

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

<b>DISCIPLINE: INFORMATION TECHNOLOGY</b>						<b>SEMESTER: 4<sup>TH</sup></b>						
<b>SL NO</b>	<b>SUBJECT CODE</b>	<b>SUBJECT</b>	<b>PERIODS</b>			<b>EVALUATION SCHEME</b>						
			<b>L</b>	<b>T</b>	<b>P</b>	<b>SESSIONAL EXAM</b>			<b>END SEM EXAM</b>	<b>TERM WORK</b>	<b>PRACTICAL EXAM</b>	<b>TOTAL MARKS</b>
						<b>TA</b>	<b>CT</b>	<b>Total</b>				
<b>THEORY</b>												
1.	ITT 401	COMPUTER SYSTEM ARCHITECTURE	4	-	-	10	20	30	70			100
2.	ITT 402	OPERATING SYSTEMS & SYSTEM PROGRAMMING	4	-	-	10	20	30	70			100
3.	ITT 403	MICROPROCESSOR & ITS INTERFACING	5	-	-	10	20	30	70			100
4.	ITT 404	DATA MINING & DATA WAREHOUSING	4	-	-	10	20	30	70			100
5.	ITT 405	OBJECT ORIENTED METHODOLOGY	4	-	-	10	20	30	70			100
<b>PRACTICAL/TERM WORK</b>												
5.	ITP 401	OPERATING SYSTEM LAB	-	-	<b>6</b>					50	50	100
6.	ITP 402	MICROPROCESSOR & INTERFACING LAB	-	-	<b>6</b>				25	50		75
7.	ITP 403	OOP LAB	-	-	<b>6</b>				25	50		75
<b>GRAND TOTAL</b>			<b>21</b>		<b>18</b>	<b>50</b>	<b>100</b>	<b>150</b>	<b>350</b>	<b>100</b>	<b>150</b>	<b>750</b>

Total Contact hours per week: 39

Abbreviations: L-Lecture, T-Tutorial, P-Practical, TA- Teacher's Assessment, CT- Class test

Minimum Pass Mark in each Theory Subject is 35% and in Practical subject is 50%

## COMPUTER SYSTEM ARCHITECTURE

Name of the Course: **Diploma in Information Technology**

Course code:	ITT 401	Semester	4 <sup>th</sup>
Total Period:	60	Examination	3 hrs
Theory periods:	4P/week	Class Test:	20
Tutorial:		Teacher's Assessment:	10
Maximum marks:	100	End Semester Examination:	70

### Objective :

Management Information System is the basic foundation paper for any hardcore computer engineer. In this subject students will be exposed to the theoretical aspects of different functional units of a digital computer and fundamental idea how different units of a computer system work together to achieve a common goal

Topic	Periods
<b>1. Basic structure of computer hardware</b>	<b>05</b>
1.1 Basic Structure of computer hardware	
1.2 Functional Units	
1.3 Computer components	
1.4 Bus Structure	
1.5 Performance measures	
1.6 Memory addressing & Operations	
<b>2. Instructions &amp; instruction sequencing</b>	<b>05</b>
2.1 Fundamentals to instructions	
2.2 Operands	
2.3 Op codes	
2.4 Instruction formats	
2.5 Addressing techniques	
2.6 Addressing Modes	
<b>3. Arithmetic operations</b>	<b>05</b>
3.1 Basic arithmetic operation	
3.2 Floating point representation	
3.3 Floating point arithmetic operation	
<b>4. Processor System</b>	<b>10</b>
4.1 Design of ALU	
4.2 Registers files	
4.3 Data path design	
4.4 Bit slice processor	
4.5 Basic memory operation	
4.6 Complete instruction execution	
4.7 Hard wired control	
4.8 Microprogrammed control	
<b>5. Memory System</b>	<b>10</b>
5.1 Memory characteristics	
5.2 Memory – processor data transfer	
5.3 Semiconductor RAM	
5.4 ROM	
5.5 Interleaved Memory	

5.6 Cache memory	
5.7 Virtual memory	
<b>6. Input – Output System</b>	<b>10</b>
6.1 Input - Output Operation	
6.2 Programmed I/O	
6.3 Interrupt driven I/O	
6.4 DMA	
6.5 I/O Channel architecture	
<b>7. I/O Interface &amp; Bus architecture</b>	<b>10</b>
7.1 Bus interconnection	
7.2 Bus structure	
7.3 Basic parameters of Bus design	
7.4 Peripheral component interconnect Bus	
7.5 SCSI	
7.6 USB	
<b>8. Parallel Processing</b>	<b>05</b>
8.1 Parallel Processing	
8.2 Linear PipeLine	
8.3 Multiprocessor	
8.4 Flynn’s Classification	

**Learning Resources:**

<b>Text Books</b>			
<b>Sl.No</b>	<b>Name of Authors</b>	<b>Title of the Book</b>	<b>Name of the publisher</b>
1	Parthasarthy , Senthil Kumar	Fundamentals of Computer Architecture	TMH
2	Moris Mano	Computer System Architecture	PHI

# OPERATING SYSTEM & SYSTEM PROGRAMMING

Name of the Course: **Diploma in Information Technology**

Course code:	ITT 402	Semester	4th
Total Period:	60	Examination	3 hrs
Theory periods:	4 P/week	Class Test:	20
Tutorial:		Teacher's Assignment:	10
Maximum marks:	100	End Semester Examination:	70

## Rationale

As Operating System is the resource manager of the Computer System, so students should be exposed towards learning the role of Operating System in controlling & coordinating all the Hardware and Software resources available with a digital computer. System programming deals with Assembler, Compiler, loader etc. which are the system software tools for the students to learn in the field of programming.

## A. OPERATING SYSTEM

<b>1. INTRODUCTION</b>	<b>03</b>
1.1 Objectives and Explain functions of operating system.	
1.2 Evolution of Operating system	
1.3 Structure of operating system.	
<b>2. PROCESS MANAGEMENT</b>	<b>08</b>
2.1 Process concept, process control, interacting processes, inter process messages.	
2.2 Implementation issues of Processes.	
2.3 Process scheduling, job scheduling.	
2.4 Process synchronization, semaphore.	
2.5 Principle of concurrency, types of scheduling .	
<b>3. MEMORY MANAGEMENT</b>	<b>08</b>
3.1 Resident monitor, multiple partition, swapping.	
3.2 Segmentation, virtual memory using paging, virtual memory using segmentation, contiguous memory allocation, non contiguous memory allocation.	
3.3 Demand paging, page fault handling.	
<b>4. DEVICE MANAGEMENT</b>	<b>05</b>
4.1 Techniques for Device Management - Dedicated, shared and virtual.	
4.2 Device allocation considerations I/O traffic control & I/O Schedule, I/O Device handlers.	
4.3 SPOOLING.	
<b>5. DEAD LOCKS</b>	<b>08</b>
5.1 Concept of deadlock.	
5.2 Dead Lock Detection, Recovery & Prevention, Explain Bankers Algorithm & Safety Algorithm	
<b>6. FILE MANAGEMENT</b>	<b>07</b>
6.1 File organization, Directory & file structure, sharing of files	
6.2 File access methods, file systems, reliability	
6.3 Allocation of disk space	
6.4 File protection, secondary storage management.	
<b>B. SYSTEM PROGRAMMING</b>	<b>21</b>
1.1 Concept of system programming and show difference from Application	

- program.
- 1.2 Assembler, functions carried out by an assembler.
  - 1.3 Compiler: functions of compiler.
  - 1.4 Compiler , Compare compiler and interpreter.
  - 1.5 Seven phases of compiler, brief description of each phase.
  - 1.6 Loader: functions of loader, different types of loader, compiler and go loader, Direct linking loader absolute loader, relocatable loader.

Learning Resources			
Text Books			
Sl.No	Name of Authors	Title of the Book	Name of the publisher
1	Donavan	Operating System	TMH
2	Flynn,Mehoes	Operating Systems	Cengage Learning
3	Damdher	System Programming	
4	Silverschz & Galvin, Addision Wesley	Operating System	
5	J.J.Donovan	System Programming	TMH
6.		Operating System	Schaum Series

## Microprocessor & Its Interfacing

Name of the Course: **Diploma in Information Technology**

Course code:	ITT 403	Semester	4th
Total Period:	60	Examination	3 hrs
Theory periods:	4P/week	Class Test:	20
Tutorial:		Teacher's Assignment:	10
Maximum marks:	100	End Semester Examination:	70

### A: RATIONALE:

The Microprocessor control has taken predominance over other types of control quite some time past. Starting from Electrical Power plant to consumer electronics this tiny chip finds extensive uses. As such Microprocessors have made pervading influence on our lives. This field is developing so rapid that it is difficult to keep track with the changes. Under this subjects Architecture and instruction sets of 8 bit and 16 bit processor have been discussed. Some applications have been included through the interfacing chips.

### B: OBJECTIVS:

On completion of the subject, the student will be able to:

- The students will able to differential between 8085 microprocessor.
- Classify Bus.
- Describe the Architecture of 8085 microprocessor.
- Comprehend different instructions of 8085 microprocessor.
- State & explain addressing modes.
- Write instructions under different addressing modes.
- Discuss assembler.
- Explain basic assembler directives.
- Describe types of assembly language programs and write programs.
- Explain the timing diagrams of different instructions.
- State the functions of the interfacing chips like 8255, etc.
- Explain the delay subroutine.
- Calculate the delay in ms by one, two or three registers.
- Explain ADC & DAC?
- Explain the use of ADC & DAC modules
- Write a program for traffic light control.
- Apply Programming technique for stepper motor control.
- Know about 16-bit microprocessor.

### C: COURSE CONTENTS & DISTRIBUTION OF PERIODS:

<b>1.0 INTRODUCTION MICROPROCESSOR</b>	<b>05</b>
1.1 Discuss Microprocessor & its Application.	
1.2 Distinguish between microprocessor & microcomputer.	
1.3 Discuss Evolution of microprocessor.	
<b>2.0 BASIC ARCHITECTURE OF 8-BIT MICROPROCESSOR.</b>	<b>10</b>
2.1 Discuss Architecture.	
2.2 Describe address bus, data bus, control bus & System Bus	
2.3 State & Explain general Bus structure	
2.4 Describe pin structure of 8085 Microprocessor.	
2.5 Describe internal Architecture of 8085 Microprocessor with a Block Diagram.	
2.6 Describe three state registers & Concept of Multiplexing.	
2.7 Study the data transfer using tri-state registers	
2.8 Define registers of 8085 & Distinguish between SPR & GPR	
2.9 State & explain stack pointer, stack & stack top.	

- 3. INSTRUCTION SETS. 05**
- 3.1 Explain need for addressing data & Differentiate between 1-address, 2-address & 3-address instructions with examples.
  - 3.2 Define addressing modes with suitable examples.
  - 3.3 Explain different types of Instructions.(Data Transfer, Arithmetic, Logical, Branching, Stack& I/O Machine Control)
  - 3.4 Simple Programs of 8085 Instructions.
  - 3.5 Explain the basic assembler directives.
- 4. PROGRAMMING TECHNICS 10**
- Write the program based on
- 4.1 Logic Operations (AND,OR,Complement1's&2's) & Masking of bits.
  - 4.2 Counters & Time delay (Single Register, Register Pair, More than Two Register)
  - 4.3 Looping, Counting & Indexing (Call/JMP etc).
  - 4.4 Stack & Subroutines.
  - 4.5 Code conversion, BCD Arithmetic & 16Bit data Operation, Block Transfer.
  - 4.6 Compare between two numbers.
  - 4.7 Array Handling (Largest number & smallest number in the array)
- 5. TIMING DIAGRAMS. 06**
- 5.1 Define T-State, Fetch cycle, Machine Cycle, Instruction cycle & discuss the concept of timing diagram.
  - 5.2 Differentiate between instruction cycle, machine cycle & T-state.
  - 5.3 Draw timing diagram for memory read, memory write, I/O read, I/O write machine cycle.
  - 5.4 Draw a neat sketch for the timing diagram for 8085 instruction (MOV, DCR, MVI, LDA, DCX).
- 6. INTERFACING I/O ,MEMORY & I/O PROGRAMMING 12**
- 6.1 Define interfacing & Describe the pin diagram of 8255 chip and explain function of each pin.
  - 6.2 Describe internal architecture of 8255. (PPI)
  - 6.3 Define Mapping & Distinguish between Memory mapping & I/O Mapping.
  - 6.4 Explain Memory interfacing with RAM & EPROM to Microprocessor
  - 6.5 Explain Functional Block Diagram 8257 DMA controller.
  - 6.6 Explain Functional Block Diagram 8259 Programming Interrupt Controller.
  - 6.7 Explain the functional Block Diagram 8251(USART)
  - 6.8 Describe ADC & DAC with Interfacing.
  - 6.9 Interface a traffic light control system using 8255.
  - 6.10 Write interfacing programme for stepper motor control.
- 7. 16-Bit MICROPROCESSOR 12**
- 7.1 Explain the block diagram of a Microprocessor based system.
  - 7.2 Explain the internal architecture of 8086-Programming model.
  - 7.3 Explain pin details of 8086 / 8088.
  - 7.4 Explain the basic 8086 system timing diagram.
  - 7.5 Explain the Instruction format-Memory addressing machine.
  - 7.6 Explain minimum and maximum mode of 8086 operation.
  - 7.7 Explain addressing modes of 8086.
  - 7.8 Discuss instruction set-Data transfer-Arithmetic and logical, Branching-loop control. &String control instruction
  - 7.9 Write simple program using 8086 instructions.

**LEARNING RESOURCES:**

SL.No.	Name of Authors	Title of the book	Name of publisher
1	R.S. Goankar	Microprocessor Arch, Programming & Application	
2	A.K.Roy and K. M. Bhurchand	Advanced <b>microprocessor</b> and peripherals,	<b>PHI</b>
3	N.SenthliKumar, M. Sarvanan,	Microprocessor & Interfacing	OXFORD

REFERENCE BOOK:

1	B.Ram	Microprocessor & its application	
2	M. Rafiquizaman	Microprocessor	PHI
3	S.P. Chowdhury & SunetrChoudhury	Microprocessor & Pherials	SCITECH
4	S.K. Sen	Understanding 8085/8086	New Age Int. Publication



## **Data Mining & Data Ware Housing**

Name of the Course: **Diploma in Information Technology**

Course code:	ITT 404	Semester	4th
Total Period:	60	Examination	3 hrs
Theory periods:	4P/week	Class Test:	20
Tutorial:		Teacher's Assignment:	10
Maximum marks:	100	End Semester Examination:	70

### **RATIONALE**

Data Mining & Data ware Housing is the upcoming features in the fields of Information Technology which is based on coverage of large databases and making queries, optimization of queries , statistical analysis of query results and deriving future trends.

<b>1.</b>	<b>Introduction to Data Mining &amp; Data Warehousing</b>	<b>10</b>
1.1	Motivation	
1.2	Data mining & Data warehousing Technology	
1.3	Data Models	
1.4	Data warehousing and OLAP:User Perspective	
1.5	Data Mining User Perspective	
1.6	Related disciplines	
1.7	Other issues and future trends	
<b>2.</b>	<b>Frequent Pattern Mining</b>	<b>10</b>
2.1	Basic Problem Definition	
2.2	Mining Association rules	
2.3	Applications	
2.4	Variations	
2.5	Interestingness	
2.6	FIM Algorithms	
<b>3.</b>	<b>Classification</b>	<b>10</b>
3.1	Basic Problem Definition	
3.2	Applications	
3.3	Evaluation of classifiers	
3.4	Other issues	
3.5	Classification Techniques	
<b>4.</b>	<b>Clustering</b>	<b>10</b>
4.1	Basic Problem definition	
4.2	Clustering Applications	
4.3	Measurement of similarity	
4.4	Evaluation of clustering algorithms	
4.5	Classification of clustering algorithms	
4.6	Partitioning Methods	
4.7	Hierarchical Methods	
4.8	Density Based methods	
4.9	Grid based methods	
4.10	Outlier Detection	
<b>5.</b>	<b>Pattern Discovery in Real world data</b>	<b>10</b>
5.1	Relational data	

- 5.2 Transactional data
- 5.3 Multidimensional data
- 5.4 Distributed data
- 5.5 Spatial data
- 5.6 Data streams
- 5.7 Time series Data
- 5.8 Text and Web data
- 5.9 Multimedia Data

**6. Data Warehousing**

**10**

- 6.1 Fundamentals
- 6.2 Data Warehouse Data characteristics
- 6.3 Data Warehouse components
- 6.4 Approaches to build Data marts and Data Warehouse
- 6.5 ETL
- 6.6 OLAP
- 6.7 Storage and chunks

**Learning Resources:**

**Text Books**

<b>Sl.No</b>	<b>Name of Authors</b>	<b>Title of the Book</b>	<b>Name of the publisher</b>
1	V. Pudi and PRadha Kishna	Data Mining	Oxford University Press.

## Object Oriented Methodology

Name of the Course:	<b>Diploma in Information Technology</b>		
Course code:	ITT 405	Semester	4 <sup>th</sup>
Total Period:	60	Examination	3 hrs
Theory periods:	4P/week	Class Test:	20
Tutorial:		Teacher's Assignment:	10
Maximum marks:	100	End Semester Examination:	70

### RATIONALE

Now-a-days object oriented Methodology is adopted almost for every computer based programs due to the reusability of the objects. This subject exposes the learner to the various typical object oriented concepts like, classes, objects, inheritance, Operator Overloading etc. It also makes the reader to realize the advantages of object oriented Programming Methodology over the conventional procedural programming methodology.

### **1.0 PRINCIPLES OF OBJECT ORIENTED PROGRAMMING 05**

- 1.1 Procedure Oriented paradigm
- 1.2 Object oriented paradigm
- 1.3 Object oriented Design & Analysis

### **2.0 DATA TYPES & I/O OPERATIONS 08**

- 2.1 Basic data types
- 2.2 User defined data types & derived data types
- 2.3 Dynamic initialization of variables
- 2.4 Operators & expressions
- 2.5 Formatted & unformatted I/O

### **3.0 CLASSES 08**

- 3.1 Introduction to classes.
- 3.2 Member functions
- 3.3 Static Data Member
- 3.4 Arrays within a class
- 3.5 Pointers to members

### **4.0 CONSTRUCTOR AND DESTRUCTOR 07**

- 4.1 The purpose of Constructor & Destructor.
- 4.2 Constructors with parameters
- 4.3 Multiple constructors in a class
- 4.4 Dynamic initialization of objects
- 4.5 Destructors

### **5.0 OPERATOR OVERLOADING 07**

- 5.1 Definition of operator over loading
- 5.2 Unary operator overloading
- 5.3 Binary operator overloading
- 5.4 String manipulation using operator
- 5.5 Type conversions

**6.0 INHERITANCE OF CLASSES** **10**

- 6.1 Derived classes
- 6.2 Single inheritance
- 6.3 Multilevel and Multiple inheritance
- 6.4 Hierarchical inheritance
- 6.5 Virtual Base Classes

**7.0 POLYMORPHISM** **04**

- 7.1 Fundamental idea on Polymorphism
- 7.1 Pointer to objects & derived classes
- 7.2 Virtual Functions

**8.0 FILE HANDLING** **07**

- 8.1 Streams and stream classes
- 8.2 Classes for file stream operation
- 8.3 Opening and closing files
- 8.4 How to handle Error
- 8.5 Command line arguments

**9.0 TEMPLATES AND EXCEPTION HANDLING** **04**

- 9.1 Class templates & Function Templates
- 9.2 Template Arguments
- 9.3 Exception Handling

Learning Resources:

**Text Books**

<b>Sl.No</b>	<b>Name of Authors</b>	<b>Title of the Book</b>	<b>Name of the publisher</b>
1	E. Balaguruswami	Object Oriented Programming With C++	TMH
2	Kamthane	Object Oriented Programming With C++	Pearson
3	Trivedi	Programming with ANSI C++	Oxford Univ. Press
4	D.Jana	C++ and OOP Paradigm	PHI

## Operating System Lab

Name of the Course: **Diploma in Information Technology**

Course code:	ITP 401	Semester	6 <sup>th</sup>
Total Period:	90	Examination	4 hrs
Lab. periods:	6P/week	Term Work	50
Maximum marks:	100	End Semester Examination:	50

### 1. OVERVIEW OF UNIX

Familiarization of UNIX as an Operating system, Kernel, shell and User, UNIX File System, Files and Directories, Access Permission, File system hierarchy.

### 2. BASIC UNIX COMMANDS

Listing of files and directories, Copying, Deleting Renaming and comparing files, Creation, Navigation and Removing directories, Access permission of files and directories, Editors in UNIX, Status of users, terminals, Date and time, Displaying blown-up message, paging & Printing of files, background jobs.

### 3. ADVANCED FEATURES OF UNIX

Practice advanced features of Unix e.g. I-nodes, Tees, Pipes and Filters, Cutting, Pasting and sorting of files, searching for a pattern in a string.

### 4. PROGRAMMING WITH THE SHELL

Write shell programs involving System variables and shell variables, interactive Shell scripts, Shell termination, conditional statements, looping statements, Special parameters in shell computation and string handling

Learning Resources

#### **Text Books**

<b>Sl.No</b>	<b>Name of Authors</b>	<b>Title of the Book</b>	<b>Name of the publisher</b>
1	C. Diaz	Introduction to Unix /Linux	Cengage Learning

## Microprocessor & Interfacing Lab

Name of the Course: **Diploma in Information Technology**

Course code:	ITP 402	Semester	6 <sup>th</sup>
Total Period:	90	Examination	4 hrs
Lab. periods:	6P/week	Term Work	25
Maximum marks:	75	End Semester Examination:	50

1.0 Acquaintance with the microprocessor trainer kit, hardware & the user's commands

2.0 Find out the Hex- code for corresponding Instruction

3.0 Write small Assembly language programme for

Data Transfer

> Register to Register

> Register to Memory and Vice-Versa

4.0 Write small Assembly language programme for Arithmetic Operation - 8 bit addition and subtraction multi byte addition and subtraction , BCD addition and subtraction, Multiplication using repeated addition, multiplication using shift-add process

5.0 Write small Assembly language programme for

Input/Output: Programming 8255 with the basic *VO* modes, interface 7-segment Display using 8255 as a port.

Learning Resources:

Text Books:

<b>Name of Authors</b>	<b>Title of the Book</b>	<b>Name of the publisher</b>	<b>Name of Authors</b>
W.A.Routt	MP architecture ,programming & system	Cengage Learning	W.A.Routt

## Object Oriented Programming Lab

Name of the Course: **Diploma in Information Technology**

Course code:	ITP 403	Semester	6 <sup>th</sup>
Total Period:	90	Examination	4 hrs
Lab. periods:	6P/week	Term Work	25
Maximum marks:	75	End Semester Examination:	50

Write Programs On :

1. Objects and classes
2. Declaring and creating objects Constructors
3. Modifiers
4. Passing objects to methods
5. Instance variables and class variables Instance method & class method
6. Scope of variables interface and packages
7. Introductory Problems on Class Inheritance Super classes and sub class Calling super class constructors
8. Calling super class methods
9. Object class
10. Number class
11. Processing date and time
12. Class Templates and Exceptional handling

### Learning Resources:

#### Text Books

Sl.No	Name of Authors	Title of the Book	Name of the publisher
1	S.K.Pandey	OOPS with C++,	Katson
2	R.Singh	OOM	Kalyani