

6.1 OPTICAL FIBER COMMUNICATION

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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

1. Introduction (14 hrs)
Historical perspective, basic communication systems, optical frequency range, advantages of optical fibre communication, application of fibre optic communication
Electromagnetic spectrum used, Advantages and disadvantages of optical communication.
Principle of light penetration, reflection, critical angle.
2. Optical Fibers and Cables (10 hrs)
Fiber types construction, multimedia and monomode fibers, step index and graded index fibers, acceptance angle and acceptance types of optical fiber cables.
3. Losses in optical fiber cable: (10 hrs)
 - a) Absorption Losses, Scattering Losses, Radiation losses, Compelling losses, Bending loses.
 - b) Dispersion, Material dispersion, wave guide dispersion, modal dispersion total dispersion and bit rate.
4. Light Sources and Detectors (12 hrs)
 - a) Characteristics of light source used in optical communication, principle of operation of LED, different type of LED structures used and their brief description, LED driving circuitry, Injection Laser diode, principle of operation, different injection laser diodes, comparison of LED and ILD, non semiconductor laser.

b) Characteristics of photo detectors used in optical communication; PIN diode and avalanche photo diode (APD), their brief description.

5. Connectors, Splicing and coupling (06 hrs)

Fiber alignment and joint losses, splicing, types of splices, types of connectors used, couplers, three and four port coupler, star coupler, fiber optic switch.

6. Optical Fiber System (12 hrs)

Optical transmitter circuit, optical receiver circuit, optical power budgeting, multiplexing methods used. Modulation methods used.

LIST OF PRACTICALS

1. Setting up of fiber analog link
2. Setting up to optic digital link
3. Measurement of various losses in optical fibers
4. To observe and measure the splice or connector loss
5. To measure and calculate numerical aperture of optical fiber
6. To observe characteristics of optical source
7. To observe characteristics of optical detector
8. To observe the radiation pattern of LED
9. To Connectorise a fiber with connector at both ends
10. Introduction to various components and tools used in optical fiber communication

RECOMMENDED BOOKS

1. Optical fiber Communication by John M Senior, Prentice Hall of India, New Delhi
2. Optical fiber Communication by J. Gower, Prentice Hall of India, New Delhi
3. Optical fiber Communication by ' Gerd Keiser, McGraw Hill International Editions
4. Optical Communications – Components and Systems by JH Franz and VK Jain, Narosa Publishing House, New Delhi
5. Optical fiber Communication Systems by GP Agrawal, John Wiley & Sons, New Delhi
6. Optical fiber Communication and its Applications by S C Gupta, Prentice Hall of India, New Delhi

SUGGESTED DISTRIBUTION OF MARKS FOR FACILITATING THE PAPER SETTER

Topic No.	Topic	Time Allotted (Hrs)	Marks Allocation
1.	Introduction	14	25
2.	Optical Fibers and Cables	10	10
3.	Losses in optical fiber cable	10	15
4.	Light sources and Detectors	12	20
5.	Connectors, Splicing and coupling	06	10
6.	Optical Fiber System	12	20
Total		64	100

6.2 MOBILE COMMUNICATION

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RATIONALE

The Wireless /mobile communication is spreading at a very fast rate . It is expected that with in short perod nearly every body is using mobile communication .Hence students should know the functioning of wireless /mobile system/ equipemnt to keep themselves abreast of this latest application of communication.

DETAILED CONTENTS

1. Wireless communication (20 hrs)
 - 1.1 Basics
 - 1.2 Advantages Of wireless communication
 - 1.3 Electromagnetic Waves
 - 1.4 Frequency Spectrum used
 - 1.5 Propagation considerations
 - 1.5.1 Range
 - 1.5.2 Atmospheric Effect
 - 1.5.3 Geographic Effect
 - 1.5.4 Fading
 - 1.5.5 Doppler Effect
2. Mobile communication (12 hrs)
 - 2..1 Evolution of Mobile Radio Communication
 - 2..2 Mobile Radio System around the world
 - 2.3 Examples of wireless communication system
 - 2.3.1 Paging system
 - 2.3.2 Cordless Telephone System
 - 2.3.3 Cellular telephone system

- 2.4 Comparison of Communication wireless communication system.
- 3. Cellular Concept: (12 hrs)
 - 3.1 Cell area
 - 3.2 Capacity of cell
 - 3.3 Frequency Response
 - 3.4 Co-channel Interference
 - 3.5 Addjacent channel Interference
 - 3.6 Power Control for reducing Interference
 - 3.7 Improving coverage and capacity in cellular system
 - 3.7.1 Cell Splitting
 - 3.7.2 Sectoring
 - 3.7.3 Repeater for Range extension
- 4. Multiple Access Techniques for wireless Communication (12 hrs)
 - 4.1 Introduction to Multiple Accesss
 - 4.2 Frequency Division Multiople Access(FDMA)
 - 4.3 Time Division multiple Access(TDMA)
 - 4.4 Code Division Multiple Access(CDMa)
 - 4.5 Spread Spectrum Multiple Access(SSMA)
 - 4.6 Channel loading
 - 4.7 Channel allocation Schemes
- 5. Mobile Communication Systems – Introduction of: (8 hrs)
 - 5.1 Advance Mobile Phone Systems(AMPS)

- 5.2 Operation of AMPS
- 5.3 Working of AMPS Phone System
- 5.4 Global Systems for Mobile Communication(GSM)
- 5.5 GPRS, GPS, Elable positioning systems

RECOMMENDED BOOKS

1. Wireless Communications (Priciples and Practice), by Theodore S.Rappaport.
2. Introdoction to Wireless and Mobile Systems, by Dharma Prakash Agarwal, Qing-An zeng.
3. Wireless Communications and Networking, by William Stallings.
4. Mobile and Personal Communication Systems and Services, by Raj Pandya,Prentice Hall of India, New Delhi

SUGGESTED DISTRIBUTION OF MARKS FOR FACILITATING THE PAPER SETTER

Topic No.	Topic	Time Allotted (Hrs)	Marks Allocation
1.	Wireless Communication	20	25
2.	Mobile communication	12	20
3.	Cellular concept	12	20
4.	Multiple Access Techniques For Wireless Communication	12	20
5.	Mobile Communication Systems	8	15
Total		64	100

6.3 MICRO CONTROLLERS AND PLCs

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RATIONALE

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 at the industrial applications of PLCs in the modern industry, this subject finds its usefulness in the present curriculum.

Micro-controllers have assumed a great significance in the electronic and consumer goods industry and are a very vital field..

DETAILED CONTENTS

1. Microcontroller series (MCS) – 51 Overview (10 hrs)
 - Pin details
 - I/O Port structure
 - Memory Organization
 - Special Function Registers (SFRS)
 - External Memory

2. Instruction Set; Addressing Modes, Instruction types (8 hrs)
 - Timer operation
 - Serial Port operation
 - Interrupts

3. Assembly language programming (08 hrs)
 - Assembler directives
 - Assembler operation

4. Design and Interface (08 hrs)
Eamples like keypad interface, 7- segment interface etc

5. Introduction to PLCs (10 hrs)
 - Architectural details – Processor
 - Memory structure, I/O Structure
 - Programming terminal, Power Supply

- | | | |
|----|---|----------|
| 6. | Working of PLC
Basic principle, response time, effects of response time, relay replacing, Basic instructions, PLC registers and program scan | (08 hrs) |
| 7. | Instruction Set
Latching, counter, timers one shot, shift register, math, Boolean instructions | (04 hrs) |
| 8. | Ladder diagram programming | (04 hrs) |
| 9. | Applications of PLCs in industry with case studies from electronics industry | (04 hrs) |

LIST OF PRACTICALS

Micro Controllers

1. Familiarization with a study of Architecture of 8085 kit, basic sub systems and input output connectors, functions keys on micro controllers kit
2. Familiarization of Micro Controllers (8051) kit
3. Assembly Language Programming
4. Familiarization of Micro controller (8051) based kit
5. Testing of general input/output on Micro controller board
6. Development of Electrical , Instrumentation applications using 8051 micro-controller
7. Study of interfacing ADC, Infra red Sensor, RS 232, DAC with 8051.

PLCs

1. Components/sub-components of a PLC, Learning functions of different modules of a PLC system
2. Practical steps in programming a PLC (a) using a Hand held programmer (b) using computer interface
3. Introduction to step 5 programming language, ladder diagram concepts, instruction list syntax
4. Basic logic operations, AND, OR, NOT functions
5. Logic control operations using latching properties e.g. in activating a cylinder
6. Logic control systems with time response as applied to clamping operation
7. Sequence control system e.g. in lifting a device for packaging and counting
8. Use of PLC for various mechanical outputs viz motion of a piston in a single cylinder multiple cylinders, driving machine operation etc.

9. Use of PLC for an application(teacher may decide)

RECOMMENDED BOOKS

1. The 8051 Micro controller by Scot Mackenzie, Prentice Hall International, London
2. Process Control Instrumentation Technology by Johnson, Curtis; EEE Edition, Prentice Hall of India, New Delhi
3. Programmable Logic Controller by Job Dan Otter; P. H. International, Inc, USA
4. Programmable Logic Controllers by Thomas E.Kissel
5. Design with Micro Controller by C Nagara, Murthy, S Ramgopal, Joshi B Peatman; McGraw Hill, 1988
6. The 8051 Micro controller Architecture Programming and Applications, Second Edition by Kenneth J; Ayala Penram International Publishing (India) 1996
7. Micro controller by Mazidi
8. Festo Didactic – Programmable Logic Controllers Basic Level – TP 301 – A Training Manual on PLCs
9. Instrument Engineers Handbook Vol.II, by Liptak, P, Chittor Book Company
10. Process control Instrumentation Technology by Johnson, Curtis; EEE Edition, Prentice Hall of India
11. Programmable Logic Controller by Job Dan Otter; P.H. International Inc, USA
12. Humphries and Lesly P Sheets, FourthEdition by James T: Demar Publisher Inc by Mazidi

SUGGESTED DISTRIBUTION OF MARKS FOR FACILITATING THE PAPER SETTER

Topic No.	Topic	Time Allotted (Hrs)	Marks Allocation
1.	Microcontroller series (MCS) – 51 Overview	10	20
2.	Instruction Set; Addressing Modes, Instruction types	8	10
3.	Assembly language programming	8	10
4.	Design and Interface	8	10
5.	Introduction to PLCs	10	15
6.	Working of PLC	8	10
7.	Instruction Set	4	8
8.	Ladder diagram programming	4	7
9.	Applications of PLCs	4	5
Total		64	100

6.4 Elective –II

6.4 (a) MEDICAL ELECTRONICS

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RATIONALE

Electronics is being used in medical science. A large number of electronic equipments are being used in hospitals for patient care and diagnosis or carry out advanced surgeries. This subject will enable the students to learn the basic principles of different instruments used in medical science. There is requirement of exposure of the medical equipment. Accordingly field visits may be arranged.

DETAILED CONTENTS

1. Anatomy and physiology (8 hrs)
 - Elementary ideas of cell structure
 - Heart and circulatory system.
 - Central nervous system
 - Muscle action
 - Respiratory system
 - Body temperature and reproduction system

2. Overview of Medical Electronics Equipments, classification, application and specifications of diagnostic, therapeutic and clinical laboratory equipment, method of operation of these instruments (06 hrs)

3. Electrodes (04 hrs)

Bioelectric signals, Bio electrodes, Electrode, Electrode tissue interface, contact impedance, Types of Electrodes, Electrodes used for ECG , EEG

4. Transducers (06 hrs)

Typical signals from physiological parameters, pressure transducer, flow transducer, temperature transducer, pulse sensor, respiration sensor,

5. Bio Medical Recorders (6 hrs)

Block diagram description and application of following instruments

 - ECG Machine
 - EEG Machine
 - EMG Machine

6. Patient Monitoring Systems (6 hrs)
- Heart rate measurement
 - Pulse rate measurement
 - Respiration rate measurement
 - Blood pressure measurement
 - Principle of defibrillator and pace mark
 - Use of Microprocessor in patient monitoring.
7. Safety Aspects of Medical Instruments (04 hrs)
- Gross current shock
 - Micro current shock
 - -Special design from safety consideration
 - Safety standards.
8. X-rays Machines (08 hrs)
- 8.1 Types of X-rays Machines
- 1) General purpose X-Rays machines
 - 2) Dental X-Ray machine
 - 3) Mobile X-Ray units
 - 4) Patient tables
- 8.2 Safety Aspects of X-rays Machines
- 1) Correct operation of controls
 - 2) Relations between KV and mA
 - 3) Exposure tables
 - 4) Precautions in the use of X-rays machines
 - 5) Test exposures
- 8.3 Operator Safety Aspects
- 1) Biological effects of X-rays
 - 2) Personnel radiation monitoring
 - 3) Film badges

Note :

Since the equipment for medical electronics is quite costly, it will be appropriate to take the students to nearby health centers, hospital(s)/ clinical laboratory(ies) for exposure and observation of the following:

LIST OF PRACTICALS

Anatomy and Physiology

1. Measurement of skins contact impedance and techniques to reduce it.
2. Determine the contact impedance of following electrodes ECG, EEG and EMG Machines.
3. Observe the wave shapes on CRO the output of these transducers. Study of physiological transducers including pressure transducers, temperature transducers and pulse sensors.
4. ECG machines frequency response, input impedance and CMMR Measurement.
5.
 - (a) Concept of ECG lead system and placement of electrodes
 - (b) Taking EEG of a subject
 - (c) Observation of ratification ECG recording
6. Use of oscilloscope as cardioscope with and without memory.
7. Measurement of heart rate with ECG machine cardioscope and heart rate meter.
8. Direct blood pressure measurement and transducers calibration and testing (under stimulated conditions).
9. Measurement of leakage currents with the help of safety tester.
10. Testing of defibrillator with the help of defibrillator analysis

X-ray Equipment

1. Operation and function of all the controls of Hospital based X-rays machines
2. Operation and functions of all the controls of dental X-rays machines.
3. Operation and functions of all the controls of mobile X-ray units.
4. Identification of different blocks/sub-systems of circuits in X-ray machines.
5. Measurement of EHT in X-ray machines.
6. Film processing (expose and develop the X-ray film)

RECOMMENDED BOOKS

1. Handbook of biomedical Instrumentation by RS Khandpur
2. Biomedical Instrumentation by Cromwell,
3. Modern Electronics Equipment by RS Khandpur, TMMH, New Delhi
4. Introduction to BioMedical Electronics by Edward J. Perkstein; Howard Bj, USA

SUGGESTED DISTRIBUTION OF MARKS FOR FACILITATING THE SETTER

Topic No.	Topic	Time Allotted (Hrs)	Marks Allocation
1.	Anatomy and physiology	8	20
2.	Overview of Medical Electronics Equipments	6	10
3.	Electrodes	4	5
4.	Transducers	6	15
5.	Bio Medical Recorders	6	10
6.	Patient Monitoring Systems	6	15
7.	Safety Aspects of Medical Instruments	4	5
8.	X-Ray Machines	8	20
Total		48	100

6.4 Elective –II

6.4(b) COMPUTER NETWORKS

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RATIONALE

The future of computer technology is in computer networks. Global connectivity can be achieved through computer networks. A diploma holder in computer engineering should therefore understand the function of networks. Knowledge about hardware and software requirements of networks is essential.

DETAILED CONTENTS

- | | | |
|----|--|----------|
| 1. | Networks Basics | (6 hrs) |
| | <ul style="list-style-type: none">- What is network- Models of network computing- Networking models- LAN, MAN and WAN- Network Services- Topologies | |
| 2. | OSI Model | (9 hrs) |
| | <ul style="list-style-type: none">- Standards- OSI Reference Model- OSI Physical layer concepts- OSI Datalink layer concepts- OSI Networks layer concepts- OSI Transport layer concepts- OSI Session layer concepts- OSI presentation layer concepts- OSI Application layer concepts | |
| 3. | Introduction to TCP/IP | (4 hrs) |
| | <ul style="list-style-type: none">- Concept of physical and logical addressing- Different classes of IP addressing special IP address- Sub netting and super netting- Loop back concept- IP packet Format | |
| 4. | Protocol Suites | (4 hrs) |
| | <ul style="list-style-type: none">- Models and Protocols- Network IPX/SPX- Intranet Protocols- Apple Talk- Digital Network Architecture | |

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|-----|--|----------|
| 5. | Network Architecture | (4 hrs) |
| | - ARC net specifications | |
| | - Ethernet Specification | |
| | - Token Ring Specifications | |
| | | |
| 6. | Network Connectivity | (4 hrs) |
| | - Network connectivity Devices | |
| | - NICs | |
| | - Hubs | |
| | - Repeaters | |
| | - Multiplexers | |
| | - Modes | |
| | - Routers | |
| | | |
| 7. | Network Printing | (2 hrs) |
| | - Print Services | |
| | | |
| 8. | Network Administration / Security | (7 hrs) |
| | - Server Chief Technology | |
| | - Server Management | |
| | - Raid management and mirroring | |
| | - Hauffman codes | |
| | - Cryptography | |
| | | |
| 9. | Network Trouble Shooting Techniques | (4 hrs) |
| | - Trouble Shooting process | |
| | - Trouble Shooting Tools | |
| | | |
| 10. | Wireless Networking | (4 hrs) |
| | - Basics of wireless LAN and blue tooth technology | |
| | - Installation of server MS 2003 ser/Linux | |

LIST OF PRACTICALS

1. Recognize the physical topology of a network.
2. Identify the IP address of a workstation and the class of the address.
3. Install Net Ware Client 32 software.
4. Use NetWare Administrator to Add a user object.
5. Use User Manager for Domains to create, delete and rename a user in Windows NT.
6. Create, Edit and Delete a Linux user account.
7. Use the Console. One utility to create a group in NetWare.
8. Subnet a Class C IP address.
9. Use of Netstat and its switches.
10. Configure an IP address on a workstation.
11. Install and configure a network interface card in a workstation.

12. Create a user login script in a NetWare network.
13. Edit a windows login script in a windows NT workstation.
14. Map a Network drive in a NetWare network.
15. Add and change security rights in a Window NT network.
16. Add and change security rights in a NetWare network.
17. Implement a full backup with the Sbackup utility.
18. Use the Monitor Utility in a NetWare 5 network to analyze network performance.
19. Analyze NetWare volume statistics.
20. Troubleshooting connectivity issues on a Multiplatform network.
21. Editing file system rights in a **Linux** environment.
22. CAT 5, CAT6, Basic idea of thin
 - a) Interfacing with the network (Ethernet)
 - b) Preparing of network cables including hubs, connectors etc.
 - c) Establishment of LAN network for homogeneous systems
 - d) Establishment of LAN network for heterogeneous systems
 - e) Use of protocols and gateways in establishing LAN
 - f) Writing small programs such as file security, file transfer, remote testing
 - g) Trouble shooting of networks
 - h) Writing login scripts

Support Equipment:

- Serial mouse
- 3.5" floppy drive
- A network Interface card
- Network connection with Internet connectivity
- A tape backup device attached to and configured on the NetWare5 server
- Access to a DNS server
- Three 3.5" floppy disks
- An external modem with cables

Required Software

- Windows95
- Windows NT server
- NetWare5 server
- Linux OS
- S/W drivers for NIC and modem.

Required Tools and Supplies

- Anti-static wrist wrap
- Anti-static mat
- Screwdriver kit

RECOMMENDED BOOKS

1. Computer Networks Tanenbaum Prentice Hall of India , New Delhi
2. Local Area Networks by Peter Hudson
3. Understanding Local Area Network by Neil Jenkins
4. Area Networks by Stan Schatt, Prentice Hall
5. Network+ Lab manual,- BPB Publications -by Tami Evanson
6. Networking Essentials – BPB Publications
7. Computer Network and communications By V.K. Jain and Narija Bajaj, Cyber Tech Publications, New Delhi.
8. Data Communications and Networking by Foronzan, TMH, New Delhi
9. Linux – The complete Reference by Richard Peterson, Tata McGraw Hill, New Delhi.
10. Linux – Install and Configuration Black Book by Dee Annleblanc and Issac Yates, IDG Books India Private Limited, Delhi.
11. Unleashed Linux by TechMedia Publishers

SUGGESTED DISTRIBUTION OF MARKS FOR FACILITATING THE SETTER

Topic No.	Topic	Time Allotted (Hrs)	Marks Allocation
1.	Networks Basics	06	15
2.	OSI Model	09	20
3.	Introduction to TCP/IP	04	8
4.	Prototcol suites	04	7
5.	Network Application	04	8
6.	Network connectivity	04	7
7.	Network Printing	02	5
8.	Network Administration /Security	07	15
9.	Network Troubleshooting Techniques	04	8
10.	Wireless Networking	04	7
Total		48	100

6.4 Elective –II

6.4(c) ADVANCED MICROPROCESSORS

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RATIONALE

The complex systems require high through put that at times is not met with 8-bit microprocessor system. So, 16 bit up based system become suitable. They provide better facilities to personal computers and other automatic process control systems. Micro controller based system design provides facilities for economical & less complicated small process control system.

DETAILED CONTENTS

1. The 8086 Microprocessor (08 hrs)
 - Internal Architecture of 8086.
 - Concept of memory segmentation & physical address generation.
 - Memory and data addressing mode
 - Minimum and Maximum mode of 8086.

2. System Design using 8086 (10 hrs)
 - Pins and Signals.
 - CLK circuitry
 - 8086 Address and Data bus Concept
 - Memory and I/o Interface block diagram
 - Math coprocessor 8087

3. Programming of 8086 (10 hrs)
 - Instruction Format
 - Data transfer, Arithmetic, Bit & Logical manipulation, String, Program transfer and processor control instructions.
 - Programming using manual assembly on exercises like
 - (i) Addition & Subtraction of two 16 bit numbers.
 - (ii) Multiplication's & Division of two numbers
 - (iii) Moving a block of data (intra and inter segment)
 - (iv) To arrange a block of data in ascending/descending order.
 - Use of assembler and assembler directives.

4. 8086 Interrupt System (6 hrs)

Concept

- Interrupt Vector table and Interrupt type code.
- Types of interrupts and interrupt priority.
- Predefined Interrupts (0 to 4).
- User defined software/hardware interrupts.

5. Application of Microprocessors- (10 hrs)

Use of microprocessor (with block diagram, main devices used and operation) for applications like-

- (i) A microprocessor based weighing scale
- (ii) Temperature measurement and control system
- (iii) Data Acquisition system.
- (iv) Speed control of DC motor.

6. Introduction to 32 bit Microprocessors (04 hrs)

Main features of 80386, 80486, Pentium microprocessor.

LIST OF PRACTICALS

1. Familiarization of different keys of 8086-microprocessor kit and its memory map.
2. Steps to enter, check /modify data or program and to execute a program on 8086 microprocessor kit.
3. Writing and execution of ALP on 8086 for addition/subtraction of two 16 bit numbers (signed & unsigned).
4. Writing and execution of ALP on 8086 kit for Multiplication/Division of two signed/unsigned numbers.
5. Writing and execution of ALP on 8086 kit for arranging a block of data in ascending/descending order.
6. Writing and execution of ALP on 8086 kit to generate nos of series like 1,1,2,3,5,8,13,21-----.
7. Writing and execution of ALP for stepper motor control using stepper motor interfacing card.
8. Study and use of Logic controller Interface card.
9. Study and use of opto coupler interface card.

10. Exercise on micro controller kit 8051.
11. Use of 8086 emulator for hardware testing.

RECOMMENDED BOOKS

1. Microprocessor and Application by D.V. Hall.
2. 8051 Micro Controller.
3. Microprocessor 8086/88 by B.B. Brey
4. Microprocessors & Micro controllers by Dr. B.P. Singh
5. Microprocessor by Rajiv Sapra, Ishan Publications, Ambala
6. Microprocessor by Naresh Grover
7. Microprocessors and Microcomputers and their Applications by AK Mukhopadhyay
8. Microprocessors and Applications by Uffenback
9. Introduction to Microprocessor by Adithya Mathur, Tata McGraw Hill Publishing Co, New Delhi
10. Microprocessor Architecture, Programming and Applications with 8085 by RS Gaonkar, Wiley Eastern Ltd, New Delhi
11. Microprocessor and Applications by B Ram
12. Microprocessor by SK Goel
13. 8051 by Mcakenzie, Prentice Hall of India, New Delhi

SUGGESTED DISTRIBUTION OF MARKS FOR FACILITATING THE SETTER

Topic No.	Topic	Time Allotted (Hrs)	Marks Allocation
1.	Then 8086 Microprocessor	08	15
2.	System Design using 8086	10	20
3.	Programming of 8086	10	20
4.	8086 Interrupt System	06	15
5.	Application of microprocessors	10	20
6.	Introduction to 32 bit Microprocessor	04	10
Total		48	100

6.5 ENTREPRENEURSHIP DEVELOPMENT AND MANAGEMENT

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RATIONALE

Entrepreneurship Development and Management is one of the core competencies of technical human resource. Creating awareness regarding entrepreneurial traits, entrepreneurial support system, opportunity identification, project report preparation and understanding of legal and managerial aspects can be helpful in motivating technical/ vocational stream students to start their own small scale business/enterprise. Since diploma technicians are expected to take-up middle level managerial positions, their exposure to basic management principles is very essential. Based on the broad competencies listed above, following detailed contents have been finalized to develop the appropriate competencies.

DETAILED CONTENTS

- | | | |
|-----|--|----------|
| (1) | Entrepreneurship | (10 hrs) |
| 1.1 | Concept/Meaning and its need | |
| 1.2 | Competencies/qualities of an entrepreneur | |
| 1.3 | Entrepreneurial Support System e.g., District Industry Centres (DICs), Commercial Banks, State Financial Corporations, Small Industries Service Institutes (SISIs), Small Industries Development Bank of India (SIDBI), National Bank for Agriculture and Rural Development (NABARD), National Small Industries Corporation (NSIC) and other relevant institutions/organizations at State and national level | |
| (2) | Market Survey and Opportunity Identification (Business Planning) | (10 hrs) |
| 2.1 | How to start a small scale industry | |
| 2.2 | Procedures for registration of small scale industry | |
| 2.3 | List of items reserved for exclusive manufacture in small scale industry | |
| 2.4 | Assessment of demand and supply in potential areas of growth | |
| 2.5 | Understanding business opportunity | |
| 2.6 | Considerations in product selection | |
| 2.7 | Data collection for setting up small ventures | |
| (3) | Project Report Preparation | (08 hrs) |
| 3.1 | Preliminary Project Report | |
| 3.2 | Techno-Economic feasibility report | |
| 3.3 | Project Viability Report | |

- (4) Managerial Aspects of Small Business (10 hrs)
- 4.1 Principles of Management, Definitions, functions of management viz planning, organization, coordination and control
 - 4.2 Structure of an industrial organization.
 - 4.3 Basic principles of financial management
 - 4.4 Marketing Techniques
 - 4.5 Personnel Management, staff development and training strategies
 - 4.6 Importance and techniques of communication in business
- (5) Legal Aspects of Small Business (10 hrs)
- 5.1 Elementary knowledge of Income Tax, Sales Tax, Patent Rules, Excise Rules, provident fund
 - 5.2 Elementary knowledge of Factory Act, 1948 and Payment of Wages Act 1936, Workmen Compensation Act, Industrial Dispute act 1947, Employees State Insurance Act 1978
- (6) Environmental Considerations (04 hrs)
- 6.1 Concept of ecology and environment
 - 6.2 Factors contributing to Air, Water, Noise pollution
 - 6.3 Air, water and noise pollution standards and control
 - 6.4 Norms and standards of State pollution Board
 - 6.5 Disaster Management – basic idea
- (7) Miscellaneous (12 hrs)
- 7.1 Human resource development in an organization
 - 7.2 Motivation – Incentives, Rewards, Job Satisfaction
 - 7.3 Leadership- types, qualities, functions and factors of effective leadership
 - 7.4 Labor Welfare schemes including wage payment- types, system of wage payment and incentives
 - 7.5 Workers participation in management, case studies in effective Management.
 - 7.6 Accident and Safety: Classification, precaution and treatment after accident, safety practices promotion, personal protection equipment (PPFs) for safety at work places.
 - 7.7 Introduction to Total Quality Management (TQM) and steps to achieve this.
 - 7.8 Intellectual Property Rights (IPR): Concept, definition, infringements and remedies related to patents, copy rights, trademarks, designs. Introduction to registering procedure

INSTRUCTIONAL STRATEGY

The aim of this subject is to develop conceptual understanding by giving inputs and exposure about starting ones own business venture/enterprise. The teacher will discuss success stories and case studies with students, which in turn, will develop managerial qualities in the students. There may be guest lectures by successful diploma holding entrepreneurs and field visits also.

RECOMMENDED BOOKS

1. A Handbook of Entrepreneurship, Edited by BS Rathore and Dr JS Saini; Aapga Publications, Panchkula (Haryana)
2. Entrepreneurship Development by CB Gupta and P Srinivasan, Sultan Chand and Sons, New Delhi
3. Environmental Engineering and Management by Suresh K Dhamija, SK Kataria and Sons, New Delhi
4. Environmental and Pollution Awareness by Sharma BR, Satya Prakashan , New Delhi
5. Thakur Kailash, Environmental Protection Law and policy in India: Deep and Deep Publications, New Delhi
6. Handbook of Small Scale Industry by PM Bhandari
7. Marketing Management by Philip Kotler, Prentice Hall of India, New Delhi
8. Industrial management by N. Mohan, and AP Verma, SK Kataria and Sons, Nai Sarak, Delhi-110006
9. Total Quality Management by Dr DD Sharma, Sultan Chand and Sons, New Delhi.
10. Principles of Management by Philip Kotler TEE Publication
11. Intellectual Property Rights and the Law by Dr. GB Reddy.

SUGGESTED DISTRIBUTION OF MARKS FOR FACILITATING THE PAPER SETTER

Sr. No.	Topic	Time Allotted (hrs)	Marks Allocation
1.	Entrepreneurship	10	10
2.	Market Survey and Opportunity Identification (Business Planning)	10	20
3.	Project Report Preparation	08	10
4.	Managerial Aspects of Small Business	10	15
5.	Legal Aspects of Small Business	10	15
6.	Environmental Considerations	04	10
7.	Miscellaneous	2	20
Total		64	100

6.6. MAJOR PROJECT WORK

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RATIONALE

Major Project Work aims at developing innovative skills in the students whereby they apply in totality the knowledge and skills gained through the course work in the solution of particular problem or by undertaking a project. In addition, the project work is intended to place students for project oriented practical training in actual work situation for the stipulated period with a view to:

- i) Develop understanding regarding the size and scale of operations and nature of field-work in which students are going to play their role after completing the courses of study.
- ii) Develop understanding of subject based knowledge given in the classroom in the context of its application at work places.
- iii) Develop first hand experience and confidence amongst the students to enable them to use and apply polytechnic/institute based knowledge and skills to solve practical problems related to the world of work.
- iv) Develop abilities like interpersonal skills, communication skills, positive attitudes and values etc.

The individual students have different aptitudes and strengths. Project work, therefore, should match the strengths of students. For this purpose, students should be asked to identify the type of project work, they would like to execute. The activity of problem identification should begin well in advance (say at the end of second year). Students should be allotted a problem of interest to him/her as a major project work. It is also essential that the faculty of the respective department may have a brainstorming session to identify suitable project assignments for their students. The project assignment can be individual assignment or a group assignment. There should not be more than 3 students if the project work is given to a group. The project work identified in collaboration with industry should be preferred.

This practical training cum project work **should not be considered** as merely conventional industrial training in which students are sent at work places with either minimal or no supervision. This experience is required to be planned in advance and supervised on regular basis by the polytechnic faculty. For the fulfillment of above objectives, polytechnics may establish close linkage with 8-10 relevant organization for providing such an experience to students. It is necessary that each organization is visited well in advance and activities to be performed by students are well defined. The chosen activities should be such that it matches with the curricular interest to students and of professional value to industrial/ field organizations. 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 areas.

- 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 based circuits/ instruments.

Some of the projects based on above areas are listed below for the benefit of students:

1. Microprocessor based rolling display/bell and calendar
2. Microprocessor based stepper motor control.
3. Speed control of DC Machines by Microprocessors.
4. Temperature monitoring using microprocessor based systems.
5. Microprocessor based liquid level indicator and control/solar tracking system
6. Fabrication and assembling of digital clock.
7. Design and fabrication of timing circuits using 555 and counters.
8. Design and fabrication of amplifiers and oscillators circuits.
9. Fabrication of demonstration type Radio receiver
10. Fabrication of PCB circuits using ORCAD/ Fagu /Proteus Software.
11. Fabrication of ON line/OFF line UPS of different ratings and inverters
12. Design, fabrication and testing of different types of experimental boards as per the curriculum of Electronics and Communication Engineering.
13. Repair of X-Ray Machines, ECG, EEG, EMG, Calorimeter and Centrifuge etc.
14. Repair and fault location of telephone exchanges and intercom system.
15. Repair of oscilloscope, function generator, Power supply
16. Design and developing web sites of organizations
17. Installation of computer network (LANS).
18. Microprocessor based solar tracking system
19. Car or home security system
20. Bank token display
21. Printer sharing unit
22. Caller Identification unit for phone
23. LCR-Q meter and frequency meter
24. μ P-Based A/D converter
25. μ P-Based D/A converter
26. Simulation of half wave and full wave rectifiers using ORCAD
27. Simulation of following circuits:
Integrator, differentiator, adder, subtractor, V-I converter comparator etc. using OP-Amps.
28. Simulation of class A, Class B, Class AB and Class C amplifiers
29. Simulation of different wave forms like sine, square, triangular waves etc.
30. Fan control using Triac.
31. AD/DA interfacing with 8051/(Micro controller).
32. Study of various wave forms after ckt display on CRO

33. Auto/ Microprocessor based Traffic control.
34. Project based on new technologies.
35. Assembly of a colour TV

NOTE:

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

A suggestive criteria 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				
			Exce-llent	Very Good	Good	Fair	Poor
1.	Selection of project assignment	10	10	8	6	4	2
2.	Planning and execution of considerations	10	10	8	6	4	2
3.	Quality of performance	20	20	16	12	8	4
4.	Providing solution of the problems or production of final product	20	20	16	12	8	4
5.	Sense of responsibility	10	10	8	6	4	2
6.	Self expression/ communication skills	5	5	4	3	2	1
7.	Interpersonal skills/human relations	5	5	4	3	2	1
8.	Report writing skills	10	10	8	6	4	2
9.	Viva voce	10	10	8	6	4	2
Total marks		100	100	80	60	40	20

Important Notes:

1. **This criteria must be followed by the internal and external examiners and they should see daily , weekly and monthly reports while awarding marks as per the above criteria.**
2. **The criteria for evaluation of the students have been worked out for 100 maximum marks. The internal and external examiners will evaluate students separately and give marks as per the study and evaluation scheme of examination.**
3. **The teachers are free to evolve another 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. **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 industries are approached for instituting such awards.**

GENERIC SKILL DEVELOPMENT CAMP-II

As per general feedback received from the employers regarding Technician Engineers during formal interactions, the pass outs of polytechnics are labeled of falling short of employable skills which comprises of Communication, inter-personal relationship, leadership qualities, team work, problem solving, managing task, managing self etc. in addition to technical knowledge and skills. We have, therefore, added papers such as English and Communication Skills and Entrepreneurship Development and Management in the curriculum in addition to proposed camps of 3-4 days to be conducted in polytechnics on common and vital issues e.g. Environmental Awareness, Entrepreneurship Development and Generic Skill Development.

It is proposed that a camp of 3-4 days duration on Generic Skills Development (GSD) during 6th semester be organized by arranging expert lectures/discussion sessions either by polytechnic teachers or by eminent educationists from the neighborhood to deal with the following topics. Few students may also be encouraged to prepare on some of these topics and make presentation during the camp. Expert lectures must be followed by distribution of relevant handouts for further study. The attendance of students should be compulsory and marks be awarded under provision of Student Centred Activities. **It is envisaged that such camps will bring in a significant improvement in confidence level and personality of the pass outs from polytechnics.**

Suggested list of topics for arranging lectures/discussion sessions:

1. **Ethics and Values**
 - 1.1 Introduction and importance
 - 1.2 Ethics and values in profession and society
 - 1.3 Dignity of labour
 - 1.4 Net etiquettes

2. **Group Dynamics**
 - 2.1 Introduction
 - 2.2 Leadership
 - 2.3 Communication in group
 - 2.4 Team work

3. **Personality Development**
 - 3.1 PR technique
 - 3.2 Positive attitude
 - 3.3 Self-esteem
 - 3.4 Creativity

4. **SWOT Analysis**
 - 4.1 Importance
 - 4.2 Introduction to SWOT analysis steps
 - 4.3 SWOT analysis parameters