# GOVERNMENT POLYTECHNIC, PUNE

## '120 – NEP' SCHEME

| | |
|---|---|
| PROGRAMME | DIPLOMA IN EE / ET |
| PROGRAMME CODE | 06 / 07 |
| COURSE TITLE | BASIC ELECTRONICS |
| COURSE CODE | ET11201 |
| PREREQUISITE COURSE CODE & TITLE | NA |

EE

## I. LEARNING & ASSESSMENT SCHEME

| Course Code | Course Title | Course Type | Learning Scheme | | | | | Credits | Assessment Scheme | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Actual Contact Hrs./Week | | | SLH | NLH | | Paper Duration | Theory | | | | Based on LL & TSL | | | | Based on SL | | Total Marks |
| | | | | | | | | | | | | | | Practical | | | | | | |
| | | | CL | TL | LL | | | | | FA-TH | SA-TH | Total | | FA-PR | | SA-PR | | SLA | | |
| | | | | | | | | | | Max | Max | Max | Min | Max | Min | Max | Min | Max | Min | |
| ET11201 | BASIC ELECTRONICS | DSC | 3 | - | 2 | 1 | 6 | 3 | 3 | 30 | 70 | 100 | 40 | 25 | 10 | 25@ | 10 | 25 | 10 | 175 |

**Total IKS Hrs for Term: 0 Hrs**

**Abbreviations:** **CL**-Classroom Learning, **TL**-Tutorial Learning, **LL**-Laboratory Learning, **SLH**-Self Learning Hours, **NLH**-Notional Learning Hours, **FA** - Formative Assessment, **SA** -Summative assessment, **IKS** – Indian Knowledge System, **SLA**- Self Learning Assessment

**Legends:** @-Internal Assessment, # - External Assessment,*# - Online Examination,@$ - Internal Online Examination

**Note:**

**FA-TH** represents an average of two class tests of 30 marks each conducted during the semester.

1. If a candidate is not securing minimum passing marks in **FA-PR** (Formative Assessment - Practical) of any course, then the candidate shall be declared as **'Detained'** in that semester.
2. If a candidate does not secure minimum passing marks in SLA (Self Learning Assessment) of any course, then the candidate shall be declared as **'fail'** and will have to repeat and resubmit SLA work.
3. **Notional learning hours** for the semester are **(CL + LL + TL + SL) hrs. * 15 Weeks**
4. **1 credit** is equivalent to **30 Notional hours.**
5. * Self-learning hours shall not be reflected in the Timetable.
6. * Self-learning includes micro-projects/assignments/other activities.

## II. RATIONALE:

Diploma engineers have to deal with the various electronic components while maintaining various electronic equipment. The study of basic operating principles and handling of various electronic devices will help them to troubleshoot electronic equipment. This course is developed in such a way that students will be able to apply the knowledge to solve broad electronic engineering application problems.

## III. COURSE-LEVEL LEARNING OUTCOMES (CO'S)

Students will be able to achieve & demonstrate the following CO's on completion of course-based learning

CO1: Use relevant passive components in Electronics circuits
CO2: Use relevant diode in different Electronics circuits
CO3: Use BJT in Electronics circuits
CO4: Use FET in Electronics circuits
CO5: Maintain DC-regulated power supply
CO6: Use the front panel to understand various controls of the instrument

## IV. THEORY LEARNING OUTCOMES AND ALIGNED COURSE CONTENT

| Sr. No | Theory Learning Outcomes (TLO'S) aligned to CO's. | Learning content mapped with TLO's. | Suggested Learning Pedagogies | Relevant COs |
|---|---|---|---|---|
| **UNIT-I PASSIVE COMPONENTS (CL Hrs-05, Marks-08)** | | | | |
| 1. | **TLO 1.1:** Identify different types of Resistors.<br>**TLO 1.2:** .Identify different types of Inductors.<br>**TLO 1.3:** Identify different types of Capacitors. | 1.1 Resistors: Definition, Classification of Resistors, Colour coding: with three, four, five Bands.Carbon composition resistor, Metal oxide film resistor, Variable Resistor (Potentiometer): constructional diagram, working and application<br>1.2Inductors: Definition, Classification, Colour coding, Construction and working of Air Core Inductor<br>1.3 Capacitors: Classification of Capacitors, Electrolytic capacitor (Aluminum),Ceramic Capacitor, Trimmer capacitor: constructional diagram, working and application. | Classroom Learning, Reference books, NPTEL | **CO1** |
| **UNIT-II SEMICONDUCTOR DIODE AND ITS APPLICATION (CL Hrs-16, Marks-22)** | | | | |
| 2 | **TLO 2.1:** Differentiate between conductor,Insulator,Semiconductor , Energy band diagram<br>**TLO2.2:**Describe the construction & working principle of semiconductor diode<br>**TLO 2.3:**Describe working principle, characteristics, and application of the given types of Diode<br>**TLO 2.4:**Describe the working of a given type of rectifier.<br>**TLO 2.5:**Calculate ripple factor, PIV and efficiency of the given type of filter.<br>**TLO 2.6:**Describe the need and working of the rectifier filter circuit. | 2.1.Introduction to : conductor,semiconductors,Insulators, Energy band diagram<br>2.2. Construction, Symbol, Working principle, Applications of following diodes: PN junction, Zener, LED, Photodiode.<br>2.3 . Forward and Reverse Biasing and V-I Characteristics of the following diodes: PN junction, Zener, LED, Photodiode.<br>2.4.Types of Rectifiers: Half Wave, Full Wave Rectifier (bridge and center tapped): circuit operation, Input and Output waveforms for voltage and current<br>2.5.Parameters of rectifier: Average DC value of current and voltage, ripple factor, ripple frequency, PIV of the diode, TUF, efficiency of rectifier **(No derivation)**<br>2.6 Types of Filters: Shunt capacitor, Series inductor, LC and $\pi$ filter.Comparison of filters. | Classroom Learning, Reference books, NPTEL | **CO2** |

| Sr. No | Theory Learning Outcomes (TLO'S) aligned to CO's. | Learning content mapped with TLO's. | Suggested Learning Pedagogies | Relevant COs |
|---|---|---|---|---|
| **UNIT-III BIPOLAR JUNCTION TRANSISTOR (CL Hrs-08, Marks-12)** | | | | |
| 3 | **TLO 3.1:**Describe the working principle of the given type of transistor.<br>**TLO 3.2:**Compare configuration of transistors.<br>**TLO 3.3:**Justify the need for a biasing method.<br>**TLO 3.4:** Describe the procedure to minimize the thermal runaway effect for the given type of transistor biasing circuit. | **3.1** Introduction to transistors<br>**3.2** Different types of transistors: PNP, NPN and its Symbols<br>**3.3** Transistor configurations: CB, CE, CC. Transistor characteristics (input, output,) in different transistor configurations.Applications of Transistor<br>**3.4.** BJT biasing: DC load line, operating point, stabilization, thermal runaway, types of biasing, fixed biasing, base bias with emitter feedback, voltage divider.<br>Use of heat sink | Classroom Learning, Reference books, NPTEL | **CO3** |
| **UNIT- IV FIELD EFFECT TRANSISTOR (CL Hrs-07, Marks-10)** | | | | |
| 4 | **TLO 4.1:** Explain the working of FET for a given application<br>**TLO 4.2:** Explain the given type of FET biasing method<br>**TLO 4.3:**Compare the working of a given type of MOSFET<br>**TLO 4.4:**Differentiate the working principle of FET and MOSFET. | **4.1**Construction of JFET (N-channel and P-channel), symbol, working principle and characteristics (Drain and Transfer characteristics)<br>**4.2** FET Biasing: Source self-bias, drain to source bias<br>**4.3** Applications of FET<br>**4.4** MOSFET: Construction, working principle and characteristics of Enhancement and depletion MOSFET, MOSFET handling. | Classroom Learning, Reference books, NPTEL | **CO4** |
| **UNIT –V REGULATORS AND POWER SUPPLY (CL Hrs-08, Marks-10)** | | | | |
| 5 | **TLO 5.1:** Describe the working of the given block of the DC-regulated power supply in the block diagram.<br>**TLO 5.2:** Calculate the output voltage of the given zener voltage regulator circuit.<br>**TLO 5.3:**Calculate load and line regulation of the given transistorized regulator. | **5.1**Basic block diagram of DC regulated power supply.<br>**5.2** Zener diode voltage regulator.<br>**5.3** Circuit diagram and working of transistorized Series and Shunt regulator. Numericals on Line and Load regulation. | Classroom Learning, Reference books, NPTEL | **CO5** |

| Sr. No | Theory Learning Outcomes (TLO'S) aligned to CO's. | Learning content mapped with TLO's. | Suggested Learning Pedagogies | Relevant COs |
|---|---|---|---|---|
| UNIT –VI INTRODUCTION TO ELECTRONIC INSTRUMENTS (CL Hrs-04, Marks-08) | | | | |
| 6 | **TLO 6.1**:Describe the working of the Instrumentation system<br>**TLO 6.2**: Describe the working of a Digital multimeter(DMM)<br>**TLO 6.3**: Describe the working principle of the Function generator.<br>**TLO 6.4**: Describe the working principle of CRO. | 6.1 Generalized block diagram of instrumentation system. Types of instruments.<br>6.2 Block diagram, operation and application of Digital multimeter(DMM).<br>6.3 Block diagram, operation and application of Function generator.<br>6.4 Block diagram, operation and application of CRO. | Classroom Learning, Reference books, NPTEL | **CO6** |

## V. LABORATORY LEARNING OUTCOME AND ALIGNED PRACTICAL/ TUTORIAL EXPERIENCES.

| Sr. No | Practical/Tutorial/Laboratory Learning Outcome (LLO) | Laboratory Experiment / Practical Titles /Tutorial Titles | Number of hrs. | Relevant COs |
|---|---|---|---|---|
| 1* | Determine the value of the given resistor, using a Digital Multimeter to confirm with colour code | Determine the value of the given resistor, using a Digital Multimeter to confirm with colour code. | 02 | CO1 |
| 2 | Use the LCR-Q meter to measure the value of the given capacitor and Inductor | Use the LCR-Q meter to measure the value of the given capacitor and Inductor | 02 | CO1 |
| 3* | Test the performance of PN Junction Diode | Test the performance of the PN junction diode | 02 | CO2 |
| 4 | Test the performance of the zener diode. | Test the performance of the Zener diode. | 02 | CO2 |
| 5 | Test the performance of the photodiode by varying the light intensity as well as the distance of the light source. | Test the performance of the photodiode by varying the light intensity as well as the distance of the light source. | 02 | CO2 |
| 6* | Build/ Test the half-wave rectifier on breadboard | Build/ Test the half-wave rectifier on bread board with and without a filter. | 02 | CO2 |
| 7 | Build/ Test the half-wave rectifier on breadboard with LC filter/ $\pi$ filter. | Build/ Test the half-wave rectifier on breadboard with LC filter/ $\pi$ filter. | 02 | CO2 |
| 8* | Build/ Test the full wave rectifier on breadboard using two diodes | Build/ Test the full wave rectifier on breadboard using two diodes | 02 | CO2 |
| 9 | Use LC/ $\pi$ filter with full wave rectifier to measure ripple factor. | Use LC/ $\pi$ filter with full wave rectifier to measure ripple factor. | 02 | CO2 |
| 10* | Identify the terminals of the PNP and NPN transistor using different methods. | Identify the terminals of the PNP and NPN transistor using different methods. | 02 | CO3 |

| Sr. No | Practical/Tutorial/Laboratory Learning Outcome (LLO) | Laboratory Experiment / Practical Titles /Tutorial Titles | Number of hrs. | Relevant COs |
|---|---|---|---|---|
| 11 | Test the performance of BJT working in CB/CE mode | Test the performance of BJT working in CB/CE mode | 02 | CO3 |
| 12 | Test the assembled BJT voltage divider bias circuit for a given input | Test the assembled BJT voltage divider bias circuit for a given input | 02 | CO3 |
| 13* | Test the performance of FET drain characteristics, transfer characteristics and calculate transconductance | Test the performance of FET drain characteristics, transfer characteristics and calculate transconductance | 02 | CO4 |
| 14 | Test the performance of transistorized series voltage regulator for the given load regulation. | Test the performance of transistorized series voltage regulator for the given load regulation. | 02 | CO5 |
| 15 | Test the performance of transistorized shunt voltage regulator for the given load regulation | Test the performance of transistorized shunt voltage regulator for the given load regulation | 02 | CO5 |
| 16* | Study block diagram and front panel controls of CRO. | Draw the front panel of the CRO and study specifications with the help of the manual. | 02 | CO6 |
| 17 | Study the front panel and specifications of DMM. | Draw the front panel of DMM and study specifications with the help of a manual | 02 | CO6 |
| 18* | Study block diagram and front panel controls of the Function generator. | Draw the front panel of the function generator and study specifications with the help of a manual | 02 | CO6 |

**Note:** A suggestive list of PrOs is given in the above table. More such PrOs can be added to attain the Cos and competency. A judicial mix of a minimum of 12 or more practical needs to be performed. Out of which, the practicals marked as ' *' are compulsory.

## VI. SUGGESTED MICRO PROJECT /ASSIGNMENT/ACTIVITIES FOR SPECIFIC LEARNING/ SKILLS DEVELOPMENT (SELF-LEARNING)

**Micro project**

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 an activity chart consisting of individual contributions to the project work and give a seminar presentation of it before submission. The student ought to submit a 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:

- Prepare a chart of different types of Resistors showing their specifications and applications
- Prepare a chart of different types of Capacitors showing their specifications and Applications

- Prepare a chart of different types of Diodes showing their specifications and Applications
- Prepare a chart of different types of Rectifiers showing their specifications and applications
- Diode: Build a circuit on general-purpose PCB to clip a positive half cycle at 1.5V of a waveform with input signal 5Vpp and prepare the report.
- Diode: Build a circuit on a general-purpose PCB to clamp a waveform at 3V using a diode and passive component.
- Rectifier: Build a half-wave rectifier for 6V,500mA output current on general-purpose PCB.
- Rectifier: Build a full wave rectifier with a capacitor filter for 6V,500mA output current on a general-purpose PCB.
- BJT: Build a circuit to switch on and off the LED by using BJT as a switching component.
- JVoltage Regulator: Build a circuit of DC-regulated power supply on a general-purpose PCB for 12V and 500mA output.

**Assignment**

- Differentiate active and Passive component
- Test different Active components on CRO.
- Give a seminar on any relevant topic.
- Collect information on passive components and prepare charts of the same.
- Make a chart of different semiconductor components.
- Analyze Data sheets of BJT, FET and MOSFET

## VII. LABORATORY EQUIPMENT/ INSTRUMENTS/ TOOLS/ SOFTWARE REQUIRED

| Sr.No | Equipment Name with Broad Specifications | Relevant LLO Number |
|---|---|---|
| 1 | Variable DC power supply 0-30V,2 Amp, SC protection, display for voltage and current | 3,4,5,,6,7,8,9,10,11,12,13,14,15 |
| 2 | Cathode Ray Oscilloscope Dual trace 20 MHz,1MΩ, Input Impedance | 3,4,5,,6,7,8,9,10,11,12,13,14,15,16,17, 18 |
| 3 | Function Generator 0-2MHz with Sine, square, and triangular output | 3,4,5,,6,7,8,9,10,11,12,13,14,15,16,17, 18 |
| 4 | Digital Multimeter:3/1/2 digit display,9999 counts digital | All |

## VIII.SUGGESTED FOR WEIGHTAGE TO LEARNING EFFORTS &ASSESSMENT PURPOSE (Specification Table)

| Sr. No | Unit | Unit Title | Aligned COs | Learning Hours | R-Level | U-Level | A-Level | Total Marks |
|---|---|---|---|---|---|---|---|---|
| 1 | I | Passive Components | CO1 | 5 | 2 | 4 | 2 | 8 |
| 2 | II | Semiconductor Diode and its Applications | CO2 | 16 | 8 | 10 | 4 | 22 |
| 3 | III | Bipolar Junction Transistor | CO3 | 8 | 4 | 4 | 4 | 12 |
| 4 | IV | Field Effect Transistor | CO4 | 7 | 2 | 6 | 2 | 10 |
| 5 | V | Regulators and Power supply | CO5 | 8 | 4 | 4 | 2 | 10 |
| 6 | VI | Introduction to Electronic Instruments. | CO6 | 4 | 4 | 4 | -- | 08 |
| **Grand Total** | | | | **48** | **24** | **32** | **14** | **70** |

## IX. ASSESSMENT METHODOLOGIES / TOOLS

| Formative assessment (Assessment for Learning) | | Summative Assessment (Assessment of Learning) |
|---|---|---|
| 1. Tests | 4. Self-Learning | 1. End Term Exam |
| 2. Assignment | 5. Term Work | 2. Micro-project |
| 3. Midterm Exam | 6. Seminar/Presentation | |

## X. SUGGESTED COS- POS MATRIX FORM

| Course Outcomes (COs) | Programme Outcomes(POs) | | | | | | | Programme Specific Outcomes *(PSOs) | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | PO-1 Basic and Discipline-Specific Knowledge | PO-2 Problem Analysis | PO-3 Design/ Development of Solutions | PO-4 Engineering Tools | PO-5 Engineering Practices for Society, Sustainability and Environment | PO-6 Project Management | PO-7 Life Long Learning | PSO-1 | PSO-2 | PSO-3 |
| CO1 | 3 | - | 2 | 2 | - | 2 | 2 | 3 | - | 2 |
| CO2 | 3 | 3 | 3 | 2 | - | 2 | 2 | 3 | 3 | 3 |
| CO3 | 2 | 2 | 2 | 3 | - | 2 | 2 | 2 | 2 | 2 |
| CO4 | 2 | 2 | 2 | 2 | - | 2 | 2 | 2 | 2 | 2 |
| CO5 | 3 | 2 | 3 | 3 | - | 2 | 2 | 3 | 2 | 3 |

**Legends:- High**:03, **Medium:**02, **Low:**01, **NoMapping: -**
*PSOs are to be formulated at the institute level

## XI. SUGGESTED LEARNING MATERIALS / BOOKS

| Sr.No | Author | Title | Publisher |
|---|---|---|---|
| 1 | Albert Malvino | Basic Electronics. | 8th Edition, Tata McGraw Hill ,2015ISBN10:1259200116 ISBN13:9781259200113 |
| 2 | B.L.Theraja, S Chand | Basic Electronics. | Publishing, 2007, ISBN 10: 8121925568ISBN 13: 9788121925563 |
| 3 | R.S.Sedha | Applied Electronics | S.Chand&company Ltd., New Delhi, ISBN:8121927833 |
| 4 | P.Ramesh Babu | Electronics Devices and Circuits | Scitech PublicationPvt.Ltd 2009 , ISBN:8183711723 |
| 5 | Boyestad & Nashelsky | Electronic Devices and Circuit Theory | Pearson Education India; 11 edition (2015) ISBN: 978-9332542600 |
| 6 | H S Kalsi | Elecronic Instrumentation | 3rd Edition,Tata McGraw Hill ISBN 978-0-07-070206-6 |

## XII. LEARNING WEBSITES & PORTALS

| Sr.No | Link/Portal | Description |
|---|---|---|
| 1. | www.nptel.com | Online Learning Initiatives by IITs |
| 2. | http://www.electronics-tutorials | Basic Electronics Tutorials and Revision |
| 3. | https://en.wikipedia.org/wiki/P%E2%80%93n_junction | Semiconductor diode description |
| 4. | https://learn.sparkfun.com/tutorials/transistors | The basics of the most common transistor around |
| 5. | http://www.pitt.edu/~qiw4/Academic/ME2082/Transistor%20Basics.pdf | Transistor Configurations |
| 6. | http://faculty.cord.edu/luther/physics225/Handouts/transistors_handout.pdf | Fundamentals of Transistors |
| 7. | www.khanacademy.com | Basic Electronics Concepts |
| 8. | www.datasheetscafe.com | Datasheets of electronic components for a specific application. |

**Name & Signature:**

**Smt. J.J. Pathan**
Lecturer in E&TC

**Smt. M.S. Datar**
Lecturer in E&TC

**(Course Experts)**

Name & Signature:

**Shri. S.S.Prabhune**
(Programme Head)

Name & Signature:

**Shri. S.B. Kulkarni**
(CDC In-charge)

# GOVERNMENT POLYTECHNIC, PUNE

## '120 – NEP' SCHEME

| | |
|---|---|
| PROGRAMME | DIPLOMA IN CE/EE/ET/ME/MT/CM/IT/DDGM |
| PROGRAMME CODE | 01/02/03/04/05/06/07/08 |
| COURSE TITLE | COMMUNICATION SKILLS (ENGLISH) |
| COURSE CODE | HU11201 |
| PREREQUISITE COURSE CODE & TITLE | NA |

## I. LEARNING & ASSESSMENT SCHEME

| Course Code | Course Title | Course Type | Learning Scheme | | | | | Credits | Assessment Scheme | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Actual Contact Hrs./Week | | | SLH | NLH | | Paper Duration | Theory | | | | Based on LL & TSL | | | | Based on SL | Total Marks |
| | | | | | | | | | | | | | | Practical | | | | | |
| | | | CL | TL | LL | | | | | FA-TH | SA-TH | Total | | FA-PR | | SA-PR | | SLA | |
| | | | | | | | | | | Max | Max | Max | Min | Max | Min | Max | Min | Max | Min |
| HU 11201 | COMMUNICATION SKILLS (ENGLISH) | AEC | 03 | - | 02 | 01 | 06 | 03 | 03 | 30 | 70 | 100 | 40 | 25 | 10 | -- | -- | 25 | 10 | 150 |

**Total IKS Hrs for Term: 0 Hrs**

**Abbreviations:** CL-Classroom Learning, TL-Tutorial Learning, LL-Laboratory Learning, SLH-Self Learning Hours, NLH-Notional Learning Hours, FA - Formative Assessment, SA -Summative assessment, IKS – Indian Knowledge System, SLA- Self Learning Assessment

**Legends:** @-Internal Assessment, # - External Assessment,*# - Online Examination,@$ - Internal Online Examination

**Note:**

**FA-TH** represents an average of two class tests of 30 marks each conducted during the semester.

1. If a candidate is not securing minimum passing marks in **FA-PR** (Formative Assessment - Practical) of any course, then the candidate shall be declared as **'Detained'** in that semester.
2. If a candidate does not secure minimum passing marks in SLA (Self Learning Assessment) of any course, then the candidate shall be declared as **'fail'** and will have to repeat and resubmit SLA work.
3. **Notional learning hours** for the semester are **(CL + LL + TL + SL) hrs. * 15 Weeks**
4. **1 credit** is equivalent to **30 Notional hours.**
5. * Self-learning hours shall not be reflected in the Timetable.
6. * Self-learning includes micro-projects/assignments/other activities.

## II. RATIONALE:

The most commonly used medium to express oneself is language. English is a global language used in all spheres of human life i.e. personal, professional and social. English Language proficiency focuses on strong reading, writing, speaking and listening skills. It will include grammar, vocabulary, comprehension and describing skills to enhance overall language proficiency. English for professional purposes aim to equip the students with the necessary language skills required for Public Speaking, presentation and negotiation. English for academic purposes will include academic writing skills and critical thinking considering the need of students to communicate in the engineering domain.

## III. COURSE-LEVEL LEARNING OUTCOMES (COS)

Students will be able to achieve & demonstrate the following CO's on completion of course-based learning

CO1: Construct grammatically correct sentences in English.
CO2: Compose paragraphs and dialogues on given situations.
CO3: Comprehend passages correctly.
CO4: Use contextual words in English appropriately.
CO5: Deliver effective presentations in English using appropriate body language.

## IV. THEORY LEARNING OUTCOMES AND ALIGNED COURSE CONTENT

| Sr. No | Theory Learning Outcomes (TLO's) aligned to CO's. | Learning content mapped with TLO's. | Suggested Learning Pedagogies | Relevant COs |
|---|---|---|---|---|
| | **UNIT I VOCABULARY (CL Hrs. -10, Marks-12)** | | | |
| 1. | TLO 1.1 Use transcription to pronounce words correctly.<br>TLO 1.2 Use prefixes and suffixes for flexibility and precision in language.<br>TLO 1.3 Employ synonyms and antonyms to express similarity and contrast between words.<br>TLO 1.4 Use Homophones to expand their vocabulary.<br>TLO 1.5 Make use of the collocations correctly. | 1.1 Phonetics: Vowels (12), Consonants (24), Diphthongs (8)<br>1.2 Prefix & Suffix: Definition & Examples, List of common prefixes and suffixes<br>1.3 Synonyms & Antonyms: Vocabulary expansion, context & Usage<br>1.4 Homophones: Identifying Homophones, Meaning & Context, Vocabulary Expansion<br>1.5 Collocations: Definition & identification, types of collocations. | Language Lab Drill, Classroom learning, Reference Books & NPTEL. | CO1 |
| | **UNIT II PARAGRAPH AND DIALOGUE WRITING (CL Hrs. -06, Marks-12)** | | | |
| 2. | TLO 2.1 Formulate paragraphs with Synchronized sentence structure on the given situation/topic.<br>TLO 2.2 Develop dialogues to practice language skills in a structured and meaningful way. | **2.1 Types of paragraphs:** Technical, Descriptive and Narrative<br>**2.2 Dialogue Writing:**<br>i. Greetings<br>ii. Development<br>iii. Closing Sentence. | Classroom learning Skit, Language Lab, YouTube & videos | CO2 |
| | **UNIT III COMPREHENSION - SEEN AND UNSEEN PASSAGES (CL-Hrs. - 16, Marks-24)** | | | |
| 3. | TLO 3.1 Respond to the given questions of the specified passage.<br>TLO 3.2 Formulate sentences using new words<br>TLO 3.3 Use correct syntax to construct meaningful sentences for the given situation<br>TLO 3.4 Interpretation of passages in written and Spoken Form. | 3.1 Passages from MSBTE workbook<br>1. Say No to Plastic bags<br>2. Interview of Dr. APJ Abdul Kalam<br>3. Maximum Achievements<br>4. Be Remarkable<br>5. Arunima Sinha: A Biography<br>6. Roses of Gratitude<br>3.2 Importance of Comprehension<br>3.3 Unseen Passages3.4 Interpretation of passages in written and Spoken Form. | Classroom learning, interactive sessions & discussion | CO3 |

| | | | | |
|---|---|---|---|---|
| | **UNIT- IV COMMUNICATIVE LANGUAGE (CL-Hrs. -07, Marks-14)** | | | |
| 4. | TLO 4.1 Describe technical objects with specifications.<br>TLO 4.2 Explain the given picture in grammatically correct language.<br>TLO 4.3 Diary Entry on situations.<br>TLO 4.4 Translate from English to Marathi/Hindi- and vice versa. | 4.1 Technical objects:<br>i. Heading ii. Description of Technical objects.<br>4.2 Picture Description:<br>i. Situational picture.<br>ii. Describe in your own words<br>4.3 Diary Entry :<br>i. Date ii. Content iii. Name of the writer<br>4.4 Translation of paragraph from English to Marathi/Hindi-Vice versa (Question not to be asked on Translation in Theory Examination) | Language Lab, Pictures on situations and classroom learning. | CO4 |
| | **UNIT- V PRESENTATION SKILLS (CL Hrs. - 06, Marks- 08)** | | | |
| 5. | TLO 5.1 Cultivate/Develop the habit of being presentable<br>TLO 5.2 Formulate speeches for occasions<br>TLO 5.3 Prepare PowerPoint presentation<br>TLO 5.4 Use appropriate body language for effective communication | 5.1 Dressing & Grooming :<br>i. Dressing for the occasion,<br>ii. Proper grooming<br>5.2 Speech Writing:<br>i. Situation<br>ii. Salutations<br>iii. Introduction of the topic<br>iv. Description/Body<br>v. Conclusion<br>5.3 PowerPoint Presentation:<br>i. Layout ii. Font size iii. Colour combination<br>5.4 Kinesics :<br>i. Facial expressions<br>ii Eye contact<br>iii Postures iv Gestures | Classroom Learning & Language Lab. | CO5 |

## V. LABORATORY LEARNING OUTCOME AND ALIGNED PRACTICAL/ TUTORIAL EXPERIENCES.

| Sr. No | Practical/Tutorial/Laboratory Learning Outcome (LLO) | Laboratory Experiment / Practical Titles /Tutorial Titles | Number of hrs. | Relevant COs |
|---|---|---|---|---|
| 1 | LLO 1.1 Use transcription in the correct form.<br>LLO 1.2 Learn to differentiate vowels, diphthongs and consonants. | Write 20 words using phonetic transcription. | 2 | CO1 |
| 2 | LLO 2.1 Learn the correct pronunciation by using headphones in the language lab. | Practice pronunciation as per IPA using language lab. | 2 | CO1 |

| Sr. No | Practical/Tutorial/Laboratory Learning Outcome (LLO) | Laboratory Experiment / Practical Titles /Tutorial Titles | Number of hrs. | Relevant COs |
|---|---|---|---|---|
| 3 | LLO 3.1 Enhance the understanding of word formation.<br>LLO 3.2 Enrich word power.<br>LLO 3.3 Construct words with the specific meanings. | Formulate 20 words using Prefix and Suffix. | 2 | CO1 |
| 4 | LLO 4.1 Use words and phrases effectively.<br>LLO 4.2 Enrich vocabulary.<br>LLO 4.3 Develop overall language skills. | Construct sentences using 20 collocations. | 2 | CO1 |
| 5 | LLO 5.1 Articulate ideas clearly and effectively.<br>LLO 5.2 Improve grammar and punctuation. | Write two paragraphs of 75 words each. | 2 | CO3 |
| 6 | LLO 6.1 Add depth to narratives.<br>LLO 6.2 Form grammatically correct sentences. | Compose situational dialogues. (Any Two) | 2 | CO3 |
| 7 | LLO 7.1 Promote the development of effective communication skills.<br>LLO 7.2. Improve non-verbal communication Skills.<br>LLO 7.3 Enhance interpersonal skills.<br>LLO 7.4 Build confidence. | Enact Role Plays as per situation and context. | 2 | CO5 |
| 8 | LLO 8.1 Acquire the ability to convey complex ideas clearly and concisely.<br>LLO 8.2 Expand technical vocabulary.<br>LLO 8.3 Enhance the written communication Skills. | Describe any three technical objects using correct grammar. | 2 | CO1<br>CO3 |
| 9 | LLO 9.1 Develop storytelling skills.<br>LLO 9.2 Connect with the audience. | Narrate anecdotes of various situations in English. | 2 | CO5 |
| 10 | LLO 10.1 Notice and articulate specific elements, colours, shapes, & other visual aids.<br>LLO 10.2 Express observations & interpretations clearly and concisely.<br>LLO 10.3 Enhance vocabulary. | Describe a given picture. (Any Two) | 2 | CO1<br>CO4 |
| 11 | LLO 11.1 Express information coherently and engagingly. LLO 11.2 Build confidence. | Introduce oneself and others. | 2 | CO5 |

| Sr. No | Practical/Tutorial/Laboratory Learning Outcome (LLO) | Laboratory Experiment / Practical Titles /Tutorial Titles | Number of hrs. | Relevant COs |
|---|---|---|---|---|
| 12 | LLO 12.1 Present complex information in a clear & concise manner. LLO 12.2 Develop public speaking skills and presentation skills. | Prepare a PowerPoint presentation on a given topic. | 2 | CO5 |
| 13 | LLO 13.1 Improve language skills &expand vocabulary. | Translate paragraph --English to Marathi/Hindi (vice -Versa) (Any4) | 2 | CO1 CO3 |
| 14 | LLO 14.1 Reflect on thoughts, feelings, and experiences. | Write your experience in 50 words on ( Four) given situations (Diary Entry) | 2 | CO3 CO5 |
| 15 | LLO 15.1 Develop language acquisition. | Respond to the questions based on the given passages. | 2 | CO2 |
| 16 | LLO 16.1 Build confidence in public speaking. LLO 16.2 Enhance the skills in planning and prioritization. | Deliver oral presentations using correct grammar and appropriate body language. | 2 | CO5 |
| **Note:** *Note*: Any 12 out of 16 practical's are compulsory. | | | | |

## VI. SUGGESTED MICRO PROJECT/ASSIGNMENT/ACTIVITIES FOR SPECIFIC LEARNING/SKILLS DEVELOPMENT (SELF-LEARNING)

**Micro project**

- Report different types of episodes/anecdotes.
- Seminar preparation and presentations.
- Make a Podcast episode based on Indian Freedom Fighters.
- Summarize the editorial columns of English newspapers.
- Summarize the content of an eminent person's biography/autobiography. Write a review on the following: Short stories, Novels and Films.
- Prepare a booklet on the contribution of eminent Indian scientists.
- Prepare a podcast referring to Bhagwat Geeta.
- Prepare blogs, podcasts, vlogs.
- Prepare a questionnaire & conduct interviews of Industry Personnel, social workers, and entrepreneurs Prepare and participate in debates and extempore speeches.

## VII. LABORATORY EQUIPMENT/INSTRUMENTS/TOOLS/SOFTWARE REQUIRED

| Sr.No | Equipment Name with Broad Specifications | Relevant LLO Number |
|---|---|---|
| 1 | Language Lab with relevant software and 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 | All |
| 2 | LCD Projector with document reader | All |
| 3 | Smart Board with networking | All |

## VIII. SUGGESTED FOR WEIGHTAGE TO LEARNING EFFORTS & ASSESSMENT PURPOSE (Specification Table)

| Sr. No | Unit | Unit Title | Aligned COs | Learning Hours | R-Level | U-Level | A-Level | Total Marks |
|---|---|---|---|---|---|---|---|---|
| 1 | I | Vocabulary | CO1 | 10 | 2 | 4 | 6 | 12 |
| 2 | II | Paragraph and Dialogue Writing | CO2 | 6 | 2 | 4 | 6 | 12 |
| 3 | III | Comprehension (Seen and Unseen Passages) | CO3 | 16 | 5 | 6 | 13 | 24 |
| 4 | IV | Communicative Language | CO4 | 7 | 2 | 4 | 8 | 14 |
| 5 | V | Presentation Skills | CO5 | 6 | 2 | 2 | 4 | 8 |
| | | | **Grand Total** | **45** | **13** | **20** | **37** | **70** |

## IX. ASSESSMENT METHODOLOGIES/TOOLS

| Formative assessment (Assessment for Learning) | Summative Assessment (Assessment of Learning) |
|---|---|
| 1. Tests<br>2. Rubrics for COs<br>3. Assignment<br>4. Midterm Exam<br>5. Self-Learning<br>6. Term Work<br>7. Seminar/Presentation | 1. End Term Exam<br>2. Micro-project<br>3. Tutorial Performance |

## X. SUGGESTED COS- POS MATRIX FORM

| Course Outcomes (COs) | Programme Outcomes(POs) | | | | | | | Programme Specific Outcomes *(PSOs) | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | PO-1 Basic and Discipline-Specific Knowledge | PO-2 Problem Analysis | PO-3 Design/ Development of Solutions | PO-4 Engineering Tools | PO-5 Engineering Practices for Society, Sustainability and Environment | PO-6 Project Management | PO-7 Life Long Learning | PSO-1 | PSO-2 | PSO-3 |
| CO1 | 1 | 1 | - | - | - | 2 | 1 | | | |
| CO2 | 1 | 1 | - | - | - | 2 | 1 | | | |
| CO3 | 1 | 1 | - | - | - | 2 | 1 | | | |
| CO4 | 1 | 1 | - | - | - | 2 | 1 | | | |
| CO5 | 1 | 1 | - | - | - | 2 | 1 | | | |

**Legends:- High:03, Medium:02, Low:01, No Mapping: -**
*PSOs are to be formulated at the institute level

## XI.SUGGESTED LEARNING MATERIALS/BOOKS

| Sr. No | Author | Title | Publisher |
|---|---|---|---|
| 1 | MSBTE | Spectrum, G Scheme and I-Scheme | MSBTE |
| 2 | Kumar, E. Suresh, Sreehari, P. Savitri | Effective English with CD | Pearson Education |
| 3 | Gnanamurli | English Grammar at a Glance | S. Chand |
| 4 | CBSE | English Communicative (class X) | Golden |
| 5 | Dr. Anjana Tiwari | Communication Skills in English | Khanna Publishers, New Delhi |

## XIII. LEARNING WEBSITES & PORTALS

| Sr. No | Link/Portal | Description |
|---|---|---|
| 1. | http://nptel.ac.in/courses/106102064/1 | Online Learning Initiatives by IITs and IISc |
| 2. | www.scilab.org/-SCILab | Signal processing, statistical analysis, and image enhancement. |
| 3. | www.mathworks.com/product/matlab/-MATLAB | Applications of concepts of Mathematics to coding. |
| 4. | Spreadsheet Applications | Use of Microsoft Excel, Apple Numbers, and Google Sheets. |
| 5. | https://ocw.mit.edu/ | MIT Courseware |

Name & Signature:

**Mr. V.V. Kulkarni**
Lecturer in English

**Dr. S.P. Palve**
Lecturer in English

**(Course Experts)**

| Name & Signature: | Name & Signature: |
|---|---|
| **Dr. S. S. Bharatkar**<br>(Programme Head) | **Shri. S.B. Kulkarni**<br>(CDC In-charge) |

# GOVERNMENT POLYTECHNIC, PUNE

'120 – NEP' SCHEME

| | |
|---|---|
| PROGRAMME | DIPLOMA IN CE / EE / ME / MT |
| PROGRAMME CODE | 01/02/04/ 05 |
| COURSE TITLE | ENGINEERING GRAPHICS |
| COURSE CODE | ME11201 |
| PREREQUISITE COURSE CODE & TITLE | NA |

## I. LEARNING & ASSESSMENT SCHEME

| Course Code | Course Title | Course Type | Learning Scheme | | | | | Credits | Assessment Scheme | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Actual Contact Hrs./Week | | | SLH | NLH | | Paper Duration | Theory | | | | Based on LL & TSL | | | | Based on SL | | Total Marks |
| | | | | | | | | | | | | | | Practical | | | | | | |
| | | | CL | TL | LL | | | | | FA-TH | SA-TH | Total | | FA-PR | | SA-PR | | SLA | | |
| | | | | | | | | | | Max. | Max | Max | Min | Max | Min | Max | Min | Max | Min | |
| ME11201 | ENGINEERING GRAPHICS | DSC | 2 | - | 4 | - | 6 | 3 | 3 | - | - | - | - | 50 | 20 | 50@ | 20 | - | - | 100 |

**Total IKS Hrs for Term:** 2 Hrs

**Abbreviations:** CL-Classroom Learning, TL-Tutorial Learning, LL-Laboratory Learning, SLH-Self Learning Hours, NLH-Notional Learning Hours, FA - Formative Assessment, SA -Summative assessment, IKS – Indian Knowledge System, SLA- Self Learning Assessment

**Legends:** @-Internal Assessment, # - External Assessment, *# - Online Examination, @$ - Internal Online Examination

**Note:**

**FA-TH** represents an average of two class tests of 30 marks each conducted during the semester.

1. If a candidate is not securing minimum passing marks in **FA-PR** (Formative Assessment - Practical) of any course, then the candidate shall be declared as **'Detained'** in that semester.
2. If a candidate does not secure minimum passing marks in SLA (Self Learning Assessment) of any course, then the candidate shall be declared as **'fail'** and will have to repeat and resubmit SLA work.
3. **Notional learning hours** for the semester are **(CL + LL + TL + SL) hrs. * 15 Weeks**
4. **1 credit** is equivalent to 30 **Notional hours.**
5. * Self-learning hours shall not be reflected in the Timetable.
6. * Self-learning includes micro-projects/assignments/other activities.

## II. RATIONALE:

Engineering graphics is the language of engineers. The concepts of graphical language are used in expressing the ideas and conveying the instructions, which are used in carrying out the jobs on the sites, shop floor etc. This course is useful in developing drafting and sketching skills in the student. It covers the knowledge & use of drawing instruments & also familiarizes the learner with the Bureau of Indian standards related to engineering drawing. The curriculum aims to develop the ability to draw and read various engineering curves, projections and dimensioning styles. The subject mainly focuses on the use of drawing instruments, developing imagination and translating ideas into sketches. This course also helps to develop the idea of visualizing the actual object or part based on drawings and blueprints. This preliminary course aims to build a foundation for further courses related to engineering drawing and other allied courses in the coming semesters.

## III. COURSE-LEVEL LEARNING OUTCOMES (CO's)

Students will be able to achieve & demonstrate the following CO's on completion of course-based learning

CO1: Draw geometrical figures and engineering curves
CO2: Apply principles of orthographic projections for drawing given pictorial views
CO3: Draw isometric views of given component from orthographic projections

CO4: Use various drawing codes, conventions and symbols as per IS SP-46 in engineering drawing.
CO5: Draw free-hand sketches of given engineering elements.

## IV. THEORY LEARNING OUTCOMES AND ALIGNED COURSE CONTENT

| Sr. No | Theory Learning Outcomes (TLO'S) aligned to CO's. | Learning content mapped with TLO's. | Suggested Learning Pedagogies | Relevant COs |
|---|---|---|---|---|
| | **UNIT-I BASIC ELEMENTS OF DRAWING (CL Hrs-04, Marks-04)** | | | |
| 1. | TLO 1.1 Prepare drawing using drawing instruments.<br>TLO 1.2 Use IS SP-46 for dimensioning<br>TLO 1.3 Use different types of lines. TLO 1.4 Draw regular geometrical figures.<br>TLO 1.5 Draw figures having tangency constructions. | 1.1 Drawing Instruments and supporting material: method to use them with applications.<br>1.2 Standard sizes of drawing sheets (ISO-A series)<br>1.3 I.S. codes for planning and layout.<br>1.4 Letters and numbers (single stroke vertical)<br>1.5 Convention of lines and their applications.<br>1.6 Scale - reduced, enlarged & full size.<br>1.7 Dimensioning techniques as per SP-46 (Latest edition): types and applications of chain, parallel and coordinate dimensioning.<br>1.8 Geometrical constructions | Model Demonstration | CO1 |
| | **UNIT-II ENGINEERING CURVES & LOCI OF POINTS (CL Hrs-06, Marks-12)** | | | |
| 2 | TLO 2.1 Explain different engineering curves with areas of application.<br>TLO 2.2 Draw different conic sections.<br>TLO 2.3 Draw involute and cycloidal curves.<br>TLO 2.4 Draw helix and spiral curves from the given data<br>TLO 2.5 Plot Loci of points from given data. | 2.1 Concept and understanding of focus, directrix, vertex and eccentricity. Conic sections.<br>2.2 Methods to draw an ellipse by Arcs of Circle method & Concentric circles method.<br>2.3 Methods to draw a parabola by Directrix-Focus method & Rectangle method.<br>2.4 Methods to draw a hyperbola by Directrix-Focus method.<br>2.5 Methods to draw involutes: circle & pentagon<br>2.6 Methods to draw Cycloidal curve: cycloid, epicycloid and hypocycloid<br>2.7 Methods to draw Helix & Archimedean spiral.<br>2.8 Loci of points on Single slider crank mechanism with given specifications. | Demonstrations | CO1 |

| | | | | |
|---|---|---|---|---|
| **UNIT-III ORTHOGRAPHIC PROJECTIONS (CL Hrs-08, Marks-14)** | | | | |
| 3 | TLO 3.1 Explain methods of Orthographic Projections.<br>TLO 3.2 Draw orthographic views of simple 2D entities containing lines, circles and arcs only.<br>TLO 3.3 Draw the orthographic views from given pictorial views.<br>TLO 3.4 Use of IS code IS SP-46 for dimensioning technique. | 3.1 Introduction of projections-orthographic, perspective, isometric and oblique: concept and applications. (No question to be asked in examination)<br>3.2 Introduction to orthographic projection, First angle and Third angle method, and their symbols. Conversion of pictorial view into Orthographic Views – object containing plain surfaces, slanting surfaces, slots, ribs, cylindrical surfaces. (use First Angle Projection) | Model<br>Demonstration<br>Video<br>Demonstrations | CO2, CO4 |
| **UNIT- IV ISOMETRIC PROJECTIONS (CL Hrs-08, Marks-14)** | | | | |
| 4 | TLO 4.1 Prepare isometric scale.<br>TLO 4.2 Draw isometric views of simple 2D entities containing lines,<br>circles and arcs only.<br>TLO4.3 Interpret the given orthographic views.<br>TLO 4.4 Draw Isometric views from given orthographic views) | 4.1 Introduction to Isometric projection.<br>4.2 Isometric scale and Natural Scale.<br>4.3 Isometric view and isometric projection.<br>4.4 Illustrative problems related to simple objects having plain, slanting, cylindrical surfaces and slots on slanting surfaces.<br>4.5 Conversion of orthographic views into isometric View/projection. (For branches other than mechanical Engineering, the teacher should select branch-specific elements. | Model<br>Demonstration | CO3, CO4 |
| **UNIT –V FREE HAND SKETCHES OF ENGINEERING ELEMENTS (CL Hrs-04, Marks-06)** | | | | |
| 5 | TLO 5.1 Sketch proportionate freehand sketches of given machine elements.<br>TLO 5.2 Select proper fasteners and locking arrangement. | 5.1 Free hand sketches of machine elements: Thread profiles, nuts, bolts, studs, set screws, washers, and Locking arrangements. (For branches other than mechanical Engineering, the teacher should select branch-specific elements for freehand sketching) | Model<br>Demonstration | CO4, CO5 |

## V. LABORATORY LEARNING OUTCOME AND ALIGNED PRACTICAL/TUTORIAL EXPERIENCES.

| Sr. No | Practical/Tutorial/Laboratory Learning Outcome (LLO) | Laboratory Experiment / Practical Titles /Tutorial Titles | Number of hrs. | Relevant COs |
|---|---|---|---|---|
| 1 | LLO 1.1 Use drawing instruments | Draw horizontal, vertical, 30-degree, 45-degree, 60- & 75-degree lines using Tee and Set squares/ drafter. (Sketch Book). | 2 | CO1 |

| Sr. No | Practical/Tutorial/Laboratory Learning Outcome (LLO) | Laboratory Experiment / Practical Titles /Tutorial Titles | Number of hrs. | Relevant COs |
|---|---|---|---|---|
| 2 | LLO 2.1 Use IS code related to dimensioning standard<br>LLO 2.2 Draw the given types of lines | Draw different types of lines, and dimensioning styles (Sketch Book) | 2 | CO1 |
| 3 | LLO 3.1 Draw the figure as per the given sketch | Draw one figure showing dimensioning techniques, two problems on redrawing the figures and one problem on loci of points - slider crank mechanism. (Sketch Book) | 2 | CO1 |
| 4 | LLO 4.1 Draw figures using IS Standard for drawing | Draw one figure showing dimensioning techniques, two problems on redrawing the figures and one problem on loci of points - slider-crank mechanism. (01 Sheet) | 4 | CO1 |
| 5 | LLO 5.1 Identify different Engineering curves<br>LLO 5.2 Draw different types of curves | Draw any four Engineering Curves (Sketchbook) | 2 | CO1 |
| 6 | LLO 6.1 Identify different Engineering curves<br>LLO 6.2 Draw different types of curves | Draw any four Engineering Curves (01 Sheet) | 4 | CO1 |
| 7 | LLO 7.1 Apply the method of projection for drawing simple orthographic views | Draw two problems on orthographic projections using the first angle method of projection having plain surfaces, slanting surfaces slots etc.- (Sketchbook) | 2 | CO2<br>CO4 |
| 8 | LLO 8.1 Apply the method of projection for drawing simple orthographic views | Draw two problems on orthographic projections using the first angle method of projection having plain surfaces, slanting surfaces slots etc.- (01 Sheet) | 4 | CO2<br>CO4 |
| 9 | LLO 9.1 Apply the method of projection for drawing complex orthographic views | Draw two problems on orthographic projections using the first angle method of projection having cylindrical surfaces, ribs etc. (Sketchbook) | 2 | CO2<br>CO4 |
| 10 | LLO 10.1 Apply the method of projection for drawing complex orthographic views | Draw two problems on orthographic projections using the first angle method of projection having cylindrical surfaces, ribs etc.- (01 Sheet) | 4 | CO2<br>CO4 |
| 11 | LLO 11.1 Draw simple isometric projections | Draw two problems on the Isometric view of simple objects having plain and slanting surfaces by using natural scale. (Sketchbook) | 4 | CO3 |
| 12 | LLO 12.1 Apply different scales for drawing isometric projections. | Draw two problems on the Isometric view of simple objects having plain and slanting surfaces by using natural scale. ( 01 sheet) | 2 | CO3 |

| Sr. No | Practical/Tutorial/Laboratory Learning Outcome (LLO) | Laboratory Experiment / Practical Titles /Tutorial Titles | Number of hrs. | Relevant COs |
|---|---|---|---|---|
| 13 | LLO 13.1 Draw simple isometric projections | Draw two problems on the Isometric Projection of objects having cylindrical surfaces and slots on slanting surfaces by using an isometric scale. (Sketchbook) | 2 | CO3 CO4 |
| 14 | LLO 14.1 Apply different scales for drawing isometric projections | Draw two problems on the Isometric Projection of objects having cylindrical surfaces and slots on slanting surfaces by using an isometric scale. ( 01 sheet) | 4 | CO3 CO4 |
| 15 | LLO 15.1 Draw Orthographic views of a given object. | Problem-Based Learning: Given the orthographic views of at least three objects with few missing lines, the student will try to imagine the corresponding objects, complete the views and draw these views (Sketchbook). | 2 | CO2 CO4 |
| 16 | LLO 16.1 Draw standard discipline-oriented components using free hand. | Draw freehand Sketches of 12 different standard components (Sketchbook) | 2 | CO5 |
| 17 | LLO 17.1 Draw standard discipline-oriented components using free hand. | Draw freehand Sketches of 12 different standard components (1 Sheet) | 2 | CO5 |
| 18 | LLO 18.1 Collect information on an ancient Indian culture related to engineering graphics | Correlate ancient Indian sculptures, Indian temples, Monuments, etc. with Engineering Graphics | 2 | CO1 CO2 CO3 CO4 CO5 |

## VI. SUGGESTED MICRO PROJECT/ASSIGNMENT/ACTIVITIES FOR SPECIFIC LEARNING/SKILLS DEVELOPMENT (SELF-LEARNING)

**Micro project:**

NA

**Assignment: -**

NA

## VII. LABORATORY EQUIPMENT/INSTRUMENTS/TOOLS/SOFTWARE REQUIRED

| Sr.No | Equipment Name with Broad Specifications | Relevant LLO Number |
|---|---|---|
| 1 | Drawing Table with Drawing Board of Full Imperial/ A1 size. | All |
| 2 | Models of objects for orthographic projections | 7,8,9,10 |
| 3 | Models/ Charts of objects mentioned in unit no. 5 | 16,17 |
| 4 | Set of various industrial drawings being used by industries. | All |
| 5 | A set of drawing sheets mentioned in section 6.0 could be developed by experienced teachers and made available on the MSBTE portal to be used as references/standards. | All |

| | | |
|---|---|---|
| 6 | Drawing equipment and instruments for classroom teaching-large size: a. T-square or drafter (Drafting Machine). b. Set squires (450 and 300-600) c. Protector. d. Drawing instrument box (containing set of compasses and dividers). Drawing sheets, Drawing pencils, Eraser, Drawing pins/clips | All |

## VIII. SUGGESTED FOR WEIGHTAGE TO LEARNING EFFORTS & ASSESSMENT PURPOSE

**(Specification Table)**

| Sr. No | Unit | Unit Title | Aligned COs | Learning Hours | R-Level | U-Level | A-Level | Total Marks |
|---|---|---|---|---|---|---|---|---|
| 1 | I | Basic Elements of Drawing | CO1 | 4 | 0 | 0 | 04 | 04 |
| 2 | II | Engineering curves and loci of Points. | CO1 | 6 | 0 | 0 | 12 | 12 |
| 3 | III | Orthographic projections | CO2,CO4 | 8 | 0 | 0 | 14 | 14 |
| 4 | IV | Isometric Projections | CO3,CO4 | 8 | 0 | 0 | 14 | 14 |
| 5 | V | Free Hand Sketches of Engineering Elements | CO4,CO5 | 4 | 0 | 0 | 06 | 06 |
| **Grand Total** | | | | **30** | **0** | **0** | **50** | **50** |

## IX. ASSESSMENT METHODOLOGIES/TOOLS

| Formative assessment (Assessment for Learning) | Summative Assessment (Assessment of Learning) |
|---|---|
| 1. Term Work | 1. End Term Practical Exam |

## X. SUGGESTED COs- POs MATRIX FORM

| Course Outcomes (COs) | Programme Outcomes(POs) | | | | | | | Programme Specific Outcomes *(PSOs) | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | PO-1 Basic and Discipline-Specific Knowledge | PO-2 Problem Analysis | PO-3 Design/ Development of Solutions | PO-4 Engineering Tools | PO-5 Engineering Practices for Society, Sustainability and Environment | PO-6 Project Management | PO-7 Life Long Learning | PSO-1 | PSO-2 | PSO-3 |
| CO1 | 3 | - | - | 2 | - | 2 | 2 | | | |
| CO2 | 3 | - | - | 2 | - | 2 | 2 | | | |
| CO3 | 3 | - | - | 2 | - | 2 | 2 | | | |
| CO4 | 3 | - | - | 2 | - | 2 | 2 | | | |
| CO5 | 3 | - | - | 2 | - | 2 | 2 | | | |

**Legends:- High:03, Medium:02, Low:01, NoMapping: -**
*PSOs are to be formulated at the institute level

## XI.SUGGESTED LEARNING MATERIALS/BOOKS

| Sr.No | Author | Title | Publisher |
|---|---|---|---|
| 1 | Bureau of Indian Standards. | Engineering Drawing Practice for Schools and Colleges IS: SP-46 | Third Reprint, October 1998 ISBN No. 81- 7061-091-2 |
| 2 | Bhatt, N.D. | Engineering Drawing | Charotar Publishing House, 2010 ISBN No. 978-93-80358-17-8 |
| 3 | Bhatt, N.D.; Panchal, V. M | Machine Drawing | Charotar Publishing House, 2010 ISBN No. 978-93-80358-11-6 |
| 4 | Jolhe, D.A. | Engineering Drawing | Tata McGraw Hill Edu. New Delhi, 2010, ISBN No. 978-0-07-064837-1 |
| 5 | Dhawan, R. K. | Engineering Drawing | S. Chand and Company New Delhi, ISBN No. 81-219-1431-0 |
| 6 | Pradhan, S.K Jain, K.K | Engineering Graphics | Khanna Book Publishing CO(P) LTD, New Delhi, ISBN No. 978-93-91505-50-9 |

## XII. LEARNING WEBSITES & PORTALS

| Sr.No | Link/Portal | Description |
|---|---|---|
| 1. | https://www.youtube.com/watch?v=dmt6_n7Sgcg | Free Hand Sketches |
| 2. | https://www.youtube.com/watch?v=dmt6_n7Sgcg | Orthographic Projection |
| 3. | https://www.youtube.com/watch?v=3WXPanCq9L1 | Basics of Projection |
| 4. | https://www.youtube.com/watch?v=fvjk7PlxAuo | Introduction to Engineering Graphics |
| 5. | https://www.youtube.com/watch?v=8j7l1OWhMIE | Isometric Projection |

| Name &Signature: | |
|---|---|
| **Mr. Swapnil S Hatwalane**<br>Lecturer in Mechanical Engineering | **Mr. N B Hirlekar**<br>Lecturer in Mechanical Engineering |
| (Course Experts) | |
| Name & Signature:<br>**Dr. S. S. Bharatkar**<br>(Programme Head) | Name & Signature:<br>**Shri.S.B.Kulkarni**<br>(CDC In-charge) |

# GOVERNMENT POLYTECHNIC, PUNE

'120 – NEP' SCHEME

| | |
|---|---|
| PROGRAMME | DIPLOMA IN EE/ET/CM/IT |
| PROGRAMME CODE | 02/03/06/07 |
| COURSE TITLE | ENGINEERING PHYSICS |
| COURSE CODE | SC11203 |
| PREREQUISITE COURSE CODE & TITLE | NA |

## I. LEARNING & ASSESSMENT SCHEME

| Course Code | Course Title | Course Type | Learning Scheme | | | | | Credits | Assessment Scheme | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Actual Contact Hrs./Week | | | SLH | NLH | | Paper Duration in Hrs. | Theory | | | | Based on LL & TSL | | | | Based on SL | | Total Marks |
| | | | | | | | | | | | | | | Practical | | | | | | |
| | | | CL | TL | LL | | | | | FA-TH | SA-TH | Total | | FA-PR | | SA-PR | | SLA | | |
| | | | | | | | | | | Max | Max | Max | Min | Max | Min | Max | Min | Max | Min | |
| SC11203 | ENGINEERING PHYSICS | DSC | 3 | - | 2 | 1 | 6 | 3 | 2 | 30 | 70*# | 100 | 40 | 25 | 10 | 25@ | 10 | 25 | 10 | 175 |

**Total IKS Hrs for Term: 2 Hrs**

**Abbreviations:** CL-Classroom Learning, TL-Tutorial Learning, LL-Laboratory Learning, SLH-Self Learning Hours, NLH-Notional Learning Hours, FA - Formative Assessment, SA -Summative assessment, IKS – Indian Knowledge System, SLA- Self Learning Assessment

**Legends:** @-Internal Assessment, # - External Assessment,*# - Online Examination,@$ - Internal Onlipe Examination

**Note:**

FA-TH represents an average of two class tests of 30 marks each conducted during the semester.

1. If a candidate is not securing minimum passing marks in **FA-PR** (Formative Assessment - Practical) of any course, then the candidate shall be declared as **'Detained'** in that semester.
2. If a candidate does not secure minimum passing marks in SLA (Self Learning Assessment) of any course, then the candidate shall be declared as **'fail'** and will have to repeat and resubmit SLA work.
3. **Notional learning hours** for the semester are **(CL + LL + TL + SL) hrs. * 15 Weeks**
4. **1 credit** is equivalent to **30 Notional hours.**
5. * Self-learning hours shall not be reflected in the Timetable.
6. * Self-learning includes micro-projects/assignments/other activities.

## II. RATIONALE:

This course is designed in a way by which fundamental information will help the diploma engineers to apply the basic principles and concepts of physics to solve broad-based engineering problems. The study of basic principles and concepts of motion, light, electricity, and modern physics will help in understanding the technology courses where the emphasis is on the applications of these in different technology applications.

## III. COURSE-LEVEL LEARNING OUTCOMES (CO'S)

Students will be able to achieve & demonstrate the following CO's on completion of course-based learning

CO1: Estimate errors in measurement and Apply laws of motion in various applications.
CO2: Use basic principles of electrostatics in the engineering field
CO3: Apply basic principles of electricity to solve engineering problems.
CO4: Apply basic principles of magnetism to solve engineering problems
CO5: Use basic principles of light in the technical field
CO6: Apply principles of X-rays and Photoectricity in Engineering.

## IV. THEORY LEARNING OUTCOMES AND ALIGNED COURSE CONTENT

| Sr. No | Theory Learning Outcomes (TLO'S) aligned to CO's. | Learning content mapped with TLO's. | Suggested Learning Pedagogies | Relevant COs |
|---|---|---|---|---|
| | **UNIT-I GENERAL PHYSICS (CL Hrs-07, Marks-10)** | | | |
| 1. | **TLO 1.1:** . List fundamental and derived quantities with their unit. Explain the procedure of measuring the dimensions of a given object by using Vernier Calipers and Screw Gauge. | **1.1. Units and Measurement** Introduction, Definition of unit, Fundamental and derived units, Different System of units, Errors in measurements. Dimensions and its Application Application of Vernier Caliper and Screw Gauge. **1.2 Types of Motion** Displacement, Velocity, Acceleration and retardation Angular displacement, Angular velocity, Angular acceleration and Units. Three equations of angular motion. SHM and its application. | Chalk and board Improved lecture, Tutorial Assignment, and Demonstration | CO1 |
| | **UNIT-II ELECTROSTATICS (CL Hrs-09, Marks-14)** | | | |
| 2 | **TLO 2.1** Describe properties of electric lines of force. **TLO 2.2** Calculate electrostatic force, electric field and electric potential difference of the given static charge. **TLO 2.3** Calculate the equivalent capacity and energy stored in the combination of the capacitors. | **2.1 Electric charge**, Coulomb's law in Electrostatics, a unit of charge, electric field, intensity of electric field, electric lines of forces (Properties), electric flux, flux density, analytical treatment. **2.2 Electric potential:** Explanation, Definition, Potential due to a point charge, potential due to a charged sphere, potential of the earth, absolute electric potential, analytical treatment. **2.3 Electric Capacitor:** Capacitance Introduction of conductor, unit, principle of condenser, parallel plate condenser, capacitances in series and parallel, Super Capacitors and Application, analytical treatment. | Chalk and board, Improved lecture, Tutorial Assignment, Demonstration | CO2 |

| Sr. No | Theory Learning Outcomes (TLO'S) aligned to CO's. | Learning content mapped with TLO's. | Suggested Learning Pedagogies | Relevant COs |
|---|---|---|---|---|
| | **UNIT-III CURRENT ELECTRICITY (CL Hrs-09, Marks-14)** | | | |
| 3 | **TLO 3.1.** State and Explain Ohm's law.<br><br>**TLO 3.2.** Explain the principle of the potentiometer and its application. | **3.1 Current,** Resistance and its unit, Law of Parallel and Series combination of resistance, Dependence of resistance-length, area of cross-section, temperature, Ohms law, specific resistance and its unit, Whetstone's network construction and principle, Meter bridge, Balancing condition of meter bridge, Measurement of unknown resistance using meter bridge, analytical treatment.<br>**3.2 Potentiometer,** Principle of the potentiometer, Potential gradient, Construction of potentiometer, Applications of potentiometer, E.M.F., Comparison of E.M.F. using potentiometer. | Chalk and board, Improved lecture, Tutorial Assignment, Demonstration | CO3 |
| | **UNIT- IV MAGNETISM (CL Hrs-05, Marks-08)** | | | |
| 4 | TLO.4.1. Calculate Magnetic induction for the given conductor.<br>TLO 4.2 Explain Electromagnetism with its applications. | **4.1 Magnetic effect of electric current,** Magnetism, Intensity of magnetic field, Magnetic induction, Magnetic Flux, Magnetic lines of force and its Properties, Analytical treatment.<br><br>**4.2Electromagnetism** and its application. | Simulation, Model Display, Demonstration Chalk and board, Presentations. | CO4 |
| | **UNIT –V OPTICS AND LASER (CL Hrs-07, Marks-12)** | | | |
| 5 | **TLO 5.1.** State laws of reflection and refraction. Describe the phenomenon of total internal reflection.<br><br>**TLO 5.2** Distinguish between optical fibre communication systems and ordinary systems.<br><br>**TLO 5.3** Differentiate between properties of ordinary light and laser light. State applications of laser in different fields | **5.1 Light:** Introduction to reflection and refraction of light, Laws of reflection and refraction, Snell's law, Refractive index, Physical significance of refractive index, Critical angle, Total internal refraction of light, analytical treatment.<br>**5.2 Fiber optics**: Propagation of light through optical fibre, Structure of optical fibre, Numerical aperture, Acceptance angle, Acceptance cone, Types of optical fibres, Applications of optical fibre, Comparison of optical fibre communication with electrical cable communication. | Simulation, Demonstration, Flipped Classroom, Collaborative Learning, Case Study, chalk and board etc. | CO5 |

| | | | | |
|---|---|---|---|---|
| | | **5.3 Laser:** Definition, Properties of LASER, Spontaneous and Stimulated emission, Population inversion, Metastable state, Pumping, Lifetime, He-Ne laser construction and working with energy level diagram, Engineering applications of laser. | | |
| | **UNIT –VI MODERN PHYSICS (CL Hrs-08, Marks-12)** | | | |
| 6 | **TLO 6.1.** Explain the production of X-rays. Describe the properties and applications of X-rays in different fields.<br><br>**TLO 6.2.** Describe properties of photon Derive Einstein's photoelectric equation. Explain the working of a given photoelectric device. | **6.1 X-ray:** principle, production of X-rays using Coolidge tube, origin of X-rays, types of X-rays, properties of X-rays, engineering applications of X-rays, analytical treatment.<br>**6.2 Photo electricity:** photoelectric effect, Plank's quantum theory, the concept of the photon, properties of the photon, threshold frequency, threshold wavelength, stopping potential, photoelectric work function, Einstein's photoelectric equation, photocell (circuit diagram and working), applications of photoelectric cell, analytical treatment. | Chalk and board, Improved lecture, Tutorial Assignment, Demonstration | CO6 |

## V. LABORATORY LEARNING OUTCOME AND ALIGNED PRACTICAL/TUTORIAL EXPERIENCES.

| Sr. No | Practical/Tutorial/Laboratory Learning Outcome (LLO) | Laboratory Experiment / Practical Titles /Tutorial Titles | Number of hrs. | Relevant COs |
|---|---|---|---|---|
| 1 | LLO1.1 Use of given instrument and<br>i) Mention name and range of the given instrument.<br>ii) Calculate the least count of the given instrument.<br>iii) List the uses of the given instrument. | Identify the given instrument and<br>i) Mention the name and range of the given instrument.<br>ii) Calculate the least count of the given instrument.<br>iii) List the uses of the given instrument. | 2 | CO1 |
| 2 | LLO2.1 Use a Vernier caliper to Measure the dimensions of given objects. Measure the dimensions of objects of known dimensions.<br>LLO 2.2 Estimate the errors in measurement. | Measurements of dimensions of the given object by Vernier caliper. | 2 | CO 1 |
| 3 | LLO3.1 Use a Micrometer Screw gauge to Measure the dimensions of given objects. Measure the dimensions of objects of known dimensions. | Measurements of dimensions of given objects by micrometre screw gauge. | 2 | CO1 |

| | | | | |
|---|---|---|---|---|
| | LLO 3.2 Estimate the measurement errors. | | | |
| 4 | LLO 4.1 Use a simple pendulum to determine acceleration due to gravity. | Determination of Acceleration due to Gravity by Simple Pendulum. | 2 | CO1 |
| 5 | LLO5.1 Apply Ohm's law to solve circuit problems | Determination of resistance by Ohm's law. | 2 | CO2 |
| 6 | LLO6.1 Determine the specific resistance of a given wire. | Determination of specific resistance of a given wire. | 2 | CO2 |
| 7 | LLO7.1 Verify the law of the series connection of resistors /capacitors. | Determination of equivalent resistance in the series connection of resistors /capacitors. | 2 | CO2 |
| 8 | LLO 8.1 Verify the law of the parallel connection of resistors /capacitors | Determination of equivalent resistance in parallel connection of resistors /capacitors. | 2 | CO2 |
| 9 | LLO 9.1 Use meter bridge to:<br>i) Determine the resistance of the given material of the wire.<br>ii) Calculate the specific resistance of the given material of the wire. | Determination of i) resistance of given material of wire.<br>ii) Calculate the specific resistance of the given material of wire by using a meter bridge. | 2 | CO3 |
| 10 | LLO 10.1 Use a potentiometer to :<br>i) Determine the potential gradient of the given cell (Principle of potentiometer).<br>ii) Calibrate the given voltmeter | Calibrate the given voltmeter using a Potentiometer. | 2 | CO3 |
| 11 | LLO 11.1 Use a potentiometer to :<br>i) Compare the emf of two cells | Compare the emf of two cells using a Potentiometer. | 2 | CO3 |
| 12 | LLO 12.1 Use a potentiometer to:<br>i) Find the internal resistance of a cell. | Find the internal resistance of a cell by using a Potentiometer. | 2 | CO3 |
| 13 | LLO 13.1 Use a magnetic compass to draw the magnetic lines of forces of magnets of different shapes and determine neutral points. | Determination of neutral points by magnetic compass. | 2 | CO4 |
| 14 | LLO 14.1 Determine the refractive index of the glass slab using the Refraction phenomenon. | Determination of the refractive index of the glass slab. | 2 | CO4 |
| 15 | LLO 15.1 Use of He-Ne laser beam. | Study the properties and working of the laser using a He-Ne laser beam. | 2 | CO4 |
| 16 | LLO 16.1 Use photoelectric cells to study the effect of :<br>i) Intensity of light on photoelectric current.<br>ii) Applied potential on photoelectric current. | Study effect of<br>i) Intensity of light on photoelectric current.<br>ii) Applied potential on photoelectric current. using Photoelectric cell | 2 | CO4 |

## VI. SUGGESTED MICRO PROJECT/ASSIGNMENT/ACTIVITIES FOR SPECIFIC LEARNING/SKILLS DEVELOPMENT (SELF-LEARNING)

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

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

**Micro project:**

- Series and parallel resistances: Prepare models for a combination of series and parallel resistances
- Series and parallel capacitors: Prepare models for a combination of series and parallel capacitors
- Magnetic flux: Prepare models to demonstrate magnetic lines of lines of forces
- Vernier Calipers: Prepare prototype vernier caliper of desired least count using card sheet
- Conductivity: Collect different materials such as metal, plastics, glass etc. and prepare models
- Carbon resistors: Determine the resistance and tolerance of carbon resistors using color codes
- Mobile applications: Use mobile applications for measurements of different physical quantities Optical Fiber and TIR: Prepare model to demonstrate total internal reflection
- Physical quantities: Prepare a Chart on comparison of systems of units for different physical quantities.
- Magnetism: Prepare a chart on magnetic lines of force of bar magnet.
- LASER: Prepare a chart to study Total Internal Reflection/LASER.
- X-rays/Photoelectric cell. Prepare a chart showing the properties of X-rays/Photoelectric cells.
- Ohm's Law: Prepare Chart to Study Ohm's Law.

**Assignment**

- Convert the units of a given physical quantity from one system of units to another.
- Prepare a chart to summarize units and measurements.
- Give details about the explanation of concepts like electrostatics, and magnetic domain. Demonstrate the variation of the angle of refraction with respect to the refractive index.
- Use a digital vernier caliper and micrometer screw gauge for measurements. (lab-based).
- Applications of optical fibres in, engineering etc.
- Applications of X-ray in engineering etc.
- Applications of LASER in, engineering etc.
- Applications of Photoelectricity in, engineering etc

## VII. LABORATORY EQUIPMENT/INSTRUMENTS/TOOLS/SOFTWARE REQUIRED

| Sr.No | Equipment Name with Broad Specifications | Relevant LLO Number |
|---|---|---|
| 1 | Vernier Calliper : Range: 0-15 cm, Resolution 0.01 cm. | 1 |
| 2 | Micrometer screw gauge: Range 0-25 mm, Resolution 0.01 mm. | 2 |
| 3 | Simple pendulum, Stop Watch. | 3 |
| 4 | Glass Slab 75x50x12mm. | 4 |
| 5 | He-Ne laser kit | 14 |
| 6 | Battery eliminator (0-12 V, 2 A) | 4,5,6,7,8,9 |
| 7 | Voltmeter(0-10 V), ammeter (0-5 A) | 1,4,5 |
| 8 | Meter Bridge (100 cm), Galvanometer (30-0-30) and jockey. | 8 |
| 9 | Potentiometer (400 cm). | 9,10,11 |
| 10 | Potentiometer, Daniell cell, Leclanche cell. | 9,10,11 |
| 11 | Bar Magnet, Magnetic Needle. | 12 |
| 12 | Photoelectric cell. | 15 |
| 13 | Parallel/Series Resistance /Capacitor Kit | 6,7 |

## VIII. SUGGESTED FOR WEIGHTAGE TO LEARNING EFFORTS & ASSESSMENT PURPOSE (Specification Table)

| Sr. No | Unit | Unit Title | Aligned COs | Learning Hours | R-Level | U-Level | A-Level | Total Marks |
|---|---|---|---|---|---|---|---|---|
| 1 | I | General Physics | CO1 | 7 | 2 | 4 | 4 | 10 |
| 2 | II | Electrostatics | CO2 | 9 | 2 | 6 | 6 | 14 |
| 3 | III | Current Electricity | CO3 | 9 | 4 | 4 | 6 | 14 |
| 4 | IV | Magnetism | CO4 | 5 | 2 | 3 | 3 | 8 |
| 5 | V | Optics and Laser | CO5 | 7 | 4 | 4 | 4 | 12 |
| 6 | VI | Modern Physics | CO6 | 8 | 4 | 4 | 4 | 12 |
| | | **Grand Total** | | **45** | **18** | **25** | **27** | **70** |

## IX. ASSESSMENT METHODOLOGIES/TOOLS

| Formative assessment (Assessment for Learning) | Summative Assessment (Assessment of Learning) |
|---|---|
| 1. Tests<br>2. Rubrics for COs<br>3. Assignment<br>4. Midterm Exam<br>5. Self-Learning<br>6. Term Work<br>7. Seminar/Presentation | 1. End-Term Exam<br>2. Micro-project<br>3. Tutorial Performance |

## X. SUGGESTED COS- POS MATRIX FORM

| Course Outcomes (COs) | Programme Outcomes(POs) | | | | | | | Programme Specific Outcomes *(PSOs) | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | PO-1 Basic and Discipline-Specific Knowledge | PO-2 Problem Analysis | PO-3 Design/ Development of Solutions | PO-4 Engineering Tools | PO-5 Engineering Practices for Society, Sustainability and Environment | PO-6 Project Management | PO-7 Life Long Learning | PSO-1 | PSO-2 | PSO-3 |
| CO1 | 3 | 1 | | 2 | 1 | 1 | 1 | | | |
| CO2 | 3 | 1 | 1 | 2 | | 1 | 1 | | | |
| CO3 | 3 | 1 | 1 | 2 | 1 | 1 | 1 | | | |
| CO4 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | | | |
| CO5 | 3 | 1 | 1 | 2 | 1 | 1 | 1 | | | |
| CO6 | 3 | 1 | 1 | 2 | 1 | 1 | 1 | | | |

**Legends:- High:03, Medium:02, Low:01, NoMapping: -**
*PSOs are to be formulated at the institute level

## XI. SUGGESTED LEARNING MATERIALS/BOOKS

| Sr.No | Author | Title | Publisher |
|---|---|---|---|
| 1 | Narlikar J. V.; Joshi , A. W.; Mathur , Anuradha ; et al | Physics Textbook Part I - Class XI | National Council of Education Research and Training, New Delhi, 2010, ISBN: 8174505083 |
| 2 | Narlikar, J.V.; Joshi , A. W.; Mathur , Anuradha ; et al | Physics Textbook Part II - Class XI | National Council of Education Research and Training, New Delhi, 2015, ISBN: 8174505660 |
| 3 | Narlikar J.V.;Joshi , A. W.; Ghatak A.K. et al | Physics Textbook Part I - Class XII | National Council of Education Research and Training, New Delhi, 2013, ISBN: 8174506314 |
| 4 | Narlikar, J.V.;Joshi , A. W.; Ghatak A.K. et al | Physics Textbook Part II - Class XII | National Council of Education Research and Training, New Delhi, 2013, ISBN: 8174506713 |
| 5 | Haliday, David; Resnik, Robert and Walker, Jearl | Fundamentals of Physics | John Wiley & Sons, Hoboken, USA, 2014 ISBN: 812650823X |
| 6 | Dr. Hussain Jeevakhan | Applied Physics - II | Khanna Book Publishing, (2021), ISBN: 978-93-91505-57-8 |

## XIII. LEARNING WEBSITES & PORTALS

| Sr.No | Link/Portal | Description |
|---|---|---|
| 1. | www.sciencejoywagon.com/physicszone | Electricity, Magnetism and Semiconductors, basic fiber optics |
| 2. | https://phet.colorado.edu | Electricity, Magnetism and Semiconductors, Thermometry and basic fiber optics |
| 3. | www.physicsclassroom.com | Concepts of basic physics |

| Sr.No | Link/Portal | Description |
|---|---|---|
| 4. | http://nptel.ac.in/course.php?disciplineId=104 | Concepts of basic physics |
| 5. | http://hperphysics.phy-astr.gsu.edu/hbase/hph.html | Concepts of basic physics |
| 6. | https://www.youtube.com/results?search_query=amruta+university+physics+expts | Concepts of basic physics |
| 7. | k. https://www.youtube.com/results?search_query=physics+class+11+chapter+1 | Concepts of basic physics |
| 8. | l. https://www.youtube.com/watch?v=zRGh9_a1J7s | Concepts of basic physics |
| 9. | https://iksindia.org | IKS physics |
| 10. | https://www.ancient-origins.net/history-famous-people/indian-sageacharya-kanad-001399 | IKS Philosophy of atom by Acharya Kanad |

Name & Signature:

**Smt. D.V. Saurkar**
Lecturer in Physics

**Mr. N.S. Salave**
Lecturer in Physics

**Mr A.D. Ghorpade**
Lecturer in Physics

(Course Experts)

Name & Signature:

**Dr. S. S. Bharatkar**
(Programme Head)

Name & Signature:

**Shri.S.B.Kulkarni**
(CDC In-charge)

# GOVERNMENT POLYTECHNIC, PUNE

## '120 – NEP' SCHEME

| | |
|---|---|
| PROGRAMME | DIPLOMA IN CE/EE/ET/ME/MT |
| PROGRAMME CODE | 01/02/03/04/05 |
| COURSE TITLE | BASIC MATHEMATICS |
| COURSE CODE | SC11205 |
| PREREQUISITE COURSE CODE & TITLE | NA |

## I. LEARNING & ASSESSMENT SCHEME

| Course Code | Course Title | Course Type | Learning Scheme | | | | | Credits | Assessment Scheme | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Actual Contact Hrs./Week | | | SLH | NLH | | Paper Duration | Theory | | | | Based on LL &TSL | | | | Based on SL | | Total Marks |
| | | | | | | | | | | | | | | Practical | | | | | | |
| | | | CL | TL | LL | | | | | FA-TH | SA-TH | Total | | FA-PR | | SA-PR | | SLA | | |
| | | | | | | | | | | Max | Max | Max | Min | Max | Min | Max | Min | Max | Min | |
| SC11205 | BASIC MATHEMATICS | AEC | 4 | 2 | - | - | 6 | 3 | 3 | 30 | 70 | 100 | 40 | - | - | - | - | - | - | 100 |

**Total IKS Hrs for Term:** 6 Hrs

**Abbreviations:** **CL**-Classroom Learning, **TL**-Tutorial Learning, **LL**-Laboratory Learning, **SLH**-Self Learning Hours, **NLH**-Notional Learning Hours, **FA** - Formative Assessment, **SA** -Summative assessment, **IKS** – Indian Knowledge System, **SLA**- Self Learning Assessment

**Legends:** @-Internal Assessment, # - External Assessment,*# - Online Examination,@$ - Internal Online Examination

**Note:**

**FA-TH** represents an average of two class tests of 30 marks each conducted during the semester.

1. If a candidate is not securing minimum passing marks in **FA-PR** (Formative Assessment - Practical) of any course, then the candidate shall be declared as **'Detained'** in that semester.
2. If a candidate does not secure minimum passing marks in SLA (Self Learning Assessment) of any course, then the candidate shall be declared as **'fail'** and will have to repeat and resubmit SLA work.
3. **Notional learning hours** for the semester are **(CL + LL + TL + SL) hrs. * 15 Weeks**
4. **1 credit** is equivalent to **30 Notional hours.**
5. * Self-learning hours shall not be reflected in the Timetable.
6. *Self-learning includes micro-projects/assignments/other activities.

## II. RATIONALE:

Basic Mathematics plays a crucial role in diploma Programmes as it fosters the development of critical thinking skills, enhances quantitative literacy, prepares students for higher education, promotes problem-solving abilities, cultivates logical and abstract thinking, and fosters mathematical literacy. By engaging with Mathematics, students acquire logical reasoning, problem-solving techniques, and analytical thinking, which are valuable for lifelong learning and professional growth.

Calculus is a branch of Mathematics that calculates how matter, particles, and heavenly bodies move. Derivatives are useful for finding maxima and minima of the function; velocity and acceleration are also useful for many engineering optimization problems. Statistics can be defined as a type of mathematical analysis which involves the method of collecting and analyzing data and then summing up the data into a numerical form for a given set of factual data or real-world observations. It equips individuals with the ability to interpret numerical information, make informed decisions, and navigate real-world situations. Moreover, Mathematics provides a foundation for further studies in various disciplines and prepares students to tackle complex challenges.

By exploring abstract concepts and logical structures, students develop their ability to reason; make connections, and approach problems with clarity and precision. Furthermore, studying Mathematics helps students appreciate the historical and cultural significance of Mathematics and its applications in diverse fields, thereby fostering mathematical literacy and a deeper understanding of the world. Hence the course provides the insight to analyze engineering problems scientifically using logarithms, matrices, trigonometry, straight line, differential calculus, and statistics.

By incorporating these topics, students comprehend to approach engineering problems from a mathematical perspective, enabling them to devise efficient and effective solutions, and this leads to preparing Diploma graduates well-rounded, adaptable, and capable of making significant contributions to the branch-specific problems.

## III. COURSE-LEVEL LEARNING OUTCOMES(CO'S)

Studentswillbeabletoachieve&demonstratethefollowing CO'soncompletionofcourse-basedlearning

CO1 - Apply the concepts of algebra to solve engineering (discipline) related problems.
CO2 - Utilize trigonometry to solve programme-specific engineering problems.
CO3 - Solve programme-specific engineering problems under given conditions of straight lines.
CO4 - Apply differential calculus to solve programme-specific problems.
CO5 - Use techniques and methods of statistics to crack programme-specific problems.

## IV. THEORY LEARNING OUTCOMES AND ALIGNED COURSE CONTENT

| Sr. No | Theory Learning Outcomes (TLO'S) aligned to CO's. | Learning content mapped with TLO's. | Suggested Learning Pedagogies | Relevant COs |
|---|---|---|---|---|
| | **UNIT-I ALGEBRA (CL Hrs-12, Marks-14)** | | | |
| 1. | TLO 1.1 Solve the given simple problem based on laws of logarithm.<br>TLO 1.2 Solve the given system of linear equations using the matrix inversion method.<br>TLO 1.3 Obtain the proper and improper partial fraction for the given simple rational function.<br>TLO 1.4 Solve simultaneous equations by using concepts given in Ancient Indian Mathematics. | 1.1 Logarithm: Concept and laws of logarithm.<br>1.2 Matrices: Matrices, algebra of matrices, transpose, value of determinant of matrix of order 3x3, adjoint and inverse of matrices.<br>1.3Matrices: Solution of simultaneous equations by matrix inversion method.<br>1.4 Partial Fractions: Types of partial fractions based on the nature of factors and related Problems.<br>1.5 Algebra in Indian Knowledge System: Solution of simultaneous equations. | Improved Lecture, Tutorial Assignment, Demonstration Simulation | CO1 |

| Sr. No | Theory Learning Outcomes (TLO'S) aligned to CO's. | Learning content mapped with TLO's. | Suggested Learning Pedagogies | Relevant COs |
|---|---|---|---|---|
| **UNIT-II TRIGONOMETRY (CL Hrs-16, Marks-14)** | | | | |
| 2 | TLO 2.1: Apply the concept of Compound angle, allied angle, and multiple angles to solve the given simple engineering problem(s).<br>TLO 2.2: Apply the concept of Sub-multiple angle to solve the given simple engineering-related problem(s).<br>TLO 2.3: Apply the concept of factorization and de-factorization formulae to solve the given simple engineering problem(s).<br>TLO 2.4: Investigate given simple problems by utilizing inverse trigonometric ratios.<br>TLO 2.5: Use concepts given in Ancient Indian Mathematics for trigonometry to solve given problems. | 2.1 Trigonometric ratios of allied angles, compound angles, multiple angles (2A, 3A), and submultiples angles (without proof).<br>2.2 Factorization and De factorization formulae (without proof).<br>2.3 Inverse Trigonometric Ratios and related problems.<br>2.4 Principal values and the relation between trigonometric and inverse trigonometric ratios.<br>2.5 Trigonometry in Indian Knowledge System: The Evolution of Sine Function in India.<br>2.6 Indian Trigonometry: Basic Indian Trigonometry - Introduction and Terminology (From Ancient Beginnings to Nilakantha).<br>2.7 Trigonometry in Indian Knowledge System: Pythagorean triples in Sulabasutras. | Improved Lecture Tutorial Assignment Demonstration Simulation | CO2 |
| **UNIT-III STRAIGHT LINE (CL Hrs-06, Marks-08)** | | | | |
| 3 | TLO 3.1 Calculate the angle between given two straight lines.<br>TLO 3.2 Formulate equation of straight lines related to given engineering problems.<br>TLO 3.3 Identify the perpendicular distance from the given point to the line.<br>TLO 3.4 Calculate the perpendicular distance between the given two parallel lines.<br>TLO 3.5 Use geometry given in Sulabasutras to solve the given problems. | 3.1 Straight line and slope of a straight line:<br>a. The angle between two lines<br>b. Condition of parallel and perpendicular lines<br>3.2 Various forms of straight lines:<br>a. General form<br>b. Slope-point form<br>c. Slope-intercept form<br>d. Two-point form<br>e. Double intercept form<br>3.3 Perpendicular distance from a point on the line<br>3.4 Perpendicular distance between two parallel lines<br>3.5 Geometry in Sulabasutras in Indian Knowledge System:<br>a. Construction of square<br>b. Circling the square | Improved Lecture Tutorial Assignment Demonstration Simulation | CO3 |

| Sr. No | Theory Learning Outcomes (TLO'S) aligned to CO's. | Learning content mapped with TLO's. | Suggested Learning Pedagogies | Relevant COs |
|---|---|---|---|---|
| **UNIT- IV DIFFERENTIAL CALCULUS (CL Hrs-16, Marks-20)** | | | | |
| 4 | TLO 4.1: Solve the given simple problems based on functions.<br>TLO 4.2: Solve the given simple problems based on rules of differentiation.<br>TLO 4.3: Obtain the derivatives of composite, implicit, parametric, inverse, logarithmic, and exponential functions.<br>TLO 4.4: Apply the concept of differentiation to find the given equation of tangent and normal.<br>TLO 4.5: Apply the concept of differentiation to calculate maxima, minima, and radius of curvature for a given function.<br>TLO 4.6: Familiar with the concept of calculus given in Indian Mathematics. | 4.1 Functions and Limits: Concept of function and simple examples.<br>4.2 Functions and Limits: Concept of limits without examples.<br>4.3 Derivatives: Rules of derivatives such as sum, product, and quotient of functions.<br>4.4 Derivatives: Derivative of composite functions (chain rule), implicit and parametric functions.<br>4.5 Derivatives: Derivatives of inverse, logarithmic, and exponential functions.<br>4.6 Applications of derivative: Second-order derivative without examples, equation of tangent and normal, maxima and minima, radius of curvature.<br>4.7 Calculus in Indian Knowledge System: The Discovery of Calculus by Indian Astronomers. | Improved Lecture Tutorial Assignment Demonstration Simulation | **CO4** |
| **UNIT –V STATISTICS (CL Hrs-10, Marks-14)** | | | | |
| 5 | TLO 5.1: Obtain the range and coefficient of range of the given grouped and ungrouped data.<br>TLO 5.2: Calculate the mean and standard deviation of ungrouped and grouped data related to the given simple engineering problem(s).<br>TLO 5.3: Determine the variance and coefficient of variance of given grouped and ungrouped data.<br>TLO 5.4: Justify the consistency of given simple sets of data. | 5.1 Range, coefficient of range of discrete and grouped data.<br>5.2 Mean deviation and standard deviation from the mean of grouped and ungrouped data.<br>5.3 Variance and coefficient of variance.<br>5.4 Comparison of two sets of observation. | Improved Lecture Tutorial Assignment Demonstration Simulation | **CO5** |

## V. LABORATORY LEARNING OUTCOME AND ALIGNED PRACTICAL/TUTORIAL EXPERIENCES.

| Sr. No | Practical/Tutorial/Laboratory Learning Outcome (LLO) | Laboratory Experiment / Practical Titles /Tutorial Titles | Number of hrs. | Relevant COs |
|---|---|---|---|---|
| 1 | LLO 1.1: Solve simple problems of Logarithms based on given applications. | Logarithm and applications. | 2 | CO1 |
| 2 | LLO 2.1: Solve elementary problems on Algebra of matrices for branch-specific engineering-related applications. | Algebra of matrices | 2 | CO1 |
| 3 | LLO 3.1: Apply the concept of matrix to solve engineering problems. | Simultaneous Equations using the inversion method. | 2 | CO1 |
| 4 | LLO 4.1: Apply the concept of matrix to solve engineering problems. | Matrix Inversion method to determine currents. | 2 | CO1 |
| 5 | LLO 5.1: Apply the concept of matrix to solve engineering problems. | Inverse of a non-singular matrix. | 2 | CO1 |
| 6 | LLO 6.1: Apply the concept of partial fractions to solve engineering problems. | Partial fractions. | 2 | CO1 |
| 7 | LLO 7.1: Solve problems on Compound, Allied, multiple and sub-multiple angles for related shapes. | Compound, Allied, multiple, and sub-multiple angles. | 2 | CO2 |
| 8 | LLO 8.1: Utilize the concept of trigonometry to solve engineering problems. | Factorization and de-factorization formulae. | 2 | CO2 |
| 9 | LLO 9.1: Utilize the concept of trigonometry to solve engineering problems. | Inverse trigonometric ratios. | 2 | CO2 |
| 10 | LLO 10.1: Solve branch-specific engineering problems under given conditions of straight lines. | Equation of straight lines using different forms. | 2 | CO3 |
| 11 | LLO 11.1: Solve branch-specific engineering problems under given conditions of straight lines. | Perpendicular distance, distance between two parallel lines, and angle between two lines. | 2 | CO3 |
| 12 | LLO 12.1: Solve branch-specific engineering problems under given conditions of straight lines. | Use of a straight line to calculate the speed, distance, and time of a moving object. | 2 | CO3 |
| 13 | LLO 13.1: Apply the concept of derivative to solve engineering problems. | Derivatives of implicit functions and parametric functions. | 2 | CO4 |
| 14 | LLO 14.1 - Apply the concept of derivatives to solve engineering problems. | Derivative of logarithmic and exponential functions. | 2 | CO4 |
| 15 | LLO 15.1 - Apply the concept of the equation of tangent and normal to solve engineering problems. | Equation of tangent and normal. | 2 | CO4 |

| Sr. No | Practical/Tutorial/Laboratory Learning Outcome (LLO) | Laboratory Experiment / Practical Titles /Tutorial Titles | Number of hrs. | Relevant COs |
|---|---|---|---|---|
| 16 | LLO 16.1 - Apply the concept of maxima, minima, and radius of curvature to solve engineering problems. | Maxima, minima of function and radius of curvature. | 2 | CO4 |
| 17 | LLO 17.1 - Apply the concept of the equation of tangent and normal to solve engineering problems. | Concept of tangent and normal to solve the given problems of Engineering Drawing. | 2 | CO4 |
| 18 | LLO 18.1 - Apply the concept of maxima and minima to solve engineering problems. | Maxima and Minima to obtain optimum value. | 2 | CO4 |
| 19 | LLO 19.1 - Apply the concept of the radius of curvature to solve engineering problems. | Radius of curvature. | 2 | CO4 |
| 20 | LLO 20.1 - Utilize the concept of derivatives to solve engineering problems. | Use of derivative to find the slope of a bending curve. | 2 | CO4 |
| 21 | LLO 21.1 - Use the concept of range and mean deviation to crack branch-specific problems. | Range, coefficient of range and mean deviation. | 2 | CO5 |
| 22 | LLO 22.1 - Use the concept of standard deviation and coefficient of variance to crack branch-specific problems. | Standard deviation, coefficient of variation and comparison of two sets. | 2 | CO5 |
| 23 | LLO 23.1 - Use the concept of standard deviation to crack branch-specific problems. | Standard Deviation for Concrete with the given data. | 2 | CO5 |

Note: 1.Take any15 tutorials out of 23 and ensure that all the units are covered.
2.Take the tutorial in a batch size of 20 to 30 students.
3.Give students at least 10 problems to solve in each tutorial.

## VI. SUGGESTED MICROPROJECT/ASSIGNMENT/ACTIVITIES FOR SPECIFIC LEARNING/SKILLS DEVELOPMENT (SELF-LEARNING)

**Micro-project**

NA

**Assignment**

NA

## VII. LABORATORY EQUIPMENT/INSTRUMENTS/TOOLS/SOFTWARE REQUIRED

| Sr. No | EquipmentNamewithBroadSpecifications | Relevant LLO Number |
|---|---|---|
| 1 | Open-source software like SageMaths, MATHS3D, GeoGebra, Graph, DPLOT and Graphing Calculator (GraphEq2.13), ORANGE can be used for Algebra, Calculus, Trigonometry and Statistics respectively. | All |

## VIII. SUGGESTED FOR WEIGHTAGE TO LEARNING EFFORTS & ASSESSMENT PURPOSE (Specification Table)

| Sr. No | Unit | Unit Title | Aligned COs | Learning Hours | R-Level | U-Level | A-Level | Total Marks |
|---|---|---|---|---|---|---|---|---|
| 1 | I | Algebra | CO1 | 12 | 2 | 6 | 6 | 14 |
| 2 | II | Trigonometry | CO2 | 16 | 2 | 6 | 6 | 14 |
| 3 | III | StraightLine | CO3 | 6 | 2 | 2 | 4 | 8 |
| 4 | IV | DifferentialCalculus | CO4 | 16 | 2 | 8 | 10 | 20 |
| 5 | V | Statistics | CO5 | 10 | 2 | 6 | 6 | 14 |
| **Grand Total** | | | | **60** | **10** | **28** | **32** | **70** |

## IX. ASSESSMENT METHODOLOGIES/TOOLS

| Formative assessment (Assessment for Learning) | Summative Assessment (Assessment of Learning) |
|---|---|
| 1. Tests | 1. End Term Exam |

## X. SUGGESTED COS- POS MATRIX FORM

| Course Outcomes (COs) | Programme Outcomes (POs) | | | | | | | Programme Specific Outcomes*(PSOs) | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | PO-1 Basic and Discipline-Specific Knowledge | PO-2 Problem Analysis | PO-3 Design/ Development of Solutions | PO-4 Engineering Tools | PO-5 Engineering Practices for Society, Sustainability and Environment | PO-6 Project Management | PO-7 Life Long Learning | PSO-1 | PSO-2 | PSO-3 |
| **CO1** | 3 | 1 | - | 1 | - | 1 | 1 | | | |
| **CO2** | 3 | 1 | - | - | 1 | 1 | 1 | | | |
| **CO3** | 3 | - | - | - | - | - | - | | | |
| **CO4** | 3 | 1 | 1 | 1 | - | 1 | - | | | |
| **CO5** | 3 | 2 | 1 | 1 | 1 | 1 | 1 | | | |

**Legends:-High:03, Medium:02, Low:01, No Mapping:-**
*PSOs are to be formulated at the institute level.

## XI. SUGGESTED LEARNING MATERIALS/BOOKS

| Sr. No | Author | Title | Publisher |
|---|---|---|---|
| 1 | Grewal B.S. | Higher Engineering Mathematics | Khanna publication New Delhi, 2013 ISBN: 8174091955 |
| 2 | Dutta D. | A textbook of Engineering Mathematics | New Age publication New Delhi,2006 ISBN: 978-81-224-1689-3 |
| 3 | Kreysizg, Ervin | Advance Engineering Mathematics | Wiley publication New Delhi 2016 ISBN:978-81-265-5423-2 |
| 4 | Das H. K. | Advance Engineering Mathematics | S Chand publication New Delhi 2008 ISBN: 9788121903455 |
| 5 | Marvin L. Bittinger David J. Ellenbogen Scott A. Surgent | Calculus and Its Applications | Addison-Wesley 10th Edition ISBN-13:978-0-321-69433-1 |

| Sr. No | Author | Title | Publisher |
|---|---|---|---|
| 6 | C. S. Seshadri | Studies in the History of Indian Mathematics | Hindustan Book Agency, New Delhi110016. ISBN978-93-80250-06-9 |
| 7 | George Gheverghese Joseph | Indian Mathematics Engaging with the World from Ancientto ModernTimes | World Scientific Publishing Europe Ltd. 57 ISBN 978-17-86340-61-0 |
| 8 | Deepak Singh | Mathematics-I | Khanna Book Publishing Co.(P) Ltd. ISBN: 978-93-91505-42-4 |
| 9 | Garima Singh | Mathematics-II | Khanna Book Publishing Co.(P) Ltd. ISBN: 978-93-91505-52-3 |
| 10 | Gareth James, Daniela Witten, Trevor Hastie Robert and Tibshirani | An Introduction to Statistical Learning with Applications in R | Springer New York Heidelberg Dordrecht London ISBN 978-1-4614-7137-0 ISBN978-1-4614-7138-7 (eBook) |
| 11 | Gunakar Muley | Sansar Ke Mahan Ganitagya | First Edition,Rajkamal Prakashan, ISBN-10: 8126703571, ISBN-13.978-8126703579 |
| 12 | T. S. Bhanumurthy | A Modern Introduction to Ancient Indian Mathematics | New Age International Private Limited, 1 January 2008 ISBN-10.812242600X, ISBN-13.978-8122426007 |
| 13 | M. P.Trivedi and P.Y.Trivedi | Consider Dimension and Replace Pi | Notion Press;1stedition (2018), ISBN-978-1644291795 |

## XIII. LEARNING WEBSITES & PORTALS

| Sr. No | Link/Portal | Description |
|---|---|---|
| 1. | http://nptel.ac.in/courses/106102064/1 | Online Learning Initiatives by IITs and IISc |
| 2. | www.scilab.org/-SCILab | Signal processing, statistical analysis and image enhancement. |
| 3. | www.mathworks.com/product/matlab/-MATLAB | Applications of concepts of Mathematics to coding. |
| 4. | SpreadsheetApplications | Use of Microsoft Excel, Apple Numbers and Google Sheets. |
| 5. | https://ocw.mit.edu/ | MIT Courseware |
| 6. | https://www.khanacademy.org/math?gclid=CNqHuabCys4CFdOJaddHoPig | Concept of Mathematics through video lectures and notes |
| 7. | http://ocw.abu.edu.ng/courses/mathematics/ | List of Mathematical Courses. |
| 8. | https://libguides.furman.edu/oer/subject/mathematics | Open Education Resources (OER) in Mathematics. |
| 9. | https://phet.colorado.edu/en/simulations/filter?subjects=math&type=html,prototype | Phet Simulation for Mathematics. |
| 10. | https://libguides.cmich.edu/OER/mathematics | Mathematics with OER. |

| Name & Signature: | |
|---|---|
| **Shri. Vitthal B. Shinde**<br>Lecturer in Mathematics | **Shri. Sachin B. Yede**<br>Lecturer in Mathematics |
| **(Course Experts)** | |
| Name & Signature: | Name & Signature: |
| **Shri. S. S. Bharatkar**<br>(Programme Head) | **Shri.S.B.Kulkarni**<br>(CDC In-charge) |

# GOVERNMENT POLYTECHNIC, PUNE

## '120 – NEP' SCHEME

| | |
|---|---|
| PROGRAMME | DIPLOMA IN EE |
| PROGRAMME CODE | 02 |
| COURSE TITLE | ENGINEERING WORKSHOP PRACTICE(EE) |
| COURSE CODE | WS11201 |
| PREREQUISITE COURSE CODE & TITLE | NA |

## I. LEARNING & ASSESSMENT SCHEME

| Course Code | Course Title | Course Type | Learning Scheme | | | | | Credits | Assessment Scheme | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Actual Contact Hrs./Week | | | SLH | NLH | | Paper Duration | | Theory | | | | Based on LL &TSL | | | | Based on SL | | Total Marks |
| | | | | | | | | | | | | | | | Practical | | | | | | |
| | | | CL | TL | LL | | | | | | FA-TH | SA-TH | Total | | FA-PR | | SA-PR | | SLA | | |
| | | | | | | | | | | | Max | Max | Max | Min | Max | Min | Max | Min | Max | Min | |
| WS11202 | ENGINEERING WORKSHOP PRACTICE(EE) | SEC | - | - | 4 | - | 4 | 2 | - | EE | - | - | - | - | 25 | 10 | 25@ | 10 | - | - | 100 |
| | | | | | | | | | | CW | - | - | - | - | 25 | 120 | 25@ | 10 | - | - | |

**Total IKS Hrs for Term:0 Hrs**

**Abbreviations:** CL-Classroom Learning, TL-Tutorial Learning, LL-Laboratory Learning, SLH-Self Learning Hours, NLH-Notional Learning Hours, FA - Formative Assessment, SA -Summative assessment, IKS – Indian Knowledge System, SLA- Self Learning Assessment

**Legends:** @-Internal Assessment, # - External Assessment,*# - Online Examination,@$ - Internal Online Examination

**Note:**

FA-TH represents an average of two class tests of 30 marks each conducted during the semester.

1. If a candidate is not securing minimum passing marks in **FA-PR** (Formative Assessment - Practical) of any course, then the candidate shall be declared as **'Detained'** in that semester.
2. If a candidate does not secure minimum passing marks in SLA (Self Learning Assessment) of any course, then the candidate shall be declared as **'fail'** and will have to repeat and resubmit SLA work.
3. **Notional learning hours** for the semester are **(CL + LL + TL + SL) hrs. * 15 Weeks**
4. **1 credit** is equivalent to **30 Notional hours**.
5. * Self-learning hours shall not be reflected in the Timetable.
6. *Self-learning includes micro-projects/assignments/other activities.
7. Candidate is detained in any one part of Engineering Workshop Practice course i.e. Central Workshop ,Electrical workshop will be declared as Detained in Engineering Workshop Practice course.
8. Candidate remaining absent in practical examination of any one part of Engineering Workshop Practice course i.e. Central Workshop ,Civil workshop will be declare as Absent in Mark List and has to appear for examination. The marks of the part for which candidate was present will not be processed or carried forward.

## II. RATIONALE:

Workshop Practice is a basic engineering course. The knowledge of basic shops like wood working, fitting, welding, plumbing and sheet metal shop is essential for technician to perform his/her duties in industries. Students are able to perform various operations using hand tool equipment and machineries in various shops. Working in workshop develops the attitude of group working and safety awareness. This course provides industrial environment in the educational institute.

## III. COURSE-LEVELLEARNINGOUTCOMES(CO'S)

Students will be able to achieve & demonstrate the following CO's on completion of course-based learning

CO1: Use of firefighting tools and equipment & understand the IE Rules for Electrical Safety.
CO2: Prepare various Electrical wiring
CO3: Troubleshooting of various Electrical domestic appliances
CO4: Perform various operations using plumbing tools
CO5: Prepare various welding joints.
CO6: Produce simple job using different sheet metal operations.

## IV. THEORYLEARNINGOUTCOMESANDALIGNEDCOURSECONTENT

| Sr. No | Theory Learning Outcomes(TLO'S) alignedtoCO's. | Learningcontentmappedwith TLO's. | Suggested Learning Pedagogics | Relevant COs |
|---|---|---|---|---|
| | **ELECTRICAL ENGINEERING WORKSHOP** | | | |
| | **UNIT-I ELECTRICAL WORKSHOP PRACTICE (CL Hrs-NIL, Marks-NIL)** | | | |
| 1. | TLO 1.1 Follow safety practices<br>TLO 1.2 Explain the different types of fire extinguisher and their uses.<br>TLO 1.3 Use firefighting equipment | 1.1 Safety Practices, Causes of accidents, General safety rules, Safety signs and symbols<br>1.2 First Aid<br>1.3 Fire, Causes of Fire, Basic ways of extinguishing the fire, Classification of fire, Class A, B, C, D, Firefighting equipment, fire extinguishers, and their types. | Demonstration Collaborative learning Role Play | CO1 |
| | **UNIT-II ELECTRICAL WIRING (CL Hrs-NIL, Marks-NIL)** | | | |
| 2 | TLO 2.1 Identify tools for Fabrication.<br>TLO 2.2 Explain operation of Fabrication of Switchboard.<br>TLO 2.3 Installation of various Wiring.<br>TLO 2.4 How to measure Resistance, Current, Voltage & Continuity of given circuit.<br>TLO 2.5 Perform the practical for understanding Result of Open, Short & Continuity circuit test.<br>TLO 2.6 Perform the practical for understanding Operate Fuse, Relay & MCB | 2.1 Study of Fabrication of switch board<br>2.2 Study of various wiring systems<br>2.3 Study of Multimeter<br>2.4 Study of House wiring, Staircase wiring & Godown wiring.<br>2.5 Study of Open circuit, short circuit & Earthing concepts<br>2.6 Study the Operation of Fuse, Relay & MCB | Demonstration Collaborative learning Role Play | CO2 |

| Sr. No | Theory Learning Outcomes (TLO'S) alignedtoCO's. | Learning content mapped with TLO's. | Suggested Learning Pedagogies | Relevant COs |
|---|---|---|---|---|
| | **UNIT-III STUDY THE PRINCIPLES, WORKING & TROUBLESHOOTING OF DOMESTIC APPLIANCES (CL Hrs-NIL, Marks-NIL)** | | | |
| 3 | TLO 3.1 Explain operation of Electrical Domestic Appliances<br>TLO 3.2 Tools used for Electrical Domestic Appliances<br>TLO 3.3 Test the Electrical Domestic Appliances. | 3.1 Study of Principle & Working of Home appliances such as automatic electric iron, immersion water heater, Geyser, food processor (mixer), Microwave, fridge, A.C. with their specifications<br>3.2 Study the procedure for Troubleshooting of Domestic appliances. | Model & Video Demonstration | CO3 |
| | **CENTRAL WORKSHOP** | | | |
| | **UNIT- IV PLUMBING (CL Hrs-NIL, Marks-NIL)** | | | |
| 4 | TLO 4.1 Identify plumbing tools.<br>TLO 4.2 Explain operation of fitting shop machines.<br>TLO 4.3 Use plumbing tools<br>TLO 4.4 Operate machineries.<br>TLO 4.5 Perform plumbing operations<br>TLO 4.6 Maintain tools, equipment and machineries | 4.1 Plumbing hand tools pipe vice, pipe bending equipment, pipe wrenches, dies and their Specifications<br>4.2 Pipe fittings- bends, elbows, tees, cross, coupler, socket, reducer, cap, plug, nipple, and their Specifications<br>4.3 Operation of Machineries in plumbing shops- pipe bending machine their specifications and maintenance. Basic process cutting, threading. | Model Demonstration | CO4 |
| | **UNIT –V METAL JOINTING (CL Hrs-NIL, Marks-NIL)** | | | |
| 5 | TLO 5.1 Identify metal joining tools.<br>TLO 5.2 Explain gas and arc welding procedure<br>TLO 5.3 Use metal joining tools.<br>TLO 5.4 Perform welding, soldering, brazing operations<br>TLO 5.5 Maintain tools, equipment, and machineries. | 5.1 Arc welding hand tools- electrode holder, cable connector, cable lugs, chipping hammer, earthing clamp, wire brush and their Specifications<br>5.2 Operation of machineries in welding shops- arc welding transformer their specifications and maintenance.<br>5.3 Welding Electrode, filler rod, fluxes, and solders. | Model Demonstration | CO5 |

| Sr. No | Theory Learning Outcomes (TLO'S) alignedtoCO's. | Learning content mapped with TLO's. | Suggested Learning Pedagogies | Relevant COs |
|---|---|---|---|---|
| | **UNIT –VI SHEET METAL (CL Hrs-NIL, Marks-NIL)** | | | |
| 6 | TLO 6.1 Identify sheet metal tools.<br>TLO 6.2 Explain operation of sheet metal machineries.<br>TLO 6.3 Use sheet metal tools<br>TLO 6.4 Operate sheet metal machineries.<br>TLO 6.5 Perform bending operations Maintain tools, equipment, and machineries. | 6.1 Sheet metal hand tools snip, shears sheet gauge, straight edge, L square, scriber, divider, trammel, punches, pliers, stakes, groovers, limit set and their Specifications<br>6.2 Operation of machineries in sheet metal shops- sheet cutting and bending machine their specifications and maintenance. Basic process- marking, bending, folding, edging, seaming, staking, riveting. | Demonstration | CO6 |

## V. LABORATORYLEARNINGOUTCOMEANDALIGNEDPRACTICAL/TUTORIALEXPERIENCES.

| Sr. No | Practical/Tutorial/LaboratoryLearningOutcome(LLO) | Laboratory Experiment / Practical Titles /TutorialTitles | Number of hrs. | RelevantCOs |
|---|---|---|---|---|
| 1 | LLO 1.1 Use fire extinguisher | Identify fire extinguisher according to their specification | 2 | CO1 |
| 2 | LLO 2.1 Operate fire extinguisher | Perform mock drill session in group of minimum 10 students for extinguishing fire. | 2 | CO1 |
| 3 | LLO 3.1 Identify different tools used in workshop. | Identify different tools used in workshop. | 2 | CO1 |
| 4 | LLO 4.1 Use of Internet/ Books & Collect the Related Information for study | Study of general safety precautions, IE Rules and Various tools required for electrical wiring and electrical work | 2 | CO1 |
| 5 | LLO 5.1 Use of Internet/ Books & Collect the Related Information for study.<br>LLO 5.2 Understand the use of Different electrical safety devices from videos. | Study of electrical safety devices such as Hand-gloves, gumboot, insulating mats, line tester, arms panel, life safety materials with their specifications and testing as per IS code of practice | 2 | CO1 |
| 6 | LLO 6.1 Understand the Fabrication of switch board from Demonstration & videos. | Fabrication of switch board with one socket, one fan regulator and four switches along with indicator and fuse. | 2 | CO2 |
| 7 | LLO 7.1 Demonstration & videos of various wiring systems. | Perform the various wiring systems. | 2 | CO2 |
| 8 | LLO 8.1 Demonstration & videos of Staircase wiring & Godown wiring. | Perform the Staircase wiring & Godown wiring. | 2 | CO2 |
| 9 | LLO 9.1 Demonstration & videos of Dismantling, Assembling & Troubleshooting of Home appliances | Dismantling, Assembling & Troubleshooting of Home appliances such as automatic electric iron, immersion water heater, Geyser, food processor (mixer), Microwave, fridge, A.C. with their specifications | 2 | CO3 |

## VII. LABORATORYEQUIPMENT/INSTRUMENTS/TOOLS/SOFTWAREREQUIRED

| Sr.No | Equipment Name with Broad Specifications | Relevant LLO Number |
|---|---|---|
| 1 | Fire buckets of standard size. | 1,2 |
| 2 | Fire extinguisher A,B and C types | 1,2 |
| 3 | Bench Drilling machine (up to 13 mm drill cap.) with ½ H.P. Motor, 1000 mm height. | 12,16 |
| 4 | Power Saw machine 350 mm mechanical with 1 HP Motor & all Accessories. | 12,14,16,17 |
| 5 | Bench Grinder 200 mm Grinding Disc diameter 200 mm. with 25 mm. bore 32 mm. with ½ HP/1HP Motor. | 16,17 |
| 6 | Vernier height Gauge 450 mm | 10,11, 12,16, 17 |
| 7 | Surface Plate 600 x 900 mm Grade I | 16,17 |
| 8 | Angle Plate 450 x 450 mm | 16,17 |
| 9 | Welding machine 20 KVA 400A welding current 300A at 50, 100, 200, 250, 300 with std. Accessories and Welding Cable 400 amp. ISI with holder | 14,16, 17 |
| 10 | Pipe Bending Machine | 11,12 |
| 11 | Pipe Vice – 100 mm | 11,12 |
| 12 | Pipe Cutter- 50 mm | 11,12 |
| 13 | Bench Vice 100 mm | 11,12 |
| 14 | Portable Hammer Drill Machine 0-13 mm A.C. 230 V, 2.5Amp, Pistol type, having different types of bits | 14,16,17 |
| 15 | Sheet Bending Machine | 17 |
| 16 | Sheet Cutting Machine | 17 |
| 17 | Brazing Equipment | 17 |
| 18 | Fitting tools - hammers, chisels, files, hacksaw, surface plate, punch, v block, angle plate, try square, marking block, steel rule, twist drills, reamers, tap set, die set. | 16,17 |
| 19 | Plumbing tools- pipe vice, pipe bending equipment, pipe wrenches, dies. | 11,12 |

| Sr. No. | Practical/Tutorial/Laboratory Learning Outcome (LLO) | Laboratory Experiment/Practical Titles/Tutorial Titles | No. of Hrs. | Relevant COs |
|---|---|---|---|---|
| 10 | LLO 10.1 Collect information about ancient tools for understanding Indian Knowledge. | Draw sketches of various ancient tools | 2 | CO04,CO5, CO6 |
| 11 | LLO 11.1 Select proper plumbing tools<br>LLO 11.2 Use plumbing operations for preparing plumbing joints | Prepare T joint pipe fitting job as per given drawing (individually) | 2 | CO4 |
| 12 | LLO 12.1 Select proper plumbing tools<br>LLO 12.2 Use plumbing operations for preparing plumbing joints | Prepare elbow joint pipe fitting job as per given drawing(individually) | 2 | CO4 |
| 13 | LLO 13.1 Develop list of different components as per the specification | Prepare bill of material for given pipeline layout (individually) | 2 | CO4 |
| 14 | LLO 14.1 Obey safety rules employed in welding shop. | Practice different safety rules in welding shop as per given instruction. | 2 | CO5 |
| 15 | LLO 15.1 Develop list of different components as per the specification for welding job | Prepare bill of material for given Welding Job (individually) | 2 | CO5 |
| 16 | LLO 16.1 Assemble utility jobs using different manufacturing processes. | Prepare utility job (like stool, benches, tables, or similar jobs) involving arc welding and artificial wood as per given drawing (in group of 4 to 5 students) Fabrication operation involve measuring, marking, cutting, edge preparation, welding | 2 | CO5 |
| 17 | LLO 17.1 Select proper sheet metal tools<br>LLO 17.2 Prepare sheet metal component using different operations. | Prepare sheet metal utility job using following operations<br>a. Cutting and Bending<br>b. Edging<br>c. End curling<br>d. Lancing<br>e. Soldering<br>f. Riveting | 2 | CO6 |
| 18 | LLO 18.1 Develop list of different components as per the specification | Prepare bill of material for given Sheet Metal work (individually) | 2 | CO6 |

## VI. SUGGESTEDMICROPROJECT/ASSIGNMENT/ACTIVITIESFORSPECIFICLEARNING/SKILLS DEVELOPMENT(SELF-LEARNING)

**Microproject**

NOT APPLICABLE

**Assignment**

NOT APPLICABLE

## VIII. SUGGESTED FOR WEIGHTAGE TO LEARNING EFFORTS & ASSESSMENT PURPOSE (Specification Table)

NOT APPLICABLE

## IX. ASSESSMENT METHODOLOGIES / TOOLS

| Formative assessment (Assessmentfor Learning) | Summative Assessment (Assessmentof Learning) |
|---|---|
| Assignment and Terms work | Lab performance |

## X. SUGGESTED $CO_S$- $PO_S$ MATRIX FORM

NOT APPLICABLE

## XI. SUGGESTED LEARNIN

## XII.

## XIII. G MATERIALS / BOOKS

| Sr.No | Author | Title | Publisher |
|---|---|---|---|
| 1 | Bawa, H.S. | Workshop Practice | McGraw Hill Education, Noida; ISBN-10: 0070671192 ISBN-13: 978- 0070671195 |
| 2 | Gupta, J.K.; Khurmi, R.S. | A Textbook of Manufacturing Process (Workshop Tech.) | S.Chand and Co. New Delhi ISBN:81-219-3092-8 |
| 3 | Hegde, R.K. | Workshop Practice Manual For Engineering Diploma & ITI Students | Sapna Book House, 2012, ISBN:13: 9798128005830 |
| 4 | Singh, Rajender | Introduction to Basic Manufacturing Process & Workshop Technology | New Age International, New Delhi; 2014, ISBN: 978-81-224-3070-7 |
| 5 | Hajra; Choudhary | Elements of Workshop Technology | Media Promoters and Publishers Mumbai, 2009, ISBN: 10-8185099146 |
| 6 | Sarathe, A.K | Engineering Workshop Practice | Khanna Book Publishing CO(P) LTD, New Delhi, ISBN No. 978-93-91505- 51-6 |

## XIII. LEARNING WEBSITES & PORTALS

| Sr.No | Link/Portal | Description |
|---|---|---|
| 1. | http://www.asnu.com.au | Basic engineering tools. |
| 2. | http://www.abmtools.com/downloads/Woodworking%20Carpentry%20Tools.pdf | Wood working |
| 3. | http://www.weldingtechnology.org | Welding techniques |
| 4. | http://www.newagepublishers.com/samplechapter/001469.pdf | Basic engineering tools. |
| 5. | http://www.youtube.com/watch?v=TeBX6cKKHWY | Welding techniques |

| Sr.No | Link/Portal | Description |
|---|---|---|
| 6. | http://www.youtube.com/watch?v=QHF0sNHnttw&feature=related | Welding techniques |
| 7. | http://www.youtube.com/watch?v=Kv1zo9CAxt4&feature=relmfu | Wood working |
| 8. | http://www.piehtoolco.com | Basic engineering tools. |
| 9. | http://sourcing.indiamart.com/engineering/articles/materials-used-hand-tools/ | Basic engineering tools. |
| 10. | https://www.youtube.com/watch?v=9_cnkaAbtCM | Basic engineering tools. |

**Name & Signature:**

12/10/2023

**Mr. P.U. Garge**
Lecturer in Mechanical Engineering &
I/C Workshop Superitendent

**Mr. Makarand L. Bhagwat**
Lecturer in Electrical Engineering

**(Course Experts)**

Name & Signature:

**Dr. S. S. Bharatkar**
(Programme Head)

Name & Signature:

**Shri. S.B. Kulkarni**
(CDC In-charge)

# GOVERNMENT POLYTECHNIC, PUNE

## '120 – NEP' SCHEME

| | |
|---|---|
| PROGRAMME | DIPLOMA IN CE/EE/ET/ME/MT/CM/IT/DDGM |
| PROGRAMME CODE | 01/02/03/04/05/06/07/08 |
| COURSE TITLE | FUNDAMENTALS OF ICT |
| COURSE CODE | CM21201 |
| PREREQUISITE COURSE CODE & TITLE | NA |

## I. LEARNING & ASSESSMENT SCHEME

| Course Code | Course Title | Course Type | Learning Scheme | | | | | Credits | Assessment Scheme | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Actual Contact Hrs./Week | | | SLH | NLH | | Paper Duration | Theory | | | | Based on LL & TSL | | | | Based on SL | | Total Marks |
| | | | | | | | | | | | | | | Practical | | | | | | |
| | | | CL | TL | LL | | | | | FA-TH | SA-TH | Total | | FA-PR | | SA-PR | | SLA | | |
| | | | | | | | | | | Max | Max | Max | Min | Max | Min | Max | Min | Max | Min | |
| CM21201 | FUNDAMENTALS OF ICT | SEC | 1 | - | 2 | 1 | 4 | 2 | -- | -- | -- | -- | -- | 25 | 10 | 25@ | 10 | 25 | 10 | 75 |

**Total IKS Hrs for Term: 0 Hrs**

**Abbreviations:** CL-Classroom Learning, TL-Tutorial Learning, LL-Laboratory Learning, SLH-Self Learning Hours, NLH-Notional Learning Hours, FA - Formative Assessment, SA -Summative assessment, IKS – Indian Knowledge System, SLA- Self Learning Assessment

**Legends:** @-Internal Assessment, # - External Assessment,*# - Online Examination,@$ - Internal Online Examination

**Note:**

**FA-TH** represents an average of two class tests of 30 marks each conducted during the semester.

1. If a candidate is not securing minimum passing marks in **FA-PR** (Formative Assessment - Practical) of any course, then the candidate shall be declared as **'Detained'** in that semester.
2. If a candidate does not secure minimum passing marks in SLA (Self Learning Assessment) of any course, then the candidate shall be declared as **'fail'** and will have to repeat and resubmit SLA work.
3. **Notional learning hours** for the semester are **(CL + LL + TL + SL) hrs. * 15 Weeks**
4. **1 credit** is equivalent to **30 Notional hours.**
5. * Self-learning hours shall not be reflected in the Timetable.
6. * Self-learning includes micro-projects/assignments/other activities.

## II. RATIONALE:

In any typical business set up to carry out routine tasks related to creating business documents, performing data analysis and its graphical representations and making electronic slide show presentations, the student needs to learn various software such 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 this course is to develop the basic competency in students for using these office automation tools to accomplish the job. This course also presents an overview of emerging technologies so that students of different disciplines can appraise the applications of these technologies in their respective domains.

## III. COURSE-LEVEL LEARNING OUTCOMES (CO'S)

Students will be able to achieve & demonstrate the following CO's on completion of course-based learning

CO1: Use a computer system and its peripherals for a given purpose.
CO2: Prepare Business documents using a Word Processing Tool.
CO3: Analyze Data and represent it graphically using Spreadsheet.
CO4: Prepare professional Slide Show presentations.
CO5: Explain the concept and application of emerging technology.

## IV. THEORY LEARNING OUTCOMES AND ALIGNED COURSE CONTENT

| Sr. No | Theory Learning Outcomes (TLO'S) aligned to CO's. | Learning content mapped with TLO's. | Suggested Learning Pedagogies | Relevant COs |
|---|---|---|---|---|
| | **UNIT-I INTRODUCTION TO COMPUTER SYSTEM (CL Hrs-2, Marks-NIL )** | | | |
| 1. | **TLO 1.1** Explain the functions of components in the block diagram of the computer system.<br>**TLO 1.2** Classify the given type of software.<br>**TLO 1.3** Explain the characteristics of the given type of network.<br>**TLO 1.4** Describe the application of the given type of network connecting device.<br>**TLO 1.5** Describe the procedure to manage a file /folder in the given way. | **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, and printers: Dot matrix, Inkjet and LaserJet, plotter and scanner, external storage devices CD/DVD, Hard disk and pen drive.<br>**1.4 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, and device drivers.<br>**1.5 Network environments:** network interface cards, hubs, switches, routers and modems, the concept of LAN, MAN, WAN, WLAN, Wi-Fi and Bluetooth.<br>**1.6 Working with Operating Systems:** Creating and managing files and folders, Copying a file, renaming and deleting files and folders, Searching files and folders, application installation, and creating shortcuts of applications on the desktop. | Hands-on<br>Demonstration<br>Presentations | **CO1** |

| Sr. No | Theory Learning Outcomes (TLO'S) aligned to CO's. | Learning content mapped with TLO's. | Suggested Learning Pedagogies | Relevant COs |
|---|---|---|---|---|
| | | **UNIT-II WORD PROCESSING (CL Hrs-3, Marks-NIL )** | | |
| 2 | **TLO 2.1** Write the steps to create the given text document.<br>**TLO 2.2** Explain the given feature for document editing.<br>**TLO 2.3** Explain the given page setup features of a document.<br>**TLO 2.4** Write the given table formatting feature.<br>**TLO 2.5** Write the steps to set the given type of document layout | **2.1 Word Processing:** Overview of Word processor Basics of Font type, size, colour, Effects like Bold, italic, underline, Subscript and superscript, Case changing options, Previewing a document, Saving a document, Closing a document and exiting the 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.<br>**2.3 Changing the Layout of a Document:** Adjust page margins, Change page orientation, Create headers and footers, Set and change indentations, and 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, and 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 page.<br>**2.6 Working with Columned Layouts and Section Breaks:** Columns, Section breaks, Creating columns, Newsletter style columns, changing part of a document layout or formatting, Remove section breaks, Adding columns to the remainder of a document, Column widths. | Hands-on Demonstration Presentations | **CO2** |
| | | **UNIT-III SPREADSHEETS (CL Hrs-03, Marks-NIL)** | | |
| 3 | **TLO 3.1** Write the steps to create the given spreadsheet.<br>**TLO 3.2** Explain the given formatting feature of a worksheet.<br>**TLO 3.3** Write steps to insert formulas and functions in the given worksheet.<br>**TLO 3.4** Write steps to create charts for the given data set. | **3.1 Working with Spreadsheets:** Overview of workbook and worksheet, Create Worksheet Entering sample data, Save, Copy Worksheet, Delete Worksheet, Close and open 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<br>**3.3 Formatting Cells and sheet:** Setting Cell Type, Setting Fonts, Text options, rotating cells, Setting Colors, Text Alignments, Merge and Wrap, applying Borders and Shades, Sheet Options, Adjust Margins, | Hands-on Demonstration Presentations | **CO3** |

| | | | | |
|---|---|---|---|---|
| | **TLO 3.5** Explain steps to perform data filter, sort and validation operations on the given data set.<br>**TLO 3.6** Write steps to set up and print a spreadsheet. | Page Orientation, Header and Footer, Insert Page Breaks.<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, and power, applying conditions using IF.<br>**3.5 Working with Charts:** Introduction to charts, an overview of different types of charts, Bar, Pie, and Line charts, creating and editing charts. Use chart options: chart title, axis title, legend, data labels, Axes, grid lines, and moving chart in a separate sheet.<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. | | |
| | **UNIT- IV PRESENTATION TOOL (CL Hrs-04, Marks-NIL)** | | | |
| 4 | **TLO 4.1:** Write the steps to create the given slide presentation.<br>**TLO 4.2:** Write the steps to insert multiple media in the given presentation.<br>**TLO 4.3:**Explain the method of including animation, and transition effects in a slide show.<br>**TLO 4.4:**Write steps to apply table features in the given presentation<br>**TLO 4.5:** Write steps to manage charts in the given presentation. | **4.1 Creating a Presentation:** Outline an effective presentation, identify the elements of the User Interface, Create New Presentation Files, Create a Basic Presentation, Work with textboxes, Apply Character Formats, and Format Paragraphs.<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.<br>**4.3 Working with Tables:** Insert a Table in a Slide, Format Tables, and Import Tables from Other Office Applications.<br>**4.4 Working with Charts:** Insert Charts in a Slide, Modify a Chart, and Import Charts from Other Office Applications. | Hands-on<br>Demonstration<br>Presentations | **CO4** |

| Sr. No | Theory Learning Outcomes (TLO'S) aligned to CO's. | Learning content mapped with TLO's. | Suggested Learning Pedagogies | Relevant COs |
|---|---|---|---|---|
| UNIT –V BASICS OF INTERNET AND EMERGING TECHNOLOGIES (CL Hrs-04, Marks-NIL) | | | | |
| 5 | **TLO 5.1** Explain the use of the given setting option in browsers.<br>**TLO 5.2** Explain the given option used for effective searching in search engine<br>**TLO 5.3** Explain the features of the given web service.<br>**TLO 5.4** Explain concepts and applications of emerging technologies<br>**TLO 5.5** Use various elementary cloud-based tools | **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.<br>**5.2 Web Services:** e-Mail, Chat, Video Conferencing, e-learning, e-shopping, e-Reservation, e-Groups, Social Networking.<br>**5.3 Emerging Technologies:** IoT, AI and ML, Drone Technologies,3D Printing.<br>**5.4 Tools:** Docs, Drive, forms, quiz, Translate and other Apps. | Hands-on Demonstration Presentations | **CO5** |

## V. LABORATORY LEARNING OUTCOME AND ALIGNED PRACTICAL/ TUTORIAL EXPERIENCES.

| Sr. No | Practical/Tutorial/Laboratory Learning Outcome (LLO) | Laboratory Experiment / Practical Titles /Tutorial Titles | Number of hrs. | Relevant COs |
|---|---|---|---|---|
| 1 | LLO 1.1 Identify various Input/output devices, connections and peripherals of the computer system.<br>LLO 1.2 Work with Computer systems, Input/output devices, and peripherals to manage files and folders for data storage. | a) Work with Computer Systems, Input/output devices, and peripherals.<br>b) Work with files and folders | 2 | CO1 |
| 2 | LLO 2.1 Create and manage Word document.<br>LLO 2.2 Apply formatting features on text at line, paragraph and page level. | Work with document files:<br>a) Create, edit and save documents in Word Processing.<br>b) Text, lines and paragraph-level formatting | 2 | CO2 |
| 3 | LLO 3.1 Insert and edit images, and shapes in a document file. | Work with Images and Shapes in Word Processing. | 2 | CO2 |
| 4 | LLO 4.1 Insert table and apply various table formatting features on it. | Work with tables in Word Processing. | 2 | CO2 |
| 5 | LLO 5.1 Apply page layout features in word processing.<br>LLO 5.2 Print a document by applying various print options<br>LLO 5.3 Use mail merge in word processing | Working with layout and printing a) Document page layout, Themes, and printing. b) Use of mail merge with options. | 2 | CO2 |

| Sr. No | Practical/Tutorial/Laboratory Learning Outcome (LLO) | Laboratory Experiment / Practical Titles /Tutorial Titles | Number of hrs. | Relevant COs |
|---|---|---|---|---|
| 6 | LLO 6.1 Enter and format data in a worksheet.<br>LLO 6.2 Insert and delete cells, rows and columns<br>LLO 6.3 Apply alignment feature on cell | Create, open and edit Worksheet. | 2 | CO3 |
| 7 | LLO 7.1 Create formula and "If" condition on cell data<br>LLO 7.2 Apply various functions and named ranges in the worksheet. | Formulas and functions in Worksheet. | 2 | CO3 |
| 8 | LLO 8.1 Implement data Sorting, Filtering and Data validation features in a worksheet. | Sort, Filter and validate data in Spreadsheet. | 2 | CO3 |
| 9 | LLO 9.1 Create charts using various chart options in a spreadsheet. | Charts for Visual Presentation in Spreadsheet. | 2 | CO3 |
| 10 | LLO 10.1 Print the worksheet by applying various print options for the worksheet | Worksheet Printing. | 2 | CO3 |
| 11 | LLO 11.1 Apply design themes to the given presentation.<br>LLO 11.2 Insert pictures text/images/shapes in slide<br>LLO 11.3 Use pictures text/images/shapes editing options. | Make Slide Show Presentation. | 2 | CO4 |
| 12 | LLO 12.1 Add tables and charts in the slides.<br>LLO 12.2 Run slide presentation in different modes<br>LLO 12.3 Print slide presentation as handouts/notes | Use Tables and Charts in Slide | 2 | CO4 |
| 13 | LLO 13.1 Apply animation effects to the text and slides<br>LLO 13.2 Add/set audio and video files in the presentation. | a) Insert Animation effects into Text and Slides. b) Insert Audio and Video files in the presentation | 2 | CO4 |
| 14 | LLO 14.1 Configure internet connection on a computer system<br>LLO 14.2 Use different web services on the internet | a) Internet connection configuration<br>b) Use Internet and Web Services. | 1 | CO5 |
| 15 | LLO 15.1 Configure different browser settings<br>LLO 15.2 Use browsers for the given purpose | Working with Browsers. | 1 | CO5 |
| 16 | LLO 16.1 Create web forms for surveys using different options. | Prepare Web Forms for Survey. | 1 | CO5 |
| 17 | LLO 17.1 Create web forms for Quiz using different options | Prepare Web Forms for Quiz | 1 | CO5 |

## VI. SUGGESTED MICRO PROJECT/ASSIGNMENT/ACTIVITIES FOR SPECIFIC LEARNING/SKILLS DEVELOPMENT (SELF-LEARNING)

**Self-Learning**

Following are some suggestive self-learning topics:

1) Use ChatGPT/any other AI tool to explore information.
2) Use Calendar to Schedule and edit activities.
3) Use the Translate app to translate the given content from one language to another.
4) Use a cloud-based storage drive to store and share your files.

**Micro project**

The micro project has to be industry application-based, internet-based, workshop-based, laboratory-based or field-based as suggested by the Teacher.

1) Perform a survey on various inputs and output devices available in the market and make its report.
2) Prepare a table, Prepare Notes on Technical Topics, Reports, and Bio data with a cover letter (The subject teacher shall assign a document to be prepared by each student)
3) Prepare slides with all Presentation features such as classroom presentation, presentation about the department, and presentation of Technical Topics. (The subject teacher shall assign a presentation to be prepared by each student).
4) Student Mark sheet, Prepare Pay bills, tax statements, and student assessment records using a spreadsheet. (The teacher shall assign a spreadsheet to be prepared by each student).
5) Carry out Surveys on different web browsers.
6) Generate resumes for different job profiles, and survey reports of any industry using ChatGPT/any other AI tool.

**Assignment**

Prepare a journal of practicals performed in the laboratory.

## VII. LABORATORY EQUIPMENT/INSTRUMENTS/TOOLS/SOFTWARE REQUIRED

| Sr. No | Equipment Name with Broad Specifications | Relevant LLO Number |
|---|---|---|
| 1 | a) Computer System with all necessary Peripherals and Internet connectivity. b) Any Office Software c) Any Browser (Any General Purpose Computer available in the Institute ) | ALL |

## VIII. SUGGESTED FOR WEIGHTAGE TO LEARNING EFFORTS & ASSESSMENT PURPOSE (Specification Table)

| Sr. No | Unit | Unit Title | Aligned COs | Learning Hours | R-Level | U-Level | A-Level | Total Marks |
|---|---|---|---|---|---|---|---|---|
| 1 | I | Introduction to Computer System | CO1 | 2 | -- | -- | -- | -- |
| 2 | II | Word Processing | CO2 | 3 | -- | -- | -- | -- |
| 3 | III | Spreadsheets | CO3 | 3 | -- | -- | -- | -- |
| 4 | IV | Presentation Tool | CO4 | 4 | -- | -- | -- | -- |
| 5 | V | Basics of Internet and Emerging Technologies | CO5 | 3 | -- | -- | -- | -- |
| | | Grand Total | | 15 | -- | -- | -- | -- |

## IX. ASSESSMENT METHODOLOGIES/TOOLS

| Formative assessment (Assessment for Learning) | Summative Assessment (Assessment of Learning) |
|---|---|
| Lab performance, Assignment, Self-learning and Seminar/Presentation | Lab. Performance, viva voce |

## X. SUGGESTED COS- POS MATRIX FORM

| Course Outcomes (COs) | Programme Outcomes(POs) | | | | | | | Programme Specific Outcomes *(PSOs) | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | PO-1 Basic and Discipline-Specific Knowledge | PO-2 Problem Analysis | PO-3 Design/ Development of Solutions | PO-4 Engineering Tools | PO-5 Engineering Practices for Society, Sustainability and Environment | PO-6 Project Management | PO-7 Life Long Learning | PSO-1 | PSO-2 | PSO-3 |
| CO1 | 1 | - | - | - | - | - | 1 | 2 | - | - |
| CO2 | - | - | - | 3 | - | - | 1 | - | - | 1 |
| CO3 | - | 2 | 1 | 3 | - | - | 1 | - | 3 | 1 |
| CO4 | - | - | - | 3 | - | - | 1 | - | - | 1 |
| CO5 | 1 | - | - | 3 | - | - | 3 | 2 | - | 1 |

**Legends:- High:03, Medium:02, Low:01, No Mapping: -**
*PSOs are to be formulated at the institute level

## XI. SUGGESTED LEARNING MATERIALS/BOOKS

| Sr. No | Author | Title | Publisher |
|---|---|---|---|
| 1 | Goel, Anita | Computer Fundamentals | Pearson Education, New Delhi, 2014, ISBN-13: 978-8131733097 |
| 2 | Miller, Michael | Computer Basics Absolute Beginner's Guide, Windows 10 | QUE Publishing; 8th edition August 2015, ISBN: 978-0789754516 |
| 3 | Alvaro, Felix | Linux: Easy Linux for Beginners | Create Space Independent Publishing Platform- 2016, ISBN-13: 978-1533683731 |
| 4 | Johnson, Steve | Microsoft Office 2010: On Demand | Pearson Education, New Delhi India, 2010. ISBN:9788131770641 |
| **Sr. No** | **Author** | **Title** | **Publisher** |
| 5 | Schwartz, Steve | Microsoft Office 2010 for Windows: Visual Quick Start | Pearson Education, New Delhi India, 2012, ISBN: 9788131766613 |
| 6 | Leete, Gurdy, Finkelstein Ellen, Mary Leete | OpenOffice.org for Dummies | Wiley Publishing, New Delhi, 2003 ISBN : 978-0764542220 |

## XIII. LEARNING WEBSITES & PORTALS

| Sr. No | Link/Portal | Description |
|---|---|---|
| 1. | https://www.microsoft.com/en-in/learning/office-training.aspx | Office |
| 2. | http://www.tutorialsforopenoffice.org/ | Open Office |

| | | |
|---|---|---|
| 3. | https://s3-ap-southeast-1.amazonaws.com/r4ltue295xy0d/Special_Edition_Using_StarOffice_6_0.pdf | Open Office |
| 4. | https://ashishmodi.weebly.com/uploads/1/8/9/7/18970467/computer_fundamental.pdf | Computer Fundamental |
| 5. | http://www.tutorialsforopenoffice.org/ | Open Office |
| 6. | https://www.tutorialspoint.com/computer_fundamentals/index.htm | Computer Fundamental |
| 7. | https://www.tutorialspoint.com/word/ | Word Processing |
| 8. | https://www.javatpoint.com/ms-word-tutorial | Word Processing |
| 9. | https://support.microsoft.com/en-au/office/word-for-windows-training-7bcd85e6-2c3d-4c3c-a2a5-5ed8847 | Word Processing |
| 10. | https://www.javatpoint.com/excel-tutorial | Spreadsheet |
| 11. | https://support.microsoft.com/en-au/office/excel-video-training-9bc05390-e94c-46af-a5b3-d7c22f6990bb | Spreadsheet |
| 12. | https://www.javatpoint.com/powerpoint-tutorial | Powerpoint Presentation |
| 13. | https://support.microsoft.com/en-au/office/powerpoint-for-windows-training-40e8c930-cb0b-40d8-82c4-b | Powerpoint Presentation |
| 14. | https://www.geeksforgeeks.org/ms-dos-operating-system/ | Operating System |

Name & Signature:

**Mrs. Priyanka L Sonwane**
Lecturer in Information Technology

**Mrs. Aafiya A Shaikh**
Lecturer in ~~Information Technology~~ Computer Engineering

(Course Experts)

| Name & Signature: | Name & Signature: |
|---|---|
| **Dr. S. S. Bharatkar**<br>(Programme Head) | **Shri. S.B. Kulkarni**<br>(CDC In-charge) |

# GOVERNMENT POLYTECHNIC, PUNE

## '120 – NEP' SCHEME

| | |
|---|---|
| PROGRAMME | DIPLOMA IN CE/EE/ET/ME/MT/CM/IT/DDGM |
| PROGRAMME CODE | 01/02/03/04/05/06/07/08 |
| COURSE TITLE | YOGA AND MEDITATION |
| COURSE CODE | HU21201 |
| PREREQUISITE COURSE CODE & TITLE | NA |

## I. LEARNING & ASSESSMENT SCHEME

| Course Code | Course Title | Course Type | Learning Scheme | | | | | Credits | Assessment Scheme | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Actual Contact Hrs./Week | | | SLH | NLH | | Paper Duration | Theory | | | | Based on LL & TSL | | | | Based on SL | | Total Marks |
| | | | | | | | | | | | | | | Practical | | | | | | |
| | | | CL | TL | LL | | | | | FA-TH | SA-TH | Total | | FA-PR | | SA-PR | | SLA | | |
| | | | | | | | | | | Max | Max | Max | Min | Max | Min | Max | Min | Max | Min | |
| HU21201 | YOGA AND MEDITATION | VEC | - | - | 1 | 1 | 2 | 1 | - | - | - | - | - | 25 | 10 | - | - | 25 | 10 | 50 |

**Total IKS Hrs for Term: 1Hr**

**Abbreviations:** **CL**-Classroom Learning, **TL**-Tutorial Learning, **LL**-Laboratory Learning, **SLH**-Self Learning Hours, **NLH**-Notional Learning Hours, **FA** - Formative Assessment, **SA** -Summative assessment, **IKS** – Indian Knowledge System, **SLA**- Self Learning Assessment

**Legends:** **@**-Internal Assessment, **#** - External Assessment,***#** - Online Examination,**@$** - Internal Online Examination

**Note:**

**FA-TH** represents an average of two class tests of 30 marks each conducted during the semester.

1. If a candidate is not securing minimum passing marks in **FA-PR** (Formative Assessment - Practical) of any course, then the candidate shall be declared as **'Detained'** in that semester.
2. If a candidate does not secure minimum passing marks in SLA (Self Learning Assessment) of any course, then the candidate shall be declared as **'fail'** and will have to repeat and resubmit SLA work.
3. **Notional learning hours** for the semester are **(CL + LL + TL + SL) hrs. * 15 Weeks**
4. **1 credit** is equivalent to **30 Notional hours.**
5. * Self-learning hours shall not be reflected in the Timetable.
6. * Self-learning includes micro-projects/assignments/other activities.

## II. RATIONALE:

Diploma Graduate needs a sound body and mind to face the challenging situations in a career as an employee or as an entrepreneur. Yoga and Meditation bring about the holistic development of an individual and equip him with the necessary balance to handle the challenges. The age of polytechnic students is appropriate to get introduced to yoga practice as this will help them in their studies as well as their professional lives. Moreover, Yoga inculcates discipline in all walks of the life of students. Pranayama practice regulates the breathing practices of the student to improve stamina and resilience.

Meditation empowers a student to focus and keep calm to get peace of mind. World Health Organization (WHO) has also emphasized the role of yoga and meditation as stress prevention measures. National Education Policy 2020 highlights the importance of yoga and meditation amongst students of all ages. Therefore, this course for Diploma students is designed for the overall well-being of the student and aims to empower students to adopt and practice "Yoga" in daily life.

## III. COURSE-LEVEL LEARNING OUTCOMES (CO'S)

Students will be able to achieve & demonstrate the following CO's on completion of course-based learning

**CO1** - Practice basic Yoga and Pranayama in daily life to maintain physical and mental fitness.
**CO2** - Practice meditation regularly to improve concentration and better handling of stress and anxiety.
**CO3** - Follow a healthy diet and hygienic practices for maintaining good health.

## IV. THEORY LEARNING OUTCOMES AND ALIGNED COURSE CONTENT

**NOT APPLICABLE**

## V. LABORATORY LEARNING OUTCOME AND ALIGNED PRACTICAL/TUTORIAL EXPERIENCES.

| Sr. No | Practical/Tutorial/Laboratory Learning Outcome (LLO) | Laboratory Experiment / Practical Titles /Tutorial Titles | Number of hrs. | Relevant COs |
|---|---|---|---|---|
| 1 | LLO 1.1 Practice warming up for Yoga. | Introduction:- Presentations on Introduction to Yoga and its History.<br>Lab Exp: 1. Perform warming-up exercises to prepare the body from head to toe for Yoga. | 5 | CO1 |
| 2 | LLO 2.1 Practice Surya Namaskar | Lab Exp: 2. Perform all the postures of Surya Namaskar one by one at a very slow pace, after warm-up.<br>Lab Exp 3. Perform multiple Surya Namaskar ( Starting with three and gradually increasing it to twelve) in one go.<br>Experiments 2 to 4 must be followed by Shavasana for self-relaxation. | 7 | CO1, CO2 |
| 3 | LLO 3.1 Practice basic Asanas | Lab Exp: 4 Perform Sarvangasna, Halasana, Kandharasana (setubandhasana)<br>Lab Exp: 5 Perform Bhujangasana, Naukasana, Mandukasana<br>Lab Exp: 6 Perform Paschimottasana, Baddhakonasana,Bharadwajasana.<br>Lab Exp: 7 Perform Veera Bhadrasana, Vrukshasana, Trikonasana.<br>Follow-up experiments 5 to 7 with Shavasana for self-relaxation | 8 | CO2 |
| 4 | LLO 4.1 Practice basic Pranayama | Lab Exp: 8 Perform Bhastrika, Anulom Vilom Pranayam Kriya<br>Lab Exp: 9 Practice Kapalbhati Pranayam Kriya<br>Lab Exp: 10 Practice Bhramary Pranayam. | 5 | CO3 |

| Sr. No | Practical/Tutorial/Laboratory Learning Outcome (LLO) | Laboratory Experiment / Practical Titles /Tutorial Titles | Number of hrs. | Relevant COs |
|---|---|---|---|---|
| 5 | LLO 5.1 Practice Meditation | Lab Exp: 11 Perform sitting in Dhyan Mudra and meditating.Star with five minutes and slowly increasing to higher durations. The trainer will explain the benefits of Meditation before practice | 5 | CO3 |

**Note :**

1. The start and end of each session can be with appropriate Yoga prayers and chanting of Omkar.
2. Trainers can add similar asanas in practical sessions.
3. Students are to be instructed to practice the experiment performed at least twice a week as part of self learning practices.
4. A live demonstration by the trainer needs to be carried out during practical hours. Yogic Videos can be used as well.

## VI. SUGGESTED MICRO PROJECT/ASSIGNMENT/ACTIVITIES FOR SPECIFIC LEARNING/SKILLS DEVELOPMENT (SELF-LEARNING)

**Micro project**

- Maintain a diary indicating date-wise practice done by the student with a photograph of self in yogic posture.

**Assignment**

- Prepare a Diet and nutrition chart for Self.

**Learning**

- Practice at least thrice a week.
- Read books on different methods to maintain health, and wellness and to enhance mood.
- Watch videos on Yoga Practices.

## VII. LABORATORY EQUIPMENT/INSTRUMENTS/TOOLS/SOFTWARE REQUIRED

| Sr.No | Equipment Name with Broad Specifications | Relevant LLO Number |
|---|---|---|
| 1 | Yoga and Meditation kits : Yoga Mats, Yoga Rollers, Yoga Blocks, Aero Yoga Clothing Blankets, Cloth Straps, Bolsters Wheels | ALL |

## VIII. SUGGESTED FOR WEIGHTAGE TO LEARNING EFFORTS & ASSESSMENT PURPOSE (Specification Table)

NOT APPLICABLE

## IX. ASSESSMENT METHODOLOGIES/TOOLS

| Formative assessment (Assessment for Learning) | Summative Assessment (Assessment of Learning) |
|---|---|
| Lab performance, Self-learning and Terms work | Actual Practical Performance |

## X. SUGGESTED COS- POS MATRIX FORM

| Course Outcomes (COs) | Programme Outcomes(POs) | | | | | | | Programme Specific Outcomes *(PSOs) | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | PO-1 Basic and Discipline-Specific Knowledge | PO-2 Problem Analysis | PO-3 Design/ Development of Solutions | PO-4 Engineering Tools | PO-5 Engineering Practices for Society, Sustainability and Environment | PO-6 Project Management | PO-7 Life Long Learning | PSO-1 | PSO-2 | PSO-3 |
| CO1 | - | - | - | - | 3 | - | - | | | |
| CO2 | - | - | - | - | 3 | - | - | | | |
| CO3 | - | - | - | - | 3 | - | - | | | |
| CO4 | - | - | - | - | 3 | - | - | | | |
| CO5 | - | - | - | - | 3 | - | - | | | |

Legends:- High:03, Medium:02, Low:01, No Mapping: -
*PSOs are to be formulated at the institute level

## XI. SUGGESTED LEARNING MATERIALS/BOOKS

| Sr.No. | Author | Title | Publisher |
|---|---|---|---|
| 1 | Swami Vivekananda | Patanjalis Yoga Sutras | Fingerprint Publishing (2019) ISBN-10 9389567351 |
| 2 | Luisa Ray (Author), Angus Sutherland (Illustrator) | Yoga for Every Body: A beginner's guide to the practice of yoga postures, breathing exercises and meditation. | Vital Life Books (2022) ISBN-13: 9781739737030, ISBN-10: 1739737032 |
| 3 | Swami Saradananda | Mudras for Modern Life: Boost your health, re-energize your life, enhance your yoga and deepen your meditation | Watkins Publishing ISBN: 9781780289984, Edition: 2018 |
| 4 | Martha Davis, Elizabeth Robbins, Matthew McKay, Eshelman MSW | The Relaxation and Stress Reduction Workbook | A New Harbinger Self-Help Workbook (2019) |
| 5 | SWANSON, ANN | Science of Yoga: Understand the Anatomy and Physiology to Perfect Your Practice | Penguin Random House, ISBN 13 9780241341230 |

## XIII. LEARNING WEBSITES & PORTALS

| Sr.No | Link/Portal | Description |
|---|---|---|
| 1. | https://onlinecourses.swayam2.ac.in/aic19_ed28/preview | Introduction to Yoga and Applications of Yoga - Course (swayam2.ac.in) |
| 2. | https://onlinecourses.swa am2.ac.in/aic23 review | Yoga for Creativity |
| 3. | https://onlinecourses.swayam2.ac.in/aic23 ge05/preview | Yoga for concentration |
| 4. | https://onlinecourses.swayam2.ac.in/aic23_ge06/previe w | Yoga for Memory Development |
| 5. | https://onlinecourses.nptel.ac.in/noc21_hs29/preview | Psychology of Stress, Health and Well-being |
| 6. | https://onlinecourses.swayam2.ac.in/nce19_sc04/previe w | Food Nutrition for Healthy Living |

| | |
|---|---|
| Name & Signature:<br><br>**Shri. Sunil P. Date**<br>(Course Expert) | |
| Name & Signature:<br><br>**Dr. S. S.Bharatkar**<br>(Programme Head) | Name & Signature:<br><br>**Shri. S.B. Kulkarni**<br>(CDC In-charge) |