



UTTARAKHAND BOARD OF TECHNICAL EDUCATION
JOINT ENTRANCE EXAMINATION AND TRAINING, RESEARCH DEVELOPMENT CELL, DEHRADUN
STUDY AND EVALUATION SCHEME FOR DIPLOMA PROGRAMME

BRANCH NAME – ELECTRONICS ENGINEERING (SPECIALIZATION IN CONSUMER ELECTRONICS)

SEMESTER – V

Subject Code	Subject	L	T	P	T O T	EVALUATION SCHEME						Total Marks	Credit Point
						Internal		External					
						Theory	Practical	Theory		Practical			
						Max Marks	Max Marks	Max Marks	Hrs.	Max Marks	Hrs.		
095004	RF Communication	4	1	5	10	25	25	75	2.5	50	3.0	175	7
395001	Power Electronics	4	1	5	10	25	25	75	2.5	50	3.0	175	7
095002	Control and Instrumentation	4	1	5	10	25	25	75	2.5	50	3.0	175	7
095001	Entrepreneurship Management	4	-	-	4	50	-	75	2.5	-	-	125	3
395002	Major project -I	-	-	10	10	-	50	-	-	200	3.0	250	6
395052	Industrial Exposure	-	-	-	-	-	25	-	-	-	-	25	1
395053	Industrial Training	4 week				-	25	-	-	25	3.0	50	3
015054	General Proficiency#	-	-	4	4	-	25	-	-	-	-	25	1
TOTAL		16	3	29	48	125	200	300	-	375	-	1000	35

General Proficiency will comprise of various co-curricular activities like games, hobby clubs, seminars, declamation contests, extension lectures, NCC, NSS and cultural activities and discipline etc.

+ Industrial visit compulsory at minimum 2 Industries or Department.

Note: 1- Each period will be 50 minutes. 2- Each session will be of 16 weeks. 3- Effective teaching will be at least 12.5 weeks.

Branch Code - 39



**FIFTH SEMESTER
ELECTRONICS ENGINEERING
(SPECIALIZATION IN CONSUMER ELECTRONICS)**



Subject Code : 095004

L	T	P
4	1	5

RATIONALE

This subject provides knowledge about microwave devices, radar and satellite communication.

This subject provides exposure to microwave engineering, Radar systems and satellite communication. At the end of the course, student will be able to-

1. Know about the microwave frequencies and the waveguides used in communication.
2. Understand the operation and working of various microwave devices like klystron, TWT, magnetron, gun diode, IMPATT diode etc.
3. Demonstrate the knowledge of antennas in communication systems and discriminate between antennas on the basis of their electrical performance.
4. Analyze different radars; find applications and use of its supporting systems.
5. Explain the basis of Satellite Communication.

DETAILED CONTENTS**Unit:- I****(04 Periods)****INTRODUCTION**

- Introduction of Electromagnetic waves, their applications.
- Frequency spectrum.
- Types of wave propagation.

Unit:- II**(30 Periods)****MICROWAVE DEVICES**

- Limitation of Vacuum Tube at microwave frequency.
- Inter electrode capacitance & its effect.
- Lead Inductance and Transit time.

Construction, characteristics, operating principles and typical applications of the following devices (No mathematical treatment):

- Multi cavity klystron
- Reflex klystron
- Multi-cavity magnetron
- Traveling wave tube
- Gunn diode
- Impatt diode
- Tunnel diode

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

- Wave guides: Rectangular and circular wave guides and their applications.
- Propagation Mode of wave guide.
- Propagation constant of a rectangular wave guide.
- Cut off wavelength.
- Guide wavelength and their relationship with free space wavelength (no mathematical derivation).

Unit:- IV**(16 Periods)****MICROWAVE COMPONENTS & ANTENNA**

- Brief introduction of S parameter.
- Tees, Bends, matched termination, twists, detector mount, directional coupler, fixed and variable attenuator, isolator, circulator and duplexer.
- Horn, Dish Antenna, Patch antenna.

Unit:- V**(10 Periods)****RADAR**

- Introduction to radar, radar range equation (no derivation), RADAR applications.
- Block diagram and operating principles of Basic pulse radar.
- Block diagram and operating principles of CW (Doppler) and FMCW radars.
- Block diagram and operating principles of MTI radar.

Unit :- VI**(10 Period)****SATELLITE COMMUNICATION**

- Satellite Communication
- Basic Idea of passive and active satellite. Meaning of the term orbit, apogee, perigee.
- Geo Stationary satellite. Block diagram and explanation of a satellite communication link, Link losses.
- Transponders, VSAT and its features.

LIST OF PRACTICALS

1. To identify the microwave components – Directional Coupler, Tees, Circulator, Isolator, Gunn Diode, Slotted section, Frequency meter, attenuator, Detector mount.
2. To measure electronics and mechanical tuning range of a reflex klystron.

3. To measure VSWR of a given load.
4. To measure the Klystron frequency by slotted section method.
5. To measure the directivity and coupling of a directional coupler.
6. To verify the properties of tee.

NOTE: Visit to the appropriate sites of microwave industries, radar installations and communication stations should be made to understand their working. A comprehensive report must be prepared by all the students on these visits, especially indicating the dates and locations of their visits.

INSTRUCTIONAL STRATEGY

Microwave and radar is a very important subject and requires both theoretical as well as practical exposure. The teaching should be supplemented by visits to the microwave stations and using suitable audio visual aids.

RECOMMENDED BOOKS

1. Microwave and Radar Engg by A.K.Gautam, Katson Publication.
2. Microwave Devices and Components by Samuel Y. Liao, Prentice Hall of India, New Delhi
3. Electronics Communication by Roddy and Coolen
4. Electronics Communication System by KS Jamwal, Dhanpat Rai and Sons, Delhi
5. Microwave Engineering by Das, Tata McGraw Hill Education Pvt Ltd, New Delhi
6. Satellite communications by D. C. Aggarwal, Khanna Publication.
7. Satellite communication by Prat & Boston

SUGGESTED DISTRIBUTION OF MARKS

Topic	Time Allotted (L+T)	Marks Allotted (%)
1	4	5
2	30	35
3	10	15
4	16	20
5	10	12
6	10	13
Total	80	100

Subject Code : 395001

L	T	P
4	1	5

RATIONALE

Nowadays all the modern electrical machines are controlled by power electronics devices and methods. The function of power electronics is to process and control the electric power by supplying voltage and current in a form that is optimally suited to the load. With the advancement of power electronics devices the conventional control and relays are now replaced by electronic control and relays, employing solid state power semiconductor devices. This course is therefore designed so that the diploma engineers will be able to use power electronics for controlling AC and DC power in various applications. Essential theoretical and practical knowledge to use power electronics to control electrical machines in commercial and industrial sector will be achieved by this course.

DETAILED CONTENTS**Unit: - I****(24 Periods)****Thyristor & Other Power Electronics Devices**

- Principle of Operating of an SCR
- Two-Transistor Analogy of SCR
- DIAC
- TRIAC
- Basic Triggering circuits for Thyristors.
- Rectifier Circuits using SCR
- Construction and Working of IGBT.
- Construction and working of UJT and its working as Relaxation Oscillator.

Unit: - II**(16 Periods)****Power Electronics Circuits**

- SCR Commutation Circuits (Class A and B only)
- Introduction to Series and Parallel Inverters
- Choppers: Step up, Step down, Morgan's

Cycloconverter

- Single pulse width, Multiple pulse width and Sinusoidal pulse width modulation
- Operating principle of cycloconverter.
- Types of cycloconverter: Single phase to single phase cycloconverter, Single phase to bridge cycloconverter.

Unit-IV**(24 Periods)****Other Industrial Applications of Power Electronic Devices**

- Speed control of D.C. Motor using SCR chopper circuit.
- Speed control of universal motor.
- Different types of speed control methods for induction motor such as stator voltage control, frequency control, Power factor control method.
- Heating control, resistance welding, static circuit breaker and time delay circuits.

LIST OF PRACTICALS

1. Familiarization & testing of components- SCR, DIAC, TRIAC.
2. To plot the V-I characteristics of SCR.
3. To plot V-I characteristics of DIAC.
4. To plot and verify Characteristic of TRIAC.
5. Assembly and testing of Half-wave Gate-controlled Rectifier using One SCR
6. Assembly and testing of Single-phase Half-controlled Full-wave Rectifier using two SCRs and two Diodes

RECOMMENDED BOOKS

1. Industrial Electronics: S.K. Bhattacharya / S Chatterjee, Tata McGraw-Hill Publishing
2. Industrial Electronics for Technicians: J.A.Sam Wilson Joseph Rissi, Prompt Publications
3. Thyristors and its Application by Ramamurthy, East West New Delhi
4. Power Electronics by P.C. Sen, Tata McGraw-Hill Publishing, New Delhi

SUGGESTED DISTRIBUTION OF MARKS

Unit	Time Allotted (L+T)	Marks Allocation %
I	24	30
II	16	20
III	24	30
IV	16	20
TOTAL	80	100



Subject Code : 095002

L	T	P
4	1	5

RATIONALE

This subject aims to develop appreciation and understanding of the use of variety of physical quantities, their measurement and their control. On completion of this course, student will be able to:

1. Explain the basic principles and importance of process control.
2. Explain the mathematical basis for the design of control systems.
3. Get a complete overview of strategies of process control.
4. Analyze the performance characteristics of each instrument.
5. Apply the complete knowledge of various electronics instruments/transducers to measure the physical quantities in the fields of science, engineering and technology.

DETAILED CONTENTS**Process Instrumentation****Unit:- I****(06 Periods)****Introduction**

- Functional block diagram of instrumentation system.
- Process Characteristics.
- Process Variables.

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

- Measurement of Pressure by
- Diaphragms
- Bourdon Tube
- Bellows

Unit:- III**(08 Periods)****Temperature Measurement**

- Temperature Measuring Devices Like
- Pyrometer
- Thermistor

Unit:- IV**(12 Periods)****Angular Velocity Measurement**

- Measurement of Angular Velocity.
- DC & AC Tachometer Generators .
- Digital Tachometer.

Unit:- V**(10 Periods)****Flow Measurement**

- Types of Flow
- Flow Coefficient
- Reynolds No
- Venturi Meter
- Orifice Plate

Unit:- VI**(08 Periods)****Humidity and Level Measurement**

- Hygrometer method for humidity measurement.
- Electrical contact type liquid level indicators.

(B) Control System**Unit:- VII****(04 Periods)****Introduction**

- Block diagram of a general open and closed loop process.

Unit:- VIII**(10 Periods)****Control System Components**

- Brief description and working of a potentiometer.
- Differential transformer, servo motors.

Unit:- IX**Types of Control Techniques****(12 Periods)**

- **Brief Idea and Introduction of following control techniques**
- ON-OFF Control
- Proportional
- Integral
- Derivative
- PI
- PD
- PID

LIST OF PRACTICALS

- Experiment of Pressure Measurement
- Experiment of Temperature Measurement
- Experiment of Flow Measurement
- Experiment of Humidity Measurement
- Measurement of Level
- Measurement of angular velocity
- ON/OFF Controller

RECOMMENDED BOOKS

- Instrumentation Devices & Systems by S. Ranjan; Tata McGraw-Hill Publishing
- Electrical & Elex Measurement by A. K. Sawhney; Danpat Rai & Co.
- Industrial Instrumentation by Tyson
- Process Instrumentation by Donald P. Echman
- Process Control by Donald P. Echman
- Instrumentation by Cirk & Rimboi
- Instrumentation Measurement and Analysis by B. C. Nakra and K K Chaudhary; MC Graw Hill Publication
- Electronics Instrumentation by H.S. Kalsi; McGraw Hill Publication
- Medical Instruments by S. Ananthi; New Age International (P) Limited Publisher
- Control system Nagrathan & Gopal

SUGGESTED DISTRIBUTION OF MARKS

Unit	Time Allotted (L+T)	Marks Allocation %
I	06	07
II	10	12
III	08	10
IV	12	16
V	10	12
VI	08	10
VII	04	05
VIII	10	12
IX	12	16
TOTAL	80	100

Subject Code : 095001

L	T	P
4	-	-

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**SECTION – A ENTREPRENEURSHIP****1. Introduction****(15 periods)**

- 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**(15 periods)**

- Scanning of business environment.
- Salient features of National and State industrial policies and resultant business opportunities.
- Assessment of demand and supply in potential areas of growth.
- Identifying business opportunity.
- Considerations in product selection.

3. Project report Preparation**(6 periods)**

- Preliminary project report.
- Detailed project report including technical, economic and market feasibility.
- Common errors in project report preparations.

SECTION –B MANAGEMENT

4. Introduction to Management

(8 periods)

- Definitions and importance of management.
- Functions of management: Importance and Process of planning, organising, staffing, directing and controlling.
- Principles of management (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

(05 periods)

- a) Leadership
 - Definition and Need.
 - Qualities and functions of a leader.
 - Manager Vs leader.
- b) Motivation
 - Definitions.
 - Factors affecting motivation.

6. Management Scope in Different Areas

(10 periods)

- a) Human Resource Management:
 - Introduction and objective.
 - Introduction to Man power planning, recruitment and selection.
- b) Material and Store Management
 - Introduction, functions, and objectives.
- c) Marketing and sales
 - Introduction, importance, and its functions.
 - Physical distribution.
- d) Financial Management
 - Introductions, importance and its functions.

7. Miscellaneous Topics

(05 periods)

- a) Customer Relation Management (CRM)
 - Definition and need.
 - Types of CRM.

b) Intellectual Property Right (IPR)

- Introduction, definition and its importance.
- Infringement related to patents, copy right, trade mark.

Note: In addition, different activities like conduct of entrepreneurship awareness camp extension lecturers by outside experts, interactions sessions with entrepreneurs and industrial visits may also be organised.

RECOMMENDED BOOKS

1. A Handbook of Entrepreneurship, Edited by BS Rathore and Dr JS Saini; Aapga Publications, Panchkula (Haryana)
2. Entrepreneurship Development published by Tata McGraw Hill Publishing Company Ltd., New Delhi
3. Entrepreneurship Development in India by CB Gupta and P Srinivasan; Sultan Chand and Sons, New Delhi
4. Entrepreneurship Development - Small Business Enterprises by Poornima M Charantimath; Pearson Education, New Delhi
5. Entrepreneurship : New Venture Creation by David H Holt; Prentice Hall of India Pvt. Ltd., New Delhi
6. Handbook of Small Scale Industry by PM Bhandari
7. Principles and Practice of Management by L M Prasad; Sultan Chand & Sons, New Delhi.

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Pds)	Marks Allotted (%)
1	15	23
2	15	23
3	6	10
4	8	12
5	5	8
6	10	16
7	5	8
Total	64	100

L	T	P
-	-	10

DETAILED CONTENTS**Steps To make a Project**

- 1) Study of different Projects.
- 2) Selection of Project.
- 3) Search component data sheet.
- 3) Component Availability of project and market search.
- 4) Identification and Testing of component.
- 5) PCB Design. PCB Layout, develop an image of PCB layout, pasting of PCB layout image on PCB, Etching, Drilling, Mounting of components.

1. Laboratory Experiences (12 period)

- Identification of components.
- Understand the use of data book for transistors, Diodes, SCR and Triac.
- Understand the use of data book for TTL and CMOS ICs.
- Testing of different components using multi-meter.

2. Designing the PCB layout using computer software (24 period)

- Understanding the use of printed circuit board in electronics.
- Use of software --Work bench and PSPICE.

3. Soldering the PCB (10 period)

- Soldering practice for PCB.
- Soldering the PCB design in layout topic.
- De-soldering practice.

4. Testing of PCB (10 period)

- After soldering the component on given PCB, testing the continuity and input / output result of given circuit.

5. Fault finding of electronic circuit (12 period)

- Basic idea of fault finding procedure.

6. This Major Project-I Work is the part of major project in sixth semester. So the student have to complete one third portion of the major project (predecessor of Major Project) . Student must present seminar and submit Synopsis related to their work.

(60 period)

RECOMMENDED BOOKS

1. Data hand books for transistors Diodes & SCR
2. Data hand book for TTL and CMOS ICs
3. PCB designing Books

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Periods)	Marks Allotted(%)
1	12	10
2	24	18
3	10	9
4	10	9
5	12	10
6	60	44
Total	128	100



LEARNING OUT COMES AND MEANS OF ASSESSMENT

BRANCH NAME: & ENGINEERING (SPECILIZATION IN CONSUMER ELECTRONICS) (39)

SEMESTER – V

S.NO.	Title of Subject/Unit	Learning Outcomes	Means of Assessment
1	RF Communication	<p>The students should be able to:</p> <ul style="list-style-type: none"> • understand electromagnetic waves and wave propagation. • identify and demonstrate operating principles and typical applications of various microwave devices. • understand the various types and propagation modes of wave guides • describe the various types of microwave components and antennas. • know the basic principle of radar and interpret the various types of RADAR. • measure VSWR of a given load • describe the working principles of different types of satellite. 	<ul style="list-style-type: none"> • Assignments and quiz/class tests, mid-semester and end-semester written tests. • Actual laboratory and practical work. • Assembly and disassembly exercises. • Presentation and Viva-Voce.
2	Power Electronics	<p>The students will be able to:</p> <ul style="list-style-type: none"> • understand the working and operating principles of thyristors and other power electronic devices. • maintain SCR Protection and Commutating Circuits. • describe cycloconverter circuits. • analyze and implement power electronic circuits used in various domestic and industrial applications. 	<ul style="list-style-type: none"> • Assignments and quiz/class tests, mid-semester and end-semester written tests. • Ability to implement different thyristor-based circuits. • Laboratory and practical work. • Seminars and Viva-Voce.
3	Control and Instrumentation	<p>The students will be able to:</p> <ul style="list-style-type: none"> • understand different methods of measurement of pressure, temperature, angular velocity, humidity, flow and level. • have a brief idea of various control techniques. 	<ul style="list-style-type: none"> • Assignments and quiz/class tests, mid-semester and end-semester written tests. • Actual laboratory and practical work. • Assembly and disassembly exercises. • Presentation and Viva-Voce.

4	Entrepreneurship Management	<ul style="list-style-type: none"> • The students will be able to: • Know about various schemes of assistance by entrepreneurial support agencies • Conduct market survey • Prepare project report • Explain the principles of management including its functions in an organisation. • Have insight into different types of organizations and their structures. • Inculcate leadership qualities to motivate self and others. • Manage human resources at the shop-floor • Maintain and be a part of healthy work culture in an organisation. • Use marketing skills for the benefit of the organization. • Maintain books of accounts and take financial decisions. • Undertake store management. 	<ul style="list-style-type: none"> • Assignments and quiz/class tests, mid-semester and end-semester written tests. • Group discussions.
5	Major Project-I	<p>The student should be able to:</p> <ul style="list-style-type: none"> • Search different projects based on real-life problems. • Select a proper project. • Search component and data sheet. • Design PCB with use of different softwares. 	<p>Based on:</p> <ul style="list-style-type: none"> • Selection of project. • Formation of PCB using minimum covered area. • Proper component mounting on PCB.