# Government Polytechnic, Pune

**(An Autonomous Institute of Government of Maharashtra)**

## Department of Computer Engineering

# Level II Curriculum

# Core Technology Level

# Courses

# Government Polytechnic, Pune

## '180OB' – Scheme

| Programme | Diploma in Computer Engineering<br>Diploma in Information Technology |
|---|---|
| Programme code | 01/02/03/04/05/**06/07**/08/16/17/21/22/23/24/**26** |
| Name of Course | **Programming in C** |
| Course Code | **CM2101** |
| Prerequisite course code and name | **NA** |
| Class Declared | **No** |

## 1.    TEACHING AND EXAMINATION SCHEME

| Teaching Scheme (In Hours) | | | Total Credits (L+T+P) | | Examination Scheme | | | | Total Marks |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | Theory | | Practical | | |
| L | T | P | C | | ESE | PA | *ESE | PA | 175 |
| | | | | Marks | 80 | 20 | 50 | 25 | |
| 03 | 02 | 02 | 07 | Exam Duration | 3 Hrs | 1 Hr | | | |

*Legends: L- Lecture, P- Practical, T- Tutorial, C- Credit, ESE-End Semester Examination, PA- Progressive Assessment (Test I, II/Term Work), \*- Practical Exam, $- Oral Exam, #- Online Examination each Lecture/Practical period is of one clock hour;*

## 2.    RATIONALE

In this era of high-speed computing, it is necessary to program computers with the help of structured dynamic languages like 'C' to study programming is useful in solving problems/tasks related to various domains. Now days almost every setup in software engineering domain chooses 'C' as a basic tool to develop software.

## 3.    COMPETENCY

The aim of this course is to attend following industry identified competency through various teaching learning experiences:

- **Develop command on programming language**

**4.   COURSE OUTCOMES (COs)**

The theory, practical experiences and relevant soft skills associated with this course are to be taught and implemented, so that the student demonstrates the following industry oriented COs associated with the above mentioned competency:

1. Write procedural program with 'C' language tokens.
2. Execute programs using branching and looping.
3. Write programs using arrays, strings.
4. Develop a C program using functions.
5. Implement programs using structures.
6. Execute programs using pointers.

**5.   SUGGESTED PRACTICALS/ EXERCISES**

| Sr. No. | Unit No. | Practical Exercises (Learning Outcomes in Psychomotor Domain) | Relevant CO | Approximate Hours Required. |
|---|---|---|---|---|
| 1 | 1 | Write/compile/execute simple 'C' program: Develop a program using Constants, Variables for different data types. | 1 | 02 |
| 2 | 1 | Write 'C' programs based on different operators and expressions. (ex. relational, logical, arithmetic etc.) Write programs based on bitwise and special operators. | 1 | 02 |
| 3 | 1 | Write simple program to take input from user at run time and display the output on the screen. | 1 | 02 |
| 4 | 2 | Programs using following control statements: If statement, Switch statements, operator, go to statements. Programs using following loop controls, while loop, do... while loop, for loop. | 2 | 04 |
| 5 | 3 | Write programs based on arrays. | 3 | 04 |
| 6 | 3 | Write programs using strings operations such as comparison, concatenation, copying etc. | 3 | 02 |
| 7 | 4 | Write programs on Predefined Functions and User defined functions. Write programs based on recursion & nesting of functions. | 4 | 04 |
| 8 | 5 | Write programs based on structure definition and initialization. Write programs based on structure within structure. | 5 | 04 |
| 9 | 6 | Write programs based on pointers. | 6 | 04 |
| 10 | 1 to 6 | Micro-project (Refer point 11 for micro project list) | All COs | 04 |
| | | **TOTAL** | | **32** |

| Sr.No. | Performance   Indicators | Weightage in % |
|--------|--------------------------|----------------|
| a. | Correctness of algorithm | 40 |
| b. | Debugging ability | 20 |
| c | Quality of  input and output displayed (messaging and formatting) | 10 |
| d. | Preparing assignments (write-ups, program and output). | 20 |
| e. | Submit assignment on time. | 10 |
| | **Total** | **100** |

## 6.    MAJOR EQUIPMENT/ INSTRUMENTSREQUIRED

The major equipment with broad specification mentioned here will usher in uniformity in conduct of practical, as well as aid to procure equipment by authorities concerned**.**

| Sr. No. | Equipment Name with Broad Specifications | Experiment Sr.No. |
|---------|------------------------------------------|-------------------|
| 1. | Computer system with Turbo C compiler to execute "C" programs | 1 to 10 |

## 7.    THEORY COMPONENTS

| Unit Outcomes (UOs) (in cognitive domain) | Topics and Sub-topics |
|-------------------------------------------|-----------------------|
| **UNIT I. C Overview, tokens and expressions** (Weightage-12, Hours-10) | |
| 1a. State importance of 'C'.  Describe Basic structure of  'C' Programs. <br> 1b. Demonstrate sample C    program <br> 1c. Describe Character set. <br> 1d. Define keywords, identifiers, constants, variables, symbolic constants. <br> 1e. List different data types. <br> 1f.  Describe different types of operators. <br> 1g. Demonstrate input and output Operators. <br> 1h. Initialize and evaluate expressions. | 1.1 Introduction to 'C'. <br> 1.2 Importance of C. <br> 1.3 Basic structure of 'C' programs, programming style, sample 'C' programs. execution of 'C' program. <br> 1.4 Character set, C tokens, keywords & Identifiers, constants, variables. Data types, type conversion, declaration of variables, assigning values to variables. <br> 1.5 Operators: Arithmetic operators and its precedence, relational, Logical, increment & decrement, conditional, bit-wise operator, special operator. <br> 1.6 Expressions: Arithmetic expressions, evaluation of expressions. |
| **UNIT II.  Decision Making and looping**   (Weightage-15, Hrs-10) | |
| 2a. Understand Branching and looping statements. <br> 2b. Demonstrate if statement, if-else, else-if ladder. <br> 2c. Use of switch statement and ?: operator. <br> 2d. Apply different types of loops. | 2.1 Branching: decision making with if  statement, if-else statement, else- if ladder. <br> 2.2 Looping: switch statement, ?: operator, go-to statement, while loop, for loop, do-while loop, break and continue statement. |
| **UNIT III. Arrays and Strings** (Weightage-13, Hrs-08) | |

| Unit Outcomes (UOs)<br>(in cognitive domain) | Topics and Sub-topics |
|---|---|
| 3a. List different types of Arrays.<br>3b. Distinguish between one- dimensional, two-dimensional and multidimensional arrays,<br>3c. Demonstrate initialization of arrays<br>3d. Declaring and initializing String variables.<br>3e. Describe String functions. | 3.1 Introduction to array: array, Initialization of arrays,<br>3.2 Types: one- dimensional arrays, two-dimensional arrays, multidimensional arrays.<br>3.3 Introduction to String: declaration & initialization of string, string variables, reading string, writing string.<br>3.4 Concatenation & comparison of two strings, string handling functions. |

**UNIT IV. Functions** (Weightage-15, Hrs-10)

| | |
|---|---|
| 4a. Use the given Predefined function.<br>4b. Write User defined functions.<br>4c. Identify different categories of Functions.<br>4d. Understand nesting of functions.<br>4e. Implement Recursion.<br>4f. Demonstrate function with arrays. | 4.1 Concept and need of functions<br>4.2 Predefined Functions: Library functions, Math function.<br>4.3 User defined function: Need, syntax, declaration, definition, return values and their types, calling a function.<br>4.4 Category of functions: No argument-No return value.<br>4.5 Nesting of functions, recursion and function with arrays. |

**UNIT V. Structures and Unions** (Weightage-12, Hrs-04)

| | |
|---|---|
| 5a. Define Structure.<br>5b. Use the structure for solving the given problem.<br>5c. Demonstrate arrays of structure.<br>5d. Execute arrays within structure.<br>5e. Identify use of structure in functions.<br>5f. Compare structure and Union. | 5.1 Structure : definition, declaring and accessing, structure initialization, copying and comparing structure variables, operations on structure members, array of structures, array within the structure, structure within structures ,structure and functions, size of structures<br>5.2 Unions: Introduction to union, definition, syntax. |

**UNIT VI. Pointers** (Weightage-13, Hrs-06)

| | |
|---|---|
| 6a. Define pointer.<br>6b. Declaration of pointers.<br>6c. Initialization of pointers and pointer expressions.<br>6d. Demonstrate pointer as a function argument. | 6.1 Pointer: Introduction to pointer Concept. Accessing the address of a variable, declaration of Pointers, Initialization of Pointers, Accessing a variable through its pointer, chain of pointer, pointer expressions.<br>6.2 Pointer and Array: Array of pointers, Pointer to array, pointers as a function argument.<br>6.3 Returning pointer and passing addresses to Functions. |

## 8. SUGGESTED SPECIFICATION TABLE FORQUESTION PAPER DESIGN

| Unit No. | Unit Title | Teaching Hours | Distribution of Theory Marks | | | |
|---|---|---|---|---|---|---|
| | | | R Level | U Level | A Level | Total Marks |
| I | C overview, tokens, expressions | 10 | 04 | 02 | 06 | 12 |
| II | Decision making and looping | 10 | 04 | 03 | 08 | 15 |
| III | Arrays, Strings | 08 | 04 | 03 | 06 | 13 |
| IV | Functions | 10 | 04 | 03 | 08 | 15 |
| V | Structures and Unions | 04 | 04 | 04 | 04 | 12 |
| VI | Pointers | 06 | 04 | 04 | 05 | 13 |
| **Total** | | **48** | **24** | **19** | **37** | **80** |

## 9. SUGGESTED STUDENT ACTIVITIES

Other than the classroom and laboratory learning, following are the suggested student-related *co-curricular* activities which can be undertaken to accelerate the attainment of the various outcomes in this course: Students should conduct following activities in group and prepare reports of about 5 pages for each activity, also collect/record physical evidences for their (student's) portfolio which will be useful for their placement interviews:

     a. Drawing flowchart and writing algorithms for the given problem statements.
     b. Prepare practical files with write-ups, programs and its outputs

## 10. SUGGESTED SPECIAL INSTRUCTIONAL STRATEGIES (if any)

These are strategies, which can be used to accelerate the attainment of the various outcomes in this course:

| Sr. No. | Topic | Instructional Strategy |
|---|---|---|
| 1 | C overview, tokens, expressions | Class room teaching |
| 2 | Decision making and looping | Laboratory demonstration |
| 3 | Arrays, Strings | Class room teaching, laboratory demonstration |
| 4 | Functions | Class room teaching, laboratory work |
| 5 | Structures and Unions | Class room teaching, laboratory work |
| 6 | Pointers | Class room teaching, laboratory work |

## 11. SUGGESTED MICRO-PROJECTS

*Only one micro-project* is planned to be undertaken by a student that needs to be assigned to him/her in the beginning of the semester. In the first four semesters, the micro-project is group-based. However, in the fifth and sixth semesters, it should be preferably be *individually* undertaken to build up the skill and confidence in every student to become problem solver so that s/he contributes to the projects of the industry. In special situations where groups have to be formed for micro-projects ,the number of students in the group should *not exceed three*.

Each micro-project should encompass two or more COs which are in fact, an integration of PrOs, UOs and ADOs. Each student will have to maintain dated work diary consisting of individual contribution in the project work and give a seminar presentation of it before

submission. The total duration of the micro-project should not be less than *16 (sixteen)* *student engagement hours* during the course.  The student ought to submit micro-project by the end of the semester to develop the industry-oriented COs.

A suggestive list of micro-projects is given here. Similar micro-projects could be added by the concerned faculty:-

a. Bank management system
b. Snake game
c. Customer billing system
d. Library management system
e. Quiz game
f. Simple result system

## 12.    SUGGESTED LEARNING RESOURCES

| S. No. | Title | Author | Publication, Edition, and Year of publication , ISBN number |
|---|---|---|---|
| 1 | Programming in ANSI 'C' | E. Balaguruswamy | Mcgraw Hill Publications<br>• ISBN 0070534772 |
| 2 | Let us 'C' | Yashwant Kanetkar | BPB Publication<br>• ISBN 9788183331630 |
| 3 | C for Beginners | MadhusudhanMothe, | Shroff Publishers and Distributions. Pvt. Ltd.<br>• ISBN 9781393743156 |

## 13.    SOFTWARE/LEARNING WEBSITES

1. http://www.nptel.ac.in
2. https://www.tutorialspoint.com/cprogramming
3. https://onlinecourses.nptel.ac.in

## 14.    PO - COMPETENCY- CO MAPPING

|  | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 |
|---|---|---|---|---|---|---|---|
| CO1 | 3 | 2 | 2 | 3 | - | - | 3 |
| CO2 | 3 | 2 | 2 | 3 | - | - | 3 |
| CO3 | 3 | 2 | 2 | 3 | - | - | 3 |
| CO4 | 3 | 2 | 2 | 3 | - | - | 3 |
| CO5 | 3 | 2 | 2 | 3 | - | - | 3 |
| CO6 | 3 | 2 | 2 | 3 | - | - | 3 |

|  | PSO1 | PSO2 |
|---|---|---|
| CO1 | - | 3 |
| CO2 | - | 3 |
| CO3 | - | 3 |
| CO4 | - | 3 |
| CO5 | - | 3 |
| CO6 | - | 3 |

| Sign:<br><br>Name:<br>1. Mrs. G.B. Garud<br>2. Mrs. K.S. Gaikwad<br>   (Course Experts) | Sign:<br><br>Name:<br>Mr. U. V. Kokate<br>Dr. S.B. Nikam<br>(Head of Department)<br>(Department of Computer Engineering) |
| --- | --- |
| Sign:<br><br>Name:<br>Mr. U.V. Kokate<br>Dr. S. B. Nikam<br>(Programme Head)<br>(Department of Computer Engineering) | Sign:<br><br><br>Name: Mr. A. S. Zanpure.<br> (CDC<br> Incharge) |

# Government Polytechnic, Pune
**'180OB'** – Scheme

| Programme | **Diploma in CE/EE/ET/ME/MT/CM/IT/DDGM** |
|---|---|
| Programme code | **01/02/03/04/05/06/07/08/21/22/23/24/26** |
| Name of Course | **Fundamentals of ICT** |
| Course Code | **CM2102** |
| Prerequisite course code and name | **NA** |
| Class Declaration | **No** |

## 1. TEACHING AND EXAMINATION SCHEME

| Teaching Scheme (In Hours) | | | Total Credits (L+T+P) | | | Examination Scheme | | | | Total Marks |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Theory | | Practical | | |
| L | T | P | C | | | ESE | PA | *ESE | PA | |
| | | | | | Marks | NA | NA | 25 | 25 | 50 |
| 01 | 00 | 02 | 03 | | Exam Duration | NA | NA | | | |

*Legends: L- Lecture, P- Practical, T- Tutorial, C- Credit, ESE-End Semester Examination, PA- Progressive Assessment (Test I, II/Term Work), \*- Practical Exam, $- Oral Exam, #- Online Examination each Lecture/Practical period is of one clock hour;*

## 2. RATIONALE

In any typical business setup, in order to carry out routine tasks related to create business documents, perform data analysis and its graphical representations and making electronic slide show presentations, the student need to learn various software as office automation tools like word processing applications, spreadsheets and presentation tools. They also need to use these tools for making their project reports and presentations. The objective of Information and Communication Technology course is to develop the basic competency in students for using these office automation tools to accomplish the job.

## 3. COMPETENCY

The aim of this course is to help the student to attain the following industry identified competency through various teaching learning experiences:
- **Use Computers for electronic documentation, data analysis, slide presentations and use of various internet services.**

### 4. COURSE OUTCOMES (COs)

The theory, practical experiences and relevant soft skills associated with this course are to be taught and implemented, so that the student demonstrates the following industry-oriented COs associated with the above-mentioned competency**:**
1. Connect Computer System and its peripherals.
2. Prepare document using word processing tool.
3. Create and design spreadsheets and data tables.
4. Prepare professional presentations.
5. Use various web services.

### 5. SUGGESTED PRACTICALS/ EXERCISES

| Sr. No. | Unit No. | Practical Exercises (Learning Outcomes in Psychomotor Domain) | Relevant CO | Approximate Hours Required. |
|---|---|---|---|---|
| 1 | 1 | i) Identify various Input/output devices, connections and peripherals of computer system<br>ii) Demonstration of Front Panel View, Rear Panel View, I/O Serial and Parallel Ports<br>iii)Demonstration of opening and closing of the computer | 1 | 1 |
| 2 | 1 | i) Connections inside CPU and its demonstration<br>ii) Setting up the Cabinet.<br>iii) Identification and Demonstration of different slots on motherboard. Mounting and Un mounting of RAM, Graphics card and Network card | 1 | 1 |
| 3 | 1 | i) Connecting various I/O Devices such as Mouse, Keyboards, Monitors, Printers, Web Cameras, Speakers, Scanners and External Hard disks etc.<br>ii)Demonstration of RJ45 connector and its use and Bluetooth as an external interface | 1 | 2 |
| 4 | 1 | Functions and working of Secondary Storage devices<br>i) Study of various types of Secondary Storage devices.<br>ii) BIOS Settings for Primary and secondary Memory.<br>iii) Installation, Configuration and Setting of Hard Disks and working of CD-ROM/DVD-ROM/ DVD-Combo/ DVD-<br>Writer (Internal and External). | 1 | 1 |
| 5 | 1 | Execution of basic commands in command window:<br>Ex: dir, md, copy, cd, move, rmdir, rd etc. | 1 | 1 |
| 6 | 1 | Various operations on Window based operating system part I:<br>i) Windows Operations: Minimizing, Maximizing, Resizing.<br>ii) Managing files and folders: Create, copy, rename, delete, move file and folder, Creating shortcuts. | 1 | 1 |
| 7 | 1 | Various operations on Window based operating system part II:<br>i) Creating and Removing/Deleting User Accounts. | 1 | 2 |

| | | | | |
|---|---|---|---|---|
| | | ii) Using Add /Remove Programs and Hardware Utility.<br>iii)Adding Fonts and Viewing Computer Configuration<br>iv)Desktop settings: Display properties, Time and Date setting, Screen Saver, Appearance | | |
| 8 | 2 | i) Create, edit and save document: apply formatting features on the text - line, paragraph<br>ii) Use bullets, numbering, page formatting<br>iii) Insert and edit images and shapes, sizing, cropping, color, background, group/ungroup | 2 | 2 |
| 9 | 2 | i) Insert and apply various table formatting features on it.<br>ii) Use mail merge with options. | 2 | 1 |
| 10 | 2 | Apply page layout features<br>i)Themes, page background, paragraph, page setup<br>ii)Create multicolumn page<br>iii)Use different options to print the documents | 2 | 2 |
| 11 | 3 | Create, open and edit worksheet<br>i)Enter data and format it, adjust row height and column width<br>ii)Insert and delete cells, rows and columns<br>iii) Apply wrap text, orientation feature on cell. | 3 | 2 |
| 12 | 3 | i) Insert formulas, "IF" conditions, functions and named ranges in worksheet.<br>ii) Apply data Sort Filter and Data Validation features. | 3 | 3 |
| 13 | 3 | Create charts to apply various chart options. | 3 | 2 |
| 14 | 3 | Apply Page setup and print options for worksheet to print the worksheet. | 3 | 1 |
| 15 | 3 | Perform following in GUI based database software using GUI like MS-Access<br>i) Create Database<br>ii) Create tables and assign primary key.<br>iii) Modify the table structure-add column, change the data type of column, delete the column from table.<br>iv) Insert, update and delete the record from table.<br>v) Retrieve data from the table according to condition given. | 3 | 2 |
| 16 | 4 | i)Create slide presentation<br>ii)Apply design themes to the given presentation<br>iii) Add new slides and insert pictures/images, shapes, apply animation effects to the text and slides.<br>iv)Add tables and charts in the slides.<br>v) Run slide presentation in different modes and print it. | 4 | 2 |
| 17 | 5 | Configure Internet connection | 5 | 1 |
| 18 | 5 | Use internet for different web services. | 5 | 2 |
| 19 | 5 | Configure browser settings and use browsers. | 5 | 1 |
| 20 | All | Micro-project<br>(Refer point 11 for micro project list) | All COs | 2 |
| | | **Total** | | **32** |

| Sr.No. | Performance Indicators | Weightage in % |
|---|---|---|
| a. | Use of Appropriate tool to solve the problem (Process) | 40 |
| b. | Quality of output achieved (Product) | 30 |
| c. | Complete the practical in stipulated time | 10 |
| d. | Observations and Recording | 10 |
| e. | Answer to sample questions | 10 |
| | **Total** | **100** |

## 6. MAJOR EQUIPMENT/ INSTRUMENTS REQUIRED

The major equipment with broad specification mentioned here will usher in uniformity in conduct of practicals, as well as aid to procure equipment by authorities concerned.

| Sr. No. | Major Equipment/ Instruments Required | Experiment Sr. No |
|---|---|---|
| 1 | Computer system with all necessary components like; motherboard, random access memory (RAM), read-only memory (ROM), Graphics cards, sound cards, internal hard disk drives, DVD drive, Network interface card, Mouse, Keyboard, Monitors, Printers, Web Cameras, Speakers, Scanners and External Hard disks etc. | 1 to 7 |
| 2 | Laser printer | 1,14,16 |
| 3 | Hard Disks, CD-ROM/DVD-ROM/ DVD-Combo/ DVD-Writer (Internal and External). | 3,4 |
| 4 | Hubs, Switches, Modems. | 18,19 |
| 5 | Any operating system. | 5 to 20 |
| 6 | Any Office Software. | 8,9,10, 11, 12, 13, 15,16,17 |
| 7 | Any browser. | 18,19,20 |

## 7.    THEORY COMPONENTS

| Unit Outcomes (UOs)<br>(in cognitive domain) | Topics and Sub-topics |
|---|---|
| **Unit -I Introduction to Computer System** (Hours- 04) | |
| Unit Outcomes (UOs)<br>(in cognitive domain) | Topics and Sub-topics |
| 1a. Explain the given block diagram of computer system.<br>1b. Classify the given types of software.<br>1c. Explain characteristics of the specified type of network.<br>1d. Describe Procedure to manage file/folders.<br>1e. Describe application of the specified type of network connecting device. | 1.1 Basics of Computer System: Overview of Hardware and Software, block diagram of Computer System, Input /Output unit, CPU, Control unit, Arithmetic logic unit (ALU), Memory Unit<br>1.2 Internal Components: Processor, Motherboards, random access memory (RAM), read-only memory (ROM), Video cards, Sound cards and internal hard disk drives<br>1.3 External Devices: Types of Input/ Output Devices, Types of monitors, Keyboards, Mouse, Printers: Dot Matrix, Inkjet and LaserJet, Plotter and scanner, external storage devices CD/DVD, Hard disk and pen drive<br>1.4 Basic Commands in command window: Ex: dir, md, copy, cd, move, rmdir, rd etc.<br>1.5 Application Software:  Word processing, Spreadsheet, database management systems, Control software, measuring software, photo editing software, video editing software, graphics manipulation software system software compilers, linkers, device drivers, operating systems and utilities<br>1.6 Network environments:  Network interface cards, hubs, switches, routers and modems, concept of LAN, MAN, WAN, WLAN, Wi-Fi and Bluetooth<br>1.7 Working with Operating Systems: Create and manage file and folders, copy a file, renaming and deleting files and folders, searching files and folders, application installation, creating shortcut of application on the desktop |
| **Unit - II Word Processing (**Hours- 03) | |

| Unit Outcomes (UOs) (in cognitive domain) | Topics and Sub-topics |
|---|---|
| 2a. Write steps to create the given text document.<br>2b. Explain the specified feature for document editing.<br>2c. Explain the given page setup features of a document.<br>2d. Write the specified table formatting feature | 2.1 Word Processing: Overview of Word processor, Basics of Font type, size, color, Effects like Bold, italic, underline, subscript and superscript, Case changing options, previewing a document, saving a document, closing a document and exiting application.<br>2.2 Editing a Document: Navigate through a document, scroll through text, Insert and delete text, select text, Undo and redo commands, Use drag and drop to move text, Copy, cut and paste, Use the clipboard, Clear formatting, Format and align text, Formatting Paragraphs, Line and paragraph spacing, using FIND and REPLACE, setting line spacing, add bullet and numbers in lists, add borders and shading, document views, Page settings and margins, Spelling and Grammatical checks<br>2.3 Changing the Layout of a Document: Adjust page margins, Change page orientation, create headers and footers, Set and change indentations, Insert and clear tabs<br>2.4 Inserting Elements to Word Documents: Insert and delete a page break, insert page numbers, Insert the date and time, insert special characters(symbols), Insert a picture from a file, Resize and reposition a picture<br>2.5 Working with Tables: Insert a table, convert a table to text, Navigate and select text in a table, resize table cells, align text in a table, format a table, Insert and delete columns and rows, Borders and shading, Repeat table headings on subsequent pages, Merge and split cells.<br>2.6 Working with Columned Layouts and Section Breaks: Add Columns, Section breaks, creating columns, Newsletter style columns, changing part of a document layout or formatting, remove section break, add columns to remainder of a document, Column widths, adjust column spacing, Insert manual column breaks |

**Unit -III Spreadsheets and Database** (Hours- 04)

| | |
|---|---|
| 3a. Write steps to create the given spreadsheet.<br>3b. Explain the specified formatting feature of a worksheet.<br>3c. Write steps to insert formula and functions in the given worksheet.<br>3d. Write steps to create charts for the specified data set.<br>3e. Explain steps to perform advance operation on the | 3.1 Working with Spreadsheets: Overview of workbook and worksheet, Create Worksheet Entering sample data, Save, Copy Worksheet, Delete Worksheet, and Open & Close Workbook.<br>3.2 Editing Worksheet: Insert and select data, adjust row height and column width, delete, move data, insert rows and columns, Copy and Paste, Find and Replace, Spell Check, Zoom In-Out, Special Symbols, Insert Comments, Add Text Box, Undo Changes, - Freeze Panes, hiding/un hiding rows and columns.<br>3.3 Formatting Cells and sheet: Setting Cell Type, Setting Fonts, Text options, Rotate Cells, Setting Colors, Text Alignments, Merge and Wrap, apply Borders and |

| Unit Outcomes (UOs) (in cognitive domain) | Topics and Sub-topics |
|---|---|
| given dataset | Shades, Sheet Options, Adjust Margins, Page Orientation, Header and Footer, Insert Page Breaks, Set Background.<br><br>3.4 Working with Formula: Creating Formulas, Copying Formulas, Common spreadsheet Functions such as sum, average, min, max, date, In, And, or, mathematical functions such as sqrt, power, applying conditions using IF.<br><br>3.5 Working with Charts: Introduction to charts, overview of different types of charts, Bar, Pie, Line charts, creating and editing charts. Using chart options: chart title, axis title, legend, data labels, Axes, grid lines, moving chart in a separate sheet.<br><br>3.6 Advanced Operations: Conditional Formatting, Data Filtering, Data Sorting, Using Ranges, Data Validation, Adding Graphics, Printing Worksheets, print area, margins, header, footer and other page setup options<br><br>3.7 Introduction to Database Management System: Meaning of Data, Database, DBMS, GUI based database software Creating tables and assign primary key, Modifying the table structure-add column, change the data type of column, and delete the column from table. And insert, update and delete the record from table. |
| **Unit – IV Presentation Tool** (Hours- 03) | |
| 4a. Write the steps to create the specified slide presentation.<br>4b. Write the steps to insert multiple media in the given presentation.<br>4c. Write steps to apply table features in the given presentation<br>4d. Write steps to manage charts in the given presentation | 4.1 Creating a Presentation: Outline of an effective presentation, Identify the elements of the User Interface, starting a New Presentation Files, creating a Basic Presentation, working with text boxes, Apply Character Formats, Format Paragraphs, view a Presentation, saving work, creating new Slides, changing a slide Layout, applying a theme, Changing Colors, fonts and effects, apply custom Color and font theme, changing the background, Arrange Slide sequence,<br><br>4.2 Inserting Media elements: Adding and Modifying Graphical Objects to a Presentation - Insert Images into a Presentation, insert audio clips, video/animation, Add Shapes, Add Visual Styles to Text in a Presentation, Edit Graphical Objects on a Slide, Format Graphical Objects on a Slide, Group Graphical Objects on a Slide, Apply an Animation Effect to a Graphical Object, Add transitions, , Add Speaker Notes, Print a Presentation.<br><br>4.3 Working with Tables: Insert a Table in a Slide, Format Tables, and Import Tables from Other Office Applications.<br><br>4.4 Working with Charts: Insert Charts in a Slide, modify a Chart, Import Charts from Other Office Applications |
| **Unit - V Basics of Internet** (Hours- 02) | |

| Unit Outcomes (UOs) (in cognitive domain) | Topics and Sub-topics |
|---|---|
| 5a. Explain use of the given setting option in browsers.<br>5b. Explain features of the specified web service.<br>5c. Describe the given characteristic of cloud.<br>5d. Explain the specified option used for effective searching in search engine | 5.1 World Wide Web: Introduction, Internet, Intranet, Cloud, Web Sites, Web Pages, URL, web servers, basic settings of web browsers-history, extension, default page, default search engine, creating and retrieving bookmarks, use search engines effectively for searching the content.<br>5.2 Web Services: e-Mail, Chat, Video Conferencing, e-learning, e-shopping, e-Reservation, e-Groups, Social Networking. |

## 8.    SUGGESTED SPECIFICATION TABLE FORQUESTION PAPER DESIGN

| Unit No. | Unit Title | Teaching Hours | Distribution of Theory Marks | | | |
|---|---|---|---|---|---|---|
| | | | R Level | U Level | A Level | Total Marks |
| I | Introduction to Computer System | 4 | -- | -- | -- | -- |
| II | Word Processing | 3 | -- | -- | -- | -- |
| III | Spreadsheets and Database | 4 | -- | -- | -- | -- |
| IV | Presentation Tool | 3 | -- | -- | -- | -- |
| V | Basics of Internet | 2 | -- | -- | -- | -- |
| | **Total** | **16** | -- | -- | -- | -- |

## 9.    SUGGESTED STUDENT ACTIVITIES

Other than the classroom and laboratory learning, following are the suggested student-related *co-curricular* activities which can be undertaken to accelerate the attainment of the various outcomes in this course: Students should conduct following activities in group and prepare reports of about 5 pages for each activity, also collect/record physical evidences for their (student's) portfolio which will be useful for their placement interviews:

   a. Prepare journal of practicals.
   b. Prepare a sample document with all word processing features. (Course teacher shall allot appropriate document type to each student)
   c. Prepare PowerPoint Presentation with all the presentation features. (Course teacher shall allot various topics to the groups of students)
   d. Prepare Database/spreadsheets in groups, related to various Fields/Organizations
   e. Undertake micro projects

## 10.    SUGGESTED SPECIAL INSTRUCTIONAL STRATEGIES (if any)

These are sample strategies, which the teacher can use to accelerate the attainment of the various outcomes in this course:
   a. Massive open online courses (*MOOCs*) may be used to teach various topics/sub topics.

b. About *15-20% of the topics/sub-topics* which is relatively simpler or descriptive in nature is to be given to the students for *self-directed learning* and assess the development of the COs through classroom presentations (see implementation guideline for details).

c. With respect to item No.8, teachers need to ensure to create opportunities and provisions for *co-curricular activities*.

d. Guide student(s) in undertaking micro-projects.

e. Correlate subtopics with power plant system and equipments.

f. Use proper equivalent analogy to explain different concepts.

g. Use Flash/Animations to explain various components, operation and

h. Teacher should ask the students to go through instruction and technical manuals

## 11. SUGGESTED MICRO-PROJECTS

*Only one micro-project* is planned to be undertaken by a student that needs to be assigned to him/her. In special situations where groups have to be formed for micro-projects, the number of students in the group should *not exceed three.* The micro-project could be industry application based, internet-based, workshop-based, laboratory-based or field-based. Each micro-project should encompass two or more COs which are in fact, an integration of PrOs, UOs and ADOs. (Affective Domain Outcomes). Each student will have to maintain activity chart consisting of individual contribution in the project work and give a seminar presentation of it before submission. The student ought to submit micro-project by the end of the semester to develop the industry-oriented COs.

A suggestive list of micro-projects is given here. Similar micro-projects could be added by the concerned faculty:

a. Word documents: Prepare Time Table, Application Notes, Reports (Subject teacher shall assign a document to be prepared by each student)

b. Slide Presentations: Prepare slides with all Presentation of reports (Subject teacher shall assign a presentation to be prepared by each student.

c. Spreadsheets: Prepare pay bills, tax statement, student's assessment record using spreadsheets (Teacher shall assign a spreadsheet to be prepared by each student

d. Web Browser/ Email: Create Email ID using any web browser and E-mail service and explore all the options available in email e.g., drive, forms etc.

## 12. SUGGESTED LEARNING RESOURCES

| S.N. | Title | Author | Publisher, Edition, Year of publication, ISBN Number |
|---|---|---|---|
| 1 | Computer Fundamentals | Goel, Anita | Pearson Education, New Delhi, 2014 <br> • ISBN-13: 978-8131733097 |
| 2 | Computer Basics Absolute Beginner's Guide, Windows 10 | Miller, Michael | QUE Publishing; 8th edition August 2015 <br> • ISBN: 978-0789754516 |
| 3 | Microsoft Office 2010 for Windows: Visual Quick Start | Schwartz, Steve | Pearson Education, New Delhi India, 2012 <br> • ISBN:9788131766613 |
| 4 | OpenOffice.org for Dummies | Leete, Gurdy, Finkelstein | Wiley Publishing, New Delhi 2003 <br> • ISBN: 978-0764542220 |

| | | Ellen, Mary Leete | |
|---|---|---|---|
| 5 | Microsoft Office 2010: On Demand | Johnson, Steve | Pearson Education, New Delhi India, 2010.<br>• ISBN: 9788131770641 |

## 13. SOFTWARE/LEARNING WEBSITES

   a. http://www.nptel.ac.in
   b.  https://www.microsoft.com/en-in/learning/office-training.aspx
   c. http://www.tutorialsforopenoffice.org
   d. https://s3-ap-southeast-1.amazonaws.com/r4ltue295xy0d

## 14. PO - COMPETENCY- CO MAPPING

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 |
|---|---|---|---|---|---|---|---|
| **CO1** | 2 | - | - | 2 | 1 | - | 2 |
| **CO2** | - | - | - | 2 | 2 | 2 | 3 |
| **CO3** | 3 | 2 | 2 | 2 | 2 | 2 | 3 |
| **CO4** | - | - | - | 2 | 2 | 2 | 3 |
| **CO5** | 1 | - | - | - | 1 | - | 1 |

| | PSO1 | PSO2 |
|---|---|---|
| **CO1** | 2 | - |
| **CO2** | - | 1 |
| **CO3** | - | 1 |
| **CO4** | - | 1 |
| **CO5** | 2 | 1 |

| Sign:<br><br>Name:<br>Smt. A. D. Kshirsagar<br>Smt. K. S. Sathawane<br>Smt. P.L. Sonwane<br>(Course Expert /s) | Sign:<br><br>Name:<br>Shri. U. V. Kokate<br>Dr. S. B. Nikam<br>(Head of Department)<br>(Department of Computer Engineering) |
|---|---|
| Sign:<br><br>Name:<br>Shri.U. V. Kokate<br>Dr. S. B. Nikam<br>(Programme Head)<br>(Department of Computer Engineering) | Sign:<br><br>Name:<br>Shri A. S. Zanpure<br>(CDC Incharge) |

# Government Polytechnic, Pune
### '180OB' – Scheme

| Programme | **Diploma in Computer Engineering** **Diploma in Information Technology** |
|---|---|
| Programme code | 01/02/03/04/05/**06/07**/08/16/17/21/22/23/24/**26** |
| Name of Course | **Linux Basics** |
| Course Code | **CM2103** |
| Prerequisite course code and name | **NA** |
| Class Declaration | **NO** |

## 1. TEACHING AND EXAMINATION SCHEME

| Teaching Scheme (In Hours) | | | Total Credits (L+T+P) | | Examination Scheme | | | | Total Marks |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | Theory | | Practical | | |
| **L** | **T** | **P** | **C** | | **ESE** | **PA** | ***ESE** | **PA** | |
| 01 | 00 | 02 | 03 | **Marks** | NA | NA | 25 | 25 | 50 |
| | | | | **Exam Duration** | NA | NA | | | |

*Legends: L- Lecture, P- Practical, T- Tutorial, C- Credit, ESE-End Semester Examination, PA- Progressive Assessment (Test I, II/Term Work), \*- Practical Exam, $- Oral Exam, #- Online Examination each Lecture/Practical period is of one clock hour;*

## 2. RATIONALE

Linux Operating System is Open source and freely distributed O.S. Apart from the fact that it's freely distributed, Linux's functionality, adaptability and robustness makes it highly suitable for server platform. The course aims at providing knowledge of shell and command line essentials.

## 3. COMPETENCY

The aim of this course is to attend following industry identified competency through various teaching learning experiences:

- **Practice Basic commands of Linux operating system.**

## 4. COURSE OUTCOMES (COs)

The theory, practical experiences and relevant soft skills associated with this course are to be taught and implemented, so that the student demonstrates the following industry-oriented COs associated with the above-mentioned competency**:**

1. Install and Configure Linux O.S.
2. Execute various commands of Linux Operating System.
3. Manage files and Directories in Linux OS
4. Compress and archive files in Linux OS.
5. Write and execute programs using shell scripting.

### 5.    SUGGESTED PRACTICALS/ EXERCISES

| Sr. No. | Unit No | Practical Exercises<br>(Learning Outcomes in Psychomotor Domain) | Relevant CO | Approximate Hours Required. |
|---|---|---|---|---|
| 1 | 1 | i) Installing Linux: Hardware, Software, Requirements, Opening   Disk space for Linux partitions<br>ii) Virtual Consoles<br>iii) Configuring GRUB / LILO Boot Loader. | 1 | 4 |
| 2 | 2 | i) Executing commands related to Login into user accounts, start up and shutdown commands, command line editing commands, man, who, who am i, info, pwd. | 2 | 2 |
| 3 | 2 | i) Executing Commands, I/O redirection and pipes.<br>ii) Practicing File Name Arguments: *,?, [ ]. | 2 | 4 |
| 4 | 3 | i) Executing various file Related commands –cat, more,ls, cd, cp, mv, rm, touch, mkdir, rmdir, find. | 2 | 2 |
| 5 | 3 | i) Practicing Absolute and Relative Pathnames.<br>ii) Setting/Changing file and directory related permissions chmod.<br>iii) Link command. | 2 | 4 |
| 6 | 4 | i) Executing commands related to archive and file compression | 3 | 2 |
| 7 | 4 | i) Executing various commands related to vi Editor.<br>ii) Practicing editing with vi editor.<br>iii) Practicing vi editing commands. | 4 | 4 |
| 8 | 5 | i) Executing various Shell commands: cat, tee, head and tail.<br>ii) Creating shell variables | 5 | 2 |
| 9 | 5 | i) Configuring Login Shell with Special Shell Variables.<br>ii) Practicing filter output: wc, spell and sort. | 5 | 2 |
| 10 | 5 | i) BASH Shell Programming (any 4 basic programs without looping) | 5 | 4 |
| 11 | All | Micro-project<br>(Refer point 11 for Micro Project list) | All CO's | 2 |
| | | **Total** | | 32 |

| S.No. | Performance   Indicators | Weightage in % |
|---|---|---|
| a. | Debugging ability. | 20 |
| b. | Quality of output achieved. | 40 |
| c. | Complete the practical in stipulated time. | 10 |
| d. | Answer to sample questions. | 20 |
| e. | Submission of assignment in time. | 10 |
| | **Total** | **100** |

## 6. MAJOR EQUIPMENT/ INSTRUMENTSREQUIRED

The major equipment with broad specification mentioned here will usher in uniformity in conduct of practical, as well as aid to procure equipment by authorities concerned.

| S. No. | Equipment Name/ Instruments required | Experiment Sr.No. |
|--------|--------------------------------------|-------------------|
| 1 | Computer system with all necessary components like; motherboard, random access memory (RAM), read-only memory (ROM), internal hard disk drives, Mouse, Keyboard, open-source operating System. | All |

## 7. THEORY COMPONENTS

| Unit Outcomes (UOs) (in cognitive domain) | Topics and Sub-topics |
|-------------------------------------------|------------------------|
| **Unit - I Introduction to Linux Operating System** (Hours-03) | |
| 1a. Describe History of Linux. 1b. Identify different types of shells. 1c. Compare Linux file systems. | 1.1 Operating System and Linux 1.2 History, Overview of Linux 1.3 Shell: Bourne, Korn, Cshell. 1.4 Linux releases, Linux File Systems(ext) and versions. |
| **Unit -II The Shell** (Hours- 04) | |
| 2a. Use History command. 2b. Use filename arguments. 2c. Execute file related commands. 2d. Execute commands using pipes and I/O redirection. | 2.1 The Command Line. 2.2 Command Line Editing. 2.3 Command and Filename Completion. 2.4 History: History Events, History command, History Event Editing. 2.5 Configuring History: HISTFILE and HISTSAVE. 2.6 Filename Expansion: *, ?, [ ]: Matching Multiple Characters, Matching Single Characters, Matching a Range of Characters, Matching Shell Symbols, Generating Patterns. 2.7 Standard Input/Output and Redirection: Redirecting the Standard Output: > and >>, The Standard Input. 2.8 Pipes: |, Redirecting the Standard Error:2>, >>. |
| **Unit-III Linux Files and Directories** (Hours-02) | |
| 3a. Describe Linux file structure 3b. Use absolute and relative pathnames. 3c. Execute file and Directory commands. 3d. Change file and directory permissions 3e. Use link command. | 3.1 Linux Files, The File Structure- Home Directories, Pathnames, System Directories. 3.2 Listing, Displaying, and Printing Files(ls, cat, more, less, and lpr). 3.3 Displaying Files: cat, less, and more, Printing Files: lpr, lpq, and lprm. 3.4 Managing Directories (mkdir, rmdir, ls, cd, and pwd): Creating and Deleting Directories, Displaying Directory Contents, Moving Through Directories, Referencing the Parent Directory. 3.5 File and Directory Operations (find, cp, mv, rm, and ln): Searching Directories: find, Searching the Working Directory, Locating Directories, Copying Files, Moving Files, Copying and Moving Directories, Erasing Files and Directories: The rm Command. |

| Unit Outcomes (UOs) (in cognitive domain) | Topics and Sub-topics |
|---|---|
| | 3.6 Links: The ln Command, Symbolic Links, Hard Links.<br>3.7 File and Directory Permissions: chmod. |

**Unit - IV Archive, Editors and Utilities** (Hours- 03)

| | |
|---|---|
| 4a. Compress and archive files.<br>4b. Create and modify files using vi editor.<br>4c. Use line editing command. | 4.1 Archive Files and Devices: tar Displaying Archive Contents, Creating Archives, Extracting Archives, Updating Archives, Compressing Archives.<br>4.2 File Compression: gzip, bzip2, and zip: Compression with gzip, compressing with bzip2, Using Zip.<br>4.3 The vi Editor: vi Command, Input, and Line Editing Modes.<br>4.4 Creating, Saving and Quitting a File in vi, Managing Editing Modes in vi.<br>4.5 vi Editing Commands: Common Operations. |

**Unit - V Filters, Regular Expressions and Shell programming (**Hours- 04)

| | |
|---|---|
| 5a. Execute Linux filters.<br>5b. Execute commands using regular expressions.<br>5c. Execute shell script programs. | 5.1 Filters and Regular Expressions: Using Redirection and Pipes with Filters: cat, tee, head and tail.<br>5.2 Types of Filter Output: wc, spell and sort.<br>5.3 Configuring Your Login Shell with Special Shell Variables.<br>5.4 Introduction to BASH Shell Programming, Variables and Scripts. |

## 8. SUGGESTED SPECIFICATION TABLE

| Unit No | Unit Title | Teaching Hrs | Distribution of Theory Marks | | | |
|---|---|---|---|---|---|---|
| | | | R Level | U Level | A Level | Total Marks |
| I | Introduction to Linux Operating System | 3 | - | - | - | - |
| II | The Shell | 4 | - | - | - | - |
| III | Linux Files and Directories | 2 | - | - | - | - |
| IV | Archive, Editors and Utilities | 3 | - | - | - | - |
| V | Filters, Regular Expressions and Shell programming | 4 | - | - | - | - |
| **Total** | | **16** | | | | |

## 9. SUGGESTED STUDENT ACTIVITIES

Other than the classroom and laboratory learning, following are the suggested student-related *co-curricular* activities which can be undertaken to accelerate the attainment of the various outcomes in this course: Students should conduct following activities in group and prepare reports of about 5 pages for each activity, also collect/record physical evidences for their (student's) portfolio which will be useful for their placement interviews:

      a. Prepare journal based on practical.
      b. Practice more commands and their options other than practical list.
      c. Undertake Micro projects in group of students.

## 10.    SUGGESTED SPECIAL INSTRUCTIONAL STRATEGIES (if any)

These are sample strategies, which the teacher can use to accelerate the attainment of the various outcomes in this course:

a. Massive open online courses (*MOOCs*) may be used to teach various topics/sub topics.
b. About *15-20% of the topics/sub-topics* which is relatively simpler or descriptive in nature is to be given to the students for *self-directed learning* and assess the development of the COs through classroom presentations.
c. With respect to item No.9, teachers need to ensure to create opportunities and provisions for *co-curricular activities*.
d. Use different Audio-Visual media for Concept understanding.
e. Guide student(s) in undertaking micro-projects.
f. Demonstrate students thoroughly before they start doing the practice.
g. Observe continuously and monitor the performance of students in Lab.

## 11.    SUGGESTED MICRO-PROJECTS

*Only one micro-project* is planned to be undertaken by a student that needs to be assigned to him/her.  In special situations where groups have to be formed for micro-projects, the number of students in the group should *not exceed three.* The micro-project could be industry application based, internet-based, workshop-based, laboratory-based or field-based. Each micro-project should encompass two or more COs which are in fact, an integration of PrOs, UOs and ADOs. (Affective Domain Outcomes). Each student will have to maintain activity chart consisting of individual contribution in the project work and give a seminar presentation of it before submission. The student ought to submit micro-project by the end of the semester to develop the industry-oriented COs.

A suggestive list of micro-projects is given here. Similar micro-projects could be added by the concerned faculty:

a) Write a shell program for the following:
1. Take 1st name as input from user. (E.g.,John)
2. Take 2nd name as input from user. (E.g.,Smith)
3. Display both names individually.
4. Display the message "Welcome John and Smith."
5. Redirect this output to a file.
b) Write a Shell script to calculate the gross salary of employee. (HRA = 20% of basic salary, DA = 50% of basic salary).
c) Write a shell program for the following:
1. Execute commands to add "Hello GPP" 5 times in a file in Vi editor.
2. Execute commands to sort a file in alphabetical order with numbered list.
d) Write a shell program to display the contents of two files in sorted format with numbers to each line.
e) Write a program to find misspelled words from two files and write the output to new file.

## 12. SUGGESTED LEARNING RESOURCES

| S. No. | Title of Book | Author | Publisher, Edition and Year of publication |
|---|---|---|---|
| 1 | Linux The Complete Reference | Richard Petersen, | McGraw Hill, 6th edition (16 January 2008) <br> • ISBN-10 007149247X |
| 2 | Linux command line and shell scripting | Richard Blum, Willey India | • ISBN-10  1119700914 <br> • ISBN-13  978-1119700913 |
| 3 | Linux Lab: Hands on Linux. | Prof. Dayanand Ambawade | Dreamtech Press 14 September 2009) <br> • ISBN-10  935004000X <br> • ISBN-13  978-9350040003 |

## 13. SOFTWARE/LEARNING WEBSITES

1. https://maker.pro/linux/tutorial/basic-linux-commands-for-beginners
2. https://www.tecmint.com/linux-commands-cheat-sheet/
3. https://www.guru99.com/must-know-linux-commands.html
4. https://www.shellscript.sh/
5. https://www.tutorialspoint.com/unix/shell_scripting.htm
6. https://spoken-tutorial.org/tutorial

## 14. PO - COMPETENCY- CO MAPPING

|  | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 |
|---|---|---|---|---|---|---|---|
| CO1 | 3 | 2 | 2 | 3 | 1 | - | 3 |
| CO2 | 3 | - | 1 | 3 | 1 | - | 3 |
| CO3 | 3 | - | 1 | 3 | 1 | - | 3 |
| CO4 | 3 | 2 | 2 | 3 | 1 | - | 3 |
| CO5 | 3 | 2 | 2 | 3 | 1 | - | 3 |

|  | PSO1 | PSO2 |
|---|---|---|
| CO1 | 1 | - |
| CO2 | - | 2 |
| CO3 | - | - |
| CO4 | - | 2 |
| CO5 | - | 3 |

| Sign: | Sign: |
|---|---|
| Name: <br> 1. Smt. H F Khan <br> 2. Smt. H S Pawar <br> 3. Smt. S. S. Ingavale <br>    (Course Experts) | Name: <br> Mr. U.V. Kokate <br> Dr. S. B. Nikam <br> (Head of the Department) <br> (Department of Computer Engineering) |
| Sign: <br><br> Name: <br><br> Mr. U.V. Kokate <br> Dr. S. B. Nikam <br> (Programme Head) <br> (Department of Computer Engineering) | Sign: <br><br><br><br> Name: <br> Mr. A.S. Zanpure <br> (CDC In-charge) |

# Government Polytechnic, Pune
**'180 OB' – Scheme**

| | |
|---|---|
| Programme | **Diploma in Computer Engineering, Diploma in Information Technology** |
| Programme code | 01/02/03/04/05/**06**/**07**/08/15/16/17/18/19/21/22/23/24/**26** |
| Name of Course | **Web Designing using HTML** |
| Course Code | **CM2104** |
| Prerequisite course code and name | **NA** |
| Class Declaration | **No** |

## 1. TEACHING AND EXAMINATION SCHEME

| Teaching Scheme (In Hours) | | | Total Credits (L+T+P) | Examination Scheme | | | | Total Marks |
|---|---|---|---|---|---|---|---|---|
| | | | | Theory Marks | | Practical Marks | | |
| **L** | **T** | **P** | **C** | **ESE** | **PA** | ***ESE** | **PA** | 75 |
| 01 | 00 | 02 | 03 | NA | NA | 25 | 50 | |

*Legends: L- Lecture, P- Practical, T- Tutorial, C- Credit, ESE-End Semester Examination, PA- Progressive Assessment (Test I, II/Term Work), \*- Practical Exam, $- Oral Exam, #- Online Examination each Lecture/Practical period is of one clock hour;*

## 2. RATIONALE
In the Era of Web Technology, it is essential for every Diploma Engineering student to understand the various steps for designing a creative and dynamic Web site and finally create good effective and customized websites. This course covers Web designing using HTML, Web site publishing, Internet related technologies and systematic way of developing a website.

## 3. COMPETENCY
The aim of this course is to attend following industry identified competency through various teaching learning experiences:
- **Develop static interactive web sites.**

## 4. COURSE OUTCOMES (COs)
The theory, practical experiences and relevant soft skills associated with this course are to be taught and implemented, so that the student demonstrates the following industry-oriented COs associated with the above-mentioned competency**:**

1. Use HTML tags for information representation on webpage.
2. Create webpage using images, colors and backgrounds.
3. Design HTML forms.
4. Format web pages using CSS.
5. Host static web sites.

## 5.    SUGGESTED PRACTICALS/EXERCISES

| Sr. No. | Unit No. | Practical Exercises (Outcomes in Psychomotor Domain) | Relevant CO | Approx. Hrs. Required |
|---|---|---|---|---|
| 1 | 1 | a) Create lists of at least 10 available browsers and search engines. Use internet for acquiring this information.<br>b) Take a string example "Government Polytechnic, Pune" and display it in all &lt;h1&gt; to &lt;h6&gt; header tags. State the output. | 1 | 02 |
| 2 | 1 | a) Design a web page with two paragraphs each of 8-10 lines. Assign title to web page. Practice formatting tags for bold, italics, underline, center, break, space, horizontal lines, span tag, pre tag etc. | 1 | 02 |
| 3 | 1 | a) Write an HTML script that gives information about G.P. Pune and displays the names of various Departments as unordered list.<br>b) Design and implement a webpage displaying list of grocery items as ordered list | 1 | 02 |
| 4 | 1 | a) Design a webpage for implementing –<br>• Ordered list within unordered list.<br>• Unordered list within ordered list.<br>• Ordered list within ordered list (implement different list numbering style)<br>• Unordered list within unordered list (Implement different bullet styles)<br>b) Write an HTML script that displays definitions of minimum 10 terms related to a context. Use definition lists for the same. | 1 | 02 |
| 5 | 2 | a) Adding Hyperlinks and Images: Create a webpage containing two images and add a hyperlink to another webpage. Apply width and height property to one image. Align one image to center and the other one to left. Assign the second image as hyperlink to another webpage.<br>b) Create a webpage containing an image and some paragraph. Apply following-<br>• Create the map of image with sections of image linking to different webpage's in the same HTML where it is to be applied.<br>• Apply this map on the image. | 2 | 02 |
| 6 | 2 | a) Applying background properties - Create a webpage with paragraphs, headers and information of your choice. Apply and practice following effects on webpage:<br>• Set the background color of the page to linen.<br>• Set border to h1 tag.<br>• Set background image to a page.<br>• Set background image to any paragraph.<br>• Repeat the image vertically only.<br>• Repeat the image horizontally only. | 2 | 02 |

| Sr. No. | Unit No. | Practical Exercises (Outcomes in Psychomotor Domain) | Relevant CO | Approx. Hrs. Required |
|---|---|---|---|---|
| | | • Show the background image at top right position. | | |
| 7 | 2 | a) Applying Border properties: Create a webpage with paragraphs, headers and information of your choice. Apply and practice following effects on webpage: <br> • Set all top border properties of a paragraph in one declaration. <br> • Set style of bottom border for a paragraph. <br> • Set the width of left border. <br> • Assign different colors to four borders. Use hexadecimal color assignment. <br> • Set rounded border for some paragraph <br> • Apply border to the page. <br> • Set border width to the header. | 2 | 02 |
| 8 | 3 | a) Create a webpage that displays first year timetable. Make effective use of rowspan and colspan attributes. Make use of <th> tag too. | 3 | 02 |
| 9 | 3 | a) Use the webpage from earlier assignments with tables. Use borders, margins and padding properties on table/table rows/table cells. <br> b) Use <div> tag to mark various divisions of webpages. Apply background, border, margin properties to different divisions | 3 | 02 |
| 10 | 3 | a) Create a webpage for creating any layout in frameset with at least two frames. <br> b) Design the layout first and then write appropriate scripts for defining frameset and individual frames. | 3 | 02 |
| 11 | 3 | a) Create a webpage that provides a form for filling information. The webpage must contain following elements : <br> • Textbox <br> • Radio buttons <br> • Checkboxes <br> • Buttons (Submit/REST) <br> • Text area <br> • Textbox for passwords <br>     Design the form properly for some task: <br> Example- Login creation/Registration etc. Provide appropriate Labels to all form elements to guide user into filling the form. | 3 | 02 |
| 12 | 4 | a) Apply background and border style on paragraph/page/header using inline and internal cascaded styles. <br> b) Apply different styles to various selectors i.e. elements, names, ids, class, groups. Use any web page created earlier. | 4 | 02 |
| 13 | | a) Applying CSS text properties: Create a web page with number of paragraphs and headers. Apply following text properties: <br> • Set the text color of page to "RED" and text color of <h1> to "BLUE". | 4 | 02 |

| Sr. No. | Unit No. | Practical Exercises (Outcomes in Psychomotor Domain) | Relevant CO | Approx. Hrs. Required |
|---|---|---|---|---|
|  | 4 | • Align <h1> to center.<br>• Style text in <h1> to uppercase.<br>• Style test in some <p> to capitalize.<br>• Indent the first line of the paragraph to 20 px.<br>• Set letter spacing for the paragraph<br>• Set word-spacing in another paragraph<br>• Set text direction from right to left<br>• Create text-shadow effect on certain heading.<br>• Set no wrap property for some paragraph. State the output. |  |  |
| 14 | 4 | a) Applying CSS font properties: Create a web page with number of paragraphs and headers. Apply following font properties:<br>• Set the font of page to "COURIER" and the font of <h1> tag to "VERDANA".<br>• Set the font size of page to "20px" and the font size of a paragraph to "3em"<br>• Show some <p> elements as Italic text.<br>• Set some part of <p> element to small caps<br>• Set font style through CSS to oblique.<br>• Set font-weight of some part of paragraph to bold. | 4 | 02 |
| 15 | 4 | a) Applying CSS link properties: Create a web page with number of paragraphs and number of links. Apply different styles to hyperlinks:<br>• Link changing colors when visited.<br>• Link changing color on Mouse over<br>• Link changing font-size on mouse over.<br>• Link changing background color on mouse-over<br>• Link changing font-family when visited.<br>• Set color of some link to green.<br>• Remove underline from the links.<br>• Set the background color of link to TOMATO for visited and unvisited link | 4 | 02 |
| 16 | 5 | Micro-project<br>(Refer point 11 for micro project list) | All COs | 02 |
|  |  | **Total Hrs** |  | 32 |

| S.No. | Performance Indicators | Weightage in % |
|---|---|---|
| a. | Debugging ability | 20 |
| b. | Quality of output achieved | 40 |
| c. | Complete the practical in stipulated time | 10 |
| d. | Answer to sample questions | 20 |
| e. | Submission of assignment in time | 10 |
|  | **Total** | **100** |

### 6. MAJOR EQUIPMENTS/ INSTRUMENTS REQUIRED

The major equipment with broad specification mentioned here will usher in uniformity in conduct of practicals, as well as aid to procure equipment by authorities concerned.

| S. No. | Equipment Name/ Instruments required | Experiment Sr. No. |
|---|---|---|
| 1 | Computer with a text editor and browser | All |
| 2 | Computer system with Internet connection | 16 |
| 3 | Web server | 16 |

### 7. THEORY COMPONENTS

| Unit Outcomes (UOs) (in cognitive domain) | Topics and Sub-topics |
|---|---|
| **Unit - I. Introduction to Common HTML, Links and Addressing.** (Hours-04) | |
| 1a. Define HTML. <br> 1b. State the Terminologies used in Web Design. <br> 1c. Describe Block Level Elements. <br> 1d. Define Components of HTML Tags. <br> 1e. Enlist Text Level Elements. <br> 1f. Create the different List. <br> 1g. Write a program for Linking HTML Documents. | 1.1 Introduction to HTML <br> 1.2 Terminologies used in Web Design: Web, Web site, Web page, Web server, Web Browser, Search Engine <br> 1.3 Components of HTML: Tags – closed tags and open tags, Attributes, Elements <br> 1.4 Structure Tags: ! DOCTYPE, HTML, HEAD, TITLE, BODY tags. <br> 1.5 Block Level Elements: Headings, Paragraphs, Breaks, Divisions, Centered Text, Block Quotes, Preformatted text, Address. <br> 1.6 Text Level Elements: Bold, Italic, Teletype, Underline, Strikethrough, Superscript, subscript. <br> 1.7 Horizontal Rules, Special characters, Adding comments, The Meta tag. <br> 1.8 Creating Lists: Ordered Lists, Unordered Lists, Definition Lists, Nested Lists. <br> 1.9 Linking HTML Documents URL: Types of URLs, Absolute URLs, Relative URLs, The anchor Tag. Linking: To document in the same folder, to document in the different folder, to document on the web, to specific section within the Document, Inserting E-mail link. |
| **Unit - II. Images, Colors and Background** (Hours-04) | |
| 2a. Find Image Formats <br> 2b. Describe HSPACE & VSPACE. <br> 2c. Differentiate between Server-side image maps & Client-side image maps. <br> 2d. Describe Text Color. <br> 2e. Write a program for setting text color & background Color. <br> 2f. Write a program for setting background images. <br> 2g. Describe attribute of BODY tag | 2.1 Image: <br> • Image formats: gif, jpeg, png <br> • The inline image: an IMG tag, alternate text, image alignment, buffer space – HSPACE, VSPACE, wrapping text, height and width of images, Image as a link. <br> • Image maps: Server-side image maps, Client-side image map <br> 2.2 Colors and Backgrounds: <br> • The text color: color attribute of FONT tag, text attribute of BODY tag. <br> • Background color: bgcolor attribute of BODY tag <br> • Background Images: |

| | Background attribute of BODY tag.<br>• Changing link colors: link, alink, vlink attributes of BODY tag. |
|---|---|
| **Unit - III. Tables, Frames and Forms (**Hours-04**)** | |
| 3a. State Basic Tables Tags.<br>3b. Describe how to add Captions.<br>3c. Define Frames.<br>3d. Enlist Advantages & Disadvantages of Frames.<br>3e. Write a program to Create Frame using Frame Tag.<br>3f. Define Forms.<br>3g. Write a program to Create basic form using different form fields.<br>3h. Describe Button tag. | 3.1 Tables:<br>• Creating basic tables: TABLE, TR, TH, TD tags.<br>• Formatting tables: border, cellspacing, cellpadding, width, align, bgcolor attributes. Adding captions: CAPTION tag.<br>• Formatting contents in the table cells: align, valign, bgcolor, height, width, nowrap attributes. Spanning rows and columns: rowspan and colspan attributes.<br>3.2 Frames:<br>• Introduction to frames: What is frame? Advantages and disadvantages of using frames.<br>• Creating frames: FRAMESET tag – rows, cols attributes, FRAME tag – name, frame border, margin height, margin width, src, resize, scrolling<br>Attributes, Use of NOFRAMES tag, Frame targeting.<br>3.3 Forms:<br>• Creating basic form: FORM tag, action and method attributes.<br>• Form fields: Single line text field, password field, multiple line text area, radio buttons, and check boxes. Pull down menus: SELECT and OPTION tags.<br>• Buttons: submit, reset and generalized buttons. Formatting technique: Using table to layout form. |
| **Unit – IV. Style Sheets (**Hours-02**)** | |
| 4a. Define CSS.<br>4b. Write a program for adding different Style to the Document.<br>4c. Describe Selectors.<br>4d. Describe Style Sheet Properties.<br>4e. Write a Program displaying Style Sheet Properties. | 4.1 Adding style to the document: Linking to style sheets, embedding style sheets, using inline style.<br>4.2 Element Selectors: CLASS rules, ID rules.<br>4.3 Style sheet properties: font, text, box, color and background properties. |
| **Unit - V. Website Hosting (**Hours-02**)** | |
| 5a. Describe the procedure to configure a web server<br>5b. Differentiate hosting requirement on Internet and Intranet.<br>5c. Describe the procedure for hosting the given web site.<br>5d. Explain process of uploading given files on a web site. | 5.1 Concept of Internet and Intranet<br>5.2 Publishing web site on Intranet<br>5.3 Installing and configuring web server<br>5.4 Uploading files on Intranet site,<br>    Access intranet base web page<br>5.5 Publishing web site on Internet.<br>5.6 Access Internet based web site. |

## 8. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

| Unit No | Unit Title | Teaching Hrs | R Level | U Level | A Level | Total Marks |
|---------|------------|--------------|---------|---------|---------|-------------|
| I | Introduction to common HTML, Links and addressing. | 4 | - | - | - | - |
| II | Image colors and background | 4 | - | - | - | - |
| III | Tables, frames and forms | 4 | - | - | - | - |
| IV | Style Sheets | 2 | - | - | - | - |
| V | Website Hosting | 2 | - | - | - | - |
| | Total | 16 | - | - | - | - |

## 9. SUGGESTED STUDENTACTIVITIES

Other than the classroom and laboratory learning, following are the suggested student-related *co-curricular* activities which can be undertaken to accelerate the attainment of the various outcomes in this course: Students should conduct following activities in group and prepare reports of about 5 pages for each activity, also collect/record physical evidences for their (student's) portfolio which will be useful for their placement interviews:

    a. Prepare journal of practical.
    b. Browse and Observe features of different types of websites.
    c. Undertake micro projects.

## 10. SUGGESTED SPECIAL INSTRUCTIONAL STRATEGIES (if any)

These are sample strategies, which the teacher can use to accelerate the attainment of the various outcomes in this course:

    a. Massive open online courses (*MOOCs*) may be used to teach various topics/sub topics.
    b. About *15-20% of the topics/sub-topics* which is relatively simpler or descriptive in nature is to be given to the students for *self-directed learning* and assess the development of the COs through classroom presentations.
    c. With respect to item No.9, teachers need to ensure to create opportunities and provisions for *co-curricular activities*.
    d. Use different Audio-Visual media for Concept understanding.
    e. Guide student(s) in undertaking micro-projects.
    f. Demonstrate students thoroughly before they start doing the practice.
    g. Observe continuously and monitor the performance of students in Lab.

## 11. SUGGESTEDMICRO-PROJECTS

*Only one micro-project* is planned to be undertaken by a student that needs to be assigned to him/her. In special situations where groups have to be formed for micro-projects, the number of students in the group should *not exceed three.* The micro-project could be industry application based, internet-based, workshop-based, laboratory-based or field-based. Each micro-project should encompass two or more COs which are in fact, an integration of PrOs, UOs and ADOs. (Affective Domain Outcomes). Each student will have to maintain activity chart consisting of individual contribution in the project work and give a seminar presentation of it before submission. The student ought to submit micro-project by the end of the semester to develop the industry-oriented COs.

A suggestive list of micro-projects is given here. Similar micro-projects could be added by the concerned faculty:

    a. Develop website for any School/Hospital/Hotel administration.
    b. Develop website for online Shopping (Flower, grocery, Cloth etc.)
    c. Develop website for ant showroom.
    d. Develop any other Relevant website of Student's / Faculty's Choice.

## 12. LEARNING RESOURCES

| Sr.No. | Title of Book | Author | Publication |
|---|---|---|---|
| 1 | The Complete Reference: HTML | Thomas A.Powell | Tata McGraw Hill,5$^{th}$ Edition<br>• ISBN 13: 9780070701946 |
| 2 | Mastering HTML 4.0 | Deborah S. Ray, Eric J. Ray | BPB Publication<br>• ISBN:9780782121025 |

## 13. SOFTWARE/LEARNING WEBSITES

1. https://www.w3.org/TR/2018/SPSD-html401-20180327/struct/links.html
2. http://www.html.net/
3. http://webdesign.about.com
4. https://www.html.am/templates/simple-website-templates/
5. https://www.w3schools.com/html/

## 14. PO - COMPETENCY- CO MAPPING

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 |
|---|---|---|---|---|---|---|---|
| CO1 | - | - | 2 | 2 | - | - | 2 |
| CO2 | - | - | 2 | - | 2 | - | 2 |
| CO3 | 1 | - | 2 | 2 | 2 | - | 2 |
| CO4 | 1 | - | 2 | 2 | 1 | - | 2 |
| CO5 | 2 | - | 2 | 2 | 2 | 2 | 1 |

| | PSO1 | PSO2 |
|---|---|---|
| CO1 | - | 2 |
| CO2 | - | 2 |
| CO3 | - | 2 |
| CO4 | - | 2 |
| CO5 | - | 3 |

| Sign:<br><br>Name:<br>1. Mrs. A.B. Bhusagare<br>2. Mrs. S.P. Ambavane<br>(Course Experts) | Sign:<br><br>Name:<br>Mr. U. V. Kokate<br>Dr. S. B. Nikam<br>(Head of the Department)<br>(Department of Computer Engineering) |
|---|---|
| Sign:<br><br>Name:<br>Mr. U.V. Kokate<br>Dr.S.B.Nikam<br>(Programme Head)<br>(Department of Computer Engineering) | Sign:<br><br>Name:<br>Mr.A.S. Zanpure<br>(CDC In-charge) |

# Government Polytechnic, Pune

**'180OB'** – Scheme

| Programme | Diploma in ET/CE/EE/ME/MT/CM/IT/DDGM/ |
|---|---|
| **Programme code** | 01/02/03/04/05/06/07/08/21/22/23/24/26 |
| **Name of Course** | **Electrical Engineering** |
| **Course Code** | **EE2107** |
| **Prerequisite course code and name** | **NA** |
| **Class declaration** | **No** |

## 1. TEACHING AND EXAMINATION SCHEME

| Teaching Scheme (In Hours) | | | Total Credits (L+T+P) | | Examination Scheme | | | | Total Marks |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | Theory | | Practical | | |
| **L** | **T** | **P** | **C** | | **ESE** | **PA** | **$ ESE** | **PA** | |
| 03 | 00 | 02 | 05 | **Marks** | 80 | 20 | 25 | 25 | 150 |
| | | | | **Exam Duration** | 3Hrs | 1Hrs | 2 Hrs | | |

**Legends**: **L**- lecture, **T**-Tutorial, **P**-practical, **C**- Credits, **ESE**-End semester examination, **PA**- Progressive Assessment (Test I, II/Term Work), **\***- Practical Exam**, $**-Oral Exam, **#**-Online Examination, Each Lecture/Practical period is of one clock hour;

## 2. RATIONALE

The basic concepts of electrical engineering in this course will be very useful for understanding the utilization of electrical circuits, equipment, and machines. Hence, it is necessary to able to grasp the basic electric and magnetic circuits, AC fundamentals, polyphase circuits, different types of AC and DC motors, their principles, working characteristics and application. It is also useful for trouble shooting of basic electrical wiring and knows the electrical safety; this course will be very useful for understanding of higher-level courses.
.

## 3. COMPETENCY

The aim of this course is to help the student to attain the following competency through various teaching learning experience

a. **Use electrical equipment in computer.**
b. **Do trouble shooting and rectification of basic electrical wiring.**
c. **Understand the electrical safety.**

### 4.    COURSE OUTCOMES (COs)

The theory, practical experiences and relevant soft skills associated with this course are to be taught and implemented, so the student are able to demonstrates the following COs associated with the above mentioned competency.

1.  CO1- Appreciate the basic principles of electric and magnetic circuits

2.  CO2- Use single phase and three phase AC supply.

3.  CO3- Utilization of transformer and AC, DC and special purpose motors for specific applications

4.   CO4- Use electrical protective switchgear for electrical wiring and system as per requirement

5.  CO5- Recognize the electrical safety

### 5.    SUGGESTED PRACTICALS/ EXERCISES

The practical's in this section are PrOs (i.e. sub-components of the COs) to be developed and assessed in the student for the attainment of the competency:

| Sr. No. | Unit No. | Practical Exercises (Outcomes in Psychomotor Domain) | Relevant CO | Approximate Hours Required |
|---|---|---|---|---|
| 1 | 1 | To verify properties of series and  parallel connection of resistances | 1 | 2 |
| 2 | 1 | Verification of Kirchhoff"s Voltage Law and Kirchhoff"s Current Law | 1 | 2 |
| 3 | 1 | Verification of Faradays laws of Electromagnetic Induction. | 1 | 2 |
| 4 | 1 | To perform  statically and dynamically  induced EMF | 1 | 2 |
| 5 | 2 | To determine  frequency, time period, peak value, rms value, peak factor and form factor of a sinusoidal A. C. waveform on C. R. O. | 2 | 2 |
| 6 | 2 | Find the phase difference between voltage and current on C. R. O. for resistive, inductive and capacitive circuits. | 2 | 2 |
| 7 | 2 | To  verify  the  relation  between line  &  phase values of  current  and voltage in a balanced star & delta connected circuit | 2 | 2 |
| 8 | 2 | Measurement of power by two wattmeter method | 2 | 2 |
| 9 | 3 | To determine voltage & current ratio of single-phase transformer and determine  efficiency  and  voltage regulation  of  single  phase transformer | 3 | 2 |
| 10 | 3 | Reversal  the  direction  of following motors 1 Three phase Induction motor 2. Single phase  induction motor | 3 | 4 |
| 11 | 4 | Reversal  the  direction  of  any one of the following motor 1.  D.C. motor .2 | 3 | 2 |
| 12 | 5 | To connect and perform two lamps control by two | 4 | 2 |

| 13 | 5 | To prepare switch board of one lamp and one socket control by using two switches. | 4 | 2 |
|----|---|-------------------------------------------------------------------------------------|---|---|
| 14 | 5 | Test circuit using series lamp and multimeter | 4 | 2 |
| 15 | 5 | Prepare chart of procedure for rescuing a person who has received an electrical shock. | 5 | 2 |
| | | **Total Hrs** | | **32** |

*(Above this, partial row at top: "switches with MCB.")*

| S.No. | Performance Indicators | Weightage in % |
|-------|------------------------|----------------|
| 1 | Arrangement of available equipment / test rig or model | 20 |
| 2 | Setting and operation | 20 |
| 3 | Safety measures | 10 |
| 4 | Observations and Recording | 10 |
| 5 | Interpretation of result and Conclusion | 20 |
| 6 | Answer to sample questions | 10 |
| 7 | Submission of report in time | 10 |
| | **Total** | **100** |

## 6. MAJOR EQUIPMENT/ INSTRUMENTSREQUIRED

The major equipment with broad specification mentioned here will user in uniformity in conduct of practical, as well as aid to procure equipment by authorities concerned**.**

| Sr.No. | Major Equipment/ Instruments Required | Experiment Sr no. |
|--------|----------------------------------------|-------------------|
| 1 | Voltage /Current/Power measuring meter AC & DC | 1 to 11 |
| 2 | Passive electrical elements ,Rheostat, Capacitor and inductor & CRO | 5 & 6 |
| 3 | Three phase lamp load | 7 & 8 |
| 4 | Single phase transformer | 9 |
| 5 | Three phase induction motor & Single phase motor | 10 |
| 6 | Stepper motor , servo motor , BLDC motor | 10 |
| 7 | Tachometer | 10 & 11 |
| 8 | DC Motor | 11 |
| 9 | Electrical tools | 1 to 15 |

## 7.    THEORY COMPONENTS

The following topics/subtopic should be taught and assessed in order to develop UOs for achieving the COs to attain the identified competency**.**

| Unit Outcomes (UOs) (in cognitive domain) | Topics and Sub-topics |
|---|---|
| **UNIT 1.  Electrical  Circuit  and  Electromagnetism** ( **Marks-12, Hrs-07** ) | |
| 1a.Define Ohms Law and Kirchhoff's Laws<br>1b. Analyze series and parallel circuits<br>1c. Define Power and Energy.<br>1d.  Define laws and rules of electromagnetism.<br>1e. Explain Statically and dynamically induced EMF..<br>1f. Explain concepts of self-inductance, mutual inductance and coefficient of coupling.<br>1g. Explain Energy stored in magnetic fields. | 1.1    Ohms Law and Kirchhoff's laws<br>1.2    Analysis of series, parallel and series –parallel circuits excited by independent voltage sources. Power and Energy.<br>1.3     Faradays Laws, Lenz's Law, Fleming's Rules. Statically and dynamically induced EMF.  Concepts of self-inductance, mutual inductance and coefficient of coupling. Energy stored in magnetic fields |
| **Unit 2   Single  Phase  and Three phase A.C. Circuits (Marks-13, Hrs-22)** | |
| 2a. Describe the method of generation of single phase voltage by an elementary alternator, define basic terms of sinusoidal waveform<br>2b.  Represent the given AC quantities by phasors, waveform and mathematical equations.<br>2c. With the help of waveforms and phasor diagrams, show the phase relationship between voltage and current in R, L, C, RL, RC, and RLC ac circuit.<br>2d. Calculate the parameters of the given circuit, and also calculate  current, power factor and power of the given AC circuit<br>2e Explain the concept of symmetrical system and phase sequence of the given AC supply.<br>2f Calculate the current and power of the given three phase star / delta connection. | 2.1 Generation of sinusoidal voltage. Definition of average value, root mean square value, form factor and peak factor of sinusoidal voltage and current and  phasor  representation of alternating quantities.<br>2.2 Analysis with  phasor diagrams of R, L, C, RL, RC and RLC circuits. Real power, reactive power, apparent power and power factor, series, parallel and series -parallel circuits. Series and parallel resonance.<br>2.3 Necessity and Advantages of three phase systems.<br>2.4 Generation of three phase power, definition of Phase sequence.<br>2.5 Relationship between line and phase values of balanced star and delta connections. Power in balanced three phase circuits.<br>2.6 Measurement of power by two wattmeter method |

| Unit Outcomes (UOs)<br>(in cognitive domain) | Topics and Sub-topics |
|---|---|
| **UNIT 3   Induction motor and Transformer ( Marks- 16 , Hrs- 10)** ||
| 3a. Explain the  construction & working principal of  induction motor<br>3b.Select relevant induction motor for given application with justification.<br>3c. Describe the construction and working of transformer.<br>3d. Derive emf equation and explain  losses, efficiency and voltage regulation. | 3.1 Concept of rotating magnetic field; Principle of operation, types and constructional features of induction motor.; Slip and its significance.<br> 3.2  Necessity of a starter, star-delta starter:<br>3.3 Applications of squirrel cage and slip ring motors.<br>3.4 Single Phase Induction Motors-<br>Working principle, construction and applications of following Motors.<br> I)        Split phase a)Resistance b)Capacitance<br> II)       Capacitor start capacitor run<br>III)       Shaded pole.<br>Reversal of rotation of above motors.<br>3.5 Principle of operation and construction of single phase transformers (Core and shell types).<br>3.6 EMF equation, losses, efficiency and voltage regulation |
| **UNIT 4 Special Purpose Electrical Motors** ( Marks-16  , Hrs-10) ||
| 4a. Explain the construction and working principle of DC motor and its applications.<br>4b. Explain the construction and working principle of stepper motor, servo motor and BLDC motor and its applications | 4.1 DC Motor: DC motor working principle; Back  EMF and its significance, torque equation;<br>Types of D.C. motors,<br>characteristics and applications;<br>Necessity of a starter for DC motor.<br>4.2. Stepper Motor:<br> Working principal and construction of stepper motor and application.<br>4.3 Servo motor: Servo motor working principal, construction and application.<br>4.5 BLDC Motor: Brush less D. C. Motor  construction, working principal and application |
| **UNIT 5  Electrical wiring ,Protective Devices  and Electrical  safety (Marks-14, Hrs-08)** ||
| 5a. Select the relevant protective device and suitable switchgear for the given application with justification.<br> 5b Describe the features of the given type of protective device.<br>5c State the I.E. rule related to be applied for the  safety  with justification. | 5.1 Introduction to domestic wiring, service mains, meter board and distribution board;<br>5.2 Introduction to circuit protective devices: Concept of overload, O.C., S.C., leakage current, H.R.C.  Fuses, MCB, use of ELCB. Necessity of Earthing<br>5.3. One lamp control by one switch. Two lamp control by two switches. Electrical wiring diagram  of 5 PC labs.<br>5.4 I.E. rules for safety of person & equipment followed when working with electrical installation.  Electrical shocks and |

| Unit Outcomes (UOs)<br>(in cognitive domain) | Topics and Sub-topics |
|---|---|
| 5d. Explain how to take the precautions against shocks and understand the procedure for rescuing a person, who has received an electrical shock. | precautions against shocks. Procedure for rescuing a person who has received an electrical shock. |

## 8. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

| Unit No. | Unit Title | Teaching Hours | Distribution of Practical Marks | | | |
|---|---|---|---|---|---|---|
| | | | R Level | U Level | A Level | Total Marks |
| I | Electrical Circuit and Electromagnetism | 07 | 02 | 06 | 04 | 12 |
| II | Single Phase and Three phase A.C. Circuits | 13 | 06 | 10 | 06 | 22 |
| III | Induction motor and Transformer | 10 | 04 | 06 | 06 | 16 |
| IV | Special Purpose Electrical Motors | 10 | 04 | 06 | 06 | 16 |
| V | Electrical wiring, Protective Devices and Electrical safety | 08 | 04 | 06 | 04 | 14 |
| **Total** | | 48 | **20** | **34** | **26** | **80** |

## 9. SUGGESTED STUDENT ACTIVITIES

Other than the classroom and laboratory learning, following are the suggested student-related *co-curricular* activities which can be undertaken to accelerate the attainment of the various outcomes in this course: Students should conduct following activities in group and prepare reports of about 5 pages for each activity, also collect/record physical evidences for their (student's) portfolio which will be useful for their placement interviews:
   a. Prepare journals based on practical performed in laboratory.
   b. Market survey regarding commonly used electrical equipment which are not covered in the curriculum.
   c. Prepare charts of different electrical wiring diagram
   d. Search information about Ratings and specifications of AC, DC and special purpose electrical motors.
   e. Prepare power point presentation or animation for showing working of DC or AC or special purpose electrical motors.
   f. Prepare posters to illustrate the use of procedure for rescuing a person who has received an electrical shock.

## 10. SUGGESTED SPECIAL INSTRUCTIONAL STRATEGIES (if any)

   These are sample strategies, which the teacher can use to accelerate the attainment of the various outcomes in this course:
   a. Massive open online courses (*MOOCs*) may be used to teach various topics/sub topics.
   b. About *15-20% of the topics/sub-topics* which is relatively simpler or descriptive in nature is to be given to the students for *self-directed learning* and assess the development of the COs through practically implementation.

c. With respect to item No.8, teachers need to ensure to create opportunities and provisions for *co-curricular activities*.
d. Guide student(s) in undertaking micro-projects.
e. Teacher should ask the students to go through instruction and Technical manuals

## 11. SUGGESTED MICRO-PROJECTS

Only one micro-project is planned to be undertaken by a student that needs to be assigned to him/her in the beginning of the semester.  The micro project should be preferably being *individually* undertaken to build up the skill and confidence in every student to become problem solver so that she/he contributes to the projects of the industry. In special situations where groups have to be formed for micro projects, the number of students in the group should *not exceed three*.

The micro-project could be application based, internet-based, and field based.  Each micro-project should encompass two or more COs.  Each student will have to maintain dated work diary consisting of individual contribution in the project work and give a seminar presentation of it before submission. The student ought to submit micro-project report by the end of the semester.

A suggestive list of micro-projects is given here. Similar micro-projects could be added by the concerned faculty:

a) Visit nearby  pole mounted sub-station and prepare a report based on the following points
   i. Rating :kVA rating,  primary & secondary voltage  and connections
   ii. Different parts and their functions
   iii. Earthing arrangement
   iv. Protective devices
b) Visit Institute workshop and prepare a report which includes the following points:
   i.  Electrical Control panel
   ii. Switch gears
   iii. Different types of motors
c) Each batch will select any one electrical device/equipment which is not included in the curriculum and prepare a short power point presentation for the class based on the following points: construction, working salient feature ,cost merits, demerits, applications  manufacturers etc
d) Write a report of electrical specification of various electrical parts/motors are used in printer, monitor ,CPU, UPS & SMPS in terms of voltage, power and frequency.
e) To build electrical switch board of three sockets and three switches.
f) Prepare a report of electrical specification of accessories such as wire, MCB, switches etc., (minimum 25 items )

## 12. SUGGESTED LEARNING RESOURCES

| S.N. | Title | Author, Publisher, Edition and Year of publication | ISBN Number |
|---|---|---|---|
| 1 | Electrical Technology – Vol-I | B. L. Theraja, A. K. Theraja , S. Chand & Company Pvt. Ltd. New Delhi | ISBN: 978-81-219-2440-5 |
| 2 | Electrical Technology- Vol-II | B. L. Theraja, A. K. Theraja , Revised by S. G. Tarnekar , S. Chand & Company Pvt. Ltd., New Delhi | ISBN: 978-81-219-2437-5 |
| 3 | A Textbook of Electrical Machines | K. R. Siddhapura, D. B. Raval, Vikas Publishing House Pvt. Ltd. | ISBN: 978-93259-7562-0 |

## 13. SOFTWARE/LEARNING WEBSITES

1. www.nptel.com
2. www.electrical-technologies.com
3. www.youtube.com/electrical

## 14. PO - COMPETENCY- CO MAPPING

| CO\PO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 |
|---|---|---|---|---|---|---|---|
| CO1 | 3 | - | - | - | 1 | - | - |
| CO2 | 3 | 1 | 1 | 1 | 1 | - | 1 |
| CO3 | 3 | 2 | 1 | 2 | - | - | 2 |
| CO4 | - | 1 | 1 | 1 | 2 | - | 2 |
| CO5 | - | 1 | - | - | 3 | - | 1 |

For Information Technology Program

| CO\PO | PSO1 | PSO2 | PSO3 |
|---|---|---|---|
| CO1 | 1 | - | - |
| CO2 | 2 | - | 1 |
| CO3 | 3 | - | 1 |
| CO4 | 2 | - | - |
| CO5 | 2 | - | - |

For Computer Engineering program

| CO\PO | PSO1 | PSO2 |
|---|---|---|
| CO1 | 1 | - |
| CO2 | 2 | - |
| CO3 | 3 | - |
| CO4 | 2 | - |
| CO5 | 2 | - |

| Sign: | Sign: |
|---|---|
| Name:  Dr. Vijaykumar Kishanrao Jadhav<br>            (Course Expert /s) | Name:<br>            (Head of Department) |
| Sign:<br><br>Name:<br>U. V. Kokate<br>Dr. S.B.Nikam<br>(Programme Head ) | Sign:<br><br>Name: Shri A.S.Zanpure<br><br>            (CDC ) |

# GOVERNMENT POLYTECHNIC, PUNE

## '180OB' – Scheme

| Programme | Diploma in ET/CE/EE//ME/MT/CM/**IT**/DDGM |
|---|---|
| Programme code | 01/02/03/04/05/**06/07**/08/16/17/21/22/23/24/**26** |
| **Name of Course** | **Fundamental of Electronics** |
| Course Code | **ET2107** |
| Prerequisite course code and name | **NA** |
| Class Declaration | **NO** |

## 1. TEACHING AND EXAMINATION SCHEME

| Teaching Scheme (In Hours) | | | Total Credits (L+T+P) | | | Examination Scheme | | | | Total Marks |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Theory | | Practical | | |
| **L** | **T** | **P** | **C** | | | **ESE** | **PA** | ***ESE** | **PA** | |
| 03 | 00 | 02 | 05 | **Marks** | | 80 | 20 | 25 | 25 | 150 |
| | | | | **Exam Duration** | | 3 Hrs | 1 Hr | | -- | |

*Legends: L- Lecture, P- Practical, T- Tutorial, C- Credit, ESE-End Semester Examination, PA-Progressive Assessment (Test I, II/Term Work), \*- Practical Exam, \$- Oral Exam, #- Online Examination each Lecture/Practical period is of one clock hour;*

## 2. RATIONALE

In today's world most of the consumer appliances are based on electronic circuits and devices. The foundation for working of computer or any of its peripherals are based on electronics. This course has been designed to develop skills to understand and test simple electronic components and circuits. After studying this course students will develop an insight to identify, build and troubleshoot simple electronic circuits.

## 3. COMPETENCY

The aim of this course is to attend following industry identified competency through various teaching learning experiences:
- **Maintain electronic circuits comprising of discrete electronic components**.

## 4. COURSE OUTCOMES (COs)

The theory, practical experiences and relevant soft skills associated with this course are to be taught and implemented, so that the student demonstrates the following industry oriented COs associated with the above mentioned competency**:**

1. Plot the characteristics of semiconductor devices.
2. Interpret working of oscillators.
3. Use OP-AMP IC in circuits.
4. Operate CRO and Function generator.
5. Select appropriate transducers for relevant applications

## 5. SUGGESTED PRACTICALS/ EXERCISES

The practicals in this section are PrOs (i.e. sub-components of the COs) to be developed and assessed in the student for the attainment of the competency:

| Sr. No. | Unit No. | Practical Exercises (Outcomes in Psychomotor Domain) | Relevant CO | Approximate Hours Required. |
|---|---|---|---|---|
| 1. | 1 | Plot V-I characteristics of P-N junction diode. | 1 | 02 |
| 2. | | Plot V-I characteristics of the given Zener diode. | 1 | 02 |
| 3. | | Test performance of diode as Half wave and Full wave rectifier with and without filter. | 1 | 04 |
| 4. | | Plot the input and output characteristics of NPN transistor in CE configuration. | 1 | 04 |
| 5. | 2 | Plot the characteristics of n-channel JFET. | 1 | 02 |
| 6. | 3 | Calculate frequency of oscillations for Crystal Oscillator. | 2 | 02 |
| 7. | | Observe input-output waveforms of Inverting Amplifier. | 3 | 02 |
| 8. | | Observe input-output waveforms of Non Inverting Amplifier. | 3 | 02 |
| 9. | | Observe input/output waveforms of Integrator. | 3 | 02 |
| 10. | | Observe input/output waveforms of Differentiator | 3 | 02 |
| 11. | 4 | Study of front panel of C.R.O. | 4 | 02 |
| 12. | | Study of front panel of Function generator. | 4 | 02 |
| 13. | | Measure amplitude, Time period of sine, triangular and square wave with the help of CRO. | 4 | 02 |
| 14. | 5 | Test performance of inductive transducer LVDT. | 5 | 02 |
| 15 | All | Complete a Micro- project as per the guidelines in point no. 11 towards the fulfillment of the COs of the course. | All | 04 |
| | | **Total Hrs** | | **36** |

| S.No. | Performance Indicators | Weightage in % |
|---|---|---|
| a. | Arrangement of available equipment / test rig or model | 20 |
| b. | Setting and operation | 20 |
| c. | Safety measures | 10 |
| d. | Observations and Recording | 10 |
| e. | Interpretation of result and Conclusion | 20 |
| f. | Answer to sample questions | 10 |
| g. | Submission of report in time | 10 |
| | **Total** | **100** |

## 6.    MAJOR EQUIPMENT/ INSTRUMENTS REQUIRED

The major equipment with broad specification mentioned here will usher in uniformity in conduct of practical, as well as aid to procure equipment by authorities concerned**.**

| Sr.No. | Major Equipment/ Instruments Required | Experiment Sr. No |
|---|---|---|
| 1 | Variable DC Power supply 0-30V with display for voltage and current | 3,4 |
| 2 | Digital Multimeter | 7,8 |
| 3 | CRO | 1,2,3,4,5,6,7,8,9,10,11,12,13 |
| 4 | Function Generator | 12,13 |
| 5 | Different types of  cables and connectors | All |

## 7.    THEORY COMPONENTS
The following topics/subtopics should be taught and assessed in order to develop UOs for achieving the COs to attain the identified competency**.**

| Unit Outcomes (UOs) (in cognitive domain) | Topics and Sub-topics |
|---|---|
| **UNIT 1. SEMICONDUCTOR DEVICES** (Weightage-22 , Hrs- 14) ||
| 1a. Plot V-I characteristics of PN Diode<br>1b.  Define and Measure parameters of diode<br>1c. Implement Zener diode as voltage regulator.<br>1d. Compare salient features of the given type of rectifiers.<br>1e. Explain with sketches the working principle of the given transistor configuration. | 1.1 Rectifying diode:<br> Review of P - type and N - type semiconductor, PN junction, Barrier voltage, depletion region, Junction Capacitance, Forward biased & reversed biased junction.<br>Diode symbol , forward & reversed Characteristics of PN junction diode<br>Specifications :<br>Forward voltage drop , Reverse saturation current, maximum forward current , power dissipation ,Package view of diodes of different power ratings (to be shown during practical hours) |

| Unit Outcomes (UOs)<br>(in cognitive domain) | Topics and Sub-topics |
|---|---|
| 1f. Analyze and differentiate between CE, CB, CC configurations<br>1g. Derive relation between alpha and beta. | 1.2 Zener diode :<br>Construction ,Symbol ,characteristics ( forward & reversed )<br>Avalanche &Zener breakdown<br>Specifications :<br>Zener voltage , power dissipation , break over current, dynamic resistance & maximum reverse current (to be shown during practical hours)<br><br>1.3 Rectifier :<br>Half wave, Full wave and Bridge Rectifier, working principle, circuit diagram, performance parameters PIV, ripple factor, efficiency<br>Need for filters: circuit diagram and working of 'L', 'C' and 'π'' filter.<br><br>1.4 Working principle and block diagram of regulated power supply.<br><br>1.5 Symbol, construction and working principle of LED<br><br>1.6 Transistor :<br>construction, symbol, operating principle, characteristics, applications, rating and specifications, configurations, comparison between CB, CE, CC.<br>Transistor as a switch and amplifier.<br>Transistor parameters – alpha, Beta , input and output resistance and relation between alpha and beta |
| **UNIT 2  FIELD EFFECT TRANSISTORS (Weightage-  14  , Hrs-08)** | |
| 2a. Explain with sketches the working principle of the given transistor configuration.<br><br>2b. Determine the FET parameters from the given FET characteristics curve.<br><br>2c. Describe the specified JFET parameter.<br><br>2d. Describe the specified MOSFET parameter. | 2.1 FET-Types: JFET and MOSFET<br><br>2.2 Classification of JFET<br><br>2.3 Symbol, construction and working principle of N-channel and P channel JFET, Drain and transfer characteristics of JFET<br><br>2.4 JFET parameters: DC and AC drain resistance, Transconductance, amplification factor<br><br>2.5 Symbol, construction and working principle of MOSFET. |

| Unit Outcomes (UOs)<br>(in cognitive domain) | Topics and Sub-topics |
|---|---|
| **UNIT 3  OSCILLATORS & LINEAR ICS (Weightage- 16  , Hrs- 10)** ||
| 3a. State Barkhausen criteria for oscillator.<br>3b.Classify oscillators.<br>3c. Describe how oscillations are produced in LC tank circuit.<br>3d. Explain with circuit diagram working of LC oscillators.<br>3e. Draw circuit and explain working of Crystal oscillator.<br>3f. Draw symbol and pin diagram of IC 741.<br>3g. Define various parameters related to OP-AMP.<br>3h. Derive expression for various mathematical operation of OP-AMP. | 3.1 Block diagram, Barkhausen Criteria for sustained oscillations, classification of oscillator.<br>Oscillations in LC tank circuit,      Working of - Hartley, Colpitts, Clapp Oscillators<br>Crystal oscillator : Diagram, Working principle<br><br>3.2 OP AMP. IC 741, symbol, pin diagram, ideal and typical characteristics, Applications such as Inverting , Non Inverting amplifier, Difference amplifier, adder , substractor , Integrator, differentiator. |
| **UNIT 4 INSTRUMENTATION(Weightage- 12  , Hrs- 06)** ||
| 4a. Draw and explain blocks of CRT, CRO and Function generator.<br>4b. State applications & specifications of CRO and Function generator. | 4.1 CRO: Cathode Ray Tube, Oscilloscope Block diagram, operation, oscilloscope specifications, Applications.<br><br>4.2 Function generator:  Block diagram, operation, specifications, applications |
| **UNIT 5  SENSORS & TRANSDUCERS( Weightage- 16  , Hrs- 10)** ||
| 5a. Differentiate between sensor and transducer.<br>5b. Define and classify transducers.<br>5c. State selection criteria of transducer.<br>5d. Differentiate between Active- Passive, Primary-Secondary, and Analog- Digital transducers.<br>5e. Interpret working principle and application of Resistive, Capacitive, Inductive, Transducers (LVDT), photodiode, phototransistor, Piezoelectric Transducers, proximity sensor transducers. | 5.1 Definition, classification: Active,  Passive, Primary, Secondary, Analog, Digital<br><br>5.2 Selection criteria for transducer<br><br>5.3 Construction, Operation, One example of -Resistive, Capacitive, Inductive, Transducers(LVDT), photodiode and phototransistor , Piezoelectric Transducers<br><br>5.4  Thermocouple, proximity sensor and its applications |

## 8.    SUGGESTED SPECIFICATION TABLE FORQUESTION PAPER DESIGN

| Unit No. | Unit Title | Teaching Hours | Distribution of Theory Marks | | | |
|---|---|---|---|---|---|---|
| | | | R Level | U Level | A Level | Total Marks |
| I | Semiconductor Devices | 14 | 08 | 08 | 06 | 22 |
| II | Field Effect Transistors | 08 | 04 | 06 | 04 | 14 |
| III | Oscillators & Linear ICs | 10 | 04 | 08 | 04 | 16 |
| IV | Instrumentation | 06 | 04 | 04 | 04 | 12 |
| V | Sensors & Transducers | 10 | 04 | 06 | 06 | 16 |
| | **Total** | 48 | **24** | **32** | **24** | **80** |

## 9.    SUGGESTED STUDENT ACTIVITIES

Other than the classroom and laboratory learning, following are the suggested student-related *co-curricular* activities which can be undertaken to accelerate the attainment of the various outcomes in this course: Students should conduct following activities in group and prepare reports of about 5 pages for each activity, also collect/record physical evidences for their (student's) portfolio which will be useful for their placement interviews:
   a. Prepare journals based on practical performed in laboratory.
   b. Study of datasheet of electronic components.
   c. Prepare charts of symbols of Electronic components.
   d. Search information about Ratings and specifications of Regulator, diodes, transistors, CRO, function generator.
   e. Collect information of passive transducers and prepare charts of the same.
   f. Prepare posters to illustrate the use of photoelectric sensors in remote controls.

## 10.    SUGGESTED SPECIAL INSTRUCTIONAL STRATEGIES (if any)

These are sample strategies, which the teacher can use to accelerate the attainment of the various outcomes in this course:
   a. Massive open online courses (*MOOCs*) may be used to teach various topics/sub topics.
   b. About *15-20% of the topics/sub-topics* which is relatively simpler or descriptive in nature is to be given to the students for *self-directed learning* and assess the development of the COs through classroom presentations (see implementation guideline for details).
   c. With respect to item No.8, teachers need to ensure to create opportunities and provisions for *co-curricular activities*.
   d. Guide student(s) in undertaking micro-projects.
   e. Correlate subtopics with power plant system and equipments.
   f. Use proper equivalent analogy to explain different concepts.
   g. Use Flash/Animations to explain various components, operation and
   h. Teacher should ask the students to go through instruction and Technical manuals

## 11. SUGGESTED MICRO-PROJECTS

**Only one Micro Project is planned to be undertaken by a student assigned to him/her in the beginning of the semester. She/He ought to submit it by the end of semester to develop industry oriented COs. Each micro-project should encompass two or more COs which are in fact, an integration of PrOs, UOs. The Micro-Project could be industry application based, internet based, workshop based, laboratory based or field based. The assessment of micro- project is to be done under Practical (PA) Assessment. The Micro Project preferably assign to the group of (4-6) students or an individual taking into the considerations the capabilities and circumstances at the time .**

A suggested list is given here. Similar micro-project could be added by the concerned faculty.

a. Rectifier: Build a half wave rectifier for 5V, 500mA output current on general purpose PCB.
b. Rectifier: Build a full wave rectifier with filter capacitor for 5V, 500mA output current on general purpose PCB.
c. BJT: Build a circuit to switch ON and OFF the LED by using BJT as a switching component.
d. Oscillator: Build a LC tank circuit to generate 650Hz frequency.
e. Build adder circuit using OP-AMP 741 and implement it on PCB.
f. Build subtractor circuit using OP-AMP 741 and implement it on breadboard.
g. Build a circuit on breadboard to turn the relay ON and OFF by using Photodiode.
h. Prepare Display boards consisting of electronic components: Prepare display boards / models/ charts / posters to visualize the appearance of electronics active and passive components.
i. Use of sensors for driving relays / output devices: Build /test circuit on breadboard / General purpose PCB. Verify output of designed circuit by applying different inputs.

## 12. SUGGESTED LEARNING RESOURCES

| S.N. | Title | Author, Publisher, Edition and Year ofpublication | ISBN Number |
|------|-------|--------------------------------------------------|-------------|
| 1 | Basic Electronics. | Albert Malvino, 8$^{th}$ Edition, Tata McGraw Hill,2015 | ISBN10:1259200116ISBN13:9781259200113 |
| 2 | Basic Electronics. | J.S.Katre. Edition 2017,Techmax Publishers | ISBN-10: 9350779641 ISBN-13: 978-9350779644 |
| 3 | Basic Electronics. | B.L.Theraja, S Chand Publishing, 2007 | ISBN 10: 8121925568 ISBN 13: 9788121925563 |
| 4 | Linear Integrated Circuits | RamakantGaikwad,4$^{TH}$ EDITION, PHI Publication, | ISBN 10: 8120320581 ISBN 13: 9788120320581 |
| 5 | Modern Digital Electronics | R P Jain, McGraw HillEducation Pvt. Ltd, 4$^{th}$ Edition,2012 | ISBN 10: 0070669112 ISBN 13: 9780070669116 |
| 6 | Instrumentation | A K Sawheny, Nineteenth edition, 2017,DhanpatRai publication | ISBN       : 8177001006 |

### 13. SOFTWARE/LEARNING WEBSITES

1. www.nptel.com
2. http://www.electronics-tutorials
3. https://en.wikipedia.org/wiki/P%E2%80%93n_junction
4. https://learn.sparkfun.com/tutorials/transistors
5. http://www.pitt.edu/~qiw4/Academic/ME2082/Transistor%20Basics.pdf
6. http://faculty.cord.edu/luther/physics225/Handouts/transistors_handout.pdf
7. http://www.technologystudent.com/elec1
8. www.slideshare.net/manash234/classification-of-transducers
9. http://www.electrical4u.com/linear-variable-differential-transformer/

### 14. PO - COMPETENCY- CO MAPPING

|      | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 |
|------|-----|-----|-----|-----|-----|-----|-----|
| CO1  | 3   | -   | 2   | 2   | -   | -   | 2   |
| CO2  | 3   | -   | 2   | 2   | -   | -   | 2   |
| CO3  | 3   | 3   | 2   | 2   | -   | -   | 2   |
| CO4  | 1   | -   | -   | 3   | -   | -   | 2   |
| CO5  | 3   | 2   | 2   | 2   | 1   | -   | 3   |

|      | PSO1 | PSO2 |
|------|------|------|
| CO1  | 3    | --   |
| CO2  | 3    | --   |
| CO3  | 3    | --   |
| CO4  | 3    | --   |
| CO5  | 3    | --   |

| 1)Sign:<br><br>Name: Shri. N. D. Toradmal<br>2)Sign:<br><br>Name:  Smt.V.S.Sabnis<br>(Course Experts) | Sign:<br><br>Name:        Shri.R.N.Shikari<br>          (Head of Department) |
|---|---|
| Sign:<br><br>Name<br>U. V. Kokate<br>Dr. S. B. Nikam<br>(Programme Head) | Sign:<br><br>Name:       Shri A.S.Zanpure<br>                (CDC ) |

# GOVERNMENT POLYTECHNIC, PUNE

## '180 OB' – Scheme

| Programme | Diploma in **CM/IT** |
|---|---|
| Programme code | **06/07/26** |
| Name of Course | **ENGINEERING MATHEMATICS** |
| Course Code | SC2102 |
| Prerequisite | SC1102 – Applied Mathematics II |
| Class Declaration | **NO** |

## 1. TEACHING AND EXAMINATION SCHEME:

| Teaching Scheme (In Hours) | | | Total Credits (L+T+P) | | | Examination Scheme | | | | Total Marks |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Theory | | Tutorials | | |
| **L** | **T** | **P** | **C** | | | **ESE** | **PA** | **ESE** | **PA** | |
| 03 | 02 | 00 | 05 | | **Marks** | 80 | 20 | NA | 25 | 125 |
| | | | | | **Exam Duration** | 3 Hrs | 1 Hr | -- | -- | — |

*Legends : L- Lecture, P- Practical, T- Tutorial, C- Credits ,ESE-End Semester Examination, PA- Progressive Assessment (Test I,II/TermWork) , \*- Practical Exam, $- Oral Exam, #- Online Examination each Lecture/Practical period is of one clock hour;*

## 2. RATIONALE

The student shall learn various techniques in integration and differential equations and use these techniques to their related Engineering problems.

## 3. COMPETENCY

The aim of this course is to help the student to attain the following industry identified competency through various teaching learning experiences:

● **Solve various engineering related problems using the principles of Engineering Mathematics**

## 4. COURSE OUTCOMES (COs)

The theory, practical experiences and relevant soft skills associated with this course are to be taught and implemented, so that the student demonstrates the following industry oriented COs associated with the above mentioned competency**:**

1. Solve the given problems of integration using suitable methods.
2. Apply the concept of integration to find mean and RMS value.
3. Solve the differential equation of first order and first degree using suitable methods.
4. Utilize basic concepts of probability distribution to solve elementary engineering problems.
5. Use statistical measures to solve engineering related problems

## 5. SUGGESTED PRACTICALS/ EXERCISES

| Sr. No. | Unit No. | Practical Exercises (Learning Outcomes in Psychomotor Domain) | Relevant COs | Approx. Hrs. required |
|---|---|---|---|---|
| 1 | 1 | Integration by substitution method | 1 | 3 |
| 2 | 1 | Integration on the type $1/ax^2+bx+c$, $1/\sqrt{ax^2+bx+c}$ ,$1/a\sin x+b\cos x+c$ , $1/a\sin^2 x +b\cos^2 x +c$. | 1 | 2 |
| 3 | 1 | *Integration using By Part Rule and integration by partial fraction method. | 1 | 2 |
| 4 | 1 | *Integration by partial fraction method. | 1 | 2 |
| 5 | 2 | Examples on Definite integral and its properties | 2 | 2 |
| 6 | 2 | Examples on Mean and R.M.S. value | 2 | 2 |
| 7 | 3 | Examples on order, degree and formation of differential equations. | 3 | 2 |
| 8 | 3 | Solution of first order first degree D.E. using various methods. | 3 | 3 |
| 9 | 4 | Solve problems based on Binomial Distribution related to engineering problems. | 4 | 2 |
| 10 | 4 | Solve problems based on Poisson Distribution related to engineering problems. | 4 | 2 |
| 11 | 4 | Solve problems based on Normal Distribution related to engineering problems. | 4 | 2 |
| 12 | 5 | Solve problems on moments. | 5 | 2 |
| 13 | 5 | Solve problems on skewness. | 5 | 2 |
| 14 | 5 | *Solve problems on Kurtosis. | 5 | 2 |
| 15 | 5 | *Solve problems on correlation. | 5 | 2 |
| 16 | ALL | *Complete a Micro- project as per the guidelines in point no. 11 towards the fulfillment of the COs of the course. | ALL | 4 |
| | | **Total** | | 32 |

**\*Experiment No. 16 compulsory, perform experiment 3 or 4, experiment 14 or 15.**

| S.No. | Performance Indicators | Weightage in % |
|---|---|---|
| a. | Prepare experimental set up | - |
| b. | Handling of instruments during performing practical. | - |
| c. | Follow Safety measures | - |
| d. | Accuracy in calculation | 20 |
| e. | Answers to questions related with performed practices. | 40 |
| f. | Submit journal report on time | 20 |
| g. | Follow Housekeeping | 10 |
| h. | Attendance and punctuality | 10 |
| | **Total** | **100** |

## 6. MAJOR EQUIPMENT/ INSTRUMENTS REQUIRED

The major equipment with broad specification mentioned here will usher in uniformity in conduct of practicals, as well as aid to procure equipment by authorities concerned.

| S. No. | Equipment Name with Broad Specifications | PrO. No. |
|--------|------------------------------------------|----------|
| 1 | LCD Projector | 1-15 |
| 2 | Interactive Classroom | 1-15 |

## 7.   THEORY COMPONENTS

| Unit Outcomes (UOs)<br>(in cognitive domain) | Topics and Sub-topics |
|---|---|
| **Units I : Integration (09 hrs, 20 marks)** ||
| 1a. Obtain the given simple integral(s) using substitution method.<br>1b. Integrate given simple functions using the integration by parts.<br>1c. Evaluate the given simple integral by partial fractions. | 1.1 Methods of Integration:<br>a.    Integration by substitution.<br>b.    Integration by parts.<br>c.    Integration by partial fractions. |
| **Unit II: Definite integrals (09 hrs, 16 marks)** ||
| 2a. Solve given simple problems based on properties of definite integration.<br>2b. Utilize the concept of definite integration to find the mean value of the function.<br>2c. Invoke the concept of definite integration to find root mean square value of function. | 2.1 Definite Integration:<br>a.    Simple examples<br>b.    Properties of definite integral (without proof) and simple examples.<br>2.2 Applications of integration :<br>a.    Mean value.<br>b.    Root Mean Square Value. |
| **Unit III: Differential Equations (12 hrs, 20 marks)** ||
| 3a. Find the order and degree of given differential equations<br>3b. Form simple differential equation for given simple engineering problems.<br>3c. Solve given differential equations using the method of Variable separable form.<br>3d. Solve the given differential equations using linear differential equations. | 3.1 Concept of differential equation.<br>3.2 Order, degree and formation of Differential equations<br>3.3 Solution of differential equation<br>a.    Variable separable form.<br>b.    Linear differential equation.<br>3.4 Application of differential equations and related engineering problems. |
| **Unit IV: Probability  Distribution (09 hrs, 12 marks)** ||
| 4a. Make use of probability distribution to identify discrete and continuous probability distribution<br>4b. Solve given problems based on repeated trials using Binomial distribution<br>4c. Solve given problems when number of trials are large and probability is very small.<br>4d. Utilize the concept of normal distribution to solve related engineering problems. | 4.1 Probability distribution Probability<br>a.    Discrete Probability distribution.<br>b.    Continuous Probability distribution.<br>4. 2 Binomial distribution.<br>4. 3 Poisson's distribution.<br>4. 4 Normal distribution. |

| Unit Outcomes (UOs) (in cognitive domain) | Topics and Sub-topics |
|---|---|
| **Unit V: Statistical Measures (09 hrs, 12 marks)** ||
| 5a. Calculate Moments about the mean of the given frequency distribution.<br>5b. Calculate the coefficient of Skewness of given distribution.<br>5c. Calculate the coefficient of Kurtosis of given distribution.<br>5d. Calculate the coefficient of correlation of given simple data. | 5.1 Moments of given frequency distribution.<br>5.2 Skewness and coefficient of skewness of the given frequency distribution.<br>5.3 Kurtosis, coefficient of Kurtosis and type of Kurtosis.<br>5.4 Karl Pearson's coefficient of Correlation of simple data. |

# 8. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

| Unit No. | Unit Title | Teaching Hours | Distribution of Theory Marks | | | |
|---|---|---|---|---|---|---|
| | | | R Level | U Level | A Level | Total Marks |
| I | Integration | 09 | 04 | 08 | 08 | 20 |
| II | Definite integration | 09 | -- | 08 | 08 | 16 |
| III | Differential equation | 12 | 04 | 08 | 08 | 20 |
| IV | Probability Distribution | 09 | 04 | 04 | 04 | 12 |
| V | Statistical Measures | 09 | 04 | 04 | 04 | 12 |
| **Total** | | **48** | **16** | **32** | **32** | **80** |

# 9. SUGGESTED STUDENT ACTIVITIES

Other than the classroom and laboratory learning, following are the suggested student-related *co-curricular* activities which can be undertaken to accelerate the attainment of the various outcomes in this course:

a.       Identify engineering problems based on real world problems and solve them with the use of free tutorials available on the internet.

b.       Use graphical software: EXCEL, DPLOT and GRAPH for related topics.

c.       Use MathCAD as a Mathematical Tool and solve the problems on Calculus.

d.       Identify problems based on applications of differential equations and solve these problems.

## 10.    SUGGESTED SPECIAL INSTRUCTIONAL STRATEGIES (if any)

These are sample strategies, which the teacher can use to accelerate the attainment of the various outcomes in this course:

a.       Massive open online courses (***MOOCs***) may be used to teach various topics/subtopics.

b.       About ***15-20% of the topics/subtopics*** which is relatively simpler or descriptive in nature is to be given to the students for ***self-directed learning*** and assess the development of the COs through classroom presentations (see implementation guideline for details).

c.       Use Flash/Animations to explain various components, operation.

d.       Teachers should ask the students to go through instruction and Technical manuals.

## 11.    SUGGESTED MICRO-PROJECTS

Only one Micro Project is planned to be undertaken by a student assigned to him/her in the beginning of the semester. She/He ought to submit it by the end of semester to develop industry oriented COs. Each micro-project should encompass two or more COs which are in fact, an integration of PrOs, UOs. The Micro-Project could be industry application based, internet based, workshop based, laboratory based or field based. The assessment of micro-project is to be done under Practical (PA) Assessment. The Micro Project preferably assign to the group of (4-6) students or an individual taking into the considerations the capabilities and circumstances at the time

A suggested list is given here. Similar micro-project could be added by the concerned faculty.

a.       Prepare charts displaying the area of irregular shapes using the concept of integration.

b.        Prepare charts displaying the volume of irregular shapes using the concept of integration.

c.       Prepare models using the concept of differential equations for radiocarbon decay.

d.       Prepare models using the concept of differential equations for population growth.

e.       Prepare models using the concept of differential equations for thermal cooling.

f.       Prepare models using the concept of Probability Distribution to solve engineering problems.

g.       Prepare models using the concept of Statistical measures to solve engineering problems.

## 12.    SUGGESTED LEARNING RESOURCES

| S. No. | Title of Book | Author | Publication |
|---|---|---|---|
| 1. | Higher Engineering Mathematics | Grewal B. S. | Khanna publication New Delhi , 2013 ISBN: 8174091955 |
| 2. | A textbook of Engineering Mathematics | Dutta. D | New age publication New Delhi, 2006 ISBN: 978-81-224-1689-3 |
| 3. | Advance Engineering Mathematics | Kreysizg, Ervin | Wiley publication New Delhi 2016 ISBN: 978-81-265-5423-2 |
| 4. | Advance Engineering Mathematics | Das H.K. | S Chand publication New Delhi 2008 ISBN: 9788121903455 |

## 13. SOFTWARE/LEARNING WEBSITES

a. *www.scilab.org/ -SCI Lab*
b. *www.mathworks.com/product/matlab/ -MATLAB*
c. *Spreadsheet Applications*
d. *www.dplot.com*
e. *https://www.khanacademy.org/math?gclid=CNqHuabCys4CFdOJaddHoPig*

## 14 PO - COMPETENCY- CO MAPPING

CO-PO Mapping of course

| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 |
|---|---|---|---|---|---|---|---|
| 1 | 2 | 2 | 1 | - | - | - | 1 |
| 2 | 3 | 3 | 1 | - | - | 1 | 2 |
| 3 | 3 | 3 | - | - | - | - | 1 |
| 4 | 3 | 3 | 1 | 1 | - | - | 1 |
| 5 | 3 | 3 | 1 | 1 | - | - | 1 |

CO-PSO Mapping of course

| CO | CM | | IT | | |
|---|---|---|---|---|---|
| | PSO1 | PSO2 | PSO1 | PSO2 | PSO3 |
| 1 | - | 1 | - | 1 | 1 |
| 2 | - | 1 | - | 1 | 1 |
| 3 | - | 2 | - | 2 | 1 |
| 4 | - | 2 | - | 2 | - |
| 5 | - | 2 | - | 2 | - |

| 1)Sign:<br>Name: S. B. Yede<br>2)Sign:<br>Name: Shri. V. B. Shinde<br>3)Sign:<br>Name : Mrs. P. R. Nemade<br>(Course Experts) | Sign:<br>Name:<br>(Head of Department) |
|---|---|
| Sign:<br>Name:<br>U. V. Kokate<br>Dr. S.B. Nikam<br>(Programme head) | Sign:<br>Name: Shri A. S. Zanpure<br>(CDC ) |