**BASIC MATHEMATICS**                                              **Course Code : 311302**

| | |
|---|---|
| **Programme Name/s** | : Architecture Assistantship/ / Automobile Engineering./ Artificial Intelligence/ Agricultural Engineering/ Artificial Intelligence and Machine Learning/ Automation and Robotics/ Architecture/ / Cloud Computing and Big Data/ Civil Engineering/ Chemical Engineering/ Computer Technology/ Computer Engineering/ Civil & Rural Engineering/ Construction Technology/ Computer Science & Engineering/ Fashion & Clothing Technology/ Digital Electronics/ Data Sciences/ Electrical Engineering/ Electronics & Tele-communication Engg./ Electrical Power System/ Electronics & Communication Engg./ Electronics Engineering/ Food Technology/ Computer Hardware & Maintenance/ Instrumentation & Control/ Industrial Electronics/ Information Technology/ Computer Science & Information Technology/ Instrumentation/ Interior Design & Decoration/ / Interior Design/ / Civil & Environmental Engineering/ Mechanical Engineering/ Mechatronics/ Medical Electronics/ Production Engineering/ Printing Technology/ Polymer Technology/ Computer Science/ Textile Technology/ Electronics & Computer Engg./ Textile Manufactures |
| **Programme Code** | : AA/ AA_ORIG/ AE/ AI/ AL/ AN/ AO/ AT/ AT_ORIG/ BD/ CE/ CH/ CM/ CO/ CR/ CS/ CW/ DC/ DE/ DS/ EE/ EJ/ EP/ ET/ EX/ FC/ HA/ IC/ IE/ IF/ IH/ IS/ IX/ IX_ORIG/ IZ/ IZ_ORIG/ LE/ ME/ MK/ MU/ PG/ PN/ PO/ SE/ TC/ TE/ TX |
| **Semester** | : First |
| **Course Title** | : BASIC MATHEMATICS |
| **Course Code** | : 311302 |

## I.  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 actually move. Derivatives are useful to find 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.

## II.  INDUSTRY / EMPLOYER EXPECTED OUTCOME

Apply the concept of Mathematics to solve industry-based technology problems.

## III.  COURSE LEVEL LEARNING OUTCOMES (COS)

Students will be able to achieve & demonstrate the following COs on completion of course based learning

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

## IV. TEACHING-LEARNING & ASSESSMENT SCHEME

| Course Code | Course Title | Abbr | Course Category/s | Learning Scheme | | | | | Credits | Assessment Scheme | | | | | | | | | | | | | Total Marks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Actual Contact Hrs./Week | | | SLH | NLH | | Paper Duration | Theory | | | | Based on LL & TL | | | | Based on SL | | | |
| | | | | | | | | | | | | | | | Practical | | | | | | | |
| | | | | CL | TL | LL | | | | | FA-TH | SA-TH | Total | | FA-PR | | SA-PR | | SLA | | | |
| | | | | | | | | | | | Max | Max | Max | Min | Max | Min | Max | Min | Max | Min | | |
| 311302 | BASIC MATHEMATICS | BMS | AEC | 4 | 2 | - | 2 | 8 | 4 | 3 | 30 | 70 | 100 | 40 | - | - | - | - | 25 | 10 | 125 |

**Total IKS Hrs for Sem. :** 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, *# On Line Examination , @$ Internal Online Examination

Note :

1. FA-TH represents average of two class tests of 30 marks each conducted during the semester.
2. If candidate is not securing minimum passing marks in FA-PR of any course then the candidate shall be declared as "Detained" in that semester.
3. If candidate is not securing minimum passing marks in SLA of any course then the candidate shall be declared as fail and will have to repeat and resubmit SLA work.
4. Notional Learning hours for the semester are (CL+LL+TL+SL)hrs.* 15 Weeks
5. 1 credit is equivalent to 30 Notional hrs.
6. * Self learning hours shall not be reflected in the Time Table.
7. * Self learning includes micro project / assignment / other activities.

## V. THEORY LEARNING OUTCOMES AND ALIGNED COURSE CONTENT

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

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| Sr.No | Theory Learning Outcomes (TLO's)aligned to CO's. | Learning content mapped with Theory Learning Outcomes (TLO's) and CO's. | Suggested Learning Pedagogies. |
|---|---|---|---|
| 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 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 concept given in Ancient Indian Mathematics for trigonometry to solve given problems. | **Unit - II Trigonometry**<br>2.1 Trigonometric ratios of allied angles, compound angles, multiple angles (2A, 3A), 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 Principle values and 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<br>Tutorial<br>Assignment<br>Demonstration<br>Simulation<br>Flipped Classroom approach |
| 3 | TLO 3.1 Calculate 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 perpendicular distance from the given point to the line.<br>TLO 3.4 Calculate perpendicular distance between the given two parallel lines.<br>TLO 3.5 Use geometry given in Sulabasutras to solve the given problems. | **Unit - III Straight Line**<br>3.1 Straight line and slope of straight line: Angle between two lines, Condition of parallel and perpendicular lines.<br>3.2 Various forms of straight lines: Slope point form, two-point form, Double intercept form, General 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 (construction of square, circling the square). (Indian Mathematics). | Improved Lecture<br>Tutorial<br>Assignment<br>Demonstration<br>Simulation |
| 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, exponential functions.<br>TLO 4.4 Apply the concept of differentiation to find given equation of tangent and normal.<br>TLO 4.5 Apply the concept of differentiation to calculate maxima, minima and radius of curvature for given function.<br>TLO 4.6 Familiar with concept of calculus given in Indian Mathematics. | **Unit - IV Differential Calculus**<br>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, 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.(Indian Mathematics). | Improved Lecture<br>Tutorial<br>Assignment<br>Demonstration<br>Simulation |

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| Sr.No | Theory Learning Outcomes (TLO's)aligned to CO's. | Learning content mapped with Theory Learning Outcomes (TLO's) and CO's. | Suggested Learning Pedagogies. |
|---|---|---|---|
| 5 | TLO 5.1 Obtain the range and coefficient of range of the given grouped and ungrouped data. TLO 5.2 Calculate mean and standard deviation of ungrouped and grouped data related to the given simple engineering problem(s). TLO 5.3 Determine the variance and coefficient of variance of given grouped and ungrouped data. TLO 5.4 Justify the consistency of given simple sets of data. | **Unit - V Statistics** 5.1 Range, coefficient of range of discrete and grouped data. 5.2 Mean deviation and standard deviation from mean of grouped and ungrouped data. 5.3 Variance and coefficient of variance. 5.4 Comparison of two sets of observation. | Improved Lecture Tutorial Assignment Demonstration Simulation Flipped Classroom approach |

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

| Practical / Tutorial / Laboratory Learning Outcome (LLO) | Sr No | Laboratory Experiment / Practical Titles / Tutorial Titles | Number of hrs. | Relevant COs |
|---|---|---|---|---|
| LLO 1.1 Solve simple problems of Logarithms based on given applications. | 1 | Solve simple problems of Logarithms based on given applications. | 2 | CO1 |
| LLO 2.1 Solve elementary problems on Algebra of matrices for branch specific engineering related applications. | 2 | Solve elementary problems on Algebra of matrices for branch specific engineering related applications. | 2 | CO1 |
| LLO 3.1 Apply the concept of matrix to solve engineering problems. | 3 | Solve solution of Simultaneous Equation using inversion method. | 2 | CO1 |
| LLO 4.1 Apply the concept of matrix to solve engineering problems. | 4 | Apply Matrix Inversion method to determine currents through various branches of given electrical networks. | 2 | CO1 |
| LLO 5.1 Apply the concept of matrix to solve engineering problems. | 5 | Determine inverse of a non-singular matrix by using open source software. | 2 | CO1 |
| LLO 6.1 Apply the concept of partial fraction to solve engineering problems. | 6 | Resolve into partial fraction using linear non-repeated, repeated, and irreducible quadratic factors. | 2 | CO1 |
| LLO 7.1 Solve problems on Compound, Allied, multiple and sub multiple angles for related shapes. | 7 | Solve problems on Compound, Allied, multiple and sub multiple angles for related shapes. | 2 | CO2 |
| LLO 8.1 Utilize the concept of trigonometry to solve engineering problems. | 8 | Practice problems on factorization and de factorization. | 2 | CO2 |
| LLO 9.1 Utilize the concept of trigonometry to solve engineering problems. | 9 | Solve problems on inverse trigonometric ratios based on applications. | 2 | CO2 |
| LLO 10.1 Solve branch specific engineering problems under given conditions of straight lines. | 10 | Practice problems on equation of straight lines using different forms. | 2 | CO3 |
| LLO 11.1 Solve branch specific engineering problems under given conditions of straight lines. | 11 | Solve problems on perpendicular distance, distance between two parallel lines and angle between two lines. | 2 | CO3 |
| LLO 12.1 Solve branch specific engineering problems under given conditions of straight lines. | 12 | Use given form of straight line to calculate the speed, distance and time of moving object. | 2 | CO3 |

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| Practical / Tutorial / Laboratory Learning Outcome (LLO) | Sr No | Laboratory Experiment / Practical Titles / Tutorial Titles | Number of hrs. | Relevant COs |
|---|---|---|---|---|
| LLO 13.1 Apply the concept of derivative to solve engineering problems. | 13 | Solve problems to find derivatives of implicit function and parametric function. | 2 | CO4 |
| LLO 14.1 Apply the concept of derivative to solve engineering problems. | 14 | Solve problems to find derivative of logarithmic and exponential functions for engineering applications. | 2 | CO4 |
| LLO 15.1 Apply the concept of equation of tangent and normal to solve engineering problems. | 15 | Solve problems based on finding equation of tangent and normal for engineering applications. | 2 | CO4 |
| LLO 16.1 Apply the concept of maxima, minima and radius of curvature to solve engineering problems. | 16 | Solve problems based on finding maxima, minima of function and radius of curvature at a given point for engineering applications. | 2 | CO4 |
| LLO 17.1 Apply the concept of equation of tangent and normal to solve engineering problems. | 17 | Use the concept of tangent and normal to solve the given problem of Engineering Drawing. | 2 | CO4 |
| LLO 18.1 Apply the concept of Maxima and Minima to solve engineering problems. | 18 | Use the concept of Maxima and Minima to obtain optimum value for given engineering problem. | 2 | CO4 |
| LLO 19.1 Apply the concept of radius of curvature to solve engineering problems. | 19 | Use the concept of radius of curvature to solve given branch specific engineering problem. | 2 | CO4 |
| LLO 20.1 Utilize the concept of derivative to solve engineering problems. | 20 | Use the concept of derivative to find the slope of a bending curve for given engineering problem. | 2 | CO4 |
| LLO 21.1 Use concept of range and mean deviation to crack branch specific problems. | 21 | Solve problems on finding range, coefficient of range and mean deviation for given applications. | 2 | CO5 |
| LLO 22.1 Use concept of standard deviation and coefficient of variance to crack branch specific problems. | 22 | Solve problems on standard deviation, coefficient of variation and comparison of two sets. | 2 | CO5 |
| LLO 23.1 Use concept of standard deviation to crack branch specific problems. | 23 | Calculate the Standard Deviation for Concrete with the given data for given engineering applications. | 2 | CO5 |

**Note : Out of above suggestive LLOs -**

- '*' Marked Practicals (LLOs) Are mandatory.
- Minimum 80% of above list of lab experiment are to be performed.
- Judicial mix of LLOs are to be performed to achieve desired outcomes.

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

**Micro project**

- Create a function that takes a matrix as input and returns its inverse matrix if it exists. Also Implement a program that finds the inverse of a square matrix.
- Collect the Data of Marks obtained by your class in mid sem test. Compute the variance and coefficient of variance of the data and interpret the result using the free open source software ORANGE.
- Prepare models using matrices to solve simple problems based on cryptography.
- Collect Model on quality control analysis, energy efficiency assessment, environmental monitoring, and process optimization, for these models, analyze data and calculate variance and standard deviation, make a presentation including short videos.

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- Prepare the model using the concept of tangent and normal bending of roads in case of sliding of a vehicle, express geometrically the same through any open source software.
- Prepare the model using the concept of radius of curvature to bending of railway tracks, express geometrically the same through any open source software.
- A window in the form of a rectangle surmounted by a semicircular opening. The total perimeter of the window to admit maximum light through the whole opening, prepare a model using concept of Maxima and Minima for the above problem and verify the result.
- Visualize trigonometric waveforms and create animations utilizing sine or cosine functions and make a presentation.
- Develop a program of trigonometric function calculator that computes sine, cosine, and tangent values.
- Collect applications of the radius of curvature on lens design and optics, mirror and reflective surface properties, road and highway design, structural behavior, roller coaster track design, and composite material manufacturing and make a video of 5-minutes duration.
- Prepare models using trigonometry based on at least 10 engineering problems.
- Apply trigonometric principles to calculate angles, distances, forces, and dimensions relevant to the chosen area and make a poster presentation.
- Prepare charts using determinant to find area of regular shapes.
- Design a puzzle based on matrices. Create a grid of numbers and operations.
- Develop a math game based on operations of matrices.
- Use matrices as a tool for music composition. Assign different musical elements (e.g., notes, chords, rhythms) to matrix elements, and experiment with combining and transforming the matrices to create unique musical compositions. You can use musical notation open software or even traditional instruments to bring your compositions to life.
- Attempt any 10-12 Micro Projects, out of the given list.

## Assignment

- Collect examples based on real world applications of logarithm and prepare a pdf file.
- Solve the simultaneous system of equation in two variables by Matrix Inversion Method. Write down a Mathematical programming using any open source software to verify the result.
- Collect an examples on coding theory using applications of matrices and prepare a pdf file.
- Represent the Graph of Trigonometric function, Logarithmic function on Geogebra and interpret the nature of graph and Make a pdf file.
- Measure height of trees in surrounding locations using trigonometry and prepare presentation.
- Find the derivative of $y = x^{\sin x}$ and visualize the graph of the function and its derivative using any open source software geometrically.
- Find height of room or distance between two pillars by using concept of straight line.
- Collect at least 10 examples based on real world applications of standard deviation/variance.
- Collect at least 10 examples based on real world uses of applications of derivative.
- Attempt any 5-7 Assignment, out of the given list.

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**Note :**

- Above is just a suggestive list of microprojects and assignments; faculty must prepare their own bank of microprojects, assignments, and activities in a similar way.
- The faculty must allocate judicial mix of tasks, considering the weaknesses and / strengths of the student in acquiring the desired skills.
- If a microproject is assigned, it is expected to be completed as a group activity.
- SLA marks shall be awarded as per the continuous assessment record.
- For courses with no SLA component the list of suggestive microprojects / assignments/ activities are optional, faculty may encourage students to perform these tasks for enhanced learning experiences.
- If the course does not have associated SLA component, above suggestive listings is applicable to Tutorials and maybe considered for FA-PR evaluations.

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

| Sr.No | Equipment Name with Broad Specifications | Relevant LLO Number |
|---|---|---|

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| Sr.No | Equipment Name with Broad Specifications | Relevant LLO Number |
|---|---|---|
| 1 | Open-source software like SageMaths, MATHS3D, GeoGebra, Graph, DPLOT, and Graphing Calculator ( Graph Eq 2.13), ORANGE can be used for Algebra, Calculus, Trigonometry, and Statistics respectively. | All |

## IX.  SUGGESTED 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 | Straight Line | CO3 | 6 | 2 | 2 | 4 | 8 |
| 4 | IV | Differential Calculus | CO4 | 16 | 2 | 8 | 10 | 20 |
| 5 | V | Statistics | CO5 | 10 | 2 | 6 | 6 | 14 |
| | | **Grand Total** | | **60** | **10** | **28** | **32** | **70** |

## X.  ASSESSMENT METHODOLOGIES/TOOLS

**Formative assessment (Assessment for Learning)**

- Tests
- Rubrics for COs Assignment
- Midterm Exam
- Self-learning
- Term Work
- Seminar/Presentation

**Summative Assessment (Assessment of Learning)**

- End Term Exam
- Micro-project
- Tutorial Performance

## XI.  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 institute level | | | | | | | | | | |

## XII.  SUGGESTED LEARNING MATERIALS / BOOKS

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| Sr.No | Author | Title | Publisher with ISBN Number |
|---|---|---|---|
| 1 | Grewal B. S. | Higher Engineering Mathematics | Khanna publication New Delhi , 2013 ISBN: 8174091955 |
| 2 | Dutta. D | A text book 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 |
| 6 | C. S. Seshadri | Studies in the History of Indian Mathematics | Hindustan Book Agency, New Delhi 110016. ISBN 978-93-80250-06-9 |
| 7 | George Gheverghese Joseph | Indian Mathematics Engaging with the World from Ancient to Modern Times | 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 ISBN 978-1-4614-7138-7 (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; 1st edition (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/ -SCI Lab | Signal processing, statistical analysis, 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, Google Sheets. |
| 5 | https://ocw.mit.edu/ | MIT Course ware |
| 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. |

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| Sr.No | Link / Portal | Description |
|---|---|---|
| **Note :** | | |

- Teachers are requested to check the creative common license status/financial implications of the suggested online educational resources before use by the students

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| Programme Name/s | : / Automobile Engineering./ Artificial Intelligence/ Agricultural Engineering/ Artificial Intelligence and Machine Learning/ Automation and Robotics/ / Cloud Computing and Big Data/ <br> Civil Engineering/ Chemical Engineering/ Computer Technology/ Computer Engineering/ <br> Civil & Rural Engineering/ Construction Technology/ Computer Science & Engineering/ Fashion & Clothing Technology/ <br> Digital Electronics/ Data Sciences/ Electrical Engineering/ Electronics & Tele-communication Engg./ <br> Electrical Power System/ Electronics & Communication Engg./ Electronics Engineering/ Food Technology/ <br> Computer Hardware & Maintenance/ Instrumentation & Control/ Industrial Electronics/ Information Technology/ <br> Computer Science & Information Technology/ Instrumentation/ / / <br> Civil & Environmental Engineering/ Mechanical Engineering/ Mechatronics/ Medical Electronics/ <br> Production Engineering/ Printing Technology/ Polymer Technology/ Computer Science/ Textile Technology/ Electronics & Computer Engg./ Textile Manufactures |
| :-- | :-- |
| Programme Code | : AA_ORIG/ AE/ AI/ AL/ AN/ AO/ AT_ORIG/ BD/ CE/ CH/ CM/ CO/ CR/ CS/ CW/ DC/ DE/ DS/ <br> EE/ EJ/ EP/ ET/ EX/ FC/ HA/ IC/ IE/ IF/ IH/ IS/ IX_ORIG/ IZ_ORIG/ LE/ ME/ MK/ MU/ <br> PG/ PN/ PO/ SE/ TC/ TE/ TX |
| Semester | : First |
| Course Title | : BASIC SCIENCE |
| Course Code | : 311305 |

## I. RATIONALE

Diploma engineers have to deal with various materials and machines. This course is designed with fundamental information to help the diploma engineering students to apply the basic concepts and principles of physics and chemistry to solve broad- based engineering problems. The basic concepts and principles of sciences related to heat, electricity, magnetism, optics, semiconductors, engineering materials will help in understanding the technology courses where emphasis is on the applications of these in various technology domain applications

## II. INDUSTRY / EMPLOYER EXPECTED OUTCOME

This course is to be taught and implemented with the aim to develop in the student, the course outcomes (COs) leading to the attainment of following industry identified outcome expected from this course: Apply principles of physics and chemistry to solve broad based relevant engineering problems.

## III. COURSE LEVEL LEARNING OUTCOMES (COS)

Students will be able to achieve & demonstrate the following COs on completion of course based learning

- CO1 - Use basic instruments to measure the physical quantities in various engineering situations.
- CO2 - Apply the basic principles of electromagnetics to solve given engineering problems.
- CO3 - Apply basic principles of thermometry and fibre optics to solve engineering problems.
- CO4 - Predict the structure, properties and behaviour of molecules and compounds based on the types of chemical bond.
- CO5 - Apply the concepts of electrochemistry and corrosion preventive measures in industry.
- CO6 - Use the appropriate engineering material and catalyst appropriately.

## IV. TEACHING-LEARNING & ASSESSMENT SCHEME

**BASIC SCIENCE** **Course Code : 311305**

| Course Code | Course Title | Abbr | Course Category/s | Learning Scheme | | | | | Credits | Paper Duration | Assessment Scheme | | | | | | | | | | Total Marks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Actual Contact Hrs./Week | | | SLH | NLH | | | Theory | | | | Based on LL & TL | | | | Based on SL | | |
| | | | | | | | | | | | | | | | Practical | | | | | | |
| | | | | CL | TL | LL | | | | | FA-TH | SA-TH | Total | | FA-PR | | SA-PR | | SLA | | |
| | | | | | | | | | | | Max | Max | Max | Min | Max | Min | Max | Min | Max | Min | |
| 311305 | BASIC SCIENCE | BSC | DSC | 4 | - | 4 | 2 | 10 | 5 | 1.5 | 30 | 70*# | 100 | 40 | 50 | 20 | 50@ | 20 | 50 | 20 | 250 |

**Total IKS Hrs for Sem. :** 4 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, *# On Line Examination , @$ Internal Online Examination

Note :

1. FA-TH represents average of two class tests of 30 marks each conducted during the semester.
2. If candidate is not securing minimum passing marks in FA-PR of any course then the candidate shall be declared as "Detained" in that semester.
3. If candidate is not securing minimum passing marks in SLA of any course then the candidate shall be declared as fail and will have to repeat and resubmit SLA work.
4. Notional Learning hours for the semester are (CL+LL+TL+SL)hrs.* 15 Weeks
5. 1 credit is equivalent to 30 Notional hrs.
6. * Self learning hours shall not be reflected in the Time Table.
7. * Self learning includes micro project / assignment / other activities.

♦ **Candidate remaining absent in practical examination of any one part of Basic Science course i.e. Physics,Chemistry 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.**

## V. THEORY LEARNING OUTCOMES AND ALIGNED COURSE CONTENT

| Sr.No | Theory Learning Outcomes (TLO's)aligned to CO's. | Learning content mapped with Theory Learning Outcomes (TLO's) and CO's. | Suggested Learning Pedagogies. |
|---|---|---|---|

**BASIC SCIENCE**

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| Sr.No | Theory Learning Outcomes (TLO's)aligned to CO's. | Learning content mapped with Theory Learning Outcomes (TLO's) and CO's. | Suggested Learning Pedagogies. |
|-------|---------------------------------------------------|-------------------------------------------------------------------------|--------------------------------|
| 1 | TLO 1.1 Explain physical quantities and its types with examples. TLO 1.2 Differentiate between scalar and vector quantities with examples. TLO 1.3 Apply dimensional analysis to check correctness of equation and conversion of units in different systems . TLO 1.4 Estimate the errors in the measurement for the give problem. TLO 1.5 Explain the working of ancient astronomical instruments to measure distance , time and hour angle . TLO 1.6 Explain the procedure of measuring the dimension of a given object by using vernier calipers and screw gauge . | **Unit - I Units and Measurements** 1.1 Unit, physical quantities: fundamental and derived quantities and their units Systems of units: CGS, MKS and SI . 1.2 Scalar and Vector Physical Quantities. 1.3 Dimensions, dimensional formula ,Applications of dimensional analysis; correctness of physical equations ,conversion factor for interconversion of units in different systems of units. 1.4 Errors, types of errors: instrumental, systematic and random error, estimation of errors: absolute, relative and percentage error, significant figures. 1.5 Ancient astronomical instruments:Chakra, Dhanuryatra , Yasti and Phalaka yantra . 1.6 Applications of Vernier calipers , Screw gauge . | Chalk and board Improved lecture, Tutorial Assignment Demonstration |
| 2 | TLO 2.1 Explain electric field, potential and potential difference. TLO 2.2 Explain magnetic intensity and flux with their units. TLO 2.3 Apply laws of series and parallel combination to the given electrical circuits.Explain the heating effect of electric current. TLO 2.4 Distinguish between conductors, semiconductors and insulators on the basis of energy bands. TLO 2.5 Explain the I-V characteristics and applications of p-n junction diode. | **Unit - II Electricity, Magnetism and Semiconductors** 2.1 Concept of charge, Coulomb's inverse square law, Electric field, Electric field intensity, potential and potential difference. 2.2 Magnetic field and magnetic field intensity and its units, magnetic lines of force, magnetic flux . 2.3 Electric current, Ohm's law, specific resistance, laws of series and parallel combination of resistance, conversion of galvanometer into ammeter and voltmeter, Heating effect of electric current . 2.4 Conductors, Insulators and Semiconductors, Energy bands, intrinsic and extrinsic semiconductors, minority and majority charge carriers. 2.5 p-n junction diode, Depletion layer I-V characteristics of p-n junction, static and dynamic resistance, applications of p-n junction diode ,: Half wave rectifier. | Chalk and board Improved lecture, Tutorial Assignment Demonstration Educational Games |

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**Semester - 1, K Scheme**

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| Sr.No | Theory Learning Outcomes (TLO's)aligned to CO's. | Learning content mapped with Theory Learning Outcomes (TLO's) and CO's. | Suggested Learning Pedagogies. |
|---|---|---|---|
| 3 | TLO 3.1 Convert temperature in different temperature scales. TLO 3.2 Compare different modes of heat transfer with examples. TLO 3.3 Inter-relate the characteristics of the three gas laws. TLO 3.4 Inter-relate the characteristics of the three gas laws. TLO 3.5 Explain total internal reflection in optical fiber. TLO 3.6 Differentiate between types optical fibber with applications. | **Unit - III Thermometry and Fiber Optics** 3.1 Heat, temperature, temperature scale: Degree Celsius, degree Kelvin, degree Fahrenheit. 3.2 Modes of heat transfer: Conduction , Convection and Radiation , Applications in daily life . 3.3 Boyle's law, Charle's law, Gay Lussac's law, perfect gas statements equations and simple numerical. 3.4 Law of thermal conductivity ,Newton's law of cooling. 3.5 Law of refraction, total internal reflection. 3.6 Optical fibber: Principle, construction and working Types of Optical fibers;Single mode step index, Multimode step index, Multimode graded index Applications of optical fibers. | Chalk and board Improved lecture, Tutorial Assignment Demonstration Flip classroom Educational Games |
| 4 | TLO 4.1 Explain the properties of given material based on the bond formation. TLO 4.2 Describe the molecular structure of given solid, liquid and gases. TLO 4.3 Describe the crystal structure of the given solids. TLO 4.4 Explain Properties of metallic solid. | **Unit - IV Chemical bonding** 4.1 Indian Chemistry:-Philosophy of atom by Acharya Kanad. 4.2 Electronic theory of valency: Assumptions , Chemical bonds: Types and characteristics of electrovalent bond, covalent bond, coordinate bond, hydrogen bond, metallic bond and Intermolecular forces of attraction. 4.3 Molecular arrangement in solid, liquid and gases. 4.4 Structure of solids: crystalline and amorphous solids ,Properties of metallic solid, Unit cell: simple cubic, body center cubic (BCC) , face centre cubic (FCC), hexagonal close pack crystals. | Simulation, Model Display, Demonstration Chalk and board , PPT, ect |

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**BASIC SCIENCE**                                                                                    **Course Code : 311305**

| Sr.No | Theory Learning Outcomes (TLO's)aligned to CO's. | Learning content mapped with Theory Learning Outcomes (TLO's) and CO's. | Suggested Learning Pedagogies. |
|---|---|---|---|
| 5 | TLO 5.1 Describe mechanism of electrolysis of CuSO4 solution by using cu and pt rods<br>TLO 5.2 Solve numerical based on Faraday's first and second law of electrolysis.<br>TLO 5.3 Distinguish between primary and secondary cell<br>TLO 5.4 Describe the phenomenon of the given type of corrosion and its prevention.<br>TLO 5.5 Identify the different factors affecting rate of corrosion for the given type of material.<br>TLO 5.6 Select the protective measures to prevent the corrosion in the given corrosive medium. | **Unit - V Electro chemistry and Metal Corrosion, its prevent ion**<br>5.1 Electrolyte- Types of electrolyte, ionization and dissociation ,Cathode, Anode, Electrode potential: oxidation and reduction, Mechanism of electrolysis :Electrolysis, Electrochemical series for cations and anions. Mechanism of electrolysis of CuSO4 solution<br>5.2 Faraday's laws of electrolysis: Faraday's first and second law, relation between electrochemical equivalent and chemical equivalent, Numerical. Applications of electrolysis: Electro-refining of copper and Electroplating.<br>5.3 Difference between primary and secondary cell.<br>5.4 Corrosion: Definition and Types of corrosion Dry corrosion: Mechanism, Types of oxide film, Wet corrosion :Mechanism hydrogen evolution in acidic medium, oxygen absorption in neutral or alkaline medium ,Galvanic cell action by Daniel cell.<br>5.5 Factors affecting the rate of corrosion.<br>5.6 Corrosion control: Modification of environment, Use of protective coatings, coating of less active metal like Tin (Tinning), coating of more active metal like Zinc (Galvanizing), Anodic and cathodic protection, Choice of material-using pure metal and using metal alloy | Simulation, Demonstration, Flipped Classroom, Collaborative Learning, Case Study, On-site/Industrial Visit ,chalk and board etc. |

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| Sr.No | Theory Learning Outcomes (TLO's)aligned to CO's. | Learning content mapped with Theory Learning Outcomes (TLO's) and CO's. | Suggested Learning Pedagogies. |
|---|---|---|---|
| 6 | TLO 6.1 Identify the ingredients of the given paints.<br>TLO 6.2 List out salient properties of the given paint and varnish.<br>TLO 6.3 Describe the properties of insulating materials for the given application.<br>TLO 6.4 Differentiate the given types of structural polymers.<br>TLO 6.5 Describe the polymerization process of the given polymer.<br>TLO 6.6 Explain the properties and uses of the given polymer, elastomer and adhesive.<br>TLO 6.7 Describe the application of relevant adhesives required for the given material.<br>TLO 6.8 Suggest the lubricant for various types of machines in industry.<br>TLO 6.9 Select the relevant catalyst for given application. | **Unit - VI Engineering Materials and Catalysis**<br>6.1 Paints: Purposes of applying paint, Characteristics of paints, Ingredients of paints, Function and examples of each ingredient.<br>6.2 Varnish: Types, Difference between paint and varnishes.<br>6.3 Insulators: Characteristics, Classification,Properties and Application of Glass wool Thermocol.<br>6.4 Polymer and Monomer : Classification on the basis of Molecular structure, on the basis of monomers (homo polymer and copolymer), on the basis of Thermal behavior(Thermoplastics and Thermosetting).<br>6.5 Types Polymerization Reaction, Addition Polymerization, Condensation Polymerization, Synthesis, properties and application of Polyethylene, Polyvinyl chloride, Teflon, Polystyrene, Phenol formaldehyde, Epoxy Resin.<br>6.6 Adhesives: Characteristics, Classification and their uses<br>6.7 Lubricants: Classification, properties and Applications.<br>6.8 Catalysis: Types of catalysis homocatalysis ,heterocatalysis .<br>6.9 Catalyst: Types of Catalyst Positive, Negative and Auto-catalyst, Catalytic Promoter and Catalytic inhibitor, Industrial application of catalyst. | Simulation, Demonstration, On-site Visit ,Chalk and Board, etc. |

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

| Practical / Tutorial / Laboratory Learning Outcome (LLO) | Sr No | Laboratory Experiment / Practical Titles / Tutorial Titles | Number of hrs. | Relevant COs |
|---|---|---|---|---|
| LLO 1.1 Use Vernier caliper to : Measure dimensions of given objects. Measure the dimensions of objects of known dimensions.<br>LLO 1.2 Estimate the errors in measurement. | 1 | Measurements of dimensions of given object by Vernier caliper. | 2 | CO1 |
| LLO 2.1 Use Micrometer Screw gauge to: Measure dimensions of given objects. Measure the dimensions of objects of known dimensions.<br>LLO 2.2 Estimate the errors in measurement. | 2 | Measurements of dimensions of given objects by micrometer screw gauge. | 2 | CO1 |
| LLO 3.1 Apply Ohm's law to solve circuit problems. | 3 | Determination of resistance by Ohm's law. | 2 | CO2 |
| LLO 4.1 Determine the specific resistance of given wire. | 4 | Determination of specific resistance of given wire. | 2 | CO2 |
| LLO 5.1 Verify law of series connection of resistors. | 5 | Determination of equivalent resistance in series connection of resistors. | 2 | CO2 |
| LLO 6.1 Verify law of parallel connection of resistors. | 6 | Determination of equivalent resistance in parallel connection of resistors. | 2 | CO2 |

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| Practical / Tutorial / Laboratory Learning Outcome (LLO) | Sr No | Laboratory Experiment / Practical Titles / Tutorial Titles | Number of hrs. | Relevant COs |
|---|---|---|---|---|
| LLO 7.1 Use magnetic compass to draw the magnetic lines of forces of magnet of different shapes and determine neutral points. | 7 | Determination of neutral points by magnetic compass. | 2 | CO2 |
| LLO 8.1 Use P -N junction diode to draw forward bias and reverse bias I-V characteristics<br>LLO 8.2 Find out static and dynamic resistance of given P N junction diode | 8 | Determination of static and dynamic resistance of given P N junction diode. | 2 | CO2 |
| LLO 9.1 Determine forbidden energy band gap in semiconductors | 9 | Determination of forbidden energy band gap in semiconductors. | 2 | CO2 |
| LLO 10.1 Use Joule's calorimeter to determine Joule's mechanical equivalent of heat | 10 | Determination of Joule's mechanical equivalent of heat by Joule's law. | 2 | CO3 |
| LLO 11.1 Determine the pressure-volume relation using Boyle's law | 11 | Determination of pressure-volume relation using Boyle's law. | 2 | CO3 |
| LLO 12.1 Use Newton''s law of cooling to determine the rate of heat loss due to convection phenomena | 12 | Determination of the rate of heat loss due to convection by Newton's law of cooling. | 2 | CO3 |
| LLO 13.1 Use Searle's thermal conductivity apparatus to find coefficient of thermal conductivity of given material ( Virtual Lab ) | 13 | Determination of Coefficient of thermal conductivity. | 2 | CO3 |
| LLO 14.1 Determine the refractive index of glass slab using TIR phenomenon. | 14 | Determination of the refractive index of glass slab. | 2 | CO3 |
| LLO 15.1 Determine the Numerical Aperture (NA) of a given step index optical fibre | 15 | Determination of the Numerical Aperture (NA) of a given step index optical fiber. | 2 | CO3 |
| LLO 16.1 Identify cation in given ionic solutions by performing selective test | 16 | Identification of cation in given ionic solutions. | 2 | CO4 |
| LLO 17.1 Identify anion in given ionic solutions by performing selective test | 17 | Identification of anion in given ionic solutions. | 2 | CO4 |
| LLO 18.1 Identify states of matter of materials by using simulation. by Appling heating and cooling Techniques.<br>LLO 18.2 Relate temperature-pressure diagram | 18 | Identification of states of matter. | 2 | CO4 |
| LLO 19.1 Determine the electrode potential of copper metal. by setting Electrochemical Cell<br>LLO 19.2 Measure electrode potential of Cu Using Voltmeter.<br>LLO 19.3 Measure the cell potential for various conditions. | 19 | Determination of electrode potential of copper. | 2 | CO5 |
| LLO 20.1 Determine the electrode potential of Iron metal. by setting Electrochemical Cell<br>LLO 20.2 Measure electrode potential of Fe Using Voltmeter<br>LLO 20.3 Measure the cell potential for various conditions. | 20 | Determination of electrode potential of Iron metal. | 2 | CO5 |
| LLO 21.1 Determine the voltage generated from chemical reaction using Daniel Cell.<br>LLO 21.2 Set up Daniel Cell. Prepare Electrolyte Solution<br>LLO 21.3 Measure voltage accurately | 21 | Determination of the voltage generated from chemical reaction using Daniel Cell. | 2 | CO5 |

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| Practical / Tutorial / Laboratory Learning Outcome (LLO) | Sr No | Laboratory Experiment / Practical Titles / Tutorial Titles | Number of hrs. | Relevant COs |
|---|---|---|---|---|
| LLO 22.1 Prepare Electrolyte Solution of CuSO 4 of known concentration LLO 22.2 Set up electrolysis apparatus LLO 22.3 Control various parameters of electrolysis. LLO 22.4 Determine electrochemical equivalent of Cu metal using Faraday's first law. | 22 | Determination of electrochemical equivalent of Cu metal using Faraday's first law. | 2 | CO5 |
| LLO 23.1 Prepare Electrolyte Solution of the given metal of known concentration LLO 23.2 Set up electrolysis apparatus LLO 23.3 Control various parameters of electrolysis LLO 23.4 Analyze the data obtained from the experiment. LLO 23.5 Verify Faraday second law | 23 | Determination of equivalent weight of metal using Faraday's second law. | 2 | CO5 |
| LLO 24.1 Prepare corrosive solutions LLO 24.2 Determine the extent of corrosion. | 24 | Preparation of corrosive medium for Aluminium at different temperature. | 2 | CO5 |
| LLO 25.1 Prepare corrosive solutions. LLO 25.2 Determine the extent of corrosion LLO 25.3 Compare the corrosion behaviour of Aluminum at different temperatures. | 25 | Determination of rate of corrosion at different temperatures for Aluminium. | 2 | CO5 |
| LLO 26.1 Determine the effect of temperature on viscosity for given lubricating oil using Redwood viscometer- | 26 | Determination of effect of temperature on viscosity for given lubricating oil using Redwood viscometer-I. | 2 | CO6 |
| LLO 27.1 Determine the steam emulsification number of given lubricating oil. LLO 27.2 Measure the steam flow duration | 27 | Determination of the steam emulsification number of given lubricating oil. | 2 | CO6 |
| LLO 28.1 Calculate the flash and fire point of given lubricating oils using Cleveland open cup apparatus | 28 | Determination of flash and fire point of given lubricating oils using Cleveland open cup apparatus. | 2 | CO6 |
| LLO 29.1 Determine the flash point of given lubricating oil using Abel's closed cup apparatus. | 29 | Determination of flash point of given lubricating oil using Abel's closed cup apparatus. | 2 | CO6 |
| LLO 30.1 Determine thinner content in oil paint. using electric oven | 30 | Determination of thinner content in oil paint. | 2 | CO6 |

**Note : Out of above suggestive LLOs -**

- '*' Marked Practicals (LLOs) Are mandatory.
- Minimum 80% of above list of lab experiment are to be performed.
- Judicial mix of LLOs are to be performed to achieve desired outcomes.

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

**Micro project**

- Series and parallel resistances: Prepare models for combination of series and parallel resistances.
- Magnetic flux: Prepare models to demonstrate magnetic lines of lines of forces of different types of magnet.
- 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.
- Gas laws: Prepare models to demonstrate Boyle's laws, Charle's Law and Gay Lussac's law using household objects.
- Carbon resistors: Determine the resistance and tolerance of carbon resistors using color codes and measure values.
- Thermal conductivity: Take different metallic plates of various metals and calculate rate of flow of heat.

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- Temperature sensor : Use Temperature sensor IC LM 35 to measure temperature of given body in various temperature scales
- Mobile applications : Use mobile applications for measurements of different physical quantities.
- Optical Fiber and TIR: Prepare model to demonstrate total internal reflection and the propagation of light.
- Convert given galvanometer into ammeter of desired range.
- Convert given galvanometer into voltmeter of desired range.
- LDR: Use Light dependent resistor for measuring the intensity of light.
- Types of bonds: Prepare chart and models displaying different types of bonds with examples.
- Prepare a chart for showing different types of bonds or molecules.
- Crystal Structure: Prepare Models of SC,FCC,HCP,BCC.
- Ionization: Prepare chart displaying ionization phenomenon.
- Corrosion-Prepare Chart displaying images of observed corrosion processes in the surrounding.
- Adhesives: Prepare chart or model to demonstrate the applications of various adhesives.
- Polymer: Collect the samples of different polymers and list their uses.
- Collect information based on market survey of different Polymer and compare the following points. i) Structure ii) Properties.
- Collect information by library survey regarding engineering material used in various industries.

**Assignment**

- Convert the units of a given physical quantity from one system of units to another.
- Measure room temperature of hot baths / bodies by using mercury thermometer and convert it into different scales.
- Prepare a chart to summarize units and measurements
- Enlist information like band gap, material used, dimension etc about different semiconductor devices.
- Give details about the explanation of concept like electrostatics, magnetic domain, current electricity.
- Demonstrate the variation of angle of refraction with respect to refractive index using online tools.
- Use a digital vernier caliper and micrometer screw gauge for measurements.(lab- based).
- Applications of optical fibers in civil, mechanical , electrical engineering etc.
- Applications of semiconductors in civil, mechanical , electrical engineering etc.
- Explain covalent bond, ionic bond, coordinate bond, hydrogen bond, intermolecular forces
- Draw Crystal structures of SC,BCC, FCC,HCP.
- Distinguish between paints and varnishes.
- Solve numerical based on Faraday's first and second law of electrolysis.
- Enlist various Adhesives with properties and applications.
- Compare between Thermoplastics and Thermosetting.
- State properties and applications thermocol and glass wool.
- Differentiate the given types of structural polymers and list out their applications.
- Demonstrate Mechanism of wet corrosion by waterline corrosion.
- Prepare chart showing mechanism of electrolysis of CuSO4 solution by using Cu and Pt electrodes.
- Write properties and applications of solid, semisolid and liquid lubricant.

**Note :**

- Above is just a suggestive list of microprojects and assignments; faculty must prepare their own bank of microprojects, assignments, and activities in a similar way.
- The faculty must allocate judicial mix of tasks, considering the weaknesses and / strengths of the student in acquiring the desired skills.
- If a microproject is assigned, it is expected to be completed as a group activity.
- SLA marks shall be awarded as per the continuous assessment record.
- For courses with no SLA component the list of suggestive microprojects / assignments/ activities are optional, faculty may encourage students to perform these tasks for enhanced learning experiences.
- If the course does not have associated SLA component, above suggestive listings is applicable to Tutorials and maybe considered for FA-PR evaluations.

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

| Sr.No | Equipment Name with Broad Specifications | Relevant LLO Number |
|---|---|---|
| 1 | Vernier Calipers: Range : 0-150mm , Resolution: 0.1mm | 1 |

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| Sr.No | Equipment Name with Broad Specifications | Relevant LLO Number |
|-------|-----------------------------------------|---------------------|
| 2 | Joule's calorimeter : well insulated "mechanical equivalent of heat apparatus" in wooden box, , digital / analog thermometer, | 10,12 |
| 3 | Boyle's apparatus: U tube manometer , barometer | 11 |
| 4 | Ammeter 0-2 amp voltmeter-0-5v DC | 19,20,21,22,23 |
| 5 | Electronic balance, with the scale range of 0.001g to 500gm pan size 100 mm; response time 3-5 sec.: power requirement 90-250 V, 10 watt | 19,20,21,22,23,24,25,30 |
| 6 | Micrometer screw gauge : Range : 0-25mm, Resolution: 0.01mm, Accuracy ±0.02mm or better | 2 |
| 7 | Redwood viscometer-I | 26 |
| 8 | Cleveland open cup apparatus | 28 |
| 9 | Abel's close cup apparatus | 29 |
| 10 | Digital multimeter : 3 1/2 digit display, 9999 counts, digital multimeter measures: Vac, Vdc ( 1000V max) , DC A, AC A(10 amp max), Resistance ( 0 - 100 MOhm | 3,4,5,6 |
| 11 | Resistance Box: 4 decade ranges from 1 ohm to 1K,accuracy 0.1 % - 1 % | 3,4,5,6 |
| 12 | Battery eliminator : 0- 12 V ,2A | 3,4,5,6,8,9,10,12 |
| 13 | Electric oven inner size 18"x18"x18"; temperature range 100 to 2500 C. with the capacity of 40 lt. | 30 |

## IX.  SUGGESTED 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 | Units and Measurements | CO1 | 7 | 2 | 3 | 4 | 9 |
| 2 | II | Electricity, Magnetism and Semiconductors | CO2 | 13 | 3 | 5 | 6 | 14 |
| 3 | III | Thermometry and Fiber Optics | CO3 | 10 | 2 | 4 | 6 | 12 |
| 4 | IV | Chemical bonding | CO4 | 6 | 2 | 3 | 4 | 9 |
| 5 | V | Electro chemistry and Metal Corrosion, its prevent ion | CO5 | 12 | 3 | 4 | 5 | 12 |
| 6 | VI | Engineering Materials and Catalysis | CO6 | 12 | 3 | 5 | 6 | 14 |
| | | **Grand Total** | | **60** | **15** | **24** | **31** | **70** |

## X.  ASSESSMENT METHODOLOGIES/TOOLS

**Formative assessment (Assessment for Learning)**

- Two unit tests of 30 marks (Physics 15 marks,Chemistry-15 marks) and average of two unit tests.
- For laboratory learning 50 marks (Physics 25 marks,Chemistry-25 marks).

**Summative Assessment (Assessment of Learning)**

- End semester assessment of 50 marks for laboratory learning (Physics 25 marks,Chemistry-25 marks).
- End semester assessment of 70 marks through online MCQ examination.

## XI.  SUGGESTED COS - POS MATRIX FORM

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| 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 | 1 | | | |
| CO3 | 3 | 1 | 1 | 2 | 1 | 1 | 1 | | | |
| CO4 | 3 | 2 | | | 2 | | 1 | | | |
| CO5 | 3 | 2 | 1 | 1 | 2 | | 1 | | | |
| CO6 | 3 | 2 | | | 2 | 1 | 1 | | | |

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

## XII.  SUGGESTED LEARNING MATERIALS / BOOKS

| Sr.No | Author | Title | Publisher with ISBN Number |
|---|---|---|---|
| 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 | Jain and Jain | Engineering Chemistry | National Council of Education Research and Training, New Delhi, 2010, ISBN : 8174505083 |
| 7 | Dara S. S. | Engineering Chemistry | National Council of Education Research and Training, New Delhi, 2015, ISBN : 8174505660 |
| 8 | Bagotsky V.S. | Fundamental of electrochemistry | National Council of Education Research and Training, New Delhi, 2013, ISBN : 8174506314 |
| 9 | Jain and Jain | Engineering Chemistry | National Council of Education Research and Training, New Delhi, 2013, ISBN : 8174506713 |
| 10 | Aryabhatta. | The Surya Siddhanta | Baptist Mission press ,Calcutta |
| 11 | Steeramula Rajeswara Sarma | The Archaic And The Exotic : Studies In The History Of Indian Astronomical Instruments | Published by Manohar Book Service, 2008 ISBN 10: 8173045712 / ISBN 13: 9788173045714 |
| 12 | Anju Rawlley,Devdatta V. Saraf | Applied Chemistry with Lab Manual | Khanna Book Publishing Co. (P) Ltd. New Delhi, 2021, ISBN- 978-93-91505-44-8 |

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| Sr.No | Author | Title | Publisher with ISBN Number |
|-------|--------|-------|---------------------------|
| 13 | 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/physiszone | Electricity, Magnetism and Semiconductors , basic of fiber optics |
| 2 | https://phet.colorado.edu | Electricity, Magnetism and Semiconductors ,Thermometry and basic of fiber optics |
| 3 | www.physicsclassroom.com | concepts of basic physics |
| 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+universi ty+physics+expts | concepts of basic physics |
| 7 | k. https://www.youtube.com/results? search_query=physics+clas s+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 | www.chem1.com | Chemistry instruction and education |
| 11 | ww.onlinelibrary.wiley.com | Materials and corrosion |
| 12 | www.rsc.org | Catalysis |
| 13 | www.chemcollective.org | Virtual Labs, simulation |
| 14 | https://www.ancient-origins.net/history-famous-people/indian -sage-acharya-kanad-001399 | IKS Philosophy of atom by Acharya Kanad. |
| 15 | https://phet.colorado.edu/en/simulations/filter? subjects=che mistry&type=html,prototype | Identify states of matter of materials by using simulation. |

**Note :**

- Teachers are requested to check the creative common license status/financial implications of the suggested online educational resources before use by the students

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**MSBTE Approval Dt. 09/08/2023**                                   **Semester - 1, K Scheme**

**COMMUNICATION SKILLS (ENGLISH)**                                    **Course Code : 311303**

| Programme Name/s | : Architecture Assistantship/ / Automobile Engineering./ Artificial Intelligence/ Agricultural Engineering/ Artificial Intelligence and Machine Learning/ Automation and Robotics/ Architecture/ / Cloud Computing and Big Data/ Civil Engineering/ Chemical Engineering/ Computer Technology/ Computer Engineering/ Civil & Rural Engineering/ Construction Technology/ Computer Science & Engineering/ Fashion & Clothing Technology/ Dress Designing & Garment Manufacturing/ Digital Electronics/ Data Sciences/ Electrical Engineering/ Electronics & Tele-communication Engg./ Electrical Power System/ Electronics & Communication Engg./ Electronics Engineering/ Food Technology/ Computer Hardware & Maintenance/ Instrumentation & Control/ Industrial Electronics/ Information Technology/ Computer Science & Information Technology/ Instrumentation/ Interior Design & Decoration/ / Interior Design/ / Civil & Environmental Engineering/ Mechanical Engineering/ Mechatronics/ Medical Laboratory Technology/ Medical Electronics/ Production Engineering/ Printing Technology/ Polymer Technology/ Surface Coating Technology/ Computer Science/ Textile Technology/ Electronics & Computer Engg./ Travel and Tourism/ Textile Manufactures |
|---|---|
| Programme Code | : AA/ AA_ORIG/ AE/ AI/ AL/ AN/ AO/ AT/ AT_ORIG/ BD/ CE/ CH/ CM/ CO/ CR/ CS/ CW/ DC/ DD/ DE/ DS/ EE/ EJ/ EP/ ET/ EX/ FC/ HA/ IC/ IE/ IF/ IH/ IS/ IX/ IX_ORIG/ IZ/ IZ_ORIG/ LE/ ME/ MK/ ML/ MU/ PG/ PN/ PO/ SC/ SE/ TC/ TE/ TR/ TX |
| Semester | : First |
| Course Title | : COMMUNICATION SKILLS (ENGLISH) |
| Course Code | : 311303 |

## I. RATIONALE

The most commonly used medium to express oneself is language. English being a global language is 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 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 engineering domain.

## II. INDUSTRY / EMPLOYER EXPECTED OUTCOME

The aim of this course is to help the student to achieve the following industry identified outcome through various learning experiences: "Communicate in written and oral form of English effectively at workplace".

## III. COURSE LEVEL LEARNING OUTCOMES (COS)

Students will be able to achieve & demonstrate the following COs 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. TEACHING-LEARNING & ASSESSMENT SCHEME

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**MSBTE Approval Dt. 09/08/2023**                              **Semester - 1, K Scheme**

# COMMUNICATION SKILLS (ENGLISH)

**Course Code : 311303**

| Course Code | Course Title | Abbr | Course Category/s | Learning Scheme | | | | | Credits | Paper Duration | Assessment Scheme | | | | | | | | | | | Total Marks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Actual Contact Hrs./Week | | | SLH | NLH | | | Theory | | | | Based on LL & TL | | | | Based on SL | | | |
| | | | | | | | | | | | | | | | Practical | | | | | | | |
| | | | | CL | TL | LL | | | | | FA-TH | SA-TH | Total | | FA-PR | | SA-PR | | SLA | | | |
| | | | | | | | | | | | Max | Max | Max | Min | Max | Min | Max | Min | Max | Min | | |
| 311303 | COMMUNICATION SKILLS (ENGLISH) | ENG | AEC | 3 | - | 2 | 1 | 6 | 3 | 3 | 30 | 70 | 100 | 40 | 25 | 10 | - | - | 25 | 10 | | 150 |

**Total IKS Hrs for Sem. :** 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, *# On Line Examination , @$ Internal Online Examination

Note :

1. FA-TH represents average of two class tests of 30 marks each conducted during the semester.
2. If candidate is not securing minimum passing marks in FA-PR of any course then the candidate shall be declared as "Detained" in that semester.
3. If candidate is not securing minimum passing marks in SLA of any course then the candidate shall be declared as fail and will have to repeat and resubmit SLA work.
4. Notional Learning hours for the semester are (CL+LL+TL+SL)hrs.* 15 Weeks
5. 1 credit is equivalent to 30 Notional hrs.
6. * Self learning hours shall not be reflected in the Time Table.
7. * Self learning includes micro project / assignment / other activities.

## V. THEORY LEARNING OUTCOMES AND ALIGNED COURSE CONTENT

| Sr.No | Theory Learning Outcomes (TLO's)aligned to CO's. | Learning content mapped with Theory Learning Outcomes (TLO's) and CO's. | Suggested Learning Pedagogies. |
|---|---|---|---|
| 1 | TLO 1.1 Use transcription to pronounce words correctly. TLO 1.2 Use prefix and suffix for flexibility and precision in language TLO 1.3 Employ synonyms and antonyms to express similarity and contrast between words. TLO 1.4 Use Homophones to expand their vocabulary TLO 1.5 Make use of the collocations correctly | **Unit - I Vocabulary** 1.1 Phonetics :Vowels(12) Consonants (24) Diphthongs (8) 1.2 Prefix & Suffix : . Definition & Examples , List of common prefixes and suffixes 1.3 Synonyms & Antonyms : Vocabulary expansion , Context & Usage 1.4 Homophones : Identifying Homophones , Meaning & Context , Vocabulary Expansion 1.5 Collocations : Definition & identification , Types of collocations | Language Lab Drill Classroom learning Reference Books NPTEL |
| 2 | TLO 2.1 Formulate paragraphs with synchronized sentence structure on the given situation / topic TLO 2.2 Develop dialogues to practice language skill in a structured and meaningful way. | **Unit - II Paragraph and Dialogue Writing** 2.1 Types of paragraphs: Technical , Descriptive , Narrative 2.2 Dialogue Writing: i Greetings ii. Development iii. Closing Sentence | Classroom learning Skit Language Lab YouTube videos |

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| Sr.No | Theory Learning Outcomes (TLO's)aligned to CO's. | Learning content mapped with Theory Learning Outcomes (TLO's) and CO's. | Suggested Learning Pedagogies. |
|---|---|---|---|
| 3 | TLO 3.1 Respond to the given questions of the specified passage. TLO 3.2 Formulate sentences using new words TLO 3.3 Use correct syntax to construct meaningful sentences for the given situation. TLO 3.4 Respond to the questions on the given seen & unseen passages. | **Unit - III Comprehension (Seen and Unseen Passages)** 3.1 1 Passages from MSBTE workbook 1.Say No to Plastic bags 2.Interview of Dr. APJ Abdul Kalam 3.Maximum Achievements 4.Be Remarkable 5.Arunima Sinha: A Biography 6.Roses of Gratitude 3.2 Importance of Comprehension 3.3 Unseen Passages 3.4 Interpretation of passages in written and Spoken form | Classroom learning interactive session Discussion |
| 4 | TLO 4.1 Describe technical objects with specifications TLO 4.2 Explain the given picture in grammatically correct language. TLO 4.3 Diary Entry on situations TLO 4.4 Translate from English to Marathi/Hindi- vice versa | **Unit - IV Communicative Language** 4.1 Technical objects : i. Heading ii. Description of technical objects 4.2 Picture Description : i. Situational picture ii. Describe in your own words 4.3 Diary Entry : i. Date ii. Content iii. Name of the writer 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 Classroom learning |
| 5 | TLO 5.1 Cultivate/Develop habit of being presentable TLO 5.2 Formulate speeches for occasions TLO 5.3 Prepare power point presentation TLO 5.4 Use appropriate body language for effective communication | **Unit - V Presentation Skills** 5.1 Dressing & Grooming : i. Dressing for the occasion ii. Proper grooming 5.2 Speech Writing : i. Situation ii. Salutations iii. Introduction of the topic iv. Description/Body v. Conclusion 5.3 Power Point Presentation : i. Layout ii. Font size iii. Color combination 5.4 Kinesics : i. Facial expressions ii Eye contact iii Postures iv Gestures | Classroom learning Language Lab |

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

| Practical / Tutorial / Laboratory Learning Outcome (LLO) | Sr No | Laboratory Experiment / Practical Titles / Tutorial Titles | Number of hrs. | Relevant COs |
|---|---|---|---|---|
| LLO 1.1 Use transcription in correct form LLO 1.2 Learn to differentiate vowel, diphthong and consonants | 1 | *Write 20 words using phonetic transcription | 2 | CO1 |
| LLO 2.1 Learn correct pronunciation by using headphones in language lab | 2 | Practice pronunciation as per IPA using language lab | 2 | CO1 |
| LLO 3.1 Enhance the understanding of word formation LLO 3.2 Enrich word power LLO 3.3 Construct words with the specific meanings | 3 | *Formulate 20 words using Prefix and Suffix | 2 | CO1 |
| LLO 4.1 Use words and phrases effectively LLO 4.2 Enrich vocabulary LLO 4.3 Develop overall language skills | 4 | *Construct sentences using 20 collocations | 2 | CO1 |
| LLO 5.1 Articulate ideas clearly and effectively LLO 5.2 Improve grammar, punctuation | 5 | *Write two paragraphs of 75 words each | 2 | CO2 |
| LLO 6.1 Add depth to narratives LLO 6.2 Form grammatically correct sentences | 6 | *Compose situational dialogues (Any Two) | 2 | CO2 |

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| Practical / Tutorial / Laboratory Learning Outcome (LLO) | Sr No | Laboratory Experiment / Practical Titles / Tutorial Titles | Number of hrs. | Relevant COs |
|---|---|---|---|---|
| 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 | 7 | Enact Role Plays as per situation and context | 2 | CO5 |
| LLO 8.1 Acquire the ability to convey complex ideas in clear and concise manner<br>LLO 8.2 Expand technical vocabulary<br>LLO 8.3 Enhance the written communication Skills | 8 | *Describe any three technical objects using correct grammar | 2 | CO4 |
| LLO 9.1 Develop skills in story telling<br>LLO 9.2 Connect with the audience | 9 | Narrate anecdotes of various situations in English | 2 | CO5 |
| LLO 10.1 Notice and articulate specific elements, colors, shapes, & other visual aids<br>LLO 10.2 Express observations & interpretations clearly and concisely<br>LLO 10.3 Enhance vocabulary | 10 | *Describe a given picture (Any Two) | 2 | CO4 |
| LLO 11.1 Express information in coherent and engaging manner<br>LLO 11.2 Build confidence | 11 | *Introduce oneself and others | 2 | CO5 |
| LLO 12.1 Present complex information in a clear & concise manner<br>LLO 12.2 Develop public speaking skills and presentation skills | 12 | *Prepare a Power point presentation on a given topic | 2 | CO5 |
| LLO 13.1 Improve language skills &expand vocabulary | 13 | *Translate paragraph --English to Marathi/Hindi (vice -Versa) (Any4) | 2 | CO4 |
| LLO 14.1 Reflect on thoughts, feelings, and experiences | 14 | *Write your experience in 50 words on ( Four) given situations (Diary Entry) | 2 | CO4 |
| LLO 15.1 Develop language acquisition | 15 | *Respond to the questions based on the given passages | 2 | CO3 |
| LLO 16.1 Build confidence in public speaking<br>LLO 16.2 Enhance the skills in planning and prioritization | 16 | Deliver oral presentations using correct grammar and appropriate body language | 2 | CO5 |

**Note : Out of above suggestive LLOs -**

- '*' Marked Practicals (LLOs) Are mandatory.
- Minimum 80% of above list of lab experiment are to be performed.
- Judicial mix of LLOs are to be performed to achieve desired outcomes.

## VII.  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 ,Films.
- Prepare a booklet on the contribution of eminent Indian scientists
- Prepare a podcast referring ancient literature.

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- Prepare blogs, podcast, vlogs
- Prepare a questionnaire & conduct the interview of Industry Personnel, social worker, entrepreneur
- Prepare and participate in debates and extempore speeches

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**Note :**

- Above is just a suggestive list of microprojects and assignments; faculty must prepare their own bank of microprojects, assignments, and activities in a similar way.
- The faculty must allocate judicial mix of tasks, considering the weaknesses and / strengths of the student in acquiring the desired skills.
- If a microproject is assigned, it is expected to be completed as a group activity.
- SLA marks shall be awarded as per the continuous assessment record.
- For courses with no SLA component the list of suggestive microprojects / assignments/ activities are optional, faculty may encourage students to perform these tasks for enhanced learning experiences.
- If the course does not have associated SLA component, above suggestive listings is applicable to Tutorials and maybe considered for FA-PR evaluations.

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## VIII. 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 |

## IX. SUGGESTED 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** |

## X. ASSESSMENT METHODOLOGIES/TOOLS

**Formative assessment (Assessment for Learning)**

- -

**Summative Assessment (Assessment of Learning)**

- -

## XI. SUGGESTED COS - POS MATRIX FORM

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**COMMUNICATION SKILLS (ENGLISH)**        **Course Code : 311303**

| 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: - <br> *PSOs are to be formulated at institute level | | | | | | | | | | |

## XII. SUGGESTED LEARNING MATERIALS / BOOKS

| Sr.No | Author | Title | Publisher with ISBN Number |
|---|---|---|---|
| 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 | https://www.britishcouncil.in/english/learn-online | Website link is given to refer Unit 1 |
| 2 | Vocabulary.com | Refer this website for interactive vocabulary quizzes, word lists |
| 3 | International Phonetic Association (IPA) Website | It offers audio examples and charts to help understand and transcribe sounds |
| 4 | grammarly.com/blog | For constructing effective paragraphs and improving clarity |
| 5 | www.newagegolden.com | Refer this website for speech writing, diary entry and paragraph writing |

**Note :**

- Teachers are requested to check the creative common license status/financial implications of the suggested online educational resources before use by the students

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