



**BANGLADESH TECHNICAL EDUCATION BOARD**  
Agargoan, Dhaka-1207.

*4-YEAR DIPLOMA-IN-ENGINEERING PROGRAM*  
SYLLABUS (PROBIDHAN-2016)

**COMPUTER SCIENCE & TECHNOLOGY**  
TECHNOLOGY CODE: **685**

3rd SEMESTER

DIPLOMA IN ENGINEERING  
PROBIDHAN-2016

**COMPUTER SCIENCE & TECHNOLOGY (685)**

**3<sup>rd</sup> SEMESTER**

Sl. No	Subject Code	Name of the subject	T	P	C	Marks				Total
						Theory		Practical		
						Cont. assess	Final exam	Cont. assess	Final exam	
1	66631	Programming Essentials	2	3	3	40	60	25	25	150
2	66632	Web Design	0	6	2	00	00	50	50	100
3	66633	Graphics Design-II	0	6	2	00	00	50	50	100
4	66834	Digital Electronics	3	3	4	60	90	25	25	200
5	65931	Mathematics -III	3	3	4	60	90	50	0	200
6	65922	Physics -II	3	3	4	60	90	25	25	200
7	65722	Communicative English	1	3	2	20	30	50	0	100
<b>Total</b>			<b>12</b>	<b>27</b>	<b>21</b>	<b>240</b>	<b>360</b>	<b>275</b>	<b>175</b>	<b>1050</b>

66631

## Programming Essentials

<b>T</b>	<b>P</b>	<b>C</b>
<b>2</b>	<b>3</b>	<b>3</b>

### OBJECTIVES

- To develop knowledge and skill on programming Basics.
- To develop knowledge and skill to create, compile, debug & execute a program.

### SHORT DESCRIPTION

Basics of programming Language; Basics of Python; Variables; Data types; Strings; Operators; Decision making and Looping statements; Lists; Tuples; Functions; File operations;

### DETAIL DESCRIPTION

#### Theory:

#### 1. Basics of Programming

- 1.1. State Computer Program and Programming
- 1.2. Explain Programming Language and its classification.
- 1.3. State Generation of Programming Languages.
- 1.4. Describe Translator Program.
- 1.5. Uses of Computer Programs
- 1.6. Describe Algorithm and Flowchart.
- 1.7. Prepare Algorithm and Flowchart for simple problems.
- 1.8. Explain the Process of Program Planning.

#### 2. BASICS OF PYTHON

- 2.1. Describe the History of Python.
- 2.2. Explain the features of Python.
- 2.3. Describe the Structure of Python Program
- 2.4. State Identifiers and Keywords
- 2.5. State Lines , Indentation, Multi-Line Statements and Multiple Statements on  
a  
Single Line
- 2.6. State Quotation and Comments in Python
- 2.7. State Command Line Arguments

#### 3. VARIABLE AND DATA TYPES

- 3.1. Assigning Values to Variables
- 3.2. State Multiple Assignment
- 3.3. Describe Standard Data Types
- 3.4. Explain Data Type Conversion

#### 4. STRINGS

- 4.1. State Accessing Values in Strings and Updating Strings
- 4.2. Uses of Escape Characters
- 4.3. Explain String Special Operators and String Formatting Operator

- 4.4. Describe Triple Quotes and Unicode String
- 4.5. Write Simple programs using strings.

## 5. PYTHON OPERATORS

- 5.1. State Operators and their types.
- 5.2. Describe Arithmetic Operators, Comparison Operators and Logical Operators
- 5.3. State Assignment Operators, Bitwise Operators and Membership Operators  
Identity Operators
- 5.4. Explain Operators Precedence

## 6. DECISION MAKING

- 6.1. Describe the conditional and unconditional branching flow.
- 6.2. Explain If Statement and If...else Statement
- 6.3. State the nested if Statement
- 6.4. Write simple program using if, if...else and nested if.

## 7. LOOPS

- 7.1. Describe the conditional and unconditional Looping flow.
- 7.2. State For Loop
- 7.3. State While Loop
- 7.4. Explain The Infinite Loop and Nested Loops
- 7.5. State Break ,Continue and pass Statement
- 7.6. Write simple program using for and while loop

## 8. LISTS

- 8.1. Define Lists and its type.
- 8.2. Assigning Values in Lists
- 8.3. Explain Updating and Deleting List Elements
- 8.4. State Basic List Operations
- 8.5. Explain Built-in List Functions and Methods
- 8.6. Write simple program using Lists.

## 9. TUPLES

- 9.1. Assigning Values in Tuples
- 9.2. Explain Updating and Deleting Tuple Elements
- 9.3. Describe Basic Tuples Operations
- 9.4. State No Enclosing Delimiters:
- 9.5. Explain Built-in Tuple Functions
- 9.6. Write simple program using Tuples.

## 10. FUNCTIONS

- 10.1. Defining a Function
- 10.2. State Calling a Function
- 10.3. Explain Passing by Reference Versus Passing by Value
- 10.4. Describe Function Arguments
- 10.5. Uses of Date and Time Functions.
- 10.6. Write simple program using functions.

## 11. FILES I/O

- 11.1. Printing to the Screen
- 11.2. Reading Keyboard Input
- 11.3. Uses of input Function
- 11.4. Describe Opening and Closing Files
- 11.5. Explain Reading and Writing Files

### **Practical:**

**Perform skill to create, compile, debug & execute programs to solve specific problems.**

#### **1. Simple programs using basic structure of a programming Language (Python).**

- 1.1. A program for printing a message.
- 1.2. A program for adding two integer numbers.

#### **2. Simple programs using variables**

- 2.1. A program to calculate the average of a set of N numbers.
- 2.2. A program to convert the given temperature in Fahrenheit to Celsius and vice versa.
- 2.3. A program to calculate the area of a circle.
- 2.4. Write similar programs using variables.

#### **3. programs using operators**

- 3.1. A program to convert days to months and days.
- 3.2. A program to calculate the area of a triangle.
- 3.3.** A program to compare two integer numbers.
- 3.4. Write similar programs using operators.

#### **4. Programs using Branching Statements.**

- 4.1. A program to select and print the largest of the three numbers.
- 4.2. A program to compute the roots of a quadratic equation.
- 4.3. Write similar programs using Branching Statements.

#### **5. Programs using Looping Statements**

- 5.1. A program to print odd or even numbers from 1 to 100.
- 5.2. A program to find the maximum or minimum number from a set of numbers
- 5.3. A program for searching prime numbers.
- 5.4. Write similar programs using Loop Statements.

## **6. Programs using Lists.**

- 6.1. A program to sort numbers in ascending or descending order using one dimensional array.
- 6.2. A program to print numbers in two dimensional forms.
- 6.3. Write similar programs using Lists.

## **7. Programs using functions.**

- 7.1. A program to calculate the area of a triangle using function.
- 7.2. A program that uses a function to sort an array of integers.
- 7.3. A program to calculate factorial of any integer using recursive function.
- 7.4. Write similar programs using functions.

## **8. Programs using files.**

- 8.1. A program to store information to or to read information from file.
- 8.2. Write similar programs using files.

## **Reference books:**

1. Learning Python – Mark Lutz
2. Website List:
  - [http:// python.howtocode.com.bd](http://python.howtocode.com.bd)
  - [http:// www.learnpython.org](http://www.learnpython.org)
  - <http://pythontutor.com>

**66632**

**Web Design**

<b>T</b>	<b>P</b>	<b>C</b>
<b>0</b>	<b>6</b>	<b>2</b>

### **Objectives**

**To be able to perform Web Design.**

**To be able to perform Design to HTML.**

### **Short Description**

This Subject covers the knowledge, skills and attitudes required to –

- Enter text and graphic medias for the webpage using HTML (Hypertext Mark-up Language) and check the completed website for QA (Quality Assurance) using latest common browsers.
- Use advanced web editing software's to design and develop interactive websites and check the completed website for accuracy using common browsers.
- Convert design (.psd, in design, image etc) to HTML and check the completed HTML for accuracy using common browsers.
- Add animations for website using CSS3, HTML5 or latest.
- Develop Cascading Style Sheets (CSS) that are linked to a HTML document in order to externally define and control styles and structure to enhance and achieve commonality among web documents, and check compatibility of the completed CSS with common browsers.
- Add and edit animations for website using common front end framework.
- Enter dynamic features for the Client Side Dynamic Web page using JavaScript and check the completed website for accuracy using common browsers.

## **1. Create and Edit Webpage Using HTML**

### **1.1. Follow OSH practices**

- 1.1.1. Safe work practices are observed as according to workplace procedures.
- 1.1.2. OSH hazards and incidents are reported to appropriate personnel according to workplace procedures.
- 1.1.3. Turn on your PC properly.

### **1.2. Plan a website to meet client requirements.**

- 1.2.1. The purpose and intended audience of the website are identified.
- 1.2.2. The design requirements and constraints are identified.
- 1.2.3. A conceptual design is developed.
- 1.2.4. Necessary software installed and checks other requirement.

### **1.3. Create the website using hypertext mark-up language in accordance with the design specifications.**

- 1.3.1. Structure and element tags are added and attributes are assigned to meet client requirements in terms of the layout and formatting of the pages and enhancements using given templates and follow the web standards.
- 1.3.2. Webpage content are added to the site, and also formatted in accordance with client requirements and be aware of legislation.
- 1.3.3. Hyperlinks are added to allow successful navigation between the pages of the website.
- 1.3.4. A sitemap is created that allows for ease of access to content
- 1.3.5. The website is saved to a file by use of the program tools available for the task.

### **1.4. Test the website.**

- 1.4.1. The website is tested to ensure functionality, correct any errors and log in according to the testing procedures in the plan.
- 1.4.2. The website is opened in a variety of common browsers and check for accessibility, readability, legibility and presentation in accordance with client requirements.
- 1.4.3. The website is evaluated for fitness for purpose in terms of the purpose, target audience and specifications of client requirements.

## **2. Use web design and content guidelines**

- 2.1. Plan a website to meet the client requirements.
  - 2.1.1. The purpose and intended audience of the website are identified.
  - 2.1.2. The design requirements and constraints are identified.
  - 2.1.3. A conceptual design is developed.
  - 2.1.4. Necessary software installed and checks other requirement.
- 2.2. Select web editing softwares
  - 2.2.1. Appropriate web editing software is started.
  - 2.2.2. A virtual web folder is created in application server
  - 2.2.3. A website project is created in editing tool
- 2.3. Create the website using templates
  - 2.3.1. Use appropriate front end design framework i.e. Twitter bootstrap, Zurb Foundation, uikit etc.
  - 2.3.2. Structure and element tags are added and attributes are assigned to meet client requirements in terms of the layout and formatting of the pages and enhancements using given design templates.
  - 2.3.3. Contents (Text and graphics) are added to the site, and also formatted in accordance with client requirements by maintain standards and be aware of legislation.
  - 2.3.4. Hyperlinks are added to allow successful navigation between the pages of the website.
  - 2.3.5. A sitemap is created that allows for ease of access to content
  - 2.3.6. The website is saved to a file by use of the program tools available for the task.
- 2.4. Test the website.
  - 2.4.1. The website is tested to ensure functionality, correct any errors and log in according to the testing procedures in the plan.
  - 2.4.2. The website is opened in a variety of common browsers and check for accessibility, readability, legibility and presentation in accordance with client requirements.
  - 2.4.3. The website is evaluated for fitness for purpose in terms of the purpose, target audience and specifications of client requirements.



### **3. Convert design to HTML**

#### 3.1. Plan a website to meet client requirements.

- 3.1.1. The purpose and intended audience of the website are identified.
- 3.1.2. The design requirements and constraints of using provided templates are identified.
- 3.1.3. Required design is developed.
- 3.1.4. Necessary software installed and checks other requirement.

#### 3.2. Convert design to HTML.

- 3.2.1. The given design template is converted into the required format (image, text etc).
- 3.2.2. Website layout developed.
- 3.2.3. Web content (image, text etc) placed into the right position by using proper HTML tags.
- 3.2.4. Content is formatted properly by maintain standards and be aware of legislation.
- 3.2.5. Structure and element tags are added and attributes are assigned to meet the specifications of the brief in terms of the enhancements, layout and formatting of the pages using given design.
- 3.2.6. Hyperlinks are added to allow successful navigation between the pages of the website.
- 3.2.7. The HTML file is named properly and saved in a proper location.

#### 3.3. Test the website.

- 3.3.1. The website is tested to ensure functionality, correct any errors and log in according to the testing procedures in the plan.
- 3.3.2. The website is opened in a variety of common browsers and check for accessibility, readability, legibility and presentation in accordance with client requirements.
- 3.3.3. The website is evaluated for fitness for purpose in terms of the purpose, target audience and specifications of client requirements.

### **4. Use Web Animation (Basic level)**

#### 4.1. Select appropriate language to create animation.

- 4.1.1. Appropriate animation language file is attached.
- 4.1.2. Necessary plug-ins are installed. (animate.css)
- 4.1.3. Necessary software installed and checks other requirement.

#### 4.2. Use animation in the website

- 4.2.1. Appropriate style sheet is added to the project.
- 4.2.2. Animation is applied onto the website by maintain standards and be aware of legislation.

#### 4.3. Animation test

- 4.3.1. The animation is tested to ensure functionality, correct any errors and log in according to the testing procedures in the plan.
- 4.3.2. The website is opened in a variety of common browsers and check for accessibility, readability, legibility and presentation in accordance with client requirements.
- 4.3.3. The website is evaluated for fitness for purpose in terms of the purpose, target audience and specifications of client requirements.

## **5. Develop Cascading Style Sheet (CSS)**

### 5.1. Determine Purpose and Accessibility

- 5.1.1. Plan to purpose of the HTML document is identified.
- 5.1.2. The IDE where the CSS will be used is identified and necessary software installed and checks other requirement.
- 5.1.3. Accessibility options are identified and determine for visually, physically or otherwise impaired persons.

### 5.2. Set styles

- 5.2.1. Appropriate styles that are to be controlled by the CSS are identified.
- 5.2.2. The styles are defined and documented in accordance with established design principles or business guidelines.

### 5.3. Create CSS

- 5.3.1. CSS is created using the determined styles by maintain standards and be aware of legislation.
- 5.3.2. CSS is edited and changes are confirmed in linked HTML document
- 5.3.3. CSS is tested / validated according to established design principles or business guidelines.  
(<https://jigsaw.w3.org/css-validator>)

### 5.4. Link CSS to HTML documents

- 5.4.1. CSS is linked to the HTML document
- 5.4.2. CSS styles are applied to the mark-up language document.

## **6. Use Web Animation (Intermediate level)**

### 6.1. Select the animation editing tool

- 6.1.1. Appropriate front end framework (slick slider, cycle slider, wow.js, <http://zurb.com/playground/motion-ui>, bootstrap component jQuery or relevant) is determined.
- 6.1.2. Appropriate animation tool is started
- 6.1.3. Necessary plug-ins are installed by maintain standards and be aware of legislation.

### 6.2. Prepare animation using editing tool

- 6.2.1. Plan a conceptual animation flow is determined.
- 6.2.2. Animation is edited and prepared to be implemented in the webpage
- 6.2.3. Necessary software installed and checks other requirement.

### 6.3. Use animation in the website

- 6.3.1. Required and accompanying files are included at right place and appropriate class or id declared plus properly activated.
- 6.3.2. The website is opened in a variety of common browsers and check for accessibility, readability, legibility and presentation in accordance with client requirements.

**7. Develop a Client Side Dynamic Webpage using JavaScript (Basic Level)**

- 7.1. Plan the dynamic features to be added to a website to meet client requirements.
  - 7.1.1. Plan the purpose and intended audience of the website are identified.
  - 7.1.2. The design requirements and constraints are identified.
  - 7.1.3. A conceptual design is developed.
  - 7.1.4. Necessary software installed and checks other requirement.
- 7.2. Add JavaScript to the website in accordance with the design specifications.
  - 7.2.1. JavaScript element is added and attributes are assigned to meet client requirements in terms of the layout and formatting of the pages and enhancements.
  - 7.2.2. Interactivity is added, edited and formatted to the website in accordance with client requirements.
  - 7.2.3. Dynamic content is added in each and every page, if required, in accordance with client requirements.
  - 7.2.4. The website is saved to a file by use of the program tools available for the task.
- 7.3. Test the website.
  - 7.3.1. The theme is tested to ensure compatibility, functionality, correct any errors and log in according to the testing procedures in the plan.
  - 7.3.2. The theme is opened in a variety of common browsers and check for accessibility, readability, legibility and presentation in accordance with client requirements.
  - 7.3.3. The theme is evaluated for fitness for purpose in terms of the purpose, target audience and specifications of client requirements.

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Graphic Design II

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## Objectives

To be able to perform Design.

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### Short Description

This Subject covers the knowledge, skills and attitude required to –

- Demonstrate creative Design work using multiple Graphics Design Software
- Create Template using Graphic Design Software.
- Develop graphics incorporating a range of features for cross-media publishing based on a client brief using a high-end application.
- Find recent developments in Graphic Design.

## 1. Perform creative design work using multiple Graphics Design Software

### 1.1. Follow OSH practices

- 1.1.1. Safe work practices are observed according to workplace procedures
- 1.1.2. OSH hazards and incidents are reported to appropriate personnel according to workplace procedures.

### 1.2. Preparations

- 1.2.1. Specify the required Creative Design work
- 1.2.2. Identify multiple Graphics Design Software as per requirement
- 1.2.3. Collect required contents
- 1.2.4. Identify appropriate Tools and arrange them as needed

### 1.3. Initiate Design work

- 1.3.1. Set ruler/unit/Grids/Guides as per requirement
- 1.3.2. Prepare Key Drawing / Design Layout as per requirement
- 1.3.3. Set Various Marks for Illustration Software
- 1.3.4. Apply Layer lock
- 1.3.5. Transfer Design Layout to Photo Editing Software

### 1.4. Create Design Background

- 1.4.1. Set resolution and colour mode as per requirement
- 1.4.2. Set guides to Photo Editing Software for designing background as required
- 1.4.3. Insert graphical contents for designing background as required
- 1.4.4. Manipulate graphical contents
- 1.4.5. Apply effects as per requirement
- 1.4.6. Save the Design for further use in appropriate File Format

### 1.5. Complete Design

- 1.5.1. Place and link the Design Background to Illustration Software
- 1.5.2. Insert vector related contents
- 1.5.3. Apply font attributes and typographical design
- 1.5.4. Apply Design Principles as per requirements

- 1.5.5. Complete the Design work
- 1.6. Review and Finalize
  - 1.6.1. Use Artwork and Preview
  - 1.6.2. Use Layer Hide-Unhide option
  - 1.6.3. Create Outline and Group
  - 1.6.4. Save in appropriate File Format
  - 1.6.5. Transfer the image to recipient

## **2. Create Template using Graphic Design Software**

- 2.1. Analyse design brief
  - 2.1.1. Client's design brief is analysed and the requirements are identified
  - 2.1.2. Key devices are selected and collected as per job requirements
- 2.2. Arrange elements on a page
  - 2.2.1. Page layout application software are selected
  - 2.2.2. Client copy, images, basic elements are created and assembled to conform to the design brief
  - 2.2.3. Text is prepared and required fonts and font size are used
  - 2.2.4. The help function is accessed if required and solution to queries found
  - 2.2.5. Document set up is completed to conform to the design brief.
- 2.3. Finalise artwork
  - 2.3.1. Additional text are manipulated and added
  - 2.3.2. Pages and combined elements are composed correctly to suit specified page size
  - 2.3.3. Artworks are outlined.
  - 2.3.4. Bleed allowance, margins and borders are incorporated as per workplace standard
  - 2.3.5. Character and paragraph attributes are added and changed as per job requirements.
- 2.4. Check quality
  - 2.4.1. Text is reviewed for possible errors and omissions and errors are corrected
  - 2.4.2. A hard copy proof is printed and rechecked for errors, omissions and the overall balance of the layout and correct tonal quality
  - 2.4.3. Trim marks and margins are correctly placed
  - 2.4.4. Necessary changes are made and reviewed on screen and re-proofed as required
  - 2.4.5. The job is saved according to enterprise procedures
  - 2.4.6. A proof or PDF is created

## **3. Develop materials for output**

- 3.1. Create balance image quality and file size
  - 3.1.1. Key devices are selected & collected as per job requirements.
  - 3.1.2. Graphic software are selected as per requirements
  - 3.1.3. Graphics files are opened and design brief requirements are confirmed.
  - 3.1.4. Graphics are repeated efficiently using a symbol or stamp to reduce file size
  - 3.1.5. Slices are created from objects, layers or groups and updated as required
  - 3.1.6. Type anti-aliasing is demonstrated.
  - 3.1.7. Tasks are automated and where necessary scripts are used for automation.
- 3.2. Manipulate objects and text.
  - 3.2.1. Objects and text are manipulated and edited according to design brief.
  - 3.2.2. Repetition tools are identified and used to create duplicates and then are manipulated as a

group

- 3.2.3. Complex shapes are created and edited.
- 3.2.4. Retouching elements are used
- 3.3. Import images
  - 3.3.1. Bitmap images are embedded and / or linked in the file
  - 3.3.2. Placed Bitmaps are modified and / or duplicated according to design requirements
  - 3.3.3. Bitmaps are masked and / or an opacity mask is added
  - 3.3.4. Layered file is exported to image editing program and edited
- 3.4. Develop variable templates
  - 3.4.1. Based on the design brief, objects are identified within the template as variables
  - 3.4.2. An automated script or an image server is used to ensure variations, using data stored in any ODBC-compliant source
  - 3.4.3. The template variables are tested to ensure correct operation.
- 3.5. Separate Colour artwork
  - 3.5.1. The correct format for the colour separation is determined by the requirements of the pre-press workflow system
  - 3.5.2. Command preferences are set to correct preferences for print quality and process
  - 3.5.3. Based on printer feedback the colour separation options are set according to print requirements of the design brief
  - 3.5.4. Process and spot colours are combined as required
- 3.6. Prepare for final media
  - 3.6.1. A screen frequency value appropriate for the print quality is selected and colour separation preferences are saved
  - 3.6.2. Spreads and chokes traps are created to avoid mis-registration
  - 3.6.3. The overlapping and overprint of objects are defined
  - 3.6.4. A proof is created and the separations checked, any required editing is completed and the file is saved
  - 3.6.5. Metadata tags are embedded to catalogue, organise and retrieve artwork
  - 3.6.6. For cross-media publishing purposes web-safe colours are selected
  - 3.6.7. File formats are chosen to best represent artwork styles
  - 3.6.8. Objects are linked to create an image map that meets design requirements
  - 3.6.9. Objects are layered to create animation frames and exported for animation set up
  - 3.6.10. Compression options are selected that keep the image quality high and the file size low.
  - 3.6.11. Export options are set to the best settings for the final media and the file is saved and exported

#### **4. Find and use recent developments of tools and procedure in graphic Design**

- 4.1. Search for new Developments
  - 4.1.1. Use Internet and other sources to find new Software or Software Versions
  - 4.1.2. Identify the new developments or the new Versions
- 4.2. Determine the new developments in design arena.
  - 4.2.1. Compare the new tools with the old ones
  - 4.2.2. Find Tutorials/Learning Materials for the new tools
- 4.3. Adopt the new Developments
  - 4.3.1. Use the new tools on a trial basis to identify the developments
  - 4.3.2. Identify the benefits that the new tools can provide
  - 4.3.3. Adopt the new tools for professional use

**AIMS**

- To develop knowledge & skills on codes and binary arithmetic operation.
- To provide knowledge & skills on logic gates, logic circuits, Boolean algebra and logic families.
- To assist to acquire the knowledge & skills on combinational logic circuit.
- To acquire knowledge & skills on Registers, Counters, Memories, Converters.

**SHORT DESCRIPTION**

Basic concept of digital electronics; Logic gates, Boolean algebra and logic simplification & Combinational logic circuits.

**DETAIL DESCRIPTION****1 Understand basic concept of digital electronics.**

- 1.1 Define digital electronics & Digital Signal.
- 1.2 Mention the characteristics of digital signal.
- 1.3 Describe the advantages of working in digital mode.
- 1.4 Define logic level of digital signal.
- 1.5 Identify DC voltage level of digital signal.
- 1.6 Describe parameters of a digital pulse waveform such as rise time, fall time, pulse width and duty cycle.

**2 Understand the binary arithmetic operation.**

- 2.1 Define decimal, binary, octal and hexadecimal number system
- 2.2 Define BCD code, Excess-3 code, Gray code, Hamming code, Unicode, and ASCII code.
- 2.3 Practice the conversion of one code to another.
- 2.4 Describe the addition and subtraction of BCD coded number and Excess-3 code.
- 2.5 State parity checked code and Hamming code.
- 2.6 Describe the error detection and correction with parity checked code.

**3 Understand the concept of Logic gates.**

- 3.1 Define logic gate.
- 3.2 Classify logic gate.
- 3.3 Explain logical statement, truth table, Boolean equation and symbol of AND, OR, NOT, NOR, NAND, EX-OR and EX-NOR gates.
- 3.4 Show that NAND & NOR gates used as Universal logic gates.
- 3.5 State the applications of logic gates.

**4 Understand the features of the logic families and digital IC's.**

- 4.1 Classify logic families.
- 4.1 Define SSI, MSI, LST and VLSI.
- 4.2 Describe Transistor logic families (DTL & TTL).
- 4.3 Describe MOS logic families (P-MOS, N-MOS & C-MOS)
- 4.4 State the characteristics of digital IC's.

- 4.5 State the meaning of the terms propagation delay time, speed, noise immunity, power dissipation, fan-in, fan-out, operating temperature and power rating of logic circuits.

**5 Understand the concepts of electronic circuit of logic gates & logic IC's.**

- 5.1 Describe the operation of standard TTL NAND gate.  
5.2 Describe the operation of CMOS NAND & NOR gates.  
5.3 State special logic gates such as buffer, tri-state and expandable gates.  
5.4 Describe fixed function Integrated circuit IC's such as AND, OR, NAND etc.  
5.5 Mention IC package, code numbers, and important specification of TTL/MOS commercial IC gates.

**6 Understand logic simplification & design of digital circuit.**

- 6.1 State the theorems of Boolean algebra.  
6.2 State Demorgan's theorems and its applications.  
6.3 Determine the terms-Sum of Product (SOP) form and Product Of Sum (POS) form.  
6.4 Determine the SOP & POS form from truth table.  
6.5 Mention the basic principle of ORing and ANDing.  
6.6 Define Karnaugh Map.  
6.7 State the structure of Karnaugh map.  
6.8 State the simplification process of Boolean expression from a K-map and design logic circuit (up to 4 variables).

**7 Understand Various combinational logic circuits.**

- 7.1 Define combinational logic circuit with example.  
7.2 Describe the operation of half adder and half Sub tractor.  
7.3 Describe the operation of full adder and full Sub tractor.  
7.4 Describe the operation of 4 bit parallel adder.  
7.5 Describe the operation of 4 bit subtraction circuit.  
7.6 Describe the operation of 4 bit BCD adder.  
7.7 Describe the operation of multipliers & divisors.  
7.8 Mention the application of combinational logic circuit.



**8 Understand the concepts of encoder, decoder and display devices.**

- 8.1 Define Encoder and Decoder.
- 8.2 Describe the operation of encoder and decoder circuit.
- 8.3 State the principle of operation of LCD, LED, seven-segment and dot matrix display.
- 8.4 Describe the operation of commonly used 4-bit BCD decoder/driver for seven segment display of common anode/cathode type.
- 8.5 Application of Encoder and Decoder.

**9 Understand the features of multiplexers and demultiplexer.**

- 9.1 Define multiplexers and demultiplexer.
- 9.2 Describe the operation of 2:1, 4:1 and 8:1 multiplexer with logic diagram.
- 9.3 Describe the operation of 1:2, 1:4 and 1:8 demultiplexer with logic diagram.
- 9.4 State the use of multiplexer & demultiplexer.
- 9.5 Explain the operation of Binary comparator.

**10 Understand the features of sequential logic circuits.**

- 10.1 Define sequential logic circuit
- 10.2 State the terms clock, timing diagram & latch of digital system.
- 10.3 Explain the operation of basic SR latch, D flip-flop, clocked flip-flop, J-K flip-flop, Toggle operation & J-K master-slave flip-flop.
- 10.4 State the concept of positive & negative edge triggering and level triggering,
- 11.8 Describe the pin diagram of commonly used flip-flop IC's.

**11 Understand the concepts of Data shift registers & counters.**

- 11.1 Define Data shift registers & counters
- 11.2 State the operation of Shift right, shift left, SISO, SIPI, PISO, PIPO & universal shift register.
- 11.3 State the operation of 4-bit Up/Down counter, MOD counter, Programmable counter.
- 11.4 Application of registers & counters.

**12 Understand the concepts of Memories.**

- 12.1 Define Memories.
- 12.2 Classify Memories.
- 12.3 Explain the internal organization of semiconductor memory.
- 12.4 State the operation of static and dynamic RAM.
- 12.5 Describe the principle and operation of ROM, PROM, EPROM and EEPROM.
- 12.6 List the application of some commercial memory ICs.

**13 Understand D/A converter.**

- 13.1 State the principle of D/A conversion.
- 13.2 Mention the types of D/A converter.
- 13.3 Explain the operation of a binary weighted D/A and R-2R ladder D/A converter.
- 13.4 State the terms – resolution and accuracy, offset error and settling time of D/A converter.
- 13.5 State the application of D/A converter.

**14 Understand A/D converter.**

- 14.1 State the principle of A/D conversion.
- 14.2 List the type of A/D converter.
- 14.3 State the working principle of 3-bit parallel A/D converter.
- 14.4 Describe the operation of Digital Ramp A/D converter
- 14.5 Explain the operation of successive approximation and dual slope A/D converter.
- 14.6 State the terms – resolution, accuracy, and conversion time of A/D converter.
- 14.7 List the applications of popular A/D converter ICS.
- 14.8 Describe the operation of sample & hold circuits and its application.

***Practical :***

**1 To verify the truth tables of logic gates (OR, AND, NOT, NAND & NOR)**

- 1.1 Select logic gate ICs.
- 1.2 Select appropriate circuits, required tools, equipments and materials.
- 1.3 Insert the selected ICs to the Breadboard.
- 1.4 Connect the circuits as per diagram.
- 1.5 Switch on the DC power supply,
- 1.6 Verify the truth tables.

**2 To verify the Truth table of X-OR & X-NOR gate using basic gates.**

- 2.1 Select logic gate ICs.
- 2.2 Select appropriate circuits, required tools, equipments and materials.
- 2.3 Insert the selected ICs to the Breadboard.
- 2.4 Connect the circuits as per diagram.
- 2.5 Switch on the DC power supply,
- 2.6 Verify the truth tables.

**3 To Show the operation of NAND & NOR gate as universal gates.**

- 3.1 Select logic gate ICs of NAND gate & NOR gate.
- 3.2 Select appropriate circuits, required tools, equipments and materials.
- 3.3 Insert the selected ICs to the Breadboard.
- 3.4 Connect the circuits as per diagram for AND OR & NOT gate.
- 3.5 Switch on the DC power supply,
- 3.6 Verify the truth tables of AND OR & NOT gate operation.

**4 To design & develop a code converter circuits and observe its output operation.**

- 4.1 Select logic gate ICs.
- 4.2 Select appropriate circuits, required tools, equipments and materials.
- 4.3 Insert the selected ICs to the Breadboard.
- 4.4 Connect the circuits as per diagram.
- 4.5 Switch on the DC power supply,
- 4.6 Verify the truth tables

- 5 To verify the functions of half adder & half sub tractor.**
  - 5.1 Select ICs.
  - 5.2 Select required tools, equipments and materials.
  - 5.3 Draw the pin diagram and internal connection.
  - 5.4 Insert the selected ICs to the Breadboard.
  - 5.5 Draw appropriate circuits.
  - 5.6 Connect the circuits as per diagram.
  - 5.7 Switch on the DC power supply,
  - 5.8 Verify the truth tables.
  
- 6 To verify the functions of full adder & full sub tractor.**
  - 6.1 Select ICs.
  - 6.2 Select required tools, equipments and materials.
  - 6.3 Insert the selected ICs to the Breadboard.
  - 6.4 Draw the pin diagram and internal connection.
  - 6.5 Draw appropriate circuits.
  - 6.6 Connect the circuits as per diagram.
  - 6.7 Switch on the DC power supply,
  - 6.8 Verify the truth tables.
  
- 7 To verify the output operation of binary 4 bit parallel adder.**
  - 7.1 Select appropriate ICs.
  - 7.2 Select required tools, equipments and materials.
  - 7.3 Insert the selected ICs to the Breadboard.
  - 7.4 Draw the pin diagram and internal connection.
  - 7.5 Draw appropriate circuits.
  - 7.6 Connect the circuits as per diagram.
  - 7.7 Switch on the DC power supply,
  - 7.8 Verify the truth tables.
  
- 8 To Show the operation of encoder & decoder.**
  - 8.1 Select appropriate ICs.
  - 8.2 Select required tools, equipments and materials.
  - 8.3 Insert the selected ICs to the Breadboard.
  - 8.4 Draw the pin diagram and internal connection.
  - 8.5 Draw appropriate circuits.
  - 8.6 Connect the circuits as per diagram.
  - 8.7 Switch on the DC power supply,
  - 8.8 Verify the truth tables.
  
- 9 To Show the operation of a decoder driver & display operation using 7 segment display.**
  - 9.1 Select appropriate ICs.
  - 9.2 Select required tools, equipments and materials.
  - 9.3 Insert the selected ICs to the Breadboard.
  - 9.4 Draw the pin diagram and internal connection.
  - 9.5 Draw appropriate circuits.
  - 9.6 Connect the circuits as per diagram.
  - 9.7 Switch on the DC power supply,
  - 9.8 Verify the truth tables.
  
- 10 To Show the operation of multiplexer & demultiplexer.**
  - 10.1 Select appropriate ICs.
  - 10.2 Select required tools, equipments and materials.

- 10.3 Insert the selected ICs to the Breadboard.
- 10.4 Draw the pin diagram and internal connection.
- 10.5 Draw appropriate circuits.
- 10.6 Connect the circuits as per diagram.
- 10.7 Switch on the DC power supply,
- 10.8 Verify the truth tables.

**11 To verify the truth table of different S-R & D flip-flops.**

- 11.1 Select appropriate ICs.
- 11.2 Select required tools, equipments and materials.
- 11.3 Insert the selected ICs to the Breadboard.
- 11.4 Draw the pin diagram and internal connection.
- 11.5 Draw appropriate circuits.
- 11.6 Connect the circuits as per diagram.
- 11.7 Switch on the DC power supply,
- 11.8 Verify the truth tables.

**12 To verify the truth table of different J-K flip-flops.**

- 12.1 Select appropriate ICs.
- 12.2 Select required tools, equipments and materials.
- 12.3 Insert the selected ICs to the Breadboard.
- 12.4 Draw the pin diagram and internal connection.
- 12.5 Draw appropriate circuits.
- 12.6 Connect the circuits as per diagram.
- 12.7 Switch on the DC power supply.
- 12.8 Verify the truth tables.
- 12.9 Observe the Toggle operation in JK flip-flop.

- 13 To verify the operation of Binary comparator.**
- 13.1 Select appropriate ICs.
  - 13.2 Select required tools, equipments and materials.
  - 13.3 Insert the selected ICs to the Breadboard.
  - 13.4 Draw the pin diagram and internal connection.
  - 13.5 Draw appropriate circuits.
  - 13.6 Connect the circuits as per diagram.
  - 13.7 Switch on the DC power supply,
  - 13.8 Verify the truth tables.
- 14 To verify the operation of Different Shift Registers.**
- 14.1 Select appropriate ICs.
  - 14.2 Select required tools, equipments and materials.
  - 14.3 Insert the selected ICs to the Breadboard.
  - 14.4 Draw the pin diagram and internal connection.
  - 14.5 Draw appropriate circuits of shift registers.
  - 14.6 Connect the circuits as per diagram.
  - 14.7 Switch on the DC power supply.
  - 14.8 Verify the truth tables.
- 15 To verify the operation of Different Memories.**
- 15.1 Select appropriate ICs.
  - 15.2 Insert the selected ICs to the Breadboard.
  - 15.3 Draw the pin diagram and internal connection.
  - 15.4 Draw appropriate circuits.
  - 15.5 Select required tools, equipments and materials.
  - 15.6 Connect the circuits as per diagram.
  - 15.7 Switch on the DC power supply,
  - 15.8 Verify the Memory Read/Write operations.
- 16 To verify the operation of Different Counters.**
- 16.1 Select appropriate ICs.
  - 16.2 Insert the selected ICs to the Breadboard.
  - 16.3 Draw the pin diagram and internal connection.
  - 16.4 Draw appropriate circuits.
  - 16.5 Select required tools, equipments and materials.
  - 16.6 Connect the circuits as per diagram.
  - 16.7 Switch on the DC power supply,
  - 16.8 Verify the truth tables.

## **REFERENCE BOOKS**

1. Digital Fundamentals-Thomas L. Floyd
2. Digital Principles– Roger L. Tokhem
3. Digital system – Ronald J. Tocci and Widmer.
4. Principle of Digital Electronics & Application - Malvino
5. Digital Systems: Principles and Applications – Ronald J, Tocci, Neal Widmer, Greg Moss
6. Schaums Outline Introduction to Digital Systems -- James Palmer, David Perlman

## AIMS

- To enable to calculate the areas of regular polygons, hexagons, octagon, hydraulic mean depth (HMD) of a channel, area occupied by water of circular culvert. Excavation work.
- To provide the ability to calculate volume of regular solids like pyramid frustum of pyramid, prismoid, wedge and area of curved surfaces.
- To enable to use the knowledge of gradient of a straight line in finding speed, acceleration etc.
- To enable to use the knowledge of conic in finding the girder of a railway bridge, cable of a suspension bridge and maximum height of an arch.
- To make understand the basic concept and techniques of composition and resolution of vectors and computing the resultant of vectors.

- **SHORT DESCRIPTION**

**Menstruation :** Area of rectangles, squares, triangles, quadrilaterals, parallelograms, rhombus, trapezium, circle, sector, segment; Volume of rectangular solids, prism, parallelepiped, pyramids, cones, spheres, frustum of pyramid and cone; Area of curved surface of prism, Cylinder cone, pyramid and frustum of cone.

**Co-ordinate Geometry:** Co-ordinates of a point, locus and its equation, straight lines, circles and conic.

**Vector:** Addition and subtraction, dot and cross product.

**DETAIL DESCRIPTION****MENSURATION:****1 Apply the concept of area of triangle.**

1.1 Find the area of triangle in the form,

i)  $A = \frac{\sqrt{3}}{4} a^2$ , a = length of a side of equilateral triangle.

ii)  $A = \frac{c}{4} \sqrt{4a^2 - c^2}$ , where a = length of equal sides, c = third side.

iii)  $A = \sqrt{s(s-a)(s-b)(s-c)}$ , where a, b, c = length of the sides of a triangle and 2s is the perimeter of the triangle.

1.2 Use formula in 1.1 to solve problems.

**2 Apply the concept of finding areas of quadrilateral & Parallelogram & finding areas of rhombus & trapezium.**

2.1 Define quadrilateral & Parallelogram.

2.2 Find the areas of quadrilateral when off sets are given.

2.3 Find the areas of a parallelogram.

2.4 Solve problems using above formulae.

2.5 Define rhombus & trapezium.

2.6 Find the areas of rhombus when the diagonals are given.

2.7 Find the areas of trapezium in terms of its parallel sides and the perpendicular distance between them.

2.8 Solve problems related to rhombus & trapezium.

**3 Apply the concept of finding areas of regular polygon.**

3.1 Define a regular polygon.

3.2 Find the area of a regular polygon of n sides, when

i) The length of one side and the radius of inscribed circle are given.

ii) The length of one side and the radius of circumscribed circle are given.

3.3 Find the area of a regular.

a) Hexagon

b) Octagon when length of side is given.

3.4 Solve problems of the followings types:

A hexagonal polygon 6 m length of each side has a 20 cm width road surrounded the polygon. Find the area of the road.

**4 Understand areas of circle, sector and segment.**

- 4.1 Define circle, circumference, sector and segment.
- 4.2 Find the circumference and area of a circle when its radius is given.
- 4.3 Find the area of sector and segment of a circle.
- 4.4 Solve problems related to the above formulae.

**5 Apply the concept of volume of a rectangular solid.**

- 5.1 Define rectangular solid and a cube.
- 5.2 Find geometrically the volume of a rectangular solid when its length, breadth and height are given.
- 5.3 Find the volume and diagonal of a cube when side is given.
- 5.4 Solve problems with the help of 6.2 & 6.3.

**6 Apply the concept of surface area, volume of a prism, parallelepiped and cylinder.**

- 6.1 Define a prism, parallelepiped and a cylinder.
- 6.2 Explain the formulae for areas of curved surfaces of prism, parallelepiped and cylinder.
- 6.3 Explain the formulae for volume of prism, parallelepiped and cylinder when base and height are given.
- 6.4 Solve problems related to 7.2, 7.3.

**7 Apply the concept of the surface area, volume of pyramid, cone and sphere.**

- 7.1 Define pyramid, cone and sphere.
- 7.2 Explain the formula for areas of curved surfaces of pyramid, cone and sphere.
- 7.3 Explain the formula for volumes of pyramid, cone and sphere.
- 7.4 Solve problems related to 8.2, 8.3.

**CO-ORDINATE GEOMETRY**

**8 Apply the concept of co-ordinates to find lengths and areas.**

- 8.1 Explain the co-ordinates of a point.
- 8.2 State different types of co-ordinates of a point.
- 8.3 Find the distance between two points  $(x_1, y_1)$  and  $(x_2, y_2)$ .
- 8.4 Find the co-ordinates of a point which divides the straight line joining two points in certain ratio.
- 8.5 Find the area of a triangle whose vertices are given.
- 8.6 Solve problems related to co-ordinates of points and distance formula.

**9 Apply the concept of locus & the equation of straight lines in calculating various Parameter.**

- 9.1 Define locus of a point.
- 9.2 Find the locus of a point.
- 9.3 Solve problems for finding locus of a point under certain conditions.
- 9.4 Describe the Equation  $x=a$  and  $y=b$  and slope of a straight line.
- 9.5 Find the slope of a straight line passing through two point  $(x_1, y_1)$  and  $(x_2, y_2)$ .
- 9.6 Find the equation of straight lines:
  - (i) Point slope form.
  - (ii) Slope Intercept form.
  - (iii) Two points form.
  - (iv) Intercept form.
  - (v) Perpendicular form.
- 9.7 Find the point of intersection of two given straight lines.
- 9.8 Find the angle between two given straight lines.
- 9.9 Find the condition of parallelism and perpendicularity of two given straight lines.
- 9.10 Find the distances of a point from a line.

**10 Apply the equations of circle, tangent and normal in solving problems.**

- 10.1 Define circle, center and radius.  
 10.2 Find the equation of a circle in the form:  
 (i)  $x^2 + y^2 = a^2$   
 (ii)  $(x - h)^2 + (y - k)^2 = a^2$   
 (iii)  $x^2 + y^2 + 2gx + 2fy + c = 0$   
 10.3 Find the equation of a circle described on the line joining  $(x_1, y_1)$  and  $(x_2, y_2)$ .  
 10.4 Define tangent and normal.  
 10.5 Find the condition that a straight line may touch a circle.  
 10.6 Find the equations of tangent and normal to a circle at any point.  
 10.7 Solve the problems related to equations of circle, tangent and normal.

**11 Understand conic or conic sections.**

- 11.1 Define conic, focus, Directorx and Eccentricity.  
 11.2 Find the equations of parabola, ellipse and hyperbola.  
 11.3 Solve problems related to parabola, ellipse and hyperbola.

**VECTOR :****12 Apply the theorems of vector algebra.**

- 12.1 Define scalar and vector.  
 12.2 Explain null vector, free vector, like vector, equal vector, collinear vector, unit vector, position vector, addition and subtraction of vectors, linear combination, direction cosines and direction ratios, dependent and independent vectors, scalar fields and vector field.  
 12.3 Prove the laws of vector algebra.  
 12.4 Resolve a vector in space along three mutually perpendicular directions  
 12.5 Solve problems involving addition and subtraction of vectors.

**13 Apply the concept of dot product and cross product of vectors.**

- 13.1 Define dot product and cross product of vectors.  
 13.2 Interpret dot product and cross product of vector geometrically.  
 13.3 Deduce the condition of parallelism and perpendicularity of two vectors.  
 13.4 Prove the distributive law of dot product and cross product of vector.  
 13.5 Explain the scalar triple product and vector triple product.  
 13.6 Solve problems involving dot product and cross product.

**Reference**

SL No	Athour	Title	Publication
01	G. V. Kumbhojkar	Companion to basic Maths	Phadke Prakashan
02	Murary R Spigel	Vector & Tensor Analysis	Schaum's Outline Series
03	Md. Abu Yousuf	Vector & Tensor Analysis	Mamun Brothers
04	Rahman & Bhattacharjee	Co-ordinate Geometry & Vector Analysis	H.L. Bhattacharjee
05	Md. Nurul Islam	Higher Mathematics	Akkhar Patra Prakashani



**OBJECTIVES**

- To develop a foundation in scientific principles and processes for the understanding and application of technology.
- To develop an understanding of fundamental scientific concepts through investigation and experimentation.
- To provide a common base for further studies in technology and science.
- To develop the basic knowledge of modern physics.

**SHORT DESCRIPTION**

Thermometry and Heat Capacity; Expansion of materials (effect of heat); Heat transfer; Humidity; Nature of heat and Thermodynamics; Photometry; Reflection of light; Refraction of light; Electron , photon and Radio activity; Theory of Relativity.

**DETAIL DESCRIPTION****THEORY****1. THERMOMETRY AND HEAT CAPACITY**

- 1.1 Define heat and temperature.
- 1.2 Mention the units of measurement of heat and temperature.
- 1.3 Distinguish between heat and temperature.
- 1.4 Identify the range of the Celsius scale determined by the boiling point and melting point of water
- 1.5 State the construction and graduation of a mercury thermometer.
- 1.6 Define specific heat capacity, thermal capacity and water equivalent with their units.
- 1.7 Prove the total heat gained by an object is equal to the sum of the heat lost by all the surrounding objects.
- 1.8 Explain the principle of calorimetry.
- 1.9 Define various kinds of specific latent heat.
- 1.10 Determine the latent heat of fusion of ice and latent heat of vaporization of water.
- 1.11 Determine the specific heat of a solid by calorimeter.

**2. EFFECT OF HEAT ON DIMENSION OF MATERIALS**

- 2.1 Show that different materials change in size at different amounts with the same heat source.
- 2.2 Explain the meaning of differential expansion in bimetallic strip, thermostats, compensated pendulum etc.
- 2.3 Explain the methods of overcoming problems caused by the expansion of materials in buildings, machinery, railway lines and bridges.
- 2.4 Mention the units co-efficient of linear, superficial and cubical expansion of solids.
- 2.5 Define the co-efficient of linear, superficial and cubical expansion of solids.
- 2.6 Relation between the co-efficient of linear, superficial and cubical expansion of solids.
- 2.7 Define real and apparent expansion of liquid.
- 2.8 Relation between the real and apparent expansion of liquid.

### 3. HEAT TRANSFER

- 3.1 Identify the phenomena of heat transferring from hot bodies to cold bodies.
- 3.2 Explain the methods of heat transfer by conduction, convection and radiation with examples of each type of transfer.
- 3.3 Define thermal conductivity (K) and Co-efficient of thermal conductivity.
- 3.4 Find the unit and dimension of Co-efficient of thermal conductivity.
- 3.5 List the factors which determine the quantity of heat (Q) flowing through a material.
- 3.6 Show that the quantity of heat flowing through a material can be found from
$$Q = \frac{KA (\theta_H - \theta_C)t}{d}$$
- 3.7 State Stefan-Boltzman Law and wien's law.
- 3.8 State Newton's law of cooling.
- 3.9 Explain Green house effect.

### 4. HUMIDITY

- 4.1 Define Standard Temperature and Pressure.
- 4.2 Define Humidity, Absolute Humidity, Relative Humidity and Dewpoint.
- 4.3 Relation between vapour pressure and air pressure.
- 4.4 Determine Humidity by wet and dry bulb hygrometer.
- 4.5 Explain few phenomena related to hygrometry.

### 5. NATURE OF HEAT AND THERMODYNAMICS

- 5.1 Describe the caloric theory and kinetic theory of heat.
- 5.2 Explain the mechanical equivalent of heat.
- 5.3 State and Explain the first law of thermodynamics .
- 5.4 Explain Isothermal and adiabatic change.
- 5.5 Explain Specific heat of a gas, Molar specific heat or molar heat capacity.
- 5.6 Relate between pressure and volume of a gas in adiabatic Change i, e; $PV^\gamma = \text{const.}$
- 5.7 State and Explain Reversible process and irreversible process.
- 5.8 State & explain 2<sup>nd</sup> law of thermodynamics
- 5.9 Entropy: Definition, unit and significant.
- 5.10 Explain Change of entropy in a reversible and irreversible process.
- 5.11 Give an example of increase of entropy in irreversible process.

### 6. PHOTOMETRY

- 6.1 Define light, medium (transparent, translucent, opaque), luminous & non-luminous bodies, parallel, convergent & divergent of rays.
- 6.2 Show the travel of light in straight line.
- 6.3 Define photometry, luminous intensity, luminous flux, brightness and illuminating power.
- 6.4 Mention relation between luminous intensity & illuminating power.
- 6.5 Explain inverse square law of light.
- 6.6 Describe the practical uses of light waves in engineering.

## 7. REFLECTION OF LIGHT

- 7.1 Define mirror (plane & spherical), image (real & virtual) and magnification of images.
- 7.2 Describe the reflection of light.
- 7.3 State the laws of reflection of light.
- 7.4 Express the verification of laws of reflection.
- 7.5 Define pole, principal axis, center of curvature, radius of curvature, principal focus in case of concave & convex mirrors.
- 7.6 Find the relation between focal length & radius of curvature of a concave & convex mirror.
- 7.7 Express the general equation of concave and convex mirror.

## 8. REFRACTION OF LIGHT

- 8.1 Define refraction of light Give examples of refraction of light
- 8.2 State the laws of refraction and Express the verification of laws of refraction
- 8.3 Define absolute and relative refractive index and Relate absolute and relative refractive index
- 8.4 Explain the meaning of total internal reflection and critical angle and Relate total internal reflection and critical angle.
- 8.5 Give examples of total internal reflection.
- 8.6 Describe refraction of light through a prism.
- 8.7 Express the deduction of the relation between refractive index, minimum deviation and angle of the prism.
- 8.8 Define lens and mention the kinds of lens.
- 8.9 Identify and List uses of lens.
- 8.10 Express the deduction of the general equation of lens (Concave & convex).

## 9. ELECTRON, PHOTON AND RADIO-ACTIVITY

- 9.1 Describe Electrical conductivity of gases.
- 9.2 Describe Discharge tube.
- 9.3 Cathode ray : Definition and its properties
- 9.4 X-ray : Definition, properties & uses
- 9.5 Discuss Photo electric effect .
- 9.6 Derive Einstein's photo electric equation
- 9.7 Define and explain radio-activity.
- 9.8 Describe radio-active decay law.
- 9.9 Define half-life and mean-life of radio-active atoms.
- 9.10 Define nuclear fission and fusion.

## 10. THEORY OF RELATIVITY

- 10.1 Define Space, time and Mass.
- 10.2 Define rest mass.
- 10.3 Express the theory of relativity.
- 10.4 Explain special theory of relativity and its fundamental postulate.
- 10.5 Mention different Kinds of theory of relativity.
- 10.6 The Relativity of Length - Length contraction.
- 10.7 The Relativity of Time – Time dilation.
- 10.8 Deduce Einstein's mass -energy relation

## **PRACTICAL**

1. Compare the operation of common thermometers.
2. Determine the coefficient of linear expansion of a solid by Pullinger's apparatus.
3. Measure the specific heat capacity of various substances.(Brass, steel).
4. Determine the latent heat of fusion of ice.
5. Determine the water equivalent by calorimeter.
6. Compare the luminous intensity of two different light sources.
7. Verify the laws of reflection.
8. Find out the focal length of a concave mirror.
9. Determine the refractive index of a glass Slab.
10. Determine the angle of Minimum deviation and refractive index of a glass prism by using I-D graph.

## **REFERENCE BOOKS:**

1. Higher Secondary Physics – Second Part - by Dr. Shahjahan Tapan
2. A Text Book of Heat and Thermodynamics - by N Subrahmanyam and Brij Lal
3. A Text Book of Optics - by N Subrahmanyam and Brij Lal
4. Higher Secondary Physics -Second Part - by Prof. Golam Hossain Pramanik
5. Higher Secondary Physics -Second Part - by Ishak Nurfungnabi
6. Thermodynamics - by K K Ramalingam

65722

**COMMUNICATIVE ENGLISH**

**T P C**  
**1 3 2**

**Full Marks: 100 (Practical-50.Theoretical-50)**

**Introduction**

This Course Will Provide A Unique Foundation In The Basic Level For Developing Listening, Speaking, Reading And Writing Skills Into Some Of More Specialized And Advanced Capabilities Of Basic Operation In Communication.

**Theory Part**

Total Mark: : 50  
Continuous Assessment : 20  
Final Exam : 30

**Objectives:**

After The Completion of the Module, Learners Will Be Able To Develop-

- # Creative Writing Ability
- # Transferring Information, Ideas And Knowledge
- #Communicative Competence Effectively In The Workplace Situation.

**1.Comprehension For Reading Task (Mark:10)**

(Text May Be Taken From Contemporary Journals, Editorial of News Papers Or From Online Resources)

**Test Items:**

1. MCQ (Guessing Meaning from Context)
2. Rearranging
3. Gap-Filling (With Clues or Without Clues)
4. Answering Questions
5. Summarizing

**2. Composition (Mark: 20)**

**The Following Are The Topic Title Introduced For Writing Task:**

1. Introduce Formal/Informal Greeting &Farewell
2. Describe The Idea Of Communication & Presentation Skills
3. Write Paragraph On The Basis Of Comparison and Contrast
4. Narrate Process, Stories And Interpreted Charts, Graphs.
5. Write Letters to the Print and Electronic Media
6. Write Letters of Advice, Complaints, Inquiry, Order and Cancellation
6. Prepare Seven Days Weather Report.
7. Make An Attractive Poster For The People Giving Advice To Protect The Environment.
8. Prepare A Series Of Questions About Personal Information, Place Of Interest, Foods, Hobby And Employment Opportunity.
9. Write Dialogue On The Following Situations
  - # About Exchanging Views With A Person And Introducing One Narrating Daily Activities
  - # Meeting At The Train Station & Asking Question About The Departure And Arrival Of The Train To The Station Manager
  - # Meeting at The Airport And Asking The Flight Schedule
  - # Getting To The Hotel And Asking For A Reservation
  - # Social Language for Telephonic Conversation
  - # Talking About the Weather, Trips & Sight Seeing
  - # Asking Permission and Making Request.
  - # Talking About Office and Office Manner
  - # Talking About Etiquette and Manner

10. Prepare Job Application With A Complete CV For Job Suitable For You.

**Practical Part:**

**Objectives:**

- 1. Communicate The Areas That Learners Encounter In Real Life Situation.**
- 2. Reinforce The Basic Language Skills Of Listening And Speaking.**
- 3. Integrate ICT As Tools In Learning Language.**

**Course Content**

Unit	Lesson	Title
1. Use Of Dictionary	Define Dictionary	1.1 Know How To Use A Dictionary 1.2 Learn At Least 10 Words In A Day With Correct Pronunciation (Follow The Link : <a href="http://Www.Marruim-Englishdictionary.Com">Www.Marruim-Englishdictionary.Com</a> )
2. Basic Vocabulary Practice	Basic Words For Communication By ODGENS	2.1 Use 10 Most Common Formulas (Structure) To Write Correct Sentence. (Follow The Link: <a href="http://Www.Odgenbasicvocabulary.Com">Www.Odgenbasicvocabulary.Com</a> <a href="http://Www.Grammarly.Com">Www.Grammarly.Com</a> )
3. Listening Skill Practice	Listen To The Audio Video Presentation On Current Real Life Situation	3.1 Practice Audio Video Conferencing Activities. 3.2. Communicate With The English Speaking People Online (Link: <a href="http://Www.Speaking24.Com">Www.Speaking24.Com</a> )
4. Speaking Skill Practice (Self Interpretation)	Introduce Yourself With The Vocabulary Prescribed By ODGENS	4.1 Browse Vocabulary Related Phrases To Introduce You. (Link : <a href="http://Www.Youtube.Com/Let Me Introduce Myself">Www.Youtube.Com/ Let Me Introduce Myself</a> )
5. Listening Skill Practice	Listen To The Weather Reports, Sports Commentary In The English TV Channels.	5.1 Prepare Seven Days Weather Report For The Place You Are Staying. 5.2. Make Some Attractive Poster To Protect The Environment.
6. Speaking Skill Practice	Identify Formal And Informal Social Language	6. 1 Practice Conversation Emphasizing On Greetings & Farewell (Link- <a href="http://Www.Esl.Guide@About.Com">Www.Esl.Guide@About.Com</a> ) 6.2 Take Part In Audio Video Conferencing Activities 6.3 Ask Questions About Personal Information, Place Of Interest, Food, Hobby, Employment Opportunity With Foreign Friends Using Social Media.
7. Writing Skill Practice	Develop Paragraph	7.1 Develop Paragraph On The Basis Of Comparison, Contrast And Analysis. Check Plagiarism Wordiness By The Correction Software ( <a href="http://Www.Grammarly.Com">Www.Grammarly.Com</a> ) 7.2. Write E-Mail, Send And Reply E-Mail

8. Listening Skill Practice	Watch Short Films, Documentary And Listen To The English Music(With Lyric) To Practice In A Group	8.1 Listen To Hard Talk, Interview 8.2. Prepare A Series Of Questions To Interview A Celebrity 8.3. Down Load Documentary From <a href="http://Www.Youtube.Com/Education">Www.Youtube.Com/Education</a>
9. Presentation	Define Presentation	9.1 Edutain/Entertain Yourself Preparing A Documentary In A Group With The Activities Done During The Period Of Class Hours In The Lab For Communicative English.

**Evaluation:**

Students Can Be Evaluated Individually Or In A Group On The Basis Of Performance Done In The Lab. Furthermore, They May Be Given Online Test Using Authenticated Websites Like

[www.Britishcouncil.Org/Education/Blog/Podcast/News/Weather](http://www.Britishcouncil.Org/Education/Blog/Podcast/News/Weather), [www.Englishteststore.Com](http://www.Englishteststore.Com), [www.Ieltsexam.Com](http://www.Ieltsexam.Com)

Lab-Facilitator, 30 Students In A Group:

Physical Facility	Size (In Ft)	Area (In Sq Ft)
Class Room Cum Laboratory	15 × 20	300
Library	15 × 20	300
Wash Room	4 × 7	28

Lists Of Equipments And Resources For 30 Learners:

Personal Computers With Accessories	15
Projector Multimedia	01
Printer	01
Scanner	01
Modem	01
Essential Software	01 Set
Internet Connection For Each Computer	Broad Band/Dial Up
Camera (Digital)	01
Video Conferencing Equipments	01 Set
TV Card	01
Satellite Cable Connection	01
Head Phone	15
Related Books And Journals	01
First Aid Box	01

Reference:

[www.Britishcouncil.Org](http://www.Britishcouncil.Org), [www.Marium-Websters.Com](http://www.Marium-Websters.Com), [www.Compellingconversation.Com](http://www.Compellingconversation.Com),  
[www.Esl.Guide@About.Com](http://www.Esl.Guide@About.Com), [www.Bbc.Com/News](http://www.Bbc.Com/News), [www.Speaking24.Com](http://www.Speaking24.Com), [www.Itutor.Com](http://www.Itutor.Com),  
[www.Ieltsexam.Com](http://www.Ieltsexam.Com), [www.Englishteststore.Com](http://www.Englishteststore.Com), [www.Ginger.Com](http://www.Ginger.Com), [www.Grammarly.Com](http://www.Grammarly.Com)

(Note: This Course May Be Introduced After Fourth Semester Coz It Needs Some Maturity Of The Students To Adopt With The Course Materials And The Contents. These Themes Are Suggestive Not Prescriptive.)