

STATE COUNCIL OF TECHNICAL EDUCATION AND VOCATIONAL TRAINING, ODISHA
TEACHING AND EVALUATION SCHEME FOR DIPLOMA IN ENGINEERING COURSES

| DISCIPLINE: APPLIED ELECTRONICS & INSTRUMENTATION ENGINEERING | | | | | | | | | | SEMESTER: 5 TH | | | |
|---|---------------------------|---|-----------|---|-----------|-------------------|------------|------------|--------------|---------------------------|----------------|-------------|--|
| SL NO | SUBJECT CODE | SUBJECT | PERIODS | | | EVALUATION SCHEME | | | | | | | |
| | | | L | T | P | INTERNAL EXAM | | | END SEM EXAM | TERM WORK | PRACTICAL EXAM | TOTAL MARKS | |
| | | | | | | TA | CT | Total | | | | | |
| THEORY | | | | | | | | | | | | | |
| 1. | BST -501 OR HMT 601 | ENVIRONMENTAL STUDIES OR ENTERPRENEURESHIP AND MANAGEMENT | 5 | - | - | 10 | 20 | 30 | 70 | | | 100 | |
| 2. | AIT 502 | PROCESS INSTRUMENTATION-II | 4 | - | - | 10 | 20 | 30 | 70 | | | 100 | |
| 3. | AIT 503 | BIO-MEDICAL INSTRUMENTATION | 4 | - | - | 10 | 20 | 30 | 70 | | | 100 | |
| 4. | AIT 504 | PROCESS CONTROL | 4 | - | - | 10 | 20 | 30 | 70 | | | 100 | |
| 5. | AIT 505 | INDUSTRIAL-CONTROL DEVICES | 4 | - | - | 10 | 20 | 30 | 70 | | | 100 | |
| PRACTICAL/TERM WORK | | | | | | | | | | | | | |
| 6. | AIP 501 | PROCESS INSTRUMENTATION-II LAB | - | - | 4 | | | | | 25 | 25 | 50 | |
| 7. | AIP 502 | BIO-MEDICAL INSTRUMENTATION LAB | - | - | 4 | | | | | 25 | 25 | 50 | |
| 8. | AIP 503 | PROCESS CONTROL LAB | - | - | 3 | | | | | 25 | 25 | 50 | |
| 9. | AIP 504 | INDUSTRIAL CONTROL DEVICES LAB | - | - | 3 | | | | | 25 | 25 | 50 | |
| 10. | AIP 505 | INFORMATION-SEARCH, ANALYSIS& PRESENTATION (ISAP) LAB & Library Study | - | - | 4 | | | | | 25 | 25 | 50 | |
| GRAND TOTAL | | | 21 | | 18 | 50 | 100 | 150 | 350 | 125 | 125 | 750 | |
| Total Contact hours per week: 39 | | | | | | | | | | | | | |
| Abbreviations: L-Lecture, T-Tutorial, P-Practical, TA- Teacher's Assessment, CT- Class test | | | | | | | | | | | | | |
| Minimum Pass Mark in each Theory Subject is 35% and in Practical subject is 50% | | | | | | | | | | | | | |

ENVIRONMENTAL STUDIES

(Common to all Branches of Engg.)

BST-501

Period/Week: 05

Total Marks: 100

Total Periods: 75

Theory End Exams: 70; CT (20) +IA (10)

Rationale:

Due to various aspects of human developments including the demand of different kinds of technological innovations, most people have been forgetting that, the Environment in which they are living is to be maintained under various living standards for the preservation of better health. The degradation of environment due to industrial growth is very much alarming due to environmental pollution beyond permissible limits in respect of air, water industrial waste, noise etc. Therefore, the subject of Environmental Studies to be learnt by every Engineering student in order to take care of the environmental aspect in each and every activity in the best possible manner.

OBJECTIVES:

After completion of study of environmental studies, the student will be able to:

1. Gather adequate knowledge of different pollutants, their sources and shall be aware of solid waste management systems and hazardous waste and their effects.
2. Develop awareness towards preservation of environment.

Unit 1: The Multidisciplinary nature of environmental studies

(04 periods)

Definition, scope and importance, Need for public awareness.

Unit 2: Natural Resources

(12 periods)

Renewable and non renewable resources:

- a) Natural resources and associated problems.
 - Forest resources: Use and over-exploitation, deforestation, case studies, Timber extraction mining, dams and their effects on forests and tribal people.
 - Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dam's benefits and problems.
 - Mineral Resources: Use and exploitation, environmental effects of extracting and using mineral resources.
 - Food Resources: World food problems, changes caused by agriculture and over grazing, effects of modern agriculture, fertilizers- pesticides problems, water logging, salinity, .
 - Energy Resources: Growing energy need, renewable and non-renewable energy sources, use of alternate energy sources, case studies.
 - Land Resources: Land as a resource, land degradation, man induces land slides, soil erosion, and desertification.
- b) Role of individual in conservation of natural resources.
- c) Equitable use of resources for sustainable life styles.

Unit 3: Systems

(12 periods)

- Concept of an eco system.
- Structure and function of an eco system.
- Producers, consumers, decomposers.
- Energy flow in the eco systems.
- Ecological succession.
- Food chains, food webs and ecological pyramids.
- Introduction, types, characteristic features, structure and function of the following eco system:
 - Forest ecosystem:
 - Aquatic eco systems (ponds, streams, lakes, rivers, oceans, estuaries).

Unit 4: Biodiversity and it's Conservation

(08 periods)

- Introduction-Definition: genetics, species and ecosystem diversity.
- Biogeographically classification of India.
- Value of biodiversity: consumptive use, productive use, social ethical, aesthetic and optin values.
- Biodiversity at global, national and local level.
- Threats to biodiversity: Habitats loss, poaching of wild life, man wildlife conflicts.

Unit 5: Environmental Pollution.

(18 periods)

Definition Causes, effects and control measures of:

- a) Air pollution.
- b) Water pollution.
- c) Soil pollution
- d) Marine pollution
- e) Noise pollution.
- f) Thermal pollution
- g) Nuclear hazards.

Solid waste Management: Causes, effects and control measures of urban and industrial wastes.

Role of an individual in prevention of pollution.

Disaster management: Floods, earth quake, cyclone and landslides.

Unit 6: Social issues and the Environment

(12 periods)

- Form unsustainable to sustainable development.
- Urban problems related to energy.
- Water conservation, rain water harvesting, water shed management.
- Resettlement and rehabilitation of people; its problems nd concern.
- Environmental ethics: issue and possible solutions.
- Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, case studies.
- Air (prevention and control of pollution) Act.
- Water (prevention and control of pollution) Act.
- Public awareness.

Unit 7: Human population and the environment

(09 periods)

- Population growth and variation among nations.
- Population explosion- family welfare program.
- Environment and human health.
- Human rights.
- Value education
- Role of information technology in environment and human health.

Recommended Books:

1. Textbook of Environmental studies, Erach Bharucha, #UGC
2. Fundamental concepts in Environmental Studies, D.D. Mishra, S.Chand & Co-Ltd,
3. Text book of Environmental Studies by K.Raghavan Nambiar, SCITECH Publication Pvt. Ltd.
4. Environmental Engineering by V.M.Domkundwar- Dhanpat Rai & Co.
5. Environmental Engineering & Safety by B.K.Mohapatra.

ENTREPRENEURSHIP & MANAGEMENT

(Code :HMT-601)

Period/Week: 05

Total Marks: 100

Total Periods: 75

Theory End Exams: 70; CT (20) +IA (10)

(COMMON TO ALL BRANCHES OF ENGG EXCEPT CIVIL/ CSE/ IT)

OBJECTIVES:

On completion of the course, students will be able to :

1. Understand the concept of different forms of organization including MSME and various managerial functions.
2. Understand Entrepreneurship and choose it as a career option after study.
3. Learn about the basic financial accounting and cost control.
4. Know different areas of management relating to stores and purchase, finance, production, sales and marketing and human resources in an organization.
5. Learn about various reasons of industrial sickness and its remedial measures.
6. Have a comprehensive idea on important legislations relating to employment in Factory.

SYLLABUS

- 1. Concept of Organization & Enterprise Management: 12 periods**
 - 1.1. Meaning, features and components of Business
 - 1.2. Different forms of Business Organizations with features
 - 1.3. Meaning, definitions and importance of management
 - 1.4. Difference between Management & Administration
 - 1.5. Functions of management- Planning, Organizing, Staffing, Directing (including Motivation, Leadership & Communication), Coordinating and Controlling.
 - 1.6. Principles of Scientific Management.
- 2. Entrepreneurship & Management of MSME: 12 periods**
 - 2.1. Meaning & Need of Entrepreneurship
 - 2.2. Qualities of an Entrepreneur
 - 2.3. Relevance of Entrepreneurship of Socio-economic gain
(Generating national wealth, creating wage & self employment, developing MSME enterprises, Optimizing human and national resources, building enterprising personalities and society)
 - 2.4. Micro, Small and Medium Enterprises. (investment limits of MSME)
 - 2.5. Project Report- PPR & DPR. (Preparation of a PPR)
 - 2.6. Incentives available to MSME as per the latest IPR
 - 2.7. Role of DIC, OSFC, OSIC, IDCO, SIDBI, IPICOL and Commercial Banks in the context of MSME.

- 3. Financial Accounting & Cost Control: 12 periods**
 - 3.1. Double- entry System of Book –keeping and types of accounts
 - 3.2. Journal, Ledger, Cash Book (different types), Trial balance
 - 3.3. Components of Final Accounts- Trading A/c, Profit & Loss A/c and Balance Sheet
 - 3.4. Elements of Cost and Preparation of Cost Sheet
 - 3.5. Break-even Analysis

- 4. Financial Management: 04 periods**
 - 4.1. Meaning & Importance
 - 4.2. Finance Functions
 - 4.3. Types of Capital- Fixed & Working Capital
 - 4.4. Components of Working Capital, Working Capital Cycle

- 5. Stores & Purchase Management: 05 periods**
 - 5.1. Inventory Control : Importance & Techniques
 - 5.2. Purchase management-Principles & Procedures
 - 5.3. Important Store Records (Bin Card, Stores Ledger & GRN)

- 6. Production Management: 04 periods**
 - 6.1. Production & Productivity
 - 6.2. Production , Planning & Control- (meaning & steps)

- 7. Sales & Marketing Management: 08 periods**
 - 7.1. Sales & Marketing Management- Meaning & Importance
 - 7.2. Selling Methods
 - 7.3. Product Policy- (Branding, Packaging, Labeling)
 - 7.4. Product-mix, Pricing methods and Sales Promotion including its techniques.
 - 7.5. Advertising & its media

- 8. Human Resource management: 06 periods**
 - 8.1. Need & Importance
 - 8.2. Recruitment & its sources
 - 8.3. Selection- Methods
 - 8.4. Training- Need, & Methods
 - 8.5. Need of Performance Appraisal

- 9. Industrial Sickness: 04 periods**
 - 9.1. Meaning & Symptoms of Sickness
 - 9.2. Causes of Industrial Sickness
 - 9.3. Remedial measures of Sickness

10. Industrial Legislation:

08 periods

- 10.1. Major Provisions of Factories Act relating to Health, Welfare, Safety, Accidents, Hours of Work, employment of Women
- 10.2. Duties and Power of Factory Inspector
- 10.3. Major Provisions of Employee's Compensation Act.

Books Recommended

- 1. Industrial Engineering & Management : O.P.Khanna
- 2. Entrepreneurship for Engineers : B.Badhei
- 3. Principles & Practice of Management : L.M.Prasad
- 4. Industrial Engineering & Management: Banga & Sharma
- 5. Mercantile Law: N.D.Kapoor
- 6. Industrial Engineering & production Management: M.Mahajan
- 7. Industrial Policy Resolution (latest)

PROCESS INSTRUMENTATION – II

| Name of the Course: Diploma in Applied Electronics & Instrumentation | | | |
|--|---------|---------------------------|-----------------|
| Course code: | AIT 502 | Semester | 5 th |
| Total Period: | 60 | Examination | 3 hrs |
| Theory periods: | 4P/week | Class Test: | 20 |
| Maximum marks: | 100 | Teacher's Assessment: | 10 |
| | | End Semester Examination: | 70 |

RATIONALE:

The study of Process Instrumentation – II will give a detail picture to the students about measurement of some special industrial process parameters such as force, torque, stress, strain, density, viscosity, humidity, pH, speed, acceleration and acoustics. This study will be useful for the students to supervise the shop-floor instrumentation work in the industries.

OBJECTIVES:

- 1 To know about the skill of different physical parameter measurement in terms of electrical voltage.
- 2 To identify different types of transducers and sensors for various physical parameters required to be measured in industry.
- 3 To know about the advantages, disadvantages and cost criteria of different types of measurement process used in industry.

COURSE CONTENT IN TERMS OF SPECIFIC OBJECTIVES :

1. MEASUREMENT OF FORCE, TORQUE, SHAFT POWER.

08

- 1.1 Define force, torque and shaft power.
- 1.2 Explain basic methods of measurement of force.
- 1.3 State and explain Equal and unequal arm balance.
- 1.4 Explain multiple level systems of force measurement.
- 1.5 Explain Hydraulic and pneumatic load cells.
- 1.6 Explain methods of measurement of torque using strain sensor.
- 1.7 Explain measurement of shaft power using rope break and prony break.

2. STRESS AND STRAIN MEASUREMENT

10

- 2.1 Define and explain strain gauge type transducers.
- 2.2 Explain strain measurement by variable resistance strain gauge.
- 2.3 Define the concept of Rosette gauges.
- 2.4 List out different types of strain sensing elements.
- 2.5 Define and explain configuration of strain gauge element.
- 2.6 List out different types of strain gauge adhesives and lead wires.

- 2.7 Distinguish between Bonded and un-bonded strain gauges.
- 2.8 Explain Instruments for strain gauge temperature compensations.
- 2.9 Explain the function of Instruments for static as well as dynamic strain measurement.
- 2.10 Describe the use of strain gauge on rotating shaft.
- 2.11 Give applications of load cell,
 - (i) Weigh bridges (Static weight measurement)
 - (ii) Belt weights (Dynamic weight measurement)

3. MEASUREMENT OF DENSITY

06

- 3.1 Define density.
- 3.2 Explain fundamental methods of density measurement.
- 3.3 Explain the function of Photo cell, Differential transformer and constant volume Hydrometer.
- 3.4 Explain the function of Air pressure balance method.
- 3.5 Explain the operation of Gas density detector

4. VISCOSITY MEASUREMENT

06

- 4.1 Define viscosity and Co-efficient of viscosity.
- 4.2 Distinguish between density and viscosity.
- 4.3 State and explain Stroke's law.
- 4.4 Define Newtonian and non-Newtonian type fluid.
- 4.5 Explain Ostwald method of determination of viscosity.
- 4.6 Explain the function of two float viscorator.
- 4.7 Describe Torque method of determination of viscosity.

5. HUMIDITY AND MOISTURE MEASUREMENT

06

- 5.1 Define moisture and humidity.
- 5.2 Define absolute, relative specific humidity and due point.
- 5.3 List out different types of humidity measuring instruments.
- 5.4 Explain the function of Wet and dry bulb psychrometer and sling psychrometer.
- 5.5 Explain the function of Hair hygrometer and Electrical type hygrometer.
- 5.6 Explain due point measurement.
- 5.7 Explain the function of
 - (a) Conductivity moisture meter
 - (b) Dielectric moisture meter

6. pH MEASUREMENT

06

- 6.1 Define hydrogen ion concentration and pH value.
- 6.2 Explain pH scale.
- 6.3 Describe electrical method of pH measurement.
- 6.4 Explain the function of
 - (a) Hydrogen electrode
 - (b) Calomel electrode
 - (c) Glass electrode
- 6.5 Describe measurement of pH with glass electrode.

7. MEASUREMENT OF SPEED AND ACCELERATION

08

- 7.1 Classify speed measurement process.
- 7.2 Define speed and acceleration.
- 7.3 Explain the function of Mechanical tachometer.
 - (a) Revolution counter.
 - (b) Centrifugal force tachometer.
 - (c) Resonance force tachometer.
- 7.4 Explain the principle of Electrical tachometer (tacho generator)
 - (a) Electro generator type.
 - (b) Eddy current drag type.
 - (c) Contact less type digital tachometer.
- 7.5 Explain optical method of speed measurement by using stroboscope.
- 7.6 Explain the operation of Accelerometer:
 - (a) Piezo-electric type
 - (b) Strain gauge type.

8. ACOUSTIC MEASUREMENT

04

- 8.1 Define acoustic pressure.
- 8.2 Explain characteristics of sound, sound pressure level & power levels.
- 8.3 Explain the function of typical sound system and microphone.

9. GAS ANALYSER

06

- 9.1 Explain the basic principle of gas analyser.
- 9.2 Describe the function of
 - (a) Infrared gas analyser.
 - (b) Oxygen analyser.
- 9.3 Explain the measurement of gas constituents by thermal conductivity method.

RECOMMENDED BOOKS:

(A) Text Book:

- 1 Mechanical measurements and instrumentation. By – R.K. Jain
- 2 Electrical & Electronics Measurement & Instrumentation A.K. Sahani
- 3 Electrical & Electronics Measurement & Instrumentation by R.K.Rajput (S.Chand Publisher.)

(B) Reference Books :

1. Industrial instrumentation. By – Fibrance
2. Instrumentation devices and system. By – Rangan, Sharmman
3. Instrumentation. By – Eckman.
4. Principles of Measurement Systems - 3rd Edition by John Bentley.
5. Instrumentation and Process Measurements by W. Bolton
6. Industrial Control and Instrumentation by W. Bolton.

BIO-MEDICAL INSTRUMENTATION

| Name of the Course: Diploma in Applied Electronics & Instrumentation | | | |
|--|---------|---------------------------|-----------------|
| Course code: | AIT 503 | Semester | 5 th |
| Total Period: | 60 | Examination | 3 hrs |
| Theory periods: | 4P/week | Class Test: | 20 |
| Maximum marks: | 100 | Teacher's Assessment: | 10 |
| | | End Semester Examination: | 70 |

RATIONALE:

The subject Biomedical Instrumentation is a very vital subject for the students at the present age, to know about Biomedical Electronic Instruments used for getting the biological information of the human being correctly for investigation. The students will have an exposure to Bio-medical instrumentation use for medical applications. In addition to that they will be able to apply the knowledge of Medical Instruments in actual fields. The course contains two pre wired panels with a variety of cables and accessories. It provides training in basic monitoring circuitry, such as ECG, EEG, EMG, Pulse rate, GSR, and temperature monitors. This lab explains the electronic circuit of the Electrocardiograph (ECG) Instrument in addition to EMG and EEG. The electrocardiograph recorder is an instrument, which can record the low-level voltages produced by the heart. Recorded from a patient's limbs and chest, these voltages produce a tracing called an electrocardiogram. Since magnetic power fields create common-mode signals, which interfere with the desired signal, special amplifier designs are needed

OBJECTIVES:

1. To know different physiological variables of interest in Medical-Electronics.
2. To know different bio-electric potentials such as ECG, EEG, EMG, ERG, EOG, EGG.
3. To get acquainted with different biomedical instruments such as Pacemaker, Defibrillator, Ultrasonograph.
4. To get an exposure to bio-telemetry systems.
5. To help students know general concepts of imaging system
6. To help students understand the electrical safety measures and standards.

TOPIC WISE DISTRIBUTION OF PERIODS

COURSE CONTENT IN TERMS OF SPECIFIC OBJECTIVES:

1. Introduction to Biomedical Instrumentation :

12

- 1.1 Define human parameters measurement system & explain its components.
- 1.2 Fundamentals and specifications of biomedical instrumentation system, physiological system of body:
Cardio vascular system, respiratory system, nervous system

- 1.3 State different types of transducers for biomedical Instruments.
- 1.4 Explain sources of bio-electric potentials.
- (a) Resting and action potential.
- (b) Propagation of action potential
- (c) Bio-electrical potentials.
- 2. Measuring, recording and monitoring instruments : 10**
- 2.1 Explain different types of Bio-electric signals (ECG, EMG, EEG, EOG, ERG and EGG).
- 2.2 Explain types of Recorders & Electrodes of ECG, EEG and EMG,
- 2.3 Explain patient monitoring system.
- 3. Modern imaging system : 8**
- 3.1 Basics of X-RAY AND RADIOISOTOPE INSTRUMENTATION
- 3.2 Generation of Ionizing Radiation.
- 3.3 Describe Instrumentation for diagnostic X-ray, handling of X-ray machine
- 3.4 Describe Instrumentation for computed tomography, ECT, SPECT, PET scanner,
Real-time ultrasonic imaging system, Echocardiograph
- 4 Therapeutic Equipments : 10**
- 4.1 Explain operation of External cardiac pacemaker
- 4.2 Explain operation of Implantable pacemaker
- 4.3 Explain operation of Bladder stimulator
- 4.4 Explain operation of cerebella stimulator, artificial kidney
- 4.5 Explain operation of Haemodialysis machine
- 4.6 Explain operation of ventilators
- 4.7 Explain operation of DC Defibrillator
- 5 Study of clinical laboratory instruments: 8**
- 5.1 Define blood cells.
- 5.2 Explain Chemical tests on blood.
- 5.3 Explain the working of Blood cell counter (Conductivity method)
- 5.4 Explain Spectrophotometer type instruments
- 5.5 Explain clinical flame photometer.
- 6 ELECTRICAL SAFETY OF MEDICAL EQUIPMENTS 6**
- 7.1 Describe the physiological effect of electrical currents.
- 7.2 Describe shock hazards of electrical equipments.
- 7.3 Explain methods of accident prevention.

7 APPLICATION OF NANOSENSORS IN BIOMEDICAL INSTRUMENTATION.

6

8.1 Explain Bio nano materials, Nano Biology instrumentation

8.2 Explain use of nano sensors in biomedical instrumentation

8.3 Advantages & disadvantages of nano materials use as Implants.

RECOMMENDED BOOKS:

A: TEXT BOOK:

1. Handbook of Biomedical Instrumentation by R.S. Khandpur, TMH Publications
2. Biomedical Instrumentation and Measurements (2nd edition) by Leslie Cromwell, Fred J. Wlibell, Enrich A. Pleiffer.

B: REFERENCE BOOK:

1. Biomedical Instrumentation and Measurement. By – Leslie Cromwell.
2. Nano Technology by Rakesh Rathi (S. Chand Publication.)
3. Medical Instrumentation by John. G. Webster -John Wiley.
4. Biomedical Instrumentation & Measurement by Carr & Brown-Pearson.

PROCESS CONTROL

| Name of the Course: Diploma in Applied Electronics & Instrumentation | | | |
|--|---------|---------------------------|-----------------|
| Course code: | AIT 504 | Semester | 5 th |
| Total Period: | 60 | Examination | 3 hrs |
| Theory periods: | 4P/week | Class Test: | 20 |
| Maximum marks: | 100 | Teacher's Assessment: | 10 |
| | | End Semester Examination: | 70 |

RATIONALE :

The subject process control will give the detail knowledge to the students about different types of control system with brief idea about DCS and SCADA system. With this experience the students will satisfactorily render the duty of supervisor in the modern process industries (Controllers, Actuators etc). They can effectively measure and control the process parameters for smooth run of the system.

OBJECTIVES:

1. Students will learn basic difference between manual & automatic Control Systems with examples.
2. Students can understand easily the difference between modes of control.
3. Students will be acquainted with Pneumatic, Hydraulic & Electronic Control systems.
4. Students will learn most advanced control system like PLC, DCS & SCADA System.

COURSE CONTENT IN TERMS OF SPECIFIC OBJECTIVES :

1. INTRODUCTION TO CONCEPT OF CONTROL

4

- 1.1 Describe close loop idea.
- 1.2 Describe Manual control of temperature.
- 1.3 Describe Conversion from manual to automatic operation.
- 1.4 Describe Open loop systems.
- 1.5 Describe Closed loop systems.
- 1.6 Explain with examples of temperature and pressure control by closed loop system.

2. CONTROL ACTION

6

- 2.1 Explain different type of control actions.
- 2.2 Explain the Principle of ON/OFF action.
- 2.3 Explain the Principle of proportional action.
- 2.4 Explain the Principle of integral action.
- 2.5 Explain the Principle of derivative action.
- 2.6 Explain the Principle of proportional plus integral action.
- 2.7 Explain the Principle of proportional plus integral plus derivative action.

3. TWO POSITION CONTROL

6

- 3.1 Explain Control loops.
- 3.2 Outline of Automatic temperature control system.
- 3.3 Explain Two-position control.
- 3.4 Explain Two-position liquid level control.

4. Elements and characteristics of process control: 6

- 4.1 Dynamic elements in control loop. Negative feedback, dead time and capacity characteristic of real processes.
- 4.2 Analysis of Self operating proportional controller for flow.
- 4.3 Analysis of Self operating proportional controller for level.
- 4.4 Explain the ideas about proportional Band.

5. CONTROLLER COMBINATION 8

- 5.1 Analysis of Proportional plus reset controller combination.
- 5.2 Derive the Equation for proportional plus reset controller combination.
- 5.3 Analysis of Proportional plus rate controller combination.
- 5.4 Derive the Equation for proportional plus rate controller combination.
- 5.5 Analysis of Proportional plus reset plus rate controller.
- 5.6 Derive the Equation for proportional plus reset plus rate controller.

6. PNEUMATIC CONTROLLER 8

- 6.1 Explain Basic concepts of conventional pneumatic controller.
- 6.2 Analysis of Pneumatic two position controller on a pressure Application.
- 6.3 Analysis of Pneumatic proportional plus reset controller on a Pressure application.
- 6.4 Analysis of Pneumatic proportional plus reset plus rate controller on a pressure application.

7. HYDRAULIC CONTROLLER 6

- 7.1 Explain hydraulic controller relay.
- 7.2 Explain hydraulic proportional controller in temperature control application.
- 7.3 Explain hydraulic proportional plus rate controller.
- 7.4 Explain hydraulic proportional plus reset plus rate controller.

8. FINAL CONTROL ELEMENTS 6

- 8.1 Describe Air operated valve, Air Diaphragm operated valve positioner.
- 8.2 Describe Air Piston actuator valve.
- 8.3 Describe Air Spring actuator for spring actuator with positioner.
- 8.4 Describe Air Hydraulic control valve.
- 8.5 Describe Air Solenoid valve, Motorized actuator for valve operation.

- 9.1 Derive ON/OFF control action using Op-Amp.
- 9.2 Derive Proportional controller action using Op-Amp.
- 9.3 Derive Proportional Plus Derivative Controller action using Op-Amp.
- 9.4 Derive Proportional Plus Integral Controller action using Op-Amp.
- 9.5 Derive Proportional plus Integral plus Derivative Controller action using Op-Amp.
- 9.6 Computer control of process- need for computers in control system –block diagram of a computer control system
- 9.7 Define Supervisory Control and Data Acquisition System (SCADA)
- 9.8 Explain briefly SCADA System with a neat block diagram, Applications of SCADA,
- 9.9 Define Remote Terminal Units (RTUs) & Master Terminal Units,

RECOMMENDED BOOKS :**(A) Test Books :**

1. Process control by Peter Horriot, TMH Publications. 1st Edition.
2. Principles of process control by D. Patranabis, TMH Publications. 2nd Edition
3. Process Control and Optimization by B.G. Liptak, CRC press

Reference Books :

1. Process Control System, F.G. Shinskey, TMH Publications. 2nd Edition
2. Process Control Instrumentation C.B. Johnson. PHI publications, 7th Edition
3. Instrumentation hand book.
4. R.J. Willam, "Hand book of SCADA System for the Oil and Gas Industry", Mold Clwyd.
5. Considine, Applications of Computers in Process Control
6. Krishnakanth, Computerised Based Industrial Controls
7. A.K. Sawhney, A course in Mechanical Measurements and Instrumentation – Dhanpat Rai and Sons, New Delhi, 1999
8. D R Coughanowr: Process Systems Analysis and Control, McGraw Hill.

INDUSTRIAL-CONTROL DEVICES

| | | | |
|--|---------|---------------------------|-----------------|
| Name of the Course: Diploma in Applied Electronics & Instrumentation | | | |
| Course code: | AIT 505 | Semester | 5 th |
| Total Period: | 60 | Examination | 3 hrs |
| Theory periods: | 4P/week | Class Test: | 20 |
| Maximum marks: | 100 | Teacher's Assessment: | 10 |
| | | End Semester Examination: | 70 |

RATIONALE :

The study of Industrial Control Devices will give the students detail idea about power electronics devices such as Thyristor, GTO, PUT and other industrial systems like relays, synchros, servomechanism and UPS. The students will also acquire adequate knowledge about principle of the devices and mechanism. The subject will also give the idea of control of D.C. and A.C. Motors. Besides, the students will gain knowledge about drives system.

OBJECTIVES :

1. Students must be acquainted with Power electronics devices
2. Students will learn some important Power electronics Circuits of interest in industry
3. Students will get the concept of regulated power supply & ICs , Relays etc
4. Students will get the concept of UPS, control of DC motor and Synchros

COURSE CONENT IN TERMS OF SPECIFIC OBJECTIVES:

1. REGULATED POWER SUPPLY

10

- 1.1 Explain Ordinary D.C. power supply
- 1.2 Explain the operation of D.C. series voltage regulators indicating different units
- 1.3 Explain the operation of D.C. shunt voltage regulators indicating different units
- 1.4 Explain the operation of fixed & variable output IC voltage regulators.
(78XX series, 79XX series, LM 317,337 & 723)
- 1.5 Explain Current limit and over voltage protection.
- 1.6 Explain Switch mode power supply. (D.C & A.C.)

2. THYRISTORS

10

- 2.1 Discuss SCR characteristics.
- 2.2 Explain Principle of operation of SCR with two transistor analogy.
- 2.4 Explain SCR ratings, specifications and nomenclatures.
- 2.5 Discuss Methods of turning On & Off of SCR
- 2.6 Explain Principle of operation & applications of TRIAC.
- 2.7 Explain Principle of operation & applications of DIAC.
- 2.8 Explain the operation of 3-phase rectification by using SCR.

| | |
|---|----------|
| 3. D.C MOTOR CONTROL | 4 |
| 3.1 Explain Speed control of DC motor by using SCR. | |
| 3.2 Explain Speed regulation with variation in load. | |
| 3.3 Explain Speed regulation with change in supply voltage. | |
| 4. RELAYS | 6 |
| 4.1 Discuss Motions and operations of relays | |
| 4.2 Classify different types of relays | |
| 4.3 Differentiate between Open circuit and Close circuit Relay system. | |
| 4.3 Explain Automatic relays. | |
| 4.4 Explain the operation of ON-delay Relay & OFF-delay Relay | |
| 4.5 Explain over current relay, over voltage relay and frequency relay | |
| 4.6 Discuss Potential free contact. | |
| 5. SYNCHROS | 5 |
| 5.1 Explain Operation of synchro generator and synchro motor. | |
| 5.2 Explain Reversing motor and stator connections. | |
| 5.3 Explain the Principle of differential synchro system. | |
| 5.4 Explain use of Differential synchro system for addition and subtraction. | |
| 6. SERVOMECHANISM | 5 |
| 6.1 List the Elements of a servo system. | |
| 6.2 Explain D.C and A.C servomotors | |
| 6.3 Explain working of Stepper Motor. | |
| 6.3 Discuss Applications of servomechanism. | |
| 7. A.C. VOLTAGE REGULATORS. | 5 |
| 7.1 Discuss Manual control regulators with tap changing. | |
| 7.2 Explain working of Autotransformer. | |
| 7.3 Explain the concept of Buck-Boost-Transformer | |
| 7.4 Explain working of Automatic step regulators. | |
| 7.5 Explain working of Automatic servo regulators. | |
| 8. UNINTERRUPTIBLE POWER SUPPLY (UPS) | 5 |
| 8.1 Explain Principle of On-line UPS. | |
| 8.2 Explain Principle of stand by UPS. | |
| 8.3 Explain Line interactive UPS | |
| 8.4 Explain Introduction to sine wave inverter (single phase full wave) and three phase inverter. (180° conduction mode only.) | |

9. POWER DEVICES

7

9.1 Explain the operation, construction and uses of Power MOSFET

9.2 Explain the operation, construction and uses of IGBT

9.3 Explain the operation, construction and uses of GTO

9.4 Explain UJT as a Control Device

10. A.C. MOTOR CONTROL

3

10.1 Discuss Types of speed control Mechanism of AC Motor Control.

10.2 Explain AC drives & frequency converter. (Variable voltage and variable frequency drive)

RECOMMENDED BOOKS:

Text Book:

1. Power Electronics by MD Singh &KB Khanchandhni, TMH.
2. Power Electronics by Ram Babu,-SCITECH Publication
3. Power Electronics by Dr P.S.Bimbhra-Khanna Publishers

REFERENCE BOOK:

1. Industrial Electronics by G.K.Mithal .
2. Theory of Power Electronics by K L RAO & CH. SAIBABU-S.Chand
3. Practical SCR / Triac projects by M.C Sharama
4. Industrial Electronics and Control by S;K; Bhattacharya & S Chatterjee-MC Graw Hill
5. Power Electronics by P.C.Sen

Process Instrumentation – II Lab

| Name of the Course: Diploma in Applied Electronics & Instrumentation | | | |
|--|------------|---------------------------|-----------------|
| Course code: | AIP 501 | Semester | 5 th |
| Total Period: | 60 | Examination | 4 hrs |
| Lab. periods: | 4 P / week | Term Work | 25 |
| Maximum marks: | 50 | End Semester Examination: | 25 |

RATIONALE :

The students will be able to measure different types of Industrial parameters using process instruments like thermistor, RTD transducers, LVDT, Load cell, Hygrometer, Strain gauge, PH meter etc with their applications, practical working principle & operation.

COURSE CONTENT

1. To plot the characteristics of Thermistor transducer.
2. To plot the characteristics of RTD transducer.
3. To plot the characteristics of Thermocouple transducer.
4. Measurement of furnace temperature using pyrometer.
5. Measurement of displacement using LVDT.
6. Measurement of strain using strain gauge.
7. Measurement of force using load cell.
8. Measurement of pH of a given solution using pH meter.
9. Measurement of humidity by hygrometer.
10. Measurement of moisture content using moisture meter.
11. Measurement of speed of fan using stroboscope.
12. Calibration of Pressure gauge by Dead weight pressure gauge.

Bio-Medical Instrumentation Lab

| Name of the Course: Diploma in Applied Electronics & Instrumentation | | | |
|--|------------|---------------------------|-----------------|
| Course code: | AIP 502 | Semester | 5 th |
| Total Period: | 60 | Examination | 4 hrs |
| Lab. periods: | 4 P / week | Term Work | 25 |
| Maximum marks: | 50 | End Semester Examination: | 25 |

RATIONALE :

The students will have an exposure to Biomedical instrumentation. In addition to that they will be able to apply the knowledge of Medical Instruments in actual fields. The course contains two pre wired panels with a variety of cables and accessories. It provides training in basic monitoring circuitry, such as ECG, EEG, EMG, Pulse rate, GSR, and temperature monitors. This lab explains the electronic circuit of the Electrocardiograph (ECG) Instrument in addition to EMG and EEG. The electrocardiograph recorder is an instrument, which can record the low-level voltages produced by the heart. Recorded from a patient's limbs and chest, these voltages produce a tracing called an electrocardiogram. Since magnetic power fields create common-mode signals, which interfere with the desired signal, special amplifier designs are needed

COURSE CONTENT

1. Performance study of differential amplifiers used in biomedical instrumentation
2. Performance study of Biomedical Amplifier System
3. Performance study of Electrocardiograph Recorder
4. Performance study of pulse rate counter with Display.
5. Performance study of respiratory recording instrument.
6. Performance study of EMG Recorder
7. Performance study of EEG amplifiers
8. Performance study of Sphygmomanometer
9. Study Visit to nearer Medical / Hospital/Medical Colleges and prepare a study visit note.

Process Control Lab

| Name of the Course: Diploma in Applied Electronics & Instrumentation | | | |
|--|------------|---------------------------|-----------------|
| Course code: | AIP 503 | Semester | 5 th |
| Total Period: | 45 | Examination | 4 hrs |
| Lab. periods: | 3 P / week | Term Work | 25 |
| Maximum marks: | 50 | End Semester Examination: | 25 |

RATIONALE :

The students will be have an exposure to controllers used in On-Line system. In addition to that they will be able to apply the knowledge of Industrial Electronics in actual fields.

COURSE CONTENT

1. Performance study of differential pressure transmitter
2. Performance study of ON/OFF, P, PI, PID Controllers on Flow process.
3. Performance study of ON/OFF, P, PI, PID Controllers on Pressure process.
4. Performance study of ON/OFF, P, PI, PID Controllers on Level process
5. Performance study of ON-Line Temperature Process Analyzer.
6. Performance study of ON-Line Pressure Process Analyzer.
7. Performance study of ON-Line Level Process Analyzer.
8. Performance study of ON-Line Flow Process Analyzer.
9. Performance study of DC Position Control using P-I-D control action.
10. Performance study of I to P converter
11. Construction of Proportional & Proportional plus integral controller using Op-Amp.
12. Study visit of nearest SUB STATION for SCADA /DCS control system

INDUSTRIAL CONTROL DEVICES LAB

| Name of the Course: Diploma in Applied Electronics & Instrumentation | | | |
|--|------------|---------------------------|-----------------|
| Course code: | AIP 504 | Semester | 5 th |
| Total Period: | 45 | Examination | 4 hrs |
| Lab. periods: | 3 P / week | Term Work | 25 |
| Maximum marks: | 50 | End Semester Examination: | 25 |

A: RATIONALE :

On completion of this Lab., the students will be familiar with power electronics devices, different triggering circuit and application of SCR and other industrial application.

B: COURSE CONTENTS IN TERMS OF SPECIFIC OBJECTIVES:

1. Construct regulated power supply using IC voltage regulators (78XX /79XX series)
2. Construct regulated power supply using IC voltage regulators (LM317 / 723)
3. Plot V-I characteristics of
 - a) SCR
 - b) DIAC
 - c) TRIAC
4. Construct and test UJT relaxation oscillator
5. Construct and test triggering of SCR using
 - a) R firing circuit
 - b) RC firing circuit
 - c) UJT Triggering
6. Construct and study lamp dimmer using TRIAC
7. Performance study of different types of Relays
8. Performance study of UPS Unit (ON, OFF & Line interactive)
9. Performance study of AC servo voltage regulator
10. Performance study of Switch mode power supply
11. Performance study of a DC motor control circuit
12. Performance study of an AC motor control circuit

Reference books

1. SCR manual-GE company
2. Power electronics-RS Ramshaw
3. Thyristors and their applications- M Rammoorthy
4. Industrial Electronics Test lab manual – Paul B Zbar
5. Instructional e-manual supplied by manufacturers

INFORMATION SEARCH, ANALYSIS AND PRESENTATION Lab & Library Study

| Name of the Course: Diploma in Applied Electronics & Instrumentation | | | |
|--|------------|---------------------------|-----------------|
| Course code: | AIP 505 | Semester | 5 th |
| Total Period: | 60 | Examination | 4 hrs |
| Lab. periods: | 4 P / week | Term Work | 25 |
| Maximum marks: | 50 | End Semester Examination: | 25 |

CONTENT OF PRACTICALS:

PART ONE: WRITTEN COMMUNICATION (15Hrs)

- A] WRITE RESEARCH PAPERS AND ARTICLES
- B] OTHER WRITTEN COMMUNICATION ACTIVITIES
 - 1. Reports
 - a) Formal Reports
 - b) Progress Reports
 - c) Feasibility Reports
 - d) Laboratory Reports
 - 2. Technical Proposals
 - 3. E-mail
 - 4. Instructions and User Manual
 - 5. Job-Hunting Materials
 - a) Resumes
 - b) Letters for Job Hunting
 - 6. Business Letters
 - 7. Memo, Notices, Agenda and Minutes

PART TWO: ORAL COMMUNICATION (15Hrs)

- A] TRANSPARENCY – BASED/PPT PRESENTATION
- B] OTHER ORAL COMMUNICATION ACTIVITIES
 - 1. Dyadic Communication (Interaction between two persons example Telephone Conversation)
 - 2. Meetings
 - 3. The Job Interview
 - 4. Group Discussion
 - 5. Debates
 - 6. Case Study

NOTE:

- 1. Both Written Communication and Oral Communication activities are to take place concurrently. That is every week 3 Hrs(Periods)of Written Communication / 3 Hrs(Periods)of Oral Communication activity has to take place.
- 2. Topic selected for part one 'A' and part two 'A' are to be separate and it is left to the student's choice.
- 3. The output of part one 'A' activity is a well documented written report, which will be evaluated at the time of examination.

4. The out put part two 'A' activity is the production of transparencies which the student will use at the time of presentation in the examination.

5. It may not be possible to do maintain a log of activities shown under part one 'B' and part two 'B'. However student has to do as much activity as possible.

6. Every student has to maintain a log of activity file, as per the Performa shown below. The concerned staff members has to sign on each day and principle has to certify on the last page in the end. Maintain separate sheets for part one and part two.

| Sl.No | Date & Time | Activity | Brief Description | Signature of Staff |
|-------|-------------|----------|-------------------|--------------------|
| 1. | | | | |
| 2. | | | | |
| | | | | |
| | | | | |

Activity under part one 'B' and part two 'B' will be evaluated on the basis of his log of activity file.

1. **INTRODUCTION:**

The average engineer walking out of education institution is surprised by the amount of non-technical work he or she faces in the world (by the amount of personal contact, the number of phone calls, meetings, reports and presentations etc).

Further many cannot find appropriate jobs, because employer's complain that students lack these key skills. This course attempts to provide a slice of that kind of practical training in a form that may be used in a classroom setting.

This course is NOT a course that is taught to the students in the manner that conventional courses are taught. In this course the emphasis will shift from **teacher – oriented – methods to students – oriented – methods**. While the **information – skills** acquired by all students will be the same, the actual methods and techniques used by each student will vary according to his or her initiative, and various other parameters – individual / group projects allotted, effort put in, enthusiasm shown, discussion held, and so on.

2. **OBJECTIVE:**

1. Some education researchers in U.S.A. found that 17-year olds, in a single academic year, learn about 200 to 300 new words, in a university environment.

However, during the same period , at their informal home and play environment, they acquire around 4000 words! Strangely enough, learning seems to be higher in an informal environment, than in an academic one, designed specifically for this purpose.

This, they found was because, in an informal home and play environment, the student's learning is self motivated – the student learns because he or she wants to, and needs to **fit-in**. The objective of this course is to simulate an informal learning environment.

2. This course provides an ideal opportunity to acquire skills in **learning – to – learn** which is very essential for his professional growth later on.

3. To inculcate information skills into students i.e. , to let the students acquire information skills on their own initiative and grow with age.

4. Another main objective of this course is to develop written communication skills in students.

NOTE: Information skill – Awareness of an idea, details of an idea and where to look for.

3. **ACTIVITIES:**

PART ONE: WRITTEN COMMUNICATION (15Hrs) & Library Study

RESEARCH – Source of Information

- a) People
- b) Print Media
 - News Paper
 - Magazines
 - Journals
 - Vendors Catalogues

- c) Electronic Information
 - CD-ROM
 - The Internet
 - Usenet Newsgroups
 - Connecting to other computers
 - The World Wide Web

Student project can be done individually or in groups of not more than five depending on the theme (or main) subject.

Sample Projects:

1. Research the anti-lock braking system used in cars and describe the principle of its operation.
2. Research the mechanism of Laser Printer and describe the principles of its operation.
3. Research the Control Area Network (CAN) protocol used with cars.(Ref. for 1, 2 and Mechatronics by W.Bolton)
4. Research the configuration, price and features of a typical 10/100 Mbs Ethernet Network Interface Card (NIC). Consider features such as media support, transmission distance for a 10/100 BASE-T operation and driver support.
5. Research the price, size and capabilities of a nominally 24 port 10/100 Mbs Ethernet Hub that is applicable for use in a medium size enterprise LAN. Consider features such as transceiver options for support of different media, auto sensing capability, how many units can be stacked and status monitoring.
6. Research the price and features of some typical print and Ethernet LAN Servers. Consider features such as the number of ports, memory size and protocols supported.
7. Research the characteristics of some commercially available multimode optical fibres, connectors, transmitters and receivers for LAN use. Assume LAN data rates are 10 and 100 Mbps and transmission distance could range upto 500m.
8. Examine the trade literature to find recent applications of 10-Gigabit Ethernet. Were these applications for local, metropolitan or wide area networks? What was the purpose of these implementations? Who was using these systems? Why was 10-Gigabit Ethernet chosen versus another technology?
9. Research the characteristics and functions of at least two Bluetooth P.C. adapter cards that are commercially available. Consider parameters such as support of the operating system, device interfaces, size and power consumption.
10. Research what Internet Service providers are available in your area. Describe some of the features that an ISP might provide. For example, consider questions such as: What connection options do they offer? What is the highest connection rate that is available? What equipment do you need to access the Internet at these speeds?
11. Describe the capabilities of at least two commercially available LAN protocol analysers. Consider parameters such as data rates that it supports, what protocols it support, error detection features and recording options.
12. Compare the LAN-monitoring capabilities of HP Open View, CISCO LAN Management Solution, Novell Manage Wise. Consider factors such as support of RMON, device-discovery capabilities, report generation and fault tolerance capabilities.
13. Biomedical Instrumentation
14. Sensor Technology/Intelligent Instrumentation using DSP software & RS 232C/USB etc
15. Using the web resources or the literature compare the advantages and limitations of at least three biometric devices for authentication purpose. For example, the technologies might be based on fingerprints, palm prints, retinal patterns or voice recognition.
16. E-waste for environmental balance

PART TWO – A: TRANSPARENCY (OR PPT) BASED PRESENTATION(15 hour)

- 1.1 Preparation

- 1.1.1 Audience Analysis
- 1.1.2 Information Gathering
- 1.1.3 Transparency Design using Power Point
- 1.1.4 Producing the Transparency for O.H.P./P.P.T.

Sample Projects:

1. Prepare and deliver a brief transparency based presentation using one of the topics.
 - a) Technicians are properly appreciated in society.
 - b) Engineers do not know enough about non-technical topics.
 - c) Laypeople do not know enough about technical topics.
 - d) India's products are not competitive in International Market because its quality is not good.
 - e) India's Software Professionals are paid too much.
2. Prepare and deliver a brief transparency – based presentation for the opposite side of the issue you in Project-1 above.
3. Prepare and deliver a brief autobiographical presentation.
4. Prepare and deliver a brief biographical presentation of a person know to you.
5. Prepare and deliver a brief sales presentation for a product (example washing machine).
6. Prepare and deliver a brief sales presentation for a service (example Insurance Policy, Maintenance of equipment) with which you are familiar.
7. Prepare and deliver a brief sales presentation that pitches your potential as an employee to a potential employer.
8. Prepare and deliver a technically accurate presentation (for a lay audience) on a technical topic of your choosing.
One example of technical topic. Describe what an embed MRI system is and what its common characteristics
9. Prepare and deliver a technical presentation (for an engineering audience) on a topic of your choosing.
Example of topic Microcontroller based digital panel meter – include
 - (a) Circuit description
 - (b) Program description
10. From a group with five members and choose one of the topics given below. In a brief planning session, divide the topic into subtopics (already done) for a group Presentation. Prepare and deliver the presentation.
 - 10.01.1 Select five India's top wealth creating companies and study their performance in the last five years? Can any lessons be learnt from their experience, any forecast be made?
 - 10.01.2 Company 1
 - 10.01.3 Company 2
 - 10.01.4 Company 3
 - 10.01.5 Company 4
 - 10.01.6 Company 5
 - 10.02 "Internet ushers in a new era in computing short and colourful history". Bill Gates predicates that with in a decade, Internet would become as mainstream as water or electricity. Study the Impact Internet could have on life and the way we do business, through the following 5 aspects:
 - 10.02.1 Publishing and Advertising
 - 10.02.2 Electronics Shopping
 - 10.02.3 Entertainment
 - 10.02.4 Education and Training
 - 10.02.5 Social Impact
 - 10.03 Asynchronous Transfer Mode (ATM) is claimed to be the communication technology that will allow total flexibility and efficiency need for high speed, multi-service multimedia networks. Many network experts predict that ATM will be the technology that finally enables high bandwidth time-critical applications to reach the desktop. Give a study on this, covering the following aspects:
 - 10.03.1 What is ATM?

- 10.03.2 What new applications will be enabled by ATM ?
- 10.03.3 How does ATM differ from exiting network technologies?
- 10.03.4 How will application programs use A.T.M.?
- 10.03.5 What products that support ATM are available in the market.
- 10.03.6 Give brief description of five products or product sub-systems which could be Embedded systems, choosing examples from the following environment:
- 10.03.7 Domestic
- 10.03.8 Automotive
- 10.03.9 Medical – Electronic
- 10.03.10 Industry
- 10.03.11 Office.

4. EXAMINATION:

- 1. Ten students or minimum per batch of 4 Hrs duration.
- 2. Marks allotment

Part One: Written Communication

- A. Research Paper and Articles – Report : 05Marks
- B. Other Written Communication Activates : 05 Marks

Part Two: Oral Communication

- A. Transparency based Presentation : 05 Marks
- B. Other Oral Communication Activities : 10 Marks

3. Evaluation:

- 3.1 For part one 'A' on the basis of the report submitted by the student.
- 3.2 For part two 'A' on the basis of the 10 minutes oral presentation by the student
- 3.3 For part one 'B' on the basis of log of activity file.

6. REFERENCE:

Books:

| Sl. N.o | Title | Author | Publisher |
|---------|---|-------------------------------------|---------------------------|
| 1. | Life Skills and Leadership for Engineers | David.E.Goldberg | Tata McGraw - Hill |
| 2. | Developing Communication Skills | Krishna Mohan MeeraBanerji | Macmillan India Ltd. |
| 3. | Power Speak | Dorothy Leeds | East-West Books Pvt.Ltd. |
| 4. | Developing Presentation Skills | Dr.R.L.Bhatia | Wheeler Publishing |
| 5. | Steps to Writing Well | Jean Wyrick | Thomoson Learning |
| 6. | Business Students Hand Book | Sheila Cameran | Pearson Education |
| 7. | Information Search and Analysis Skills | | NIIT |
| 8. | A Beginner's Guide to Technical Communication | Anne Eisenberg | McGraw Hill International |
| 9. | A Guide to Technical Communication | James Sherlock | Ally and Bacon inc., USA |
| 10. | Technical Writing | Sharon J Gerson Steven M. Gerson | Pearson Education |
| 11. | Basic Communication Skills for | Andrea J | Pearson Education |

| | | | |
|-----|--|--|------------------------------|
| | Technology | Rutherford | |
| 12. | How to Write for the World of Work | Thomas E Pearsall Donald H Cunningham | Prism Book Pvt.Ltd. |
| 13. | Technical Writing and Professional Communication | Thomas N Huckin Leslie A Olsen | McGraw Hill International |
| 14. | Business Communication | BoveeThill | Pearson Education |
| | Today | Schatzman | |
| 15. | Business Communication | Mary Ellen Guffay | Thomson |
| 16. | Critical Thinking | Greg Bassham etc., | McGraw Hill |
| 17. | Advanced Business Communication | Penrose / Rasberry /Myers | Thomson |
| 18. | Strategies for Engineering Communication | Susan Stevenson / Steve Whitmore | Wiley |

Journals:

1. Business World
2. Business Today
3. Business India
4. Voice and Data
5. Data Quest
6. Information Technology
7. Electronics for you
8. Network Magazine
9. Network Computing
10. Developer IQ
11. Developer 2.0

Television:

1. BBC – Hard Talk, 24 x 7 NDTV – Big Fight

Web Sites:

1. ATM Forum <http://www.atmforum.com>
2. CISCO <http://www.cisco.com>
3. 3 Com <http://www.3com.com>
4. Extreme Network <http://www.extremenetworks.com>
5. Hewlett Packard <http://www.hp.com>
6. Novell <http://www.noveli.com>