4.1 MATERIALS AND METALLURGY

L	T	P
3	-	2

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 (07 hrs)

   Material, History of Material Origin, Scope of Material Science, Overview of different engineering materials and applications, Classification of materials, Thermal, Chemical, Electrical, Mechanical properties of various materials, Present and future needs of materials, Overview of Biomaterials and semi-conducting materials, Various issues of Material Usage-Economical, Environment and Social.

2. Crystallography (07 hrs)

   Fundamentals: Crystal, Unit Cell, Space Lattice, Arrangement of atoms in Simple Cubic Crystals, BCC, FCC and HCP Crystals, Number of atoms per unit Cell, Atomic Packing Factor.

   Deformation: Overview of deformation behaviour and its mechanisms, behaviour of material under load and stress-strain.

   Failure Mechanisms: Overview of failure modes, fracture, fatigue and creep.

3. Metals And Alloys (14 hrs)

   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 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)

Non Ferrous Materials: Properties and uses of Light Metals and their alloys, properties and uses of White Metals and their alloys.

4. Theory of Heat Treatment (08 hrs)

Purpose of heat treatment, Solid solutions and its types, Iron Carbon diagram, Formation and decomposition of Austenite, Martensitic 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)

5. Engineering Plastics (03 hrs)

Important sources of plastics, Classification-thermoplastic and thermo set and their uses, Various Trade names of engg. Plastics, Plastic Coatings.

6. Advanced Materials (03 hrs)

Composites-Classification, properties, applications
Ceramics-Classification, properties, applications
Heat insulating materials

7. Miscellaneous Materials (06 hrs)

Properties and uses of Asbestos, Glass wool, thermocole, cork, mica. Overview of tool and die materials, Materials for bearing metals, Spring materials, Materials for Nuclear Energy, Refractory materials.

LIST OF PRACTICALS

1. Classification of about 25 specimens of materials/machine parts into
   (i) Metals and non metals
   (ii) Metals and alloys
   (iii) Ferrous and non ferrous metals
   (iv) Ferrous and non ferrous alloys
2. Given a set of specimen of metals and alloys (copper, brass, aluminium, cast iron, HSS, Gun metal); identify and indicate the various properties possessed by them.
3. Study of heat treatment furnace.
4. Study of a metallurgical microscope and a specimen polishing machine.
5. To prepare specimens of following materials for microscopic examination and to Examine the microstructure of the specimens of following materials:
   i) Brass ii)Copper iii)Grey iv)Malleable v)Low carbon steel vi)High carbon steel vii) HSS
6. To anneal a given specimen and find out difference in hardness as a result of annealing.
7. To normalize a given specimen and to find out the difference in hardness as a result of normalizing.
8. To harden and temper a specimen and to find out the difference in hardness due to tempering.

INSTRUCTIONAL STRATEGY

While imparting instructions, teacher should show various types of engineering materials to the students. Students should be asked to collect samples of various materials available in the market. Visits to industry should be planned to demonstrate use of various types of materials or Heat Treatment Processes in the industry.

RECOMMENDED BOOKS

1. Text book of Material Science by R.K. Rajput; Katson Pubs, Ludhiana
2. Text book of Material Science by Varinder Kumar, Eagle Publisher, Jalandhar
3. Text book of Material Science by V.K. Manchanda; India Publishing House, Jalandhar.
4. Engg. Metallurgy by R.A. Higgens, Standard Publishers, New Delhi
5. Introduction to Material Science by A.R. Gupta, Satya Prakashan, New Delhi.

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1.	07	15
2.	07	15
3.	14	30
4.	08	16
5.	03	06
6.	03	06
7.	06	12
Total	**48**	**100**

4.2 HYDRAULICS AND HYDRAULIC MACHINES

L	T	P
3	-	2

RATIONALE

Diploma holders in this course are required to deal with problems of fluid and use of hydraulics and pneumatics in power generation. For this purpose, knowledge and skills about fluid mechanics and machinery, hydraulics and pneumatics systems are required to be imparted for enabling them to perform above functions.

DETAILED CONTENTS

1. Introduction (04hrs)

   Fluid, types of fluid; properties of fluid viz mass density, weight density (specific weight), specific volume, capillarity, specific gravity, viscosity, compressibility, surface tension, kinematic viscosity and dynamic viscosity and their units.

2. Pressure and its Measurement (07 hrs)

   2.1 Concept of pressure (Atmospheric Pressure, gauge pressure, absolute pressure), Pascal's Law, Static Pressure

   2.2 Pressure measuring devices: peizometer tube manometers - simple U-tube, differential single column, inverted U-tube, micromanometer including simple problems

   2.3 Bourdon pressure gauge, Diaphragm pressure gauge, dead weight pressure gauge

3. Flow of Fluids (08 hrs)

   Types of fluid flow – steady and unsteady, uniform and non-uniform, laminar and turbulent; rate of flow and their units; continuity equation of flow; potential energy of a flowing fluid; total head; Bernoulli's theorem (statement and proof) and its applications. Discharge measurement with the help of venturi-meter, orifice meter, pitot-tube, limitations of Bernoulli's theorem simple problems.

4. Flow through Pipes (08 hrs)

   4.1 Definition of pipe flow, wetted perimeter, hydraulic mean depth, hydraulic gradient; loss of head due to friction; Chezy's equation and Darcy's equation of head loss (without proof), Reynold's number and its effect on pipe friction; siphon, Nozzle - definition, velocity of liquid flowing through the nozzle, power developed. Water hammer, anchor block, syphon, surge tank (concept only).

   4.2 Loss of head in pipes due to sudden enlargement, sudden contraction, obstruction on flow path, change of direction and pipe fittings (without proof)

5. Flow through Orifices (05 hrs)

C_c, C_v, C_d, flow through drowned, partially drowned orifices, time for emptying a tank through a circular orifice. Simple problems.

6. Hydraulic Machines (06 hrs)

Description, operation and application of hydraulic systems – hydraulic ram, hydraulic jack, hydraulic brake, hydraulic accumulator, hydraulic door closer, hydraulic press, selection of specification of above systems for different applications

7. Water Turbines and Pumps (10 hrs)

7.1 Concept of a turbine, types of turbines –impulse and reaction type (concept only), difference between them. Construction and working of pelton wheel, Francis turbine, Propeller and Kaplan turbines. Unit speed, unit power, unit discharge, specific speed of turbines, selection of turbines based on specific speed.

7.2 Concept of hydraulic pump, single acting reciprocating pump (construction and operation only), vane, screw and gear pumps.

7.3 Construction, working and operation of centrigual pump. Performance, efficiencies and specifications of a centrifugal pump. Trouble shooting and problems in centrifugal pumps and remedial measures, pitting, cavitation, priming.

LIST OF PRACTICALS

1. Measurement of pressure head by employing.

   i) Piezometer tube
   ii) Single and double column manometer

2. To find out the value of coefficient of discharge for a venturimeter.

3. Measurement of flow by using venturimeter.

4. Verification of Bernoulli's theorem.

5. To find coefficient of friction for a pipe (Darcy's friction).

6. To study hydraulic circuit of an automobile brake and hydraulic ram.

7. Study the working of a Pelton wheel and Francis turbine.

8. To study a single stage centrifugal pump for constructional details and its operation to find out its normal head and discharge.

INSTRUCTIONAL STRATEGY

1. Use computer based learning aids for effective teaching-learning
2. Expose students to real life problems
3. Plan assignments so as to promote problem solving abilities and develop continued learning skills

RECOMMENDED BOOKS

1. Fluid Mechanics by KL Kumar; S Chand and Co Ltd., Ram Nagar, New Delhi.

2. Hydraulics and Fluid Mechanics Machine by RS Khurmi ; S.Chand & Co. Ltd., New Delhi.

3. Fluid Mechanics through Problems by RJ Garde; Wiley Eastern Ltd., New Delhi.

4. Fluid Mechanics by Dr AK Jain, Khanna Publishers, New Delhi.

5. Hydraulic and Pneumatic Control by K Shammuga Sundaram, S. Chand & Co. Ltd., New Delhi

6. Hydraulics and Hydraulic Machinery by Dr. Jagadish Lal; Metropolitan Book Company Ltd., Delhi.

7. Hydraulic and Pneumatic Power and Control Design, Performance and Application by Yeaple, McGraw Hill, New York..

8. Pneumatic Controls by Festo Didactic; Bangalore.

9. Pneumatics Control: An Introduction to the Principles by Werner Deppert and Kurt Stoll; Vogel – Verlag.

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1	04	08
2	07	16
3	08	16
4	08	16
5	05	15
6	06	15
7	10	16
Total	**48**	**100**

4.3 WORKSHOP TECHNOLOGY-II

L	T	P
3	-	-

RATIONALE

Diploma holders are responsible for supervising production processes to achieve production targets and for optimal utilization of resources. For this purpose, knowledge about various machining processes, modern machining methods, processing of plastic, tools, jigs and fixtures and processing of plastics is required to be imparted. Hence the subject of workshop technology.

DETAILED CONTENTS

1. Cutting Tools and Cutting Materials (04 hrs)

   1.1. Cutting Tools - Various types of single point cutting tools and their uses, Single point cutting tool geometry, tool signature and its effect, Heat produced during cutting and its effect, Cutting speed, feed and depth of cut and their effect

   1.2 Cutting Tool Materials - Properties of cutting tool material, Study of various cutting tool materials viz. High-speed steel, tungsten carbide, cobalt steel cemented carbides, stellite, ceramics and diamond.

2. Lathe (12 hrs)

   2.1 Principle of turning
   2.2 Function of various parts of a lathe
   2.3 Classification and specification of various types of lathe
   2.4 Work holding devices
   2.5 Lathe tools and operations :- Plain and step turning, facing, parting off, taper turning, eccentric turning, drilling, reaming, boring, threading and knurling, form turning, spinning.
   2.6 Cutting parameters – Speed, feed and depth of cut for various materials and for various operations, machining time.
   2.7 Speed ratio, preferred numbers of speed selection.
   2.8 Lathe accessories:- Centers, dogs, different types of chucks, collets, face plate, angle plate, mandrel, steady rest, follower rest, taper turning attachment, tool post grinder, milling attachment, Quick change device for tools.
   2.9 Introduction to capstan and turret lathe

3. Drilling (06 hrs)

   3.1 Principle of drilling.
   3.2 Classification of drilling machines and their description.
   3.3 Various operation performed on drilling machine – drilling, spot facing, reaming, boring, counter boring, counter sinking, hole milling, tapping.
   3.4 Speeds and feeds during drilling, impact of these parameters on drilling, machining time.
   3.5 Types of drills and their features, nomenclature of a drill
   3.6 Drill holding devices.

4. Boring (04 hrs)

4.1 Principle of boring
4.2 Classification of boring machines and their brief description.
4.3 Boring tools, boring bars and boring heads.

5. Shaping, Planing and Slotting (04 hrs)

5.1 Working principle of shaper, planer and slotter.
5.2 Type of shapers
5.3 Type of planers
5.4 Types of tools used and their geometry.
5.5 Speeds and feeds in above processes.

6. Broaching (04 hrs)

6.1 Introduction
6.2 Types of broaching machines – Single ram and duplex ram horizontal type, vertical type pull up, pull down, push down.
6.3 Elements of broach tool, broach tooth details – nomenclature, types, and tool material.

7. Jigs and Fixtures (06 hrs)

7.1 Importance and use of jigs and fixture
7.2 Principle of location
7.3 Locating devices
7.4 Clamping devices
7.5 Advantages of jigs and fixtures

8. Cutting Fluids and Lubricants (08 hrs)

8.1 Function of cutting fluid
8.2 Types of cutting fluids
8.3 Difference between cutting fluid and lubricant
8.4 Selection of cutting fluids for different materials and operations
8.5 Common methods of lubrication of machine tools.

INSTRUCTIONAL STRATEGY

1. Teachers should lay emphasis in making students conversant with concepts and principles of manufacturing processes.

2. Focus should be on preparing jobs using various machines in the workshop

RECOMMENDED BOOKS

1. Workshop Technology by B.S. Raghuwanshi; Dhanpat Rai and Sons; Delhi
2. Elements of Workshop Technology by SK Choudhry and Hajra; Asia Publishing House
3. A Text Book of Production Engineering by PC Sharma; S Chand and Company Ltd. Delhi
4. Workshop Technology by R.C. Jindal; North Publication, Ishan Publishers

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1	04	08
2	12	26
3	06	14
4	04	08
5	04	08
6	04	08
7	06	12
8	08	16
Tot1al	**48**	**100**

4.4 ELECTRIAL MACHINES

L	T	P
3	-	3

RATIONALE

This subject deals with various types of electrical machines being employed in industry, power stations, domestic and commercial appliances etc. It is envisaged that after studying the subject, students will gain competence in operation, repair and maintenance of such machines and give suggestions for improvement in their performance. The students will study three phase supply, transformer, a.c. and d.c. motors. The practicals will enable students to perform various tests necessary for installation and commissioning of such machines.

DETAILED CONTENT

1. Three Phase Supply (06 hrs)

   a) Advantages of 3 phase system over single phase system
   b) Star delta connections
   c) Relation between phase voltage and line voltage, phase current and line current in a 3 phase system
   d) Power and power factor(p.f.) in 3 phase system and their measurements, importance of p.f. (simple problems)

2. Transformer (08 hrs)

   Principle of transformer, construction, voltage and current transformation. Methods of connection in 3 phase transformers, current and voltage relationship, auto transformer and its uses, instrument transformer, voltage regulation and its significance, need for isolation, electrical and transients suppression, principles of isolation transformer, specifications of all types of transformers. Losses in a transformer

3. DC Motor (08 hrs)

   Principle, significance of back emf, types of motors and their construction, motor characteristics for shunt and series, speed control of DC motors and factors controlling the speed. Starting methods, construction and working of 3 point starter, applications (simple problems)

4. Three Phase Induction Motors (08 hrs)

   Principle, construction, concept of slip, torque and characteristics, effect of motor resistance on torque (running and starting), rotor current, output power, different methods of speed control. Starting methods and constructional and working of 3 point starter, applications (simple problems)

5. Synchronous Motors (06 hrs)

   Principle, construction and working, effect of load and excitation on synchronous motor. Starting of motor and their applications

6. Single Phase Motors (06 hrs)

Principle, construction, working speed, control, starting and applications of the following motors:

a) Induction motor
b) Universal motor

7. Stepper Motor and Servo Motor (06 hrs)

Types, construction, working and their applications

(**Note**: No derivation of any formula)

LIST OF PRACTICALS

The students to perform following experiments in the lab:

1. DC machines

   1.1 Speed control of dc shunt motor (i) Armature control method (ii) Field control method
   1.2 Study of dc series motor with starter (to operate the motor on no load for a moment)

2. Transformers (single phase)

   Open circuit and short circuit test for determining parameter of a transformer

3. Determining the regulation and efficiency from the data obtained from open circuit and short circuit test

4. Three-phase transformers

   Checking the polarity of the windings of a three phase transformer and connecting the windings in various configurations

5. To measure power and power factors in 3 - phase load using two wattmeter method.

6. To connect a dc shunt motor with supply through 3 - phase starter and to run the motor at different speech with the help of a field regulator.

7. To run a 3 - phase squirrel cage Induction motor with the help of a star delta starter.

8. To change the direction of rotation of induction motor.

9. To run a synchronous motor with a.c. supply and to measure speed to verify the relation $N = \frac{120 f}{p}$

INSTRUCTIONAL STRATEGY

For conceptual understanding a field/industrial visit (preferably Transformer Factory) may be organised to give live exposure to students. For this the teacher should visit first to understand the assembly line-up which could be followed by a visit of the students, where the teacher can give an idea of the working of the factory without much seeking assistance of the factory staff. In addition, emphasis may be given on field applications and simple numerical problems.

RECOMMENDED BOOKS

1) Electrical Machine by SK Bhattacharya, Tata McGraw Hill Education Pvt Ltd, New Delhi
2) Electrical Machines by Nagrath and Kothari, Tata McGraw Hill Education Pvt Ltd, New Delhi
3) Experiments in Basic Electrical Engineering: by S.K. Bhattacharya, KM Rastogi: New Age International (P) Ltd. Publishers, New Delhi
4) Electrical Machines by SK Sahdev, Uneek Publications, Jalandhar
5) Electrical Engineering by JB Gupta, SK Kataria & Sons, New Delhi
6) Electrical Machines by DR Arora, Ishan Publications, Ambala city
7) Electrical Technology Vol. - I and II B.L. Thareja, S Chand and Co. New Delhi

SUGGESTED DISTRIBUTION OF MARKS

Topic	Time Allotted (hrs)	Marks Allocation
1	6	12
2	8	20
3	8	15
4	8	20
5	6	10
6	6	13
7	6	10
Total	**48**	**100**

4.5 ELECTRONIC DEVICES AND CIRCUITS

L	T	P
4	-	2

RATIONALE

Having attained basic knowledge of electronic devices like diodes, transistors, and elementary circuits, in second semester, this course will enable the students to learn about the use of transistors in analog circuits like power amplifier, multistage amplifier, oscillators, wave shaping circuits and in multivibrators etc. It also gives information about timer, operational amplifier, voltage regulator, ICs and their applications for effective functioning in the field of electronic service industry.

DETAILED CONTENTS

1. Multistage Amplifiers (08 hrs)

   a) Need for multistage amplifier
   b) Gain of multistage amplifier
   c) Different types of multistage amplifier like RC coupled, transformer coupled, direct coupled, and their frequency response and bandwidth

2. Large Signal Amplifier (08 hrs)

   a) Difference between voltage and power amplifiers
   b) Importance of impedance matching in amplifiers
   c) Class A, Class B, Class AB, and Class C amplifiers, collector efficiency and Distortion in class A,B,C
   d) Single ended power amplifiers, Graphical method of calculation (without derivation) of out put power; heat dissipation curve and importance of heat sinks. Push-pull amplifier, and complementary symmetry push-pull amplifier

3. Feedback in Amplifiers (08 hrs)

   a) Basic principles and types of feedback
   b) Derivation of expression for gain of an amplifier employing feedback
   c) Effect of feedback (negative) on gain, stability, distortion and bandwidth of an amplifier
   d) RC coupled amplifier with emitter bypass capacitor
   e) Emitter follower amplifier and its application

4. Sinusoidal Oscillators (08 hrs)

   a) Use of positive feedback
   b) Barkhausen criterion for oscillations
   c) Different oscillator circuits-tuned collector, Hartley, Colpitts, phase shift, Wien's bridge, and crystal oscillator. Their working principles (no mathematical derivation but only simple numerical problems)

5. Tuned Voltage Amplifiers (04 hrs)

   a) Series and parallel resonant circuits and bandwidth of resonant circuits
   b) Single and double tuned voltage amplifiers and their frequency response characteristics

6. Wave Shaping Circuits (04 hrs)

a) General idea about different wave shapers
b) RC and RL integrating and differentiating circuits with their applications
c) Diode clipping and clamping circuits and simple numerical problems on these circuits

7. Multivibrator Circuits (08 hrs)

a) Working principle of transistor as switch
b) Concept of multi-vibrator: astable, monostable, and bistable and their applications
c) Block diagram of IC555 and its working and applications
d) IC555 as monostable and astable multi-vibrator

8. Operational Amplifiers (06 hrs)

a) Characteristics of an ideal operational amplifier and its block diagram
b) Definition of differential voltage gain, CMRR, PSRR, slew rate and input offset current
c) Operational amplifier as an inverter, scale changer, adder, subtractor, differentiator, and integrator
d) Concept of Schmitt trigger circuit and sample/hold circuit using operational amplifier and their application

9. Regulated DC Power Supplies (04 hrs)

a) Concept of DC power supply. Line and load regulation
b) Concept of fixed voltage, IC regulators (like 7805, 7905), and variable voltage regulator like (IC 723)

10. Opto Electric Devices (04 hrs)

Working principles and characteristics of photo resistors, photo diodes, photo transistors, opto couplers.

11. VCO (IC 565) and PLL (IC 566) and their Applications (02hrs)

LIST OF PRACTICALS

(1) Plot the frequency response of two stage RC coupled amplifier and calculate the bandwidth and compare it with single stage amplifier
(2) To measure the gain of push-pull amplifier at 1KHz
(3) To measure the voltage gain of emitter follower circuit and plot its frequency response
(4) Plot the frequency response curve of Hartley and Colpitts Oscillator
(5) Plot the frequency response curve of phase shift and Wein bridge Oscillator
(6) To observe the output waveforms of series and shunt clipping circuits
(7) To observe the output for clamping circuits
(8) Use of IC 555 as monostable multivibrator and observe the output for different values of RC

(9) Use of IC 555 as astable multivibrator and observe the output at different duty cycles

(10) To use IC 741 (op-amplifier) as
i) Inverter, ii) Adder, iii) Subtracter iv) Integrator

(11) To realize positive and negative fixed voltage AC power supply using three terminal voltage regulator IC (7805, 7812, 7905)

INSTRUCTIONAL STRATEGY

This subject being of fundamental importance for diploma holders in electronics engineering and related fields, emphasis on conceptual understanding may be given by taking the help of charts, simulation packages etc. Sufficient exercises may given to the students in single stage and multi-stage amplifier circuits in addition to simple exercises in fabricating and testing of various simple d.c circuits. The students may be encouraged to perform some additional practical exercises apart from the list provided.

LIST OF RECOMMENDED BOOKS

(1) Basic Electronics and Linear Circuits by NN Bhargava, Tata McGraw Hills, New Delhi

(2) Electronic Principles by Sahdev, Dhanpat Rai and Sons, New Delhi.

(3) Electronics Principles by Malvino, Tata McGraw Hills, New Delhi

(4) Electronic Devices and Circuits by Millman and Halkias, McGraw Hills, New Delhi

(5) Electronics Devices and Circuits by Bhupinderjit Kaur,modern Publishers, Jalandhar

(6) Basic Electronics by Grob, Tata McGraw Hills, New Delhi

(7) Art of Electronics by Horowitz

(8) Electronic Circuit Theory by Boylstead

(9) Electronic Devices and Circuits by BL Theraja, S Chand and Co Ltd. New Delhi

(10) Operational Amplifiers and Linear Integrated Circuits by Ramakant A. Gaykwad

(11) Electronics Devices and Circuits by Rama Reddy, Narosa Publishing House Pvt. Ltd., New Delhi

(12) Electronics Devices and Circuits-II by Rajesh Kumar, Eagle Prakashan, Jalandhar

SUGGESTED DISTRIBUTION OF MARKS

Topic	Time Allotted (hrs)	Marks Allocation
1	08	15
2	08	15
3	08	15
4	08	10
5	04	5
6	04	5
7	08	10
8	06	10
9	04	5
10	04	5
11	02	5
Total	**64**	**100**

4.6 WORKSHOP PRACTICE – I

L	T	P
-	-	9

LIST OF PRACTICALS

General introduction to hand tools used in foundry, welding and pattern making and smithy shop.

Welding Shop

Job 1. Preparing gas welding joint in vertical position joining M.S. Plates
Job 2. Exercise on gas cutting of mild steel plate with oxy-acetylene gas torch.
Job 3. Exercise on gas welding of cast iron and brass part or component.
Job 4. Exercise on preparation of T Joint by arc welding
Job 5. Exercise on spot welding/seam welding
Job 6. Exercise on MIG and TIG welding

Pattern making

Job 1. Preparation of solid/single piece pattern.
Job 2. Preparation of two piece/split pattern
Job 3. Preparation of a pattern on wooden lathe
Job 4. Preparation of a self cored pattern
Job 5. Preparation of a core box.

Foundry Shop

Job 1. Preparation of mould with solid pattern on floor.
Job 2. Preparation of floor mould of solid pattern using cope.
Job 3. Preparation of floor mould of split pattern in cope and drag of moulding box.
Job 4. Moulding and casting of a solid pattern of aluminum
Job 5. Preparing a mould of step pulley and also preparing core for the same.
Job 6. A visit to cast iron foundry should be arranged to have first hand knowledge of cast iron melting pouring and casting.
Job 7. Testing of moisture contents and strength of moulding sand.

Forging Shop/Fitting Shop/Sheet Metal Shop

Job 1. Preparation of single ended spanner by hand/machine forging.
Job 2. Preparation of simple die
Job 3. Demonstration of spinning process on lathe and spinning a bowl on a lathe machine.
Job 4. Demonstration of grinding process on lathe machine and grinding a job on a lathe machine
Job 5. Preparation of utility item out of G.I. sheet.
Job 6. Preparation of drilling Jig.

PERSONALITY DEVELOPMENT CAMP

This is to be organized at a stretch for two to three days during fifth or sixth semester. Extension Lectures by experts or teachers from the polytechnic will be delivered on the following broad topics. There will be no examination for this subject.

1. Communication Skills

2. Correspondence and job finding/applying/thanks and follow-up

3. Resume Writing

4. Interview Techniques: In-Person Interviews; Telephonic Interview; Panel interviews; Group interviews and Video Conferencing etc.

5. Presentation Techniques

6. Group Discussions Techniques

7. Aspects of Personality Development

8. Motivation

9. Leadership

10. Stress Management

11. Time Management

12. Interpersonal Relationship

13. Health and Hygiene

INDUSTRIAL TRAINING OF STUDENTS

(during summer vacation after IV Semester)

It is needless to emphasize further the importance of Industrial Training of students during their 3 years of studies at Polytechnics. It is industrial training, which provides an opportunity to students to experience the environment and culture of industrial production units and commercial activities undertaken in field organizations. It prepares student for their future role as diploma engineers in the world of work and enables them to integrate theory with practice. Polytechnics have been arranging industrial training of students of various durations to meet the above objectives.

This document includes guided and supervised industrial training of a minimum of 4 weeks duration to be organised during the semester break starting after second year i.e. after IV Semester examinations. The concerned HODs along with other teachers will guide and help students in arranging appropriate training places relevant to their specific branch. It is suggested that a training schedule may be drawn for each student before starting of the training in consultation with the training providers. Students should also be briefed in advance about the organizational setup, product range, manufacturing process, important machines and materials used in the training organization.

Equally important with the guidance is supervision of students training in the industry/organization by the teachers. A minimum of one visit per week by the teacher is recommended. Students should be encouraged to write daily report in their diary to enable them to write final report and its presentation later on.

An internal assessment of 50 and external assessment of 50 marks have been provided in the study and evaluation scheme of V Semester. Evaluation of professional industrial training report through viva-voce/presentation aims at assessing students understanding of materials, industrial process, practices in industry/field organization and their ability to engage in activities related to problem solving in industrial setup as well as understanding of application of knowledge and skills learnt in real life situations. The formative and summative evaluation may comprise of weightage to performance in testing, general behaviour, quality of report and presentation during viva-voce examination. It is recommended that such evaluations may be carried out by a team comprising of concerned HOD, teachers and representative from industry.

Teachers and students are requested to see the footnote below the study and evaluation scheme of IV Semester for further details.