Setters:

a) Ten compulsory very short answer questions of 2 marks each. 10x02=20
b) Eight short answer questions of 5 marks each, students are required attempt any five questions. 05x05=25
c) Four long answer questions of 15 marks each, students are required to attempt any two. 02x15=30

UNIT–I

Logic Development and Program Development Tools: Data Representation, Flowcharts, Problem Analysis, Decision Trees/Tables, Pseudo code and algorithms.

UNIT–II

UNIX: Network Operating System: Architecture, Shell, Kernel & File System

UNIT–III

E–Commerce:
Its definition, aims, processes, tools and results, EDI, VANs and Internet as Promoters. Types of E–Commerce, Commerce–net.

Steps to Start E–Commerce.
H/W & S/W Requirements, Steps involved in opening your own online business.

Bachelor of Vocation (B.Voc.)
(Refrigeration and Air Conditioning) Semester – V

PRACTICAL

1. On the basis of UNIX and E–Commerce **Marks: 25**

Books Recommended:

1. M.S. Office, the Complete Reference by Keitel, McGraw Hill.
2. E–Commerce –The Cutting Edge of Business
–Kamlesh K. Bajaj
–Debjani Nag
3. Robert Reinstein, et.al: Windows NT Trouble Shooting and Configuration, Techmedia.

Bachelor of Vocation (B.Voc.)
(Refrigeration and Air Conditioning) Semester – V

Paper–II: Refrigeration and Air Conditioning–VII

Time: 3 Hours **Max. Marks: 100**
Periods per week Theory: 6

Instructions for the Paper Setters:

a) Ten compulsory very short answer questions of two marks each 10x02=20
b) Eight short answer questions of eight marks each, students are required attempt any five questions. 05x08=40
c) Six long answer questions of ten marks each, students are required to attempt any four. 04x10=40

Note: Attempt of question paper may be made either in English or Punjabi.

UNIT–I

Absorption Refrigeration System: Introduction, Simple absorption system, ammonia absorption system, selection of absorbent and refrigerant, properties for ideal absorbents, properties for ideal refrigerant–absorbent combination, Electrolux Refrigerators.

UNIT–II

Analysis of Absorption Refrigeration System: Aqua ammonia absorption Refrigeration system and its analysis, properties of binary mixture, temperature Concentration Diagram for binary mixture (T–C)

List of Books Recommended:

Name of Book	Author	Publisher
Refrigeration & Air Conditioning	S.C. Arora	Dhanpat Rai
Refrigeration & Air Conditioning	Dowkundwar Khurmi	Katson Publication
Refrigeration & Air Conditioning	Sarao, Gaabi Singh	Satya Prakashan.

Bachelor of Vocation (B.Voc.)
(Refrigeration and Air Conditioning) Semester – V

Paper–III– Project Lab–I

Max.Marks– 200
Project–work – 120
Viva–voce –80

Students are required to submit their synopsis related to Refrigeration and Air Conditioning of any project module.

Bachelor of Vocation (B.Voc.)
(Refrigeration and Air Conditioning) Semester – VI

Paper–I: Fundamentals of Computer – VI
(Theory)

Time: 3 Hours **Max. Marks: 100**
Theory Marks: 75
Practical Marks: 25

Instructions for the Paper Setters:

a) Ten compulsory very short answer questions of 2 marks each. 10x02=20
b) Eight short answer questions of 5 marks each, students are required attempt any five questions. 05x05=25
c) Four long answer questions of 15 marks each, students are required to attempt any two. 02x15=30

UNIT–I

Introduction to data, field, record, file, database, database management system. Structure of database system, Advantage and disadvantage, levels of database system, Relational model, hierarchical model, network model, comparison of these models, E–R diagram

UNIT–II

RDBMS: –Different keys used in a relational system, Data Integrity

DBA, responsibilities of DBA

UNIT–III

SQI. *PLUS
Introduction to Oracle **10g**
SQL– DDL, DML, DCL

Bachelor of Vocation (B.Voc.)
(Refrigeration and Air Conditioning) Semester – VI

PRACTICAL

1. On the basis of Basic SQL **Marks: 25**

Reference Books:

1. Introduction to Database System by C.J. Date.

2. Database Management System by B.C. Desai.

3. Database Concept by Korth.

4. Simplified Approach to DBMS– Kalyani Publishers

5. Oracle – Developer – 2000 by Ivan Bayross.

6. Database System Concepts & Oracle (SQL/PLSQ) – AP Publishers.

Bachelor of Vocation (B.Voc.)
(Refrigeration and Air Conditioning) Semester – VI

Paper–II: Refrigeration and Air Conditioning–VIII

Time: 3 Hours **Max. Marks: 100**
Periods per week Theory: 6

Instructions for the Paper Setters:

a) Ten compulsory very short answer questions of two marks each. 10x02=20
b) Eight short answer questions of eight marks each, students are required attempt any five questions. 05x08=40
c) Six long answer questions of ten marks each, students are required to attempt any four. 04x10=40

Note: Attempt of question paper may be made either in English or Punjabi.

UNIT–I

Stream Jet Refrigeration: – Introduction, Components of the plants, advantages and disadvantages of Steam Jet System, applications of steam jet system, Performance of Steam jet Refrigeration system

UNIT–II

Production of low Temperature:– Introduction, Production of dry ice, Manufacture of Dry Ice, Liquefaction of Hydrogen, Liquefaction of helium, Application of Low Temperature

List of Books Recommended:

Name of Book	Author	Publisher
Refrigeration & Air Conditioning	S.C. Arora	Dhanpat Rai
Refrigeration & Air Conditioning	Dowkundwar Khurmi	Katson Publication
Refrigeration & Air Conditioning	Sarao, Gaabi Singh	Satya Prakashan.

Bachelor of Vocation (B.Voc.)
(Refrigeration and Air Conditioning) Semester – VI

Paper–III– Project Lab–II

Max. Marks: 200
Project work: 120
Viva–voce: 80

Students are required to submit their synopsis related to Refrigeration and Air Conditioning of any project module.