



COMMUNITY COLLEGE BHIMTAL

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B. Voc.

AUTOMOBILE TECHNOLOGY

Regulation and Syllabus, Effective from the Academic Year

2023-24

B. VOC. IN AUTOMOBILE TECHNOLOGY

INTRODUCTION

This scheme on skills development based higher education is a part of College/University education-leading to Bachelor of Vocation (B.Voc.) degree with multiple exits such as Diploma/Advanced Diploma under the NSQF. Automobile Technology course is a program that focuses on the scientific and technological aspects of food production, processing, preservation, and distribution. The course covers a wide range of topics, including food chemistry, microbiology, nutrition, sensory evaluation, food packaging, and food safety.

The course typically combines theoretical and practical components, with students gaining hands-on experience in food processing techniques and laboratory work.

CURRICULUM

The curriculum in each of the years of the programme is a suitable combination of general education and skill development components.

DURATION

The duration of the B. Voc. in Automobile Technology is three years consisting of six semesters. The duration of each semester is five months inclusive of the days of examinations. There are at least 90 working days in a semester and a minimum 450 hours of learning in a semester.

PROGRAMME STRUCTURE

B.Voc. Automobile Technology includes:

General Education Components
Skill Components
Internship/On the Job Training/Projects

CONDITIONS FOR ADMISSIONS ELIGIBILITY

The admission to B Voc. programme is as per the rules and regulations of the University for admissions. The eligibility criteria for admission to B. Voc. Programme are 10+2 in all streams from a recognized board. Reservation rules are applicable as per Govt. rules.

The eligibility criteria for admission are as announced by the University from time to time. Other conditions are as laid down in admission policy in prospectus of the University.

ADMISSIONS

The admission to B Voc. (Automobile Technology), Semester – I, are done on the basis of merit in 10+2 or first come first serve. There is no age bar for admission in the Community Colleges. Admissions may be done twice a year and there is provision of pre-defined entry and multiple exit points. The applicants seeking re-entry into the CC should get preference in admission over the new applicants. A maximum of 50 students can be admitted to B. Voc. programme.

MEDIUM OF INSTRUCTIONS

Medium of instruction is English and Hindi.

BOARD OF STUDIES

An expert from industry sector is the member of affiliated BOS including University members.

The BOS is responsible for reviewing and approving the syllabus and provide suggestions in curriculum.

ATTENDANCE

All Students must earn 75% and above of attendance for appearing for the University Examination.
(Theory/Practical)

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COURSE STRUCTURE

B. Voc. is programme with multiple exits. All the candidates continuing to diploma courses are further treated from the second semester onwards. Students may exit after six months with certificate (NSQF Level 4) or may continue for diploma or advance diploma level courses.

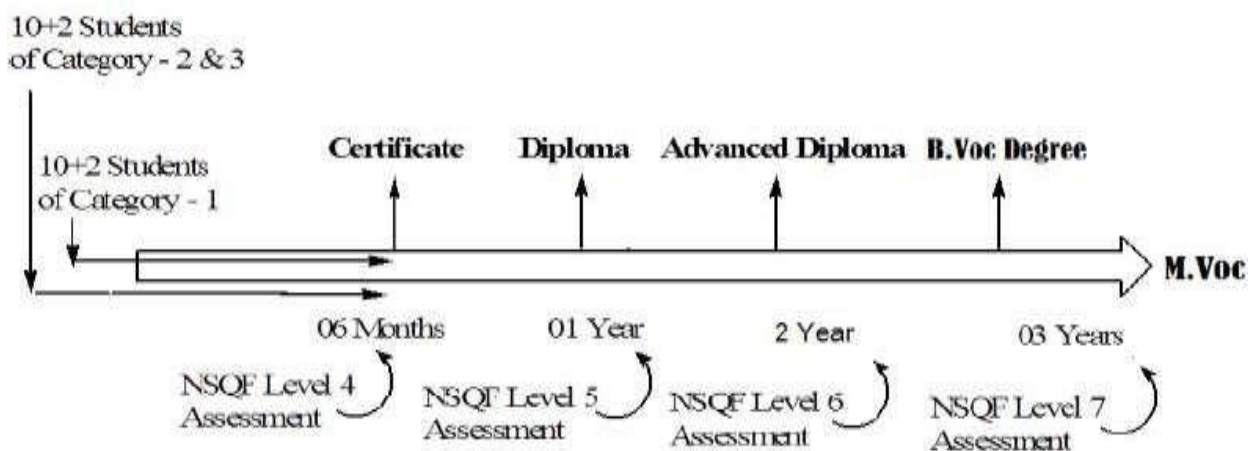


Table -1: Following table shows the various certificates/diploma and their duration.

NSQF Level	Skill Component Credits	General Education Credits	Total Credits for Award	Normal Duration	Exit Points / Awards
4	18	12	30	One Sem.	Certificate
5	36	24	60	Two Sem.	Diploma
6	72	48	120	Four Sem.	Advanced Diploma
7	108	72	180	Six Sem.	B.Voc Degree
7	108	72	180	Six Sem.	B.Voc Degree

As per the UGC guidelines- there are multiple exit point for a candidate admitted in this course. If he/she is completing all the six semesters successfully, he/she will get B.Voc degree in Automobile Technology. If he is completing the first four semesters

successfully, he/she will get an advanced diploma in Automobile Technology. If he/she is completing the first two semesters he/she will get a diploma in Automobile Technology.

PROGRAMME DURATION

The duration of the B.Voc. Programme is for a period of three years consisting of six semesters. The curriculum in each semester has been classified into General Component and Skill Component.

The General Education component includes theory subjects and the Skill Component includes a mix of theory, Practical and Internship/OJT.

GUIDELINES FOR CREDIT CALCULATION

Guidelines used for credit calculations are in alignment with the UGC Guidelines. The below norms are used for computation of credit hours:

Under Skill Component-

Practical/Internship: 01 Credit = 30 hours of training

Under General Component:

Theory: 01 Credit = 15 hours of teaching

PROGRAMME EDUCATIONAL OBJECTIVES

PEO 1: Demonstrate ability to adapt to a rapidly changing environment by having learned and applied new skills and new competencies.

PEO 2: Acquire the spirit of compassion, kinship and commitment for National Harmony

PEO 3: Progressively adopt and learn continuously through ICT modules

PEO 4: To transform our students into highly skilled professionals

PEO 5: To provide professional Automobile education with ethical values, shaping the career of the student.

PROGRAMME OUTCOMES

PO 1: Become knowledgeable in the subject of Automobile Technology and apply the

principles of the same to the needs of the Employer / Institution /own Business or Enterprise.

PO 2: Gain Analytical skills in the field/area of Automobile Technology service industry.

PO 3: Understand and appreciate professional ethics, community living and Nation Building initiatives.

PO 4: Integrated Theory and Practical knowledge towards skill development.

PO 5: Training in all sectors of Automobile Technology industry to have a wide exposure.

PO 6: To create employability to the students at different levels during their course of study.

PO 7: Focus towards development of multi-skilled professionals in the competitive Automobile Technology environment.

**Scheme of Teaching: B.Voc. AUTOMOBILE TECHNOLOGY Part I (Diploma)
Semester-I**

Code	General Educational Component		Hours	Code	Skill Component		Hours	Total Hours
	Course Title	Credit (Theory)			Course Title	Credit (Practical)		
A.T. 101	Communication Skill & Technical English	3	45	A.T. /P101	Lab/Practical Communication Skill & Technical English	5	75	120
A.T. 102	Computer Fundamentals & Engineering Computation	3	45	A.T. /P102	Lab/Practical – Computer Fundamentals & Engineering Computation	5	75	120
A.T. 103	Automobile Basics – I	3	45	A.T. /P103	Lab/Practical – Automobile Basics - I	4	60	105
A.T. 104	Manufacturing Process- I	3	45	A.T. /P104	Lab/Practical Manufacturing Process- I	4	60	105
	Total	12	180		Total	18	270	450

Scheme of Teaching: B.Voc. AUTOMOBILE TECHNOLOGY Part I (Diploma)
Semester- II

Code	General Educational Component		Hours	Code	Skill Component		Hours	Total Hours
	Course Title	Credit (Theory)			Course Title	Credit (Practical)		
A.T. 201	Automobile Basics- II	3	45	A.T./P. 201	Lab/Practical - Automobile Basics- II	5	75	120
A.T. 202	Elements of Automobile Engineering	3	45	A.T./P. 201	Lab/Practical – Elements of Automobile Engineering	5	75	120
A.T. 203	Engineering Drawing & Autocad Basics	3	45	A.T./P. 201	Lab/Practical – Engineering Drawing & Autocad Basics	4	60	105
A.T. 204	Manufacturing Process- II	3	45	A.T./P. 201	Lab/Practical – Manufacturing Process- II	4	60	105
	Total	12	180		Total	18	270	450

**Scheme of Teaching: B.Voc. AUTOMOBILE TECHNOLOGY Part II (Advanced Diploma)
Semester- III**

Code	General Educational Component		Hours	Code	Skill Component		Hours	Total Hours
	Course Title	Credit (Theory)			Course Title	Credit (Practical)		
A.T. 301	AUTOMOBILE TECHNOLOGY and Related Aspects	12	180	A.T./P. 301	Lab/Practical- AUTOMOBILE TECHNOLOGY and Related Aspects Practical-I Practical-II Practical-III Practical-IV	5 5 4 4	75 75 60 60	450
	Total	12	180		Total	18	270	450

Minimum 120 Days On the Job Training [OJT] followed by submission of Training Certificate/ Report

Scheme of Teaching: B.Voc. AUTOMOBILE TECHNOLOGY Part II (Advanced Diploma)

Semester- IV

Code	General Educational Component		Hours	Code	Skill Component		Hours	Total Hours
	Course Title	Credit (Theory)			Course Title	Credit (Practical)		
A.T. 401	Basic Engineering -I	12	180	A.T./P. 401	Lab/ Practical - Basic Engineering -I			450
					Practical-I	5	75	
					Practical-II	5	75	
					Practical-III	4	60	
					Practical-IV	4	60	
	Total	12	180		Total	18	270	450

Minimum 120 Days On the Job Training [OJT] followed by submission of Training Certificate/ Report

Scheme of Teaching: B.Voc. AUTOMOBILE TECHNOLOGY Part III (Degree)
Semester- V

Code	General Educational Component		Hours	Code	Skill Component		Hours	Total Hours
	Course Title	Credit (Theory)			Course Title	Credit (Practical)		
A.T. 501	Basic Engineering-II	12	180	A.T./P. 501	Lab/Practical – Basic Engineering-II Practical-I Practical-II Practical-III Practical-IV	5 5 4 4	75 75 60 60	450
	Total	12	180		Total	18	270	450

Minimum 120 Days On the Job Training [OJT] followed by submission of Training Certificate/ Report

Scheme of Teaching: B.Voc. Food Technology Part III (Degree)
Semester- VI

Minimum 120 Days On the Job Training [OJT] followed by submission of Training Certificate/ Report

Code	General Educational Component	Credit	Hours	Code	Skill Component	Credit	Hours	Total Hours
A.T. 601	Industrial Specific Project Work	12	180	A.T. /P.601	VIVA-VOCE AND ON THE JOB TRAINING Practical-I Practical-II Practical-III Practical-IV	5 5 4 4	75 75 60 60	450
	Total	12	180		Total	18	270	450

B.Voc. AUTOMOBILE TECHNOLOGY

Semester- I, Paper –I, Total Marks:70

AT-101- Communication Skill & Technical English (Theory)

UNIT	CONTENT	NO OF HOURS	CREDIT
Unit- 1	Communication: - Elements of communication, procedure step in communication, media, classification, 5W's and 1H in communication, 7C's in communication, credibility gap, listening, tips for improving communication skills, barriers in communication	45	3
Unit - 2	Listening Skills: Barriers to listening, effective listening skills, feedback skills. Attending telephone calls, note taking. 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, Situation based Conversation in English, Essentials of Spoken English.	45	3
Unit- 3	(Glossary & Basic grammar) Introduction: Difference between general English and technical English, Application of technical English at work, Glossary of technical terms used in the industry, Articles (a, an, the), Editing (Correcting of passages with changing of words like – articles, preposition, verbs, tenses etc.), Omission (Correcting of passages with putting new and right words), Syntax (Agreement between subject and verb), Use of preposition (fill in the blanks), Tense (knowledge of all kind of tenses-Present past future)	45	3
Unit- 4	Writing Skill: Guidelines for effective writing; writing styles for application, resume, personal letter, official/ business letter, memo, notices etc.; outline and revision. Report writing (making a report of a topic) 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.	45	3

B.Voc. AUTOMOBILE TECHNOLOGY
Semester- I, Paper –II, Total Marks:70
AT-102 - Computer Fundamentals & Engineering Computation
(Theory)

UNIT	CONTENT	NO OF HOURS	CREDIT
Unit- 1	Introduction to Windows, Parts of Windows Screen, Introduction to MS Office Package, Detail introduction of MS Word and its working, Elements of MS Word, Detail introduction of MS Power Point and its working, Elements of Power Point, Detail Introduction to MS Excel, Elements of MS Excel, Introduction to MS Outlook, Microsoft Access, Microsoft Publisher BIT, Byte, binary, Decimal, Hexadecimal, Octal system, Conversion from one System to another Internet, Browsers, World Wide Web Email, Video conferencing, LAN, WAN, MAN, □□Client Server System, Types of software, Translators (compiler, interpreter, assembler)	45	3
Unit - 2	Units & Measurements – Systems of units, Fundamentals and derived units Conversion of units and applied problems. FPS, CGS, MKS and SI units, Fraction & decimals – Addition, Subtraction, multiplication and division simple problems. Algebra: addition multiplication subtraction division, simplification problems, simultaneous equation. Square & Square roots, Plotting and reading of simple graph, Logarithm: Multiplication division, Simplification of fraction and decimals, Ratio and Percentage – Direct – Indirect and mixed proportions Calculate the Percentage of Metal removal by machining and metal added by welding Estimation and cost finished products	45	3
Unit- 3	Trigonometry: trigonometrically ratios and simple formulae, calculate the area of triangle by using trigonometry and application of Pythagoras theorem, calculate height and distance by using trigonometry. Mensuration – area of circle, triangle and polygons Surface area, Volume of cube and Sphere, Surface area and volume of Cone and prism surface area and volume of cylinder and hollow cylinder. Mass, weight, volume and Density and their units. Problems on density and volume of Steel, Aluminium and copper	45	3
Unit- 4	Friction and kind of friction, advantages disadvantage simple problems	45	3

	Definition –Force, Pressure, and their units, problems Heat, Temperature and conversion of scales Fahrenheit, Centigrade & Kelvin. Thermometer, Thermocouple and Pyrometer and its application Transmission of heat and co- efficient of Thermal expansion of solid and related problems Demanding for efficiency and quality		
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B.Voc. AUTOMOBILE TECHNOLOGY
Semester- I, Paper –III, Total Marks:70
Semester- I
AT-103- Automobile Basics-I (Theory)

UNIT	CONTENT	NO OF HOURS	CREDIT
Unit- 1	Introduction to Automotive Technology: Introduction, Light commercial vehicle, Medium & Heavy Commercial vehicle, Major parts of Automobiles, Introduction and layout of Chassis frame, Functions and Types of Chassis frames, Various loads acting on the frame, State the different bodies used in automobiles, Requirements of bodies for various types of vehicles viz. private, commercial etc.	45	3
Unit - 2	Steering System- Types of Steering Systems and Power Steering, Steering linkages, Under steering, over steering & Turning radius, Ackerman's & Davis Steering gear Mechanism, Steering geometry - Caster, Camber, King pin inclination, toe in and toe out, Wheel alignment, Steering defects - wheel wobble and shimmy. Braking System- Functions of brakes, stopping time and stopping distance, Disc and Drum braking system, Construction and working of Mechanical, hydraulic, and pneumatic brakes, Bleeding of Hydraulic brakes	45	3
Unit- 3	Suspension System- Types of suspension system - conventional and Independent, Types of springs - Laminated spring, coil spring, helical spring, Construction and working of different types of shock absorbers, Stabilizer bar and torsion bar. Seat, Door and Window mechanism- Construction and working of door lock mechanism, manual and power window regulating mechanism, seat adjusting mechanism	45	3
Unit- 4	Air Conditioning of motor vehicles- Construction and working of passenger car air conditioning Painting of automobiles- Constituents of paints, Methods of painting, Painting Procedure, Reasons for failure of paint, Pollution- Types of automobile emissions, Treatment of exhaust gases by using catalytic convertors, Exhaust gas analyzer	45	3

B.Voc. AUTOMOBILE TECHNOLOGY
Semester- I, Paper –IV, Total Marks:70
AT-104- MANUFACTURING PROCESS-I (Theory)

UNIT	CONTENT	NO OF HOURS	CREDIT
Unit- 1	Introduction to Manufacturing, Manufacturing Process classification, Engineering Materials Classification & applications Casting Processes: Principles of metal casting, pattern materials, type of patterns and allowance; study of moulding sand, moulding tools, moulding materials, classification of moulds, core, elements of gating and rising system, Casting defects, description and operation of cupola: special casting processes e.g., die casting, Permanent mould casting, centrifugal casting, investment casting.	15	1
Unit - 2	Metal Forming: Basic Concepts and Classification of Forming Processes – Principles- Equipment used and Application of Following Processes-Forging, Rolling, Extrusion, Wire Drawing, Spinning, Sheet Metal Work: Common Processes, Punching, Blanking, tools and equipments; metals used for sheets, Standard Specification for Sheets, Spinning, Bending, Embossing and Coining	15	1
Unit- 3	Welding & Metal Joining: Classification of welding processes, Gas Welding, equipments and field of application, Arc Welding, Metal Arc, Carbon Arc, Submerged Arc and Atomic Hydrogen welding. Resistance Welding - Spot, Seam, Butt, Percussion Welding; Thermit welding, Soldering, Brazing. Standard welding symbol, Flux: Composition, Properties and Function; Electrodes, Types of Joints and Edge Preparation.	60	4
Unit- 5	Powder Metallurgy: Powder Metallurgy, steps involved and its applications, Heat treatment: Heat treatment of metals,Phase diagram (iron-carbon),TTT-diagram for carbon steel	45	3
Unit- 6	Processing of plastic: - introduction, forming and shaping of plastics – Extrusion, injection molding, blow molding, thermoforming, compression molding, transfer molding, and casting	45	3

AT/P-101- Communication Skill & Technical English (Practical)
Semester- I, Total Marks:30

S.N.	CONTENT	NO OF HOURS	CREDIT
1	Project	65	4

Suggested Readings:

Tamuli, A. (2019). English Language for Undergraduate Students (Units 1 – 8), Cambridge: Cambridge University Press

Brown, K. & Hood, S. (2002). Academic Encounters: Intermediate to High Intermediate. Cambridge: CUP

Doff, A. & Jones, C. (2004). Language in Use: Intermediate Classroom Book. Cambridge: CUP

Jones, L. (1988). Cambridge Advanced English: Student's Book. Cambridge: CUP

Soars, J. & Soars, L. (2012). New Headway: Intermediate. Oxford: OUP

Thaine, C. (2012). Cambridge Academic English: B1+ Intermediate Student's Book. Cambridge: CUP

AT/P-102- Computer Fundamentals & Engineering Computation (Practical)
Semester- I, Total Marks:30

S.N.	CONTENT	NO OF HOURS	CREDIT
1.	Operating System Lab Control System Lab	65	4
2.	Computer network Lab		
3.	Computer Graphics & Multimedia Lab System		
4.	Database Management System Lab Microprocessor & Microcontrollers Lab		

Suggested Reading:

Data Structures and Algorithms – O.G. Kakde & U.A. Deshpandey, ISTE/EXCEL BOOKS

Aho Alfred V., Hopperoft John E., Ullman Jeffrey D., “Data Structures and Algorithms”, Addison Wesley

Drozdek- Data Structures and Algorithms, Vikas

Heileman: data structure algorithms & Oop Tata McGraw Hill

Data Structures Using C – M.Radhakrishnan and V.Srinivasan, ISTE/EXCEL BOOKS

Weiss Mark Allen, “Algorithms, Data Structures, and Problem Solving with C++”, Addison Wesley

AT/P-103- Automobile Basics - I (Practical)
Semester- I, Total Marks:30

S.N.	CONTENT	NO OF HOURS	CREDIT
1	Experiments on emissivity and absorvity; Heat exchangers: LMTD methods, mass transfer	70	5
2	Experiments on heat transfer: thermal conductivity of solids, liquids and gases, natural and forced convection, boiling heat transfer, cooling tower;		
3	: Measurements of position, displacement, velocity, force, temperature, proximity/range		
4	Measurements of various product features using mechanical, pneumatic, optical and electronic instruments, interferometer, surface roughness measurements, measurements of threads and gears		

Suggested Readings:

Judge. A.W., Modern Electrical Equipment of Automobiles, Chapman & Hall, London, 1992.

2. Young. A.P., & Griffiths. L., Automobile Electrical Equipment, English Language Book Society & New Press, 1990.

3. Vinal. G.W., Storage Batteries, John Wiley & Sons Inc., New York, 1985.

4. Crouse. W.H., Automobile Electrical Equipment, McGraw Hill Book Co Inc., New York, 1980

5. Spreadbury. F.G. Electrical ignition Equipment, Constable & Co. Ltd., London 1962.

6. Kholi. P.L., Automotive Electrical Equipment, Tata McGraw-Hill Co. Ltd. New Delhi, 1975.

7. Automotive Hand Book, Robert Bosch, Bently Publishers, 1997.

8. William B. Ribbens, Understanding Automotive Electronics, 5th Edition, Butterworth, Heinemann Woburn, 1998.

AT/P-104- MANUFACTURING PROCESS-I (Practical)
Semester- I, Total Marks:30

S.N.	CONTENT	NO OF HOURS	CREDIT
1.	Pattern making; pattern material, pattern allowances and types of patterns.	70	5
2.	Introduction to primary technology processes involving casting, preparation of foundry sand and molds, Experiments on properties of post		
3.	casting, fettling, cleaning, deburring, polishing and painting operations.		
4.	Mould making Practice: Uses of moulding tools: green sand moulding, gating system, risering system, core making.		
5.	Casting: sand preparation, sand testing: specimen preparation, permeability, clay content, grain fineness number, green compression strength,		
6.	green shear strength, dry strength, hardness. Characterisation of materials - solids and fluids.		

Suggested Readings:

A Laboratory Manual of Food Analysis by Shalini Sehgal.

Food Analysis Laboratory Manual by S. Suzanne Nielsen.

Food Analysis Manual by J.A. Awan and S. U. Rehman

B.Voc. AUTOMOBILE TECHNOLOGY
Semester- II, Paper –I, Total Marks:70
AT-201- Automobile Basics-II (Theory)

UNIT	CONTENT	NO OF HOURS
Unit- 1	<p>Automobile Electrical System: The automobile direct current (DC), 12 Volt, vehicle body earth returns electrical system. Basic circuits of automotive electrical system. Automotive wiring. Low-tension and high-tension cables. Colour coding of wires. Electrical symbols.</p> <p>Battery: Lead-acid type battery. Working, materials, battery ratings, battery testing, battery chargers, battery defects, battery maintenance.</p>	45
Unit - 2	<p>Charging System: Components of charging system and their functions. Construction and working of alternator and cutout-relay. Regulators for alternators. Voltage regulators. Maintenance of charging system</p> <p>Starting System: Construction, function and working of starting motor, starter switches and starter drives. Types of starting motors, drives and switches. Service and maintenance of starter motor.</p>	45
Unit- 3	<p>Ignition System: Types of ignition system. Electronic, transistorized coil ignition system (TCI), capacitive discharge ignition system (CDI). Ignition system testing- ammeter test, voltmeter test and resistant test for finding faults in ignition system, Spark plug testing, ignition timing testing and setting.</p> <p>Wheel and Tyres: Types of wheels/rims, constructional details etc., constructional features of different types of tyres, Tyres specifications, Causes of tyre wear and their remedies, Effect of air pressure in tyre on vehicle performance. Tyre maintenance, Tyre retreading.</p>	45
Unit- 4	<p>Transmission System: Function and working of single and multi-plate clutches. Clutch pedal/lever adjustment. Servicing, testing and adjustment of clutch unit.</p> <p>Construction, function and working of a gearbox. Synchronesh types of gearboxes. Manual shifting and automatic transmission. Troubles in gear box, rectifications and servicing.</p>	45

B.Voc. AUTOMOBILE TECHNOLOGY
Semester- II, Paper –II, Total Marks:70
AT-202- Elements of Automobile Engineering (Theory)

UNIT	CONTENT	NO OF HOURS
Unit- 1	Sources of food. Scope and benefit of industrial food preservation Perishable and non-perishable food. Causes of food spoilage, Preservation by salt and sugar-principle, method, equipment and effect on food quality	45
Unit - 2	Thermal processing methods of preservation- principle and equipment. Canning, blanching, pasteurization, sterilization and evaporation Use of low temperature- principle, equipment and effect on quality, chilling, cold storage and freezing	45
Unit- 3	Preservation by drying, dehydration and concentration- principle, equipment, methods and effect on quality. Physical and chemical changes in food during drying and dehydration, Intermediate moisture foods, concentrates- concepts and methods Preservation by radiation, chemicals and preservatives – definitions, methods of irradiation, direct and indirect effect Preservation by fermentation- definition, advantages, disadvantages, types and equipment	45
Unit- 4	Microwave processing of foods Modern methods of food preservation- pulsed electric field processing, high pressure processing, processing using ultrasound, dielectric, ohmic and infrared heating, ozone and carbon di oxide processing- theory, equipment and effect on food quality Concepts of size reduction, size enlargement, mass balance etc.	45

B.Voc. AUTOMOBILE TECHNOLOGY

Semester- II, Paper –III, Total Marks:70

AT-203- ENGINEERING DRAWING &AUTOCAD BASICS (Theory)

UNIT	CONTENT	NO OF HOURS
Unit- 1	Introduction- Scope and objective of the subject, Importance of engineering drawing as a communication medium Drawing instruments and their uses, Scales : Recommended scales, reduced & enlarged, Sheet sizes : A0, A1, A2, A3, A4, A5. Layout of drawing sheet,sizes of title block and its contents, Simple exercises on the use of drawing instruments. Lettering and Dimensioning-Types of Lettering, Guide Lines for lettering, Recommended sizes of letters and numbers, Single stroke letters,Dimensioning - rules and systems of dimensioning – dimensioning a given drawing	45
Unit - 2	Geometric Construction-Bisecting a line - perpendiculars - parallel lines - division of a line, Angles - bisection, trisection, Tangent lines touching circles internally and externally, Polygons - Regular polygons - circumscribed and inscribed in circles, Conic sections - Definitions of focus, directrix, eccentricity, Construction of Ellipse by Concentric circles method, Construction of parabola by rectangular method, Construction of Hyperbola when given the position of point from X-axis and Y-axis	45
Unit- 3	Orthographic Projection-Definition - Planes of Projection - Four quadrants – Reference line,First angle projection - Third angle projection, Projections of points, Projections of straight lines, Projections of planes, Projections of solids Conversion of pictorial views into orthographic views Isometric Projection-Definition - Isometric axes, lines and planes,Isometric Scale - Isometric view, Drawing of isometric views of plane figures, Drawing of isometric views of prisms and pyramids, Drawing of isometric view of cylinders and cones	45
Unit- 4	Sections of Solids- Need for drawing sectional views - section planes - true shape of a section, Sections of prisms and pyramids, Sections of cones and cylinders. AutoCAD- Study of Auto-CAD screen, toolbars, menus and various commands, Exercise on mirror	45

	imaging, rotate, array and move commands, Exercise on dimensioning and hatching, Exercise on 2D drawings, Study the 3D solids and solid tool bar options, Draw bolt and nut in 3D drawings- Preserve and candy	
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B.Voc. AUTOMOBILE TECHNOLOGY
Semester- II, Paper –IV, Total Marks:70
FT-204- MANUFACTURING PROCESS-II (Theory)

UNIT	CONTENT	NO OF HOURS
Unit- 1	<p>Machining:Centre Lathe, Capstan and Turret lathe: - function and principle, types, parts and specification, operation performed in lathe machine, cutting speed, feed, depth of cut and machining time, tools used in lathe.</p> <p>Milling: - function and principle, types, parts and specification, operation performed in milling machine, cutting speed, feed, depth of cut and machining time, cutters used in milling machine. Direct and Simple indexing</p>	45
Unit - 2	<p>Shaper-Slotter-Planner: - function and principle, types, parts and specification, operation performed, cutting speed, feed, depth of cut and machining time, tools used.</p> <p>Grinding: - function and principle, types, parts and specification, operation performed, different types of grinding wheels used, grinding wheel specification. cutting speed, feed, depth of cut and machining time</p>	45
Unit- 3	<p>Jig and Fixture:- Introduction, principle of jig and fixture design, location, loading and unloading, clamping, clearance in a jig and fixture, types, difference between jig and fixture.</p> <p>Metal finishing processes: - Introduction, lapping, honing, super finishing, polishing, buffing, powder brushing, electroplating, hot dipping, galvanizing, metal spraying.</p>	45
Unit- 4	<p>Gear Manufacturing</p> <p>Recent development of manufacturing: - Introduction, manual manufacturing & mechanization, hard automation, soft automation-NC/CNC/DNC, industrial robots, FMC/FMS, CAD/CAM, rapid prototyping, integrated manufacturing</p>	45

B.Voc. AUTOMOBILE TECHNOLOGY

Semester- II, Total Marks:30

AT/P-201- Automobile Basics-II (Practical)

S.N.	CONTENT	NO OF HOURS	CREDIT
1	Study of Pressure pickups, charge amplifier, storage oscilloscope and signal analysers used for IC	65	4
2	engine testing.		
3	Performance study of petrol and diesel engines both at full load and part load conditions.		
4	Morse test on petrol and diesel engines.		

Suggested Readings:

Timenshenko.S. And Young.D.H., Elements of Strength of Materials, T.Van Nostrand Co Inc., Princeton.N.J.1977.

Malhotra.D.R, and Gupta.H.C, The Strength of Materials, Satya Prakashan Tech., India Punlications, New Delhi, 1995.

Kazimi.S.M.A., Solid Mechanics, Tata McGraw Hill, 1976.

Dym.C.L, and Shames.I.H., Solid Mechanics, McGraw Hill, Kogakusha, Tokyo, 1973.

Khurmi.R.S, Strength of Materials, S.C Chand and Co, 1998.

B.Voc. AUTOMOBILE TECHNOLOGY
Semester- II, Paper –II, Total Marks:30
AT/P-202- Elements of Automobile Engineering (Practical)

S.N.	CONTENT	NO OF HOURS	CREDIT
1	Basic concepts: Definition of terms, calibration, standards, generalized measurement systems static and dynamic performance characteristics.	65	4
2	Analysis of experimental data; Instrumentation for measurement of position and displacement, force, velocity, temperature, proximity and range.		
3	Metrology: Standards, slip gauges, Measurement of angles, tapers, threads, coordinates, inspection of straightness, flatness, alignment and surface finish, gear measurements		
4	Instruments, Interferometry and use of optical flats.		

Suggested Reading:

Experimental Methods for Engineers by J.Holman, 6th ed. McGrawhill.

Mechanical Measurements by T.G.Beckwith, N.L.Buck and R.D.Marangoni, 3rd ed., Narosa Publishing House.

Measurement Systems - Application and Design by E.O.Doeblin, 4th ed., McGrawhill.

Instrumentation, Measurement and Analysis by B.C.Nakra and K.K.Chaudhary, TMH.

Metrology for Engineers by J.W.F. Gallies and C.R.Shotbolt, Cassel.

Metrology by R.K.Jain.

B.Voc. AUTOMOBILE TECHNOLOGY
Semester- II, Paper –III, Total Marks:30
AT/P-203- ENGINEERING DRAWING &AUTOCAD BASICS (Practical)

S.N.	CONTENT	NO OF HOURS	CREDIT
1	Using wax blocks or soap bars to develop three dimensional object from given orthographic projections b. Using wax blocks or soap bars to develop three dimensional object, section it and color the section	70	5
2	Using wax blocks or soap bars to develop three dimensional object from given orthographic projections b. Using wax blocks or soap bars to develop three dimensional object, section it and color the section		
3	Develop the lateral surface of different objects involving individual or a combination of solids like Prism, Cone, Pyramid, Cylinder, Sphere etc.		

Suggested Readings:

Jolhe, D.A., Engineering Drawing, Tata McGraw Hill, 2008. Davies, B. L., Yarwood, A., Engineering Drawing and Computer Graphics, Van Nostrand Reinhold (UK), 1986.

Gill, P.S., Geometrical Drawings, S.K. Kataria & Sons, Delhi (2008).

Gill, P.S., Machine Drawings, S.K. Kataria & Sons, Delhi (2013).

Mohan, K.R., Engineering Graphics, Dhanpat Rai Publishing Company (P) Ltd, Delhi (2002).

French, T. E., Vierck, C. J. and Foster, R. J., Fundamental of Engineering Drawing & Graphics Technology, McGraw Hill Book Company, New Delhi (1986).

Rowan, J. and Sidwell, E. H., Graphics for Engineers, Edward Arnold, London (1968)

B.Voc. AUTOMOBILE TECHNOLOGY
Semester- II, Paper –IV, Total Marks:30
AT/P-204- MANUFACTURING PROCESS-II (Practical)

S.N.	CONTENT	NO OF HOURS	CREDIT
1.	Surface preparation and etching techniques, heat treatment and metallographic studies.	70	5
2.	Laboratory experiments in fabrication processes: Spot, MIG, ARC and Gas Welding, Testing of Joints.		
3.	Basic Forging processes like upsetting, drawing down and forge welding		

Suggested Readings:

Betster field D.H. Quality Control-Prentice Hall Pub (1993) (Revised Edn.)

Sharma S.C. Inspection Quality Control and Reliability –Khanna Publishers New Delhi (1998)

John Bank, The Essence of Total Quality Management, Prentice Hall of India P Ltd New Delhi 1995.

Danny Samson, Manufacturing & Operations strategy. Prentice Hall New York (1991)

Ganapathy K. Subramaniam B. Narayana V-Quality Circle concepts and implementation – QCFI. Secndrabad 919940.

Tapan P. Bagchi ISO9000. Concepts methods and implementation – Wheeler Publisher Allahbad (1994)

B.Voc. AUTOMOBILE TECHNOLOGY
Semester- III, Paper –I, Total Marks:70
AT-301- Workshop Calculation & Science (Theory)

UNIT	CONTENT	NO OF HOURS
Unit- 1	Fitting and Wood work : Safety precautions and elementary First aid ,Introduction of Fitting Trade,familiarise with various Hand tools used in fitter workshop and their general uses.	10
Unit - 2	Methods of measuring and marking. Description of files, hammers , chisels, Hacksaw frames, blades -their specifications and uses.	10
Unit- 3	Different Metals and alloys- their characteristics and uses , Types of cutting tools Drills, Taps and Reamers, Limit fits and tolerances description and working of machines , use of Vernier calipers ,	10
Unit- 4	Micrometer , height gauge etc., use of tap & dies, various types of threads and their specific applications, different types of nuts & bolts	15
Unit- 5	Sheet Metal, Wiring & Soldering: Familiarise with different hand tools used in sheet metal workshop, various types of joints used in sheet metal, Rivet and its types and uses. Making of rectangular box-	15
Unit- 6	Wires and cables : specification , selection & used in electrical wiring ,connectors, lugs, various types of wire joints, crimping ,protective devices and their uses,SWG	15
Unit- 7	. Soldering: various composition of solder wires, fluxes and their uses. Characteristics, properties and uses of : Bakelite, PVC, Porcelain etc Biological methods -Pesticides, their Formulations and Nomenclature -Integrated Pest Management in Food Premises	15

B.Voc. AUTOMOBILE TECHNOLOGY
Semester- III, Total Marks:30
AT/P-301- Workshop Calculation & Science (Practical)

S.N.	CONTENT	NO OF HOURS	CREDIT
1	Safety precaution and elementary First aid Familiarise with the tools ,Filing practice on Marking ,Hack Sawing, filing to size.	270	18
2	- Drilling practice, fitting exercises on various shapes, Tapping and Chipping Practice on cutting, planing and making different joints.		
3	Practice on shearing, bending and making Various joints. Making rectangular boxes. Riveting exercises.		
4	Selection of wires and cables. Simple wiring practice, Exercises on wire joints and crimping Simple exercise on Tinning, soldering etc		

Suggested Readings:

Heldt. P.M. High speed combustion engine, Chilton Books Co., 1952

Giles. J.G., Engine design, IIIiffe Books Ltd., London, 1962.

Newton. K. and Steeds. W., The Motor Vehicle, The English Language Book Society and
Newnes Butterworth, London, 1972.

Khovak, Motor vehicle engines, MIR Publishers.

Kolchin. A. and Demidov.V.Design of Automotive Engines

B.Voc. AUTOMOBILE TECHNOLOGY
Semester- IV, Paper –I, Total Marks:70
AT-401- Basic Engineering and Graphics

UNIT	CONTENT	NO OF HOURS
Unit- 1	Safety precautions and elementary First aid , Identification , uses and maintenance of hand tools, DC & AC current, terms and definitions used in circuits , frequency, waveform	15
Unit - 2	Measurement of AC & DC using Ammeter / Voltmeter , AC power, power factor, ,work, power & Energy - their units and measurements , Identification of AC / DC meters , Kirchhoff's law, Ohms law, electric power and dissipation in resistance, IR voltage drops Define magnetism, unit of measurement, types of magnetic properties, Magnet and its classification, materials used & its application, mutual & self inductance, unit of measurement, BH curve.	15
Unit- 3	Passive Components: Resistor -definition, types of resistors, their construction & specific use, color-coding, power rating, Series /parallel combination of resistances and measurement of current in branches , Capacitance –define, construction ,types of capacitors, color coding charge/energy stored in capacitor, capacitive reactance , series /parallel combination of capacitors Inductors-define, types & their application, series and parallel combination, Q factor,	15
Unit- 4	Current carrying conductor, Fleming rule Electromagnets –define, Solenoids & relays define ,construction & its application Working principle, construction of Transformers & their types, various losses of transformers. RC,RL, RLC Circuits, Series and parallel resonance	15
Unit- 5	Electrons and protons in an atom, Structure of atom, valance & conduction electron ,Conductors, Insulators, Semiconductors, , charge in motion-current, units, electron flow, motion of +ve charge, Semiconductors, Crystal structure and bonds, Intrinsic & extrinsic semiconductors, N- type, P-type, Free electron & Hole charges, Fixed ion charges, The P-N junction, Barrier potential, Forward & Reverse voltage, Effect of temp., V-I characteristic, Special purpose diodes and symbols Rectifier types i.e. Half-wave, full-wave & bridge rectifiers, measurement of different currents i.e. Im,Idc, Irms, d.c. out put voltage, efficiency, filter circuits and their types, i.e. capacitor input filter, Choke input filter, etc,Junction break down, Zener break down, Zener diode, Forward & Reverse bias, Voltage regulation using Zener diode ,Zener regulators,	15
Unit- 6	Battery: Electrochemical action, define ,symbol, types of cell, construction, principle ,charging ,specific gravity (Amp-hr capacity)	15

	specification of battery classification of battery, application, , service Needs, storage, lead acid battery, ideal voltage source, real voltage source, shorted load current, matched load current, Current source	
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B.Voc. AUTOMOBILE TECHNOLOGY
Semester- IV, Total Marks:30
AT/P-401- Basic Engineering and Graphics (Practical)

S.N.	CONTENT	NO OF HOURS	CREDIT
1	Identification of various Hand tools used Identification of different types of cables, workshop safety practice.	270	18
2	Measure the power , voltage and current in different circuits. Construct & verify Ohm's law. Construct and verify Kirchhoff's voltage law Tracing the magnetic field of Bar magnet using compass.		
3	Measure the power , voltage and current in different circuits. Construct & verify Ohm's law. Construct and verify Kirchhoff's voltage law Tracing the magnetic field of Bar magnet using compass. relays. Identification and testing of different types of transformers, measure the O/P voltage		
4	Identification of anode, cathodes of different types of diodes. Study the specifications of a semiconductor diode using a data sheet Construct a forward bias and a reverse bias circuit and plot V-I characteristic of diode		

Suggested Readings:

Nag.P.K, Engineering Thermodynamics, Tata McGraw Hill Co Ltd., Seventh Edn, 1993.

Mayhew and Rogers, Engineering Thermodynamics, Longman Green & Co Ltd., London, E.L.B.S. Edn, 1990.

Van Wylen.G.J. and Sonntag. R.E., Fundamentals of Classical Thermodynamics (SI Version) 2nd Edn, 1986

D.H.Bacon, Engineering Thermodynamics, Butterworth & Co., London, 1989.

M.A.Sadd Thermodynamics for Engineers, Prentice Hall of India Pvt Ltd., 1989

Reynolds, Thermodynamics, Int.Student Edn, McGraw Hill Book Co Ltd., 1990.

B.Voc. AUTOMOBILE TECHNOLOGY
Semester- V, Paper –I, Total Marks:70
AT-501- BASIC ENGINEERING I (Theory)

UNIT	CONTENT	NO OF HOURS
Unit- 1	Introduction to various types of welding process - Basic principal and application - Advantages and limitation - Nomenclature of welded joints - Term applied to welding	15
Unit - 2	- Explanation with simple sketches of various types of joints - Welding symbols - Edge preparation & application - Welding positions - Welding Techniques - Right ward & left ward practices.	15
Unit- 3	-Gas welding principle and application - Safety in Oxy-acetylene welding and cutting plant (DA & O2) - Flame setting and their uses - Specification for filler rods - - Use of gas welding flux - Construction and operation features of different type of regulators - Blow pipes & cutting torches - Gas welding, brazing & soldering procedures	15
Unit- 4	Principles of Shielded Metal Arc Welding (SMAW) - Basic Electricity of welding power source - Types of power source & Connection features - AC/DC power source advantages and disadvantages. - Arc and its characteristics - Polarity types & Arc length - Electrode – Types, description & Specification– BIS, AWS, etc... - Function of flux & Characteristics of flux - Selection of electrodes and coating factors	15
Unit- 5	- Resistance welding process – Spot welding - Seam welding – projection welding – Butt welding - MIG Welding, TIG Welding - Gas cutting and welding Geometric features as per IS 8000-1985 Straightness, flatness, circularity and roundness, cylindricity, profile of any line or surface, parallelism, perpendicularity and squareness. Angularity, position, concentricity and coaxiality, Symmetry Maximum material condition and representation of geometrical features in engineering drawing.	15
Unit- 6	Drills – Drill materials drill types and use Helix angle point angle and clearance angle according to depth of hole, material to be drilled drill sizes. System of drill size, standard designation, and, stems of drill size, of symmetry of point angle and lip length on size of holes,	15

	<p>influence of symmetry of point angle and lip length on size of the holes, selection of centre drill size according to diameter of work piece, Carbide tipped drills and uses.</p> <p>.</p> <p>Reamers – Types of reamers and uses, reaming allowance, care and maintenance.</p> <p>Taps – Hand taps, machine taps and calculation of tap drill size for 60 degree metric thread.</p> <p>Counter bore, counter sink spot face and boring tools Drilling machines – Types, specifications tool and work holding devices.</p> <p>Drilling machine operations</p>	
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B.Voc. AUTOMOBILE TECHNOLOGY

Semester- V, Total Marks:30

AT/P-501- Basic Engineering-II (Practical)

S.N.	CONTENT	NO OF HOURS	CREDIT
1	Familiarisation with the machinery use equipment and their use - Introduction to safety - Setting up of Arc and Gas apparatus. - Lighting and adjustment of Gas welding flame. - Striking an arc by MMAW - Fusion run with/without filler rod on M S sheet. - Square butt joint on M S sheet - Lap, T and Edge joint on M S sheet. - MS to MS brazing - SS to copper soldering		
2	- Straight line beads on M S plate - Weaved bead on M S plate. - Fillet weld open corner joint on M S plate - Fillet weld on Tee joint - Square butt joint on M S plate. - Spot welding of M S sheet - Spot welding of S S sheet	270	18
3	Measurement of straightness and flatness using spirit level, straight edge and dial Measurement of circularity and roundness s using between centre and dial. Measurement of cylindricity using V Blocks and dial Measurement of angularity using sine bar, slip gauge and dial		
4	Exercises including drilling, reaming, tapping, counter boring and counter sinking Exercise on slide fitting		

Suggested Readings:

Sastry, S.S Introductory Methods of Numerical Analysis (Third Edition), Prentice Hall of India, New Delhi, 1998.

Kandasamy, P., Thilakavathy, K, and Gumnavathy, K, Numerical Methods, S.Chand & Co., New Delhi, 1999.

Grewal, B.S and Grewal J.S.Numerical Methods in Engineering and Science, Hanna Publishers, New Delhi, 1999.

Jain, M.K., Iyengar, S.R.K and Jain, R.K.Numerical Methods for Engineering and Scientific Computation (Third Edition), New Age

B.Voc. AUTOMOBILE TECHNOLOGY

SEMESTER 6th

Total Marks 70+30=100

AT 601: Industrial Specific Project Work (Viva-Voce examination)

Students will prepare a project report on the basis of work done in the industry in the relevant specific area they are working, which will be evaluated by Viva-Voce examination in the end semester.

UNIT	CONTENT	NO OF HOURS
	<ol style="list-style-type: none">1. Review of Related Literatures2. Objectives3. Defining research problem and formulation of Title and design for the study.4. Methods and techniques of data collection - Sampling and sampling designs - Attitude measurement and scales.5. Data processing - Statistical analysis and interpretation of data6. Model building and decision making7. Discussion8. Findings/result9. Conclusion10. References11. Project writing and presentation12. Presentation of Project and submission (Viva-Voce)	75

Reference books.

Rosenthal, "Principle of Metal Casting", Tata McGraw Hill, New Delhi.

Ostwald Phillip F., Munoz Jairo, "Manufacturing Processes and Systems", John Wiley & Sons.

P.N. Rao, "Manufacturing Technology-Foundry, Forming and Welding", Tata McGraw Hill.

B.S. Nagendra Parasher, RK Mittal, "Elements of Manufacturing Processes", Prantice Hall India ND Horowitz Ellis & Sartaj Sahni, "Fundamentals of Data Structures", Galgotria Pub.

Tanenbaum A. S., "Data Structures using 'C'"

Ajay Agarwal: Data structure Through C.Cybertech

Experimental Methods for Engineers by J.Holman, 6th ed. McGrawhill.

Mechanical Measurements by T.G.Beckwith, N.L.Buck and R.D.Marangoni, 3rd ed., Narosa Publishing House.

Measurement Systems - Application and Design by E.O.Doeblin, 4th ed., McGrawhill.

Instrumentation, Measurement and Analysis by B.C.Nakra and K.K.Chaudhary, TMH.

Metrology for Engineers by J.W.F. Gallies and C.R.Shotbolt, Cassel.

Metrology by R.K.Jain.