

OPTICAL FIBRE COMMUNICATION

Subject Code : 096003

L	T	P
4	-	4

RATIONALE

Progressing from communication over copper wire to today's fibre optic communication, we have increased our ability to transmit more information, more quickly and over longer distances. This has expanded our boundaries and is finding a good slot in communication system. Optical fibers has replaced existing transmission media due to its advantages. As a result the technicians are supposed to have knowledge of optical communication. This subject will provide basic concepts and requisite knowledge and skill required.

DETAILED CONTENTS

Unit:- I INTRODUCTION

(10 Periods)

- Basic block diagram of Optical fiber communication.
- Its advantages & applications.
- Principle of light penetration, Total Internal Reflection, critical angle, Numerical aperture.

Unit:- II OPTICAL FIBRES & CABLES

(12 Periods)

- Constructional details of various optical fibers, multimode and single mode fibers, step index and graded index fibers, acceptance angle.

Unit:- III LOSSES IN OPTICAL FIBRE CABLES

(12 Periods)

- Absorption Losses: Scattering Losses, Radiation losses, Connector losses, Bending losses.
- Dispersion: Types and its effect on data rate.

Unit:- IV OPTICAL SOURCES & DETECTOR

(15 Periods)

- Principle of operation of LED
- Brief introduction of Laser diode (Semiconductor laser).
- Characteristics of photo detectors used in optical communication; PIN diode and Avalanche photo diode (APD).

MOBILE COMMUNICATION

Subject Code : 096002

L	T	P
4	-	3

RATIONALE

The wireless/mobile communication technology though complex but is spreading at a very fast rate. People use more mobile phones in comparison to land line phones. It is expected that with in very short period almost everybody will be using mobile communication. Technology is also changing very fast. Therefore, the students should know the functioning of wireless/mobile system/equipment to keep themselves abreast of this latest application of communication.

DETAILED CONTENTS

Unit:- I WIRELESS COMMUNICATION

(08 Periods)

- Basics of wireless communication
- Advantages of wireless communication
- Example of wireless communication:
- Cellular Telephone System

Unit:- II CELLULAR FUNDAMENTALS

(20 Periods)

- Cell area
- Frequency Reuse
- Co-channel Interference
- Adjacent channel Interference
- Power Control for Interference reduction
- Improving coverage and capacity in cellular system
- Cell Splitting. b) Sectoring c) Repeater for Range Extension.

Unit:- IV

(20 Periods)

Multiple Access Techniques for Wireless Communication

- Introduction to Multiple Access.

- Frequency Division Multiple Access (FDMA)
- Time Division Multiple Access (TDMA)
- Code Division Multiple Access (CDMA)
- Introduction to Wireless local loop (WLL) technologies.

- (a) Satellite- Based System
- (b) Cellular-- Based System
- (c) Micro Cellular-- Based System
- (d) Fixed Wireless Access Systems

Unit- IV

(16 Periods)

DEVELOPMENT OF CELLULAR COMMUNICATION SYSTEM

- GSM Architecture & it's features.
- Salient features of GPS
- Introduction to Bluetooth, Wi-Fi & Radio Frequency identification (RFID)
- Features of LTE system

LIST OF PRACTICALS

1. To Study the features, specification and working of cellular Telephone system.
2. To observe waveforms at various stages of basic GSM trainer/demonstrator.
3. Fault finding on a basic GSM trainer/demonstrator.
4. Visit of BTS in order to get familiarize with the process.
5. Visit of nearby Mobile Switching Centre with a live demonstration of Frequency Reuse/Channel Allocation methods. (Mandatory)

RECOMMENDED BOOKS

1. Wireless Communications, Principles and Practice, by Theodore S. Rappaport.
2. Wireless Communications by Singal, Tata McGraw Hill Education Pvt Ltd, New Delhi
3. Wireless Communications by Misra, Tata McGraw Hill Education Pvt Ltd, New Delhi
4. Introduction to Wireless and Mobile Systems, by Dharma Prakash Agarwal, Qing-An zeng.
5. Wireless Communications and Networking, by William Stallings.

6. Satellite communication by D C Agarwal Khanna Pub. New Delhi.
7. Electronic Communication by George Kennedy, PHI New Delhi.

SUGGESTED DISTRIBUTION OF MARKS

Unit	Time Allotted (Periods)	Marks Allocation %
I	08	11
II	20	23
III	20	23
IV	20	23
V	16	20
TOTAL	64	100

MICROCONTROLLER & EMBEDDED SYSTEM

Subject Code : 096001

RATIONALE

This subject aims to expose students to the embedded systems besides giving them adequate knowledge of microcontrollers.

The study of microcontrollers in terms of architecture, software and interfacing techniques leads to the understanding of working of microcontrollers and applications of microcontroller in electronic industries. Microcontroller is the heart of the programmable devices. Embedded systems and Microcontrollers have assumed a great significance in the electronic and consumer goods industry and are very vital field. students of electronics and related engineering branches often use microcontroller to introduce programmable control in their projects, automation and fault finding in industry. The subject aims expose students to the embedded systems and besides giving them adequate knowledge of micro controllers.

L.T.P	4
T.P	1

DETAILED CONTENTS

Unit:- I

MICROCONTROLLER SERIES (MCS) - 51

(15 Periods)

- Introduction & features of microcontroller,
- Pin details
- I/O Port structure
- Memory Organization
- External Memory

Unit:- II

INSTRUCTION SET

(15 Periods)

- Different instruction groups
- Addressing Modes
- Instruction types

Unit:- III

Special Function Registers (SFRS)

(15 Periods)

- Timer operation
- Serial Port operation
- Interrupts

Unit:- IV

ASSEMBLER DIRECTIVES & INTERFACING

(8 Periods)

- Different types of Assembler directives
- Interfacing of Switches and 7-segment display.

Unit:- V

EMBEDDED SYSTEM

(11 Periods)

- Introduction, Embedded design concept.
- AVR: ATMEGA 16
- Pin description & features.
- Memory structure
- Architecture
- Interfacing examples of AVR board: LED, 7-segment, LDR, Stepper motor, IR module, Temperature sensor

LIST OF PRACTICALS

1. Familiarization of Micro Controllers (8051) kit
2. Write ALP for two 8 bit Addition.
3. Write ALP for two 8 bit Subtraction.
4. Write ALP for finding the greatest number out of 10 nos.
5. Write ALP for finding the smallest number out of 10 nos.
6. Write ALP for Ascending and Descending order sorting of 10 numbers.
7. Interfacing of switch with 8051.
8. Study of interfacing LED, 7-segment, LDR, Stepper motor, IR module, Temperature sensor on microcontroller board.

RECOMMENDED BOOKS

1. Mazidi and Mazidi: The 8051 Microcontroller and Embedded Systems, Pearson education.
2. Ayala Kenneth: The 8051 microcontroller, Third Edition, Cengage Learning
3. A. V. Deshmukh: Microcontroller (Theory and Application), TMH.
4. Raj Kamal: Embedded Systems- Architecture, Programming and Design, TMH, New Delhi.

5. V. Udayashankara and M.S. Mallikarjunaswamy: 8051 Microcontroller, New Delhi.

6. The AVR microcontroller & embedded system using Assembly & C by Mazidi, Naimi: Pearson Education India

SUGGESTED DISTRIBUTION OF MARKS

Unit	Time Allotted (Periods)	Marks Allocation %
I	15	25
II	15	25
III	15	25
IV	08	10
V	11	15
TOTAL	64	100

PLC & ITS APPLICATION

Subject Code : 096004

L	T	P
4	.	4

RATIONAL

This subject deals with various instruments, their construction and working which control the various parameters and operations in any industry.

This subject deals with the various instruments, their construction and working which control the various parameters and operations in any industry. A diploma holder in the field of electronics employed for maintenance of electronic equipment/gadgets is required to diagnose faults, rectify them and test the total system for good performance. Thus there is a need of introducing diploma holders to the basics of instrumentation. In industry, many manufacturing processes demand a sequence of operation, which are to be performed repetitively. Early automation systems were mechanical in design, timing and sequencing being effected by gears and cams. Slowly these design concepts were replaced by electrical drives which were controlled by relays and now by programmable logic controllers (PLCs). A PLC is a solid state device, designed to operate in noisy industrial environments and can perform all logic functions. PLCs are widely used in all industries for efficient control operations. A diploma holder in industry is called upon to design, modify and troubleshoot such control circuits. Looking to the industrial applications of PLCs in the modern industry, this subject finds its usefulness in the present curriculum.

DETAILED CONTENTS

Unit-I

PLC (Programmable Logic Controller)

(15 Periods)

- Introduction
- Advantages of PLC control Panel
- Architecture of PLC
- Functions of various blocks that make PLC
- Working Principle of PLC
- Memory Types
- Different types of Input/Output circuits
- Concept of inputs & outputs : Concept of Digital inputs & outputs, Concept of Analog inputs & outputs.
- Concept of PLC scan cycle
- Concept of sink & source input/output card

Unit -2

Instructions for Programming in PLC

- Basic Instructions – NO & NC contacts
- User & bit functions
- Input / Output
- Compare Instructions
- Compute /Math Instructions
- Move & Logical Instructions

(20 Periods)

Unit-3

Programming with PLC

- Programming methods
- Programming devices
- Boolean gates – Symbols & truth tables
- Ladder Logic
- Concept of latching & unlatching
- Timers (on-delay timer, off-delay timer, retentive timer, resetting of timer)
- Counters (Counter instructions like up-counter, down counter, resetting of counters).
- Sequencers, output sequencers, input sequencers time driven and even driven sequencers masking.

(20 Periods)

Unit -4

Applications of PLCs

- Car parking
- Doorbell operation
- Traffic light control
- Microwave Oven
- Washing machine

(9 Periods)

LIST OF PRACTICALS

1. Familiarization with the working of PLC
2. Familiarization with the functions of different modules of PLC
3. Steps to enter, Load & Execute the program in PLC.
4. Practice of Basic Logic operations: AND, OR, NOT etc. on PLC Trainer

- Write, enter & execute programs using a computer having the following functions: Timer, Counter & sequencer.
5. Simple program based on basic instructions.
 6. Simple program based on gates.
 7. Simple program based on gates.

RECOMMENDED BOOKS

- Programmable Logic controller by Job Dan oter, PHI
1. Introduction to PLC by Grey Dunning, Mcgraw Hill Pub.
 2. Introduction to PLC & their applications by Rajesh Kumar, NIT-TR Chandigarh
 3. Module on PLC & their applications by Rajesh Kumar, NIT-TR Chandigarh

Suggested Distribution of Marks

Unit	Time Allotted (Periods)	Marks Allocation %
I	15	23
II	20	32
III	20	32
IV	09	13
TOTAL	64	100

MAJOR PROJECT - II

Subject Code : 096005

Each teacher is expected to supervise and guide 5-6 students. Some of the project activities are given below:

- Projects related to designing small electronic equipment / instruments.
- Projects related to increasing productivity in electronic manufacturing area.
- Projects related to quality assurance.
- Projects connected with repair and maintenance of plant and equipment.
- Projects related to design of PCBs.
- Projects related to suggesting substitutes of electronics components being used.
- Projects related to design of small oscillators and amplifier circuits.
- Projects related to design, fabrication, testing and application of simple digital circuits and components.
- Projects related to microprocessor/microcontroller based circuits/ instruments.

A. SOME OF THE PROJECTS BASED ON ABOVE AREAS ARE LISTED BELOW FOR THE BENEFIT OF STUDENTS

- Microprocessor/Microcontroller based rolling display/bell and calendar.
- Microprocessor based stepper motor control.
- Speed control of DC Machines by Microprocessor/Microcontrollers.
- Temperature monitoring using Microprocessor/Microcontroller based system.
- Microprocessor/Microcontroller based liquid level indicator and control.
- Fabrication and assembling of digital clock.
- Fabrication of PCB circuits using ORCAD/EAGLE Software.
- Fabrication of ON line/OFF line UPS of different ratings and inverters.
- Design, fabrication and testing of different types of experimental boards.
- Repair of oscilloscope, function generator.
- Design and developing web sites of organizations.
- Installation of computer network (LANs).
- Microprocessor/Microcontroller based solar tracking system.
- GSM based car or home security system.
- Bank token display using microcontroller.
- Printer sharing unit.
- Microprocessor/Microcontroller Based A/D converter.

- Microprocessor/Microcontroller Based D/A converter.
- Simulation of half wave and full wave rectifiers using Simulation Software.
- Simulation of class A, Class B, Class AB and Class C amplifiers.
- Simulation of different wave forms like sine, square, triangular waves etc.
- Simulation of vehicle tracking system.
- GFS based Bit Error Rate (BER) of various modulation techniques.
- Calculate Bit Error Rate (BER) of various modulation techniques.
- Design ALU using CPLD/FPGA.
- Design Display System using CPLD/FPGA.
- Design Electronic Weighing Machines.

B. FABRICATION AND TESTING (AT LEAST TWO OF THE FOLLOWING):

- Voltage Stabilizer for Refrigerator, Air-Conditioner.
- Emergency Light using SCR.
- Power amplifier.
- Low cost intercom for home.
- Analog computer.
- Regulated power supply (+12V and +6V) using 7812, 7912 and 7806, 7906.
- Automatic battery charger using SCR.
- Automatic battery charger using SCR.
- Burglar Alarm.
- Automatic street light/dressing table light.
- Inverter circuit 500 watt.
- Microprocessor/Microcontroller Based A/D converter.
- Microprocessor/Microcontroller Based D/A converter.
- Simulation of half wave and full wave rectifiers using Simulation Software.
- Simulation of class A, Class B, Class AB and Class C amplifiers.
- Inverter/Emergency light circuit using power transistors.
- SCR based automatic battery charger.
- SCR operated illumination controller.
- SCR operated automatic water level controller.
- SCR based speed controller for DC shunt motor.
- Three phase full wave rectifier using power diodes.
- Timer circuit using 555-IC.
- SCR controlled rectifier circuit.
- Speed control circuit of DC shunt motor using SCR.
- Inverting and non-inverting amplifiers using OP AMP (741).
- Comparator circuits using OP AMP (741).

NOTE: The list is only the guideline for selecting a project, however a student is free to select any other related project of his choice independently under guidance of his teacher

A suggestive criterion for assessing student performance by the external (person from industry) and internal (teacher) examiner is given in table below:

Sr. No.	Performance criteria	Max. marks	Rating Scale			
			Excellent	Very Good	Good	Satisfactory
1.	Selection of project assignment	10	10	8	6	4
2.	Planning and execution of considerations	10	10	8	6	4
3.	Quality of performance	20	20	16	12	8
4.	Providing solution of the problems or production of final product	20	20	16	12	8
5.	Sense of responsibility	10	10	8	6	4
6.	Self expression/communication skills	5	5	4	3	2
7.	Interpersonal skills/human relations	5	5	4	3	2
8.	Report writing skills	10	10	8	6	4
9.	Viva voce	10	10	8	6	4
Total marks		100	100	80	60	40

The overall grading of the practical training shall be made as per following table in order to qualify for the diploma, students must get "Overall Good grade" failing which the students may be given one more chance to improve and re-evaluate before being disqualified and declared "not eligible to receive diploma". It is also important to note that the students must get more than six "goods" or above "good" grade in different performance criteria items in order to get "Overall Good" grade.

Range of maximum marks Overall grade

- i) More than 80 Excellent
- ii) 79 > 65 Very good
- iii) 64 > 50 Good
- iv) 49 > 40 Fair
- v) Less than 40 Poor Important

Notes

1. This criteria must be followed by the internal and external examiner and they should see the daily, weekly and monthly reports while awarding marks as per the above criteria.

The criteria for evaluation of the students have been worked out for 200 maximum marks. The internal and external examiners will evaluate students separately and give marks as per the study and evaluation scheme of examination.

The external examiner, preferably, a person from industry/organization, who has been associated with the project-oriented professional training of the students, should evaluate the students performance as per the above criteria.

It is also proposed that two students or two projects which are rated best be given merit certificate at the time of annual day of the institute. It would be better if specific nearby industries are approached for instituting such awards.

The teachers are free to evolve other criteria of assessment, depending upon the type of project work. It is proposed that the institute may organize an annual exhibition of the project work done by the students and invite leading Industrial organisations in such an exhibition.

EMPLOYABILITY SKILLS

Subject Code : 016055

RATIONALE

Diploma holders are required to not only possess subject related knowledge but also soft skills to get good jobs and to rise steadily at their workplace. This subject is included to develop employability skills amongst the students.

DETAILED CONTENTS

Unit I:

- Technical Education & Industrial scenario.
- Competency required of an engineer.

(06 periods)

Unit II:

- Professional Engineer desirable values and ethics and their development.
- Relation between engineering profession, society and environment.

(06 periods)

Unit III:

Effective Communication

- Reading & Active Listening Skills
- Speaking
- Writing
- Presentation Technique/Seminar
- Group discussion

(12 periods)

Unit IV:

Managing project

- Leadership
- Motivation
- Time management
- Resource management
- Interpersonal relationship

(12 periods)

Unit V:

Preparing for Employment

- Searching for job/job hunting

(10 periods)

L	T
4	1

resume & CV Writing

- Interview technique in personal interview telephonic interview, panel
- Interview, group interview, video conferencing
- Interview, group interview, video conferencing

(08 periods)

Unit VI:

Self Management

- Self awareness
- Stress Management
- Conflict resolution

(06 periods)

Unit VII:

- Creativity, Innovation and Intellectual property right
- Concept and need in present time for an engineer

(04 periods)

Unit VIII:

Rules & Ethics

- Basic rules, laws and norms to be adhered by engineers during their working

LIST OF PRACTICES

- Steps how to effectively write different types of Letters.
- Steps to make a Presentation in Power Point.
- Steps to make a Resume more effective.
- Steps to conduct Telephonic/On-line Interview (Through skype/Google Hangout).
- Study of Different Techniques of Stress Management.
- Study of Rules & Ethical practices to be followed at Workplace.

RECOMMENDED BOOKS

- Employability skills by Kapil Dev, Vishnu P. Singh Asian Pub. New Delhi
- Employability skills for Diploma students by Dr. S.K. Singh, Vayu Education, New Delhi

SUGGESTED DISTRIBUTION OF MARKS

Unit No.	Time Allotted (Periods)	Marks Allotted(%)
1	06	10
2	06	10
3	12	18
4	12	18
5	10	16
6	08	12
7	06	10
8	04	6
Total	64	100

