4.1 GENERIC SKILLS AND ENTREPRENEURSHIP DEVELOPMENT

L	P
3	-

RATIONALE

Generic Skills and Entrepreneurship Development is one of the courses from "Human Science" subject area. Generic skills have emerged as an important component of employability skills, which enable an individual to become and remain employable over lifetime and to lead happy and prosperous life. Entrepreneurship development aims at developing conceptual understanding for setting-up one's own business venture/enterprise. This aspect of Human Resource Development has become equally important in the era, when wage employment prospects have become meager. Both the subject areas are supplementary to each other and soft skills are required to be developed in diploma pass-outs for enhancing their employability and self-confidence.

LEARNING OUTCOMES

After undergoing the subject, the students will be able to:

- Explain the importance of generic skills
- Manage himself/herself physically, intellectually and psychologically
- Work effectively as a team member
- Manage tasks effectively
- Develop an entrepreneurial mindset.
- Identify entrepreneurial support system for new ventures and small businesses.
- Recognize a business opportunity.
- Conduct market survey and prepare project report.

DETAILED CONTENTS

1. Introduction to Generic Skills (04 hrs)

Importance of Generic Skill Development

Life Long Learning and associated importance of Generic Skill Development

2. Managing Self (07 hrs)

Knowing Self for Self Development

- Self-concept, personality, traits, multiple intelligence such as language intelligence, numerical intelligence, psychological intelligence etc.

Managing Self - Physical

Personal grooming, Health, Hygiene, Time Management

Managing Self – Intellectual development

- Information Search: Sources of information
- Communication: Official & business correspondence, Job application covering letter and resume

Managing Self – Psychological

- Stress, Emotions, Anxiety-concepts and significance
- Techniques to manage stress

3. Managing in Team (06 hrs)

Team - definition, team dynamics

Team related skills- sympathy, empathy, co-operation, concern, lead and negotiate, work well with people from culturally diverse background

4 Task Management (03 hrs)

Task Initiation, planning, execution, close out

Exercises/case studies on task planning towards development of skills for task management

5. Problem Solving (05 hrs)

Prerequisites of problem solving- meaningful learning, ability to apply knowledge in problem solving

Different approaches for problem solving.

Steps followed in problem solving.

Exercises/case studies on problem solving.

6. Entrepreneurship (20 hrs)

Introduction

- Concept/Meaning and its need
- Qualities of an entrepreneur
- Entrepreneurial Support System e.g., District Industry Centres (DICs), Commercial Banks, State Financial Corporations, Small Industries Service Institute (SISIs), Small Industries Development Bank of India (SIDBI), National Bank of Agriculture and Rural Development (NABARD), National Small Industries Corporation (NSIC) and other relevant institutions/organizations at State/National level.

Obtaining financial assistance through various government schemes like Prime Minister Employment Generation Program (PMEGP) Pradhan Mantri Mudra Yojana (PMMY) , Make in India, Start up India, Stand up India, National Urban Livelihood Mission (NULM); Technology Business Incubator (TBI) and Science and Technology Entrepreneur Parks (STEP).

Market Survey and Opportunity Identification (Business Planning)

- How to start a small scale unit/ industry

- Procedures for registration of small-scale unit /industry
- Assessment of demand and supply in potential areas of growth.
- Understanding business opportunity
- Considerations in product selection

Project Report Preparation

- Preliminary Project Report
- Techno-Economic Feasibility Report
- Exercises on preparation of Detailed Project Report

INSTRUCTIONAL STRATEGY

This subject will require a blend of different teaching and learning methods beginning with lecture method. Some of the topics may be taught using question answer, assignment, case studies or seminar. In addition, expert lectures may be arranged from within the institution or from management organizations. Conceptual understanding of Entrepreneurship, inputs by teachers and outside experts will expose the students so as to facilitate in starting ones own business venture/enterprise. The teacher will discuss success stories and case studies with students, which in turn, will develop managerial qualities in the students. There may be guest lectures by successful diploma holding entrepreneurs and field visits also. The students may also be provided relevant text material and handouts.

RECOMMENDED BOOKS

1. Balasubramanian, S., "Soft Skills for Interpersonal Communication", Orient Black Swan, New Delhi.
2. "Lifelong learning", Policy Brief (www.oecd.orf).
3. Rathore, BS, and Dr JS Saini, "A Handbook of Entrepreneurship", Aapga Publications, Panchkula (Haryana).
4. Gupta, CB, and P Srinivasan, "Entrepreneurship Development", Sultan Chand and Sons, New Delhi.
5. "Entrepreneurship Development", Tata McGraw Hill Publishing Company Ltd., New Delhi.

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (Out of 50)
1.	04	06
2.	07	08
3.	06	06
4.	03	04
5.	05	06
6.	20	20
Total	**45**	**50**

4.2 BASICS OF DIGITAL ELECTRONICS

L	P
2	2

RATIONALE

Digital Electronics has made extremely rapid advances in the last five decades. It has important applications in communication, entertainment, instrumentation, control, automation etc. So, it is important to give knowledge of digital electronics to electrical students.

LEARNING OUTCOMES

After undergoing the subject, students will be able to:

- Implement various number system
- Apply Boolean laws for simplification of logical expressions
- Apply the K-Map technique for simplification
- Design various combinational and sequential circuits
- Analyze functioning of multiplexer, de-multiplexer, encoder and decoders.

DETAILED CONTENTS

1. Number System (4 Hrs)

Decimal, Binary, octal and hexadecimal number system and their inter-conversion

Binary and Hexadecimal addition, subtraction and multiplication

1's and 2's complement method of addition/subtraction

2. Logic Gates (4 Hrs)

Definition, symbols and truth tables of NOT, AND, OR, XOR, X-NOR gates

Universal gates NAND and NOR and the implementation of basic gates with Universal gates

3. Boolean Algebra (6 Hrs)

Boolean relations and their applications
Verification of De Morgan's Theorems
Implementation of Boolean (logic) equation with gates
Karnaugh (K) map (upto 4 variables) and simple application in developing combinational logic circuits

4. Combinational Circuits (8 Hrs)

Half adder and Full adder circuit, design and implementation.
Half and Full subtractor circuit, design and implementation.
2-bit comparator
Basic functions and block diagram of Encoders and decoders.
Basic functions and block diagram of Multiplexers and De-Multiplexers.
Display devices (LED, LCD, 7-Segment Display)

5. Sequential Circuits (8 Hrs)

Operation using waveforms and truth tables of R-S, T, D, J-K flip flops.
Applications of flip flops
Shift registers and counters: Introduction and types
A/D and D/A converters: Introduction

LIST OF PRACTICALS

1. Verification and interpretation of truth tables for AND, OR, NOT, NAND, NOR and XOR gates
2. Realisation of logic functions with the help of NAND or NOR gates
3. Design of a NOR gate latch and verification of its operation
4. Construction of half adder using gates
5. Construction of full adder using gates
6. To verify the truth table of R-S flip flop
7. To verify the truth table of J-K flip flop
8. To verify the truth table of T and D type flip flop

9. Design problem using Flip flops
10. Verification of truth table for encoder and decoder ICs,
11. Verification of truth table for Mux and DeMux ICs
12. Design problem using MUX and DE MUX
13. Construction of Shift registers and their

functioningNote: All experiments preferably be performed on

breadboard**RECOMMENDED BOOKS**

1. Leach, Malvino, "Digital Electronics and Applications ", Tata McGraw Hill Education Pvt Ltd, New Delhi.
2. Mano, Morris, "Digital Logic Designs ", Prentice Hall of India, New Delhi.
3. Mandal, Soumitra Kumar, "Digital Electronics ", Tata McGraw Hill Education Pvt Ltd.
4. Jain, RP, "Digital Electronics ", Tata McGraw Hill Education Pvt Ltd, New Delhi.
5. Gupta, BR, "Digital Electronics ", Dhanpat Rai & Co., New Delhi.
6. Rajaraman, V., "Digital Electronics", Prentice Hall of India, New Delhi.

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (Out of 50)
1	4	8
2	4	8
3	6	10
4	8	12
5	8	12
Total	**30**	**50**

4.3 ELECTRICAL MACHINES - II

L	P
3	4

RATIONALE

Electrical machines is a subject where a student will deal with various types of electrical machines which are employed in industries, power stations, domestic and commercial appliances etc. After studying this subject, an electrical diploma holder must be competent to repair and maintain these machines and give suggestions to improve their performance. Explanation of practical aspects of the subject will make the students capable of performing various tests on the machines as per latest BIS specifications

LEARNING OUTCOMES

After undergoing the subject, students will be able to:

- Operate and control three phase synchronous generator and motor
- Operate the synchronous motor as synchronous condenser
- Operate and control speed of three phase squirrel cage and three phase slip ring induction motor.
- Identify and connect starters for starting three phase and single phase induction motors
- Operate and control speed of single phase induction motors

DETAILED CONTENTS

1. Synchronous Machines (18 hrs)

Main constructional features of synchronous machine including commutator
Generation of three phase emf
Production of rotating magnetic field in a three phase winding
E.M.F. Equation, Concept of distribution factor and coil span factor
Operation of single synchronous machine independently supplying a load, voltage regulation by synchronous impedance method

Need and necessary conditions of parallel operation of alternators, synchronizing an alternator (Synchroscope method) with the bus bars

Operation of synchronous machine as motor, Starting methods of Synchronous Motor

Concept and Cause of hunting and its prevention

Specification of Synchronous Machine

Cooling of synchronous machines

Application of synchronous machines (as a synchronous condenser)

2. Induction Motors (16 hrs)

Salient constructional features of 3 phase squirrel cage and slip ring induction motors

Principle of operation, slip and its significance

Locking of rotor and stator fields

Rotor resistance, inductance, e.m.f. and current

Relationship between copper loss and the motor slip

Power flow diagram of an induction motor

Factors determining the torque

Torque-slip curve, stable and unstable zones

Effect of rotor resistance upon the torque slip relationship

Starting of 3-phase induction motors by DOL, star-delta and auto transformer starter

Causes of low power factor of induction motors

Speed control of induction motor

Cogging and Crawling in Induction Motors.

3. Single Phase Induction Motors (06 hrs)

Single phase induction motors; Construction characteristics and applications

Nature of field produced in single phase induction motor

Split phase induction motor: Capacitors start and run motor, Shaded pole motor and Reluctance start motor

Alternating current series motor and universal motors

4. Special Purpose Machines (05 hrs)

Working principle of Linear induction motor, Stepper motor and Servomotor
Introduction to Energy efficient Motors.

LIST OF PRACTICALS

1. To Plot relationship between no load terminal voltage and excitation current in a synchronous generator at constant speed.
2. Determination of the relationship between the terminal voltage and load current of an alternator, keeping excitation and speed constant.
3. Determination of the efficiency of alternator from the open circuit and short circuit test.
4. Parallel operation of three phase alternators.
5. Study of ISI/BIS code for 3-phase induction motors.
6. Perform at least two tests on a 3-phase induction motor as per BIS code.
7. To reverse the direction of rotation of three phase induction motor.
8. To control speed of three phase induction motor.
9. Determination of efficiency of three phase induction motor by
   (a) No load test and blocked rotor test.
   (b) Direct loading (refer BIS code).
10. Determination of effect of rotor resistance on torque speed curve of an induction motor.
11. To Plot Torque-Slip Characteristics of three phase induction Motor.
12. Study of performance of a ceiling fan with and without capacitor.
13. Study the effect of change in capacitor on the performance of single phase induction motor.
14. To reverse the direction of rotation of single phase induction motor.

INSTRUCTIONAL STRATEGY

Teacher should lay-emphasis on development of understanding amongst students about basic principles of operation and control of electrical machines. This may be achieved by conducting quiz tests and by giving home assignments. The teachers should also conduct laboratories classes themselves encouraging each should to perform with his/her own hands and draw conclusions.

RECOMMENDED BOOKS

1. Bhattacharya, SK, "Electrical Machines", Tata Mc Graw Hill, Education Pvt Ltd. New Delhi.
2. Sahdev, SK, 'Electrical Machines ", Uneek Publications, Jalandhar.
3. Gupta, JB, 'Electrical Machines ", SK Kataria and Sons, New Delhi.
4. Marwaha, G L, 'Electrical Machines ", Eagles Publication, Jalandhar.
5. Arora, D R, 'Electrical Machines I ", Ishan Publications, Ambala City.
6. Bimbra, P.S., 'Electrical Machines ", Khanna Publishers.
7. Nagrath, I.J., & D.P. Kothari, 'Electric Machines ", Tata Mc Graw –Hill Publishers.

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (Out of 50)
1	18	19
2	16	17
3	6	8
4	5	6
Total	**45**	**50**

4.4 ELECTRICAL MEASUREMENT AND INSTRUMENTATION

L	P
2	4

RATIONALE

Diploma holders in Electrical Engineering have to work on various jobs in the field as well as in testing laboratories and on control panels, where they perform the duties of installation, operation, maintenance and testing by measuring instruments. They will come across the use of various types of instruments and have to take measurements. Instruments used to read and observe the general electrical quantities like current, voltage, power, energy, frequency, resistance etc and their wave shapes, have been incorporated in this subject. So the technician will know the construction and use of various types of electrical instruments.

LEARNING OUTCOMES

After undergoing the subject, student will be able to:

- Comprehend how different types of meters work and their construction
- Maintain and repair different indicating and recording instruments in electric circuits
- Measure different electrical quantities like current, voltage, power, energy, power factor, frequency etc.
- Monitor, analyze and control any electrical system
- Design and create novel products and solutions for real life problems.

DETAILED CONTENTS

1. Electrical Measuring Instruments (6 hrs)

Concept of measurement and instruments

Concept of measurement of electrical quantities and instruments for their measurements

Types of electrical measuring instruments–indicating, integrating and recording type instruments

Essentials of indicating instruments–deflecting, controlling and damping

torque

Methods of providing deflecting, controlling and damping torque

2. Moving coil and moving iron type measuring Instruments (4 Hrs)

Concept of ammeters and voltmeters and difference between them

Construction and working principles of moving Iron and moving coil instruments

Merits and demerits, sources of error and application of these instruments

3. Power & Energy Measurement (7 Hrs)

Construction, working principle, merits and demerits of dynamometer type wattmeter, sources of error

Induction Type Energy Meter: Construction, working principle, merits and demerits of single Phase and Three phase energy meters, Errors and their compensation, Simple numerical problems

Construction and working principle of maximum demand indicators

Block diagram of Digital Energy meter

4. Other Measuring Instruments: (7 Hrs)

Construction, working principle and application of Meggar, Earth tester, Multimeter (Analog), Frequency meter (Dynamometer type), Single phase Power Factor Meter (Electrodynamo meter type), Phase sequence indicator

Instrument Transformers: Construction, working and applications of Current Transformer (CT) and Potential transformer (PT).

5. Transducers (6 Hrs)

Introduction and advantages

Classification of transducer: Primary & Secondary transducers, Active & Passive transducer, Analog & Digital transducer

Principle of strain gauge and displacement transducer

Construction, working and applications of Capacitive Transducers, Inductive

Transducers, LVDT, Photoelectric Transducer, Piezoelectric Transducers.
Construction, working and applications of Temperature Transducers:
Thermistors, Thermocouple and Resistance Thermometer.

LIST OF PRACTICALS

1. Use of analog multimeter for measurement of voltage, current and resistance.
2. Study the front panel of digital multimeter, draw its block diagram and measure voltage, current (A.C/D.C) and resistance.
3. Measure current using tong tester (Clamp-on meter)
4. To measure power, power factor in a single-phase circuit, using wattmeter and power factor meter and to verify results with calculations.
5. Measurement of power in a 3 phase circuit using CT, PT and 3-phase wattmeter
6. To measure Energy at different Loads using Single Phase Digital Energy meter
7. To measure the value of earth resistance using earth tester.
8. Study the front panel of CRO and draw its block diagram.
9. Measurement of voltage and frequency of a sinusoidal signal using CRO and draw wave shape of signal.
10. Study the front panel of analog LCR meter, draw its block diagram and measure inductance, capacitance and resistance.
11. Study the front panel of Digital LCRmeter, draw its block diagram and measure inductance, capacitance and resistance.
12. Measurement of temperature by using Thermistor, Thermocouple and RTD
13. Measurement of pressure by using LVDT
14. To record all electrical quantities from the meters installed in the institution premises

INSTRUCTIONAL STRATEGY

After making the students familiar with measuring instruments, they should be made conceptually clear about the constructional features and connections of various measuring instruments. Teacher should demonstrate the application of each measuring instrument in laboratory and encourage students to use them independently in various circuits.

RECOMMENDED BOOKS

1. Golding, & Widdis, "Electrical Measurements and Measuring Instruments ", Wheeler Publishers.
2. Prasad, Dr. R., "Electrical Measurements and Measuring Instruments , Khanna Publishers.
3. Sahdev, S.K., Electrical Measurements and Measuring Instruments, Uneek International Publications, Jalandhar.
4. Sawhney, A.K., "A Course in Electrical and electronic Measurement and Instrumentation", Dhanpat Rai and Co., New Delhi.
5. Kalsi, H.S., "Electronics Instrumentation and Measurement ", MacGraw-Hill.
6. Gupta, J.B., "Electrical Measurement and Measuring Instruments", SK Kataria and Sons, New Delhi.

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allocation (Out of 50)
1	6	10
2	4	6
3	7	12
4	7	12
5	6	10
Total	**30**	**50**

4.5 INDUSTRIAL ELECTRONICS AND CONTROL OF DRIVES

L	P
3	4

RATIONALE

Industrial electronics plays a very vital role in the field of control engineering specifically in the modern industries as they mostly use electronic controls, which are more efficient, effective and precise as compare to the conventional methods. The old magnetic and electrical control schemes have all become obsolete. Electrical diploma holder many times has to maintain the panels used in the modern control process. Therefore, the knowledge of components like thyristors and other semiconductor devices used in such control panels is must for them in order to supervise the work efficiently and effectively. Looking in to usefulness and importance of the subject this has been incorporated in the curriculum.

LEARNING OUTCOMES

After undergoing the subject, student will be able to:

- Illustrate the use of Diode for Alternating Current (DIAC) and Triode for Alternating Current (TRIAC).
- Detail the various controlled Rectifiers.
- Control various Electrical Drives.
- Maintenance of Uninterrupted Power Supply (UPS) and storage batteries.
- Comprehend the applications of choppers, cyclo convertors and dual convertors

DETAILED CONTENTS

1. Introduction to Silicon Controlled Rectifier (SCR) (15 hrs)

Introduction to Power Transistors

1.2 Symbols and V-I characteristics of DIAC, TRIAC and Quadriac

1.3. Basic idea about the selection of heat sinks.

1.4 Construction and working principles of an SCR, two transistor analogy and characteristics

Methods of triggering a Thyristor

Commutation of Thyristors

Series and parallel operation of Thyristors

Snubber Circuit.

Applications of SCR, TRIACS and Quadriac such as light intensity control, speed control of DC and Universal motor, fan regulator, battery charger

1.10 UJT, its Construction, working principles and V-I characteristics, UJT as relaxation oscillator

2. Controlled Rectifiers (8 hrs)

Single phase half wave controlled rectifier with resistive load and inductive load, concept of freewheeling diode.
Single phase half controlled full wave rectifier
Single phase fully controlled full wave Rectifier Bridge.
Single phase full wave centre tapped rectifier
Three phase full wave half controlled bridge rectifier
Three phase full wave fully controlled bridge rectifier

3. Inverter, Chopper and Cycloconverter (9 hrs)

Inverter-introduction, working principles, series and parallel inverters and applications, Basic Idea of Reduction of Harmonics in Inverter Output Voltage.
Choppers-introduction, types and their working principle and applications
Dual converters-introduction, working principle and applications
Cyclo-converters- introduction, types, working principle and applications
Basic Layout of HVDC Transmission system

4. Control of Electric Drives (10 hrs)

Basic concept of DC drives control
Half wave drives
Dual Converter Drives (Four Quadrant D.C. Drive)
Speed control of DC motor using Chopper.
Basic concept of AC drives control)
Voltage Source Inverter (VSI)
Current Source inverter (CSI)
Cyclo convertors controlled AC drives
Slip control AC drives

5. UPS (Uninterruptible Power Supply) (3 hrs)

Block Diagram and working principle of Online UPS and off line UPS

Use of Industrial Electronics in Industrial Automation

LIST OF PRACTICALS

1. To draw V-I characteristics of a DIAC and TRIAC.
2. To study SCR specifications and rating.
3. To draw V-I characteristics of an SCR
4. To study and design SCR using Two Transistors.
5. Observe the wave shape across SCR and load of an illumination control circuit.
6. Fan speed regulator using TRIAC Quadriac (fabrication of this circuit)
7. Study of Light Intensity control circuit.
8. To draw uni-junction transistor characteristics.
9. Observe the output wave of an UJT as relaxation oscillator.
10. To observe the output wave shape on CRO Single phase full controlled rectifier and effect of change in firing angle.
11. To observe the output wave shape on CRO Three phase full wave fully controlled bridge rectifier and effect of change in firing angle.
12. Speed-control of a DC shunt motor or universal motor
13. Characteristics of online and offline UPS.
14. Installation of UPS and Maintenance of batteries.
15. Study of choppers, dual convertors and cylco-convertors.

RECOMMENDED BOOKS

1. Rashid, Mohammad H., "Power Electronics, Circuits Devices and Applications ".
2. Sen, PC, "Power Electronics ", Tata McGraw-Hill.
3. Bhimbra, PS, "Power Electronics by, Khanna Publishers ", New Delhi.
4. Bhattacharya, SK, & S Chatterji, "Industrial Electronics & Control", New Age international Publications(P) Ltd, New Delhi.
5. Sehdev, SK, "Power Electronics ", Uneek Publication, Jalandhar.

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (Out of 50)
1	15	14
2	8	8
3	9	10
4	10	12
5	3	6
Total	**45**	**50**

4.6 ELECTRICAL ENGINEERING DESIGN AND DRAWING

L	P
-	6

RATIONALE

A student of electrical engineering is supposed to have ability to read, understand and interpret engineering drawings. He has to Communicate and co-relate through sketches and drawings while preparing estimates of electrical engineering projects. Preparing working drawings of panels and distribution boards is another important task to be performed by an electrical engineering diploma holder. The contents of this subject have been designed to develop requisite knowledge and skills of electrical drawings in the students of diploma in electrical engineering.

LEARNING OUTCOMES

After undergoing the subject, students will be able to:

- Recognize various electrical devices and their symbols
- Design and draw the panels/ distribution boards.
- Draw orthographic projections of simple electrical parts and machine parts.
- Draw schematic and wiring diagrams of simple electrical circuits and contactor control circuits.
- Read and interpret electrical installation plan.
- Communicate about circuits and devices through sketches and drawings.

DETAILED CONTENTS CUM PRACTICAL EXERCISES

1. Symbols, Signs Conventions and Panels/Distribution Boards (3 Sheets)

   Various Electrical Symbols used in Domestic, Industrial Installations and Power System as per BIS Code.
   Design and Drawing of panels/Distribution board using MCB, ELCB, Main switch and change over switches for domestic installation, industrial and commercial installation.

2. Orthographic projections of Simple Electrical Parts (3 Sheets)

   Bus bar post/ Kit Kat.

Pin type and shackle type insulator
Bobbins of a small transformer / choke
Stay insulators/Suspension type insulators

3. Orthographic Projection of Machine Parts (3 Sheets)

Rotor of a squirrel cage induction motor
Motor body (induction motor) as per IS Specifications (using outside dimensions)
Slip rings of 3-phase induction Motor.
End cover of 3 phase Induction motor (Sectional View)

4. Contactor Control Circuits: Schematic and wiring diagram (4 Sheets)

DOL Starter of 3-phase induction Motor.
Forwarding/reversing of 3-phase induction motor
Limit switch control of a 3-phase induction motor
Sequence operation of two 3-phase induction Motor using T.D.R.
Two speed 3-phase induction motor control.
Remote control of 3-phase induction motor.
Automatic star-delta starter for 3-phase induction motor.

5. AutoCAD in Electrical Design (2 Sheets)

To draw electrical and electronic symbols.
To draw DOL starter for 3 Phase Induction motor.
To draw star delta starter for 3 Phase Induction motor.

INSTRUCTIONAL STRATEGY

Teacher should identify/prepare more exercises on the pattern shown above. The teacher should make the students confident in making drawing and layouts of electrical wiring installations and doing estimation and costing. This capability will lead the students to become a successful entrepreneur. Take the students to field/laboratory and show the material and equipment.

RECOMMENDED BOOKS

1. Singh, Surjeet, "Electrical Engineering Design and Drawings", Dhanpat Rai and Co. New Delhi.

2. Bhattacharya, SK, "Electrical Engineering Design and Drawings", SK Kataria and Sons, New Delhi
3. Ubhi, & Marwaha, "Electrical Engineering Design and Drawings", IPH, New Delhi.
4. Sahdev, SK, "Electrical Design and Drawing", Uneek Publications, Jalandhar.
5. Singh, Surjit, "Electrical Engineering Drawing", SK Kataria and Sons, New Delhi.

ENTREPRENEURIAL AWARENESS CAMP

This is to be organized at a stretch for two to three days during fourth semester. Lectures will be delivered on the following broad topics. There will be no examination for this subject.

1. Who is an entrepreneur?

2. Need for entrepreneurship, entrepreneurial career and wage employment

3. Scenario of development of small scale industries in India

4. Entrepreneurial history in India, Indian values and entrepreneurship

5. Assistance from District Industries Centres, Commercial Banks. State Financial Corporations, Small industries Service Institutes, Research and Development Laboratories and other financial and development corporations

6. Considerations for product selection

7. Opportunities for business, service and industrial ventures

8. Learning from Indian experiences in entrepreneurship (Interaction with successful entrepreneurs)

9. Legal aspects of small business

10. Managerial aspects of small business

11. Preparation of Project Report

INDUSTRIAL TRAINING OF STUDENTS

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 6 weeks duration to be organised during the semester break starting after second year i.e. after 4th 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 5th 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.

Teachers and students are requested to see the footnote below the study and evaluation scheme of 4th semester for further details.

The teacher along with field supervisors will conduct performance assessment of students. The components of evaluation will include the following:

a)	Punctuality and regularity	15%
b)	Initiative in learning new things	15%
c)	Relationship with workers	15%
d)	Industrial training report	55%