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

- 5.2.1 Introduction, functions and objectives of material management
- 5.2.2 Purchasing: definition and procedure
- 5.2.3 Just in time (JIT)

5.3. Marketing and Sales

- 5.3.1 Introduction, importance and its functions
- 5.3.2 Difference between marketing and selling
- 5.3.3 Advertisement- print media and electronic media
- 5.3.4 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)

6.1.1 Definition and Need

6.1.2 Types of CRM

6.1.3 Customer satisfaction

6.2. Total Quality Management (TQM)

6.2.1 Inspection and Quality Control

6.2.2 Concept of Quality Assurance

6.2.3 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
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 ELEMENTS OF AVIONICS

L	T	P
3	-	2

RATIONALE

An aircraft is capable of flying in spite of bad weather and several unfavourable conditions with the help of various instruments. In order to appreciate the principles involved in flying, it is essential to gain knowledge and skill in the area of all the instruments and equipments applied to flying.

DETAILED CONTENTS

1. Introduction to Avionics Sub Systems and Electronic Circuits (4 hrs)

Typical avionics subsystems, amplifier, oscillator, aircraft communication system, transmitter, receiver, antenna.

2. Avionics Technology (10 hrs)

The nature of microelectronic devices: Processors , Memory devices , Digital data buses , Data bus examples – integration of aircraft systems , Regional aircraft/business jets , Fibre-optic buses , Avionics packaging – Line Replaceable Units ,Typical LRU architecture ,Environmental conditions , Integrated Modular Avionics

3. Navigation System and Radar (8 hrs)

Electrical diagram and identification scheme, circuit controlling devices, power utilisation-typical application to avionics, need for avionics in civil and military aircraft, gyroscopic versus inertial platform, structure of stable platform, inertial navigation units, inertial alignment, inertial interface system, importance of compass swing

4. Electronic Flight Control System (8 hrs)

Fly-by-wire system: - basic concept and features. Pitch and Roll rate: - command and response, control laws, frequency response of a typical Fly By Wire actuator, cooper harper scale, redundancy and failure survival, common mode of failures and effects analysis

5. Flight Deck and Cockpits (9 hrs)

Control and display technologies, Cathode Ray Tube, Light Emitting Diode and plasma panel - Touch screen - Direct voice input (DVI) – Civil cockpit and military cockpit: Multi function display, Head Up Display, Multi Function Keyboard

6. Avionics Systems Integration (9 hrs)

Avionics equipment fit, Electrical data bus system, communication systems, navigation systems, flight control systems, radar, electronic warfare, and fire control system, avionics system architecture–data buses MIL–STD 1553 B.

LIST OF PRACTICALS

1. Study and demonstration of electronics flight systems.
2. Study and demonstration of communication and navigational systems.
3. Study and demonstration of Pitch and roll system.
4. Study and demonstration of amplifiers and oscillator of aircraft.
5. Study and demonstration of transmitters & antennas.

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. Introduction to Avionics Systems by R P G Collinson; Kulwar Academic Publishers, 2003
2. Aircraft Electrical System by E H J Pallett; Pitman Publishers, 1976
3. Avionics Systems by Middleton, D.H., Ed.; Longman Scientific and Technical Longman Group UK Ltd., England, 1989.
4. Digital Avionic Systems by Spitzer, C.R.; Prentice Hall, Englewood Cliffs, N.J., USA, 1987.
5. Navigation by R.B. Underdown & Tony Palmer; Black Well Publishing 2001.

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (hrs)	Marks Allotted (%)
1.	04	07
2.	10	22
3.	08	18
4.	08	16
5.	09	17
6.	09	20
Total	**48**	**100**

6.3 AVIATION MANAGEMENT

L	T	P
4	-	-

RATIONALE

The subject deals with the aviation management practices and safety regulations during flying,take off and landing and maintenance of aircraft. The students will acquire knowledge and skill in the management of aircraft,aircraft regulations, organizational required controls and economics of management. The teaching is to be practice- oriented.

DETAILED CONTENTS

1. Air Traffic Control (10 hrs)

Principles of air Navigation and Air Traffic Control (ATC), overview of Commuinication Navigation and Surveillance, separation standards, radar and non radar separation, wake turbulence longitudinal separation minima, precision approaches for landing, radar system for ATC quality and airworthiness assurance

2. Airlines (08 hrs)

Introduction to airline industry and economics, determination of operating costs, Airline route selection and scheduling, planning of flight operations, special topics in airline operations, Emergence of Low Cost Carrier.

3. Airports (08 hrs)

Aircraft characteristics affecting airport design, aircraft layouts and configuration, geometric design of the airfield, wind rose diagram.

4. Current Issues and Trends in Air Transportation (11 hrs)

Modelling and simulation of ATC system, estimation of airway capacity, human factors and controller workload, performance based navigation, free flight, conflict detection and resolution, environmental effects of aviation, modelling air transport system.

5. Aircraft Assembly and Rigging (09 hrs)

Aircraft assembly, rigging, alignment of fixed surfaces and flight controls and system in detail, balancing, inspection and maintenance.

6. Quality and Airworthiness Assurance (08 hrs)

Zero defect analogy, FMECA, fault tree analysis, bench marking, quality circles, quality audit. Quality standards: ISO 9000, TQM, CMM, Six sigma, quality organizational set up in production/repair/operational set up.

7. Civil aviation regulations (10 hrs)

DGCA(Directorate general of civil aviation) and FAA regulation: Licensing regulations, general regulations, operations regulations, airworthiness regulations, aviation safety regulations, air navigation regulations, aerodromes regulations

INSTRUCTIONAL STRATEGY

It is observed that the diploma holders generally take up middle level managerial positions and therefore their exposure to basic management principles and knowledge of safety is very essential. Accordingly students may be given conceptual understanding of different functions related to management and safety. Some of the topics may be taught using question answers, assignment or seminar method.

RECOMMENDED BOOKS

1. Quality planning and analysis by J M Juran, Frank M Gryna; TMH publications, 2005
2. Fundamental of air traffic control, 4th edition by Michael S Nolan; Thomson Brooks/Cole, USA, 2004
3. Planning and Design of Airports, 4th edition by Robert Horonjeff & Francis X Mckelvey; Mcgraw Hill Professional Publishing, 1993

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (hrs)	Marks Allotted (%)
1.	10	12
2.	08	16
3.	08	12
4.	11	14
5.	09	14
6.	08	12
7.	10	20
Total	**64**	**100**

6.4 AIRCRAFT MAINTENANCE, REPAIR AND OVERHAUL

L	T	P
3	-	4

RATIONALE

The subject deals with the maintenance concepts and practices in general and as applicable to aeronautical field. The students will acquire knowledge and skill in the maintenance of aircraft and its system, controls and economics of maintenance. The teaching is to be practice- oriented.

DETAILED CONTENTS

1. Maintenance Schedules (8 hrs)

Types of maintenance schedules, mandatory schedules, inspection of aircraft and components: types of inspections, various aircraft manuals, service letter and service bulleting, advisory circulars, repair, modifications, alteration, reconditioning, history record sheet.

2. Maintenance of Radio and Communication Systems (10 hrs)

Basics application and identification of electrical cables used in Aircraft radio installation, crimping and soldering techniques, bonding continuity and insulation tests. Composition, performance (stability and tolerance) and limitations of the fixed resistors and varistors (carbon composition, carbon film, wire wound and metallic film), AC and DC measuring instruments

3. Engine Maintenance (12 hrs)

Piston/Gas Turbines: Periodical servicing procedures, engine installation checks, control rigging, ground running checks, bleeding and performance checks. Engine on condition maintenance, Trouble shooting and rectification, Inspection after shock landing, Crack detection, Procedure for long and short terms storage of engine and accessories, engine preservation and depreservation.

4. Maintenance of Airframe and Systems (10 hrs)

Various types of structures in airframe construction, tubular, braced monocoque, semimonocoque, etc, longerons, stringers, formers, bulkhead, spars and ribs, honeycomb construction, airplane controls surfaces, Flying controls including power operated controls, hydraulic, pneumatic, landing gear various types, shock struts, nose wheel steering, ice and rain protection, fire detection warning and extinguishing, oxygen, air -conditioning and pressurization systems, wheels, tyres, brakes, antiskid system.

5. Maintenance of Electrical and Instrument Systems (8 hrs)

Airspeed indicator, altimeter, mach meter, gyroscope, turn and bank indicator, rate of climb and descent indicators, battery, basic elements of DC system, basic elements of AC systems.

LIST OF PRACTICALS

Aircraft maintenance and overhaul lab experiments:

1. Maintenance of landing gear, removal and installation of tyres.
2. Maintenance of spark plugs.
3. Removal and inspection of inspection plates.
4. Maintenance of Aircraft instruments-CVR, FDR etc.
5. Identify Leakage in hydraulic system and its maintenance.
6. Calibration of pressure and temperature in hydraulic system.

INSTRUCTIONAL STRATEGY

1. Use experimental 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. Aircraft Maintenance and Repair by Michael J. Kores and William A. Watkins; MGraw Hill.
2. Aircrarft Instruments by E H J Pallet; Himalayan Book, New Delhi 1981.
3. Aircraft Instruments by C A Williams; Galgotia Publications, New Delhi 1973.
4. Instruments by R W Sloley and Coulthard.
5. Civil Aircraft Inspection Procedures (CAP 459) Pt II Aircraft, Himalayan Books
6. Airframe and Power Plant Mechanic (AC 65-15A) Airframe Hand Book, Himalayan Books.

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (hrs)	Marks Allotted (%)
1.	08	20
2.	10	15
3.	12	25
4.	10	25
5.	08	15
Total	**48**	**100**

6.5 AIRCRAFT POWER PLANT

L T P
4 - 2

RATIONALE

The diploma holders in aeronautical engineering must have required knowledge and skill about the power plant system. This subject has been designed for the full basics about the knowledge of different types of engines which are used in aircraft system.

DETAILED CONTENTS

1. Piston Engines (10 hrs)

   Two and four stroke engines, Efficiency, factors affecting engine performance, Knowledge of the function and construction of various parts and accessories of the engine including induction, exhaust and cooling system, engine mounting, Engine fire detection and protection systems.

2. Propellers (8 hrs)

   Knowledge and functioning of parts, variable pitch and feathering propellers and associated control system components.

3. Engine Fuel and Oil System (12 hrs)

   Construction, features of carburettors, engine fuel and oil systems. Characteristics of aviation fuel and oil, common sources of contamination, methods of checking contamination

4. Ignition and Starting Systems (10 hrs)

   Magnetos and ignition system components, various types of engine starters.

5. Engine Instruments (10 hrs)

   Principle of operation. Superchargers-constructional features and principles of operation and function of various types of superchargers and its related component.

6. Gas Turbine (14 hrs)

   Principle of operation, general constructional details and function of various type of gas turbine engines, Theory of gas turbine engines, advantages and disadvantages of each type, Induction, exhaust and cooling systems, anticing of engine, engine mountings, thrust augmentation, Compressor surge and stall, bleed control system, Principles of operation, general constructional details and functions of fuel and oil systems.

LIST OF PRACTICALS

1. Study and demonstration of two and four stroke aircraft piston engine
2. Study and demonstration of forced convective heat transfer over combustion chamber
3. Study and demonstration of performance of a turbojet
4. Study and demonstration of measurement of nozzle flow
5. Study and demonstration of fuel-injection characteristics

INSTRUCTIONAL STRATEGY

1. Teachers should take the students to industry and explain the details of power plant systems and their components.
2. While imparting instructions, focus should be on conceptual understanding.
3. Training slides of "Carrier Fundamentals of Aircraft power plant" to be shown to students.

RECOMMENDED BOOKS

1. Aviation Maintenance Management by Harry A. Kinnison, Tariq Siddiqui
2. Jet Engine Manual by E Mangham and A Peace; Himalayan Books
3. Jet Engines, Rolls Royce Ltd. 1992
4. Civil Aircraft Inspection Procedures (CAP 459), Himalayan Books

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (hrs)	Marks Allotted (%)
1.	10	16
2.	08	14
3.	12	16
4.	10	15
5.	10	15
6.	14	24
Total	**64**	**100**

6.6 PROJECT WORK

L T P
- - 12

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 someone 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. Projects related to quality control.
4. Project work related to increasing productivity.
5. Projects relating to installation, calibration and testing of machines/instruments.
6. Projects related to wastage reduction.
7. Project, related to fabrication.
8. Energy efficiency related projects.
9. 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

Note: 3. Students may be sent for industrial training at the following organizations:

- Aviation Clubs
- HAL
- NAL
- DRDO
- Airforce Station
- Airlines
- Aircrtaft Repair, Maintenance and Overhaul Workshops etc.