

**Scheme of Teaching and Examination for  
VI Semester DIPLOMA in MECHANICAL ENGINEERING**

**THEORY**

Sr. No.	SUBJECTS	SUBJECT CODE	TEACHING SCHEME		EXAMINATION - SCHEME					
			Periods per Week	Periods in one Session (Year)	Hours of Exam.	Terminal Exam. (A) Marks	Final Exam. (B) Marks	Total Marks (A+B)	Pass Marks Final Exam.	Pass Marks in the Subject
1.	Professional Studies & Entrepreneurship	00601	06	60	03	20	80	100	26	36
2.	Manufacturing Technology-II	25602	06	60	03	20	80	100	26	36
3.	Industrial Management	25603	04	50	03	20	80	100	26	36
4.	Drawing & Design	25604	04	50	04	20	80	100	26	36
5.	Elective*		06	60	03	20	80	100	26	36
	Non-Conventional Energy Sources	25605A								
	Refrigeration and Air-Conditioning	25605B								
	CAD/CAM	25605C								
	Auto CADD	25605D								
<b>Total:-</b>			<b>26</b>					<b>500</b>		

**PRACTICAL**

Sr. No.	SUBJECTS	SUBJECT CODE	TEACHING SCHEME		EXAMINATION – SCHEME					
			Periods per Week	Periods in one Session (Year)	Hours of Exam.	Marks Internal Exam. (A)	Marks External Exam. (B)	Total Marks (A+B)	Pass Marks Final Exam.	Pass Marks in the Subject
6.	Mechanical Engineering Lab.	25606	08	150	03	10	40	50	16	21
7	Elective Lab.		04	60	03	10	40	50	16	21
	Non-Conventional Energy Sources Lab	25607A								
	Refrigeration and Air-Conditioning Lab	25607B								
	CAD/CAM Lab	25607C								
	Auto CADD Lab	25607D								
<b>Total:-</b>			<b>12</b>					<b>100</b>		

**SESSIONAL**

Sr. No.	SUBJECTS	SUBJECT CODE	TEACHING SCHEME		EXAMINATION - SCHEME			
			Periods per Week	Periods in One Session (Year)	Marks of Internal Examiner (X)	Marks of External Examiner (Y)	Total Marks (X+Y)	Pass Marks in the Subject
8.	Professional Studies & Entrepreneurship	00607	04	50	20	30	50	25
9.	Drawing & Design	25608	--	--	20	30	50	25
10.	Project Work & Its Presentation in Seminar	25609			20	30	50	25
<b>Total:-</b>			<b>04</b>				<b>150</b>	

<b>Total Periods per Week</b>	<b>42</b>	<b>Total Marks = 750</b>
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# PROFESSIONAL STUDIES & ENTREPRENEURSHIP

<b>Subject Code</b> <b>00601</b>	<b>Theory</b>			<b>No of Period in one session : 60</b>		
	<b>No. of Periods Per Week</b>			<b>Full Marks</b>	<b>:</b>	<b>100</b>
	<b>L</b>	<b>T</b>	<b>P/S</b>	<b>Annual Exam.</b>	<b>:</b>	<b>80</b>
	<b>06</b>	<b>-</b>	<b>-</b>	<b>Internal Exam.</b>	<b>:</b>	<b>20</b>

**Rationale:**

The paper has been introduced to achieve dual purpose for the students. Firstly, this course provides the basics of Professional management and secondly it also prepares the student to develop self reliance by becoming an entrepreneur.

This makes them conversant with their duties and responsibility to make them successful in their career building by developing profession expertise.

**Objectives:**

With the input provided in this paper, the students will be able to :-

- Acquire basic knowledge of management.
- Understand the various area of management such as human resources, marketing, finance and commercial aspect, production & material management etc.
- Understand the benefit of becoming an entrepreneur.
- Handle a project efficiently and independently.
- To avail subsidies / grants / loan etc. from various of agencies.

## PART-I: PROFESSIONAL STUDIES

**TOPIC:**

**01 – INTRODUCTION:**

01.01	Professional Ethics: Definition, Objective, Right & Wrong, Duty & Obligation	[05]
01.02	Management: Definition, Function and Objectives.	[05]
01.03	Leadership: Definition, Types – Autocratic, Democratic and Laissez – faire, Functions and Characteristics of Leadership.	[05]
01.04	Motivation : Definition, Types and Importance / Benefits	[05]
01.05	Forms of Business organization: Sole proprietorship, Partnership, Joint Stock company and Co-operative Societies.	[05]
01.06	Supervisor’s/Technician’s role: Concept of supervisory management, career needs, Role of Technicians in an organization.	[05]

## PART-II: ENTREPRENEURSHIP

**TOPIC:**

**02 – INTRODUCTION:**

02.01	Entrepreneurship: Concept, Characteristics of a successful entrepreneurship, basic ingredients of entrepreneurship: 1. Finance 2. Technology 3. Sales and Marketing	[10]
02.02	Project Report: Meaning, Project Identification, Project Selection, Contents of a project Report, Techno-Economic Feasibility Report ( TEFRR), Market Survey.	[10]

02.03 Sources of Finance: [05]  
Government, Commercial Banks, Financial institutions:  
SIDBI – Small Industries development Bank of India  
SFC – State Financial Corporations  
IDBI – Industrial Development Bank of India  
IFCI – Industrial Finance Corporation of India  
ICICI – Industrial Credit Investment Corporation of India

02.04 Acts : [05]  
Indian factories Act 1948 ( Main Provision Only)  
Consumers Protection Act 1986 ( Main Provision Only)

**03 – PROJECT WORK:**

As elaborated in Sessional Paper (00607).

**Books Recommended :**

1. Essential of Management, Tata McGraw Hill, Publishing Company Ltd., New Delhi. - Herald Koonz & Cyril O' Donnel.
2. Business Organization and Management, S. C. Chand and Company (Pvt.) Ltd., Ram Nagar, New Delhi - M. C. Shukla.
3. Managerial Economics, Sultan Chand & Sons, New Delhi - R. L. Vashney & K. L. Maheshwari
4. Project Appraisal and Follow up, Govind Prakashan, Mumbai. - D. P. Sharda
5. Modern Marketing Management, Progressive Corporation Pvt. Ltd., P51, Mahatma Gandhi Road, Bombay-400 001 - Dr. Rustam S. Davar
6. A hand book for new entrepreneurs (with special reference to science and technology target group) - Entrepreneurship Development Institute of India, 83-A, Swastic Society Navrangpura, Ahmedabad, PIN-380 009.

**Reference Books :**

1. Leadership in Organisation - Published by I.S.T.E. Mysore
2. Motivation - Published by I.S.T.E. Mysore
3. Motivation - I.I.T. Kanpur - Published by I.S.T.E. Mysore
4. A Hand book on Project Appraisal and follow up, Govind Prakashan, 204, Saraswati Kunj, 90, S. V. Road, Goregoan, Bombay-400 062. - D. P. Sarda
5. Bihar Industrial Policy - Government of Bihar, Department of Industries.
6. Entrepreneurship Guide - Bihar State Financial Corporation, Fraser Road, Patna-800 001.

## MANUFACTURING TECHNOLOGY - II

<b>Subject Code</b> <b>25602</b>	<b>Theory</b>			<b>No of Period in one session : 60</b>		
	<b>No. of Periods Per Week</b>			<b>Full Marks</b>	<b>:</b>	<b>100</b>
	<b>L</b>	<b>T</b>	<b>P/S</b>	<b>Annual Exam.</b>	<b>:</b>	<b>80</b>
	<b>06</b>	<b>-</b>	<b>-</b>	<b>Internal Exam.</b>	<b>:</b>	<b>20</b>

**Rationale :**

The modern trend in Engineering field i.e. in industrial production is very competitive owing to the new business policies being adopted by world traders. In a competitive marketing the product needs higher accuracy together with man production at lower price to suit the pocket of the consumers. This has resulted in need for adoptions of new machine tools, new processes and techniques automation and controls. The need of higher strength of materials being used in aero-space and other alike field, still requires advance technique of machining.

The Diploma holders being employed in supervisory capacity in different industrial concern must be conversant with essential traditional machine tools and processes and the modern technique & controls being adopted in developed and developing countries.

The introduction of this revised curriculum on subject named Manufacturing Technology-II is a very balanced effort to extend our technicians a comprehensive knowledge of traditional machine tools and techniques being adopted by modern industries.

**Objective:**

After completion of the course a student will be able to :-

- Classify Milling Machines and Milling operations.
- Select milling cutter.
- Give specification of milling machine.
- Know the different processes of gear manufacturing.
- Select best gear manufacturing method.
- Know the grinders.
- Select wheels for different grinding operations.
- Know the precision finishing operation.
- Develop knowledge in handling of broaches.
- Know the presses, classify, different press operation, dies and punches and their accessories.
- Develop design skill of jigs and fixtures and their applications.
- Know the different special purpose machines and operations carried on.
- Develop basic concept of C. N. C. machines and C. A. M.
- Understand the principle of modern machinery methods.

<u>S.No.</u>	<u>Topics</u>	<u>Periods</u>
01	Milling Process.	(08)
02	Gear Manufacturing.	(08)
03	Grinding.	(08)
04	Super Finishing Process.	(07)
05	Broaching.	(05)
06	Press Work.	(10)
07	Jigs & Fixtures.	(07)
08	Modern Machining Method.	(07)
<b>Total :</b>		<b>(60)</b>

## CONTENTS:

<b><u>TOPIC: 01 – MILLING PROCESS:</u></b>	<b>[08]</b>
Introduction, Classification, Important parts and its functions, Mechanism, Work and cutter holding devices, Attachments, Types of Milling cutters, Different milling process.	
<b><u>TOPIC: 02 – GEAR MANUFACTURING:</u></b>	<b>[08]</b>
Introduction, Different methods, Indexing and dividing heads, Form cutters, Gear generating processes, Gear hobbing, Shaving, burnishing, grinding.	
<b><u>TOPIC: 03–GRINDING:</u></b>	<b>[08]</b>
Introduction, Classification, Grinding m/c, its parts and functions, Different types of grinding m/c centreless grinding, Work holding devices, Dry and wet grinding, Allowances and tolerances, Grinding Wheels, marking system, selection, binding glazing, loading, dressing & mounting of grinding wheels.	
<b><u>TOPIC: 04 – SUPER FINISHING PROCESS :</u></b>	<b>[07]</b>
Introduction, working Principle, application, advantages and limitations of Lapping, Honing, Polishing, Electroplating and Metal Spraying.	
<b><u>TOPIC: 05 – BROACHING:</u></b>	<b>[05]</b>
Introduction, broach and its types, Different broaching methods, broaching machines, fixtures for different operations, advantages and limitations.	
<b><u>TOPIC: 06 – PRESS WORK:</u></b>	<b>[10]</b>
Introduction, different operations, Press classification, selection, size, press tools-punch and die, die accessories, types of dies, clearance, feeding mechanism, Power press, main parts and working, driving mechanism.	
Operation performed on press :-	
<ul style="list-style-type: none"><li>• Notching,</li><li>• Piercing,</li><li>• Blaming,</li><li>• Shearing,</li><li>• Nibbling,</li><li>• Perforating etc.</li></ul>	
<b><u>TOPIC: 07 – JIGS &amp; FIXTURES:</u></b>	<b>[07]</b>
Introduction, difference between jig and fixture, advantages and limitations, design principles, Elements of jigs and fixtures, principle of location, drilling jigs, milling fixtures.	
<b><u>TOPIC: 08 – MODERN MACHINING METHOD:</u></b>	<b>[07]</b>
Introduction, need, applications, advantages, limitation, working principles of electric discharge machining (EDM), Ultrasonic Machining (USM), Electrochemical Machining (ECM), Abrasive Jet Machining (AJM). Numerical Control (NC) and Computerized Numerical Control (CNC) Machines.	
<b>Books Recommended:</b>	
1. Workshop Technology	- Hazra & Choudhary
2. Workshop Technology	- Raghuvanshi
3. Workshop Technology, Vol.-II & III	- Chapman
4. Workshop Technology, HMT Publication	-
5. A Text Book of Production Engineering, S. Chand & Co. Ltd., Delhi	- P. C. Sharma
6. Modern Machining Methods	- M. Adittam
7. Modern Trend in Machine & Technology, I. S. T. E., Mysore.	-
8. N. C. & C. N. C. Machine Tools, I. S. T. E., Mysore.	-

# INDUSTRIAL MANAGEMENT

<b>Subject Code</b> <b>25603</b>	<b>Theory</b>			<b>No of Period in one session : 50</b>		
	<b>No. of Periods Per Week</b>			<b>Full Marks</b>	<b>:</b>	<b>100</b>
	<b>L</b>	<b>T</b>	<b>P/S</b>	<b>Annual Exam.</b>	<b>:</b>	<b>80</b>
	<b>04</b>	<b>-</b>	<b>-</b>	<b>Internal Exam.</b>	<b>:</b>	<b>20</b>

## **Rationale & Objective:**

By studying industrial management paper, diploma students will become acquainted with skills of management, have knowledge about site selection, plant layout, purchasing, stores, material handling, safety management, maintenance and problem control.

<u>S.No.</u>	<u>Topics</u>	<u>Periods</u>
01	Functions of Management.	(05)
02	Business organisation.	(05)
03	Site Selection & Plant layout.	(06)
04	Purchase Management.	(05)
05	Inventory Control.	(06)
06	Material Management.	(05)
07	Safety Management.	(06)
08	Environmental Pollution Control.	(06)
09	Plant Maintenance.	(06)
<b>Total :</b>		<b>(50)</b>

## **CONTENTS:**

### **TOPIC: 01 – FUNCTIONS OF MANAGEMENT: [05]**

01.01 Definition, objective, importance, classification, functions of management planning, organising authority and responsibility communicating, directing, co-ordinating, control, motivation, decision-making.

### **TOPIC: 02 – BUSINESS ORGANISATION: [05]**

02.01 Introduction, necessity, classification line, functional line and staff, organisation-advantages and disadvantages, organisation chart, Project organisation, public, private and joint sector enterprises.

### **TOPIC: 03– SITE SELECTION & PLANT LAYOUT: [06]**

03.01 Importance of site selection, factors affecting plant location, Rural Vs. Urban location. Plant layout, objectives, advantages of good plant layout, classification, comparison between product layout and process layout.

### **TOPIC: 04 – PURCHASE MANAGEMENT : [05]**

04.01 Purchasing, objective, function, classification of purchasing organisation, purchase procedure.

### **TOPIC: 05 – INVENTORY CONTROL: [06]**

05.01 Introduction, importance, classification, advantage, economic order quantity (EOQ), A-B-C analysis, numericals. Function of Stores Management, Centralised and decentralized stores.

**TOPIC: 06 – MATERIAL MANAGEMENT:** [06]

06.01 Introduction, definition, principles and function, types, selection of material handling equipments, handling of hazardous materials, relation to plant layout.

**TOPIC: 07 – SAFETY MANAGEMENT:** [06]

07.01 Introduction, importance, steps for safety, functions, compensation for injury.

**TOPIC: 08 – ENVIRONMENTAL POLLUTION CONTROL:** [06]

08.01 Introduction, factors affecting environment, effects of pollution on ecology, air pollution control, water pollution control, solid waste management, noise pollution control.

**TOPIC: 09 – PLANT MAINTENANCE:** [06]

09.01 Objective, importance, duties, function and responsibilities of plant maintenance department, types and disadvantages, plant maintenance schedule.

**Books Recommended:**

1. Industrial Engineering & Management - O. P. Khanna
2. Industrial Engineering & Management - S. K. Sharma & S. Sharma
3. Organisation and Management - Banga & Sharma

# DRAWING & DESIGN

<b>Subject Code</b> <b>25604</b>	<b>Theory</b>			<b>No of Period in one session : 50</b>		
	<b>No. of Periods Per Week</b>			<b>Full Marks</b>	<b>:</b>	<b>100</b>
	<b>L</b>	<b>T</b>	<b>P/S</b>	<b>Annual Exam.</b>	<b>:</b>	<b>80</b>
	<b>04</b>	<b>-</b>	<b>-</b>	<b>Internal Exam.</b>	<b>:</b>	<b>20</b>

**Rationale :**

This course is aimed at further reinforcing and enhancing the knowledge skill acquired in the earlier courses. The exercise included in the course would provide the students such experiences which he would encounter later in his professional life.

The day to day function carried out in the drawing and design department of an industry are multifarious. Some of these functions are planning, sketching, deciding specification, determining factors and providing dimensions etc.

This course is so designed as to provide the students such experiences where he can apply his knowledge acquired from various subjects.

**Objective:**

A student will be able to :-

- (i) Read and understand drawing.
- (ii) Prepare assembly and dessembly drawings.
- (iii) Design machine parts.
- (iv) Prepare working drawing.
- (v) Develop skill to draw sketches of simple machine parts, assembly machine parts.
- (vi) Impart ideas, convey information and specify shape through drawing.

<u>S.No.</u>	<u>Topics</u>	<u>No. of Sheets</u>	<u>Periods</u>
<b>Part-I (Machine Drawing)</b>			
01	Assembly of machine parts.	7	(81)
02	Working drawing.	1	(12)
		<b>Total :</b>	<b>(93)</b>
<b>Part-II (Machine Design)</b>			
03	Design of Machine Parts.	01(Half Size)	(09)
04	Design of Fasteners.	01(Half Size)	(09)
05	Design of Keys and Couplings.	01(Half Size)	(09)
06	Design of Power Screws.	01(Half Size)	(09)
07	Design of Springs.	01(Half Size)	(06)
08	Design of Power transmission.	01(Half Size)	(09)
09	Design of Bearings	01(Half Size)	(06)
		<b>Total :</b>	<b>(57)</b>
		<b>Grand Total :</b>	<b>(150)</b>

**N.B. - One design on half drawing sheet or two design on full drawing sheet.**

**CONTENTS:**

**PART-I ( MACHINE DRAWING)**

**TOPIC: 01 –ASSEMBLY OF MACHINE PARTS:** [07] [81]

- 01.01 Feed Check valve.
- 01.02 Lathe Slide Rest
- 01.03 Machine Vice (plain & Swivel)
- 01.04 Tool head of shaping machine.
- 01.05 Tail stock of a Lathe.
- 01.06 Drilling jig
- 01.07 Ball and Roller bearing.
- 01.08 Hydraulic expansion joint.
- 01.09 Connecting rod of I. C. Engine.
- 01.10 Automiser.
- 01.11 Cam Profile.
- 01.12 Gears in mesh (Spur gears/Bevel gears/Worm & Worm Wheel.



<b><u>TOPIC: 02 – WORKING DRAWING:</u></b>	[01]	[12]
02.01 Working Drawing of designed machine part.		
<b>PART-II (MACHINE DESIGN)</b>		
<b><u>TOPIC: 03 – DESIGN OF MACHINE PARTS:</u></b>	[01]	[09]
03.01 Cotter Joint.		
03.02 Kunckle Joint.		
<b><u>TOPIC: 04 – DESIGN OF FASTENERS:</u></b>	[01]	[09]
04.01 Rivetted Joint (Lap & Butt).		
04.02 Welded Joints.		
<b><u>TOPIC: 05 – DESIGN OF KEYS AND COUPLINGS:</u></b>	[01]	[09]
05.01 Protected type flange coupling.		
05.02 Pin type flexible coupling.		
05.03 Univesal Coupling.		
<b><u>TOPIC: 06 – DESIGN OF POWER SCREWS:</u></b>	[ 01]	[06]
06.01 Screw Clamp and nut.		
06.02 Screw Jack.		
<b><u>TOPIC: 07 – DESIGN OF SPRINGS:</u></b>	[01]	[06]
07.01 Close Coiled Hellical valve spring.		
07.02 Carriage spring.		
<b><u>TOPIC: 08 – DESIGN OF POWER TRANSMISSION:</u></b>	[01]	[09]
08.01 Single plate clutch.		
08.02 Spur gear used in speed reduction in lathe (Co-axial).		
<b><u>TOPIC: 09 – DESIGN OF BEARING:</u></b>	[01]	[06]
09.01 Solid Journal Bearing.		
09.02 Plumber Block.		
09.03 Ball and Roller Bearing.		

**Books Recommended:**

- |  |                              |
|--|------------------------------|
| 1. Engineering Drawing                                     | - A. C. Parkinson            |
| 2. Machine Drawing   | - Laxmi Narayan              |
| 3. Machine Drawing   | - N. D. Bhatt                |
| 4. Machine Drawing   | - Jones & Jones              |
| 5. Machine Design  | - N. C. Pandya & C.S. Shah   |
| 6. Machine Design  | - R. C. Patel & A. D. Pandya |
| 7. Machine Design  | - Vijay Vargeya              |
| 8. Machine Drawing, Oxford University Press, Madras-600006 | - T.T.T.I., Madras           |
| 9. Machine Design, S. Chand & Co.                          | - R. S. khurm                |

# NON-CONVENTIONAL ENERGY SOURCES

<b>Subject Code</b> <b>25605A</b>	<b>Theory</b>			<b>No of Period in one session : 60</b>		
	<b>No. of Periods Per Week</b>			<b>Full Marks</b>	<b>:</b>	<b>100</b>
	<b>L</b>	<b>T</b>	<b>P/S</b>	<b>Annual Exam.</b>	<b>:</b>	<b>80</b>
	<b>06</b>	<b>-</b>	<b>-</b>	<b>Internal Exam.</b>	<b>:</b>	<b>20</b>

**Rationale :**

Non-conventional energy sources have become the most urgent sources for replacement of conventional energy source because of rising cost, decreasing availability and causing pollution to environment. Knowledge of new technologies will enrich the technical know how of students and the increase their employment opportunities in upcoming sector of renewable energy.

**Objective:**

<u>S.No.</u>	<u>Topics</u>	<u>Periods</u>
01	Wind Energy.	(09)
02	Biomass Energy.	(10)
03	Geothermal Energy.	(10)
04	Energy from Ocean.	(07)
05	Fuel Cells.	(06)
06	Hydrogen Energy.	(06)
07	Energy Storage.	(06)
08	Energy Conservation.	(06)
<b>Total :</b>		<b>(60)</b>

**CONTENTS:**

**TOPIC: 01 – WIND ENERGY:** **[09]**

Introduction, Principle, wind energy conversion systems, types of wind machines, its performance, advantages and limitation.

**TOPIC: 02 – BIOMASS ENERGY:** **[10]**

Introduction, Bio-gas generation, composition, Bio-gas plants, site-selection, bio-mass gasifiers, applications, advantages and limitations.

**TOPIC: 03 – GEOTHERMAL ENERGY:** **[10]**

Introduction, geothermal sources, classification, compressed resources, exploration, environmental implications, applications, advantages and dis-advantages.

**TOPIC: 04 – ENERGY FROM OCEANS:** **[07]**

Introduction, Ocean thermal energy conversion, site-selection, utilization, tidal power energy conversion. Ocean waves, mini and micro hydel plants.

**TOPIC: 05 – FUEL CELLS:** **[06]**

Introduction, Classification, Principles, performance, application, advantages and limitations.

**TOPIC: 06 – HYDROGEN ENERGY:** **[06]**

Introduction, production, storage, transportation, safety, utility, comparison with other automobile fuels.

**TOPIC: 07 – ENERGY STORAGE:**

**[06]**

Introduction, classification, application, advantages, disadvantages of mechanical, electrical, chemical and thermal energy storage systems.

**TOPIC: 08 –ENERGY CONSERVATION:**

**[06]**

Introduction, Conservation of thermal and electrical energy in agriculture, industry, transport and home sector, Present energy scenario in India, Energy audit.

**Books Recommended:**

1. -
2. -
3. -
4. -
5. -
6. -
7. -

# REFRIGERATION & AIR - CONDITIONING

<b>Subject Code 25605B</b>	<b>Theory</b>			<b>No of Period in one session : 60</b>		
	<b>No. of Periods Per Week</b>			<b>Full Marks</b>	<b>:</b>	<b>100</b>
	<b>L</b>	<b>T</b>	<b>P/S</b>	<b>Annual Exam.</b>	<b>:</b>	<b>80</b>
	<b>06</b>	<b>-</b>	<b>-</b>	<b>Internal Exam.</b>	<b>:</b>	<b>20</b>

### Rationale and Objective :

Refrigeration and air-conditioning is essential for comfort of human being for increasing the efficiency of daily work. It is widely used in automotive Engg and medicine to maintain the refined temperature and humidity.

Diploma technicians need to know the knowledge of this subject to supply the suggestions about the above.

<u>S.No.</u>	<u>Topics</u>	<u>Periods</u>
01	Method of Refrigeration.	(04)
02	Air Refrigeration System.	(05)
03	Simple Vapour Compression Refrigeration System.	(08)
04	Vapour absorption and Electrolux Refrigeration System.	(05)
05	Refrigerant and its properties.	(03)
06	Refrigeration equipments and application of refrigeration.	(07)
07	Psychrometry.	(07)
08	Comfort air-conditioning.	(05)
09	Cooling Load Calculation.	(08)
10	Air Conditioning equipments and its application.	(05)
11	Maintenance of Refrigeration and air-conditioning system.	(03)
<b>Total :</b>		<b>(60)</b>

### CONTENTS:

#### **TOPIC: 01 – METHOD OF REFRIGERATION:** **[04]**

- 01.01 Ice Refrigeration.
- 01.02 Evaporative Refrigeration.
- 01.03 Dry Ice Refrigeration.
- 01.04 Steam Jet Refrigeration.
- 01.05 Unit of Refrigeration, engine, Refrigeration and heat pump.

#### **TOPIC: 02 – AIR REFRIGERATION SYSTEM:** **[05]**

- 02.01 Reversed Carnot Cycle and most efficient refrigeration.
- 02.02 Bell Coleman Refrigeration, Calculation of C. O. P.
- 02.03 Advantages and disadvantages of air-refrigeration system.
- 02.04 Necessity of cooling the aeroplane.
- 02.05 Limitations, merit and compactions of air refrigeration system (Numerical problems).

<b><u>TOPIC: 03 – SIMPLE VAPOUR COMPRESSION REFRIGERATION SYSTEM:</u></b>	<b>[08]</b>
03.01 Vapour Compression Refrigerator.	
03.02 T- $\phi$ , H- $\phi$ and P-H diagram for Vapour Compressions Refrigeration System.	
03.03 Analysis of Vapour Compression System.	
03.04 Wet versus dry compression.	
03.05 Advantages of Vapour Compressions over air refrigeration System.	
03.06 C. O. P. Calculation by analytically and by the help of tables & numerical problems.	
<b><u>TOPIC: 04 – VAPOUR ABSORPTION AND ELECTROLUX REFRIGERATION SYSTEM:</u></b>	<b>[05]</b>
04.01 Basic absorption system.	
04.02 Actual ammonia absorption system with block diagram.	
04.03 Electrolux refrigeration System with block diagram & working principle.	
04.04 Comparison of compression and absorption refrigeration system.	
<b><u>TOPIC: 05 – REFRIGERANT AND ITS PROPERTIES:</u></b>	<b>[03]</b>
05.01 Classification of Refrigerants.	
05.02 Physical properties of CO <sub>2</sub> , SO <sub>2</sub> , F-12 & F-22.	
05.03 Antifreeze solutions.	
<b><u>TOPIC: 06 – REFRIGERATION EQUIPMENTS AND APPLICATION OF REFRIGERATION:</u></b>	<b>[07]</b>
06.01 Compressors, Condensers and Cooling towers.	
06.02 Evaporators, Electric motors.	
06.03 Industrial, medical and comfort air conditioning.	
<b><u>TOPIC: 07 – PSYCHROMETRY:</u></b>	<b>[07]</b>
07.01 Introduction.	
07.02 Meaning of air-conditioning.	
07.03 Psychrometer properties and relations.	
07.04 Psychrometer chart and processes.	
07.05 Summer, Winter and Year round air-conditioning –Numerical problem.	
<b><u>TOPIC: 08 – COMFORT AIR-CONDITIONING:</u></b>	<b>[05]</b>
08.01 Requirement of Comfort air-conditioning.	
08.02 Thermodynamics of human body.	
<b><u>TOPIC: 09 – COOLING LOAD CALCULATION:</u></b>	<b>[09]</b>
09.01 Different heat sources.	
09.02 Conduction heat, radiation heat of sun, occupant and equipment load.	
09.03 Infiltration air load.	
09.04 Fresh air load. (Numerical Problems)	

**TOPIC: 10 – AIR CONDITIONING EQUIPMENTS AND ITS APPLICATION:**

[05]

- 10.01 Air cleaning and air filters.
- 10.02 Humidifiers and dehumidifiers.
- 10.03 Fan and blowers.
- 10.04 Grills and registers.
- 10.05 Heating and cooling coil.

**TOPIC: 11 – MAINTENANCE OF REFRIGERATION AND AIR-CONDITIONING SYSTEM:**

[03]

- 11.01 Charging of refrigeration unit air conditioning system.
- 11.02 Causes of faults and their remedies.

**Books Recommended:**

- 1. Refrigeration and Air Conditioning, Dhanpat Rai Publishers. - S. Domkundman.
- 2. Refrigeration and Air Conditioning, Tata McGraw Hill, New Delhi. - C. P. Arora.
- 3. Refrigeration and Air Conditioning - R. S. Khurana.
- 4. Basic Refrigeration of Air Conditioning, Tata McGraw Hill, New Delhi. - P. N. Ananthanarayan.
- 5. A Text Book of Refrigeration Air Conditioning, Eurasia Publication House Pvt. Ltd., New Delhi - R. S. Khanna & J. K. Gupta.

**Reference Books :**

- 1. Refrigeration and Air Conditioning, Prentice Hall India. - R. C. Jordan & G. P. Priester.
- 2. Refrigeration and Air. - Manohar Prasad.
- 3. Refrigeration and Air Conditioning Principles of Refrigeration Conditioning, Tata McGraw Hill, New Delhi. - W. F. Stocker & R. N. Dossel.
- 4. Refrigeration and Air Conditioning, Khanna Publishers. - P. L. Ballany.
- 5. Principle of Refrigeration, Rajdhani Publication House Pvt. Ltd. - D. P. Gupta.
- 6. Basic Refrigeration of Air Conditioning, Dhanpat Rai Publishers. - B. Hazre and D. N. Chakravarty.
- 7. Modev Refrigeration Practice, McGraw Hill. - G. R. King.
- 8. Principle of Air Conditioning, Allied Publishers Pvt. Ltd. - P. M. Patel and A. K. Mehta.
- 9. Refrigeration and Air Conditioning, S. Prakashan, New Delhi. - A. S. Sarao and P. S. Gaabi.
- 10. Refrigeration and Air Conditioning in the light of latest development, I. S. T. E. -

# CAD / CAM

<b>Subject Code 25605C</b>	<b>Theory</b>			<b>No of Period in one session : 60</b>		
	<b>No. of Periods Per Week</b>			<b>Full Marks</b>	<b>:</b>	<b>100</b>
	<b>L</b>	<b>T</b>	<b>P/S</b>	<b>Annual Exam.</b>	<b>:</b>	<b>80</b>
	<b>06</b>	<b>-</b>	<b>-</b>	<b>Internal Exam.</b>	<b>:</b>	<b>20</b>

**Rationale :**

**Objective:**

<u>S.No.</u>	<u>Topics</u>	<u>Periods</u>
01	Introduction.	(03)
<b>Computers, The Foundation Of CAD/CAM</b>		
02	Computer Technology.	(06)
03	Mini Computers, Micro Computers And Programmable.	(05)
<b>Computer-Aided Design</b>		
04	Fundamentals of CAD.	(06)
05	Hardware in Computer-Aided Design.	(06)
06	Computer Graphics Software & Data Base.	(06)
<b>Numerical Control, The Beginnings</b>		
07	Conventional Numerical Control.	(06)
08	NC part Programming.	(07)
09	Computer Controls in NC.	(03)
10	Industrial Robots.	(05)
11	Robot Applications.	(07)
<b>Total :</b>		<b>(60)</b>

**CONTENTS:**

<b><u>TOPIC: 01 – INTRODUCTION:</u></b>		<b>[03]</b>
01.01	CAD/CAM Defined.	
01.02	The Product Cycle and CAD/CAM.	
01.03	Automation and CAD/CAM.	
<b>COMPUTERS, THE FOUNDATION OF CAD/CAM</b>		
<b><u>TOPIC: 02 – COMPUTER TECHNOLOGY:</u></b>		<b>[06]</b>
02.01	Introduction.	
02.02	Central Processing Unit (CPU).	
02.03	Types of Memory.	
02.04	Input/Output.	
02.05	Date Representation.	
02.06	Computer Programming Languages.	
02.07	Operating the Computer System.	
<b><u>TOPIC: 03 – MINI COMPUTERS, MICRO COMPUTERS AND PROGRAMMABLE:</u></b>		<b>[05]</b>
03.01	Introduction.	
03.02	Mini Computers.	
03.03	Micro Computers.	
03.04	Programmable Controllers.	

## **COMPUTER-AIDED DESIGN**

### **TOPIC: 04 – FUNDAMENTALS OF CAD:**

[06]

- 04.01 Introduction.
- 04.02 The design process.
- 04.03 The Application of Computers for Design.
- 04.04 Creating the Manufacturing Data Base.
- 04.05 Benefits of Computer-Aided Design.

### **TOPIC: 05 – HARDWARE IN COMPUTER-AIDED DESIGN:**

[06]

- 05.01 Introduction.
- 05.02 The Design Workstation.
- 05.03 The Graphics Terminal.
- 05.04 Operator Input Devices.
- 05.05 Plotters and Other Output Devices.
- 05.06 The Central Processing Unit.
- 05.07 Secondary Storage.

### **TOPIC: 06 – COMPUTER GRAPHICS SOFTWARE & DATA BASE:**

[06]

- 06.01 Introduction.
- 06.02 The Software Configuration of a Graphics System.
- 06.03 Functions of a Graphics Package.
- 06.04 Constructing the Geometry.
- 06.05 Transformations.
- 06.06 Data base structure & Content.
- 06.07 Wire frame versus Solid modeling.
- 06.08 Other CAD Features & CAD/CAM Integration.

## **NUMERICAL CONTROL, THE BEGINNINGS**

### **TOPIC: 07 – CONVENTIONAL NUMERICAL CONTROL:**

[06]

- 07.01 Introduction.
- 07.02 Basic Components of an NC System.
- 07.03 The NC Procedure.
- 07.04 NC Coordinate Systems.
- 07.05 NC Motion Control Systems.
- 07.06 Applications of Numerical Control.

### **TOPIC: 08 – NC PART PROGRAMMING:**

[07]

- 08.01 Introduction.
- 08.02 The Punched Type in NC.
- 08.03 Type Coding and Format.
- 08.04 Manual Part Programming.
- 08.05 Computer-Assisted Part Programming.

### **TOPIC: 09 – COMPUTER CONTROLS IN NC:**

[03]

- 09.01 Introduction.
- 09.02 Problems with Conventional NC.
- 09.03 NC Controller Technology.
- 09.04 Computer Numerical Control.



- 09.05 Direct Numerical Control.
- 09.06 Combined DNC / CNC Systems.
- 09.07 Adaptive Control Machining Systems.

**TOPIC: 10 – INDUSTRIAL ROBOTS:**

[05]

- 10.01 Introduction.
- 10.02 Robot Physical Configuration.
- 10.03 Basic Robot Motions.
- 10.04 Other Technical Features.

**TOPIC: 11 – ROBOT APPLICATIONS:**

[07]

- 11.01 General Considerations in Robot Applications.
- 11.02 Material Transfer.
- 11.03 Machine Loading.
- 11.04 Welding.
- 11.05 Spray Coating.
- 11.06 Processing Operations.
- 11.07 Assembly.
- 11.08 Inspection.

**Books Recommended:**

- |   |   |
|---|---|
| 1. CAD/CAM(Computer Aided Design and Manufacturing),<br>Prentice Hall of India Pvt. Ltd., New Delhi-110 001.  | - Mikell P. Groover & Emory W. Zimmers, Jr. |
| 2. Mastering Auto CAD, BPB Publications, B-14, Connaught<br>Place, New Delhi  | - George Omura                              |
| 3. Auto CAD   | - Sachin Raje                               |
| 4. Principles of Computer Aided Design.   | - Joe Rooney and Philip.                    |
| 5. Computer Aided Electronic Circuit Design.  | - Raghuram                                  |
| 6. AutoCAD.   | - Rice                                      |
| 7. Inside Auto CAD, Prentice Hall of India Pvt. Ltd.  | - Dr. Racker and H. Rice                    |
| 8. Easy Auto CAD-A Tutorial Approach, McGraw Hill<br>International (Computer Science Services).   | -   |
| 9. Fundamentals of Engineering Drawing : with an introduction<br>to interactive Computer Graphics for Design and Production<br>(Latest Edition), Prentice Hall of India Pvt. Ltd. | - Warren J. Luzadder and John M. Duff.      |
| 10. An Introduction to Digital Computer Design, Prentice Hall of<br>India Pvt. Ltd.   | - Raja Raman and Radha Krishan              |
| 11. Users Manual of Release 12.   | -   |

# AUTO CADD

<b>Subject Code 25605D</b>	<b>Theory</b>			<b>No of Period in one session : 60</b>		
	<b>No. of Periods Per Week</b>			<b>Full Marks</b>	<b>:</b>	<b>100</b>
	<b>L</b>	<b>T</b>	<b>P/S</b>	<b>Annual Exam.</b>	<b>:</b>	<b>80</b>
	<b>06</b>	<b>-</b>	<b>-</b>	<b>Internal Exam.</b>	<b>:</b>	<b>20</b>

**Rationale :**

Like drawing and workshop practice, knowledge and practice of communication skill are necessary for development of professional competencies of a technician-engineer. He has to be conversant with Database Management and Graphics. The course will impart to the students the basic principles of computer uses especially in Graphics.

**Objective:**

A student will be able to :

- Handle a micro computer independently and perform some independent works.
- Make 2 D and 3 D drawing on computer.
- Convert 2 D drawings into 3 D drawing.
- Exchange (Import and Export) data from other software.

<u>S.No.</u>	<u>Topics</u>	<u>Periods</u>
01	Introduction to various CADD Tools.	(06)
02	Basic 2 D Drafting.	(12)
03	Advance 2 D Drafting.	(12)
04	Advance AUTO-CAD features.	(12)
05	3 D Drawing.	(12)
06	Import and Export of data from other software.	(06)
<b>Total :</b>		<b>(60)</b>

**CONTENTS:**

**TOPIC: 01 – INTRODUCTION TO VARIOUS CADD TOOLS:** **[06]**

- 01.01 Review of basic knowledge of Computers-Input and output devices, keyboard, Digitizer, Graphic Screen, Printers and Plotters, uses of networking in CAD centres and integrated approach of concept's design to manufacturing.
- 01.02 Introduction to development of Graphics from GKS, CORE, PHICS which provided subroutines for programming to specification-based tools for drawing and drafting.
- 01.03 Broad aspects of Mechanical CAD Designing and Analysis. Various types of CAD packages. Important Auto CAD features (Release 2004 or higher). Customizing Auto CAD.

**TOPIC: 02 – BASIC 2 D DRAFTING:** **[12]**

- 02.01 Drawing accurately, controlling the Graphics Display. Basic drawing and Editing Graphics entities. Introduction to Editing. Parametric Drawing. Multi-layer Drawing.

**TOPIC: 03 – ADVANCE 2 D DRAFTING:** **[12]**

- 03.01 Advance Editing. Drawing construction Techniques, Graphing entities into Blocks. Construction techniques with Blocks and xrefs. Sheet Composition Scaling and Plotting. Drawing enhancements and inquiry. Dimensioning.

**TOPIC: 04 – ADVANCE AUTO-CAD FEATURES:** [12]

04.01 Attributes and data Extraction. Advance dimensioning. Data Exchange with other applications.

**TOPIC: 05 – 3 D DRAWING:** [12]

05.01 Getting started with 3 D. Using 3 D entities. Dynamic 3 D Displays. Inside shading and Rendering. Inside solid and Region Modeling. Converting 2 D Drawing into 3 D Drawing.

**TOPIC: 06 – IMPORT AND EXPORT OF DATA FROM OTHER SOFTWARE:** [06]

06.01 Import and Export of Auto CAD Drawing from packages like Corel Draw, Photoshop etc. Drawing packages like paintbrush for colour rendering, documentation.

**Books Recommended:**

1. CAD/CAM(Computer Aided Design and Manufacturing), - Mikell P. Groover & Emory W. Prentice Hall of India Pvt. Ltd., New Delhi-110 001. Zimmers, Jr.
2. Mastering Auto CAD, BPB Publications, B-14, Connaught - George Omura Place, New Delhi
3. Auto CAD - Sachin Raje
4. Principles of Computer Aided Design. - Joe Rooney and Philip.
5. Computer Aided Electronic Circuit Design. - Raghuram
6. AutoCAD. - Rice
7. Inside Auto CAD, Prentice Hall of India Pvt. Ltd. - Dr. Racker and H. Rice
8. Easy Auto CAD-A Tutorial Approach, McGraw Hill - International (Computer Science Services).
9. Fundamentals of Engineering Drawing : with an introduction - Warren J. Luzadder and John M. to interactive Computer Graphics for Design and Production Duff. (Latest Edition), Prentice Hall of India Pvt. Ltd.
10. An Introduction to Digital Computer Design, Prentice Hall of - Raja Raman and Radha Krishan India Pvt. Ltd.
11. Users Manual of Release 12. -

# MECHANICAL ENGINEERING LAB

<b>Subject Code 25606</b>	<b>Practical</b>			<b>No of Period in one session : 150</b>		
	<b>No. of Periods Per Week</b>			<b>Full Marks</b>	<b>:</b>	<b>50</b>
	<b>L</b>	<b>T</b>	<b>P/S</b>	<b>Annual Exam.</b>	<b>:</b>	<b>40</b>
	<b>08</b>	<b>-</b>	<b>-</b>	<b>Internal Exam.</b>	<b>:</b>	<b>10</b>

**Rationale :**

A technician after graduating from Polytechnics has to tackle the problems of machine like refrigerator, Computer, I. C. engines. He quite often has to select, substitute the materials, and maintain quality.

He is to be conversant with the knowledge of the machine and properties of the materials. The course contents of the subject has been cast to develop sufficient skill on engine / machine performance testing as well as measurement testing as well as measurement of different properties of the materials in use.

**Objective:**

After completing the course a student will be able to :-

- ◆ Find out C. O. P. of the refrigerator.
- ◆ Find out the B. H. P. and fuel consumption / B. H. P. of a petrol and diesel engine.
- ◆ Find out the thermal efficiency of I. C. engines.
- ◆ Determine the impact value of materials.
- ◆ Determine the hardness of materials.
- ◆ Differentiate / distinguish various materials based on properties.
- ◆ Determine the tensile and compressive strength of materials.

**CONTENTS:**

Energy conversion laboratory

The following experiments will have to conducted :

- |    |  |      |
|----|--|------|
| 01 | To find out C. O. P. of a given refrigerator.                          | (15) |
| 02 | To find out the efficiency of a single stage reciprocating compressor. | (15) |
| 03 | Performance test of petrol engine                                      | (15) |
|    | (i) Mechanical efficiency.   |      |
|    | (ii) Fuel consumption / BH. P /hr                                      |      |
|    | (iii) Thermal efficiency.  |      |
| 04 | Performance test of diesel engine                                      | (15) |
|    | (i) Mechanical efficiency.   |      |
|    | (ii) Fuel consumption / BH. P /hr                                      |      |
|    | (iii) Thermal efficiency.  |      |
| 05 | To find out efficiency of a Pelton Turbine.                            | (15) |

**MATERIAL TESTING LABORATORY :**

- |     |  |      |
|-----|--|------|
| (A) | Tensile test on M.S. rod.  | (15) |
| (B) | Compression test on C. I. and Steel bars.  | (15) |
| (C) | Torsion test of mild steel.  | (15) |
| (D) | Impact test on M. S., Al., and brass.  | (15) |
| (E) | Hardness test on Rockwell and brinell machine of Mild Steel Tools sheet and brass. | (15) |

## NON – CONVENTIONAL ENERGY SOURCES LAB

Subject Code 25607A	Practical			No of Period in one session : 60		
	No. of Periods Per Week			Full Marks	:	50
	L	T	P/S	Annual Exam.	:	40
	-	-	04	Internal Exam.	:	10

### Rationale:

Non-Conventional Energy Sources have become the most important sources for replacement of conventional energy sources because of latter rising cost, decreasing availability and causing pollution to environment. Knowledge of new technologies will enrich the technical know how of the students and increase their employment opportunities in upcoming sector of renewable energy.

### Objective:

After performing the following experiments, the students will be able to :-

- Utilise solar energy for various purposes.
- Utilise wind energy for running chakki, water pump etc.
- Make use of Bio-gas in energies, stoves, Petromax etc.
- Save conventional energy whose sources are limited in many cases.

### CONTENTS:

Study / Observation of following Systems:-

<u>S.No.</u>	<u>Topics</u>
01	Solar concentrating type cooker.
02	Wind mill pump.
03	Wind turbine electric generator.
04	Bio-gas plant fixed dome type.
05	Bio-gas plant floating dome type.
06	Bio-gasifier.
07	12 V Battery Charging and maintenance.
08	Performance rating of Solar lantern during different weather conditions.

# REFRIGERATION & AIR-CONDITIONING LAB

<b>Subject Code</b> <b>25607B</b>	<b>Practical</b>			<b>No of Period in one session : 60</b>		
	<b>No. of Periods Per Week</b>			<b>Full Marks</b>	<b>:</b>	<b>50</b>
	<b>L</b>	<b>T</b>	<b>P/S</b>	<b>Annual Exam.</b>	<b>:</b>	<b>40</b>
	<b>-</b>	<b>-</b>	<b>04</b>	<b>Internal Exam.</b>	<b>:</b>	<b>10</b>

## Rationale & Objective:

A diploma holder technician should be able to handle the refrigerator and air-conditioning machines to operate successfully. Fault should be detected and the better use of modification of the machines.

## CONTENTS:

### Perform at least five:-

<u>S.No.</u>	<u>Topics</u>
01	Determination of C. O. P. Of a refrigeration.
02	Study of evaporator and cooling towers.
03	Study of house hold refrigeration.
04	Study of vapour absorption refrigeration system.
05	Determination of dry and wet bulb temperature.
06	Study of Spray ponds.

### Books Recommended:

1. Refrigeration Air Conditioning - P. L. Ballancy
2. Refrigeration Air Conditioning - R. S. Khurana

# CAD/CAM LAB

<b>Subject Code</b> <b>25607C</b>	<b>Practical</b>			<b>No of Period in one session : 60</b>		
	<b>No. of Periods Per Week</b>			<b>Full Marks</b>	<b>:</b>	<b>50</b>
	<b>L</b>	<b>T</b>	<b>P/S</b>	<b>Annual Exam.</b>	<b>:</b>	<b>40</b>
	<b>-</b>	<b>-</b>	<b>04</b>	<b>Internal Exam.</b>	<b>:</b>	<b>10</b>

**Rationale:**

**Objective:**

**CONTENTS:**

<b><u>S.No.</u></b>	<b><u>Topics</u></b>
01	Create the manufacturing data base.
02	Design processes for a simple job.
03	Study the working of :
	(a) Design Work Station.
	(b) Graphics Terminal.
	(c) Operator Input Devices.
	(d) Plotter and other output devices.
04	Application of Graphics Package.
05	Study and Application of N. C. machine.
06	Prepare manual part programming.
07	Prepare computer-assisted part programming.
08	Make job using D N C (Direct Numerical Control) / C N C (Computer Numerical Control) system.
09	Study of Robots.

# AUTO CADD LAB

<b>Subject Code 25607D</b>	<b>Practical</b>			<b>No of Period in one session : 60</b>		
	<b>No. of Periods Per Week</b>			<b>Full Marks</b>	<b>:</b>	<b>50</b>
	<b>L</b>	<b>T</b>	<b>P/S</b>	<b>Annual Exam.</b>	<b>:</b>	<b>40</b>
	<b>-</b>	<b>-</b>	<b>04</b>	<b>Internal Exam.</b>	<b>:</b>	<b>10</b>

### Rationale:

Like drawing and workshop practice, knowledge and practice of communication skill are necessary for development of professional competencies of a technician-engineer. He has to be conversant with Database Management and Graphics. The course will impart to the students the basic principles of computer uses especially in Graphics.

### Objective:

A student will be able to:

- Handle a micro computer independently and perform some independent works.
- Make 2 D and 3 D drawing on computer.
- Convert 2 D drawings into 3 D drawing.
- Exchange (Import and Export) data from other software.

### CONTENTS:

#### S.No.    Topics

- |    |  |
|----|--|
| 01 | Familirisation with computer and its peripherals.  |
| 02 | Familirisation with use of AUTOCAD R. 2004 package.  |
| 03 | Practice CAD techniques : Sub assemblies, blocks, inserts, layers, hierarchical approach to Drawing, entering Drawing library.   |
| 04 | Drawing lines, rectangles, circles, chambers, solid, infills, cross-hatching, automatic dimensioning, removal of construction lines, Edit functions, move reflection, rotation, cloning, zoom etc. |
| 05 | Prepare 3 D-models, Practice transformation techniques like swing, lift, spin, turn.   |
| 06 | Convert 2-D Drawing into 3 D Drawing.  |
| 07 | Practice networking and exchange of data (import and export) from other packages.  |

### Books Recommended:

1. Inside Auto CAD, Prentice Hall of India Pvt. Ltd. - Dr. Racker and H. Rice
2. Easy Auto CAD-A Tutorial Approach, McGraw Hill International (Computer Science Services) -
3. Fundamentals of Engineering Drawing : with an introduction to interactive Computer Graphics for Design and Production (Latest Edition), Prentice Hall of India Pvt. Ltd. - Warren J. Luzadder and John M. Duff.
4. An Introduction to Digital Computer Design, Prentice Hall of India Pvt. Ltd. - Raja Raman and Radha Krishan
5. Users Manual AUTOCAD Release 2004. -



## PROFESSIONAL STUDIES & ENTREPRENEURSHIP

<b>Subject Code</b> <b>00607</b>	<b>Sessional</b>			<b>No of Period in one session : 50</b>		
	<b>No. of Periods Per Week</b>			<b>Full Marks</b>	<b>:</b>	<b>50</b>
	<b>L</b>	<b>T</b>	<b>P/S</b>	<b>Annual Exam.</b>	<b>:</b>	<b>30</b>
	<b>-</b>	<b>-</b>	<b>04</b>	<b>Internal Exam.</b>	<b>:</b>	<b>20</b>

### Rationale:

The paper has been introduced to achieve dual purpose for the students.

Firstly, this course provides the basics of Professional management and secondly it also prepares the student to undertake independent venture by becoming an entrepreneur.

This makes them conversant with their duties and responsibility to make them successful in their career building.

### Objectives:

With the input provided in this paper, the students will be able to :-

- Acquire basic knowledge of management.
- Understand the area of management such as human resources, marketing, finance and commercial aspect.
- Understand the benefit of becoming an entrepreneur.
- Handle a project efficiently and in dependently.

**To prepare a Project Report on any of the followings:**

<u>S.No.</u>	<u>Topics</u>
01	Project Identification and formulation Report.
02	Project Profile/Pre-feasibility Report.
03	Techno-economical Feasibility Report (TEFR).
04	Market Survey Report.

### CONTENTS

#### S.NO.            TOPICS

#### TOPIC – 01 : PROJECT IDENTIFICATION AND FORMULATION REPORT:

- ◆ Introduction.
- ◆ Collection of Data.
- ◆ Compilation of Data.
- ◆ Analysis and Assimilation of Data.
- ◆ Product Selection.
- ◆ Report Finalisation and Report Writing.

#### TOPIC - 02 : PROJECT PROFILE/PRE-FEASIBILITY REPORT :

- ◆ Introduction of the product.
- ◆ Market.
- ◆ Man Power (Personnel Required).
- ◆ Manufacturing Process.
- ◆ Plant and Machinery.
- ◆ Cost of Project.

- ◆ Means of Finance.
- ◆ Cost of Production.
- ◆ Annual Turnover.
- ◆ Profit.
- ◆ Profit on Investment.

**TOPIC – 03: TECHNO-ECONOMICAL FEASIBILITY REPORT (TEFR).**

- ◆ Introduction on product.
- ◆ Market Prospects and Marketing.
- ◆ Location.
- ◆ Manufacturing Programme and Annual Turnover.
- ◆ Manufacturing Process.
- ◆ Cost of Project.
- ◆ Means of Finance.
- ◆ Requirement of Raw materials, Consumables, Utilities and Working Capital.
- ◆ Organisational Structure, Management and Man Power.
- ◆ Project Implementation Schedule.
- ◆ Profitability and Cash Flow.

**TOPIC - 04 : MARKET SURVEY REPORT:**

- ◆ Data Collection & Processing through Primary & Secondary Sources- Questionnaire method, e-mail, by post, by phone.
- ◆ Present Status.
- ◆ Growth of the Industry.
- ◆ Import and Export.
- ◆ Present market Demand.
- ◆ Forecast.
- ◆ Future Prospect/Scope.
- ◆ Market Segmentation.

**Books Recommended:**

1. Essential of Management, Tata McGraw Hill, - Herald Koonz & Cyril O' Donnel. Publishing Company Ltd., New Delhi.
2. Business Organisation and Management, S. C. Chand - M. C. Shukla and Company (Pvt.) Ltd., Ram Nagar, New Delhi
3. Managerial Economics, Sultan Chand & Sons, New - R. L. Vashney & K. L. Maheshwari Delhi
4. Project Appraisal and Follow up, Govind Prakashan, - D. P. Sharda Mumbai.
5. Modern Marketing Management, Progressive - Dr. Rustam S. Davar Corporation Pvt. Ltd., P51, Mahatma Gandhi Road, Bombay-400 001

6. A hand book for new entrepreneurs (with special reference to science and technology target group) - Entrepreneurship Development Institute of India, 83-A, Swastic Society Navrangpura, Ahmedabad, PIN-380 009.
7. Student discipline - Published by I.S.T.E. Mysore
8. Communication Skill - Published by I.S.T.E. Mysore
9. Decision Making - Published by I.S.T.E. Mysore
10. Pollution Control in Industry - Published by I.S.T.E. Mysore
11. S.S.M. in Environmental Engineering - Published by I.S.T.E. Mysore
12. Leadership in Organisation - Published by I.S.T.E. Mysore
13. Small Enterprise Management - Published by I.S.T.E. Mysore
14. Motivation - Published by I.S.T.E. Mysore
15. Fundamentals of Environmental Pollution - Krishnan and Kannan
16. Enviromental Engineering, T.T.T.I., Madras - Tata Mcgraw Hill
17. Motivation I.I.T. Kanpur - Published by I.S.T.E. Mysore
18. Mine Management - V.N. Singh, Bangle Prining Press Ranchi
19. Hand book on Project Appraisal and follow up, Govind Prakashan, 204, Saraswati Kunj, 90, S. V. Road, Goregoan, Bombay-400 062. - D. P. Sarda
20. Bihar Industrial Policy - Government of Bihar, Department of Industries.
21. Entrepreneurship Guide - Bihar State Financial Corporation, Fraser Road, Patna-800 001.
22. Management Economics, S. Chand & Sons, 4792/23, Dariaganj, New Delhi-110 002. - R. L. Varshney & G. L. Maheshwari
23. Management Principles & Practices, S. Chand & Sons, 4792/23, Dariaganj, New Delhi-110002. - L. Prasad & S. S. Gulshan

# DRAWING & DESIGN

<b>Subject Code</b> <b>25608</b>	<b>Sessional</b>			<b>No of Period in one session :</b>		
	<b>No. of Periods Per Week</b>			<b>Full Marks</b>	<b>:</b>	<b>50</b>
	<b>L</b>	<b>T</b>	<b>P/S</b>	<b>Annual Exam.</b>	<b>:</b>	<b>30</b>
	<b>-</b>	<b>-</b>	<b>-</b>	<b>Internal Exam.</b>	<b>:</b>	<b>20</b>

**Rationale :**

This course is aimed at further reinforcing and enhancing the knowledge skill acquired in the earlier courses. The exercise included in the course would provide the students such experiences which he would encounter later in his professional life.

The day to day function carried out in the drawing and design department of an industry are multifarious. Some of these functions are planning, sketching, deciding specification, determining factors and providing dimensions etc. This course is so designed as to provide the students such experiences where he can apply his knowledge acquired from various subjects.

**Objective:**

A student overall be able to :-

- (vii) Read and understand drawing.
- (viii) Prepare assembly and dessembly drawings.
- (ix) Design machine parts.
- (x) Prepare working drawing.
- (xi) Develop skill to draw sketches of simple machine parts, assemble machine parts.
- (xii) Impart ideas, convey information and specify shape through drawing.

**CONTENTS:**

**PART-I ( MACHINE DRAWING)**

**TOPIC: 01 –ASSEMBLY OF MACHINE PARTS:** [07] [81]

- 01.01 Feed Check valve.
- 01.02 Lathe Slide Rest
- 01.03 Machine Vice (plain & Swivel)
- 01.04 Tool head of shaping machine.
- 01.05 Tail stock of a Lathe.
- 01.06 Drilling jig
- 01.07 Ball and Roller bearing.
- 01.08 Hydraulic expansion joint.
- 01.09 Connecting rod of I. C. Engine.
- 01.10 Automiser.
- 01.11 Cam Profile.
- 01.12 Gears in mesh (Spur gears/Bevel gears/Worm & Worm Wheel.

**TOPIC: 02 – WORKING DRAWING:** [01] [12]

- 02.01 Working Drawing of designed machine part.

**PART-II (MACHINE DESIGN)**

**TOPIC: 03 – DESIGN OF MACHINE PARTS:** [01] [09]

- 03.01 Cotter Joint.
- 03.02 Kunckle Joint.

**TOPIC: 04 – DESIGN OF FASTENERS:** [01] [09]

- 04.01 Rivetted Joint (Lap & Butt).
- 04.02 Welded Joints.

<b><u>TOPIC: 05 – DESIGN OF KEYS AND COUPLINGS:</u></b>		[01]	[09]
05.01	Protected type flange coupling.		
05.02	Pin type flexible coupling.		
05.03	Univesal Coupling.		
<b><u>TOPIC: 06 – DESIGN OF POWER SCREWS:</u></b>		[ 01]	[06]
06.01	Screw Clamp and nut.		
06.02	Screw Jack.		
<b><u>TOPIC: 07 – DESIGN OF SPRINGS:</u></b>		[01]	[06]
07.01	Close Coiled Hellical valve spring.		
07.02	Carriage spring.		
<b><u>TOPIC: 08 – DESIGN OF POWER TRANSMISSION:</u></b>		[01]	[09]
08.01	Single plate clutch.		
08.02	Spur gear used in speed reduction in lathe (Co-axial).		
<b><u>TOPIC: 09 – DESIGN OF BEARING:</u></b>		[01]	[06]
09.01	Solid Journal Bearing.		
09.02	Plumber Block.		
09.03	Ball and Roller Bearing.		

**Books Recommended:**

- |  |                              |
|--|------------------------------|
| 1. Engineering Drawing                                     | - A. C. Parkinson            |
| 2. Machine Drawing   | - Laxmi Narayan              |
| 3. Machine Drawing   | - N. D. Bhatt                |
| 4. Machine Drawing   | - Jones & Jones              |
| 5. Machine Design  | - N. C. Pandya & C.S. Shah   |
| 6. Machine Design  | - R. C. Patel & A. D. Pandya |
| 7. Machine Design  | - Vijay Vargeya              |
| 8. Machine Drawing, Oxford University Press, Madras-600006 | - T.T.T.I., Madras           |
| 9. Machine Design, S. Chand & Co.                          | - R. S. khurm                |

## PROJECT WORK AND ITS PRESENTATION IN SEMINAR

<b>Subject Code</b> <b>25609</b>	<b>Sessional</b>			<b>No of Period in one session : -</b>		
	<b>No. of Periods Per Week</b>			<b>Full Marks</b>	<b>:</b>	<b>50</b>
	<b>L</b>	<b>T</b>	<b>P/S</b>	<b>Annual Exam.</b>	<b>:</b>	<b>30</b>
	<b>-</b>	<b>-</b>	<b>-</b>	<b>Internal Exam.</b>	<b>:</b>	<b>20</b>

**Rationale :**

The Project work and its presentation in seminar is an important subject for a diploma holder technician. The course is designed to help a student to develop self confidence, skill in report writing to analyse, design, estimating and costing, deciding a process etc. The course will also help in developing communication skill, and learning process in student. The student will develop the skill of quality documentation in an important activity.

**Objective:**

The student will be able to:

- Select a Problem from industry.
- Analyse the Problem.
- Develop logical approach to solution of a Problem.
- Design a product.
- Make estimation of materials, operation and calculate the cost of product.
- Manufacture / fabricate the product in the workshop.
- Test the product for failure.
- Prepare a project report (Computer printed / typed)
- Present the paper in seminar.

**CONTENTS**

Design, Estimate, Costing and Production of at least one from the following:

- 01 Screw Jack.
- 02 Machine Vice.
- 03 Fitter’s Bench Vice.
- 04 Carpenter’s Bench Vice.
- 05 Hand Operated Air Pump.
- 06 Fabrication of Grill and / or Gate.
- 07 Desert Cooler.
- 08 Solar Cooker.
- 09 A LPG Gas Cylinder stand which should indicate weight of gas in the cylinder on graduated scale.
- 10 Any new utility product.

## **REPORT WRITING:**

The report must include

<b><u>S.No.</u></b>	<b><u>Topics</u></b>
01	Introduction.
02	Design.
03	Estimating of materials.
04	Calculation of cost of the materials.
05	Operation time estimation.
06	Cost of Operation.
07	Process of Manufacture.
08	List of machines / tools / equipments used with specification.

## **OR**

A project on Live Industrial Problems that may be—

- Technical
- Human Relation
- Welfare
- Safety
- Any other

The Project Report should consist of :-

01	Introduction.
02	Problem statement.
03	Background of Industry.
04	Organisational set –up.
05	Plant Layout.
06	General Environmental Problem.
07	Analysis of Problem.
08	Probable solution.
09	Best solution possible.
10	Reasons.
11	Any other.

Project Work, in ideal condition, should be done individually. If it is not possible then it can be done in a group of not more than five students. Project Work / Project Report should be presented in a seminar for developing confidence and communication skill among the students.

### **NOTE:-**

Project work will be allotted to the students in the very beginning of the session. Each student will be give a separate work under the supervision of a teacher. Total number of students may be divided among the number of teachers available. The teacher concerned will select separate problem for each student under him and allot it to him at the beginning of the session. The work allotted should be completed within scheduled time. i. e. by the end of the session. Problems selected should preferably conform to the syllabus. If it is outside of the syllabus then it must be within the field of Mechanical engineering.