

FIRST
SEMESTER

Course Name : VOCATIONAL DIPLOMA IN AUTOMOBILE

Course Code : VA

Semester : FIRST

Subject Title : COMMUNICATION SKILLS

Subject Code : 9005

Teaching and examination scheme:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER	TH	TEST	OR	TW	TOTAL
02	--	02	03	80	20	25#	25@	150

Rationale:

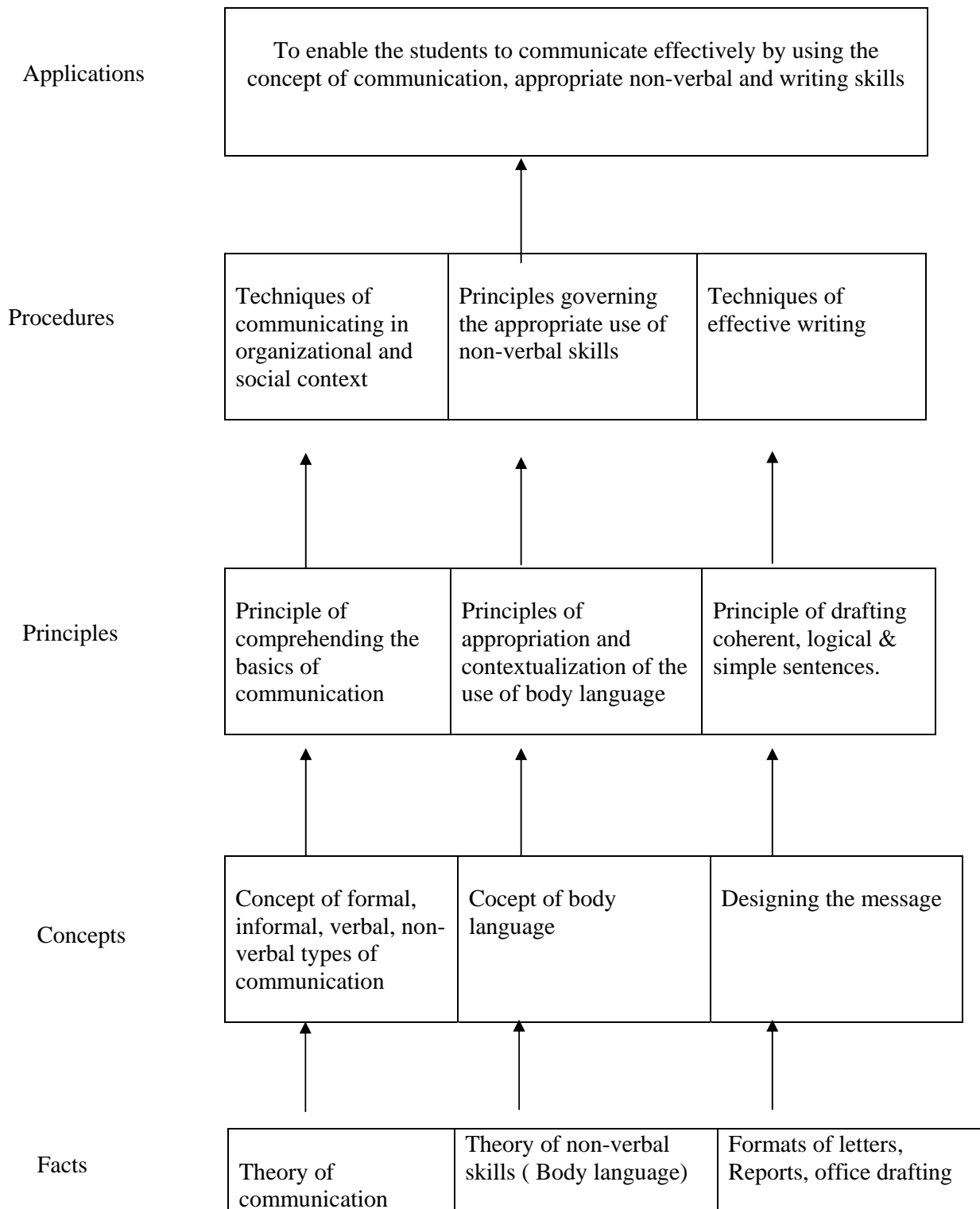
The Students have been already been exposed to the Language Skills pertaining to English, leading to a better understanding of English & use of grammar, developing a base for the language. Now with a view to achieve some mastery over the language & to develop Communication Skills, which is the main objective of this subject, the basic concepts of communication, Non-verbal and written skills have been introduced.

Objectives:

The Students will be able to:

- 1) Understand and use the basic concepts of communication and principles of effective communication in an organized set up and social context
- 2) Give a positive feedback in various situations, to use appropriate body language & to avoid barriers for effective communication
- 3) Write the various types of letters, reports and office drafting with the appropriate format

Learning Structure:



Contents: Theory

Chapter	Name of the Topic	Hours	Marks
01	Introduction to communication: 1.1 Definition, communication cycle/ process, 1.2 The elements of communication: sender- message – channel- Receiver –Feedback & Context. 1.3 Definition of communication process. 1.4 Stages in the process : defining the context, knowing the audience, designing the message, encoding , selecting proper channels, transmitting, receiving, decoding and giving feedback.	04	08
02	Types of communication Formal- Informal, Verbal- Nonverbal, Vertical- horizontal- diagonal	04	08
03	Principles of effective communication: 3.1 Definition of effective communication 3.2 Communication barriers & how to overcome them. 3.3 Developing effective messages: Thinking about purpose, knowing the audience, structuring the message, selecting proper channels, minimizing barriers & facilitating feedback.	04	10
04	Non verbal- graphic communication: 4.1 Non- verbal codes: A- Kinesics , B- Proxemics , C – Haptics D-Vocalics , E- Physical appearance. F -Chronemics , G –Artifacts 4.2 Aspects of body language 4.3 Interpreting visuals & illustrating with visuals like tables, charts & graphs.	08	22
05	Formal written skills : 5.1 Office Drafting : Circular, Notice , and Memo. 5.2 Job Application with resume. 5.3 Business correspondence: Enquiry, Order letter, Complaint letter, and Adjustment letter. 5.4 Report writing: Accident report, fall in production, Progress / Investigative. 5.5 Defining & describing objects & giving Instructions.	12	32
Total		32	80

Assignments:

1. Communication Cycle (With The Help Of Diagram)
2. Communication Situations (List Of 5 Communication situations stating the type of communication)
3. Barriers That Hinder A Particular Communication Situation. (State the type of barrier, and how to overcome them).
4. Developing A Story Or A Paragraph For The Given Topic Sentence.(in a group of 5 – 6 students)
5. Describing Various Equipment's.
6. Identifying The Various Sentences With Their Type Of Writing. (e.g. Scientific, legal, colloquial etc.)
7. Business Letters
8. Letters Of Suggestion
9. Comparative Time Table Of 2 Students
10. Description Of Two Different Persons.(seeing the picture)
11. Letter To The Librarian, Principal
12. Report Writing.

NOTE: The above assignments are suggested to be completed in the prescribed work-book.

Learning Resources:**Books:**

Sr. No.	Author	Title	Publisher
01	Krushna Mohan, Meera Banerji	Developing Communication Skills	Macmillan
02	Joyeeta Bhattacharya	Communication Skills	Reliable Series
03	Jayakaran	Every ones guide to effective writing	Apple publishing

Course Name : VOCATIONAL DIPLOMA IN AUTOMOBILE
Course Code : VA
Semester : FIRST
Subject Title : DRAWING OF AUTO-COMPONENTS
Subject Code : 10140

Teaching and examination scheme:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER	TH	TEST	PR	OR	TW
02	--	04	04	80	20	-	25@	25@

Rationale:-In the view of fast development in the field of Automobile the trend is to incorporate change in the drawing of vehicle components from time to time, an automobile engineer is suppose to be acquainted with the drawing practice of various automobile components so, it meets curriculum requirements

Objectives:-

Student will able to

1. Learn Basic concept of Engineering Drawing
2. Familiar with the Drawing Procedure
3. Have the Knowledge of screw fastening
4. Draw the drawing of the piston, connecting rod, crankshaft, camshaft, timing gears etc

Detail Contents

Chapter	Contents	Marks	Hrs
1	Basic Concept of engineering Drawing 1.1 Drawing Board and T- square 1.2 Various Drawing Instruments 1.3 Drawing Papers 1.4 Drawing Pencils 1.5 Eraser (rubber) 1.6 Drafting Machine	02	02
2	Sheet Layout & Sketching 1.1 Sheet layout 1.2 Sheet size 1.3 Sheet margin 1.4 Border lines 1.5 Borders and frames	02	02
3	Lines, Lettering and dimensioning 3.1 Introduction 3.2 Lines, line thickness, inked drawing pencil drawing, types of lines, out lines, margin line, dimension line, extension or projection line, construction line, hatching or section line, leader or pointer lines, border line, short brake line, long brake line, hidden or dotted line, center line, cutting plane line etc.	04	02
4	4.1 Lettering, single stroke letters, gothic letter	02	02

	4.2 Dimensioning 4.3 Dimension terms and notations 4.4 Placing of dimension 4.5 Unit of dimensioning 4.6 Practical hints on dimensioning		
5	Scales 5.1 Introduction 5.2 Scales- Engineers scale, graphical scale, representative scale 5.3 Types of scale- plain scale, diagonal scale, comparative scale, inch scale etc.	04	02
6	Geometrical construction 6.1 Introduction 6.2 Bisecting line 6.3 To draw parallel lines 6.4 To draw polygon 6.5 To divide a line 6.6 To bisect an angle 6.7 To trisect an angle 6.8 To find center of an arc 6.9 freehand sketching with dimensions and proportionate sketching of circles, rectangles, squares, parallelograms, rhombus, polygons	05	02
7	7.1 Curves used in engineering Practice 7.2 Ellipse -----by rectangle method 7.3 Parabola -----by rectangle method 7.4 Hyperbola -----by rectangle method 7.5 Involves 7.6 Helix 7.7 Screw threads	08	02
8	Loci of points 8.1 Introduction 8.2 Loci of points 8.3 Simple mechanism 8.4 The slider crank mechanism 8.5 A four bar mechanism	04	02
9	Orthographic Projections 9.1 Introduction 9.2 Principle of projection 9.3 Method of projection 9.4 Orthographic projection 9.5 Four quadrants 9.6 First angle projection 9.7 Third angle projection 9.8 Sectional views –various types of cross-section. 9.9 Exercises on orthographic projections	08	02
10	Isometric Projection 10.1 Introduction 10.2 Isometric axes, lines and planes 10.3 Isometric scales 10.4 Isometric drawing 10.5 Exercises.	08	04

11	Conversion of pictorial views into orthographic views 11.1 First angle method 11.2 Third angle method 11.3 Orthographic projection 11.4 Procedure for preparing a scale drawing 11.5 Illustrative problems	03	04
12	12.1 Common types of screw fastening through bolts, tap bolts, cap screws, stud, m/c screws. 12.2 Freehand proportionate drawing of engine parts of Automobiles. 12.3 Freehand proportionate drawing of transmission system, clutch, gearbox, propeller shaft, universal joint, slip joint, differential axle, hub 12.4 Suspension system – leaf spring, coil spring, shock absorbers. 12.5 Steering system – steering gear box, steering columns steering linkages. 12.6 Chassis- frame/ body	30	6
	TOTAL	80	32

Practical

Sr.no.	Practical content
1	One sheet on lettering
2	One sheet on geometrical construction.
3	One sheet on curves used in engg. practice.
4	One sheet on dimensioning techniques.
5	One sheet on loci of points.
6	Conversion of given pictorial view Into sectional orthographic view.
7	One sheet on isometric views.
8	One sheet on sectional views.
9	One sheet on fastening devices.
10	Two sheet on various engine parts.
11	One sheet on suspension system of automobiles.
12	One sheet on clutches used in automobiles.
13	One sheet on gearbox used in automobiles.

Reference :

Sr.No.	Author	Title	Edition	Year	Publisher and Address
1	N.D.Bhat	Elements of Engg. Drawing			
2	N.D.Bhat	Machine Drawing			
3	R.K.Jain	Machine Design			
4	R.S.Khurmi & J.K.Gupta	Text Book of Machine Design			
5	by Pandya & shah	Machine Design			
6	by Donkin	Motor Vehicle Design			
7	Shigley	Machine Design CMT1 Handbook			
8	P S G Coimbatore	Design data Book			
9	by N.K Giri.	Problems in Auto Engineering			

Course Name : VOCATIONAL DIPLOMA IN AUTOMOBILE

Course Code : VA

Semester : FIRST

Subject Title : AUTOMOBILE ENGINES

Subject Code : 10141

Teaching and examination scheme:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER	TH	TEST	PR	OR	TW
02	--	02	03	80	20	#50	--	25@

RATIONALE: -The Engine being the most important part of automobile vehicle, the automobile engineers should know various types of engines, their working and different systems employed in sound working of automobile engine. This subject intends to develop the skills of identification and location of engine parts, and its functions, procedure for disassembly & assembly of all systems and its components related to automobile engine.

OBJECTIVE:

Student will be able to know:

- 1) Basic knowledge of engine principles and fundamentals, constructional features, fundamental concepts.
- 2) The sources of energies, components of engine and laws of thermodynamics.
- 3) Various test conducted on IC Engine.
- 4) Gas turbine and air compressor.

Detailed contents:

CHAPTER	CONTENTS	MARKS	HOURS
1	<u>ENGINE PRINCIPLES & FUNDAMENTALS</u> THEORY 1.1 Introduction. 1.2 Basic engine nomenclature & classification of automobile engine. 1.3 Working cycle of Otto , Diesel & Dual . 1.4 Use of Engine, merit & De-merits of vertical & horizontal engine 1.5 Four stroke SI & CI engines 1.6 Two stroke cycle engines 1.7 Comparison of 2 & 4 Stroke cycle & SI –CI engines. 1.8 Reasons for using single cylinder four & two stroke cycle engines.	10	02

2	<p><u>Constructional features of automobile engine.</u> <u>COMPONENTS</u> THEORY 2.1 Cylinder block, cylinder liner, types of liners & blocks. 2.2 cylinder head, gaskets, piston, piston rings & pins etc. 2.3 Crank shaft, camshaft & their drives, connecting rod, valve, & valve train, timing, manifolds, silencers, flywheel etc. 2.4 Rotary & reed valves.</p>	10	04
3	<p>Sources Of Energies: 3.1 Brief description of various sources of energy. Conventional & non-conventional energy sources. 3.2 Renewable & non renewable sources of energy: i) Heat ii) Hydraulic iii) solar iv) nuclear v) Tidal vi) Wind vii) Geothermal viii) Bio-gas ix) Biomass Various appliances based on the above energy sources.</p>	12	05
4	<p>Fundamental Concepts & Laws Of Thermodynamics: 4.1 Basic concept of working of pure substance system & system boundary. Type of system close, open & Isolated system 4.2 Properties and state of system extensive & intensive properties like Pressure, volume, density enthalpy, entropy, temperature & its measurement/measuring devices, potential & kinetic energy, Internal energy concept of work, Heat as a form of energy, Principle of conservation of energy. 4.3 First law of thermodynamics, statement & its application to closed & open system, cyclic & non-cyclic processes. Zeroth law of thermodynamics. 4.4 Second Law Of Thermodynamics, Statements like Kelvin Plank and Clausius Statements. 4.5 Application of second law to heat pump refrigerator. heat engines</p>	15	05
5	<p><i>Ideal Gases:</i> 5.1 Concept of Ideal gas, Charles's law, Boyle's law, Equation of state, Avogadro's law, 5.2 Characteristic of gas constant, Universal gas constant, various gas processes- Isobaric, Isochoric, Isothermal adiabatic, polytropic 5.3 Representation on the PV & T-S diagrams Calculation of work done, Heat transfer, Change in internal energy ,in each processes (only simple numerical calculations)</p>	10	04

6	<p>I.C. Engine & Testing:</p> <p>6.1 Various power cycles,, otto, diesel and dual cycles with simple numerical Classification of I.C. engine & working principle of 2/4 stroke cycle , valve timing diagram</p> <p>6.2 Terms related to I. C engines scavenging, Pre ignition , Detonation , Supercharging. Engine power – IP , FP & B P , Mechanical , thermal , relative , volumetric efficiencies.</p> <p>6.3 Fuel consumption , BSFC (Brake Specific Fuel Consumption)</p> <p>Morse and motoring test , heat balance sheet, Concept of pollutants in exhaust gases in petrol & diesel engine such as CO, unburnt Hydro carbon ,their effect on Environment</p> <p>6.4 Exhaust gas analyzers for petrol & diesel engines, Central motor vehicles Act provisions 1989 Section 115 Regulations.</p>	10	04
7	<p>Gas Turbine:</p> <p>7.1 Working cycle, classification, application of gas turbine. Constant volume and constant pressure Gas turbines</p> <p>7.2 Principle of Turbojet, Turboprop, , Rocket jets. Rocket fuel.</p>	08	04
8	<p>Air compressor:</p> <p>8.1 Industrial use of compressed air. Classification, construction and working of single and two stage compressor, Efficiency- volumetric, isothermal, mechanical . (simple numerical calculation)</p> <p>8.2 Multistaging-- Advantage of multistageing in compressor</p>	05	04
	TOTAL	80	32

1 PRACTICAL

01	<p><u>Practice</u></p> <p>1.1 Study of two stroke cycle engines.</p> <p>1.2 Study of four-stroke cycle SI and CI Engine.</p>
02	<p><u>PRACTICE</u></p> <p>2.1 Dismantling & reassembling of engines.(any one of two stroke Moped, motor cycle, single cylinder petrol or diesel engine.)</p> <p>2.2 Dismantling & reassembling of Four stroke petrol & diesel single cylinder engines.</p>
03	Practical with concept of thin cylinder
04	<p>01) Study and demonstration of residential solar, water heating, system</p> <p>02) . Demonstration & analysis of Solar photo voltaic panel operated Tube lights,</p>

	Lamps 03) Study of Bio-gas plant & sketching 04) Demonstration & study of wind mill operated well pumps.
05	Practical with fundamental concepts of Laws of Thermodynamics
06	Measure amount of CO and HC in exhaust gases of 2 stroke and 4 stroke engines with the help of exhaust gas analyzers.
07	Study construction and working of gas turbine
08	i) Trial on reciprocating air compressor) Dismantling and assembly of reciprocating compressor and observe various parts and systems

Ref. Books,

Sr. No	Author	Title	Edition	Year	Publisher and Address
1	R.B.Gupta	Automobile Engineering	6 th	2006	Satya Prakashan
2	William H Crouse & Donald L Anglin	Automotive Mechanics	10 th	2005	Tata McGraw Hill
3	Srinivasan	Automotive Mechanics	--	2005	--- do ---
4	Narang	Automobile Engineering	--	2005	Khanna
5	C.P.Nakara	----- “ -----	5 th	1990	Khanna
6	M.L.Mathur, R.P.Sharma	A course in internal combustion engines			Dhanpat Rai and sons.,
7	G.B.S. Narang.	Automobile engineering			
8	R.B.Gupta.	Automobile Engineering			
9	Dr.Kripal Singh.	Automobile Engineering (VolI)			
10	George Lear and Lynn Mosher	Motor Cycle Mechanics			PrenticeHall Inc.
11	R.S.Khurmi	Engineering Thermodynamics			S.Chand & Co. Pvt. Ltd
12	S.C. MUDD	MOTOR MECHANIC VOL.-1,2,3,4.			
13	P.L. BALLANEY	THERMAL ENGINEERING			
14	R. YADAV	HEAT ENGINES, VOL.1&2.			
15	R.S.KHURMI & B.K.GUPTA	THERMAL ENGINEERING			S.Chand & Co. Pvt. Ltd
16	GARRISON	I.C.ENGINES			Tata McGraw Hill

Course Name : VOCATIONAL DIPLOMA IN AUTOMOBILE

Course Code : VA

Semester : FIRST

Subject Title : WORKSHOP PRACTICE-I

Subject Code:

(COMMON TO VM ,VT,VA,VF)

Teaching and examination scheme:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER	TH	TEST	PR	OR	TW
-	--	4	-	-	--	50#	-	50@

RATIONALE: - In this practical subject student will do the practical work with his own hand and get some important skills like drill sharpening, filing, sawing, keyway slotting, tapping, reaming, dressing the grinding wheel. This skill will develop the confidence of Automobile Engineer in the field of automotive

OBJECTIVES:

Students will be able to do:

Fitting (hands on)

- 1) Filing flat surfaces by files and checking it by try square, filing types.
- 2) Cleaning of file and chipping skill to be developed.
- 3) Hacksaw blade fixing with correct tension, job setting in jaws for sawing.
- 4) Filing 'v' grooves and complex profile by file and check it by profile gauge.
- 5) Radius filing and check with radius gauge.
- 6) Drill tapping of blind holes.
- 7)

Basic workshop practice.

- 1) Turning of lathe m/c step, radius and with form tool.
- 2) Grinding different cutting tools on grinder.
- 3) Drilling and boring skills on drilling and boring machines.
- 4) Dressing the grinding wheels.
- 5) Planning various shape blocks on planning machines.
- 6) Shaping plane surface on shaping machines.
- 7) Slotting internal groove on slotting machines.
- 8) Safety in welding work and simple welding joint.

DETAILED CONTENTS

Chapter	Contents	Hrs	Marks
	Fitting 01 Filing Flat surfaces: Checking flatness and square ness using a try square – Types of filing – Cleaning files. 02 Chipping: Hints on chipping 03 Hack sawing: Selection of blades for different metal sections- Fix hack sawing of material for the job , maintaining blades		

	<p>Correct tension and direction – Hack sawing Filing ‘V groove and complex profile by file & check with profile gauge. 04 Filing radius –check with radius gauge 05 Check profile with profile gauges. 06 Drill plate, Drilling, counter sinking, counter boring. Operations on job 07 Drilling and Tapping: Internal threading of holes by using hand taps – determine the tap drill size, drilling, counter- sinking and tapping – precautions with tapping a blind hole. 08 External thread cutting using die.</p> <p>Basic Workshop Practice</p> <ol style="list-style-type: none"> 1. Step turning and Radius forming: Free hand form turning – by using form tool. 2. Grinding a parting tool with an end cutting edge angle 3. Grinding an undercutting tool for thread cutting 4. Drilling and Boring-Use of inside caliper and outside Micrometer for bore measurement. 5. Grinding a twist drill 6. Dressing and truing the wheel – Re sharpening of twist drill, Testing a re sharpened twist drill for its performance. Drilling and reaming: by hand-Method of checking the bore with a plug gauge. 7. Drilling and step Boring: Boring blind hole with a boring tool. 8. Drilling, Boring and Recessing: Internal recessing to a size broader than the width of tool – Form a recess. 9. Planing various blocks on planing machine 10. Shaping blind & open keyways on shaping machine 11. Slotting internal grooves on slotting machine 12. Welding Practical-fusion run with/without filler rod on MS Sheet – square butt joint on MS sheet LAP,T& Edge joint on M.S. Sheet <p style="text-align: center;">1</p>		
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List of practical

- 1) Filing flat surfaces by files and checking it by try square, filing types.
- 2) Cleaning of file and chipping skill to be developed.
- 3) Hacksaw blade fixing with correct tension, job setting in jaws for sawing.
- 4) Filing ‘v’ grooves and complex profile by file and check it by profile gauge.
- 5) Radius filing and check with radius gauge.
- 6) Drill ,tapping of blind holes.

Basic workshop practice.

- 1) Turning on lathe m/c step, radius with form tool.
- 2) Grinding different cutting tools on grinder.
- 3) Drilling and boring skills on drilling and boring machines.
- 4) Dressing the grinding wheels.
- 5) Planing various shape blocks on planing machines.
- 6) Shaping plane surface on shaping machines.
- 7) Slotting internal groove on slotting machines.
- 8) Safety in welding work and simple welding joint.

As per table below---

Termwork to be submitted along with the jobs, should contains the following

- 1) Work Book 2)Job drawing 3)Sketches of used tools

Student has to compile the assignment & Journal should present with term. work.

*---Practical examination shall be of 6 hrs. duration & student has to do any one job on the above mention basic workshop practice. The job drawing is to be given by external examiner in consultation with internal examiner.

SR. NO.	JOB DESCRIPTION	MATERIAL & SIZE	PROCESS	ACCURACY
1	FITTING JOB	MILD STEEL FLAT ANY SIZE	FITTING, DRILLING, TAPPING,V GROOVE.	+/- 0.1 m.m.
2	TURNING JOB	M.S. ROUND BAR	PLAIN, TAPER, STEP ,THREAD.(INTERNAL / EXTERNAL.)	+/- 0.1 m.m.
3	MILLING JOB	C. I. BLOCK	FACE MILLING, SLOT MILLING.	+/- 0.1 m.m.
4	GRINDING JOB	M.S. ROUND BAR M.S. BLOCK	CYLLINDRICAL GRINDING SURFACE GRINDING	+/- 0.05 m.m.
5	DRILLINING & REAMING JOB	M.S. PLATE C.I. BLOCK	DIFFERENT SIZE DRILLING & REAMING (2 TO 10) M.M.	+/- 0.1 m.m.
6	SHAPING & PLAINING JOB	C.I. BLOCK	SLOTING PLAINING OPERATION	+/- 0.1 m.m.
7	WELDING JOB	M.S. PLATE	WELDING OPERATION	VISUAL O.K.

References

Sr. No.	Author	Title	Publisher and address
1	S.K.Hajra Choudhary	Elements of workshop technology Vol I & II	Media promoters & Publisher pvt. Ltd.
2	Mahajan	Mechanical Technology	Vrinda publication

Course Name : VOCATIONAL DIPLOMA IN AUTOMOBILE
Course Code : VA
Semester : FIRST
Subject Title : COMPUTER FUNDAMENTALS
Subject Code :

Teaching and examination scheme:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER	TH	TEST	PR	OR	TW
--	--	04	--	--	50* #	--	25@	--

*** On line examination**

RATIONALE:

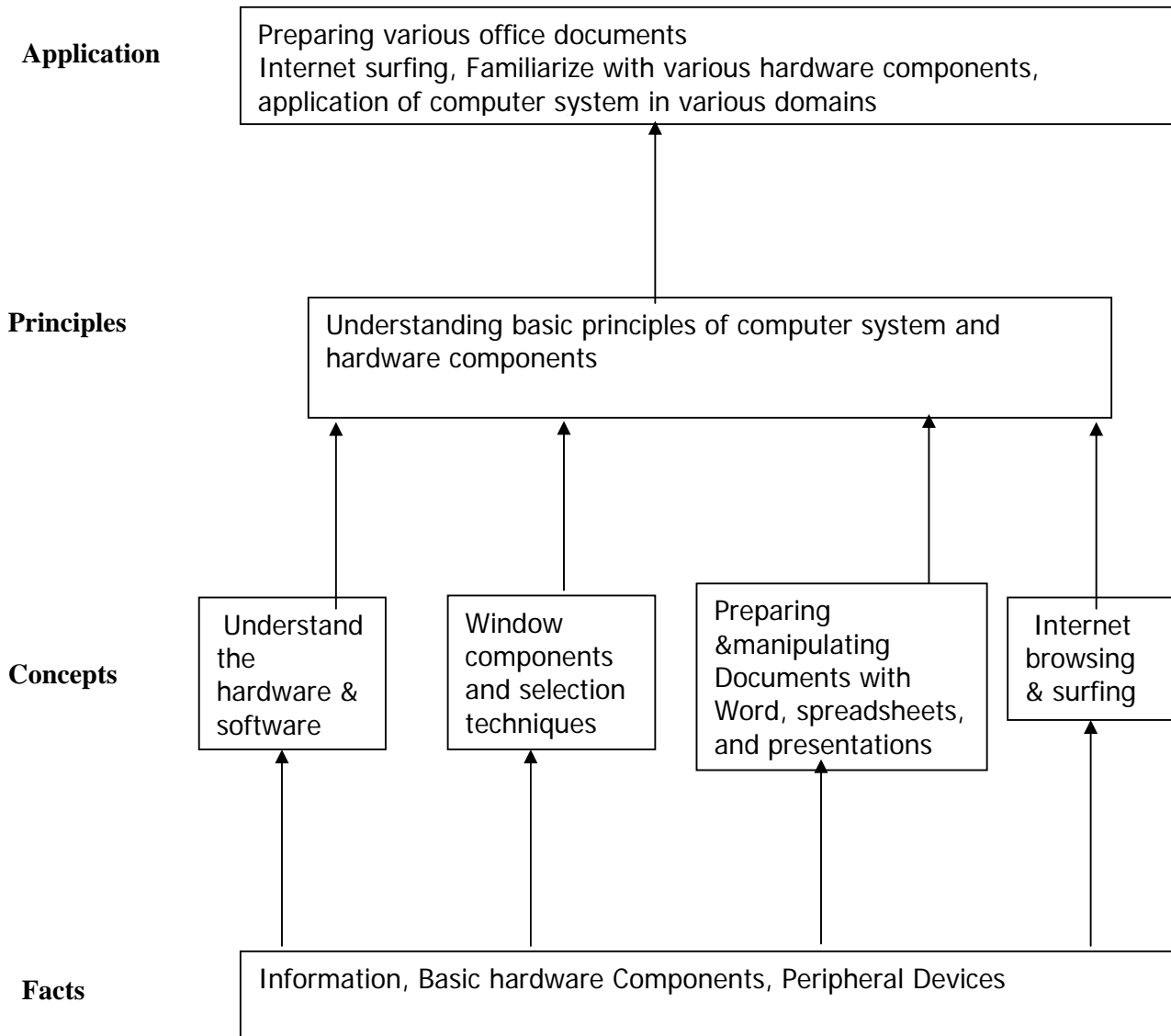
Computer plays an important role in human lives. The primary purpose of using a computer is to make life easier. It is a gateway to a wonderful world of information and various applications. Computers have established an indispensable part in a business, academics, defense, budgeting, research, engineering, medicine, space. This subject introduces the fundamentals of computer system focusing various hardware and software components. It also provides biblical worldview regarding computer ethics by means of Internet.

OBJECTIVES:

Students will be able to:

1. Understand a computer system that has hardware and software components, which controls and makes them useful.
2. Understand the operating system as the interface to the computer system.
3. Use the basic functions of an operating system.
4. Set the parameter required for effective use of hardware combined with and application software's
5. Compare major OS like Linux and MS-Windows
6. Use file managers, word processors, spreadsheets, presentation software's and Internet.
7. Have hands on experience on operating system and different application software
8. Use the Internet to send mail and surf the World Wide Web.

Learning Structure:



CONTENTS: Theory

Note: Contents of theory are to be taught in Practical Period

Chapter	Name of the Topic
1	Fundamentals Of Computer Introduction Components of PC The system Unit Front part of system Unit Back part of system Unit CPU Memory of computer Monitor Mouse, Keyboard Disk, Printer, Scanner, Modem, Video, Sound cards, Speakers
2	Introduction To Windows 2000/Xp Working with window Desktop Components of window Menu bar option Starting window Getting familiar with desktop Moving from one window to another Reverting windows to its previous size Opening task bar buttons into a windows Creating shortcut of program Quitting windows
3	GUI Based Editing, Spreadsheets, Tables & Presentation Application Using MS Office 2000 & Open Office.Org Menus Opening, menus, Toolbars, standard toolbars, formatting toolbars & closing Quitting Document ,Editing & designing your document Spreadsheets Working & Manipulating data with Excel Changing the layout Working with simple graphs Presentation Working With PowerPoint and Presentation
4	Introduction To Internet What is Internet Equipment Required for Internet connection Sending &receiving Emails Browsing the WWW Creating own Email Account Internet chatting
5	Usage of Computer System in various Domains Computer application in

Chapter	Name of the Topic
	Offices, books publication data analysis ,accounting , investment, inventory control, graphics, database management, Instrumentation, Airline and railway ticket reservation, robotics, artificial intelligence, military, banks, design and research work, real-time, point of sale terminals, financial transaction terminals.
6	Information technology for benefits of community Impact of computer on society Social responsibilities Applications of IT Impact of IT Ethics and information technology Future with information technology

Sr.No	List of Practicals
1.	Working with Windows 2000 desktop ,start icon, taskbar, Recycle Bin, My Computer icon ,The Recycle Bin and deleted files Creating shortcuts on the desktop
2.	The Windows 2000 accessories Word Pad – editing an existing document Use of Paint – drawing tools The Calculator, Clock
3.	The Windows Explorer window, concept of drives, folders and files? Folder selection techniques, Switching drives, Folder creation Moving or copying files, Renaming, Deleting files ,and folders
4.	Printing Installing a printer driver Setting up a printer Default and installed printers Controlling print queues Viewing installed fonts
	The clipboard and ‘drag and drop’ Basic clipboard concepts Linking vs. embedding
5.	Moving through a Word document menu bar and drop down menus toolbars
6.	Entering text into a Word 2000 document, selection techniques Deleting text
7.	Font formatting keyboard shortcuts
8.	* Paragraph formatting Bullets and numbering
9.	* Page formatting What is page formatting? Page margins Page size and orientation Page brakes, Headers and footers
10.	Introducing tables and columns
11.	Printing within Word 2000 Print setup Printing options Print preview
12.	* Development of application using mail merge Mail merging addresses for envelopes Printing an addressed envelope and letter
13.	Creating and using macros in a document
14.	* Creating and opening workbooks Entering data

15.	Navigating in the worksheet Selecting items within Excel 2000 Inserting and deleting cells, rows and column Moving between worksheets, saving worksheet, workbook
16.	Formatting and customizing data
17.	Formulas, functions and named ranges
18.	Creating, manipulating & changing the chart type
19.	Printing, Page setup, Margins Sheet printing options, Printing a worksheet
20.	* Preparing presentations with Microsoft Power Point. Slides and presentations, Opening an existing presentation , Saving a presentation
21.	Using the AutoContent wizard ,Starting the AutoContent wizard Selecting a presentation type within the AutoContent wizard Presentation type Presentation titles, footers and slide number
22.	* Creating a simple text slide Selecting a slide layout Manipulating slide information within normal and outline view Formatting and proofing text Pictures and backgrounds drawing toolbar AutoShapes Using clipart Selecting objects Grouping and un-grouping objects The format painter
23.	* Creating and running a slide show Navigating through a slide show Slide show transitions Slide show timings Animation effects
24.	* Microsoft Internet Explorer 5 & the Internet Connecting to the Internet The Internet Explorer program window The on-line web tutorial Using hyper links Responding to an email link on a web page
25.	Searching the Internet Searching the web via Microsoft Internet Explorer Searching the Internet using Web Crawler Searching the Internet using Yahoo Commonly used search engines
26.	Favorites, security & customizing Explorer Organizing Favorite web sites Customizing options – general, security, contents, connection, programs, advanced
27.	* Using the Address Book Adding a new contact Creating a mailing group Addressing a message Finding an e-mail address

28.	Using electronic mail Starting Outlook Express Using the Outlook Express window Changing the window layout Reading file attachment Taking action on message-deleting, forwarding, replying
29.	* Email & newsgroups Creating and sending emails Attached files Receiving emails Locating and subscribing to newsgroups Posting a message to a newsgroup
30.	Chatting on internet Understating Microsoft chat environment Chat toolbar

Note : Term work will include printout of Exercises of practical marked with asterisks (*)

Learning Resources:

Books:

Sr. No.	Author	Title	Publisher
01	Vikas Gupta	Comdex Computer Course Kit	Dreamtech
02	Henry Lucas	Information Technology for management	Tata Mc-Graw Hills
03	B.Ram	Computer Fundamentals Architecture and Organisation	New Age International Publisher

**SECOND
SEMESTER**

Course Name : VOCATIONAL DIPLOMA IN AUTOMOBILE
Course Code : VA
Semester : SECOND
Subject Title : AUTOMOBILE MECHATRONICS
Subject Code : 10142

Teaching and examination scheme:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER	TH	TEST	PR	OR	TW
02	--	04	03	80	20	#50	--	25@

RATIONALE:

In order to meet Automotive Service excellence in Electrical, Mechanical and Electronic area, an automobile engineer must have thorough knowledge of this subject. Almost every important part or operation of the automobile depends to some degree on the proper functioning of the electrical, mechanical and electronic system. Electrical systems on today's vehicles are being called upon to perform functions beyond those required a few years ago.

OBJECTIVE:

Student will be able to:

- 1) Work with automobile engines.
- 2) Have awareness about accessories of hydraulic and pneumatic circuit used in automobile.
- 3) Be conversant with safety precautions in mechanical, electrical and electronics.
- 4) Be able to find the fault in the different electrical, electronic, hydraulic and pneumatic circuits used in the automobile.

Detailed contents:

CHAPTER	CONTENTS	MARKS	HOURS
1	Electrical/Electronics 1.1 Safety precaution in electrical/electronics 1.2 Sources of electricity, Static Current Electricity AC/ DC supply, Earthing, 1.3 Ohms law, work, power & energy 1.4 Study of resistors Capacitors Inductors, Magnetic Flux, Electro magnetism coils, transformers, wires/Cables, lugs terminals etc 1.5 Study of various types of lamps, indicating lamps , switches ,fuses etc 1.6 Soldering &Soldering Practices 1.7 Study of Lead acid Battery, battery charging & discharging 1.8 Instrumentation, study of different meters 1.9 Semiconductor theory Diode & transistors use in automobiles. 1.10 Study of transducers Electronics Gadgets	16	06

	used on vehicles		
2	Flow of liquids 2.1 Types of Flows 2.2 Laws of continuity 2.3 Energy possessed by flowing liquid 2.4 Bernoulli's theorem and its applications such as venturimeter and pitot tube & orifice meter.	16	07
3	Hydraulic Devices 3.1 Working principles, construction and applications of Simple & Differential accumulator 3.2 Intensifier, Hydraulic jack, Hydraulic ram, Hydraulic lift, Hydraulic press, hydraulic shaper, hydraulic crane.	16	07
4	Hydraulics & Pneumatics 4.1 Safety precaution in Hydraulics & pneumatics 4.2 Introduction to Hydraulics & pneumatics, simple hydraulics & pneumatic circuits. 4.3 <u>Study of ----</u> 4.3.1 Various types of pumps 4.3.2 Different actuators 4.3.3 Direction control, pressure control & flow control valves 4.3.4 Hydraulics & lubricating oils 4.3.5 Pipe, pipe fitting, tank accessories 4.4 Introduction to pneumatics 4.5 <u>Study of ----</u> 4.5.1 Compressors, Vacuum pumps, actuators 4.5.2 Control valves such as system protection dual brake, isolating valves. 4.5.3 Vacuum & air Brake Systems	08	06
5	Accessories of Hydraulic & Pneumatic circuit 5.1 Filters – Types, Function, Construction. 5.2 Tubing & Hose – Type, Construction 5.3 Seals & Gaskets - Types, Function, Construction	08	02
6	Application to hydraulic & pneumatic circuit with illustrations.	08	2
7	Instruments in the field of automobile engineering-types / applications.	08	2
	TOTAL	80	32

PRACTICAL

1	Practical of Electrical & Electronics in Automobiles
2	Laboratory work Verification of Bernoulli's theorem. Determination of Coefficient of discharge for venturimeter
3	Practical on Hydraulic Devices
4	Hydraulics & Pneumatics machines Related Practical
5	Develop any two pneumatic and Hydraulic circuits and test for achieving rotary and reciprocating motion. Identify and draw various Hydraulics and Pneumatic circuits used in vehicle.

Ref. Books,

Sr. No	Author	Title	Edition	Year	Publisher and Address
1	JOHN.M.STORER HARRY. LSTEWAR	FLUID POWER	SECOND EDITION	1997	HOWARD W SAMS 4 CO.INC 4300 WEST 62 ND ST INDIANA POLIS INDIANA 46268 USA
2	HARR.Y.L.STEWART	PNEUMATICS AND HYDRAULICS	THIRD EDITION	1976	HAWARE SAMS & CO INC INDIANAPLIS INDIANA U.S.A.
3	SAMMER.VAZIR SHAIKH & ILIYAS RASUL KHAN. R.K.PUBLICATIONS	HYDRAULICS & PNEUMATICS FLUID POWER			2615 D WARA OLD BUDHWAR PETH, TORASKAR CHOWK .KOLHAPUR-416002 MAHARASTRA (INDIA)
4	M.K.NIMBARTE	PNUMATIC & HYDRAULIC FLUID POWER SYSTEM			SKILL TODAY SANGVI(OLD)
5	R.H.WARRINY	HYDRAULIC HAND BOOK	8 TH EDITION	1983	BY THE TRADE OFF AND TECHNICAL PRESS LTD,CROWN HOUSE MORDAN SURREY SM4 5EW ENGLAND LIBRARY OF CONGRESS CATLOG CARDUO 83080066
6	JOHN. I.PIPENGER TYLER G.HICKS	INDUSTRIAL HYDRAULIC		1979	GREGG DIVISION MCGRAW- HILL BOOK COMPANY NEWYARK,LONDON,NEW DELHI.
7	CHANDRASHEKAR. P.K.	A TEXT BOOK OF FLUID POWER , HYDRAULICS & PNEUMATICS	1 ST EDITION	1998	MRS.JYOTI DEEPAK BHIRPATKI EVERST PUBLISHING HOUSE EVEREST .PARSHIRAM & PARTMENT 12 SANKALP SOCIETY PAND PHATA ROAD

					PUNE-411038
8	V.K.MEHATA	PRINCIPAL OF ELECTRONICS			
9	DR. SENGUPTA	SOLDERING TECHNIC			
10	JALGAONKAR S.K.SOHANY	INSRUMENTATION			
11	S.R.MUJUMDAR	OIL HYDRAULIC SYSTEM PRINCIPAL & MAINTANACE			TATA MC.CROW HILL NEW DELHI
12	S.K.BHATTACHARYA. BRIJINDER SINGH.	CONTROL OF ELECTRICAL MACHINES			NEW AGE INTERNATIONAL PUBLISHERS,LTD 4835/24 ANSARI ROAD DARYA GANG.NEW DELHI
13	K.S.KALE	ELETRICAL ENGINEERING.			VRINDA PUBLICATION MAHATHMA GANDHI ROAD,JALGOAN 425001
14	B. LAL	OIL HYDRAULICS			
15	Dr. BANSAL	FLUID POWER			
16	R.S.KHURMI	HYDRAULICS & HYDRAULIC MACHINES			S CHAND

Course Name : VOCATIONAL DIPLOMA IN AUTOMOBILE
Course Code : VA
Semester : SECOND
Subject Title : SHEET METAL WORK & BODY BUILDING
Subject Code : 10143

Teaching and examination scheme:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER	TH	TEST	PR	OR	TW
02	--	04	02	40	10	#50	--	50@

RATIONALE: -The knowledge of materials, their properties and applications is essential for a technician engaged in engineering organizations. He should also be proficient in the selection and use of basic manufacturing processes. This subject is intended to develop these abilities. In the automobile field importance of knowledge about sheet metal is very much essential. Generally all body parts are made from sheet metal therefore for knowledge of Sheet Metal and body building is necessary in automobile field.

OBJECTIVE:

Student will be able to know:

- 1) Kinematics, and mechanics used in automobile
- 2) Be expert in sheet metal working.
- 3) Be expert in welding, Body Building and Vehicle body repairing.

Detailed contents:

CHAPTER	CONTENTS	MARKS	HOURS
1	KINEMATICS RECTILINEAR MOTION 1.1 Definition of kinematics, rectilinear motion, Displacement, speed, velocity, acceleration. 1.2 Equation of rectilinear motion with uniform Acceleration. 1.3 Velocity – Time diagrams, motion under gravity.	05	04
2	KINETICS 2.1 Concept of momentum & impulse. 2.2 Newton’s laws of motion, 2.3 Conservation of momentum.	05	04
3	Types Of Mechanisms: 3.1 Laws of inversions Single slider crank chain & its inversions like Hand pump mechanism, Oscillating cylinder engine mechanism, Quick return mechanism, and Rotary I.C. engine mechanism. 3.2 Double slider crank chain mechanism & its inversions like Scotch yoke mechanism,	05	04

	Oldham's coupling, Elliptical trammel 3.3 Four bar chain mechanism & its inversions like Coupling of locomotives, Watt's indicator mechanism, pantograph		
4	Study Of Some Common Mechanisms: 4.1 Bicycle rear wheel sprocket mechanism 4.2 Mechanism of two stroke I.C. Engine 4.3 Reciprocating air compressor mechanism 4.4 Mechanism of plate valves of compressors 4.5 Crane mechanism (winch) with worm & worm gear box, spur gear box, with brakes. 4.6 Belt tension adjusting mechanisms for motors, Geneva mechanism Foot operated air pump mechanism 4.7 Steering mechanism of automobiles 4.7.1 Differential mechanism of automobiles etc. 4.7.2 Shaper quick return mechanism 4.7.3 Feed hopper mechanism & paper feed mechanism.	05	04
5	Sheet metal working 5.1 Basic sheet metal working 5.2 Safety in sheet metal working 5.3 Introduction to sheet metal hand tools 5.4 Study of 5.4.1 Structure & properties of Sheet Metals, 5.4.2 Development, marking, cutting of sheet metals 5.4.3 Folding, Bending, Wiring & Hemming operations of sheet metal Different types of sheet metal joints, riveting, soldering, welding etc 5.4.5 Removing Dents, Finishing, Sanding	05	04
6	Welding 1.1. Safety in welding 1.2. Introduction to various Welding & Thermal cutting processes 1.3. Study of--- 1.3.1. Manual Metal Arc Welding 1.3.2. Joint Design & different welding joints 1.3.3. Welding methods such as, horizontal, vertical, overhead, down hand flat etc 1.4. Weld slope angles, rotations	05	04
7	Vehicle Body Building 7.1 Knowledge of Equipment & machinery used for body building 7.2 Steps involved in auto body building considering various factors	10	08
	Total	40	32

PRACTICALS

01	Practical Of Kinematics
02	Study of the mechanisms & inversions with neat sketches & diagrams
03	Study & description of above mechanism with neat sketches & labeled diagrams of any five at least
04	Practical of Sheet metal working
05	Practical of welding
06	Practical & visit to body building shop
07	Practical of body repairing of different vehicles

Ref. Books,

Sr. No.	Author	Title	Edition	Year	Publisher and Address
1)	Kundra T.K., Rao P.N, Tiwari N.K.	Numerical control and computer aided manufacturing			
2)	Adithan M and Pobly B.S.	CNC machines : programming and application			
3)	Korem Y and J.B.Uri	Numerical control of manufacturing system			
4)	Korem Y and J.B.Uri	Workshop Technology			
5)	Hazra S.K. and Choudhari S.K.	Elements of workshop Technology			
6)	Raghuwanshi B.S.	Workshop Technology			
7)	Gupta K.N and Kaushin J.P.	Workshop Technology Vol I & II			
8)	Atherton W.H	Workshop Practice Vol I to V			
9)	R.K. MOHANTY	AUTO BODY BUILDING			
10)	O.P.KHANNA	WELDING TECHNOLOGY			DHANPATRA I & SONS
11)	POWLPAWLO USLAY	BODY ENGINEERING			
13)	R.S.KHURMI	THEORY OF MACHINES			S CHAND
14)	P.C.SHARMA	PRODUCTION ENGINEERING			S CHAND
15)	R.S.KHURMI	ENGINEERING MECHANICS			
16)	Web Site www.dget.nic.in/centreofexcellence/automobilesector				

Course Name : VOCATIONAL DIPLOMA IN AUTOMOBILE
Course Code : VA
Semester : SECOND
Subject Title : DENTING-PAINTING & WELDING IN AUTOMOBILE
Subject Code : 10144

Teaching and examination scheme:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER	TH	TEST	PR	OR	TW
02	--	04	03	80	20	#50	--	50@

RATIONALE: - In the Assembly of automobile vehicle welding process is very important. For good appearance painting is necessary and without denting best painting is not possible, because denting is the preparation before painting. Hence knowledge of denting, painting and welding is essential for technician in the automobile field.

OBJECTIVE:

Student will be able to know:

- 1) The repairs of vehicle body with all safety precautions.
- 2) The painting of vehicle body.
- 3) About welding of various parts.
- 4) Different type of welding methods and their use as per the requirement in automobile.

Detailed contents:

CHAPTER	CONTENTS	MARKS	HOURS
1.	1.1. Safety measures during denting-painting & welding 1.2. Different type of structure of vehicle 1.3. Introduction & function of body & panels 1.4. Function & types of frames. 1.5. Types and uses of sander. Dry and wet sander. Denting procedure.	13	05
2.	2.1. Anti-rusted treatment under body of vehicle. 2.2. Body prepares coating. 2.3. Surface application. 2.4. Putty/filling applications.	13	05
3.	3.1. Priming 3.2. Paint application. 3.3. Clear coat application. 3.4. Rubbing and polishing application. 3.5. Body construction , on crash repair system & alignment	13	06
4.	4.1. Checking frame alignment (car-o-liner) 4.2. Method & types of painting & repainting. 4.3. Masking of non- painting area. 4.4. Method of fixation of wind screen glass	13	06
5.	5.1 GAS WELDING:- Gas Welding , brazing & Soldering procedures Gas cutting practice	13	05

	5.2 ARC WELDING:- Basic Electricity and welding power source Electrodes- types, description & Specification Arc Welding procedure.		
6.	6.1 MIG/MAG WELDING:- Principles of MIG/MAG Welding MIG Welding Procedure. 6.2 TIG WELDING:- Introduction to TIG Welding ,Methods of Welding 6.3 RESISTANCE & PLASTIC WELDING :- Resistance welding process- spot, seam and Butt welding. Plastic welding procedure.	15	05
	Total	80	32

PRACTICAL

1	<ul style="list-style-type: none"> ➤ Dismantle body ➤ Checking & repairing of body shell ➤ Checking & repairing of front door, rear floor & wheel boxes
2	<ul style="list-style-type: none"> ➤ Checking & repairing of right side & left side panel with fender ➤ Checking & repairing of roof panel & rear lower panel ➤ Touch up work on the body of vehicle
3	<ul style="list-style-type: none"> ➤ Preparation of body before painting ➤ Use of different types of sanders (Sand type)
4	<ul style="list-style-type: none"> ➤ Painting an accidental Vehicle ➤ Fixation of wind screen glass.
6	<ul style="list-style-type: none"> ➤ Practice on gas welding, gas brazing & gas soldering ➤ Practice on arc welding
6	<ul style="list-style-type: none"> ➤ Practice on MIG /MAG welding ➤ Practice on TIG welding ➤ Practice on Resistance spot welding ➤ Practice on plastic welding

Ref. Books

Sr.No.	Author	Title	Edition	Year	Publisher and Address
1	W.M. Morgans	Outline of Paint Technology	Third		Cbs publishers & Distributors, 4596/1Aa
2		Surface Coating Vol-2 Paints & their Applications	1984		Chapman and Hall New York NY 10017
3	Dr.A.J.Singh	Paint Technology (Notes) Diploma in Paint Technology			D.E.Society Jagannath Rathi Voactional Guidance & Training Institute Pune – 4
4	C.D.Vargese	Eletroplating & Other Surface treatment (A Practical Guide)			Tata McGraw Hill, New Delhi
5	Mohanty	Automobile body building, Sheet metal			

6	O.P.KHANNA	WELDING TECHNOLOGY			DHANPATRAI & SONS
7		BOOK OF THE CAR			
8	Web Site www.dget.nic.in/centreofexcellence/automobilesector				

iv) TOOLS, MACHINERY, EQUIPMENTS etc. for a batch of 16 trainees

Sr. No.	Item	Qty
a)	TRAINEES TOOL KIT	17 Nos
01	Try Square 10 cm Blade	17 Nos
02	Callipers outside 15 cm spring	17 Nos
03	Calliper inside 15 cm Spring	17 Nos
04	Dividers 15 cm Spring	17 Nos
05	Callipers 15 cm Hermaphrodite	17 Nos
06	Scriber 15 cm	17 Nos
07	Punch center 10 cm	17 Nos
08	Screw driver 15 cm	17 Nos
09	Chisel cold 20 cm	17 Nos
10	Trammel 30 cm	17 Nos
11	Hammer ball peen 0.5 kg with handle	17 Nos
12	Hammer Mallet	17 Nos
13	Hammer Plastic	17 Nos
14	Hammer ball peen 0.5 kg with handle	17 Nos
15	File flat 25 cm second cut	17 Nos
16	File flat 25 cm second cut	17 Nos
17	Hacksaw frame adjustable 20-30 cm	17 Nos
18	Dot slot punch	17 Nos
19	Steel rule 15 cm English and metric	17 Nos
20	Steel rule 30 cm English and metric	17 Nos
21	Try square 30 cm Blade	17 Nos
22	Steel tool box	17 Nos
23	sinebar	17 Nos
24	Lock and keys	17 Nos
25	Combination plier	17 Nos
26	Jenny calipers	17 Nos
27	Alluminium tray 15 cm X 10 cm	17Nos.
28	Fellow polish cloth standard size	17 Nos

b)	SHOP OUTFIT & MEASURING INSTRUMENTS	
29	Straight edge 45 cm X 45 cm	1 No
30	Marking table 90X90 cm	1 No
31	Surface plate 45 cm X 45 cm	1 No
32	Vee Block pair 7 cm and 15 cm with clamps	2 nos
33	Angle plate 10 X 20cm	1 no
34	Number Punch 3 mm set	2 Sets
35	letter Punch 3 mm set	2 Sets
36	Round punch 3 mm X 4 mm set of 2	2 Sets
37	File flat 20 cm bastard	4 Nos
38	Oil Stone 15 X 5 cm X 2.5 cm	4 Nos
39	Spanner adjustable 10 cm	1 No
40	Chisel cold 20 cm cross cut	4 Nos
41	Chisel 10 cm flat	4 Nos
42	Drill twist 1.5 mm to 15mm (various sizes) by 0.5	4 Nos
43	Files assorted sizes and type including safe edge file	20 Nos
44	Micrometer inside 50-150 mm with screen	2 Nos
45	Bench Vice 12 cm jaw	10 Nos
46	Work Bench 240 X 120 x60 mm with screen	3 Nos
47	Drill point angle gauge	1 No
48	Vernier Callipers 20 cm	1 No
49	Vernier height gauge 30 cm	1 No
50	Huntington and diamond dresser	1 Each
51	Taps and dies complete set (metric)	1 Sets
52	Almirah steel 180 X 120X45 cm	4 No.
53	Fire buckets with stand	2 nos
54	D.E. spanner set of 12 metric 6 mm to 32 mm	2set
55	Ring spanner set at 12 metric 6 mm to 32	2set
56	Stud extractor set of 3	2set
57	Universal puller for removing pulleys, bearings	2set
58	Unserviceable engine/gear box rear axle	2 nos
59	Stud remover with socket handle	1 nos
60	Combination pliers 15 cm	4 nos
61	Depth guage (inch and metric)	2 Nos
62	Screw pitch gauge (inch and metric)	1set
63	Alluminium tray 45 X 30 mm	6 nos
64	Oil can 0.5 litre capacity	2 nos
65	Surface gauge	1 no
66	Steel measuring tape 10 meter in a case	2 nos.
67	Sets of Morse socket MT 0-1,1-2,and 2-3	1set
68	Blow lamp	4 nos
69	Torque wrenches 5-35 Nm,12-68 Nm&50-225 Nm.	1esch
70	Micrometer outside 1 to 25 mm,25mmto 50mm ,50 to75 mm,75 to100mm,100 to 125mm,125 to 150mm.	1each
71	Printed wall chart framed for display showing measuring instruments.	12 nos
72	Vernier bevel protractor (metric and inch)	2 nos
73	Vernier calipers (inch and metric) 6"x12"	2 nos
74	Vernier micrometers(inch and metric)	2 nos
75	Vernier height gauge 150 mm height (inch and metric)	2 nos

C)	GENERAL INSTALLATOIN /MACHINERIES	
76	LCV condemned	1 no
77	Spray painting equipment with accessories	1 set
78	Air compressor with accessories	1 no
79	V-block (big) with clamps	2 nos.
80	V-block (small)with clamps	2 nos
81	Surface plate (small)	1 no
82	Surface plate (big)	10
83	TIG welding machine with complete accessories	1 set
84	Plastic welding equipment with complete accessories	1 set
85	Spot welding machine with complete accessories	1 set
86	MIG welding machine with complete accessories	1 set
87	Oxy-acetylene welding equipment with complete accessories (Low &High pressure)	1 set
88	A.C. welding transformer 300 Amps with complete accessories	1 set
89	Bench Drilling machine 6-12mm cap Motorized with chuck and key	1 no
90	Grinding machine (general purpose)D.E. pedestal with 300mm dia wheels rough and smooth	1 no

Workshop furniture	Qty
Suitable Work Tables with vices	As required
Stools	17 Nos
Discussion Table	1 no
Tool Cabinet	2 nos
Trainees locker	2 nos
Fire fighting equipment , first aid box etc	As required
Book shelf (glass panel)	1 nos
Storage Rack	As required
Storage shelf	As required

Course Name : VOCATIONAL DIPLOMA IN AUTOMOBILE
Course Code : VA
Semester : SECOND
Subject Title : AUTOMOBILE-CHASSIS
Subject Code : 10145

Teaching and examination scheme:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER	TH	TEST	PR	OR	TW
02	--	02	-03	80	20	#50	--	25@

RATIONALE: - Chassis is the backbone of the vehicle as we can't do any activity without our backbone vehicle can't run without chassis .Not only for vehicle but also for every instrument, circuit etc. chassis is required. Therefore study of automobile chassis is the important part in the automobile field.

OBJECTIVE:

Student will be able to:

- 1) Introduced the working of automobile chassis .
- 2) Acquired the skills in chassis frame, Clutch, gearbox, Propeller shaft and axle and their fitment.
- 3) Familiar with steering theory and performance of vehicle with knowledge of different axles used in automobile.

Detailed contents:

CHAPTER	CONTENTS	MARKS	HOURS
1	Vehicle layout and Chassis frame. Theory 1.1 Introduction. 1.2 Vehicle layout; types of layout. 1.3 Major assemblies – their locations and their functions. 1.4 Type of frames, frames construction, and material, frame alignment. 1.5 Chassis lubrication. 1.6 Classification and specifications of Chassis.	12	04
2	Clutches and Gear Boxes Theory 2.1 Function of clutch and it's necessity. 2.2 Various types of clutches used in Automobiles – single plate, multiplate clutches, dry & wet clutches, centrifugal clutch, semi-centrifugal clutch, diaphragm clutch and automatic clutches. 2.3 Materials used for clutch lining. 2.4 Operation and working of clutches.	12	05

	<p>2.5 Clutch automatic mechanism 2.6 Hydraulic clutch linkage 2.7 Clutch construction 2.8 Driven member (friction or clutch disc) 2.9 Automatic transmission devices- Fluid flywheel, torque converter. 2.10 Clutch troubles and service procedures. 2.11 Function and necessity of Gear Box. 2.12 Types of gear boxes–sliding mesh, constant mesh, synchromesh type. 2.13 Forward and reverse gear ratio. 2.14 Gear shift mechanism. 2.15 Overdrive 2.16 Epicyclic gear train 2.17 Semi automatic and automatic gear box. 1.18 Gear box problem and maintenance</p>		
3	<p>Propeller Shaft and Final Drive Theory 3.1 Necessity and function of Propeller Shaft, Universal joint and slip joint. 3.2 Hotchkiss drive and torque tube drive. 3.3 Type of universal joints-Hooks universal joint, double cradle joint, bendix-weiss universal joint, ball & trunion joint. 3.4 Propeller shaft trouble shooting. 3.5 Necessity and function of final drive and differential 3.6 Working of differential and differential lock. Backlash in differential. 3.7 Types of rear axle - semi - floating, three quarter floating and full floating type. Two wheel and four wheel drive, Transfer case. Differential problems and maintenance.</p>	12	05
4	<p>Front Axle and Steering Theory 4.1 Types of front axle's arrangement , Dead axle, live axle. 4.2 Front wheel assembly. 4.3 Steering geometry – Caster, camber, king pin inclination, toe in – toe out, Correct Steering angle. 4.4 Steering gear box – worm and sector, worm and wheel, worm and roller, screw and nut, cam and lever, rack and pinion type. 4.5 Steering linkages. 4.6 Ackerman linkage 4.7 Power steering 4.8 Under steering and over steering 4.9 Steering lock 4.10 Turning radius 4.11 Steering problem and maintenance.</p>	14	05
5	<p>Suspension Systems Theory 5.1 Front and rear axle suspension, rigid and independent suspension.</p>	10	05

	5.2 Leaf spring and their types, coil spring torsion bar arrangement and shock absorber. 5.3 Air Suspension System. 5.4 Use of Anti roll bar, stabilizer bar. 5.5 Suspension system trouble shooting.		
6	Brakes, Wheels And Tyres Theory Part 6.1 Function and necessity of brakes. 6.2 Types of brakes, mechanical, hydraulic, air brakes, parking brake 6.3 Tandem master cylinder, wheel cylinder, brake valve, brake chamber, bleeding of brake and properties of brake fluid. 6.4 Disc brake 6.5 Antilock braking system. 6.6 Types of wheels, rims and tyres. Tyre tube, Tubeless tyres. 6.7 Braking Efficiency used, Brake lining materials, and power assisted brakes. 6.8 Tyre materials, construction, and types of treads. Tubular tyres. Tyre inflation and its effect.	10	04
7	Performance Of The Vehicle 7.1 Resistance faced by the vehicle – air, rolling & gradient. 7.2 Power required for propulsion - traction tractive efforts, drawbar pull, gradability and acceleration. 7.3 Gear ratio requirement. 7.4 Stability of vehicle on slopes and turns, pitching , bouncing , rolling, swaying. 7.5 Human comfortl and Vibration.	10	04
	Total	80	32

PRACTICAL

SR.No.	Practical
1	1) Draw various tools used in auto garage and automobile chassis repair 2) Draw various types of bearing pullers. 3) Draw various vehicle layouts and it's comparison for two wheelers And four wheelers.
2	Practice 1) Open the single plate dry clutch mechanism – draw clutch plate, pressure plate arrangement and clutch operating mechanism. 2) Open the multiplate clutch used in two wheelers, observe the drive linkages and sketch the system. 3) Open the centrifugal clutch of mopeds. Observe the arrangement and sketch the system. 4) Open any two types of gear box, observe gear shifting, gear ratio and sketch the system. 5) Study and compare various types of gear box used in Indian automobiles.
3	Open the differential; sketch the unit with bearing location. 2) Study of Universal joint of different vehicles.
4) Open any two types of steering gear box, and sketch.

	2) Observe the steering linkage and sketch.
5	Open front axle as well as rear axle leaf spring and telescopic shock absorber, observe and sketch
6	1) Open any two wheels, rims, tyre and tubes, observe and sketch.

Ref. Books

Sr.No	Author	Title	Edition	Year	Publisher and Address
1	R.B.Gupta	Automobile Engineering	6 th	2006	Satya Prakashan
2	William H Crouse & Donald L Anglin	Automotive Mechanics	10 th	2005	Tata McGraw Hill
3	Srinivasan	Automotive Mechanics	--	2005	--- do ---
4	Narang	Automobile Engineering	--	2005	Khanna
5	C.P.Nakara	----- “ -----	5 th	1990	Khanna
6	A. W. Judge	Mechanisms of Car			
7	Joseph Heither	Automotive Mechanics			
8	William Crouse	Automotive Mechanics			
9	G.B.S. Narang.	Automotive Engineering			
10	Kripal Singh.	Auto Engineering Vol I			
11	Harbans Singh Reyat.	The Automobile			
12	Dr.N.K.Giri.	Problem in Automobile Mechanics			
13		Book of the car			
14	P.L Ballaney.	Theory of machines			

THIRD
SEMESTER

Course Name : VOCATIONAL DIPLOMA IN AUTOMOBILE
Course Code : VA
Semester : THIRD
Subject Title : AUTO ELECTRICAL ELECTRONICS & AIR CONDITIONING SYSTEM
Subject Code : 10146

Teaching and examination scheme:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER	TH	TEST	PR	OR	TW
02	--	04	03	80	20	#50	--	50@

RATIONALE: -The automobile electrical system does several things . it produces electrical energy, it stores and delivers electrical energy on demand to other electrical component in the vehicle. Knowledge of electronic engine control system and other electronic system control by an electronic control module or computer is essential . These includes traction control , steering , suspension, air condition and other component that operate under varying condition.

OBJECTIVE:

Student will be able to:

- 1) Make wire connections and soldering.
- 2) Simple electrical circuit and measuring of current, voltage and resistance.
- 3) Check Battery.
- 4) Trace and rectify defects in electrical wiring circuit.
- 5) Trace and rectify defects in alternator , starter, ignition system, spark plug.
- 6) Test of electronic devices , fault finding in electronic circuits and remedies.
- 7) Trace and rectify defects in various sensors.
- 8) Maintenance of air conditioning system.

Detailed Contents:

CHAPTER	CONTENTS	MARKS	HOURS
1	<p>AUTO ELECTRICAL FUNDAMENTALS</p> <p>1.1 Basic of electricity , electrical terms 1.2 Conductors and insulators, electromagnetism basics 1.3 Generation of electricity through chemical process – battery 1.4 Low maintenance and maintenance free batteries 1.5 Hybrid batteries , recombination batteries 1.6 Battery voltage and capacity , battery rating methods battery size selection , factors affecting battery life 1.7 Battery testing and maintenance 1.8 Symbols used in electric circuits diagrams , color codes and cables specifications 1.9 Method of circuits tracing</p>	15	05
2	<p>AUTO ELECTRIC PARTS AND ITS CIRCUIT ON ENGINE</p> <p>2.1 Electromagnetic devices – relays and types of relays 2.2 Solenoids, transformer, H.T. coils igniters 2.3 voltage current regulators and its working , testing 2.4 Principal of hall effects 2.5 Construction and working of hall effect equipment 2.6 Design and components and starter (Armature, field coil , brushes) 2.7 Control circuits 2.8 Starting system testing (light run test , torque test) 2.9 Starter mechanism (bendix drive, over running clutch) 2.10 Working principle of alternator 2.11 components of alternator 2.12 Alternating current charging system test. 2.13 Alternator performance and servicing . 2.14 Ignition system wiring diagram and its components 2.15 What is ignition timing ?and ignition timing setting procedure. 2.16 Function of spark plug , petrol solenoid injector, IAC,FIAC valves 2.17 Construction of spark plug, types of spark plugs 2.18 Servicing and maintenance of ignition system</p>	15	05

3	WIRING CIRCUITS IN VEHICLE		
	<p>3.1 Lamps , switches ,sockets , connectors and wiring harness</p> <p>3.2 Head light circuits</p> <p>3.3 Side indicator circuits</p> <p>3.4 parking light circuits</p> <p>3.5 Hood light , door light , brake light circuits</p> <p>3.6 Audio / video circuits</p> <p>3.7 Power window circuit , central locking circuits</p> <p>3.8 Instruments panel circuits, (temperature oil, coolant , speedometer etc.)</p> <p>3.9 Horn circuits , buzzer circuits neutral light circuit</p> <p>3.10 Wiper motor circuit , fan circuit, map (GPS-global positioning system), license plate circuits , inspection of light circuit</p> <p>3.11 Head light with relay , horn with relay circuit</p>	14	06
4	<p>AUTO ELECTRONICS</p> <p>4.1 Fundamental of electronics (neutron , proton , electron theory)</p> <p>4.2 Conductor , semiconductor and resisters its characteristics and construction</p> <p>4.3 Factor affecting resisters , types of resisters / thermister (PTC and NTC) and calculating resistance in deferent circuits</p> <p>4.4 Symbols used in electronic circuits</p> <p>4.5 Checking procedure of diodes , transistors , capacitors, thermisters , resisters , LED and their, application in automobile</p> <p>4.6 Importantance of earthing in electronic circuits</p> <p>4.7 Working of CDI unit , distributor less ignition system (DIS) ECM or ECU and magnetic pick up coil</p> <p>4.8 Working principle of various sensor i.e. throttle position (TP) sensor , intake air temperature sensor (IAT) manifold absolute pressure sensor (MAP) , engine coolant temperature sensor (ECT) cam shaft position sensor (CMP) , crank shaft position sensor (CKP) ,vehicle speed sensor (VSS) , power steering sensor (PSS) air conditioning sensor (A/C sensor) , oxygen sensor (O₂ sensor)etc.</p> <p>4.9 Basic of pontentiometer, piezo resistive, piezo electric principle.</p> <p>4.10 Basic structure and operation of a micro computer and its characteristic digital to analog converter , input output device, fail safe function</p> <p>4.11 Explanation of simple electronic and different strategic in circuits</p>	12	06

5	AIR CONDITIONING SYSTEM	12	05
	5.1 Fundamentals of air conditioning and ventilation system 5.2 Automatic heating system 5.3 Theory of automatic air conditioning 5.4 Refrigerants in air conditioning system 5.5 The air conditioning system and its components 5.6 Air conditioning system , anti icing controls , temperature control system 5.7 Air conditioning in automobiles		
6	SERVICING OF AIR CONDITIONING SYSTEM	12	05
	6.1 Refrigerant safety precautions 6.2 Guidelines for converting (retrofiting) R-12 systems to R-134 A 6.3 Air conditioner testing and servicing equipments ,service , procedure 6.4 diagnostic and trouble shooting procedure 6.5 Electric system inspection and servicing.		
		80	32

PRACTICAL

SR.NO.	PRACTICAL - AUTO ELECTRICAL
1	Practice of using multimeter, voltmeter, amper meter for DC current testing ➤ Measuring voltage, current, resistance in different circuits in a vehicle. ➤ Battery electrolyte preparation, charging and testing. ➤ Circuit tracing in a vehicle – horn circuit, brake lamp circuit, wiper motor circuit, indicators and power windows circuits,
2	➤ Checking of circuit barkers and relays ➤ Construction of simple circuit by using relay ➤ Charging system tests- alternator output voltage, circuit voltage drop, trouble shooting in a charging system ➤ Dismantling alternators and components tests- diodes, rotor condition , rotor winding insulation, rotor condition
	Practical
	➤ Tracing starter circuit in a vehicle ➤ Checking starter motor- diagonise the faults ➤ Dismantling starter and checking of each components. ➤ Repairing the faults, assembling and checking starter motor on a test rig. ➤ Checking spark plugs, HT leads Ignition coil and condenser. ➤ Setting ignition timing.
	- AUTO ELECTRONICS ➤ Checking ignition coil E-DIS (Electronic distributor less ignition system) ➤ Checking ground connection ➤ Checking sensors using engine scanner . ➤ Checking actuators using engine scanner. ➤ Construction of simple electronic circuits. ➤ Checking the different modes/strategies of ECA (electronic control assembly) ➤ Resetting of keep alive memory/ECA
	Practical - AIR CONDITIONING
1	Leak detection test

2	Fault finding Dismantling Rectification
3	Assembling Testing
4	Evacuating and recharging of A/C system

Ref. Books,

Sr. No	Author	Title	Edition	Year	Publisher and Address
1	P.L.KOHLI	AUTOMOTIVE ELECTRICAL EQUIPMENT	23 RD 2004 PEPRINT	2004	TATA M.C. GROUP HILL WEST PATOL NAGAR NEW DELHI –110008
2	WILLIAM .H.CROUSE DONALD L. ANGLIN	AUTOMOTIVE MACHINES	10 TH EDITION	2005	TATA M.C. GROUP HILL WEST PATOL NAGAR NEW DELHI –110008
3	ANDREW .D.ALTHOUSE CARL.H. TURNOUSOST ALFRED .F.BRACCINO	MODERN REFRIGERATION & AIRCONDITION	COPY RIGHT 1968	1968	THE GOOD HEARTH WILL CORE CO.INC
4	CROUSE	AUTOMOBILE MACHINES	10 TH EDITION	2005	TATA M.C. GROUP HILL WEST PATOL NAGAR NEW DELHI –110008
5	R.B.GUPTA	AUTOMOBILE ENGINEERING	6 TH	2006	SATYA PRAKASHAN
6	SHRINIVASAN	AUTOMOBILE MACHINES	--	2005	TATA M.C. GROUP HILL WEST PATOL NAGAR NEW DELHI –110008
7	NARANG	AUTOMOBILE ENGINEERING	-	2005	KHANNA PRAKASHAN
8	KRIPAL SINGH	AUTOMOBILE ENGINEERING VOL I & II,V	-	2004	KHANNA PRAKASHAN
9	Lynn Mosher	Automechanics guide to Electronic Instrumentation		1987	Prentice – Hall Inc New jersey
10	Don knowles	Automotive Electronics & Compression controlled lighting system.		1988	Prentice Hall Inc New jersey
11	Don knowles	Advanced Electronics Diagnosis of Automobile		1988	Prentice Hall Inc New jersey
12	Don knowles	Automechanics Understanding New		1988	Prentice Hall Inc New jersey

		Technology			
13		Santro & Accent Basic training Book			Hundai motors Ltd.
14		Service manuals of all Euro II cars			Maruti Udyog India Ltd.
15	G.E Fardin	Automobile Electrical & Electronic equipment by Youg & Griffiths Revised			Publisher – The English Language Book society & Newness – Butter worths London
16	Arthur Judge.	Automotive Electricals			Automotive Electricals - Kohli.
17	R S KHURMI	Refrigeration & Air conditionig			S Chand
17	Web Site www.dget.nic.in/centreofexcellence/automobilesector				

TOOLS, MACHINERY,EQUIPEMENTS etc.

SL NO	ITEM	QTY
A) TRAINEES TOOL KIT		
01	Ball peen hammer 0.75 kg	17 NOS
02	Cold flat chisel 19 mm	17 NOS
03	Center punch 10 mm dia x 100mm	17 NOS
04	Insulated screw driver 30 cm x 9mm blade	17 NOS
05	Insulated screw driver 20cm x 9cm blade	17 NOS
06	Steel rule 30mm	17 NOS
07	Plier combination 15cm	17 NOS
08	Steel tool box with lock and key (folding type) size 400 x 200 x 150mm	17 NOS
09	Hand file 20cm second cut	17 NOS
10	Ring spanner set of 12mm	17 NOS
B) Shop outfit and measuring instruments		
11	Electric testing screw driver	4 NOS
12	Hand vice 37 mm	2 NOS
13	Allen key set of 12 pieces (2mm-14mm)	4 SET
14	Circlip pliers (External and Internal) 150mm & 200mm	8 SET
15	Philips screw driver set of 5 pieces 100mm-300mm	4 SET
16	Star Allen key	4 SET
17	Prick punch 15 cm	2 NOS
18	Chisel cross cut 200mm x 6mm	1 NOS
19	Ball peen hammer 0.5 kg	2 NOS
20	Hammer copper 1 kg with handle	1 NOS
21	Hack saw frame for 30 cm blade	4 NOS
22	Hollow punch 6,7,8,9,10 12mm set	1SET
23	Flat file 35 cm bastard	2 NOS.
24	Flat file 25 cm second cut	2 NOS.
25	Micrometer outside 0-25mm,25-50mm	1 EACH
26	Soldering iron 120 watts	2 NOS.
27	Nose pliers (round and straight) 150 mm and 200 mm	2EACH
28	Circlip pliers	1 NO.
29	Thread pitch gauge	1 NO.
30	Stud remover	1 NO

31	Spanner T. flocks for screwing up and up-screwing inaccessible positions	1 NO
32	Cleaning tray 45x30cm	16 NOS
33	Oil can 0.5 liters	1 NO
34	Snip (straight and bent)	1 NO
35	General purpose puller	1 SET
36	Stud extractors	1 SET
37	Poker	2 NOS.
38	Double ended spanner 6 to 32 mm – set of 12 nos.	1 SET
39	Double ended off-set spanner (w.w) – 3 to 13.5 mm – set of 7 nos.	1 SET
40	Double open ended ignition spanner set (of BA-0 x 1to 8x9 set of 5)	1 SET
41	Spanner clyburn 15 cm	1 NO.
42	Adjustable spanner 20 cm.	1 NO.
43	Spark plug spanner 14 mm	1 NO.
44	Magneto spanner set with 8 spanners	1 SET
45	Socket spanner set with handle , T-bar and ratchet	2 NOS.
46	Drift copper (10 mm x 150 mm)	1 NO.
47	Double open ended spanner set (10.5mm x 12 mm ; 10.5mmx 18mm set of four)	1 SET
48	Hydrometer	2 NOS.
49	Spring tension tester	1 NO.
50	A.V.O. meter	1 NO.
51	Alternator regulator tester	1 NO.
52	Distributor tester	1 NO.
53	Continuity meter	1 NO.
54	Clip on meter digital and analog	1 EACH
55	Tachometer	1 NO.
56	Spark plug tester “NEON” type	1 NO.
57	High rate discharge tester	1 NO.
58	Multimeter digital and analog	1 EACH
59	Starter motor, alternator, dynamo cut out	2 EACH
C) GENRAL INSTALLATION MACHINERIES		
60	Drilling Machine (Bench) 12mm dia	1 NO
61	Growler	1 NO
62	Battery charger 6V-24V	1 NO
63	AC alternator slip ring puller	1 NO
64	Ac alternator slip ring press tool	1 NO
65	Executive Auto Electrical tool kit	1 NO
66	Electrical test bench	1 NO
67	Car stereo	1 NO
68	Battery 12V (Lead acid & Alkaline)	2 EACH
69	Electronic engine control module	1 NO
70	Starter motor axial type & co axial type	2EACH
71	Electrical horn (different types)	2 EACH
72	Wiper motor assembly	4 NOS.
73	Engine Scanner	1 NO.
74	Anti theft device	2 NOS.
75	Melting Pot	2 NOS.
76	Paraffin pressure Gun	1 NO.
77	Grease Gun	1 NO.
78	Pulley set universal for bearing & bushes (set)	1 NO.

79	Pulley Puller	2 NOS.
80	Glow plug	4 NOS.
81	Alternator	1 NO.
82	Glow plug tester	1 NO.
83	Torque wrenches 5--35 Nm, 12-68 Nm ,50—225 Nm	1 EACH
84	Starter test Bench	1 NO.
85	Dynamo and voltage regulator	1 NO.
86	Alternator and inbuilt regulator	2 NOS.
87	Horn and Horn relay	1 EACH
88	Air conditioned MPFI vehicle with accessories	1 NO.
89	Engine control sensors 8 types	2 EACH
90	5 point relay	4 NOS.
91	4 point relays	4 NOS.
92	Bearing puller set (100-300 mm for extracting both outer and inner races with box containing (a) 8 internal extractor (b) 2 counter stays (c) Pulling chuck of capacity 5 X 32 mm (d) 2 leg Pooler, capacity 80 and 160 mm (e) Slide hammer	
93	Stool Suitable work tables with vices	AS REQUIRED.
94	Timing light gun	1 no
95	Impact screw driver set	1 SET
96	Plastic mallet	1 NO
97	Tachometer (light type digital)	1 No
98	Engineers stethoscope	1 No
SR NO	D) Workshop furniture	Quantity
99	Discussion Table	1 NO.
100	Tool cabinet	2 NOS.
101	Trainees locker	2 NOS.
102	Fire fighting equipment, first aid box etc.	AS REQUIRED
103	Book Shelf (glass panel)	1 NO.
104	Storage Rack	AS REQUIRED
105	Storage shelf	AS REQUIRED

Course Name : VOCATIONAL DIPLOMA IN AUTOMOBILE
Course Code : VA
Semester : THIRD
Subject Title : SERVICING & OVERHAULING OF AUTOMOBILE (PETROL)
Subject Code : 10147

Teaching and examination scheme:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER	TH	TEST	PR	OR	TW
02	--	04	03	80	20	#50	--	50@

RATIONALE: -The environmental pollution and fuel crisis are severe problems that world is facing today. To obtain the better fuel economy and to reduce air pollution the automobile technology has changed to a great extent. To be conversant with recent trend in engine management the automobile engineer should have adequate knowledge of latest techniques adopted in automobile engines.

The power developed inside the engine cylinder is chemical energy converted into mechanical energy ultimately aimed to turn the wheel so that the motor vehicle can move on the road. When the vehicle starting from rest, hill climbing, accelerating and meeting other resistances high torque is require at the driving wheels. Hence a device must be provided to permit the engine crank shaft to revolve at relatively high speed.

OBJECTIVE:

Student will be able to:

- 1 Overhaul petrol engine.
- 2 Overhaul petrol fuel system diagnosis fault in carburetor, MPFI system.
- 3 Rectify fault in electrical and electronic ignition system.
- 4 Servicing, maintenance and repairer of cooling system, lubrication system, suspension system.
- 5 Servicing and repair of clutch, gear box, final drive.
- 6 Servicing, repair and setting of steering system.
- 7 Repair and servicing of hydraulic brake and mechanical brake and EVAP/EGR(exhaust gas recirculation), catalytic converter.

Detailed Contents:

CHAPTER	CONTENTS	MARKS	HOURS
1	CONSTRUCTION AND WORKING OF PETROL VEHICLE	04	02
	1.1 Construction of vehicle (main parts of vehicle) 1.2 Classification of vehicle parts i.e. machine portion (frame & chassis) carriage portion (body of vehicle) 1.3 Body structure and mechanism of modern car 1.4 Working of automobile		

2	FUNDAMENTAL OF IC ENGINE	08	04
	<p>2.1 Working principal of IC engine</p> <p>2.2 Otto cycle of engine, clerk cycle ,PV diagram</p> <p>2.3 Two stroke and four stroke of engine</p> <p>2.4 Calculating mechanical efficiency , volumetric efficiency, specific fuel consumption</p> <p>2.5 Comparison between diesel and petrol engine.</p>		
3	PARTS OF POWER GENERATION UNIT	08	02
	<p>3.1 Description , construction and function of petrol engine parts</p> <p>3.2 Components of cylinder head and its working , servicing and its assembly</p> <p>3.3 Construction of cylinder block , cylinder liners and its types</p> <p>3.4 Oil sump and its construction</p> <p>3.5 Engine moving parts construction, working and servicing such as piston , piston ring , type of piston rings ,connecting rod ,crank shaft , camshaft , valve ,valve lifters , piston pins , oil pumps , main journals , big end bearings , timing gears, timing belts ,chains etc.</p> <p>3.6 Water Jackets, oil galleries</p> <p>3.7 Supercharger, Turbocharger, Positive crankcase ventilations(PCV)</p> <p>3.8 Exhaust gas recirculation system, catalytic converters.</p> <p>3.9 Air cleaner, Types of air cleaners</p>		
4	FUEL SYSTEMS OF PETROL ENGINES	08	02
	<p>4.1 Carbureted fuel supply system:- carburetors , A/C pump, Electric pump, Double barrel carburetors, Petrol filter</p> <p>4.2 Working of carburetors petrol supply system and its service maintenance</p> <p>4.3 MPFI System (without carburetors) Fuel gallery, fuel pressure regulator, petrol injector, H.P filters etc.</p> <p>4.4 Working of MPFI fuel delivery system and its servicing.</p> <p>4.5 Engine fitted with CNG/LPG kit</p> <p>4.6 Study and working of fitting gas kits and its servicing.</p> <p>4.7 Study of Euro III norms</p> <p>4.8 Fuel saving tips and habits</p>		
5	IGNITION SYSTEM	04	02
	<p>5.1 Circuit diagram of ignition system</p> <p>5.2 Types of ignition system and its parts</p> <p>5.3 Electronic ignition system</p> <p>5.4 distributor less ignition system</p> <p>5.5 Ignition timing advance mechanism</p> <p>5.6 firing order and its importance</p> <p>5.7 compression between C.B.Point ignition and electronic ignition</p> <p>5.8 servicing and maintenance of ignition system such as spark plug,distributor,ignition coils etc.</p>		

6	COOLING SYSTEM	04	02
	6.1 Necessity of cooling system 6.2 Types of engine cooling system 6.3 Parts of cooling system such as radiator, water pumps, hoses, thermostat valve, pressure cap etc. 6.4 Coolant, Anti Freeze Solution used in cooling system 6.5 Servicing, maintenance and Repairing of cooling system		
7	ENGINE LUBRICATION SYSTEM	08	02
	7.1 Necessity of lubrication 7.2 Types of lubrication system 7.3 Components of lubrication system 7.4 Characteristics of lubricants. 7.5 Service rating of lubricating oils 7.6 Oil cooling system 7.7 Viscosity index ,oil additives. 7.8 Servicing and maintenance of lubrication system		
8	POWER TRANSMISSION SYSTEM	04	02
	8.1 Engine clutch assembly requirement 8.2 Types of clutch 8.3 Main parts of clutch assembly (pressure plate, clutch plate, clutch release bearing , clutch fork ,torsion spring, cushioning spring, clutch lining etc.) 8.4 Types automobile clutch 8.5 Clutch pedal, free play setting ,servicing 8.6 Fluid fly wheel construction ,working and use		
9	GEAR BOX ASSEMBLY	08	02
	9.1 Purpose of gear box 9.2 Resistance affecting movement of vehicle ,tractive efforts 9.3 Construction of gear box ,gear, types of gears, gear ratio, combination gear ratio 9.4 Types of gear box such as crash mesh gear box ,constant mesh gear box, syncromesh gear box 9.5 Transfer case gear box, over drive 9.6 Torque converter, epicyclic gear box (used in automatic transmission) 9.7 Gear shifting mechanism 9.8 Gear box servicing and maintenance and lubrication schedule, lubricants used.		
10	FINAL DRIVE (PROPELLER SHAFT, DIFFERENTIAL)	04	02

	<p>10.1 Purpose of drive shafts 10.2 Different types of drive shafts 10.3 Front wheel drive and rear wheel drive(FWD/RWD) 10.4 Propeller shaft, slip joint, universal joint, sliding joint 10.5 Principle of differential 10.6 Working ,construction of differential 10.7 Different types of differential 10.8 Differential lock, non slip differential 10.9 Different types of bearings used in differential unit 10.10 Differential testing, matching techniques servicing</p>		
11	SUSPENSION SYSTEM	04	02
	<p>11.1 Purpose of suspension system 11.2 Parts of suspension system (spring shock absorber, leaf spring, stabilizer, torsion bar, shackle etc.) 11.3 Types of suspension system like rigid suspension, independent suspension (wishbone suspension etc) 11.4 Air suspension 11.5 Basic suspension movement's i-e. bouncing, pitching, rolling, knee action springs. 11.6 Servicing maintenance of suspension system</p>		
12	STEERING SYSTEM	04	02
	<p>12.1 Necessity of steering system 12.2 Steering system 12.3 Types of steering system such as cam and peg, rack& pinion, nut with recirculating ball type and power steering 12.4 Components of steering system i.e. steering wheel, steering column, steering gear box, drop arm ,push pull rod, steering arm, king pin and stub axel 12.5 Steering geometry like Ackerman steering, castor, camber angle, king pin inclination ,toe in ,toe out, included angle and toe out on turns 12.6 Factors affecting steering ,wheel alignment, reversible steering, cornering force ,slip angle ,four wheel steering alignment 12.7 Under steering and over steering. 12.8 Servicing and setting of steering system</p>		
13	BRAKE SYSTEM	04	02
	<p>13.1 Braking principle, braking force 13.2 Weight transfer during braking. 13.3 Braking distance and time, brake efficiency 13.4 Types of brakes (mechanical ,hydraulic, disk, pneumatic) 13.5 Dual brake system, power brakes 13.6 Repair and servicing of hydraulic brake, mechanical brake 13.7 Study of anti skid brake system (ABS)</p>		
14	EMMISSION CONTROL SYSTEM	08	04
	<p>14.1 Legislative history 14.2 Pollutants 14.3 Evaporative emission control system (EVAP) 14.4 Use of exhaust gas recirculation system (EGR)</p>		

	14.5 Precombustion and post combustion emission testing 14.6 PCV system diagnosis and service 14.7 EGR system diagnosis and service 14.8 Spark control system ,intake heat control diagnosis and service 14.9 Catalytic converter diagnosis, air injection system diagnosis and service 14.10 Evaporative emission control system diagnosis		
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PRACTICAL

Sr. No.	Practical
1.	<ul style="list-style-type: none"> ➤ Identification of vehicle components. ➤ Compression pressure and Vacuum test & its importance ➤ Removing & refitting of petrol engine from vehicle. ➤ Dismantling of petrol engine. ➤ Removing broken studs. ➤ Servicing of inlet, exhaust manifold. ➤ Overhauling of piston and connecting rod assembly.
2.	<ul style="list-style-type: none"> ➤ Complete overhauling of petrol engine. ➤ Assembling engine parts, piston connecting rod and cylinder head. Rocker arm assembly, manifold and other accessories of the petrol engine. ➤ Setting of valve timing & adjusting tappet clearance on different engines. ➤ Tuning of engine and testing the performance of the petrol engine. ➤ Adjustments, troubleshooting and remedies of CNG/LPG system fitted on engines. ➤ Servicing of water pump and testing thermostat valve. ➤ Servicing of radiator and adjusting fan belt. ➤ Servicing of oil pump.
3.	<ul style="list-style-type: none"> ➤ Overhauling of clutch assembly of vehicle. ➤ Overhauling of gear box of vehicle. ➤ Overhauling of differential, servicing of propeller shaft. ➤ Testing of transmission alignment.
4	<ul style="list-style-type: none"> ➤ Overhauling of brake in vehicle. ➤ Bleeding of hydraulic brake. ➤ Repair & Maintenance of Tyre and tubes. ➤ Adjusting wheel alignment & wheel balancing. ➤ Repair & Maintenance of body of vehicle. ➤ Servicing of steering system. ➤ Servicing of fuel supply system & servicing of air cleaners. ➤ Servicing of carburetor <ul style="list-style-type: none"> ➤ Starting and stopping of petrol engine. ➤ Trouble shooting of petrol engine. ➤ Trouble in electrical circuits. ➤ Testing of electronic devices used in petrol engine. ➤ Catalytic converter diagnosis

Ref. Books,

Sr. No.	Author	Title	Edition	Year	Publisher and Address
1	R.B.GUPTA	AUTOMOBILE ENGINEERING	6 TH	2006	SATYA PRAKASHAN
2	GBS .NARANG	AUTOMOBILE ENGINEERING		2006	KHANNA PRAKASHAN
3	KRIPAL SINGH	AUTOMOBILE ENGINEERING			
4	SHRINIVASAN	AUTOMOBILE MACHINES		2005	T.M.H.
5	P.L.KOHLI	AUTOMOTIVE ELECTRICAL EQUIPMENT	2		T.M.H.
6	WILLIAM CROUSE DONALD ANGLIN	AUTOMOTIVE MACHINE	10 TH	2005	T.M.H.
7	JUDGE	AUTOMOTIVE REPAIRS	VOL.I TO VOL.X		
8	Jack Erjavek	Automotive Technology (A System Approach)	3 rd	2005	Thomson Delmard
9	John Remling	Suspension & Steering system	--	--	John Wilay & Sons, New York
10	Joseph Heitner	Automotive Mechanics			TATA Mc Graw Hill
Web Site www.dget.nic.in/centreofexcellence/automobilesector					

IV TOOLS, MACHINERY, EQUIPMENTS etc..

Sr. No.	Item	Qty
a)	TRINING TOOLS KIT	17Nos
01	Steel rule 15cm. English and metric	17Nos
02	Screw driver 20cm.X 9mm. Blade	17Nos
03	Screw driver 30cm.X 9mm. Blade	17Nos
04	Spanner D.E. set of 12 pieces (6mmto 32mm)	17Nos
05	Pliers combination 20cm.	17Nos
06	Pliers side cutting 15cm.	17Nos
07	Pliers round nose 15cm.	17Nos
08	Pliers flat nose 15cm	17Nos
09.	Hand file 20 cm. Second cut flat	17 Nos
10	Hand file 20 cm. Second cut half round	17 Nos
11.	Hand file 20 smooth triangular	17 Nos.
12.	Hand file30 cm. Half round basted	17 Nos

13.	Hand file 30 cm. Round basted	17Nos
14.	Center punch 10 cm	17 Nos
15.	Chisel cold flat 20 x 200mm.	17 Nos
16.	Feeler gauge 20 blades (metric)	17 Nos.
17.	Steel tools box with lock and key (folding type) size 400 x200 x150 mm.	17 Nos.
	Shop outfit & Measuring instrument	
18.	Hollow punch set of seven pieces 6mm to 15mm.	1 set .
19.	Drift punch copper 15 cm	2 Nos.
20.	Prick punch 15 cm.	2 Nos.
21.	Chisels cross cut 200 mm x 6mm	2 Nos.
22.	Allen key set of 12 pieces (2mm to 14mm)	04 Nos.
23.	Philips screw driver set of 5 pieces (100 mm to 300 mm)	04 Nos.
24.	Rule steel 30 cm. English and metric	2 Nos.
25.	Engineer's square 15 cm. Blade	2 Nos.
26.	Dividers spring 15 cm	2 Nos.
27.	Ball peen hammer 0.5kg.	16 Nos.
28.	Scriber with scribing block universal	4 Nos.
29.	Marking out table 90x 60 x 90cm.	1 Nos.
30.	Hacksaw frame adjustable	4 Nos.
31.	Engineers stethoscope	1 Nos.
32.	Hand vice –37 mm	2 Nos.
33.	Drill twist (assorted)	10 Nos.
34.	Taps and dies complete sets (5 types)	1 set.
		Each
35.	Hand reamers adjustable 10.5to 11.25mm , 11.25to 12.75mm, 12.75to 14.25mm and 14.25to 15.75mm	2sets
36.	Micrometer out side 0-25mm, 25-50mm,75-100mm	1 each
37.	Micrometer in side 25-50, 50-75mm, 75-100 mm	1 each
38.	Mallets wooden/plastic.	2 Nos.
39.	Spanner, ring set of 12 metric sizes 6 t 32 mm.	2 Nos.
40.	Spanner , adjustable 15 cm.	1 No.
41.	Spanner for spark plugs 14mm, 16mm ,22mm	1 Nos.each
42.	Spanner socket with speed handle , T-bar, ratchet and universal up to 32 mm set of 28 pieces with box	2 sets .
43.	Adjustable spanner (pipe wrench 350mm)	2sets
44.	Chain and pulley block 3000kg.capacity electric type	1Nos.
45.	Horse and wheel chock	4sets.
46.	Screw jack one tone capacity double lift	2 Nos.
47.	Hydraulic jack with trolley capacity 3 Ton	1 Nos.

48.	Oil can 0.5/0.25litre capacity	2Nos.
49.	Cleaning tray 45x 30cm	4 Nos
50.	Piston ring expander and remover 50 mm & 100 mm	1 each
51	Piston Ring compressor	2 Nos.
52	Piston Ring Groove cleaner	2 Nos.
53	Cylinder ridge remover / cutter.	1 No.
54	Torque wrench 5 to 35 Nm, 12- 68 Nm, & 50 – 225 Nm,	1No.
55	Work bench 250 * 60 cm with 2 vices 12cm jaw	2 Nos.
56	Puller screw powered 2 mm gap with bearing puller attachment	1 No.
57	Vice grip pliers 200mm	2 Nos.
58	Circlip pliers Expanding and contracting type 15 cm and 20 cm each	8 Sets.
59	Inspection lamp with guard and wandering lead of 100 ft. length.	1 No.
60	Crow bar	1 No.
61	Fire extinguisher ABC type 5 kg capacity.	2 Nos.
62	Fire Buckets (4 Nos.) with stand	2 Nos.
63	Feeler gauge piston (metric)	1 set.
64	Cleaning tray-Aluminum 45*30 cm	8Nos.
65	Spark plug spanner 14mm * 18mm* size	2 Nos.
66	Valve spring lifter	1 Nos.
67	Valve grinding tool-suction type	Nos.
68	Valve seat cutting tools complete with guides and pilot bar (all angles)	1 Set.
69	Valve key inserter	1 No.
70	Cylinder bore gauge capacity 50 to 150 mm	1 Nos
71	Carburetor different types	2 Nos.
72	Fuel feed pump	2 Nos.
73	Straight edge 2 ft	1 No.
74	Distributor different types	2 Nos.
75	Surface plate 60 X60 cm	1 Nos.
76	'V' block 75 X38mm with clamps	2 Nos.
77	4 wheeler petrol vehicle fitted with MPFI system / carburetor system with manuals	2 No.
78	Synchromesh gear box of LCV	2 Nos.
79	Diaphragm type clutch assembly	2 Nos.
80	Drum brake assembly	2 Nos.
81	Disc brake with caliper assembly	2 Nos.
82	Tandem master cylinder with booster	4 Nos.
83	Wheel cylinder	4 Nos.
84	Lead acid battery 12V	4 Nos.

85	Battery charger 6 –24 with 10 A rate	1No.
86	C.V. joint units of 3 different types	4 Sets
87	Drilling machine bench type to drill up to 12mm dia	1No.
88	Electric pedestal grinder with two 18 cm. Wheel.	1No.
89	Compression testing gauge to read 0 to 50 kg./sq.cm .	1No.
90	Vacuum gauge to read 0 to 760 mm of Hg.	1No.
91	Cut model of 4 stroke petrol engine on stand	1No.
92	Cut model of 2 stroke petrol engine on stand	1No.
93	Engine analyzer	1 Sets
94	Bearing puller screw powered / hydraulic powered with attachments Max spread 80,200 and 300mm	1 Each.
95	Speed counter / tacho meter – pointed type to read up to 10000 RPM	1No.
96	Petrol engine of :latest model (CNG engine) with workshop manuals.	1
97	Petrol engine 4 stroke fitted with MPFI/ carburetor fuel system for practice, up to 50 H.P. with manuals	2 Nos
98	Spark testing machine	1 Nos
99	Smoke testing machine	1 Nos
100	Petrol Engine of latest models with manuals	2 Nos
101	Triple leg puller with bearings attachment screw/ hydraulic Powered max. spread 80, 160, 250, 450mm	1Nos

Course Name : VOCATIONAL DIPLOMA IN AUTOMOBILE
Course Code : VA
Semester : THIRD
Subject Title : TYRE REMOULding, WHEEL BALANCING & ALIGNMENT
Subject Code : 10148

Teaching and examination scheme:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER	TH	TEST	PR	OR	TW
01	--	04	02	40	10	#50	--	50@

RATIONALE: - the chassis components that drive the vehicle and support its weight are the wheels and tyres only. The vehicle tyres have contact with the road. Tyres are air filled, cushion that absorb most of the shock caused by road irregularities. This reduces the effects the effect of road shocks on the vehicle, passengers and load. The tyres grip the road to provide good traction. This enables the vehicle to accelerate, brake & make turns without skidding. Excessive wear of tyres affect on speed, cushioning, and alignment of wheel from wobbling to remove these factors tyre remolding is essential.

The balance of a trued wheel is essentially required to avoid front wheel wobble, which affects on alignment and increase tyre wear rates.

The purpose of wheel alignment is to restore the vehicle suspension to the original or manufacturers specifications it is the proper adjustment of all the interrelated supervision angles affecting the running and steering of the vehicle.

OBJECTIVE: -

Student will be able to

- 1) Puncture repair of tube with advance techniques.
- 2) Carry wheel alignment & balancing
- 3) Do tyre retrading & repair
- 4) Do tyre rotation and finding various faults for tyre wear.

Detailed contents :

CHAPTER	CONTENTS	MARKS	HOURS
	Theory		
1	1.1 Types of wheels, its construction & parts. 1.2 Purpose & desirable properties of tyre 1.3 Types of tyres & tubes (solid & pneumatic tyre – Cross ply & Radial ply) 1.4 Safety precautions during dismantling & Assembling tyre & rim	06	06
2	2.1 Components of tyre & their functions 2.2 Manufacturing process of tyre 2.3 Designation of tyres 2.4 vulcanizing process	06	05

3	3.1 Reasons for defects of tyres 3.2 Maintenance of tyre & tubes 3.3 Importance of tyre inflation 3.4 Tread patterns & their applications 3.5 Inspection procedure 3.6 Procedure for tyre rotation of different vehicles (Front wheel drive, rear wheel drive & four wheel drive vehicles) 3.7 Procedure & Types of balancing and importance of dynamic balancing.	06	05
4	4.1 Purpose & function of steering geometry and their effect on tyre wear 4.2 Equipments used for retarding & the knowledge of material sourcing 4.3 Different types of tyres Re-treading 4.4 Material used in re-treading & re-treading procedures. 4.5 General operation & maintenance of machines & equipments used for retrading	06	06
5	5.1 Advantages and disadvantages of re-treading 5.2 Description of different types of steering geometry	06	05
6	6.1 Wheel alignment & balancing procedures Wheel balancing procedure with electronic balancer	10	05
TOTAL		40	32

PRACTICAL

SR.NO	Practical
1	<ul style="list-style-type: none"> ➤ Removal & re-fitting of wheel from the vehicle ➤ Check tyre & tube for puncture & inflate it to correct pressure ➤ Removal & re-fitting of tyre from rim
2	<ul style="list-style-type: none"> ➤ Removal & refitting of split rim from tyre ➤ Vulcanizing of tubes ➤ Repair tubeless tyre puncture. ➤ Measurement of tread wear
3	<ul style="list-style-type: none"> ➤ Tyre inspection ➤ Wheel alignment & balancing ➤ Cause of tyre wear ➤ Knowing the problem by inspecting tyre wear pattern ➤
4	<ul style="list-style-type: none"> ➤ Re-tread different types & Tread Pattern
5	<ul style="list-style-type: none"> ➤ Check & adjust ➤ Check & adjust steering geometry ➤ Check & grease center pin (pivot pin)
6	<ul style="list-style-type: none"> ➤ Check & adjust free play of steering system ➤ Wheel balancing with electronic balancer ➤ Trouble shooting of wheels

Ref. Books,

Sr.No.	Author	Title	Edition	Year	Publisher &Address
1	R.B.Gupta	Automobile Engineering	6 th	2006	Satya Prakashan
2	Narang	Automobile Engineering	--	2005	Khanna
3	C.P.Nakara	----- “ -----	5 th	1990	Khanna
4	William H & Donald L	Automotive Mechanics	10 th	2005	Tata McGraw Hill
5	Srinivasan	Automotive Mechanics	--	2005	--- do ---
6	John Remling	Suspension & steering system			John Wilay & Sons, New York
7	William Crowse	Automotive Mechanics	10 th	2006	Tada Porwala, Mumbai
Web Site www.dget.nic.in/centreofexcellence/automobilesector					

TOOLS, MACHINERY, EQUIPMENTS etc,

SR. NO	Item	Oty
A) TRAINEES TOOL KIT		
02	Screw driver 20cm.*9mm. Blade	17 Nos
03	Screw driver 30cmm*9mm .Blade	17 Nos.
04	Spanner D.E.set of 12 pieces (6mml to 32mm)	17 Nos.
05	Pliers combination 20 cm	17 Nos.
12	Hand file 30 cm. bastard	17 Nos.
13	Hand file 30 cm. round bastard	17 Nos.
15	Chisel cold flat 20 mm.	17 Nos.
17.	Steel tools box with lock and key (folding type) size 400*200*150mm	17 Nos.
B) SHOP OUTFIT & MEASURING INSTRUMENTS		
19	Drift punch copper 15 cm	2 Nos.
20.	Oil can 0.5 / 0.25 liter cap.	2 Nos.
21.	Cleaning Tray 45*30 cm.	4 Nos.
25	Allen Key set of 12 pieces (2mmto 14mm)	04 sets
26	Philips Screw Driver Typeset of 5 pieces(100to300mm)	04 sets
27	Engineer's square 15 cm. Blade	2 Nos.
29	Ball peen Hammer 0.5 kg	16 Nos.
31	Marking out table 90x60 x90 cm	1 Nos.
32	Hacksaw frame adjustable	4Nos.
34	Hand vice 37 mm	2 Nos.
37	Micrometer out side 0-25mm, 25-50 mm	1 each
38	Mallets wooden /plastic	2 Nos.
41	Spanner, ring set of 12 metric sizes 6 to 32 mm.	2 Nos.
43	Torque wrench 5-35 Nm, 12-68 Nm & 50-225 Nm.	1 each

44	Workbench 250 x 120 x 60 cm with 2 vices 12 cm jaw.	2 Nos.
45	Spanners socket with speed handle, T-bar , ratchet and universal up to 32 mm	2 Nos.
46	Adjustable spanner (pipe wrench 350 mm)	2 Nos.
47	Pullers screw powered 2 mm gap with bearing puller attachment	1 Nos.
48	Vice grip pliers	2 Nos.
49	Circlip pliers Expanding and contracting type 15 cm & 20 cm	8 sets
50	Inspection lamp with guard and wandering lead of 100ft.	1 No.
53	Circlip pliers 15 cm. Expanding type	1 No.
54	Circler pliers 15 cm. contracting type	1 No.
55	Cleaning tray – Aluminum 45 x30 cm	8 Nos.
56	Tread wear indicator	2 Nos.
C) GENERAL INSTALLATION / MACHINERIES		
57	Tube vulcanizing machine	1 No.
58	Chain and pulley block 3000 kg. Capacity electric type	1 No.
59	Horses and wheel chock	4 Nos. each
60	Screw jack one, tone capacity double lift	2 Nos.
61	Hydraulic jack with trolley capacity 3 ton Ton	1 No.
62	Bearing puller screw powered / hydraulic powered with attachments max spread 80, 200 and 300mm.	1 Each
65	Tyre & split rim wheel assembly	1 No.
67	Electric pedestal grinder with two 18 cm wheel	1 Nos.
68	Tyre remover pneumatic & mechanical type	1set
69	Tyre vulcanizing machine	1 No.
70	Tyre retreading machine with accessory	1 No.
71	Air compressor with accessories	1 No.
72	Tyre pressure gauge with accessories	1sset
73	Computerized Wheel alignment	1 set
76	Wheel balancing machine with accessory	1 set
77	Speed counter –pointed type to read up to 5000 RPM	1 No.
78	Triple leg grip puller with bearing attachment screw / hydraulic powered max. Spread 80, 160, 250, 450 mm	1 No.
79	Solid tyre	1 No.
80	Tube tyre of car, trucks & motorcycle	2each
81	Tubeless tyre of car & trucks	2each
82	Tubes of different sizes of motor cycle , cars & trucks	2 each
83	Cut section of cross ply and radial tyres	1 each
84	Light commercial vehicle (L.C.V.)	1 No.

OTHER MACHININARY REQUIREMENT

1	Tube vulcanizing machine	1 Nos
2.	Tyre remover pneumatic & mechanical type	1 Set
3.	Tyre vulcanizing machine	1 no.
4.	Air compressor with accessories	1 No.
5.	Tyre pressure gauge with accessories	1 Set
6.	Wheel alignment gauge	1 Set
7.	Camber angle Gauge	1 No.
8.	Toe-in, toe-out gauge	1 No.
9.	Wheel balancing machine with accessory	1 Set.
10.	Tubed tyer of cars to	2 Each.

Workshop furniture	Qty
Suitable work tables with vices	As required
Stools	17 Nos.
Discussion table	1 No.
Tool cabinet	2 Nos.
Trainees locker	2 Nos.
Fire fighting equipment, first aid box etc.	As required
Book shelf (glass panel)	1 No.
Storage rack	As required
Storage shelf	As required

Course Name : VOCATIONAL DIPLOMA IN AUTOMOBILE
Course Code : VA
Semester : THIRD
Subject Title : TRANSPORT & INDUSTRIAL MANAGEMENT
Subject Code : 10149

Teaching and examination scheme:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER	TH	TEST	PR	OR	TW
03	--	--	03	80	20	--	--	--

RATIONALE: - An automobile engineer is supposed to know how Transport Management and Motor Industry function in a country. After the completion of this subject the students will be able to know how the motor vehicle Act is helping to control the automobile industry, how the taxation is done on the vehicle and how the insurance will help for safety of the vehicle owner and public.

Motor transport is conveyance of people product. Transport is the movement of men, materials & means. The evolution of transport has proceeded in stages from the invention of the wheel, the user of animals for transport, improved road, to the use of special purpose vehicles, cars, trucks, buses etc.

OBJECTIVE: -

Student will be able to

- 1) Fill up taxation form
- 2) Insurance form
- 3) Schedule of bus transport & goods transport
- 4) Fuel consumption & log book record.
- 5) Making job card & supervisor report
- 6) Industrial safety & safety awareness.

Detailed Contents:

CHAPTER	CONTENTS	MARKS	HOURS
	Part A :- TRANSPORT MANAGEMENT		
1	<u>MOTOR VEHICLE ACT.</u> 1.1 Licensing of drivers and conductor of motor vehicle. 1.2 Registration of motor vehicle. 1.3 Transport and exemption permit control. 1.4 Offences, penalties and procedures. 1.5 Different types of forms. Transfer of ownership. 1.6 Difference between STA and RTA. 1.7 Motor vehicle acts and rules. State and central motor vehicle act. 1.8 Procedure for change of registration mark.	06	04

2	<p><u>TAXATION</u></p> <p>2.1 Meaning of taxation. 2.2 Taxation structure for 2 / 3 wheelers goods and passenger vehicle. 2.3 Method of laying tax. 2.4 Tax exemption for motor vehicle.</p>	06	04
3	<p><u>INSURANCE</u></p> <p>3.1 Meaning of the insurance / difference between assurance and insurance. 3.2 Different types of insurance life, fire, and motor vehicle. 3.3 MV insurance comprehensive third party no fault liability fund, solicited fund. 3.4 Procedure of accident claim and settlement. 3.5 Duty of drivers in case of accident and injury. 3.6 Role of surveyor and loss assessor, and their function.</p>	06	04
4	<p><u>BUS TRANSPORT ORGANISATION</u></p> <p>4.1 Classification road, water and air transport. Advantages and disadvantages 4.2 Passenger and transport organization setup. 4.3 Urban and rural transport. 4.4 Theory of fares flat fares and telescopic fares. 4.5 Schedule of bus transport and crewing. 4.6 Calculation of cost of transport. 4.7 Layout of bus station and depot. 4.8 Passenger amenities.</p>	06	04
5	<p><u>GOODS TRANSPORT OPERATION.</u></p> <p>5.1 Basic element of transport. – the way the vehicles terminals infrastructure facilities. 5.2 Various factors such as geographical economic social etc. 5.3 Goods transport organization setup. 5.4 Fixation of freight. Fixed and running cost. 5.5 Types of booking.- to pay, paid, billing. 5.6 Scheduling of goods transport – factors. 5.7 Transport and storage of petroleum products.</p>	06	04
6	<p><u>TRANSPORT OPERATIONS</u></p> <p>6.1 log book trip operation sheet , truck history record. 6.2 Monthly operation performance statement. 6.3 Goods consignment notes. 6.4 Daily fuel consumption. Complaint book route map. 6.5 Control of traffic. Speed limit. Various fitness certificates. 6.6 Advanced traffic control system.</p>	06	04
7	<p><u>MOTOR INDUSTRY</u></p>	06	04

	<p>7.1 History and development of motor industry in India.</p> <p>7.2 Organization setup of automobile industry.</p> <p>7.3 Marketing and servicing setup.</p> <p>7.4 Importance of automobile engineer.</p> <p>7.5 Working of various ST organization.</p> <p>7.6 CRRI – central road research institute.</p> <p>7.7 PCRA – petroleum conservation research institute.</p> <p>7.8 ARAI – automotive research association of India & CIRT-Central Institute Of Road Transport.</p> <p>7.9 VRDE – vehicle research development establishment.</p> <p>7.10 ISO 9000</p> <p>7.11 Necessity, importance of deferent ISO quality system and EURO.NORMS</p>		
	PART –B : INDUSTRIAL MANAGEMENT		
1	<p>INTRODUCTION:</p> <p>Overview of sectors of developments.</p> <p>1.1 Indian industries.</p> <p>1.2 Fundamental concepts of growth of manufacturing industry.</p>	06	04
2	<p>VIEWING OF MANUFACTURING ORGANIZATION AS A SYSTEM</p> <p>2.1 Structure of organization</p> <p>2.2 Essential of organization</p> <p>2.3 Types of organization</p> <p>2.4 Necessity of viewing of manufacturing organization as a system.</p>	06	04
3	<p>INTEGRATING STEPS TO BE TAKEN BY SUPERVISOR IN MANAGING HIS JOB</p> <p>3.1 Planning day’s work</p> <p>3.2 Supervisory responsibility survey</p> <p>3.3 Checklist for accepting assignment of new dept.</p>	06	04
4	<p>NATURE OF SHOP-FLOOR JOBS TO BE SUPERVISED:</p> <p>4.1 Procurement of resources</p> <p>4.2 Planning for Procurement of resources</p> <p>4.3 Process of transformation</p> <p>4.4 Jobs and responsibility of a supervisor</p>	10	04
5	<p>INDUSTRIAL SAFETY</p> <p>5.1 Causes of Accidents</p> <p>5.2 Types of accidents</p> <p>5.3 Safety procedures to prevent accident</p> <p>5.4 Reporting and investigation of accident.</p> <p>5.5 Safety awareness</p>	10	04
	TOTAL	80	48

Ref. Books,

Sr. No	Author	Title	Edition	Year	Publisher and Address
1	- By Home Department (M.S),central M.V Rules 1988.	Motor Vehicle Act,1988			
2	R.J.Eatan	Elements of Transport			
3	Hudson and Constantin	Motor Transportation			
4	L.D.Kitchin	Bush operation			
5	F.G..Fletcher.	Fundamental principles of Road passenger Transport operation			
6	Schumer	Economic of Transport			
7	J.F.Sleeman	British Public utilities			
8	H.R.Bonavia	Economics Of Transport			
9	Frank	Principal of Urban Transportation			
10	K.P.Bhatnagar,Satish Bahadur D.N.Agarwal,S.C.Gu pta	Transport in Modern India			
11	R.C.sanena.	Labor Problem and social welfare			

FOURTH
SEMESTER

Course Name : VOCATIONAL DIPLOMA IN AUTOMOBILE
Course Code : VA
Semester : FOURTH
Subject Title : SERVICING & OVERHAULING OF AUTOMOBILE (DIESEL)
Subject Code : 10150

Teaching and examination scheme:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER HRS	TH	TEST	PR	OR	TW
02	--	03	03	80	20	#50	--	25@

RATIONALE: -The environmental pollution and fuel crisis are severe problems that world is facing today. To obtain the better fuel economy and to reduce air pollution the automobile technology has changed to a great extent. To be conversant with recent trend in engine management the automobile engineer should have adequate knowledge of latest techniques adopted in automobile engines pertaining to heavy duty vehicles such as road rollers, multi axle load carriers, earth moving equipments, agricultural implements .etc

The power developed inside the engine cylinder it is chemical energy is converted into mechanical energy which is ultimately aimed to turn the wheel so that the motor vehicle can move on the road . When the vehicle starting from rest , hill climbing , accelerating and meeting other resistance, high torque is required at the driving wheels . hence a device must be provided to permit the engine crank shaft to rotate at relatively high speed .

OBJECTIVE:

Student will be able to:

- 1) Overhaul diesel engine.
- 2) Overhaul diesel fuel system, diagnosis fault in CRDI fuel system.
- 3) Servicing, maintenance and repairer of cooling system, lubrication system, suspension system.
- 4) Servicing and repair of clutch, gear box , final drive of heavy duty vehicles.
- 5) Servicing, repair and setting of steering system of heavy duty vehicles.
- 6) Repair and servicing of hydraulic brake and mechanical brake and EGR, catalytic converter.
- 7) Servicing of turbocharger & supercharger

Detailed contents:

CHAPTER	CONTENTS	MARKS	HOURS
1	General classification of diesel engine vehicle Theory(HEAVY DUTY VEHICLE) 1.1 Main parts of Automobiles (Body & Chassis) Classification of Chassis & framebody (full & half frame chassis vehicle) 1.2 Power Generation System : Description	06	03

	<p>1.3 Classification of engines: Construction and function of engine parts, important working parts in the engine ,the four stroke cycle, piston rings, piston connecting rod, cam shaft, crank shaft, valve lifter, valve operating mechanism and valve timing. Description and function of valve, valve seat, valve seals, tappet clearance in four and six cylinder engines.</p> <p>1.4 Cylinder Head, cylinder liners (wet & dry),cylinder block, big end & Main Journal bearings, crank case and oil sump.</p>		
2	<p>Accessories:</p> <p>2.1 Type of air cleaners & after coolers.</p> <p>2.2 Different types of filters, firing order, turbo chargers.</p> <p>2.3 Working of exhaust gas recirculation (EGR) system and its purpose.</p> <p>2.4 Types of mufflers.</p>	06	02
3	<p>Cooling System: (HEAVY DUTY VEHICLE)</p> <p>3.1 Purpose of cooling system & advancement.</p> <p>3.2 Types of cooling system – Air cooling system and water cooling system and its parts , intercoolers.</p> <p>3.3 Radiator, Radiator pressure cap, water pump, Thermostat valve.</p> <p>3.4 Anti freezers, coolants</p>	06	02
4	<p>Lubricating System (HEAVY DUTY VEHICLE)</p> <p>4.1 Types and purpose of Lubricating system</p> <p>4.2 Oil classification</p> <p>4.3 Types of oil pumps its drive, oil filter</p> <p>4.4 Drive system its parts, oil cooling in diesel engine.</p>	06	03
5	<p>Fuel Supply System (HEAVY DUTY VEHICLE)</p> <p>5.1 Types of fuel injection system (DI (Direct Injection, IDI (Indirect Injection), CRDI (Common rail direct injection)</p> <p>5.2 Types of combustion chambers and glow plugs. Purpose of fuel supply system</p> <p>5.3 Types of fuel pump. Mechanical fuel feed pumps (plunger type & gear type) and electrical fuel feed pump.</p> <p>5.4 Fuel filter.</p> <p>5.5 Function and working of injectors and inline fuel injection pump and their parts.</p> <p>5.6 Procedure for phasing & calibration.</p> <p>5.7 Types of governors & their working principles. Distributor type pump.</p>	06	03

	Transmission unit: (HEAVY DUTY VEHICLE)		
6	<p>6.1 CLUTCH ASSEMBLY: Type & Requirement of a clutch, main parts of clutch, clutch plate, clutch lining, pressure plate, , pressure spring, clutch pedal, clutch release bearing , sleeve cylinder.</p> <p>6.2 multi plate clutch & cone clutch.</p>	06	02
	GEAR BOX ASSEMBLY: (HEAVY DUTY VEHICLE)		
7	<p>7.1 Purpose of gearbox</p> <p>7.2 Types of gear box, synchromesh gear box, constant mesh gearbox</p> <p>7.3 Types of gears, counter shaft, transmission shaft.</p> <p>7.4 Parts of gear box, gear lever, gear shifter fork.</p> <p>7.5 Introduction of Torque converter.</p> <p>7.6 Fluid fly wheel / coupling</p>	06	03
	PROPELLER SHAFT & DIFFERENTIAL ASSEMBLY (HEAVY DUTY VEHICLE)		
8	<p>8.1 Description & purpose of different types of rear axles</p> <p>8.2 Propeller shaft, universal joint, slip joint or sliding joint.</p> <p>8.3 Differential, its purpose</p> <p>8.4 Front wheel drive and rear wheel drive.</p> <p>8.5 Differential lock. Different types of bearings-roller type, ball bearing taper roller bearing.</p>	06	03
	Control Unit: STEERING SYSTEM: (HEAVY DUTY VEHICLE)		
9	<p>9.1 Description of different types of steering boxes-special feature of each adjustment.</p> <p>9.2 Power assisted steering and its advantages.</p> <p>9.3 Description of Ackerman's angle, caster, camber, Toe-in, Toe – out, on turning inclination – purpose and effect of these angles.</p> <p>9.4 Steering linkage system, four wheel steering (4 WS) . Need of front wheel alignment.</p>	06	03
	BRAKE SYSTEM: (HEAVY DUTY VEHICLE)		
10	<p>10.1 Function of different type of brakes and its parts.</p> <p>10.2 Description and advantages of vacuum assisted hydraulic brakes.</p> <p>10.3 Common troubles in vacuum assisted brakes & air brake.</p> <p>10.4 Working of wheel cylinder and master cylinder.</p> <p>10.5 Antilock brake system</p>	06	02

11	Suspension system: (HEAVY DUTY VEHICLE) 11.1 Function of suspension system. 11.2 Types of suspension system: independent front suspension, torsion bar. 11.3 Leaf spring. 11.4 Type of shackle pin fixing assembly. 11.5 Shock absorbers (single and double acting type). 11.6 Front Axle – different types of stub axle. 11.7 Construction of front axle. 11.8 Function of front axle system. Ball joint and axle beam.	10	03
12	Electrical & electronic Unit: (HEAVY DUTY VEHICLE) 12.1 Description of electrical circuits. 12.2 Starter motor & glow plugs. 12.3 Description of charging circuit . 12.4 Operation of alternator. 12.5 Power windows, wiper motors and its circuits. 12.6 Lighting system: Head light, tail light, parking light, cabin light, dash board lights, fog lights, horn and its circuit. 12.7 Adjustments of lighting system – head lamp, signal lights, fog lights. 12.8 Introduction to electronics circuit: Definition of resistor, capacitor and inductor and their working principles. 12.9 Different types of diodes, transistors, power supply for electronic circuit. 12.10 Electronics safety devices used in cars. Remote control.	10	03
TOTAL		80	32

PRACTICAL

Sr. No	Practical
1	<ul style="list-style-type: none"> ➤ Compression pressure test & it's importance. ➤ Removing & refitting of diesel engine from the vehicle. ➤ Dismantling of diesel engine. ➤ Servicing of inlet, exhaust manifold. ➤ Removing broken studs. ➤ Overhauling of engine block, crank shaft, cam shaft, cylinder head, piston & connecting rod assembly.
2	<ul style="list-style-type: none"> ➤ Servicing of water pump & testing thermostat valve. ➤ Servicing of radiator and adjusting fan belt. ➤ Servicing of oil pump. ➤ Assembling engine parts, piston connecting rod, cylinder head. Rocker arm assembly, manifold and other accessories of the car engine. ➤ Setting valve timing and adjusting tappet. ➤ Starting and stopping of diesel engine. ➤ Trouble shooting of diesel engine. tuning of engine for better performance.

3	<ul style="list-style-type: none"> ➤ Servicing fuel supply system, servicing of air cleaners. ➤ Overhauling fuel feed pump. ➤ Bleeding of fuel supply system. ➤ Phasing & calibration of Fuel Injection Pump. ➤ Setting fuel injection pump timing.
4	<ul style="list-style-type: none"> ➤ Overhauling of clutch assembly . ➤ Overhauling of gear box. ➤ Testing of transmission alignment. ➤ Overhauling of differential, servicing of propeller shaft.
5	<ul style="list-style-type: none"> ➤ Servicing of steering system. ➤ Overhauling of brake system. ➤ Bleeding of hydraulic brake. ➤ Repair & Maintenance of tyre and tubes. ➤ Wheel balancing & alignment.
6	<ul style="list-style-type: none"> ➤ Overhauling of alternators ➤ Overhauling of starter & wiper motor ➤ Maintenance of Battery ➤ Regulator setting ➤ Testing of glow plugs

Ref. Books,

Sr.No	Author	Title	Edition	Year	Publisher and Address
1	HARBHAJAN SINGH	AUTOMOBILE ENGINEERING	2004 COPY RIGHT	2004	--
2	KIRPAL SINGH	AUTOMOBILE ENGINEERING VOL-2	-	2004	KHANNA
3	WILLIAM CROUSE & ANGLIN	AUTOMOTIVE MACHINES	10 TH EDITION	2005	TATA-HILL
4	R.B. GUPTA	AUTOMOBILE ENGINEERING	6 TH	2006	SATYA PRAKASHAN
5	JACK ERJOICE	AUTOMOTIVE TECHNOLOGY	-	-	-
6	SHRINIVASAN	AUTOMOBILE MECHANICS	-	2005	TATA-MacGraw HILL
7	P.L.KOHLI	AUTO.ELECTRICAL EQUIPMENT	23 RD REPRINT	2004	TATA-HILL & WEST PATOL NAGAR NEW DELHI-08
8	C.P.NAKRA	AUTOMOBILE ENGINEERING	5 TH REVISED	1990	J.C.KAPUR DHANPAT RAI & SONS DELHI JALANDAR
9	ANDREW & ALFRED BRACCINO	MODERN REF.& A.C.	1968 COPY RIGHT	1968	GOOD RESEARCH
10	JAGMANSINGH	ART OF EARTH MOVING			
11	RADICHEV	TRACTORS & AUTOMOBILE			

12	BUGER	TRACTOR'S & THEIR POWER			
13	TRUCKER	EARTH MOVING MACHINES			
Web Site www.dget.nic.in/centreofexcellence/automobilesector					

Course Name : VOCATIONAL DIPLOMA IN AUTOMOBILE
Course Code : VA
Semester : FOURTH
Subject Title : VEHICLE MAINTENANCE AND GARAGE PRACTICE
Subject Code : 10151

Teaching and examination scheme:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER HRS	TH	TEST	PR	OR	TW
02	--	03	03	80	20	@50	--	25@

RATIONALE: -The body of vehicle should provide sufficient space for passengers and luggage. It should have good access to the engine & suspension system. It should create minimum vibration when the vehicle is running.

The inspection, testing, maintenance and servicing to motor vehicle at regular intervals have been of great importance. It is very necessary for a technician to acquire specialized knowledge of advance technology.

Objective: -

Student will be able to know :-

- 1) Body repair & painting procedure
- 2) Maintenance schedule & record keeping
- 3) Engine trouble shooting repairs & various chassis parts
- 4) Handling of modern tools & equipments in automobile workshop
- 5) Fault diagnosis & repair in A/C system
- 6) Trouble shooting & fault diagnosis of MPFI & CRDI system.

Detailed contents :

CHAPTER	CONTENTS	MARKS	HOURS
1	BODY ENGINEERING THEORY:- 1.1 Materials used in body construction and manufacturing. 1.2 Painting procedure during manufacturing of vehicle. 1.3 Body repairs 1.4 Interior designing of car.	13	06
2	MAINTENANCE MANAGEMENT AND RECORD KEEPING THEORY:- 2.1 Preventive, schedule, breakdown maintenance system 2.2 Planning for effective control of maintenance	13	04

3	VEHICLE MAINTENANCE AND AUTOMOBILE REPAIR THEORY 3.1 Study of cylinder , crank shaft , camshaft, valve mechanism, timing gears, pistons and to check wear of cylinder & piston. 3.2 Transmission system maintenance- clutch, gear box, propeller shaft, differential, rear axle 3.3 Adjustment of doors and locks 3.4 Frame repair and alignment. 3.5 Electric accessories maintenance 3.6 Steering wheel and brake maintenance	13	06
4	AUTO WORKSHOP LAYOUT THEORY 4.1 Layout with equipment required for two-wheeler, four wheeler-dealer of car and commercial vehicle. 4.2 Layout with equipment required for maintenance of various side garages. 4.3 Layout of modern workshop for specialized job work-crankshaft grinding, cylinder block boring, FIP calibration, brake drum, fly wheel, pressure plate main line boring	13	06
5	CAR AIR CONDITIONING MAINTENANCE THEORY 5.1 Basic principle of air conditioning 5.2 Car AC system components, control system 5.3 Construction and working of car AC system 5.4 Trouble shooting of car airconditioners.	14	06
6	Maintenance of Multi Point Fuel Injection System (MPFI) AND Common Rail Direct Injection (CRDI) THEORY 6.1 Trouble shooting and fault diagnosis of MPFI and CRDI engine 6.2 Testing of injectors 6.3 Replace of sensors and injectors	14	04
Total		80	32

PRACTICAL

CHAPTER	PRACTICAL
1	1.1 Visit to bodybuilding and manufacturing workshop.
2	2.1 Visit to various maintenance organization, service station to study maintenance schedule.
3	3.1 Adjust clutch and brake paddle play 3.2 Overhauling gear box 3.3 Check wear in universal joints, bushes, bearing and replace it. 3.4 Checking wheel alignment 3.5 Overhauling power steering system 3.6 Overhauling hydraulic brakes system
4	4.1 Visit to industry
5	5.1 Evacuating and charging the refrigeration system

	5.2 Overhauling car AC system
6	6.1 Visit to garage for light motor vehicle and heavy motor vehicle of modern automobile industry.

Ref. Books,

Sr. No.	Author	Title	Edition	Year	Publisher and Address
1	Williams H. Course and Donald	Automotive mechanics			TATA M. H.
2	A. W. Judge -	Car Maintenance and repair Volume - IV			
3	A.W. Judge.	Maintenance of high speed diesel engine			
4		BOOK OF THE CARS			
5	JOSEPH HEITHNER	Automotive mechanics			TATA M. H.
6	G.V.S. Narang	Automotive Engineering			

Course Name : VOCATIONAL DIPLOMA IN AUTOMOBILE

Course Code : VA

Semester : FOURTH

Subject Title : DESIGNING OF AUTO COMPONENTS

Subject Code : 10152

Teaching and examination scheme:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER HRS	TH	TEST	PR	OR	TW
02	--	02	03	80	20	--	25@	25@

Rational :- In the view of fast development in the field of Automobile the trend is to incorporate change in the design of vehicle components from time to time ,an automobile engineer is suppose to be equipped acquainted with the design practice of various automobile components.

Objective:

Student will able to

- 1) Aware of basic concept of design
- 2) Familiar with the design procedure
- 3) Design chassis, piston etc.
- 4) Aware of AutoCAD.

Chapter	Contents	Marks	Hours
1	1.1 Basic concept of design 1.2 Introduction to design 1.3 Design consideration	11	3
2	2.1 Design Procedure 2.2 Introduction to product design & quality concept in design 2.3 Stress, strain, Elastic limit, yield point, factor of safety. 2.4 selection of material 2.5 Commercial designation of material & ISI specifications. 2.6 Importance of standardization in design practice. 2.7 Bearings –various types, location in Automobile system. 2.8 seals & gasket in Automobile.	11	4
3	3.1 Theory of bending movement, torsion, combine effect of bending movement & torsion principle of stress, formula for buckling	11	4
4	4.1 Common type of screw fastening, Through bolts, cap screw, studs, m/c screws. 4.2 Design of machine elements theory. 4.3 Design of cotter joint (socket spigot) knuckle joint. 4.4 Design of chassis components i.e. propeller shaft, rear axle etc. 4.5 Design single plate clutch. 4.6 Design of vehicle gearbox. 4.7 Design of semi elliptical leaf spring. 4.8 Design of engine components theory.	11	5

	4.9 Data of engine specification & simple calculation of cylinder dimension for given power. 4.10 Materials for various engine components & their properties.		
5	5.1 Design of piston simple calculation 5.2 Design connecting rod cross section 5.3 Design of crankshaft simple calculation. 5.4 Design of valve & valve mechanism.	11	06
6	Introduction to AUTOCAD.	11	06
7	Design of cylinder— 7.1 Definition of cylinder. 7.2 Hoop stress, longitudinal stress & stress in the wall of the thin cylinder due to internal pressures. Design of cylinder block & cylinder head. 7.3 Change in dimension & volume due to internal pressure.	14	04
TOTAL		80	32

PRACTICALS

SR.NO	PRACTICAL CONTENTS
1	One sheet on simple stresses in machine parts.
2	One sheet on Welding joint / riveted joint/Pipe joint.
3	One sheet on shaft couplings.
4	One sheet on various types of bearings used in automobiles.
5	Two sheet on auto engine parts (Design & Drawing)
6	One sheet on limit fit tolerance.(Design & drawing)
7	Two sheets on auto chassis design & drawing.
8	Use of AUTOCAD for drawing different auto components. Sheet of chassis, various engine parts, wiring diagram etc.

Ref. Books,

Sr. No.	Author	Title	Edition	Year	Publisher & Address
1	M.L. MATHUR	A COURSE IN INTERNAL COMBUSTION ENGINE			
2	DON KNOWLES	AUTOMOBILE CHASSIS (UNDERSTANDING NEW TECHNIQUE)			
3	DON KNOWLES	AUTOMOBILE PRINCIPLES			
4	DON KNOWLES	AUTOMECHANICS			
5	SERVICE MANUALS	SANTRO & ACCENT BASIC TRAINING BOOK			

6		ALL EURO – II			
7	DON KNOWLES	AUTOMOTIVE ELECTRONICS AND COMPRESSION CONTROLLED LIGHTING SYSTEM			
8	DON KNOWLES	ADVANCED ELECTRONICS DIAGNOSIS OF AUTOMOBILE			
9		SERVICE MANUALS OF MARUTI UDYOG INDIA LTD.			
10	ARTHUR JUDGE	AUTOMOTIVE ELECTRICAL			
11	KOHLI.	AUTOMOTIVE ELECTRICAL			
12	WILLIAM H. AND DONALD	AUTOMOTIVE MECHANICS COURSE			
13	A.W.JUDGE	MAINTAINANCE OF HIGH SPEED DEISEL ENGINE			
14	G.V.S. NARANG	AUTOMOTIVE ENGG.			
15	R.K. JAIN	MACHINE DESIGN			
16	DONKIN.	MOTOR VEHICLE DESIGN			
17	SHIGLEY	MACHINE DESIGN			
18	RAMA MRUTHUMS	BY HYDROLIC FLUID MECH			
19	PANCHANDIK AR M.V.	ELEMENTS OF HYDROLICS			
20	HARRY STUART	PNEUMATIC AND HYDROLICS			

Course Name : VOCATIONAL DIPLOMA IN AUTOMOBILE

Course Code : VA

Semester : FOURTH

Subject Title : ENTREPRENEURSHIP DEVELOPMENT

Subject Code :

Teaching and examination scheme:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER HRS	TH	TEST	PR	OR	TW
01	--	02	--	--	--	--	--	50@

RATIONALE:

Entrepreneurship development is a part of the subject consists of topics related to the development of entrepreneurial skills and other details such as personnel management, quality control and creative thinking.

OBJECTIVES - The Students Shall able to know

- Development of entrepreneurial skills & other details such as selection of product lines, site selection, financial aspects personnel management, quality control & creative thinking
- Emphasizes the development of enterprising qualities among young engineers.

CONTENTS: Theory

SR. NO.	CONTENTS	HOURS
1.	ENTERPRENEUR & ENTERPRENEURSHIP 1.1 Introduction. 1.2 Needs, scope for self-employment with special reference to self-employment scheme and sources of assistance in Central & State Government Organization like DIC, SIDA, SISI, NSIC, SIDO, Financial institutes and Banks 1.3 Entrepreneurial values, attitude & motivation. Identifying & developing entrepreneurial competence and networking, entrepreneurial culture. Characteristics of successful entrepreneur and successful enterprise 1.4 The causes of failure and identification of entrepreneurship abilities through self assessment and other technique	4
2.	Information collection 2.1 Information gathering Techniques 2.2 Produce and services 2.3 Product specification 2.4 Market research, Survey	2
3.	COSTING & TENDER PROCESS 3.1 CONCEPT OF ENTERPRENERSHIP 3.2 Product Selection 3.3 Concept of costing. 3.4 Market Survey 3.5 Project Report Preparation	4

	3.6 Marketing 3.7 Finance, Account & Auditing 3.8 Accounting and Analysis – Bank Operation i.e. Debit and Credit Book Keeping, Financial Software packages, invoicing and chalans 3.9 Tender & tender process.	
4	HUMAN RESOURCE & QUALITY MANAGEMENT 4.1.Human resource functions 4.2 Training & Development of Human Resource 4.3 Self &Other Awareness &Development 4.4 Motivation 4.5 Concept of Quality 4.6 Total Quality Management 4.7 Quality Circle	3
5.	INTERACTION WITH VARIOUS AGENCIES 5.1 Banks, Insurance Co. 5.2 Department of labour 5.3 Transport & Logistics 5.4 Sales Tax Income Tax & Excise Department 5.5 Local Municipal Corporation 5.6 Environment 5.7 Electricity Board / Water Supply / Department of Land Record/ Register of Stamp Duty	3
	Total	16

ASSIGNMENTS: --

1. Make a market survey for selection of your product.
2. Interact with minimum five customers & understand their needs & requirements of your product.
3. Interact with minimum two Entrepreneurs & prepare the report.
4. Approach any financial institute to get financial aid to start your new enterprise.
5. Approach to *DISTRICT INDUSTRIES CENTRE* & collect the data to start new establishment.
6. Collect information about various insurance schemes regarding to industry.
7. Prepare report for approval of *SMALL SCALE INDUSTRIES UNIT CERTIFICATION*.
8. Approach the appropriate authority of *SALES TAX / EXISE DUTY / ELECTRICITY / WATER SUPPLY*, & gather the information in view of starting a new establishment.

Learning Resources:**Books:**

Sr. No.	Name of Author	Name of Books	Publisher
1	N.V.Srivastava	Training Manual on human Resource Management & Organization Learning	--
2	Joseph K.Mandass	Entrepreneurship & Venture Management	--
3	Banga & Banga	Project Planning & Entrepreneurship	--
4	Uday Pareek	Behavioral Process in Organization	--
5	O. P. Khanna	Production management	

Course Name : VOCATIONAL DIPLOMA IN AUTOMOBILE

Course Code : VA

Semester : FOURTH

Subject Title : PROJECT WORK

Subject Code :

Teaching and examination scheme:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER HRS	TH	TEST	PR	OR	TW
--	--	04	--	--	--	--	50#	50@

RATIONALE:- full freedom has been given for the project report writing /presenting. all facilities will be provided to the student by the institution.

OBJECTIVE:

The Students are expected to get acquainted with the existing market project having socio-economic impact on automobile engineering community. With concept the students will get full knowledge of automobile engineering industry and built confidence for starting the industry with proper knowledge of marketing.

GUIDELINES:

1. Team Size: - Max . 5 students or individual.
2. Selection of project Topic :- Each team by self or in consultation with any staff Member or expert from out side, it should be Intimated to the project coordinator.
3. Sponsorship: - sponsored by self or other sponsoror.
4. Guide lines for selection of the project: - the students are having full freedom to select the project. The project shall be selected looking at the market potential or research in the field of automobile engineering. It should have good market potential and socio-economical impact on automobile engineering community.
5. Submissions Project :-
 - I. Working on the project can be started from the beginning of the course and submitted 15 days earlier than the date of examination.
 - II. The working on the project can be continued after examination in the same institute and the institute must provide all the infrastructure to the student.
6. Guidelines for the setup of project: -

Introduction

 - a. Decision to be self-employed.
 - b. Selection of project.
 - c. Selection of location and site.
 - d. Provisional Registration.
 - e. Statutory licenses /clearances.
 - f. Organizational structure
 - g. Standard and specifications
 - h. Product.
 - i. Market.
 - j. Suggested capacity.
 - k. Land and Building.

Course Name : VOCATIONAL DIPLOMA IN AUTOMOBILE

Course Code : VA

Semester : FOURTH

Subject Title : SEMINAR

Subject Code :

Teaching and examination scheme:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER HRS	TH	TEST	PR	OR	TW
--	--	--	--	--	--	--	50#	--

RATIONALE:- Due to globalization effective communication is utmost important in industries. Which requires the collection, compilation & presentation of technical information in effective manner. So this subject is included to develop the presentation skill of student.

SEMINAR SELECTION

Seminar should be based on recent topics. It should cover the latest development in the field of production process, development analysis, quality control, production management advanced technology used in the automobiles etc. The seminar report should consist of minimum 20 to 30 pages & submitted at the end of semester. The student has to give presentation in front of the external examiner.

IV) TOOLS, MACHINERY,EQUIPMENTS etc.

SR. NO	ITEM	QTY
A) TRAINEES TOOL KIT		
01	Steel rule 15 cm. English and metric	17 Nos
02	Screw driver 20cm. X 9mm, Blade	17 Nos
03	Screw driver 30 cm. X 12mm, Blade	17 Nos
04	Spanner D.E. set of 12 pieces (6mml to 32mm)	17 Nos
05	Pliers combination 20 cm.	17 Nos
06	Pliers side cutting 15 cm	17 Nos
07	Plier round nose 15 cm	17 Nos
08	Plier flat nose 15 cm	17 Nos
09	Hand file 20 cm. Second cut flat	17 Nos
10	Hand file 20 cm. Second cut half-round	17 Nos
11	Hand file 20 cm. Smooth triangular	17 Nos
12	Hand file 30 cm. bastard	17 Nos
13	Hand file 30 cm. Round bastard	17 Nos
14	Center punch 10 cm.	17 Nos
15	Chisel cold flat 20 mm.	17 No
16	Feeler gauge 20 blades (metric)	17 Nos
17	Steel tools box with lock and key (folding type)size 400X200X150mm	17 Nos
B) SHOP OUTFIT & MEASURING INSTRUMENTS		
18	Hollow punch set of seven pieces 6mm to 15mm	1 Set.
19	Drift punch copper 15 cm	2 Nos.
20	Prick punch 15 cm.	2 Nos.
21	Allen key set of 12 pieces (2mm to 14mm)	2 Nos.
22	Philips Screw Driver set of 5 pieces (100mm to 300 mm)	04Sets
24	Rule steel 30 cm. English and metric	04Sets
25	Engineer's square 15 cm.	2 Nos
26	Dividers spring 15 cm	2 Nos
27	Ball peen Hammer 0.5kg.	2 Nos
28	Scriber with scribing block universal	16 Nos.
29	Marking out table 90X60X90 cm.	4 No
30	Hacksaw frame adjustable	1 Nos.
31	Engineers stethoscope	4 Nos.
32	Hand vice –37 mm	1 Nos
33	Drill Twist (assorted)	2 Nos
34	Taps and Dies complete sets (5 types)	10 Nos
35	Hand reamers adjustable 10.5 to 11.25mm,11.25 to 12.75 mm, 12.75 to 14.25 mm and 14.25 to 15.75 mm	2 Sets
36	Micrometer out side 0-25 mm, 25-50 mm, 50-75 mm,75-100 mm	1 eash
37	Micrometer inside 25-50 mm,50-75, 75-150 mm with extension rod.	1 Each
38	Mallets wooden/plastic.	2 nos
39	Spanner, ring set of 12 metric sizes 6 to 32 mm.	21 Sets
40	Spanner , adjustable 15cm,	1 No
41	Spanners socket with speed handle, T-bar, ratchet and universal up to 32 mm set of 28 pieces with a box	2 Sets
42	Adjustable spanner (pipe wrench 350 mm)	2 Nos
43	Chain and pulley block 3000 kg. Capacity electric type	1 No
44	Horses and wheel chock	4 Nos.each

45	Screw jack one tone, capacity double lift	2 Nos.
46	Hydraulic jack with trolley capacity 3 Ton	1 No.
47	Oil can 0.5/0.25 liter capacity	2 No.
48	Cleaning tray 45x30 cm.	4 No.
49	Piston ring expander	1 No.
50	Piston Ring Compressor	2 No.
51	Piston Ring Groove Cleaner.	2 No.
52	Cylinder ridge remover /cutter.	1 No.
53	Torque wrench 5 to 35 Nm,12 –68 Nm& 50 –225Nm	1 each
54	Work bench 250x 120x60 cm with 2 vices 12 cm Jaw	2 No.
55	Pullers screw powered 2 mm gap with bearing puller attachment	1 No.
56	Vice grip pliers	2 No.
57	Circle pliers Expanding and Contracting type 15 cm and 20 cm inch	8 Sets.
58	Inspection lamp with guard and wandering lead of 50ft.	1 No.
59	Crow bar	1 No.
60	Feeler gauge piston (metric)	1 Set
61	Cleaning tray –Aluminum 45x30 cm	8 Nos.
62	Valve spring Lifter	1 Nos.
63	Valve grinding tool – suction type	6 Nos.
64	Valve key inserter	1 Nos.
65	Cylinder bore gauge capacity 20 to 160 mm	2 Nos.
66	Portable electric drill 6 mm	1 No.
67	Circlip pliers 15 cm .Expanding type	1 No.
C) GENERAL INSTALLATION / MACHINERIES		
68	Fuel feed pump	1No
69	Injector	2Nos.
70	Surface Plate 60x60 cm	1 No.
71	‘V’ Block 75 x38mm pair with Clamps	2 Nos.
72	Drilling machine bench to drill up to n12 mm die	1 No.
73	Electric pedestal grinder with two 18cm. Wheel	1 No.
74	Compression testing gauge to read 0 to 115 kg/sq.cm	1 No.
75	Vacuum gauge to read 0 to 760 mm of Hg	1 No.
76	Fuel injection pump –pneumatic governor ,R.Q.V governor and R.S.V governor	2 Nos. each
77	Disc brake with caliper assembly	2 Nos.
78	Valve seat cutting tools complete with guides and pilot bar (all angles)	1 Set
79	Bearing puller screw powered /hydraulic powered with attachments Max spread 80,200 and 300mm	1Each
80	Straight edge gauge 4 ft.	1No.
81	4 Wheeler diesel vehicle different models	2Nos.
82	Synchromesh gear box of LCV	2 Nos.
83	Gear box with differential (Transaxle)	1 No.
84	Diaphragm type clutch assembly	2 Nos.
85	Drum brake assembly	2 Nos.
86	Tandem master cylinder with booster	4 Nos.
87	Diesel engine 4 stock for practice ,up to 80 H.P	4 Nos.
88	Wheel cylinder	4 Nos.
89	Lead acid battery 12 V	4 Nos.
90	Battery charger 6 –24 with 10 A rating	1 Nos.
91	C.V. Joint units of 3 different types	4 sets
92	Diesel Engine of latest models of vehicles	2 Nos.

93	Diesel engine 4 stroke up to 10HP/80HP running condition	1 No.
94	Injector tester (hand operated)	1 no
95	Injector dismantling jig with mounting bench	1 no.
96	Fuel injector cleaning kit (in a wooden box complete)	4Sets
97	Tachometer – pointed type to read up to 5000 RPM	1no
98	Cut model of 4 stroke diesel engine on stand	1no
99	Triple leg grip puller with bearings attachment screw/hydraulic Powered maximum spread 80,160,250,450mm	1 no.