6.1 BASICS OF MANAGEMENT

L	T	P
3	-	-

RATIONALE

The diploma holders are generally expected to take up middle level managerial positions, their exposure to basic management principles is very essential. Topics like Structure of Organization, Leadership, Motivation, Ethics and Values, Customer Relationship Management (CRM), Legal Aspects of Business, Total Quality Management (TQM), Intellectual Property Rights (IPR) etc. have been included in the subject to provide elementary knowledge about these management areas.

DETAILED CONTENTS

1. Principles of Management (06 hrs)

    1.1. Introduction, definition and importance of management.
    1.2. Functions of Management
    Planning, Organizing, Staffing, Coordinating, Directing, Motivating and Controlling.
    1.3. Concept and Structure of an organization
    Types of industrial organization
    a) Line organization
    b) Functional organization
    c) Line and Functional organization
    1.4. Hierarchical Management Structure
    Top, middle and lower level management
    1.5. Departmentalization
    Introduction and its advantages.

2. Work Culture (06 hrs)

    2.1. Introduction and importance of Healthy Work Culture in organization
    2.2. Components of Culture
    2.3. Importance of attitude, values and behaviour
    Behavioural Science – Individual and group behaviour
    2.4. Professional ethics – Concept and need of Professional Ethics

3. Leadership and Motivation (06 hrs)

    3.1. Leadership
        3.1.1. Definition and Need of Leadership
        3.1.2. Qualities of a good leader
        3.1.3. Manager vs. leader

3.2. Motivation
- 3.2.1. Definition and characteristics of motivation
- 3.2.2. Factors affecting motivation
- 3.2.3. Maslow's Need Hierarchy Theory of Motivation

3.3. Job Satisfaction

4. Legal Aspects of Business: Introduction and need (06 hrs)

4.1. Labour Welfare Schemes
- 4.1.1. Wage payment : Definition and types
- 4.1.2 Incentives: Definition, need and types

4.2. Factory Act 1948

4.3. Minimum Wages Act 1948

5. Management Scope in different Areas (12 hrs)

5.1. Human Resource Development

- 5.1.1. Introduction and objective
- 5.1.2. Manpower Planning, recruitment and selection
- 5.1.3. Performance appraisal methods

5.2. Material and Store Management

a) Introduction, functions and objectives of material management
b) Purchasing: definition and procedure
c) Just in time (JIT)

5.3. Marketing and Sales

a) Introduction, importance and its functions
b) Difference between marketing and selling
c) Advertisement- print media and electronic media
d) Market-Survey and Sales promotion.

5.4. Financial Management – Introduction

- 5.4.1. Concept of NPV, IRR, Cost-benefit analysis
- 5.4.2. Elementary knowledge of Income Tax, Sale Tax, Excise duty, Custom duty, Provident Fund

5.5 Maintenance Management

- 5.5.1 Concept
- 5.5.2 Preventive Maintenance

6. Miscellaneous topics (12 hrs)

6.1. Customer Relationship Management (CRM)

a) Definition and Need
b) Types of CRM
c) Customer satisfaction

6.2. Total Quality Management (TQM)

a) Inspection and Quality Control
b) Concept of Quality Assurance
c) TQM

6.3. Intellectual Property Rights (IPR)

3.3.1. Introduction, definition and its importance
3.3.2. Infringements related to patents, copyright, trade mark

INSTRUCTIONAL STRATEGY

It is observed that the diploma holders generally take up middle level managerial positions, therefore, their exposure to basic management principles is very essential. Accordingly students may be given conceptual understanding of different functions related to management. Some of the topics may be taught using question answer, assignment or seminar method. The teacher will discuss success stories and case studies with students, which in turn, will develop appropriate managerial qualities in the students. In addition, expert lectures may also be arranged from within the institutions or from management organizations. Appropriate extracted reading material and handouts may be provided.

RECOMMENDED BOOKS

1. Principles of Management by Philip Kotler TEE Publication
2. Principles and Practice of Management by Shyamal Bannerjee: Oxford and IBM Publishing Co, New Delhi.
3. Financial Management by MY Khan and PK Jain, Tata McGraw Hill Publishing Co., 7, West Patel Nagar , New Delhi.
4. Modern Management Techniques by SL Goel: Deep and Deep Publications Pvt Limited , Rajouri Garden, New Delhi.
5. Management by James AF Stoner, R Edward Freeman and Daniel R Gilbert Jr. : Prentice Hall of India Pvt Ltd, New Delhi.
6. Essentials of Management by H Koontz, C O' Daniel , McGraw Hill Book Company, New Delhi.
7. Marketing Management by Philip Kotler, Prentice Hall of India, New Delhi
8. Total Quality Management by DD Sharma, Sultan Chand and Sons, New Delhi.

9. Intellectual Property Rights and the Law by Dr. GB Reddy.

10. Service Quality Standards, Sales & Marketing Department, Maruti Udyog Ltd.
11. Customer Relationship Management: A step-by-step approach, Mohamed & Sagadevan Oscar Publication, Delhi
12. Customer Relation Management, Sugandhi RK, Oscar Publication, Delhi.

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (hrs)	Marks Allotted (%)
1.	06	15
2.	06	10
3.	06	15
4.	06	10
5.	12	25
6.	12	25
Total	**48**	**100**

6.2 FORGING DIE - DESIGN AND DRAWING

L	T	P
3	-	4

RATIONALE

A diploma holder should be able to conceive, design and draw assembly drawings and detailed part drawings of forging dies with proper dimensioning and calculations. Hence this subject.

DETAILED CONTENT

Section –A

1. Introduction to Forging (08 hrs)

   Various processes of forging, examples of components produced by forging processes, forging equipments and forging die features.

2. Forging Machines (12 hrs)

   Types of machines, specification and various parts of machines, and their function

3. Tool Design Parameters (06 hrs)

   Design of component drawings and design consideration

4. Forging Dies (16 hrs)

   Types of forging dies
   Closed die hammer forging, closed die press forging, upsetting die forging, cold forging, open dies, extrusion dies, design of component drawing. Specifications of dies, materials. Design of trimming tools. Design consideration of forging tools such as fuller, edger, bender, blocker, finisher.

5. Maintenance and Storage (06 hrs)

   Maintenance, safety and storage of forging die tools and material, handling of dies.

Section –B

1. Making drawing of different forging dies parts. Design and drawing of forging dies for simple components.

Note * Question paper will consist of section A and B.

Section A will contain theory contents up to 50%. Section B will contain design and drawing up to 50% marks.

At least, 2 Industrial visits to the concerned industry involved in forging dies should be arranged.

RECOMMENDED BOOKS

1. Forging handbook-forging methods by A. Thomas, Drop Forging Research Association, Sheffield Street, Sheffield.
2. Forging die design and practice by R. Sharam, S.N. Parsad, N.P. Saxena; S. Chand and Company. New Delhi.
3. Die, Mould and Jigs by V. Vladimi Rov, MIR. Publisher.
4. Forging and Forming metal by S.E. Rusinoff, S. Chand and Company, New Delhi.
5. Forging handbook by T.E. Byrer, American Society for metal.
6. Handbook of Die Design by Ivana Suchy; Mc Graw Hill.

SUGGESTED DISTRIBUTION MARKS

Topic No.	Allotted Time	Allotted Marks
1	08	16
2	12	26
3	06	12
4	16	34
5	06	12
Total	**48**	**100**

6.3 COMPRESSION AND BLOW MOULD - DESIGN AND DRAWING

L	T	P
4	-	2

RATIONALE

A diploma holder should be able to conceive, design and draw assembly drawing and detailed part drawings of injection/compression/transfer moulds with proper dimensioning and calculations. Hence this subject.

DETAILED CONTENT

Section – A

1. **Introduction to Moulding Process** (06 hrs)

   Injection moulding, blow/rotational moulding, compression/transfer moulding, Extrusion, thermoforming, examples for the above machines used.

2. **Moulding Machines** (06 hrs)

   Injection and compression moulding machines- classification, specifications, parts and their functions. Hand machines.

3. **Compression Moulds** (24 hrs)

   Main parts and their function, feeding systems, runners, gates, parting line, ejection systems, ejector return mechanism, under cuts, sliders, split moulds, multicavity moulds, moulds for threaded components, draft angle placement of cavities, three plate moulds, mould cooling, location and guide system, shrinkage allowances, clamping force, mould ventilation, moulding defects, moulding cycle.

4. **Moulds for Blow Moulding, Rotational Moulding** (16 hrs)

   Main parts and their functions, die design and its related fdifferent parts, effect of process parameters.

5. **Material for Mould Parts** (08 hrs)

   Materials used for various mould parts, their treatment like hardening, tempering, electroplating.

6. **Mould Maintenance** (04 hrs)

   Maintenance, storage and safety of moulds, transportation/handling.

Section B

Making drawings of the relevant topics learnt; design and drawing of mould for simple components for compression mould.

Note:

The question paper on the subject will consist of two parts i.e. Section-A and Section-B. Section A will contain Theory contents to the extent of 50%. Section B will contain Design and Drawing to the extent of 50%.

At last 2 industrial visits should be arranged in the concerned industry dealing with plastic moulds and moulding machine.

RECOMMENDED BOOKS

1. Injection Mould design fundamentals by A.B. Glanvill, E.N. Denton, Industrial Press Inc.
2. Plastic Material handbook Vol. I and II. by A.S. Athalye, Multitech Publishers Co. Mumbai.
3. Injection Moulding by A.S. Athalye, Multitech Publishers Co. Mumbai.
4. Rubber and Plastic technology by Chandra and Mishra, CBS Publishers and Distributor, New Delhi
5. Plastics Mould Engineering Handbook by J. Harry Du Bois and Waynel Pribble; Van Nostrand Rehnhold Company.
6. Injection moulds by R.G.W. Pye

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Allotted Time	Allotted Hours
1	06	09
2	06	09
3	24	40
4	16	24
5	08	12
6	04	06
Total	**64**	**100**

6.4 INSPECTION AND QUALITY CONTROL

L	T	P
4	-	2

RATIONALE

Diploma holders in this course are required to measure and inspect for ensuring quality of product. For this purpose, knowledge and skills about standards of measurement, limits, fits and tolerances, types of inspection and various measuring instruments, SQC & quality standards are necessary. Hence this subject.

DETAILED CONTENT

1. Inspection (09 hrs)

- Introduction, units of measurement, standards for measurement and interchangeability.
- International, national and company standard, line and wavelength standards.
- Planning of inspection: what to inspect? When to inspect? Who should inspect? Where to inspect?
- Types of inspection: remedial, preventive and operative inspection, incoming, in-process and final inspection.
- Study of factors influencing the quality of manufacture.

2. Measurement and Gauging (22 hrs)

- Basic principles used in measurement and gauging, mechanical, optical, electrical and electronic.
- Study of various measuring instruments like: calipers, micrometers, dial indicators, surface plate, straight edge, try square, protectors, sine bar, clinometer, comparators – mechanical, electrical and pneumatic. Slip gauges, tool room microscope, profile projector, co-ordinate measuring machine (CMM).
- Geometrical parameters and errors:
  Errors & their effect on quality, concept of errors, measurement of geometrical parameter such as straightness, flatness and parallelism.
- Study of procedure for alignment tests on lathes, drilling and milling machines.
- Testing and maintenance of measuring instruments.

3. Statistical Quality Control (16 hrs)

- Basic statistical concepts, empirical distribution and histograms, frequency, mean, mode, standard deviation, normal distribution, binomial and Poisson, Simple examples.
- Introduction to control charts, namely X, R, P and C charts and their applications.

- Sampling plans, selection of sample size, method of taking samples, frequency of samples.
- Inspection plan format and test reports

4. Modern Quality Concepts (09 hrs)

- Concept of total quality management (TQM)
- National and International Codes.
- ISO-9000, concept and its evolution
- QC tools
- Introduction to Kaizen, 5S

5. Instrumentation (08 hrs)

Measurement of mechanical quantities such as displacement, vibration, frequency, pressure temperature by electro mechanical transducers of resistance, capacitance & inductance type.

LIST OF PRACTICALS

1 Use of dial indicator for measuring taper.

2 Use of combination set, bevel protector and sine bar for measuring taper.

3 Measurement of thread characteristic using vernier and gauges.

4 Use of slip gauge in measurement of center distance between two pins.

5 Use of tool maker's microscope and comparator.

6 Plot frequency distribution for 50 turned components.

7 With the help of given data, plot X, R, P and C charts

RECOMMENDED BOOKS

1. Statistical Quality Control by M.Mahajan; Dhanpat Rai and Sons, Delhi

2. Engineering Metrology by RK Jain

3. Engineering Metrology by RK Rajput; SK Kataria and Sons

4. Production Planning Control and Management by KC Jain & Aggarwal; Khanna Publishers, New Delhi.

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1	09	14
2	22	34
3	16	24
4	09	14
5	08	14
Total	**64**	**100**

6.5 CNC MACHINES AND AUTOMATION

L	T	P
3	-	3

RATIONALE

Diploma holders are required to supervise and handle specialized machines and equipment like CNC machines. For this purpose, knowledge and skills about NC machines, part programming in NC machines and tooling for CNC machines are required to be imparted for enabling them to perform above functions. This subject aims at development of knowledge and skills about CNC machines, tools, equipment and use of high tech machines for increased productivity and quality.

DETAILED CONTENTS

1. Introduction (10 hrs)

   Introduction to NC, CNC & DNC, their advantages, disadvantages and applications, Machine Control Unit, input devices, serial communication and Ethernet techniques, selection of components to be machined on CNC machines, Problems with conventional NC, New developments in NC, Axis identification, PLC Control and its components.

2. Construction and Tooling (08 Hrs)

   Design features, specification Chart of CNC machines, use of slideways, balls, rollers and coatings, motor and leadscrew, swarf removal, safety and guarding devices, various cutting tools for CNC machines, overview of tool holder, different pallet systems and automatic tool changer system, management of a tool room.

3. Part Programming (08 Hrs)

   Part programming and basic concepts of part programming, NC words, part programming formats, simple programming for rational components, part programming using conned cycles, subroutines and do loops, tool off sets, cutter radius compensation and wear compensation.

4. System Devices (12 Hrs)

   Actuators, Transducers and Sensors, Tachometer, LVDT, opto-interrupters, potentiometers for linear and angular position, encoder and decoder, axis drives, open loop system, close loop system.

5. Problems in CNC Machines (04 Hrs)

   Common problems in mechanical, electrical, pneumatic, electronic and PC components of NC machines, diagnostic study of common problems and remedies, use of on-time fault finding diagnosis tools in CNC machines.

6. Automation and NC system (06 Hrs)

Role of computer in automation, emerging trends in automation, automatic assembly, manufacture of magnetic tape, manufacture of printed circuit boards, manufacture of integrated Circuits, Overview of FMS, Group technology, CAD/CAM and CIM.

LIST OF PRACTICALS

1 Study the constructional details of CNC lathe.

2. Study the constructional details of CNC milling machine.

3. Study the constructional details and working of:

- Automatic tool changer and tool setter
- Multiple pallets
- Swarf removal
- Safety devices

4. Develop a part programme for following lathe operations and make the job on CNC lathe and CNC turning center.

- Plain turning and facing operations
- Taper turning operations
- Operation along contour using circular interpolation.

5. Develop a part programme for the following milling operations and make the job on CNC milling

- Plain milling
- Slot milling
- Contouring
- Pocket milling

6. Preparation of work instruction for machine operator

7. Preparation of preventive maintenance schedule for CNC machine.

8. Demonstration through industrial visit for awareness of actual working of FMS in production.
9. Use of software for turning operations on CNC turning center.

10. Use of software for milling operations on machine centres.

INSTRUCTIONAL STRATEGY

This is highly practice-based course. Efforts should be made to develop programming skills amongst the students. During practice work, it should be ensured that students get opportunity to individually perform practical tasks.

RECOMMENDED BOOKS

1. CNC Machines – Programming and Applications by M Adithan and BS Pabla; New Age International (P) Ltd., Delhi.
2. Computer Aided Manufacturing by Rao, Kundra and Tiwari; Tata Mc Graw Hill, New Delhi.
3. CNC Machine by Bharaj; Satya Publications, New Delhi.

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1	10	20
2	08	16
3	08	16
4	12	26
5	04	10
6	06	12
Total	**48**	**100**

6.7 PROJECT WORK

L	T	P
-	-	10

RATIONALE

The practical training cum project work is intended to place students for project oriented practical training in actual work situations for the stipulated period with a view to:

i) Develop understanding regarding the size and scale of operations and nature of field work in which students are going to play their role after completing the courses of study.

ii) Develop understanding of subject based knowledge given in the class room in the context of its application at work places.

iii) Develop first hand experience and confidence amongst the students to enable them to use and apply polytechnic/institute based knowledge and skills to solve practical problems in the world of work.

iv) Develop special skills and abilities like interpersonal skills, communication skills, attitudes and values.

This practical training cum project work should not be considered as merely conventional industrial training in which students are sent at work places with minimal supervision. This experience is required to be planned and supervised on regular basis by the polytechnic faculty. For the fulfillment of above objectives, polytechnic may establish close linkage with 8-10 relevant organization for providing such an experience. It is necessary that each organisation is visited well in advance and activities to be performed by students are well defined. The chosen activities should be such which are of curricular interest to students and of professional value to industrial/field organisations. Each teacher is expected to supervise and guide 5-6 students.

Effort should be made to identify actual field problems as project work for the students. Project selected should not be too complex which is beyond the level of the students. The placement of the students for such a practical cum project work should match with the competency profile of students and the project work assigned to them.

The projects given to students should be such for which some one is waiting for solution. Some of the suggested project activities are given below:

1. Projects connected with repair and maintenance of dies.
2. Estimating and costing projects.
3. Project work related to increasing productivity.
4. Projects relating to try-out of jigs, fixtures, press tools etc.
5. Projects related to improving an existing toolings

6. Design and Fabrication of any one of the following:

   a. Jigs and Fixtures
   b. Press Tool
   c. Injection Mould
   d. Forging Dies
   e. Casting Die
   f. Compress/Blow Moulds

Note:

1. Students are required to prepare working drawings of the projects and will prepare the estimate, material lists as required, and carry out market survey etc.

2. Students will specify various processes involved in the project

A suggestive criteria for assessing student performance by the external (personnel from industry) and internal (teacher) examiner is given in table below:

Sr. No.	Performance criteria	Max. marks	Rating Scale				
			Excellent	Very good	Good	Satis-factory	Poor
1.	Selection of project assignment	10	10	8	6	4	2
2.	Planning and execution of considerations	10	10	8	6	4	2
3.	Quality of performance	20	20	16	12	8	4
4.	Providing solution of the problems or production of final product	20	20	16	12	8	4
5.	Sense of responsibility	10	10	8	6	4	2
6.	Self expression/ communication skills	5	5	4	3	2	1
7.	Interpersonal skills/human relations	5	5	4	3	2	1
8.	Report writing skills	10	10	8	6	4	2
9.	Viva voce	10	10	8	6	4	2
Total marks		**100**	**100**	**80**	**60**	**40**	**20**

The overall grading of the practical training shall be made as per following table

	Range of maximum marks	Overall grade
i)	More than 80	Excellent
ii)	65-80	Very good
iii)	50-64	Good
iv)	41-49	Fair
v)	Less than 40	Poor

In order to qualify for the diploma, students must get "Overall Good grade" failing which the students may be given one more chance of undergoing 8 -10 weeks of project oriented professional training in the same industry and re-evaluated before being disqualified and declared "not eligible to receive diploma ". It is also important to note that the students must get more than six "goods" or above "good" grade in different performance criteria items in order to get "Overall Good" grade.

Important Notes

1. This criteria must be followed by the internal and external examiner and they should see the daily, weekly and monthly reports while awarding marks as per the above criteria.

2. The criteria for evaluation of the students have been worked out for 100 maximum marks. The internal and external examiners will evaluate students separately and give marks as per the study and evaluation scheme of examination.

3. The external examiner, preferably, a person from industry/organization, who has been associated with the project-oriented professional training of the students, should evaluate the students performance as per the above criteria.

4. It is also proposed that two students or two projects which are rated best be given merit certificate at the time of annual day of the institute. It would be better if specific nearby industries are approached for instituting such awards.

The teachers are free to evolve another criteria of assessment, depending upon the type of project work.

It is proposed that the institute may organize an annual exhibition of the project work done by the students and invite leading Industrial organizations in such an exhibition. It is also proposed that two students or two projects which are rated best be given merit certificate at the time of annual day of the institute. It would be better if specific industries are approached for instituting such awards.