

STUDY & EVALUATION SCHEME

Diploma in Engineering – Final Year

Branch – Automobile Engineering

Year – Year-III, Semester-VI

S. No.	Subject Code	Subject	Periods			Evaluation Scheme				Subject Total
						Sessional			Exam.	
						L	T	P	CT	
Theory Subjects										
1.	DAE-601	Dynamics of Machines	03	01	00	30	20	50	100	150
2.	DAE-603	Automobile Engine	03	01	00	30	20	50	100	150
3.	DAE-604	Automobile Technology	03	01	00	30	20	50	100	150
4.	DAE-605	Automobile Maintenance, Service And Repairing	03	01	00	30	20	50	100	150
5.	DAE-607	Metrology and Quality Control	03	01	00	30	20	50	100	150
6.	DEV-601	Environmental Education And Disaster Management	03	01	00	30	20	50	100	150
Practical Subjects										
1.	DAE-652	Metrology Lab	00	00	02	10	10	20	30	50
2.	DAE-653	Automobile Engg. Lab	00	00	02	10	10	20	30	50
3.	DAE-656	Project	00	00	02	10	10	20	50	70
4.		General Proficiency	-	-	-	-	-	50	-	50
		Total	18	06	06	-	-	-	-	1120

DYNAMICS OF MACHINES

DAE-601

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UNIT-I

DYNAMICS OF MACHINES :

Static and dynamic force analysis, Graphical and analytical approaches, Engine mechanisms, Turning moment diagram, Flywheel analysis, Gyroscopic action in machines.

UNIT-II

GOVERNORS;

Types and classification, Principle of working of gravity controlled and spring controlled governors, Stability, Isochronisms, Sensitivity and capacity.

UNIT-III

UNBALANCE IN MACHINES;

Origin of unbalanced forces and moments and effects of unbalance, Unbalance in rotating bodies and balancing of discs and rotors, Balancing machines, Field balancing of

discs and rotors, Unbalance in reciprocating machines -engine, Compressor, Presses.

UNIT-IV

ENGINES AND BALANCING;

Unbalance force and moment in a single cylinder engine and balancing, Multi cylinder engine balancing in Line engine, V and Radial engines, Lanchester balancing techniques.

UNIT-V

VIBRATIONS;

Vibration of single degree of freedom, Systems, Free forced, Damped and undamped vibration, Frequency response and resonance, Bare excitation - Transmissibility and Isolation, Free vibration 2 DOF system - Concept of normal mode, vibration absorber, Multidegree of freedom systems, Free vibration of bars, Shafts and beams, Energy methods and approximate methods.

AUTOMOBILE ENGINE

(DAE-603)

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UNIT-I

GENERAL CONCEPT OF AUTOMOBILES:

Their classification name and make of some India made automobiles. Layout of chassis.

Meaning of the terms : Front wheel drive, Rear wheel drive, Four wheel drive,

Front and Rear wheeled vehicles. Basic requirements of an automobile.

Study of specifications of different engines used in Indian vehicles.

CHOICE OF POWER UNIT FOR AN AUTOMOBILE:

Torque and power requirements of an automobile in various conditions.

Torque characteristics of some power units such as Gas turbine, Electric motor and I.C. engine;

their suitability to automobile needs. Draw back of I.C. engine to meet these needs.

Measures taken to make it suitable to these needs.

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UNIT-II

I.C. ENGINE:

Multicylinder engine, Construction and material of its Piston and Connecting rod Assembly; Crank shaft, Fly wheel and Bearings; Engine valve and Valve operating mechanism (Cam shaft, Valve timing gears, Tappet, Push rod, Rocker and Valve springs). Advantage of multicylinder engine for automobiles use,

Firing order, Arrangement of cylinders. Valve positions and design of combustion chamber cylinder head and gasket. Wankle rotary engine. Idea of super charging, its advantages phenomenon of knocking or detonation, its cause and effect on engine. Octane number and cetane number.

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UNIT-III

FUEL SUPPLY AND IGNITION SYSTEM:

PETROL ENGINE:

Fuel supply circuit components (fuel tank to engine), their function. Exhaust pipe and silencer. Construction and working of mechanical and electrical fuel pumps, carburettor, its function. Simple carburettor, its limitations. Modified carburettor-Zenith, Carter, Solex and S.U. carburettors, their construction and working. Carburettor Controls-Throttle, Choke (Conventional, Automatic). Airfuel ratio, its variation with speed. Magneto and Coil Ignition Systems-Working of coil ignition system for multicylinder engine and electronic ignition system, Ignition timing, Ignition advance and retard-Their need and factors on which they depend. Spark Plugs-their types as used in automobile engines. Location of spark plug.

DIESEL ENGINE:

Fuel supply circuit for Diesel engine, Primary and secondary fuel filter, their positioning in the circuit. Construction and working of fuel pump and fuel injection pump. Governor and injector, Solid and Air injection in Diesel engine. Distributor types of diesel Injection pump. Turbulence in filters wet and dry

types. Inlet and exhaust manifolds arrangement. Exhaust pipe and silencer. Concept of fuel energy saving.

MULTI POINT FUEL SUPPLY FOR PETROL ENGINE :

Construction, Fuel Supply system and working

Introduction to other fuels - CNG, Battery, etc.

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UNIT-IV

COOLING SYSTEM:

Necessity for cooling the engine Air cooling, Shapes of cooling fins. Field of application for air cooling. Water Cooling- Thermosyphon system, Pump circulated water cooling system. Details of water cooling system-Water jackets, Hose, radiators and fans. Thermostat, Water pump and pressure type radiator cap, Anti freeze and anti corrosive additives. Engine cooling liquids other than water and their characteristics. 6

UNIT-V

LUBRICATION SYSTEM OF AUTOMOBILE ENGINES:

Principle of lubrication on multicylinder petrol/diesel engine. Types of lubrication systems-Splash type, Pressure type and Combined. Types of lubrication pumps, pump drive, Relief valves, Oil pressure, Oil filters and their location in lubrication system, Crank case ventilation, Crank case dilution.

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Ref Books:

1. AUTOMOBILE ENGINE: G.B.S NARANG.
2. AUTOMOBILE ENGINE: R.K. RAJPUT

AUTOMOBILE TECHNOLOGY

DAE-604

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UNIT-I

AUTO TRANSMISSION SYSTEM

(a) CLUTCH:

Function of clutch in an auto mobile, Construction detail of single plate and multi plate friction clutches, Centrifugal and semicentrifugal clutch. Construction and working of fluid flywheel.

(b) GEAR BOX:

Its function, Assembly detail and working of sliding Mesh, constant mesh, Synchromesh and epicyclic gear boxes. Simple concept of over drive, overrunning clutch, transfer case and torque converter.

(c) PROPELLER SHAFT:

Its function, Universal joint and slip joint, Hotchkiss drive and Torque tube drive.

(d) FINAL DRIVES:

Concept of tail pinion, Crown wheel, Differential type rear axle.

(e) WHEELS AND TYRES:

Sizes of tyres used in Indian vehicles, over inflation, under inflation and their effect. Causes of tyre wear, Tyre retreading, idea of Toe in, Toe out, Camber, Caster, King pin inclination. Advantages of tube less tyres over tyres with tubes. Wheel alignment and balancing, Tyre rotation, Difference between radial and cross ply.

UNIT-II

STEERING, BRAKING AND SUSPENSION SYSTEM

Its function, Principle of steering. Ackerman and Davis steering gears, Steering gear types, Worm and nut, Worm and wheel, Worm and roller, Rack and pinion type. Concept of steering system commonly used in Indian Vehicles. Concept of steering locking assembly, introduction to power steering. Construction details and working of mechanical, Hydraulic and Vacuum brakes, disc brake, air brake, Introduction to power

brake. Details of master cylinder, Wheel cylinders , Concept of brake drum and brake linings and brake adjustment. Function of suspension system. Types of suspension systems, Working of leaf springs, Coil springs. Shock absorbers, Torsion bar suspension and stabilisers. Mac pherson system.

UNIT-III

STORAGE BATTERY

Storage Battery constructional detail of lead acid cell battery. Specific gravity preparation of electrolyte, effect of temperature, Charging and discharging on specific gravity of electrolyte. Capacity and efficiency of battery. Battery charging from D.C. mains, A.C. mains, Battery charger-Charging circuit, care and maintenance of batteries. Checking of cells for voltage and specific gravity of electrolyte.

DYNAMO AND ALTERNATORS;

Introduction to Dynamo and its details, Regulators- Voltage, current and compensated types. Cutout Construction working and their adjustment. Alternators-Construction and working, charging of battery from alternator. Use of battery, dynamo/alternator in an automobile.

ENGINE STARTING;

Engine starting circuit, Drive motor and its characteristics, Conditions of starting and behaviour of motor at starting. Starter Drive-Bendix pinion, Torsion, compression, Clutch and sliding armature type. Starter Switch-Manual, over running, solenoid and vacuum switches. Turbo charging and inter-cooling.

UNIT-IV

AUTOMOBILE WIRING & LIGHTING SYSTEM:

Earth return and insulated return systems-6 volts, 12 volts and 24 volts systems, Positive and negative earthing, Fuse in circuit, Automobile cables-Specifications and colour

code. Diagram of a typical wiring systems. Principle of auto illumination, Lighting requirement-Head lamp mounting and construction, sealed beam lamp, Assymetrical head lights, dip and full beam type bulb, auxillary type lights. Polarised head light, Flesher unit, Warning lights and panel lights. Fore head lamp systems. Other lamps-Pass lamps, Fog lamp, reversing lamps. Switching of lamps. Parking brake, Direction indicators. Electric horns, Revolution counter, Speedometer, Fuel gauge, Pressure gauge, Temperature gauge, Wind screen wipers, stereo system and speaker, introduction to remote sensing devices. Microprocessor control of automobile.

UNIT-V

VEHICLE AIRCONDITIONING AND STUDY OF SPECIFICATION FOR DIFFERENT UNITS

Meaning of airconditioning and its applications, brief idea of various type heat loads in vehicles, concepts of room air conditioner, fundamental of comfort air conditioning and its conditions, brief idea of air-conditioning cycle and its layout, fundamental and working of compressor magnet clutch, condenser, evaporator, expansion valve, thermo switch,

three way solenoid valve, check valve, fan assembly and airconditioners relay, H.V.A.C.

Clutch, Gear Box, Propeller Shaft, Final Drive, Wheel and

tyre manufactured in India

AUTOMOBILE MAINTENANCE, SERVICING & REPAIR

(DAE-605)

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UNIT-I

ENGINE MAINTENANCE & REPAIRING :

Maintenance, Maintenance schedule, Routine Maintenance schedule for petrol engine and diesel engine, lubricating chart, cleaning and adjustment, preventive maintenance, trouble shooting for faults in engines. Overhauling of engines, Adjusting the engine timing, Maintenance and adjustment of carburetor and fuel injection pump. Checking the valve clearance and adjustment, valve grinding and

lapping, engine tuning, detection and rectification of faults using compression gauge and vacuum gauge, general methods of predelivery inspection of vehicle.

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UNIT-II

REPAIRING PROCESSES:

Cylinder reboring and resleeving, Removal of liners and fitting, inspection; Repair and fitting of valve and valve guides, checking the connecting rod for bending and connecting rod alignment, inspection of crank shaft for ovality and regrinding, Phasing and calibration of fuel injection pump, nozzle testing, cleaning and grinding.

REPAIR AND MAINTENANCE OF RADIATOR AND LUBRICATING SYSTEM:

Radiator repair and maintenance, Maintenance of lubricating system, Flushing the lubricating system, Change of used lubricating oils, cleaning and fitting of oil filter lubrication of water pump, grades of oils, multi grade oil, additives for improving the quality of oil.

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UNIT-III

CHASIS REPAIR AND MAINTENANCE:

Grease and greasing points requiring greasing, specifications of greases to be used for different parts, repair of tyres and tubes, greasing of wheel bearing, rotating schedule for front and rear tyres, bleeding of brakes, pedal play adjustment in clutch and brakes, adjustment, change of brake lining, testing of brakes, disassembly greasing and recambering of leaf spring.

ELECTRICAL SYSTEM REPAIR AND MAINTENANCE :

Starter trouble, shooting and suggesting remedies, removal of starter from engine, repairing the starter, bushes and bushes replacement, checking of armature for short circuit, cleaning of commutators, checking, repairing of starter drive reassembly and testing of starter, dynamo, lubricating the dynamo, changing the bushes, checking and turning the electrical horn.

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UNIT-IV

ACCESSORIES OF ELECTRICAL SYSTEM AND THEIR SERVICE :

Wind screen, wiper, electrical horn and relay, cigarette lighter, growler, spark plug cleaner and tester, electrical test bench.

TOOLS AND EQUIPMENTS:

Cylinder reboring machine, surface grinder, arbor press, valve seat cutter and grinder, valve refacer crank shaft grinder, engine tune up instruments, feeler gauge, Timing light (Neon light), Tachometer, Spark Plug cleaner micrometer, vernier callipers, cylinder gauge, dial gauge, hydraulic hoist specification and working, car washer specification and working, air compressor specification and utility, screw jack, bearing puller, fuel pump testing and calibration machine, nozzle testing machine, grease guns.

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UNIT-V

AUTOMOBILE POLLUTION & CONTROL :

Source and control of automobile air pollution, causes of automobile pollution and their remedies monitoring and analysis of auto exhaust emission, legislative action, judicial response.

Introduction to energy conservation.

REPAIR AND MAINTENANCE OF VEHICLE AIR CONDITIONING SYSTEM :

Testing and Charging of Air Conditioner, care & maintenance electrical components, noise level system, fresh air allowance, primary & secondary circuit, heat exchanger, cooling & dehumidifying coil. Care & servicing-Air control unit, temperature control unit, magnet clutch, condenser, fan assembly, Evaporator, relays, expansion valve, filters and three way solenoid valve. Checking of harness of air conditioning.

METROLOGY AND QUALITY CONTROL

DME-607/ DAE-607

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UNIT-1

INTRODUCTION TO METROLOGY

Metrology Basis: Definition of metrology, objectives, categories, scientific metrology, Industrial metrology, legal metrology, need of inspection, precision, accuracy, sensitivity, readability, calibration, traceability, reproducibility, sources of errors.

Linear and Angular Measurements: Definition of standards, line & end standards, end and length bars, wave length standards. Instruments used for angular measurements:

(a) Vernier and optical Bevel Protractor. (b) Sine bars angle gauges, clinometer, Auto collimator. 8

UNIT-2

SURFACE FINISH

Meaning of surface texture, surface roughness, methods of measuring surface finish, stylus probe instruments, tomlinson surface meter, root mean square value, center line average value, symbols for designating the surface roughness on drawings.

MACHINE TOOL TESTING

Parallelism, straightness, squareness, coaxiality, roundness, alignment testing of machine tools such as lathe machine, milling machine & drilling machine. Study of optical flat for flatness testing. 8

UNIT-3

LIMITS, FITS, TRANSDUCERS, COMPARATORS

Concept of limits, fits and tolerances, interchangeability, hole & shaft basis system, Taylor principle. Transducers: classification of transducers, active & passive, resistive, inductive, capacitive, piezo resistive, thermo-resistive.

Comparators: classification of comparators, use & working principle of comparators, dial indicator, sigma comparator, pneumatic comparator-high pressure differential type, electrical (LVDT) advantages & disadvantages.

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UNIT-4

TEMPERATURE MEASUREMENT

Non electrical methods- Bimetallic, liquid in glass and pressure thermometer .

Electrical methods- Platinum resistance thermometer, thermistor, RTD.

Pyrometers- radiation & optical.

MEASUREMENT OF VIBRATIONS

Seismic Accelerometer, Potentiometric type, L.V.D.T. Type, Piezoelectric type accelerometer.

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UNIT-5

QUALITY CONTROL

Quality: Definitions, meaning of quality of produce & services, Quality characteristics, Quality of design, Quality of conformance, Quality of performance, Concept of reliability, cost, Quality assurance, Cost of network & repair, Quality & Inspection, Inspection stages.

Total Quality Management: Principles & concept of total quality management.

- (a) Quality Audit: Concept of audit practices, lead assessor certification.
- (b) Six sigma: statistical meaning, methodology of system improvement.
- (c) Introduction of ISO 9001-2008.ISO-14000 & TS 16949.

Statistical Quality Control: Basics of Statistical concepts, Meaning & importance of SQC, Variable & attribute Measurement. Control charts-inherent & assignable sources of variation, control charts for variables-X & R charts, control charts for attributes, p, np, C charts, process capability of machines, Cp & Cpk calculations, determination of statistical limits, different possibilities, Rejection area, statistically capable & incapable processes.

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References:

1. D. S. Kumar: Mechanical Measurement & Control

Publication:- Metropolitan, New Delhi.

2. R. K. Jain: Mechanical & industrial Measurements

Khanna Publication, New Delhi.

3. S. K. Singh Industrial Instrumentation & Control: - Tata

McGraw Hill.

4. R.K. Rajput Mechanical Measurement &

Instrumentation: - KATSON Publication.

ENVIRONMENTAL EDUCATION & DISASTER MANAGEMENT

DEV-601

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UNIT-I

INTRODUCTION;

Basics of ecology, Ecosystem, Biodiversity Human activities and its effect on ecology and eco system, different development i.e. irrigation, urbanization, road development and other engineering activities and their effects on ecology and eco system, Mining and deforestation and their effects.

- Lowering of water level , Urbanization.
- Biodegradation and Biodegradability, composting, bio remediation, Microbes .Use of biopesticides and biofungicides.
- Global warning concerns, Ozone layer depletion, Green house effect, Acid rain,etc Sources of pollution, natural and man made, their effects on living environments and related legislation.

UNIT-II

WATER POLLUTION & NOISE POLLUTION

Factors contributing water pollution and their effect.

- Domestic waste water and industrial waste water. Heavy metals, microbes and leaching metal.
 - Physical, Chemical and Biological Characteristics of waste water.
 - Indian Standards for quality of drinking water.
 - Indian Standards for quality of treated waste water.
 - Treatment methods of effluent (domestic waste water and industrial/ mining waste water), its reuse/safe disposal
- Sources of noise pollution, its effect and control.

UNIT-III

AIR POLLUTION AND RADIOACTIVE POLLUTION

Definition of Air pollution, types of air pollutants i.e. SPM, NOX, SOX, CO₂, NH₃, F, CL, causes and its effects on the environment.

- Monitoring and control of air pollutants, Control measures techniques. Introductory Idea of control equipment in industries i.e.

A. Settling chambers

B. Cyclones

C. Scrubbers (Dry and Wet)

D. Multi Clones

E. Electro Static Precipitations

F. Bog Fillers.

- Ambient air quality measurement and their standards.

- Process and domestic emission control

- Vehicular Pollution and Its control with special emphasis of

Euro-I, Euro-II, Euro-III and Euro IV. Sources and its effect on human, animal, plant and material, means to control and preventive measures.

UNIT-IV

SOLID WASTE MANAGEMENT AND LEGISLATIONS

Municipal solid waste, Biomedical waste, Industrial and Hazardous waste, Plastic waste and its management.

Preliminary knowledge of the following Acts and rules madethere under-

- The Water (Prevention and Control of Pollution) Act - 1974.

- The Air (Prevention and Control of Pollution) Act - 1981.

- The Environmental Protection (Prevention and Control of

Pollution) Act -1986. Rules notified under EP Act - 1986

Viz.

The Manufacture, Storage and Import of Hazardous

Chemical (Amendment) Rules, 2000

The Hazardous Wastes (Management and Handling)

Amendment Rules, 2003.

Bio-Medical Waste (Management and Handling) (Amendment)

Rules, 2003.

The Noise Pollution (Regulation and Control)

(Amendment) Rules, 2002.

Municipal Solid Wastes (Management and Handling) Rules,

2000.

The Recycled Plastics Manufacture and Usage (Amendment) rules, 2003.

UNIT-V

ENVIRONMENTAL IMPACT ASSESSMENT(EIA) AND DISASTER MANAGEMENT

Basic concepts, objective and methodology of EIA. Objectives and requirement of Environmental Management System (ISO-14000) (An Introduction).

Definition of disaster - Natural and Manmade, Type of disaster management, How disaster forms, Destructive power, Causes and Hazards, Case study of Tsunami Disaster, National policy- Its objective and main features, National Environment Policy, Need for central intervention, State Disaster Authority- Duties and powers, Case studies of various Disaster in the country, Meaning and benefit of vulnerability reduction, Factor promoting vulnerability reduction and mitigation, Emergency support function plan.

Main feature and function of National Disaster Management Frame Work, Disaster mitigation and prevention, Legal Policy Frame Work, Early warning system, Human

Resource Development and Function, Information dissemination and communication.

METROLOGY LAB

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1. Measurement of angle with the help of sine bar/vernier Bevel protractor.
2. Study and sketch of various types of optical projectors.
3. Use of comparators for measurement
4. To measure the diameter of a hole with the help of precision balls.
5. Measurement of Taper by standard balls and rollers.
6. To test the squareness of a component with autocollimeter.
7. To measure the pitch, angle and form of thread of a screw.
8. Measurement of gear elements by using gear tooth vernier.
9. To measure the straightness of the edge of a component with the help of autocollimeter.
10. Use of linear measuring instrument such as vernier calliper
and micrometer.
11. Use of height gauge and vernier callipers.

AUTOMOBILE ENGINEERING AND MAINTENANCE LAB

(DAE-653)

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AUTOMOBILE ENGINEERING:

Any Ten Exp:

1. Study And Sketch Of

- i. Battery Ignition System.
- ii. Magnetic Ignition System.

2. Study And Sketch Of

- i. Head Light Model.
- ii. Wiper and Indicator.

3. Study And Sketch Of

- i. Radiator.
- ii. Water Pump.
- iii. Oil Pump.
- iv. Shock Absorber.

4. Study And Sketch Of

- i. A. C. Pump
- ii. S. V. Pump
- iii. Master Cylinder

5. Study And Sketch Of

- i. Rear axle
- ii. Differential
- iii. Steering System
- iv. Bendix Drive

6. Checking and setting of ignition on timing using timing light for advance and retard.

7. Charging of Automobile battery and measuring cell voltage and specific gravity of electrolyte.

8. Determination on of gear ratio of an auto engine tachometer/stroboscope.

9. Cleaning and adjustment a carburetor.

10. Changing of wheels and checking the alignment of wheels.

11. Fault finding practice of an automobile four wheeler (petrol/Diesel)

12. Driving Practice of four wheeler.

AUTOMOBILE MAINTENANCE:

Any ten Exp:

1. Study and sketch of hand tools different gauges and their use.
2. Automobile engine cylinder boring practice.
3. Valve face grinding , tapping and reaming of valve guide.
4. Light vehicle brake drum turning practice.
5. Nozzle cleaning , testing and adrouotment.
6. Assemble and deassemble of petrol and diesel engine of an automobile vehicle
7. Setting a regulator of cut out and testing of dynamo and rectify its minor repairs.
8. Phasing and calibration of diesel fuel injection pump.
9. Engine Turning of an automobile engine.
10. Checking and overhandling of car radiator.
11. Automobile engine cylinder honing practice.
12. Overhandling of hydraulics brake system.

Measuring of spark plug gap, valve clearance and ring clearance, grinding and lapping operation for adjustment.