



## ਗੁਰੂ ਨਾਨਕ ਦੇਵ ਯੂਨੀਵਰਸਿਟੀ, ਅੰਮ੍ਰਿਤਸਰ (ਇਕੱਤਰਤਾਵਾਂ ਸ਼ਾਖਾ)

(Established by State Legislature Act No. 21 of 1969 and  
Accredited at "A" grade level by NAAC and awarded "University  
with Potential for Excellence" status by UGC)

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ਮਿਤੀ: 17-08-2015

ਪ੍ਰਿੰਸੀਪਲ,  
ਗੁਰੂ ਨਾਨਕ ਦੇਵ ਯੂਨੀਵਰਸਿਟੀ ਵੇਰਕਾ ਕਾਲਜ,  
ਵੇਰਕਾ ।

ਪ੍ਰਿੰਸੀਪਲ,  
ਗੁਰੂ ਨਾਨਕ ਦੇਵ ਯੂਨੀਵਰਸਿਟੀ ਪੱਟੀ ਕਾਲਜ,  
ਪੱਟੀ ।

**ਵਿਸ਼ਾ: B.Voc. Refrigeration & Air Conditioning ਅਤੇ B.Voc. Automobile Technology ਦੇ  
ਸਮੈਸਟਰ ਤੀਜੇ ਅਤੇ ਛੇਥੇ ਵਿਚ ਸੈਸ਼ਨ 2015-16 ਤੋਂ ਸੋਧ ਬਾਰੇ ।**

ਸ਼੍ਰੀਮਾਨ ਜੀ,

ਆਪ ਜੀ ਨੂੰ ਸੂਚਿਤ ਕੀਤਾ ਜਾਂਦਾ ਹੈ ਕਿ ਸਮਰੱਥ ਅਧਿਕਾਰੀਆਂ ਦੇ ਹੋਏ ਆਦੇਸ਼ਾ ਅਨੁਸਾਰ B.Voc. Refrigeration & Air Conditioning ਅਤੇ B.Voc. Automobile Technology ਦੇ ਸਮੈਸਟਰ ਤੀਜੇ ਅਤੇ ਛੇਥੇ ਵਿਚ ਸੈਸ਼ਨ 2015-16 ਤੋਂ ਨਾਲ ਨੱਥੀ ਅਨੁਸਾਰ ਤਬਦੀਲੀ ਕੀਤੀ ਹੈ ਅਤੇ ਇਸ ਸੋਧ ਨੂੰ ਯੂਨੀਵਰਸਿਟੀ ਵੈਬਸਾਈਟ ਤੇ ਅਪਲੋਡ ਕਰ ਦਿੱਤਾ ਗਿਆ ਹੈ ਜੀ ।

(ਰਿਤੂ ਭੱਟੀ)  
ਉਪ ਰਜਿਸਟਰਾਰ (ਇਕੱਤਰਤਾਵਾਂ)

ਉਪਰੋਕਤ ਦਾ ਉਤਾਰਾ ਹੇਠ ਲਿਖਿਆਂ ਨੂੰ ਲੋੜੀਂਦੀ ਕਾਰਵਾਈ ਲਈ ਭੇਜਣ ਹਿੱਤ ਹੈ ਜੀ:-

1. ਪ੍ਰੋਫੈਸਰ ਇੰਚਾਰਜ (ਪ੍ਰੀਖਿਆਵਾਂ)
2. ਉਪ ਰਜਿਸਟਰਾਰ (ਕੰਡਕਟ ਸ਼ਾਖਾ)
3. ਸਿਸਟਮ ਮੈਨੇਜਰ, ਕੰਪਿਊਟਰ ਸੈਂਟਰ, ਕੰਟ੍ਰੋਲਰ ਪ੍ਰੀਖਿਆਵਾਂ
4. ਸਹਾਇਕ ਰਜਿਸਟਰਾਰ (ਗੁਪਤ)
5. ਸਹਾਇਕ ਰਜਿਸਟਰਾਰ (ਪ੍ਰੀਖਿਆ ਸ਼ਾਖਾ-III)
6. ਕੰਪਿਊਟਰ ਸੈਕਸ਼ਨ AM-III (ਇਕੱਤਰਤਾਵਾਂ)

*Bachelor of Vocation (B.Voc.)  
(Automobile Technology) Semester System*

**Semester – III:**

<b>Paper No.</b>	<b>Paper</b>	<b>M. Marks</b>
Paper – I	Fundamentals of Computer – III	100 (75 theory +25 Practical)
Paper – II	Automobile Technology – IV	100 (50 theory +50 Practical)
Paper – III	Automobile Technology – V	100 (50 theory +50 Practical)
Paper – IV	Workshop Practice	100
Paper – V *	Environmental Studies – I	050
	<b>Total :</b>	<b>400</b>

**Semester – IV:**

<b>Paper No.</b>	<b>Paper</b>	<b>M. Marks</b>
Paper – I	Fundamentals of Computer – IV	100 (75 theory +25 Practical)
Paper – II	Automobile Technology – VI	100 (50 theory +50 Practical)
Paper – III	Automobile Technology – VII	100 (50 theory +50 Practical)
Paper – IV	Basic Automobile Lab	100
Paper – V *	Environmental Studies – II	050
	<b>Total :</b>	<b>400</b>

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

*Bachelor of Vocation (B.Voc.)  
(Automobile Technology) 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.)  
(Automobile Technology) 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.)  
(Automobile Technology) Semester – III*

**Paper – II: Automobile Technology – IV**

**Time: 3 Hours**

**Periods per week Theory: 6**

**Max. Marks: 100**

**Theory Marks: 50**

**Practical Marks: 50**

**Instructions for the Paper Setters:**

- a. Ten compulsory short answer questions of one mark each. **1x10=10**
- b. Eight short answer questions of four marks each, student is required to attempt any five questions. **5x04=20**
- c. Four long answer questions of ten marks each, student is required to attempt any two. **2x10=20**

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

**Orientation of the Course:**

**UNIT-I**

**Automatic Electrical Systems:** Basic Automotive Circuits, Starting motor, Starting Devices, Bendix starting Drive, Overrunning clutch drive, Solenoid shift systems, Starting motor troubleshooting.

**UNIT-II**

**Generator:** Generator principles, Generation of Alternating currents, Generation of direct current, Generator construction, generator output control, Cut out relay, Regulator, Alternator type generator, Generating Systems troubleshooting.

*Bachelor of Vocation (B.Voc.)  
(Automobile Technology) Semester – III*

**PRACTICAL:  
Automobile Technology – IV**

**PRACTICAL: LAB – IV**

**Time: 3 Hours**

**Marks: 50**

**Periods per week: Practical: 4 Hrs.**

**Distribution of Marks**

Three visits to Motor Workshop –	<b>10 Marks</b>
Oral Examination –	<b>10 Marks</b>
Written Test –	<b>10 Marks</b>
Test of Workshop Jobs –	<b>10 Marks</b>
Identification of Workshop Tool –	<b>05 Marks</b>
Scale Instrument Readings –	<b>05 Marks</b>

1. Self Starter opening from the Voh and Refitting
2. Dynmo /Alternator Dismantling and Assembling.

**References:**

1. Basic Automobile Engineering (Punjabi Edition) written by C.P. Nakra, Published by Dhanpat Rai and Sons, Jalandhar, (Delhi).
2. Royal Basic Automobile Engineering written by R.K. Kalia. (Punjabi Edition).

*Bachelor of Vocation (B.Voc.)*  
*(Automobile Technology) Semester – III*

**Paper-III: Automobile Technology – V**

**Time: 3 Hours**  
**Periods per week Theory: 6**

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

**Instructions for the Paper Setters:**

- a. Ten compulsory short answer questions of one mark each. **1x10=10**
- b. Eight short answer questions of four marks each, student is required to attempt any five questions. **5x04=20**
- c. Four long answer questions of ten marks each, student is required to attempt any two. **2x10=20**

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

**Orientation of the Course:**

**UNIT-I**

**Ignition Systems:** Introduction, Qualities of a good ignition system, Battery ignition system, Components of battery ignition system, Ignition coil, Condenser, Contact breaker, Distributer, Ignition Advance, Methods of ignition advance, Spark plug, Classification Sparking Plugs, Spark Plug Gap, Magneto Ignition System, Rotating Armature Type, Rotating magnet type, Low and high tension types, Special type of magneto, Ignition System troubleshooting.

**UNIT-II**

**Petrol engine principles and fundamentals**

Introduction, Basic engine nomenclature, Classification of petrol engines, Merits and Demerits of petrol engines

Thermodynamic cycle of petrol engine, Four stroke petrol engine, Two stroke petrol engine – Construction, working, Valve & port arrangements, scavenging systems, comparison with 4 stroke engines, Advantages, Disadvantages of two and four stroke petrol engines

*Bachelor of Vocation (B.Voc.)  
(Automobile Technology) Semester – III*

**PRACTICAL: Automobile Technology – V**

**PRACTICAL: LAB – V**

**Time: 3 Hours**

**Marks: 50**

**Periods per week: Practical: 4 Hrs.**

**Distribution of Marks**

Three visits to Motor Workshop –	<b>10 Marks</b>
Oral Examination –	<b>10 Marks</b>
Written Test –	<b>10 Marks</b>
Test of Workshop Jobs –	<b>10 Marks</b>
Identification of Workshop Tool –	<b>05 Marks</b>
Scale Instrument Readings –	<b>05 Marks</b>

1. Ignition Timing with the Engine.
2. Engine fault Diagonising.

**References:**

1. Basic Automobile Engineering (Punjabi Edition) written by C.P. Nakra, Published by Dhanpat Rai and Sons, Jalandhar, (Delhi).
2. Royal Basic Automobile Engineering written by R.K. Kalia. (Punjabi Edition).



*Bachelor of Vocation (B.Voc.)  
(Automobile Technology) 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  
Introduction and Practice on Lathe machine, Grinder, 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.)  
(Automobile Technology) Semester – III*

**Paper–V: ENVIRONMENTAL STUDIES–I**

**Theory Lectures: 1.5 Hours/ Week**

**Max. Marks: 50**

**Time of Examination: 3 Hours**

**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:
  - 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 of 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 Resources:** Land as a resource, land degradation, soil erosion and desertification.
    - Role of an individual in conservation of natural resources.
    - Equitable use of resources for sustainable lifestyles.

**3. Ecosystem:**

- Concept of an ecosystem.
- Structure and function of an ecosystem.
- Producers, consumers and decomposers.
- Energy flow in the ecosystem.
- Ecological succession.

*Bachelor of Vocation (B.Voc.)  
(Automobile Technology) Semester – III*

- Food chains, food webs and ecological pyramids.
- Introduction, types, characteristic features, structure and function of the following ecosystems:
  - a. Forest ecosystem
  - b. Grassland ecosystem
  - c. Desert ecosystem
  - d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

**4. Social Issues and Environment:**

- From unsustainable to sustainable development.
- Urban problems related to energy.
- Water conservation, rain water harvesting, watershed management.
- Resettlement and rehabilitation of people; its problems and concerns. Case studies.
- Environmental ethics: Issues and possible solutions.
- Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case studies.
- Wasteland reclamation.
- Consumerism and waste products.
- 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.
- Public awareness.

**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.)  
(Automobile Technology) 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.)  
(Automobile Technology) 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.)  
(Automobile Technology) Semester – IV*

**Paper-II: Automobile Technology – VI**

**Time: 3 Hours**

**Max. Marks: 100  
Marks: 50**

**Periods per week: 6 Hrs.**

**Instructions for the Paper Setters:**

- a. Ten compulsory short answer questions of one mark each. **1x10=10 Marks**
- b. Eight short answer questions of four marks each, student is required to attempt any five questions. **5x04=20 Marks**
- c. Four long answer questions of ten marks each, student is required to attempt any two. **2x10=20 Marks**

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

**Orientation of the Course:**

**UNIT-I**

**Engines:** Introduction, Classification of automobile engines, Engine cycle, Number of strokes, With respect to fuels use, Number and arrangement of cylinders, Classification based on valve arrangements, Classification based on type of cooling, Classification based on type of valve, Special type engines, Square engines, Fuel cell, Electric vehicles, Engine position.

**UNIT-II**

**Ignition Systems:** No spark, Spark at some wires, Intermittent spark, Weak spark, servicing ignition system. Piston Assembly, Piston rings, Analysis of piston rings, piston pins, Materials.

**Engine Service Crank Shift and Cylinder Blocks:** Review of design, Analysis of Crank shift for strength, Surface hardening of crank shaft and their materials.

*Bachelor of Vocation (B.Voc.)  
(Automobile Technology) Semester – IV*

**PRACTICAL: Automobile Technology-VI**

**PRACTICAL: LAB–VI**

**Time: 3 Hours**

**Marks: 50**

**Periods per week: Practical: 4 Hrs.**

**Distribution of Marks**

Three visits to Motor Workshop –	<b>10 Marks</b>
Oral Examination –	<b>10 Marks</b>
Written Test –	<b>10 Marks</b>
Test of Workshop Jobs –	<b>10 Marks</b>
Identification of Workshop Tool –	<b>05 Marks</b>
Scale Instrument Readings –	<b>05 Marks</b>

1. Engine Piston and Rings Fitting
2. Clutch Dismantling and Assembling

**References:**

1. Basic Automobile Engineering (Punjabi Edition) written by C.P. Nakra, Published by Dhanpat Rai and Sons, Jalandhar, (Delhi).
2. Royal Basic Automobile Engineering written by R.K. Kalia. (Punjabi Edition).

*Bachelor of Vocation (B.Voc.)*  
*(Automobile Technology) Semester – IV*

**Paper – III: Automobile Technology – VII**

**Time: 3 Hours**  
**Periods per week: 6 Hrs.**

**Max. Marks: 100**  
**Marks: 50**

**Instructions for the Paper Setters:**

- a. Ten compulsory short answer questions of one mark each. **1x10=10 Marks**
- b. Eight short answer questions of four marks each, student is required to attempt any five questions. **5x04=20 Marks**
- c. Four long answer questions of ten marks each, student is required to attempt any two. **2x10=20 Marks**

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

**Orientation of the Course:**

**UNIT-I**

**Clutch Operation:** Clutch, Requirement of clutch, Types of Clutch, Friction clutches, Clutch components, Friction materials, Clutch lining materials, Bonding materials, Fluid coupling, Torque transmission, Characteristics of the fluid flywheel, Advantages of fluid flywheel, Clutch troubleshooting, Fluid flywheel troubleshooting.

**UNIT-II**

**Diesel Engine Service:** Fuel pump tests, Fuel Delivery, Pressure, Stroke, Carburetor test and adjustments, Fuel level, Float level, Adjustment.



*Bachelor of Vocation (B.Voc.)  
(Automobile Technology) Semester – IV*

**PRACTICAL: Automobile Technology-VII**

**PRACTICAL: LAB–VII**

**Time: 3 Hours**

**Marks: 50**

**Periods per week: Practical: 4 Hrs.**

**Distribution of Marks**

Three visits to Motor Workshop –	<b>10 Marks</b>
Oral Examination –	<b>10 Marks</b>
Written Test –	<b>10 Marks</b>
Test of Workshop Jobs –	<b>10 Marks</b>
Identification of Workshop Tool –	<b>05 Marks</b>
Scale Instrument Readings –	<b>05 Marks</b>

1. Clutch Fitting with Engine.
2. Cut out opening and fitting with Engine.

**References:**

1. Basic Automobile Engineering (Punjabi Edition) written by C.P. Nakra, Published by Dhanpat Rai and Sons, Jalandhar, (Delhi).
2. Royal Basic Automobile Engineering written by R.K. Kalia. (Punjabi Edition).

*Bachelor of Vocation (B.Voc.)  
(Automobile Technology) Semester – IV*

**PAPER–IV: Basic Automobile Lab**

**Max.Marks: 100**

**Introduction of Vehicle parts:**

Demonstration of different types of vehicles (2 wheelers, 3 wheelers and 4 wheelers) through models, sectioned actual vehicles and charts.

Familiarization with the parts of vehicles, demonstration of methods of washing, cleaning, oiling, greasing and lubricating of various parts, nuts, bolts, etc. Dismantling, cleaning and inspecting of various vehicle parts of SI and CI engines like piston rings, connecting rod, crankshaft, valves, piston head, bearings, etc.

**Measuring Instruments:** Practice of measurement by calipers and other gauges on automobile parts like cylinder bore, connecting rod, crankshaft, camshaft, cam height, valve stem diameter, piston diameter, piston pin diameter. Practice for measuring tire air pressure and the recommended setting for different tires and vehicles. To check vacuum of engine manifold using vacuum gauge. Practice of measuring wear on valve guide, crankshaft run out, crankshaft end play using dial indicator. Practice of using feeler gauge to find wall clearance between piston and cylinder, end gap of piston ring. To check the flatness of cylinder head.

**Heat Treatment:**

Practice on heat treatment processes.

**Fuel Supply System:** Demonstration of various parts of carburetor, removal and re-assembling of carburetor parts, like float, float valve, jet, adjustment of float level. Checking of throttle cable and its adjustment. Removing and cleaning of air cleaner, oil filter screen. Practice of inspection of fuel lines, engine oil level and spark plug. Practice on removing and installing the fuel tank. Fault finding and rectification of engine not starting, high fuel consumption and practice for engine tuning.

**Recommended Books:**

1. Basic Automobile Engineering (Punjabi Edition) written by C.P. Nakra, Published by Dhanpat Rai and Sons, Jalandhar, (Delhi).
2. Royal Basic Automobile Engineering written by R.K. Kalia. (Punjabi Edition).

**PAPER–V: ENVIRONMENTAL STUDIES–II**

**(Theory)**

**Theory Lectures: 1.5 Hours/ Week**

**Max. Marks: 50**

**Time of Examination: 3 Hours**

**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 of 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:
  - a) Air Pollution
  - b) Water Pollution
  - c) Soil Pollution
  - d) Marine Pollution
  - e) Noise Pollution
  - f) Thermal Pollution
  - g) Nuclear Hazards
  - h) Electronic Waste
- Solid Waste Management: Causes, effects and control measures of urban and industrial wastes.
- Role of an individual in prevention of pollution.
- Pollution case studies.
- Disaster Management: Floods, Earthquake, Cyclone and Landslides.

*Bachelor of Vocation (B.Voc.)*  
*(Automobile Technology) Semester – IV*

**3. Human population and the environment**

- Population growth, variation among nations.
- Population explosion-Family welfare programme.
- Environment and human health.
- Human rights.
- Value education.
- HIV/AIDS.
- Women and child welfare.
- Role of information technology in environment and human health.
- Case studies.
- 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.

**4. Field Visits:**

- Visit to a local area to document environmental assets–river/forest/grassland/hill/mountain.
- Visit to a local polluted site–Urban/Rural/Industrial/Agricultural.
- Study of common plants, insects, birds.
- Study of simple ecosystems–pond, river, hill slopes etc.

**Note:** In this section the students will be required to visit and write on the environment of an area/ecosystem/village industry/disaster/mine/dam/agriculture field/waste management/ hospital etc. with its salient features, limitations, their implications and suggestion for improvement.

**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.

*(Refrigeration and Air Conditioning) Semester System*

**Semester – III:**

<b>Paper No.</b>	<b>Paper</b>	<b>Max Marks</b>
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
	<b>Total :</b>	<b>400</b>

**Semester – IV:**

<b>Paper No.</b>	<b>Paper</b>	<b>Max Marks</b>
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
	<b>Total :</b>	<b>400</b>

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

*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**  
**Periods/week: 6**

**Max. Marks: 100**  
**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-IV**

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

**Marks: 40**

**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**  
**Periods/week: 6**

**Max. Marks: 100**  
**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 valve. Refrigerant receivers. Dryers Filters.

**UNIT – III**

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

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

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

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

**Marks: 40**

**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  
Introduction 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)**

**Theory Lectures: 1.5 Hours/ Week**  
**Time of Examination: 3 Hours**

**Max. Marks: 50**

**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:
  - 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 of 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 Resources:** Land as a resource, land degradation, soil erosion and desertification.
    - Role of an individual in conservation of natural resources.
    - Equitable use of resources for sustainable lifestyles.

**3. Ecosystem:**

- Concept of an ecosystem.
- Structure and function of an ecosystem.
- Producers, consumers and decomposers.
- Energy flow in the ecosystem.
- Ecological succession.

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

- Food chains, food webs and ecological pyramids.
- Introduction, types, characteristic features, structure and function of the following ecosystems:
  - a. Forest ecosystem
  - b. Grassland ecosystem
  - c. Desert ecosystem
  - d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

**4. Social Issues and Environment:**

- From unsustainable to sustainable development.
- Urban problems related to energy.
- Water conservation, rain water harvesting, watershed management.
- Resettlement and rehabilitation of people; its problems and concerns. Case studies.
- Environmental ethics: Issues and possible solutions.
- Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case studies.
- Wasteland reclamation.
- Consumerism and waste products.
- 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.
- Public awareness.

**References/Books:**

11. Agarwal, K. C. 2001. Environmental Biology, Nidhi Publications Ltd. Bikaner.
12. Bharucha, E. 2005. Textbook of Environmental Studies, Universities Press, Hyderabad.
13. Down to Earth, Centre for Science and Environment, New Delhi.
14. Jadhav, H. & Bhosale, V. M. 1995. Environmental Protection and Laws. Himalaya Pub.
15. Joseph, K. and Nagendran, R. 2004. Essentials of Environmental Studies, Pearson Education (Singapore) Pte. Ltd., Delhi.
16. Kaushik, A. & Kaushik, C. P. 2004. Perspective in Environmental Studies, New Age International (P) Ltd, New Delhi.
17. Miller, T. G. Jr. 2000. Environmental Science, Wadsworth Publishing Co.
18. Sharma, P. D. 2005. Ecology and Environment, Rastogi Publications, Meerut.
19. Booklet on Safe Driving. Sukhmani Society (Suvidha Centre), District Court Complex, Amritsar
20. 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**  
**Periods/week: 6**

**Max. Marks: 100**  
**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**  
**Period/week: 6**

**Marks: 40**

**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**  
**Periods/week: 6**

**Max. Marks: 100**  
**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**  
**Period/week: 6**

**Marks: 40**

**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)**

**Theory Lectures: 1.5 Hours/ Week**

**Max. Marks: 50**

**Time of Examination: 3 Hours**

**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 of 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:
  - a) Air Pollution
  - b) Water Pollution
  - c) Soil Pollution
  - d) Marine Pollution
  - e) Noise Pollution
  - f) Thermal Pollution
  - g) Nuclear Hazards
  - h) Electronic Waste
- Solid Waste Management: Causes, effects and control measures of urban and industrial wastes.
- Role of an individual in prevention of pollution.
- Pollution case studies.
- Disaster Management: Floods, Earthquake, Cyclone and Landslides.

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

**3. Human population and the environment**

- Population growth, variation among nations.
- Population explosion-Family welfare programme.
- Environment and human health.
- Human rights.
- Value education.
- HIV/AIDS.
- Women and child welfare.
- Role of information technology in environment and human health.
- Case studies.
- 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.

**4. Field Visits:**

- Visit to a local area to document environmental assets–river/forest/grassland/hill/mountain.
- Visit to a local polluted site–Urban/Rural/Industrial/Agricultural.
- Study of common plants, insects, birds.
- Study of simple ecosystems–pond, river, hill slopes etc.

**Note:** In this section the students will be required to visit and write on the environment of an area/ ecosystem/village industry/disaster/mine/dam/agriculture field/waste management/hospital etc. with its salient features, limitations, their implications and suggestion for improvement.

**References/Books:**

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