6.1 BASICS OF MANAGEMENT

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
b) 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)

6.3.1. Introduction, definition and its importance

6.3.2. 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
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.
10. Service Quality Standards, Sales & Marketing Department, Maruti Udyog Ltd.

SUGGESTED DISTRIBUTION OF MARKS

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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 and SQC is necessary. He/she must be aware of quality systems. Hence this subject.

**DETAILED CONTENTS**

1. **Inspection** (16 hrs)
   - 1.1 Introduction, units of measurement, standards for measurement and interchangeability, accuracy and precision
   - 1.2 International, National and company standard, line and wavelength standards
   - 1.3 Planning of inspection: What to inspect? When to inspect? Who should inspect? How to inspect? Where to inspect?
   - 1.4 Types of inspection: Remedial, preventive and operative inspection, incoming, in-process and final inspection

2. **Measurement and Gauging** (30 hrs)
   - 2.1 Study of various measuring instruments like: Callipers, micrometers, dial indicators, surface plate, straight edge, try square, protactors, sine bar, clinometer, gear tooth vernier, comparators-mechanical and electrical. Slip gauges, tool room microscope, profile projector, talysurf. Limit gauges: Plug, ring, snap, taper, thread, height, depth, form, feeler, plate, wire and their applications for linear, angular, surface, thread and gear measurements, gauge tolerances.
   - 2.3 Error, calibration of measuring instruments

3. **Statistical Quality Control** (28 hrs)
   - 3.1 Quality control, SQC, functions of quality control, quality cost, factors affecting quality of product.
   - 3.2 Basic statistical concepts, emperical distribution and histograms, frequency, mean, mode, standard deviation, normal distribution, binomial and poisson (No mathematical derivations)
   - 3.3 Process Capability:- Introduction to control charts namely X bar, R,p & c Charts and their simple applications. (simple numericals)
3.4  Total Quality Management (In brief)
    - QC Tools
    - Kaizen
    - 5S
    - Just-in-time
3.5  Sampling plans, selection of sample size, method of taking samples, frequency of samples
3.6  Inspection plan format and test reports

4.  Standards And Codes  (06 hrs)
4.1  National and International Codes
4.2  ISO-9000, ISO-14000-concept and its evolution and implications

LIST OF PRACTICALS

1.  Exercise on use of height gauge
2.  Exercise on use of combination set
3.  Exercise on use of bevel protractor
4.  Exercise on use of sine bar and slip gauges for measuring taper
5.  Exercise on use of Mechanical Comparators
6.  Measurement of thread characteristic using thread micrometer
7.  Measurement of all elements of gears by using gear tooth vernier
8.  Use of tool maker’s microscope
9.  Use of profile projector
10.  Plot frequency distribution for 50 turned components
11.  To plot X-R charts for given samples
12.  To plot p-chart for given samples
13.  To plot c-chart for given samples

INSTRUCTIONAL STRATEGY

1.  Role of National Physical Laboratory (NPL) in standardization and calibration should be clearly explained.
2.  While dealing with theory, the respective measuring instruments should be demonstrated.
3.  Stress should be laid on correct use of measuring instruments
4.  Visit to quality control department of any one manufacturing unit should be made.
LIST OF RECOMMENDED BOOKS

1. Production Engineering Estimating and Costing by M. Adithon and B.S. Pabra; Konark Publisher, New Delhi.
4. Statistical Quality Control by M. Mahajan

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6.3. MACHINE DESIGN AND DRAWING

RATIONALE

A diploma holder in this course is required to assist in the design and development of prototype and other components. For this, it is essential that he is made conversant with the principles related to design of components and applications of these principles for designing. Hence this subject.

DETAILED CONTENTS

1. General Design Considerations
   1.1 Modes of failure
   1.2 General considerations in design of machine components
   1.3 Stress concentration

2. Design and Drawing of following
   a) Bolts nuts
   b) Rivetted joints – lap, butt (single and double cover plate)
   c) Knuckle joint, Cotter joint
   d) Shafts and keys subjected to torsion, bending and combined torsion and bending
   e) Flanged Coupling (Protected and Unprotected)
   f) Simple pulley
   g) Screw jack

3. Terminology of gears, types of gears, design and drawing of spur and helical gears

NOTE: The ratio of design and drawing may be kept as 70:30 while setting the paper.

Recommended Books

6.4  CNC MACHINES AND AUTOMATION  

RATIONAL

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.
3. CNC Machine by Bharaj; Satya Publications, New Delhi.

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6.5 PROJECT WORK

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- - 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. Students may be assessed both by industry and polytechnic faculty. The suggested performance criteria is given below:

(1) Punctuality and regularity
(2) Initiative in learning/working at site
(3) Level/proficiency of practical skills acquired
(4) Ability of solve live practical problems
(5) Sense of responsibility
(6) Self expression/communication skills
(7) Interpersonal skills/Human Relation
(8) Report Writing Skills
(9) Viva Voce
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 machines.
2. Estimating and costing projects.
3. Design of jigs / fixtures.
4. Projects related to quality control.
5. Project work related to increasing productivity.
6. Projects relating to installation, calibration and testing of machines.
7. Projects related to wastage reduction.
8. Project, related to fabrication.
10. Projects related to improving an existing system

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