5.1 CONSUMER ELECTRONICS AND TROUBLESHOOTING

L T P
Periods/ Weeks 5 **- 1 – 4**

Unit:- I **(20 Periods)**

AUDIO SYSTEM

- Basic working Principle, Construction, Polar pattern, frequency Response & application of Carbon, moving coil, & cordless microphones. Brief idea of velocity, crystal, and condenser microphone.
- Basic working Principle, Construction, Polar pattern, frequency Response & application of direct radiating & horn Loud Speaker.
- Basic idea of woofer, tweeter, baffles and enclosures and crossover networks.

Unit:- II **(25 Periods)**

T.V. FUNDAMENTALS

- Brief idea of V.S.B.(Vestigial sideband) modulation.
- Concept of Scanning and its types.
- Aspect ratio, Resolution.
- Importance of Synchronizing and Blanking pulses.
- Composite video signal (CVS) at the end of even and odd fields.

Unit:- III **(10 Periods)**

- Concept of Camera- Vidicon Camera.
- An Introduction to Latest trends of T.V. Technology: LCD, LED & HDTV.

Unit:- IV **(20 Periods)**

Consumer Appliances- Principle, Working and troubleshooting with special emphasis on control panel

a) Microwave Oven
b) Washing Machine
c) Photostat Machine
d) DTH System
e) Digital Camera

Unit:- V **(25Periods)**

a) Repair, Servicing and Maintenance Concepts

Mean time between failures (MTBF), Mean time to repair (MTR), Maintenance policy,potential problems, preventive maintenance and corrective maintenance.

b) Fundamental Trouble Shooting Procedures
i) Fault location
ii) Fault finding aids
- Service manuals
- Test and measuring instruments
- Special tools
iii) Trouble Shooting Techniques
- Functional Areas Approach
- Split half method
- Divergent, convergent and feedback path circuit.

LIST OF PRACTICALS

1. To plot the directivity pattern and frequency response ofa microphone.
2. To plot the directivity pattern and tiequency response of a loudspeaker.
3. Demonstration of VCD/DVD player and study of its transport mechanism
4. Familiarization with the different sections of B/W TV Receiver.
5. To observe the wave fonrs and voltage of B/W and colour TV Receiver.
6. Fault finding ofcolour T.V Receiver.
7. Familiarization with different section of LCD & LED TV
8. Study ofcable TV network system.
9. Demonstration and Operation ofControl Panel
   (a) Microwave Oven
   (b) DTH System
   (c) Photostat Machine
   (d) Washing Machine

RECOMMENDED BOOKS

- Audio and Video Systems by RG Cupta, Tata McGraw Hill Education Pvt Ltd, New Delhi
- Colour Television-Principles & Practice by R.R Gulati , Wiley Eastern Limited, New Delhi
- Complete Satellite & cable Television R.R Gulati New age lnternational Publisher, New Delhi
- Colour Television Servicing by RC Vijay BPB Publication, New Delhi
- Colour Television & Video Technology by A.K. Maini CSB Publishers
- Colour TV by A. Dhake
- Service Manuals, BPB Publication, New Delhi
- Modem Electronic Equipment Trouble shooting, Repair and Maintenance by RS Khandpur, Tata Mccraw Hill Education Pvt Ltd, New Delhi

Suggested Distribution of Marks

Unit	Time Allotted (Periods)	Marks Allocation %
I	20	20
II	25	25
III	10	10
IV	20	20
V	25	25
TOTAL	**80**	**100**

5.2 ELECTRONICS APPLICATIONS IN INDUSTRY

	L	T	P
Periods/ Weeks	5	1	4

Unit:- I **(20 Periods)**

Silicon Controlled Rectifiers & Thyristor family

Introduction, Construction and working principles of an SCR, two transistor analogy and characteristics, specifications and rating, Methods of triggering a Thyristor, Commutation of Thyristors (Concept), Series and parallel operation of Thyristors, Protection of SCR, Snubber Circuit Construction, working principles and V-I characteristics of DIAC, TRIAC, Basic idea about the selection of heat sinks for SCR and TRIACS. UJT, its Construction, working principles and V-I characteristics, UJT relaxation oscillator

Applications of SCR, TRIAC such as light intensity control, speed control of DC and universal motor, fan regulator, battery charger, temperature control

Unit:- II **(20 Periods)**

Controlled Rectifiers

Single phase half wave controlled rectifier with resistive load and inductive load, concept of freewheeling diode, Single phase half controlled full wave rectifier (No mathematical derivation), 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

Unit:- III **(10 Periods)**

Choppers

Choppers-introduction, types of choppers and their working principles, Quadrant operation and applications

Unit:- IV **(15 Periods)**

Dual Converters and Cyclo Converters

Dual converters-introduction, working principles and applications

Cyclo-converters- introduction, types, working principles of simultaneous and non simultaneous control and applications.

Unit:- V **(15 Periods)**

Inverters & Uninterrupted Power Supplies

Inverter-introduction, working principles, voltage and current driven series and parallel inverters and applications

UPS, Stabilizers, SMPS, UPS online, off line, Storage devices (batteries)

Power Conditioners

LIST OF PRACTICALS

1. To draw V-I characteristics of an SCR
2. To draw V-I characteristics of a TRIAC
3. To draw V-I characteristics of a DIAC
4. To draw uni-junction transistor characteristics
5. Observe the output wave of an UJT relaxation oscillator
6. Observe the wave shape across SCR and load of an illumination control circuit
7. Fan speed regulator using TRIAC
8. To observe the output wave shape on CRO of a Single phase half controlled full wave rectifier
9. Single phase controlled rectifier

RECOMMENDED BOOKS

- Industrial Control Electronics. John Webb, Kevin Greshock, Maxwell, Macmillan International editions
- Fundamentals of Power Electronics by S Rama Reddi, Narosa Publishing House Pvt. Ltd, New Delhi
- Power Electronics, Circuits Devices and Applications by Mohammad H. Rashid
- Power Electronics by PC Sen
- Power Electronics by Dr. PS Bhimbra, Khanna Publishers, New Delhi
- Industrial Electronics & Control by SK Bhattacharya & S Chatterji, New Age international Publications(P) Ltd, New Delhi
- Industrial Electronics and Control of Drives by SK Sahdev, Uneek Publication, Jalandhar
- Industrial Power Electronics by JC Karhava, King India Publication,
- Fundamentals of Electrical Drives by Gopal K Dubey, Narosa Publishing House Pvt. Ltd, New Delhi
- Power Electronics and Controls by Samir K Datta, Prentice Hall of India, New Delhi

Suggested Distribution of Marks

Unit	Time Allotted (Periods)	Marks Allocation %
I	20	25
II	20	25
III	10	10
IV	15	20
V	15	20
TOTAL	**80**	**100**

5.3 PROCESS CONTROL

	L	T	P
Periods/ Weeks	4	1	4

Unit:- I **(10 Periods)**

Basic Control Loops and Characteristics

Basic of process control, process variables, single and multi capacity processes, single capacity level, pressure, temperature and flow loop systems. Process lag, measurement lag, transmission lag and dead time.

Unit:- II **(10 Periods)**

Controller modes and characteristics

Concept of on-off, proportional, integral, derivative, P, PI and PID controls, their examples, merits and demerits.

Unit:- III **(12 Periods)**

Electrical Control Elements

Construction and principle of operation of solenoids, stepper motor, limit switches, relays, auto transformer and magnetic amplifier.

Unit:- IV **(14 Periods)**

Pneumatic and Hydraulic Control Elements

Pneumatic pressure supply, pneumatic actuator, pneumatic relay, pneumatic amplifiers, electro-pneumatic actuators, flapper-nozzle system and bellows, air filter and regulator. Hydraulic actuators and valves, electro hydraulic actuators.

Unit:- V **(18 Periods)**

Control Valves & Switches

Principle of operation and constructional details of solenoid valve, diaphragm operated valve, globe valve, ball valve, butterfly valve, valve positioners. Control valve characteristics, their sizing and selection of valves. Temperature switches, Flow switches, Pressure switches, interlocking and sequencing circuits, need of interlocks, anaurciators.

LIST OF PRACTICALS

1. To find the differential gap of on-off control system.
2. To rig up an electronic PID controller and verify its working.
3. To rig up an electronic proportional controller unit.
4. To rig up an electronic proportional integrated controller unit.
5. To study the characteristics and controller specifications ol different types ofcontrol valves
6. and their repair and maintenance.
7. To study and obtain the inpuVoutput relationship of a pneumatic relay.
8. To determine the characteristics of a control valve with positioned and without positioner.
9. To study a control loop oftank level control using on-offcontrol.
10. To study the control loop of a system for a flow control.
11. To study the control loop ofa system for pressure control.
12. To study the construction and working of a pressure switch.
13. To study the construction and working ofa temperature switch.
14. To study the consEuction and working ola float type oflevel switch.

RECOMMENDED BOOKS

- Process control by Peter Harrot, Tata McGraw Hill Publishers, New Delhi.
- Automatic process control by Erchman DP; John Wiley and Sons, New Delhi
- Instrument Engineers Handbook by Liptik BG.
- Process Control Instrumentation Technology by Johnson Curtis D. John Willey and Sons, New Delhi.
- Process Measurement and Analysis by Liptik BG.
- Handbook of Applied Instrumentation by DM Considine.
- Mechanical and Industrial and Industrial Measurements by RK Jain, Khanna Publishers, New Delhi.

Suggested Distribution of Marks

Unit	Time Allotted (Periods)	Marks Allocation %
I	10	16
II	10	16
III	12	22
IV	14	22
V	18	24
TOTAL	**64**	**100**

5.4 ENTREPRENEURSHIP DEVELOPMENT AND MANAGEMENT

	L	T	P
Periods/ Weeks	5	-	-

RATIONALE

In the present day scenario, it has become imperative to impart entrepreneurship and management concepts to students so that a significant percentage of them can be directed towards setting up and managing their own small enterprises. This subject focuses on imparting the necessary competencies and skills of enterprise set up and its management.

DETAILED CONTENTS

A. **ENTREPRENEURSHIP** **(30 Periods)**

1. Introduction
   Concept /Meaning and its need
   - Qualities and functions of entrepreneur and barriers in entrepreneurship
   - Sole proprietorship and partnership forms of business organisations
   - Schemes of assistance by entrepreneurial support agencies at National, State,
   - District level: NSIC, NRDC, DC:MSME, SIDBI, NABARD, Commercial Banks,SFC's TCO, KVIB, DIC, Technology Business Incubator (TBI) and Science and Technology Entrepreneur Parks (STEP)
2. Market Survey and Opportunity Identification
   - Scanning of business environment
   - Salient features of National and State industrial policies and resultant business opportunities Types and conduct of market survey
   - Assessment of demand and supply in potential areas of growth
   - Identifying business opportunity
   - Considerations in product selection
3. Project report Preparation
   - Preliminary project report
   - Detailed project report including technical, economic and market feasibility
   - Common errors in project report preparations
   - Exercises on preparation of project report

B MANAGEMENT **(30 Periods)**

4. Introduction to Management
   Definitions and importance of management

- Functions of management: Importance and Process of planning, organising, staffing,directing and controlling Principles of management (Henri Fayol, F.W. Taylor)
- Concept and structure of an organisation
- Types of industrial organisations

a) Line organisation b) Line and staff organisation c) Functional Organisation

5. Leadership and Motivation

a)Leadership Definition and Need

- Qualities and functions of a leader
- Manager Vs leader
- Types of leadership

b) Motivation Definitions and characteristics

- Factors affecting motivation
- Theories of motivation (Maslow, Herzberg, McGregor)

6. Management Scope in Different Areas

a) Human Resource Management Introduction and objective

- Introduction to Man power planning, recruitment and selection
- Introduction to performance appraisal methods

b) Material and Store Management Introduction functions, and objectives

- ABC Analysis and EOQ

c) Marketing and sales Introduction, importance, and its functions

- Physical distribution
- Introduction to promotion mix
- Sales promotion

d) Financial Management Introductions, importance and its functions

- Elementary knowledge of income tax, sales tax, excise duty, custom duty and VAT

7. Miscellaneous Topics

a) Customer Relation Management (CRM) Definition and need

- Types of CRM

b) Total Quality Management (TQM) Statistical process control

- Total employees Involvement
- Just in time (JIT)

c) Intellectual Property Right (IPR) Introductions, definition and its importance,Infringement related to patents, copy right, trade mark.

C EMPLOYABLE SKILLS (20 Periods)

8. Industrial Scenario Engineering Education and expectations of competences from an engineer by employer,Personality types, characteristic and features for a successful engineer. Professional Engineer desirable values and ethics and their development. Relation between engineering profession, society and environment.

9. Preparing for Employment

Searching for job/job hunting

- Resume Writing
- Interview technique in personal interview telephonic interview, panel interview, group interview, video conference. Effective Communication Listening
- Speaking
- Writing
- Presentation Technique/Seminar
- Group discussion

Managing Self: Managers body, mind, emotion and spirit

- Stress Management
- Conflict resolution

10. Creativity, Innovation and Intellectual property right, Concept and need in present time for an engineer, Basic rules, laws and norms to be adhered by engineers during their working .

INSTRUCTIONAL STRATEGY

Some of the topics may be taught using question/answer, assignment or seminar method. The teacher will discuss stories and case studies with students, which in turn will develop appropriate managerial and entrepreneurial qualities in the students. In addition, expert lecturers may also be arranged from outside experts and students may be taken to nearby industrial organisations on visit. Approach extracted reading and handouts may be provided.

RECOMMENDED BOOKS

- A Handbook of Entrepreneurship, Edited by BS Rathore and Dr JS Saini; Aapga Publications, Panchkula (Haryana)
- Entrepreneurship Development published by Tata McGraw Hill Publishing Company Ltd., New Delhi
- Entrepreneurship Development in India by CB Gupta and P Srinivasan; Sultan Chand and Sons, New Delhi

- Entrepreneurship Development - Small Business Enterprises by Poornima M Charantimath; Pearson Education, New Delhi
- Entrepreneurship : New Venture Creation by David H Holt; Prentice Hall of India Pvt. Ltd., New Delhi
- Handbook of Small Scale Industry by PM Bhandari
- Principles and Practice of Management by L M Prasad; Sultan Chand & Sons, New Delhi. Entrepreneurship by Alpana Trehan; Dream Tech. Press.
- Entrepreneurship by Manimali; Viz Tantra Publications.
- Patterns of Entrepreneurship by Kalpana; Wiley India Publications.

SUGGESTED DISTRIBUTION OF MARKS

Unit	Time Allotted (Periods)	Marks Allocation (%)
A	30	37
B	30	37
C	20	26
Total	**80**	**100**

5.4 TRANSDUCER & ANALYZERS

	L	T	P
Periods/ Weeks	5	- 1 –	4

Unit:- I **(10 Periods)**

Introduction: Definition of transducers

- Classification of Transducers:
- Primary and secondary, mechanical devices as primary detectors.
- Electrical transducer: Advantages, classification of electrical transducer, active and passive, analog and digital, electrical phenomena used in transducers.

Unit:- II **(20 Periods)**

Resistance, Variable Inductance & Capacitive transducers

Principle of variable resistance transducers.

- Potentiometers - Principle of working, construction, linearity and sensitivity, types, advantages and disadvantages of potentiometer, its applications. Strain gauges - Theory of strain gauges, gauge factor, types of strain gauges, material for strain gauges, temperature compensation in strain gauge, applications. Thermistors - Construction, characteristics and applications of Thermistors

Variable Inductance Type Transducers

- Principle ofvariable inductive transducers by variation of self inductance, mutual inductance and eddy current. Different types of transducers, working on above principles. L.V.D.T. : Construction, theory, linearity and sensitivity, advantages, disadvantages and uses.

Capacitive Transducers

- Principle of capacitive transducers, capacitive transducers using change in distance between plates, differential arrangement tbr improving sensitivity, capacitive transducers constant, application for capacitive transducers.

Unit:- III **(20 Periods)**

Optical Transducers & Piezo Electric Transducers

- Theory of photo emission, classification ofphoto electric devices, vacuum photo tube, gas photo tube, photo multiplier tube, photo conductive cell, photo diode, photo transistor and their applications.
- Theory of piezoelectric effect, mode of operation and properties of piezoelectric crystal, equivalent circuit of piezoelectric transducer and applications of piezo electric transducers.

Unit:- IV **(15 Periods)**

Viscosity Measurement, PH & Conductivity Analyzer

- Definition of viscosity, measurement ofviscosity by capillary type and rotational type, and rotational type.
- Definition and importance of PH value, buffer solution, reference and standard electrodes for PH measurement.

- Definition of conductivity, conductance, Sp-conductance and equivalent conductance-Altemating current conduction. Measurement of conductivity, conductivity cell, cell constant applications.

Unit:- V **(15 Periods)**

Spectrophotometry & Gas Analyzer

- Principle of Filter photometer, direct reading type and double beam spectrophotometer for visible infrared and ultraviolet regions, advantages of double beam spectrophotometer. Principle of colorimetry, photometry and use of various types of colorimeter photometers and flame photometers.
- Basic function of analyzer, types of analyzers, working principle and construction of gas analyzer.

LIST OF PRACTICALS

1. Study of strain gauge and measruement of strain for given sample.
2. Study of piezoelectric pressure transducer.
3. Study of RTD.
4. Study of Thermistor.
5. Study of LVDT.
6. Study of angular dispalcement using capacitive transducer.
7. Study of thermocouple.
8. To study and draw characteristics of LDR, Photo diode, Photo transistor.

RECOMMENDED BOOKS

- Mechanical and industrial measurements by RK Jain, Khanna Publishers, New Delhi.
- Modern Control Engineering by OGATA.
- Fundamentals of Instrumentaion by AE Fribance.
- Transducers by Peter Norton.
- Mechatronics by Bolton, Prentice Hall of India, New Delhi.
- Electronic Measurement and Instrumentation by AK Sawhney, Dhanpat Rai and Co, New Delhi.

Suggested Distribution of Marks

Unit	Time Allotted (Periods)	Marks Allocation %
I	10	10
II	20	25
III	20	25
IV	15	20
V	15	20
TOTAL	**80**	**100**