5.1 EMPLOYABILITY SKILLS – I

L	T	P
-	-	2

RATIONALE

The present day world requires professionals who are not only well qualified and competent but also possess good communication skills. Our diploma students not only need to possess subject related knowledge but also soft skills to get good jobs or to rise steadily at their work place. The objective of this subject is to prepare students for employability in job market and survive in cut throat competition among professionals.

DETAILED CONTENTS

1. Writing skills (08 hrs)
   - i) Official and business correspondence
   - ii) Job application - covering letter and resume
   - iii) Report writing - key features and kinds

2. Oral Communication Skills (20 hrs)
   - i) Giving advice
   - ii) Making comparisons
   - iii) Agreeing and disagreeing
   - iv) Taking turns in conversation
   - v) Fixing and cancelling appointments

3. Generic Skills (04 hrs)
   - i) Stress management
   - ii) Time management
   - iii) Negotiations and conflict resolution
   - iv) Team work and leadership qualities

5.2 ELECTRICAL MACHINES

L	T	P
4	-	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

a) 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 FOR FACILITATING THE PAPER SETTER

Sr. No.	Topic	Time Allotted (hrs)	Marks Allocation
1.	Three phase Supply	6	12
2.	Transformers	8	20
3.	DC Motor	8	15
4.	3 Phase Induction Motors	8	20
5.	Synchronous Motors	6	10
6.	Single Phase Motors	6	13
7.	Stepper Motor and Servo Motor	6	10
Total		**48**	**100**

5.3 ENVIRONMENTAL EDUCATION

L	T	P
3	-	-

RATIONALE

Education about environment protection is a must for all the citizens. In addition, a diploma holder must have knowledge of different types of pollution caused by industries and construction activities so that he may help in balancing the eco system and controlling pollution by adopting pollution control measures. He should also be aware of environmental laws related to the control of pollution.

DETAILED CONTENTS

1. Definition, Scope and Importance of Environmental Education (02 hrs)

2. Basics of ecology, biodiversity, eco system and sustainable development (03 hrs)

3. Sources of pollution - natural and manmade, causes, effects and control measures of pollution (air, water, noise, soil, radioactive and nuclear) and their units of measurement (12 hrs)

4. Solid waste management – Causes, effects and control measures of urban and industrial waste (06 hrs)

5. Mining and deforestation – Causes, effects and control measures (04 hrs)

6. Environmental Legislation - Water (prevention and control of pollution) Act 1974, Air (Prevention and Control of Pollution) Act 1981 and Environmental Protection Act 1986, Role and Function of State Pollution Control Board, Environmental Impact Assessment (EIA) (10 hrs)

7. Role of Non-conventional Energy Resources (Solar Energy, Wind Energy, Bio Energy, Hydro Energy) (04 hrs)

8. Current Issues in Environmental Pollution – Global Warming, Green House Effect, Depletion of Ozone Layer, Recycling of Material, Environmental Ethics, Rain Water Harvesting, Maintenance of Groundwater, Acid Rain, Carbon Credits. (07 hrs)

INSTRUCTIONAL STRATEGY

The contents will be covered through lecture cum discussion sessions. In addition, in order to have more appreciation of need for protection of environment, it is suggested that different activities pertaining to Environmental Education like video films, seminars, environmental awareness camps and expert lectures may also be organized.

RECOMMENDED BOOKS

1. Environmental Engineering and Management by Suresh K Dhameja; SK Kataria and Sons, New Delhi.
2. Environmental Science by Dr. Suresh K Dhameja; SK Kataria and Sons, New Delhi.
3. Environmental and Pollution Awareness by Sharma BR; Satya Prakashan, New Delhi.
4. Environmental Protection Law and Policy in India by Thakur Kailash; Deep and Deep Publications, New Delhi.
5. Environmental Science by Deswal and Deswal; Dhanpat Rai and Co. (P) Ltd. Delhi.
6. Engineering Chemistry by Jain and Jain; Dhanpat Rai and Co. (P) Ltd. Delhi.
7. Environmental Studies by Erach Bharucha; UGC University Press.

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted for Lectures (Periods)	Marks Allotted (%
1	02	04
2	03	06
3	12	24
4	06	12
5	04	10
6	10	20
7	04	10
8	07	14
Total	**48**	**100**

5.4 MICROCONTROLLERS AND EMBEDDED SYSTEM

L	T	P
4	-	2

RATIONALE

Embedded systems and Micro-controllers have also assumed a great significance in the electronic and consumer goods industry and are a very vital field. The subject aims expose students to the embedded systems besides giving them adequate knowledge of Micro controllers.

DETAILED CONTENTS

1. Microcontroller series (MCS) – 51 Overview (12 hrs)

   Architecture of 8051/8031 Microcontroller
   - Pin details
   - I/O Port structure
   - Memory Organization
   - Special Function Registers (SFRs)
   - External Memory

2. Instruction Set; Addressing Modes, Instruction types (12 hrs)

   - Timer operation
   - Serial Port operation
   - Interrupts

3. Assembly language for Micro controller (12 hrs)

   - Assembler directives
   - Assembler operation
   - Compiler operations
   - De bugger
   - Simulator

4. Design and Interface (12 hrs)

   Examples like: keypad interface, 7- segment interface, LCD, stepper motor. A/D, D/A, RTC Interface.

5. Introduction of PIC Micro controllers (04 hrs)

6. Application of Micro controllers in Communication System (06 hrs)

7. Embedded System and its Application (06 hrs)

LIST OF PRACTICALS

1. Familiarization with Micro-controller Kit
2. Assembly Language Programming (PC Based)
3. C Language Programming- (PC Based)
4. Write Program for LCD interface.
5. Write Program for A/D converter, result on LCD.
6. Write Program for D/A converter, result on LCD.
7. Write a Program for serial data transmission from Kit to PC.
8. Application of micro controllers in GSM.
9. Program to Interface Sensors.

INSTRUCTIONAL STRATEGY

More emphasis while teaching this subject should be given on practical aspects along with the theory input. Lots of programming exercises may be given to the students. Mini-projects based on microprocessor and micro-controller operations may be identified and given to students as assignments.

RECOMMENDED BOOKS:

1. Microcontrollers by Deshmukh, Tata McGraw Hill Education Pvt Ltd, New Delhi
2. Microcontrollers by Ayala
3. Microcontrollers by Mazidi, Pearon Education, Delhi
4. Microcontrollers by Neil Makanzi, Pearon Education, Delhi
5. Embedded GSM Applications
6. Microcontrollers and Embedded Systems by Sangar and Sahdev, Uneek Publications, Jalandhar
7. Embedded Systems Architechture, Programming and design by Raj Kamal, Tata McGraw Hill Education Pvt Ltd, New Delhi

SUGGESTED DISTRIBUTION OF MARKS FOR FACILITATING THE PAPER SETTER

Sr. No.		Time Allotted (hrs)	Marks Allocation
1.	Micro controller series (MCS) – 51 Overview	12	15
2.	Instruction Set; Addressing Modes, Instruction types	12	20
3.	Assembly language for Micro controller	12	20
4.	Design and Interface	12	20
5.	Introduction of PIC micro controllers	4	5
6.	Application of Micro controllers in Communication System	6	10
7.	Embedded System	6	10
Total		**64**	**100**

5.5 SUPERVISED PRACTICAL TRAINING

Duration: 12 Weeks

Industrial/Practical training is proposed to be organized under the guidance and supervision of senior teachers and will give the students an over all exposure of the manufacturing process & applications of the Bio- Medical Instruments used in Hospitals and Nursing Homes etc.

The students after completion of the training will have to write a Training Report about the work they have done & the knowledge they have gained during the training. After completion of the training they will submit the Training Report and make Presentation of their work before the faculty members and fellow students in the Institutes. Their work will be evaluated and marks will be awarded accordingly.

This practical training **should not be considered** as merely conventional industrial training in which students are sent at work places with either minimal or no supervision. This experience is required to be planned in advance and supervised on regular basis by the polytechnic faculty. For the fulfillment of above objectives, polytechnics may establish close linkage with 8-10 relevant organization for providing such an experience to students. It is necessary that each organization is visited by the teacher well in advance and activities to be performed by students are well defined. The chosen activities should be such that it matches with the curricular interest to students and of professional value to industrial/field organizations. Each teacher is expected to supervise and guide 5-6 students.

Before sending the students for Industrial training, the concerned Lecturer should guide the students about the specific areas to be observed during the industrial training:

For instruments and equipment they are handling: They may be asked to observe the working principle, limitations, manufacturers, approximate costs, common occurring faults and repairs of various instruments and equipment used in the training place. These details must be included in their training report. The students must make a mention of new information gathered at the work place. Any specific observations they have made, should be mentioned in their Project Report and also during the presentation.

It is proposed to divide 12 weeks period into following modules:

03 weeks training in one of the principal Training Institute namely ATI-EPI, Dehradun/Hyderabad or CEDTI, C-Dac Mohali, CSIO Chandigarh. Here they will be given training each in repair and maintenance of instruments used in Clinical Laboratory, Physiotherapy Laboratory, Cardiology Laboratory, X-ray and Ultrasound laboratory.

04 weeks exposure will be given at one of the Medical Instruments manufacturing factory and another 03 weeks at one of the Govt. Hospital/Private Hospital/Nursing Homes/Super Speciality Hospitals. 02 weeks will be given to students to write the report for the training they have undergone and prepare presentation for the seminar.

The total period of 12 weeks will be divided as follows:

			(Weeks)
1.	Training in one of the Principal Institute in Repair & Maintenance of Bio-Medical Instruments	-	03
2.	Training at one of the instruments manufacturers factory/ServicingCentres	-	04
3.	Training in Hospital /Nursing Homes	-	03
4.	Report Writing and Presentation of the Work	-	02
		Total:	**12 Weeks**

Note:

The respective Polytechnics/Institutes offering this diploma course should make prior arrangements for the above training and Principal Training Institute/Hospitals/ Instruments Manufacturer may be contacted in advance for permission etc. for the training.

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 interviews, 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