

2.1 THERMAL ENGG.

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RATIONALE

A diploma holder in Automobile Engineering is supposed to look after the I.C engines, air compressors and air conditioning of automobiles. Therefore, it is essential to teach concepts, principles, applications and practices covering laws of thermodynamics, basic air cycles, types of fuel used and their properties and components of air conditioners. Hence this subject has been included in this course.

DETAILED CONTENTS

1. Thermodynamic terminology (10 periods)
Concept of thermodynamics, heat, temperature, intensive and extensive properties, path, process, system, surroundings, enthalpy, internal energy and thermodynamic work
2. Gas Laws (11 periods)
Boyle's law, Charle's law, Joule's law, Characteristic gas equation, gas constant, universal gas constant. Simple numerical problems based on above laws.
3. Laws of Thermodynamics (10 periods)
Zeroth law of thermodynamics, Irreversible process, First law of thermodynamics, Second law of thermodynamics (concept only), Thermal efficiency, Heat pump, heat engine and heat sink, concept of entropy, Constant volume, constant pressure, isothermal, adiabatic, polytropic, throttling and free expansion processes.
4. Air Cycles (10 periods)
Carnot cycle – concept only, Otto cycle, Diesel cycle, Dual combustion cycle.
5. Air Compressors (08 periods)
Reciprocating air compressor, Centrifugal compressor, Rotary air compressor - its types. Working of single stage and double stage compressor and applications, super charging
6. Refrigeration and Air Conditioning (11 periods)
 - Concept of refrigeration, Unit of refrigeration, refrigerants, heat pump, coefficient of performance, rating of refrigeration machines
 - Principles of air conditioning, Concept of human comfort, Air-conditioning system, components of air conditioning system and their function

LIST OF PRACTICAL

1. Identification of components in air-conditioning system
2. Study of components of a refrigerator
3. To study different air compressors
4. To study room air conditioning system

LIST OF BOOKS

1. Thermal Engineering by SK Kulshreshtha; Vikas Publishing House Pvt. Ltd., Delhi
2. Thermal Engineering by A.S. Sarao; Satya Prakashan, New Delhi
3. Engineering Thermodynamics by Valan A. Arasu, TMH, Delhi
4. Thermal Engineering by P.L. Ballaney; Khanna Publishers, Delhi
5. Thermal Engineering by R.K. Rajput; Laxmi Publications, New Delhi

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted for Lecturers and Tutorials (Periods)	Marks Allotted
1.	10	08
2.	11	10
3.	10	08
4.	10	08
5.	08	07
6.	11	09
TOTAL	60	50

2.2AUTOMOTIVE MATERIALS

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RATIONALE

Lot of developments have taken place in the field of materials. New materials are being developed and it has become possible to change the properties of materials to suit the requirements. Diploma holders in this course are required to make use of different materials for various applications. For this purpose, it is necessary to teach them basics of metal structure, properties, usage and testing of various ferrous and non ferrous materials and various heat treatment processes. This subject aims at developing knowledge about the characteristics, testing and usage of various types of materials used in industries.

DETAILED CONTENTS

1. Introduction (09 period)

Material, History of material origin, Scope of Material Science, Overview of different engineering materials and application, Classification of materials, Thermal, chemical, electrical, mechanical properties of various materials, present and future needs of materials Usage –Economical, Environmental and Social

2. Metal and Alloys (17 period)

- Introduction - History and development of iron and steel, Different iron ores, Raw Materials in Production of Iron and Steel, Basic Process of Iron making and steel making, Classification of iron and steel
- Cast Iron - Different types of Cast Iron, manufacture, properties and their usage
- Steels - Steels and alloy steel, Classification of plain carbon steels, availability, Properties and usage of different types of Plain Carbon Steels, effect of various alloys on properties of steel, Uses of alloy steels (high speed steel, stainless steel, spring steel, silicon steel, ultra light steel)
- Non Ferrous Materials - Properties and uses of Light Metals and their properties, properties and uses of White Metals and their alloys, Aluminum , Magnesium

3. Theory of Heat Treatment (12 period)

Purpose of heat treatment, Solid solution and its types, Iron Carbon diagram, Formation and decomposition of Austenite, Martensite Transformation – Simplified Transformation Cooling Curves various heat treatment processes – hardening, tempering, annealing, normalizing, Case hardening and surface hardening. Types of heat treatment furnaces required for above operations (only basic idea)

4. Engineering Plastics (10 period)

Important sources of plastics, Classification – Thermoplastic and Thermo Set and their uses, various trade names of engineering plastics, Plastic Coatings

5. Other Important Materials (12 period)

- Composites - Classification, properties, application
- Ceramics and Silicon - Classification, properties, application
- Heat Insulating Materials

LIST OF PRACTICALS

1. Classification of about 5 specimen of materials/parts into

- Metals
- Metals and Alloys
- Ferrous and non ferrous metals

- Ferrous and non ferrous alloys
2. Given a set of specimen of metals and alloys (copper, brass, aluminum, cast iron, HSS, Gun metal), identify and indicate the various properties possessed by them
 3. Study of metallurgical microscope and a specimen polishing machine.
 4. To prepare specification of following materials for microscopic examination and to examine the micro structure of specimens of following materials (i) Brass (ii) Copper (iii) Cast Iron (iv) Mild steel
 5. To anneal a given specimen and find out difference in hardness as a result of annealing.
 6. To temper a given specimen to find out the difference in hardness as a result of Tempering.

RECOMMENDED BOOKS

1. Material Science by GBS Narang; Khanna Publishers, New Delhi
2. Material Science and Metallurgy by RB Choudary; Khanna Publishers, New Delhi
3. Material Science by G. Narula, Tata McGraw Hill, Delhi
4. Material Science by RK Rajput; SK Kataria and Sons, Ludhiana

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted for Lecturers and Tutorials (Periods)	Marks Allotted
1.	09	09
2.	17	14
3.	12	10
4.	10	08
5.	12	09
TOTAL	60	50

2.3 AUTO ENGG. DRAWING

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RATIONALE

An Automobile Engineering diploma holder, irrespective of his field of operation in an industry or transport undertaking, is expected to possess a thorough understanding of engineering drawing, which includes clear spatial visualization of the subject and the proficiency in reading and interpreting a wide variety of drawings. Besides this, he is also expected to have a certain degree of drafting skills depending upon his job functions to perform his day-to-day activities e.g. communicating and discussing the ideas with his superiors and passing on instructions to his subordinates in an unambiguous way. The teachers are recommended to lay emphasis on showing automobile components to students..

DETAILED CONTENTS

Assembly Drawings of the following automotive components:

1. Joints and Bearings (20 period)
 - Cotter Joint
 - Knuckle Joint
 - Universal joint
 - Bush bearing
 - Plummer block or pedestal bearing
 - Ball bearing
 - Roller bearing- Straight and Needle type
2. Engine Components (20period)
 - Four Stroke Petrol Engine Piston
 - Diesel Engine Piston
 - Connecting rod
 - Crank shaft – 4 cylinder Engine
 - Spark Plug
3. Gears (05 period)
 - Nomenclature of gears
 - Profile of spur gear by ‘Approximate method’
 - Profile of spur gear by “Unwin’s Method’
4. Cam Profile (10 period)
 - Different types of cams and followers
 - Drawing of cam profile for following motion of follower
 - a. Uniform velocity motion
 - b. Simple harmonic motion (SHM)
 - c. Uniformly accelerated and retarded motion
5. Coupling (05 period)

Flange coupling – Protected, unprotected and flexible, muff coupling, Oldham coupling

RECOMMENDED BOOKS

1. Auto Engineering Drawing by RB Gupta; Satya Parkashan, New Delhi
2. Automobile Engg. Drawing by Raj Kumar, North Publication, Jalandhar
3. Machine Drawing by PS Gill; BD Kataria and Sons, Ludhiana
4. Machine Drawing by Lakshminarayan; Jain Brothers, New Delhi

2.4 BASIC COMPUTER APPLICATION

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RATIONALE

Computer has great influence on all aspects of life. Almost all work places and living environment are being computerized. In order to prepare diploma holders to

work in these environments, it is essential that they are exposed to various aspects of

information technology such as understanding the concept of information technology and

its scope; operating a computer; use of various tools of MS office; using internet etc. form

the broad competency profile of diploma holders. This exposure will enable the students

to enter their professions with confidence, live in a harmonious way and contribute to the

productivity.

DETAILED CONTENT LIST OF PRACTICALS

1. Given a PC, name its various components and list their functions

2. Identification of various parts of a computer and peripherals

3. Practice in installing a computer system by giving connection

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4. DOS Commands (internal / external) e.g. TYPE, REN, DEL, CD, MD, COPY, TREE, BACKUP

5. Exercises on entering text and data (Typing Practice using any tutor)

6. Features of Windows as an operating system

- Start

- Shutdown and restore

- Creating and operating on the icons

- Opening closing and sizing the windows

- Using elementary job commands like – creating, saving, modifying, renaming, finding and deleting a file

- Creating and operating on a folder

- Changing setting like, date, time color (back ground and fore ground)

- Using short cuts

- Using on line help

7. MS-Word

- File Management:

Opening, creating and saving a document, locating files, copying contents in some different file(s), protecting files, Giving password protection for a file

- Page Set up:

Setting margins, tab setting, ruler, indenting

- Editing a document:

Entering text, Cut, copy, paste using tool- bars

- Formatting a document:

Using different fonts, changing font size and colour, changing the appearance through bold/ italic/ underlined, highlighting a text, changing case, using subscript and superscript, using different underline methods

- Aligning of text in a document, justification of document, Inserting bullets and numbering

- Formatting paragraph, inserting page breaks and column breaks, line spacing

- Use of headers, footers: Inserting footnote, end note, use of comments

- Inserting date, time, special symbols, importing graphic images, drawing tools

- Tables and Borders:

Creating a table, formatting cells, use of different border styles, shading in tables, merging of cells, partition of cells, inserting and deleting a row in a table

- Print preview, zoom, page set up, printing options

- Using Find, Replace options

- Using Tools like:

Spell checker, help, use of macros, mail merge, thesaurus word content and
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RECOMMENDED BOOKS

1. Fundamentals of Computer by V . Rajaraman; Prentice Hall of India Pvt. Ltd., New Delhi
2. Computers Today by SK Basandara, Galgotia Publication Pvt ltd. Daryaganj, New Delhi.
3. MS-Office 2000 for Everyone by Sanjay Saxena; Vikas Publishing House Pvt. Ltd., New Delhi
4. Internet for Every One by Alexis Leon and Mathews Leon; Vikas Publishing House Pvt. Ltd., Jungpura, New Delhi
5. A First Course in Computer by Sanjay Saxena; Vikas Publishing House Pvt. Ltd., Jungpura, New Delhi
6. Mastering Windows 95, BPB Publication, New Delhi
7. Computer Fundamentals by PK Sinha; BPB Publication, New Delhi

2.5 BASICS OF AUTO ENGINE

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RATIONALE

Engine forms the heart of an automobile. This subject deals with engine terminology, basic concept of 2 stroke and 4 stroke engine, classification of engines, constructional details of engine, cooling system and lubrication system.

DETAILED CONTENTS

1. Introduction (16 period)

Layout and working of internal combustion engine

- Engine terms - Bore, stroke, dead centres, compression ratio, swept volume, clearance volume, capacity, torque, power at the crank shaft
- Classification and brief description of engines as per stroke, cycle, fuel, ignition, cooling, number and arrangement of cylinders, valve arrangement
- Alternate Fuel Engine
 - LPG/CNG vehicles
 - Electric vehicles
 - Hybrid vehicles

2. Constructional Details (16 period)

- Constructional details of cylinder block, cylinder head, cylinder liner, piston, piston coatings, piston rings, gudgeon pin, connecting rod, crankshaft, camshaft, valve timing, variable valve timing and lift, valve mechanisms, flywheel.

3. Performance of Engine (11 period)

Performance curves, Effect on engine performance due to atmospheric temperature, pressure, compression ratio, engine speed, working conditions, dirt, desert, hills, injection timing/spark timing. Air fuel ratio.

4. Cooling System (11 period)

Necessity of cooling system. Air cooling, Water cooling system. Components of water cooling system- Radiators, thermostat, water pump, fan, pressure cap, water jackets, antifreeze solution. Trouble shooting

5. Lubrication System (10 period)

Necessity of lubrication, types of lubricants, lubricant rating, oil additives, effect of engine conditions on consumption of lubricant oil, crank case ventilation, pressure lubrication system, splash lubrication. Components of lubrication system-oil pump, oil lines, oil filters, oil coolers, classification and service ratings of lubricating oil, additives for lubricants.

6. Fuels (11period)

Desirable properties of engine fuels, types of auto engine fuels. Properties of conventional fuels (petrol, diesel), properties of alternative fuels (Alcohols, LNG, CNG, LPG, Bio-Diesel, Hydrogen)

LIST OF PRACTICALS

1. Servicing of lubricating system
2. Servicing of fuel systems in petrol engines
3. Servicing of fuel injector
4. Servicing of F.I.P (Fuel Injection Pump)
5. Engine tune up
6. Servicing of cooling system
7. Study of engine block.

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted for Lecturers and Tutorials (Periods)	Marks Allotted
1.	16	12
2.	16	10
3.	11	06
4.	11	06
5.	10	08
6.	11	08
TOTAL	75	50

2.6 ENVIRONMENTAL SCIENCE

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RATIONALE

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Any people must have knowledge of different types of pollution caused due to industries and constructional activities so that he may help in balancing the eco system and controlling pollution by pollution control measures. He should also be aware of environmental laws related to the control of pollution.

DETAILED CONTENTS

1. Basics of ecology, eco system and sustainable development **(03 Period)**
2. Conservation of land reforms, preservation of species, prevention of advancement of deserts and lowering of water table **(03 Period)**
3. Sources of pollution - natural and man made, their effects on living and non-living organisms, Pollution of water - causes, effects of domestic wastes and industrial effluent on living and non-living organisms, Pollution of air-causes and effects of man, animal, vegetation and non-living organisms, Sources of noise pollution and its effects **(16 Period)**
4. Solid waste management; classification of refuse material, types, sources and properties of solid wastes, abatement methods **(06 Period)**
5. Mining, blasting, deforestation and their effects **(03 Period)**
6. Legislation to control environment **(04 Period)**
7. Environmental Impact Assessment (EIA), Elements for preparing EIA statements **(04 Period)**
8. Current issues in environmental pollution and its control, role of non-conventional sources of energy in environmental protection **(06 Period)**

RECOMMENDED BOOKS

1. Environmental and Pollution Awareness by Sharma BR; Satya Prakashan, New Delhi.
2. Environmental Protection Law and Policy in India by Thakur Kailash; Deep and Deep Publications, New Delhi.
3. Environmental Engineering and Management by Suresh K Dhamija; SK Kataria and Sons, New Delhi.
4. Environmental Science by Deswal and Deswal; Dhanpat Rai and Co. (P) Ltd. Delhi.

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted for Lecturers and Tutorials (Period)	Marks Allotted
1.	03	03
2.	03	05
3.	16	20
4.	06	06
5.	03	02
6.	04	04
7.	04	04
8.	06	06
TOTAL	45	50