# CONTENTS

<table>
<thead>
<tr>
<th>S No</th>
<th>Particulars</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>Scheme of Instructions I Semester B.E 2019-2020 (Physics Cycle)</td>
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<td>Scheme of Instructions I Semester B.E 2019-2020 (Chemistry Cycle)</td>
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<td></td>
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<td>5.2 18PY1BSPHY/18PY2BSPHY - Applied Physics</td>
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<td>5.3 18EC1ESECE/18EC2ESECE - Elements of Electronics Engineering</td>
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<td>5.6 18HS1NCKAN/18HS2NCKAN - Kannada Language</td>
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<td>5.7 18CY1BSCHY/18CY2BSCHY - Engineering Chemistry</td>
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<td>5.8 18EE1ESELE/18EE2ESELE - Elements of Electrical Engineering</td>
<td>23</td>
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<td></td>
<td>5.9 18CV1ESENM/18CV2ESENM - Engineering Mechanics</td>
<td>26</td>
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<tr>
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<td>5.10 18ME1ESEED/18ME2ESEED - Elements of Engineering Drawing</td>
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<td>5.11 18HS1NCENG/18HS2NCENG - Functional English</td>
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<td></td>
<td>5.12 18MA2BSEM2 - Engineering Mathematics - 2</td>
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</table>
Scheme & Syllabus for UG Programme – I & II Semesters

**ABBREVIATIONS**

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>AY</td>
<td>Academic Year</td>
</tr>
<tr>
<td>AAT</td>
<td>Alternative Assessment Tools</td>
</tr>
<tr>
<td>BOE</td>
<td>Board of Examiners</td>
</tr>
<tr>
<td>BOS</td>
<td>Board of Studies</td>
</tr>
<tr>
<td>CBCS</td>
<td>Choice Based Credit System</td>
</tr>
<tr>
<td>CGPA</td>
<td>Cumulative Grade Point Averages</td>
</tr>
<tr>
<td>CIE</td>
<td>Continuous Internal Evaluation</td>
</tr>
<tr>
<td>HS</td>
<td>Humanity and Social Science Courses</td>
</tr>
<tr>
<td>L-T-P-S</td>
<td>Lecture-Tutorial- Practical-Self study</td>
</tr>
<tr>
<td>NFTE</td>
<td>Not Fit for Technical Education</td>
</tr>
<tr>
<td>SEE</td>
<td>Semester End Examination</td>
</tr>
<tr>
<td>SGPA</td>
<td>Semester Grade Point Average</td>
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<tr>
<td>BS</td>
<td>Basic Science</td>
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<tr>
<td>ES</td>
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<td>NC</td>
<td>No Credit</td>
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Scheme & Syllabus for UG Programme – I Semester
Scheme of Instruction for First Semester B.E. 2019-2020

(PHYSICS CYCLE)

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<th>T</th>
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(CHEMISTRY CYCLE)

<table>
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<th>T</th>
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L - Lecture (1 credit=1 contact hr.);
T - Tutorial (1 credit=2 contact hrs.);
P - Practical (1 credit=2 contact hrs.);
* CIE only
## Scheme & Syllabus for UG Programme – II Semester

### Scheme of Instruction for Second Semester B.E. 2019-2020

#### (CHEMISTRY CYCLE)

<table>
<thead>
<tr>
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<td>18CV2SENE</td>
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#### (PHYSICS CYCLE)

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<td>18ME2SEM</td>
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<td>5</td>
<td>18CS2SEC</td>
<td>'C' Programming</td>
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<tr>
<td>6</td>
<td>18HS2NCKA</td>
<td>Kannada Language*</td>
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<td></td>
<td></td>
<td></td>
<td>20</td>
</tr>
</tbody>
</table>

- **L**-Lecture (1 credit=1 contact hr.);
- **T**-Tutorial (1 credit=2 contact hrs.);
- **P**-Practical (1 credit=2 contact hrs.);
- * CIE only
Course Objectives: To acquaint the students with principles of mathematics through Calculus and Differential Equations, that serves as an essential tool in several engineering applications.

UNIT-I

DIFFERENTIAL CALCULUS – 1

Polar curves - Angle between the radius vector and tangent, angle between two curves, length of the perpendicular from pole to the tangent, pedal equation. Curvature and radius of curvature- Cartesian and polar forms (without proof). Taylor’s and Maclaurin’s series expansions for function of one variable (without proof).

[9 hours]

UNIT-II

DIFFERENTIAL CALCULUS – 2

Partial differentiation; Total derivatives-differentiation of composite functions. Jacobians, Taylor’s and Maclaurin’s series expansions for function of two variables. Maxima and minima for a function of two variables.

[10 hours]

UNIT-III

INTEGRAL CALCULUS

Multiple integrals: Evaluation of double integrals- change of order of integration and changing into polar co-ordinates, triple integrals. Applications: Area (Polar curves) and volume.

Beta and Gamma functions: Definitions, Relation between Beta and Gamma functions and problems.

[11 hours]

UNIT-IV

ORDINARY DIFFERENTIAL EQUATIONS OF FIRST ORDER

Bernoulli’s equation. Exact and reducible to exact differential equations.

\[ \frac{M_y - N_x}{N} = g(x) \quad \text{and} \quad \frac{N_y - M_x}{M} = h(y) \] . Initial value problems. Applications: Orthogonal trajectories and Mixing problems.

[9 hours]

UNIT-V

ORDINARY DIFFERENTIAL EQUATIONS OF HIGHER ORDER

Second and higher order linear ordinary differential equations with constant coefficients- Inverse differential operators, Particular Integrals of \( e^{ax}, \sin(ax), \cos(ax) \) and \( x^m \). Method of variation of parameters; Cauchy’s and Legendre homogeneous equations.

[9 hours]
Text Books


Reference Books


E-books and Online Resources

   https://ndl.iitkgp.ac.in/ and  
   https://www.pdfdrive.com/engineering-mathematics-books.html
   https://ndl.iitkgp.ac.in/ and  
   https://www.pdfdrive.com/engineering-mathematics-books.html

NPTEL/SWAYAM/MOOCs:

7) http://nptel.ac.in/courses.php/
8) https://www.class-central.com/subject/math (MOOCS)

Course Outcomes:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>CO’s</th>
<th>At the end of the course, the student will have the ability to:</th>
<th>PO’s mapped</th>
<th>Strength of mapping</th>
</tr>
</thead>
<tbody>
<tr>
<td>18MA1BSEM1</td>
<td>CO 1</td>
<td>Understand the concepts of Calculus and differential equations.</td>
<td>--</td>
<td>--</td>
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<tr>
<td></td>
<td>CO 2</td>
<td>Apply the concepts of calculus and Differential Equations to Engineering Problems.</td>
<td>1</td>
<td>3</td>
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<tr>
<td></td>
<td>CO 3</td>
<td>Demonstrate an understanding of the multiple integrals using alternate tools.</td>
<td>5</td>
<td>1</td>
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</table>

* * * * *
COURSE TITLE | APPLIED PHYSICS | COURSE CODE | 18PY1BSPHY/18PY2BSPHY
--- | --- | --- | ---
CREDITS | 05 | L – T – P | 4 – 0 – 1
CONTACT HOURS | Theory: 48 Hours. Practical: 24 Hours

Course Objectives: To disseminate to the students, the concepts of quantum mechanics, electrical and thermal properties of solids, materials science, lasers, optical fibers, oscillations and facilitate students to apply in their area of specialization.

UNIT – I

Quantum Mechanics

UNIT – II

Electrical and Thermal Properties of Solids

UNIT – III

Materials Science

[10 hours]

UNIT – IV

Lasers and Optical Fibers

[10 hours]

UNIT – V

Theory of Oscillations
Theory of free vibrations: Periodic motion, simple harmonic motion, equation of a simple harmonic oscillator, expressions for period and frequency, energy considerations-total energy, conversion of energy from kinetic to potential in SHM, electric to magnetic in an LC circuit. Theory of damped vibrations: Resistive forces, equation of motion-expression for decaying amplitude, cases of damping. Logarithmic decrement, relaxation time and quality factor. Theory of forced vibrations and resonance: Equation of motion-expression for amplitude, mechanical impedance, expression for maximum amplitude. Examples of resonance – ESR and NMR. Problems.

[9 hours]

LIST OF EXPERIMENTS

<table>
<thead>
<tr>
<th>No.</th>
<th>Name of the experiment</th>
<th>Skill</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Wavelength of LEDs</td>
<td>Determine</td>
</tr>
<tr>
<td>2</td>
<td>Fermi energy of copper</td>
<td>Determine</td>
</tr>
<tr>
<td>3</td>
<td>Thermal conductivity of a poor conductor by Lee Charlton’s method</td>
<td>Determine</td>
</tr>
<tr>
<td>4</td>
<td>Thermal conductivity of a metal by Forbe’s method</td>
<td>Determine</td>
</tr>
<tr>
<td>5</td>
<td>Dielectric constant of a material by charging and discharging of a capacitor</td>
<td>Determine</td>
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</tr>
<tr>
<td>6</td>
<td>Energy gap of a semiconductor using four probe method</td>
<td>Determine</td>
</tr>
<tr>
<td>7</td>
<td>Wavelength of semiconductor laser source using diffraction grating</td>
<td>Determine</td>
</tr>
<tr>
<td>8</td>
<td>Divergence angle of semiconductor laser beam</td>
<td>Determine</td>
</tr>
<tr>
<td>9</td>
<td>Numerical aperture of an optical fiber</td>
<td>Analyse</td>
</tr>
<tr>
<td>10</td>
<td>Series and parallel LCR circuits</td>
<td>Analyse</td>
</tr>
</tbody>
</table>

**Text Books:**


**Reference Books:**


**E-Books/Resources:**

5. [http://de.physnet.net/PhysNet/education.html](http://de.physnet.net/PhysNet/education.html)
6. [http://hyperphysics.phy-astr.gsu.edu/hbase/hframe.html](http://hyperphysics.phy-astr.gsu.edu/hbase/hframe.html)

**NPTEL/SWAYAM/MOOCs:**

7. [http://nptel.ac.in/](http://nptel.ac.in/)
8. [https://swayam.gov.in/](https://swayam.gov.in/)

**Course Outcomes:**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>CO’s</th>
<th>At the end of the course, the student will have the ability to:</th>
<th>POs Mapped</th>
<th>Strength of mapping</th>
</tr>
</thead>
<tbody>
<tr>
<td>18PY1BSPHY/18PY2BSPHY</td>
<td>CO1</td>
<td><strong>Understand</strong> the principles of quantum mechanics, transport phenomena, dielectric and semiconductor material properties of solids, laser and optical fiber and concept of vibrations.</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td></td>
<td>CO2</td>
<td><strong>Apply</strong> the principles of quantum mechanics, transport phenomena, dielectric and semiconductor material properties of solids, laser and optical fibre and types of vibrations to obtain desired parameters.</td>
<td>PO1 3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>CO3</td>
<td><strong>Conduct</strong> experiments to obtain the desired parameter of the given material / physical system.</td>
<td>PO4 3</td>
<td></td>
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</tbody>
</table>

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UNIT-I

Semiconductor Diode & Applications

UNIT-II

Transistor & Applications

UNIT-III

Oscillators and Op-amps

UNIT-IV

Digital Electronics & Circuits

UNIT-V

Communication Systems
Analog and Digital Communication: Fundamental Concepts with Block Diagram, Introduction to Cellular Communication, Computer Communication Networks and IOT.
Text Books:

Reference Books:

E-Books:
5. [https://www.elsevier.com/books/basic-electronics/holbrook/978-0-08-006865-7](https://www.elsevier.com/books/basic-electronics/holbrook/978-0-08-006865-7)
6. [http://www.worldcat.org/title/basic-electronics/oclc/681543319](http://www.worldcat.org/title/basic-electronics/oclc/681543319)

NPTEL/SWAYAM/ MOOC:
7. [http://nptel.ac.in/courses/117103063/](http://nptel.ac.in/courses/117103063/)
8. [https://swayam.gov.in/course/3595-basic-electronics](https://swayam.gov.in/course/3595-basic-electronics)

Course Outcomes:

<table>
<thead>
<tr>
<th>Course Code</th>
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<th>At the end of the course, the student will have the ability to:</th>
<th>POs Mapped</th>
<th>Strength of mapping</th>
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<tbody>
<tr>
<td>18EC1ICECE/18EC2ICECE</td>
<td>CO1</td>
<td>Understand the Concepts of Electronic Devices and Circuits and realize the Applications of Electronics in Interdisciplinary Engineering Domains.</td>
<td>0</td>
<td>1</td>
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<tr>
<td></td>
<td>CO2</td>
<td>Apply the basic principles of Electronics to solve Analog and Digital circuits.</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>CO3</td>
<td>Analyze the characteristics/performance parameters of Electronic Circuits.</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>CO4</td>
<td>Design basic Electronic Circuits for given Specifications.</td>
<td>3</td>
<td>1</td>
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<tr>
<td></td>
<td>CO5</td>
<td>Build cognizance on Electronic Waste and its Management.</td>
<td>6</td>
<td>1</td>
</tr>
</tbody>
</table>

* * * * *
Course Objectives:
- To provide a general understanding of energy-machine-application relationship.
- To introduce the fundamentals of harnessing energy.
- To familiarize the working principles of basic mechanical systems.
- To acquaint with basic fabrication processes.

UNIT-I
Sources of Energy
Introduction to sources of energy, conventional and non-conventional sources, solar energy (heliothermal, flat plate, parabolic), Steam formation, properties of steam, specific volume, enthalpy & internal energy, types of steam, Introduction & principle of boilers, types of boilers (No sketching of Boilers), Introduction and classification of steam turbines (Impulse & Reaction), Open and Closed Gas turbines, Working of hydro power plant, Classification of Hydraulic turbines, working principle of Impulse & Reaction turbines (Pelton, Francis turbine with simple diagram).

UNIT-II
Refrigeration and Internal Combustion Engines
Introduction to refrigeration, properties of an ideal refrigerant, COP, types of refrigerants, working principle of vapour compression and vapour absorption refrigerators, Classification of IC engines, parts of IC engines (simple sketch), working principle of 4-stroke petrol engine, diesel engine, numerical problems on 4 stroke petrol and diesel engines (power and efficiency calculation).

UNIT-III
Metal joining and Machine Tools
Introduction to metal joining process-permanent & temporary joints, nuts and bolts, metric thread profile. Arc welding (explanation with sketch), brazing, soldering. Introduction to Lathe, parts of Lathe, Lathe specifications, type of Lathe operations (turning, taper turning, thread cutting & knurling). Introduction to drilling machine, classification of drilling machines, radial drilling machine, drilling operations (Boring, counter boring, countersinking, reaming, tapping), Introduction to grinding machine, working principle of cylindrical, surface and centreless grinding (line diagram).

UNIT-IV
Power Transmission
Introduction to power transmission, open and crossed belt drives (no derivations), velocity ratio of belt drive, simple numerical problems, Types of gear drives, simple and compound gear trains, numerical problems on gear ratio, velocity ratio calculation, Introduction to Bearing, Classification of Bearings (Ball & Roller) Lubrication – Types & Examples.
UNIT-V

Mechatronics & Additive Manufacturing
Introduction, definition of mechatronic systems, measurement and control systems, open and closed loop control systems (simple block diagrams), Examples for Open and Closed Loop systems, Introduction to AM - eight step process of AM (detailing not needed), Materials used in AM, Types of AM processes - FFF process and DLP process, Applications of AM in various industries.

[6 hours]

LIST OF EXPERIMENTS

<table>
<thead>
<tr>
<th>No.</th>
<th>Name of the experiment</th>
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</tr>
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<tbody>
<tr>
<td>1</td>
<td>Drilling, Tapping</td>
<td>Fabrication Skills</td>
</tr>
<tr>
<td>2</td>
<td>Thread cutting using Dies</td>
<td>Fabrication Skills</td>
</tr>
<tr>
<td>3</td>
<td>Welding (Lap Joint)</td>
<td>Fabrication Skills</td>
</tr>
<tr>
<td>4</td>
<td>Sheet metal-Development, joints (Funnel)</td>
<td>Fabrication Skills, Apply</td>
</tr>
<tr>
<td>5</td>
<td>Soldering</td>
<td>Fabrication Skills</td>
</tr>
<tr>
<td>6</td>
<td>Demonstration of Additive Manufacturing</td>
<td>Demonstrate</td>
</tr>
<tr>
<td>7</td>
<td>Demonstration of Lathe operations</td>
<td>Demonstrate</td>
</tr>
<tr>
<td>8</td>
<td>Lathe- Model on Plain turning</td>
<td>Demonstrate</td>
</tr>
<tr>
<td>9</td>
<td>Model on step turning</td>
<td>Demonstrate</td>
</tr>
</tbody>
</table>

Text Books:

Reference Books:
3. A Text Book of Elements of Mechanical Engineering – S. Trymbaka Murthy
   I. K. International Pvt Ltd, 2010 - Mechanical engineering
E-Books:
7. Elements of Mechanical Engineering by V. K. MANGLIK https://books.google.co.in/books/about/Elements_of_MECHANICAL_ENGIN_ERING.html?id=QlYorohzY_AC

NPTEL//MOOC:
9. www.distance.lehigh.edu/credit/me.html

Course Outcomes:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>CO’s</th>
<th>At the end of the course, the student will have the ability to:</th>
<th>POs Mapped</th>
<th>Strength of mapping</th>
</tr>
</thead>
<tbody>
<tr>
<td>18ME1ESEME/18ME2ESEME</td>
<td>CO1</td>
<td>Understand the working principles of various mechanical systems.</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>CO2</td>
<td>Identify practical applications of mechanical elements, systems and processes</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>CO3</td>
<td>Distinguish the different refrigeration systems, IC engines, fasteners and power transmission systems</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>CO4</td>
<td>Compute various performance parameters of IC engines, velocity ratio of belt and gear drives.</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>CO5</td>
<td>Impact of Energy sources on Environment and sustainability</td>
<td>7</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>CO6</td>
<td>Develop basic fabrication skills through hands on Laboratory Exercises.</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>CO7</td>
<td>Apply the knowledge of engineering drawing in the fabrication of sheet metal components</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

* * * * *
Course Title: C Programming            Course Code: 18CS1ESCCP/ 18CS2ESCCP
L:T:P: 3-0-1                      Credits: 04
Contact Hours:36                  Hours/Week: 03

Course Objectives:
• To understand basic programming concepts.
• To provide knowledge for problem solving through programming.
• To provide hands-on experience with the concepts.

Note: All the units shall include sample programs.

UNIT -I
INTRODUCTION TO PROGRAMMING     [8 hours]
Introduction to computer software, Program Design Tools: Algorithms, Flowcharts, Pseudo codes, Structure of a C program, Writing the first C program, Keywords, Identifiers, Basic Data Types in C, Variables, Constants, Input / Output Statements in C, Operators in C-Arithmetic, Relational, Logical, Conditional, Type conversion and Typecasting.

UNIT -II
CONDITIONAL AND LOOPING STATEMENTS  [7 hours]
Conditional branching statements, if, if-else, if-else-if and switch statements, Iterative statements, while, do-while and for loop statements, Nested loops, the break and continue statements.

UNIT-III
FUNCTIONS AND ARRAYS            [7 hours]
Functions: Function Declaration/Function Prototype, Function definition, Function call, passing parameters to functions.
Arrays: Declaration of arrays, accessing the elements of an array, storing values in arrays, operations on 1-d arrays – Inserting an Element in an array, Deleting an Element from an Array, searching for a Value in an Array, two-dimensional arrays, operations on two-dimensional arrays – Sum, Difference.

UNIT-IV
STRINGS AND STRUCTURES      [7 Hours]
Strings: Introduction, Operations on Strings – finding the length of a String, converting characters of a string into upper case, Converting characters of a string into lower case.
Structures: Introduction to Structures, Copying and comparing structures, Nested structures.
UNIT-V

POINTERs AND FILE PROCESSing  [7 hours]

Pointers: Introduction to Pointers, Declaring pointer variables, Passing arguments to function using pointers.
File Processing: Introduction to Files, Read Data from Files, Writing data to Files.

Text Books:

Reference Books:

Online References:
VTU e learning,

Concepts of Programming in C Lab

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Develop a program to find the largest of three numbers.</td>
</tr>
<tr>
<td>2.</td>
<td>Develop an interactive program to calculate roots of quadratic equation by accepting the coefficients.</td>
</tr>
<tr>
<td>3.</td>
<td>Develop a program to sum the series: 1/1! + 4/2! + 27/3! +….. using functions.</td>
</tr>
<tr>
<td>4.</td>
<td>Develop a program to insert a number at a given location in an array.</td>
</tr>
<tr>
<td>5.</td>
<td>Implement a program to perform a binary search on 1D sorted Array.</td>
</tr>
<tr>
<td>6.</td>
<td>Develop a program to read a two dimensional array “marks” which stores marks of 5 students in three subjects. Display the highest marks in each subject.</td>
</tr>
<tr>
<td>7.</td>
<td>Develop a program to concatenate two strings and determine the length of the concatenated string.</td>
</tr>
<tr>
<td>8.</td>
<td>Develop a program to read and display the information about a student using structures.</td>
</tr>
<tr>
<td>9.</td>
<td>Implement a program to enter a character and then determine whether it is a vowel or not using pointers.</td>
</tr>
<tr>
<td>10.</td>
<td>Develop a program to read data from the keyboard, write it to a file called “Input”, again read the same data from the “Input” file and display it on the screen.</td>
</tr>
</tbody>
</table>

Mini Projects
1. Implement a commercial calculator to solve simple computational problems using arithmetic expressions (without using built-in math function).

2. An electricity board charges the following rates for the use of electricity: for the first 200 units 80 paise per unit; for the next 100 units 90 paise per unit; beyond 300 units Rs. 1 per unit. All users are charged a minimum of Rs. 100 as meter charge. If the total amount is more than Rs. 400, then an additional surcharge of 15% of total amount is charged. Develop an application to read the name of the user, number of units consumed and print out the charges.

3. Design and implement an interactive application to calculate Semester Grade Point Average (SGPA) of a student in a Semester End Examination (SEE).

Course Outcomes and mapping for the C Programming Course

| CO1 | Ability to describe the basic concepts of C programming |
| CO2 | Ability to apply the knowledge of C programming constructs for a given problem |
| CO3 | Ability to analyse the given problem to determine the output and correctness of the programs given |
| CO4 | Ability to develop C programs to find a solution for the given requirements. |
| CO5 | Ability to conduct practical experiments for demonstrating the features of C programming concepts. |

* * * * *
OBJECTIVES: Kannada Kali is a course for non-Karnataka students. It aims to teach the students about Kannada grammar and vocabulary.

PART-1  [06 hours]

Lesson-1: Introducing each other-1. Personal Pronouns, Possessive forms, Interrogative forms.

Lesson-2: Absolute Ramayana. Possessive forms of nouns, dubitative question, relative nouns.

Lesson-3: Enquiring about a room for rent, Qualitative and Quantitative adjectives.

Lesson-4: Vegetable market, Numeral, Plurals.

PART-2  [06 hours]

Lesson-1: Planning for a picnic, Imperative, Permissive, hortative.

Lesson-2: About Brindavan Garden, Past tense, negation.

Lesson-3: About routine activities of a student, verbal principle, reflexive form, negation.

Lesson-4: About Halebid, Belur, relative, principle, Negation.

OUTCOMES: The course aims to equip students with basic Kannada skills, including grammar, vocabulary, and usage.

TEXT BOOKS: Kannada Kali, Prasangara, Kannada university, Hampi.

Reference Books:
1. Kannada Kali – Dr. Lingadevaru Halemane
2. Spoken Kannada – Kannada Sahithya Parishath, Bangalore.

* * * * *
Course Code | 18HS1NCKAM / 18HS2NCKAM | Course Name | KANNADA MANASU
--- | --- | --- | ---
Credits | 0 | L – T – P – S | 1 - 0 - 0 - 0

12 hours
(ONLY FOR KARNATAKA STUDENTS)

OBJECTIVES: কারণের মাধ্যমে মূলতঃ কেন্দ্রীয় বিষয় ও বিষয়ের সাথে সম্পর্কিত সাধারণতঃ বিষয়সূচী তৈরি করা হয়।

[06 hours]

1. কারণের মাধ্যমে মূলতঃ বিষয়ের সাথে সম্পর্কিত সাধারণতঃ বিষয়সূচী তৈরি করা হয়।
2. কারণের মাধ্যমে মূলতঃ বিষয়ের সাথে সম্পর্কিত সাধারণতঃ বিষয়সূচী তৈরি করা হয়।
3. কারণের মাধ্যমে মূলতঃ বিষয়ের সাথে সম্পর্কিত সাধারণতঃ বিষয়সূচী তৈরি করা হয়।
4. কারণের মাধ্যমে মূলতঃ বিষয়ের সাথে সম্পর্কিত সাধারণতঃ বিষয়সূচী তৈরি করা হয়।

[06 hours]

1. কারণের মাধ্যমে মূলতঃ বিষয়ের সাথে সম্পর্কিত সাধারণতঃ বিষয়সূচী তৈরি করা হয়।
2. কারণের মাধ্যমে মূলতঃ বিষয়ের সাথে সম্পর্কিত সাধারণতঃ বিষয়সূচী তৈরি করা হয়।
3. কারণের মাধ্যমে মূলতঃ বিষয়ের সাথে সম্পর্কিত সাধারণতঃ বিষয়সূচী তৈরি করা হয়।
4. কারণের মাধ্যমে মূলতঃ বিষয়ের সাথে সম্পর্কিত সাধারণতঃ বিষয়সূচী তৈরি করা হয়।

OUTCOMES: করণের মাধ্যমে মূলতঃ বিষয়ের সাথে সম্পর্কিত সাধারণতঃ বিষয়সূচী তৈরি করা হয়।

******

1. করণের মাধ্যমে মূলতঃ বিষয়ের সাথে সম্পর্কিত সাধারণতঃ বিষয়সূচী তৈরি করা হয়।
2. করণের মাধ্যমে মূলতঃ বিষয়ের সাথে সম্পর্কিত সাধারণতঃ বিষয়সূচী তৈরি করা হয়।
3. করণের মাধ্যমে মূলতঃ বিষয়ের সাথে সম্পর্কিত সাধারণতঃ বিষয়সূচী তৈরি করা হয়।

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19
COURSE TITLE: ENGINEERING CHEMISTRY  
COURSE CODE: 18CY1BSCHY/18CY2BSCHY  
CREDITS: 05  
CONTACT HOURS: Theory: 48 Hours. Practical: 24 Hours

Course Objectives:
To impart the knowledge of Chemistry involved in water treatment, electrochemistry, corrosion and its control, conventional energy sources, electrochemical and renewable sources of energy, polymers, nanomaterials and instrumental methods of analysis.

UNIT-I
Water Treatment

UNIT-II
Electrochemistry and Corrosion
Electrodes and cells – Introduction, classification of cells-primary, secondary and concentration cells, reference electrodes—calomel electrode and Ag/AgCl electrode, ion-selective electrode - glass electrode, determination of pH using glass electrode, determination of pKa of weak acids, numerical problems on concentration cells and pH determination.
Corrosion – Definition of chemical corrosion, electrochemical theory of corrosion, types of corrosion - differential metal, differential aeration (pitting and water line corrosion) and stress corrosion, factors affecting the rate of corrosion, corrosion control: inorganic coatings – anodizing and phosphating, metal coatings - galvanization, tinning and electroplating of chromium, cathodic protection.

UNIT-III
Energy: Sources, Conversion and Storage
Chemical fuels - Introduction, calorific value - definition, gross and net calorific values, determination of calorific value of a solid / liquid fuel using Bomb calorimeter and problems on calorific value, petroleum cracking - fluidized bed catalytic cracking, Octane number, reformation of petrol, synthetic petrol – Fischer-Tropsch’s process, power alcohol, biodiesel and hydrogen as a fuel – advantages, production and storage.
Photovoltaic cells – Production of solar grade silicon, physical and chemical properties of silicon relevant to photovoltaics, doping of silicon, construction and working of a PV cell and advantages. Batteries - Basic concepts, classification of batteries – primary and secondary batteries, battery characteristics, modern batteries - construction, working and applications of zinc–air, nickel-metal hydride and Li-ion batteries (one example).
Fuel cells - Introduction, construction and working of methanol-oxygen fuel cell with acid electrolyte.
UNIT-IV

Polymer Chemistry


[9 hours]

UNIT-V

Nanomaterials and Instrumental methods of analysis


[9 hours]

LIST OF EXPERIMENTS

<table>
<thead>
<tr>
<th>No.</th>
<th>Name of the experiment</th>
<th>Skill</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Determination of percentage of copper in brass using standard sodium thiosulphate solution (brass solution to be prepared by weighing brass-making up method).</td>
<td>Alloy composition</td>
</tr>
<tr>
<td>2</td>
<td>Determination of total hardness of a sample of water using disodium salt of EDTA.</td>
<td>Estimation hardness of water</td>
</tr>
<tr>
<td>3</td>
<td>Determination of chemical oxygen demand (COD) of the given industrial waste water sample.</td>
<td>Estimation of Pollutant level in industrial waste water</td>
</tr>
<tr>
<td>4</td>
<td>Determination of pKa of a weak acid using pH meter.</td>
<td>Determination of strength of weak acid</td>
</tr>
<tr>
<td>5</td>
<td>Potentiometric estimation of FAS using standard K2Cr2O7 solution.</td>
<td>Application of different electrodes</td>
</tr>
<tr>
<td>6</td>
<td>Determination of percentage of iron in the given rust solution (using potassium dichromate) by external indicator method.</td>
<td>Corrosion product analysis</td>
</tr>
<tr>
<td>7</td>
<td>Determination of calorific value of a solid fuel using Bomb calorimeter.</td>
<td>Fuel characteristics</td>
</tr>
<tr>
<td>8</td>
<td>Synthesis of polyaniline and its conductivity measurement</td>
<td>Synthesis of conducting polyaniline</td>
</tr>
</tbody>
</table>
9. Estimation of copper by colorimetric method. Absorption spectroscopy

10. Conductometric estimation of HCl + CH₃COOH using standard sodium hydroxide solution Analysis of acid mixture

11. Estimation of sodium in water by flame photometric method Emission spectroscopy

Text Books:


Reference Books:


E-Books:

5. Electrochemistry basics by LibreTexts of UCDavis: https://chem.libretexts.org/LibreTexts/University_of_California_Davis/UCD_Chem_002C/UCD_Chem_2C_Larsen/Chapters/Unit_1%3A_Electrochemistry

NPTEL/SWAYAM/MOOCs:

7. http://nptel.ac.in/
8. https://swayam.gov.in/

Reference Book: (Laboratory)


Course Outcomes:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>CO’s</th>
<th>At the end of the course, the student will have the ability to:</th>
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<th>Strength of mapping</th>
</tr>
</thead>
<tbody>
<tr>
<td>18CY1BSCHY / 18CY2BSCHY</td>
<td>CO1</td>
<td>Describe the principles of Chemistry involved in water treatment, electrochemistry corrosion and its control, conventional energy sources, electrochemical and renewable sources of energy, polymers, nanomaterials and instrumental methods of analysis.</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>CO2</td>
<td>Address the problems based on the learnt chemistry principles.</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>CO3</td>
<td>Apply the acquired knowledge to analyze data, conduct experiments and draw meaningful inferences</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>
Course Objectives:
To introduce fundamental concepts and techniques to analyse the behaviour of electrical circuits. To provide the details regarding principle of operation and methods to evaluate the performance of electrical apparatus. To impart an overview about electrical wiring and protection mechanisms for domestic applications

UNIT-I


DC motors: Construction and principle of operation, back emf, torque equation, types of dc motors, characteristics of dc motors (shunt and series motors only) and applications, illustrative examples.

[7 hours]

UNIT-II

A.C. Fundamentals: Generation of sinusoidal voltage, frequency of generated voltage, definitions and expressions for average value, root mean square value, form factor and peak factor of sinusoidally varying voltage and current, phasor representation of alternating quantity, illustrative examples.


[7 hours]

UNIT-III

Three Phase Synchronous Generator: Basic parts, principle of operation, synchronous speed, frequency of generated voltage, emf equation. Concept of winding factor (excluding the derivation of distribution and pitch factors), illustrative examples.

Three phase AC Circuits: Three-phase balanced circuits, voltage and current relations in star and delta connections. Measurement of three phase power using two wattmeter method, effect of power factor on wattmeter readings, illustrative examples.

[8 hours]

UNIT-IV

Single Phase Transformers: Construction and principle of operation, emf equation, losses, variation in losses with respect to load, efficiency, condition for maximum efficiency, illustrative examples.

[7 hours]
UNIT-V

Three Phase Induction Motors: Concept of rotating magnetic field, construction and working of a three-phase induction motor, slip and its significance, illustrative examples.


LIST OF EXPERIMENTS

<table>
<thead>
<tr>
<th>No.</th>
<th>Name of the Experiment</th>
<th>Skill</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Verification of KCL and KVL for DC circuit.</td>
<td>Conduct and analyse</td>
</tr>
<tr>
<td>2</td>
<td>Measurement of Power and Power factor in a single phase lighting circuit.</td>
<td>Conduct and analyse</td>
</tr>
<tr>
<td>3</td>
<td>Measurement of Power and Power factor in a single phase power load circuit.</td>
<td>Conduct and analyse</td>
</tr>
<tr>
<td>4</td>
<td>Measurement of resistance and inductance of a coil using A-V-W method.</td>
<td>Conduct and analyse</td>
</tr>
<tr>
<td>5</td>
<td>Verification of voltage and current relationship in a Three phase Star connected load.</td>
<td>Conduct and verify</td>
</tr>
<tr>
<td>6</td>
<td>Verification of voltage and current relationship in a Three phase Delta connected load.</td>
<td>Conduct and verify</td>
</tr>
<tr>
<td>7</td>
<td>Measurement of three phase power in star connected load using two wattmeter method.</td>
<td>Conduct and analyse</td>
</tr>
<tr>
<td>8</td>
<td>Measurement of three phase power in delta connected load using two wattmeter method.</td>
<td>Conduct and analyse</td>
</tr>
<tr>
<td>9</td>
<td>The speed versus torque characteristic of a DC Shunt motor.</td>
<td>Conduct and verify</td>
</tr>
<tr>
<td>10</td>
<td>Load test on single phase Transformer</td>
<td>Conduct and verify</td>
</tr>
<tr>
<td>11</td>
<td>Observation of phase differences between current and voltage</td>
<td>Learn</td>
</tr>
<tr>
<td>12</td>
<td>Experiment on safety devices and Earthing</td>
<td>Learn</td>
</tr>
</tbody>
</table>

Text Books:

Reference Books:
E-Book:
6. [http://nptel.ac.in/courses/108105053/](http://nptel.ac.in/courses/108105053/)

ONLINE VIDEO LECTURES:
7. [http://nptel.ac.in/courses/108108076/](http://nptel.ac.in/courses/108108076/)

Course Outcomes:

<table>
<thead>
<tr>
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<th>Strength of mapping</th>
</tr>
</thead>
<tbody>
<tr>
<td>18EE1ESELE/18EE2ESELE</td>
<td>CO1</td>
<td>Understand the basic concepts of DC, AC circuits and Electrical Machines.</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td></td>
<td>CO2</td>
<td>Apply the basic knowledge of mathematics, science and electrical engineering to obtain the desired parameters/performance characteristics of Electric circuits and Machines.</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>CO3</td>
<td>Analyse the behavior of Electric circuits, transformers and Electrical machines.</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>CO4</td>
<td>Conduct a study on safety aspects, wiring and consumption of electrical power in domestic installations.</td>
<td>6</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>CO5</td>
<td>Conduct experiments and study the performance of electrical machines, AC and DC circuits.</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>CO6</td>
<td>Norms of engineering practice for domestic earthing.</td>
<td>8</td>
<td>1</td>
</tr>
</tbody>
</table>

* * * * *
Course Objectives:
Day to day activities of every action follows the fundamental laws of physics. There is a need to know how the laws of physics could be applied to explain these activities. Effects of forces/force systems on an object/engineering structure are to be analyzed under static and dynamic conditions. This course is devised keeping the above objectives in mind.

UNIT-1
ENGINEERING MECHANICS – BASIC CONCEPTS AND RESULTANT OF FORCE SYSTEM
Concept of force, force Characteristics, internal and external force, force system and types of force systems, Principle of Transmissibility of force, principle of Superposition and physical independence, Idealization of bodies-particle, rigid body, continuum, Moment of a force about a point and about an axis, Couple, characteristics of couple. Resolution and composition of force, Numerical problems on resolution and composition of forces. Resultant and equilibrant of force system, Numerical problems on Resultant and equilibrant of force system, Parallelogram law, Triangle law, and Polygon law of forces, Numerical problems on Parallelogram law, Triangle law, and Polygon law of forces, Varignon’s theorem, problems on resultant of coplanar concurrent and non-concurrent force systems by method of resolution.

[12 hours]

UNIT-II
EQUILIBRIUM OF FORCE SYSTEM:
Free body diagram, conditions of equilibrium of concurrent and non-concurrent co planar force system, Lami’s Theorem, problems on particle and rigid body equilibrium; Types of supports in beams; Types of loads. Numerical problems on support reactions in determinate beams and frames. Analysis of plane trusses by method of joints, Numerical problems.

[8 hours]

UNIT-III
FRICTION:
Introduction, coefficient of friction, angle of friction, angle of repose; laws of dry (Coulomb) friction, Numerical problems on single and multi-body system on horizontal planes and incline planes, Numerical problems on wedge friction and ladder friction.

[8 hours]

UNIT-IV
CENTROID AND MOMENT OF INERTIA:
Centroids and centre of gravity of regular geometrical plane areas including parabola, Derivations on centroid of regular geometrical areas by integration, Numerical problems on centroids of composite areas and built up sections. Second moment (moment of inertia) of an area, moment of inertia of regular geometrical shapes by integration method, polar moment of inertia, radius of gyration, Parallel and Perpendicular axis theorems, Numerical problems on moment of inertia of composite areas and built up sections.

[10 hours]
UNIT-V

DYNAMICS:

Text Books:

Reference Books:

E-Books/Resources:
6. VTU e-learning center (Program number 13)
7. NPTEL Lecture Series on Engineering Mechanics, IIT Kanpur

Course Outcomes:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>COs</th>
<th>At the end of the course, the student will be able to</th>
<th>POs mapped</th>
<th>Strength of mapping</th>
</tr>
</thead>
<tbody>
<tr>
<td>18CV1ESENM/18CV2ESENM</td>
<td>CO1</td>
<td>Explain basic terminologies, definitions, laws and principles related to statics and dynamics.</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>CO2</td>
<td>Apply mathematical and engineering fundamentals for solution of coplanar force system, centroid and second moment of composite and built up areas.</td>
<td>PO1</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>CO3</td>
<td>Analyze Engineering problems related to statics, particle Kinematics and Kinetics</td>
<td>PO2</td>
<td>3</td>
</tr>
</tbody>
</table>

* * * * *
Course Objectives:
- To understand the concept of projection systems; standards and conventions.
- To develop the views of basic geometrical entities - points, lines, planes and solids.
- To enhance speed and accuracy in use of drawing instruments and sketching capabilities.
- To acquire the skill of expressing two and three dimensional objects as pictorial views.
- Exposure to engineering communication.

UNIT – I

B: Orthographic Projections
Introduction, Planes of projection, Reference line and conventions employed, Projections of points in all the four quadrants. Projections of straight lines (located in first quadrant and without reference to traces), True and apparent lengths and inclinations to reference planes and application problems.

UNIT – II
Projections of Plane Surfaces in First Angle
Introduction, Projections of plane surfaces: triangle, square, rectangle, rhombus, regular pentagon, regular hexagon and circle in different positions by change of position method.

UNIT – III
Projections of solids in First Angle
Introduction, Projections of regular upright solid: tetrahedron, cube, prism, pyramid, cylinder and cone in different positions by change of position method.

UNIT – IV
Development of Lateral Surfaces of Solids
Concept of section planes (horizontal and vertical traces), Development of lateral surfaces of right regular prisms, pyramids, cylinders and cones resting with base on HP, their frustums and truncations.

UNIT – V
A: Isometric Projection
Introduction, Isometric scale, Isometric projection of simple plane figures, Isometric projection of tetrahedron, hexahedron, right regular prisms, pyramids, cylinders, cones, spheres, cut spheres and combination of solids (maximum of three solids)
B: Use of solid-modelling software for creating cube, right regular prisms, pyramids, cylinders, cones, spheres, and combination of solids (maximum of two solids) and extracting orthographic views, sectional views and Isometric views. Two exercises only.

[1L+4P Hrs]

Text Books:

Reference Books:

Publications of Bureau of Indian Standards

E-Books:
11. Student’s Guide To Learning Solid works Software

NPTEL/SWAYAM/ MOOC:

Course Outcomes:

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<th>POs mapped</th>
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</tr>
</thead>
<tbody>
<tr>
<td>18ME1ESEED/18ME2ESEED</td>
<td>CO1</td>
<td>Draw orthographic projections of basic geometrical entities in various positions and translate the geometric information of engineering objects into engineering drawings.</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>CO2</td>
<td>Create sketches and Isometric projections of solids</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>CO3</td>
<td>Develop lateral surfaces of solids and appreciate their applications in the industry.</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>CO4</td>
<td>Use modern engineering tool (CAD software) necessary for engineering practice.</td>
<td>5</td>
<td>1</td>
</tr>
</tbody>
</table>
COURSE TITLE: Functional English
COURSE CODE: 18HS1NCENG/18HS2NCENG
CREDITS: 00
CONTACT HOURS: 24 Hours

Course Objectives:
• To impart basic English grammar and essentials of language skills
• To train to identify the nuances of phonetics, intonation and enhance pronunciation skills
• To enhance with English vocabulary and language proficiency

UNIT -I

COMMUNICATION:
• Introduction- Role and Importance of English in the Corporate World.
• Communication-Importance of technical communication-levels, flow of organizational communication
• Effective Presentation strategies: non-verbal communication aspects, Preparing Power Point Presentation
• Public Speaking
• Listening-Types, traits and importance of listening
• Telephone Etiquette
• Interviews-types and preparation.
• InterpersonalCommunication Skills –Group Discussion

Additional Reference:
• Communication: Organizational communication, Communication cycle, Barriers
• Language as a tool of communication, characteristics of language
• Non-verbal communication
• Power point presentations
• Traits of a good listener, barriers
• Interviews: questions frequently asked
• Business Meetings/Conferences: Spoken
• Effective reading skills [4 hours]

UNIT -II

Technical Writing / Speaking: Specific Focus
• Letter Writing –Job Applications, E-mails and other Official Letters
• Writing a résumé
• Writing reports and dissertation/thesis-structure and significance
• Description of Graphics -kinds, construction, use and application (in scientific texts) and Interpretation

Additional Reference:
• Paragraph Writing, Expansion of ideas – Précis Writing
• Business Letters: Significance, purpose, structure, layout, types and samples
• Curriculum Vitae/ résumé/bio-data–different formats
Technical Reports: objectives, characteristics and categories
Manuscript format, prefatory parts and main text
Interpretation of the diagrams and graphs in paragraphs
Structure of a Research dissertation/thesis. [4 hours]

UNIT -III
Grammar: Basics and Structures
- Parts of Speech-in brief
- Transformation of Sentences, Active and Passive Voice, Direct and Indirect Speech.
- Subject-Verb Agreement

Additional Reference:
- Nouns, Pronouns, Tenses, Articles and Prepositions. Adjectives, Conjunctions, Adverbs, Interjection
- Degrees of comparison
- Punctuation
- Types of sentences
- Simple-compound and complex sentences
- Rules governing Active-Passive voice and Direct-Indirect Speech
- Singular and plural nouns and verbs. [2 hours]

UNIT -IV
Vocabulary
- Correct pronunciation of important words
- Identifying errors in sentences-often mispronounced and misspelt word
- Difference between American and British English,
- Indianism-Mother tongue influence
- Using Idioms and phrases –words commonly misused and confused
- Analogy of Comparison
- Corporate/conventional idioms.

Additional Reference:
- IPA script chart to read sounds-vowels and consonants
- Spellings chart
- Words often mispronounced
- Homophones and homonyms
- American English- evolution, expressions and slangs
- How American English has influenced corporate world
- Indianized expressions in English
- phrasal verbs and proverbs. [2 hours]

Language Lab
For augmenting LSRW and GV skills (Listening, Speaking, Reading, Writing and Grammar, Vocabulary) through tests, activities, exercises etc., comprehensive web-based learning systems can be referred. (10 levels) [12 hours]
Text Book:
1. Practice and Perfect- a workbook issued by the Department of Mathematics and Humanities, BMS College of Engineering.
2. Additional Reference Source prepared by the Faculty of English-issued by the Department of Mathematics and Humanities, BMSCE.

Reference Books:
5. *English for Presentations* by Marion Grussendorf, OUP, 2015

Course Outcomes:

<table>
<thead>
<tr>
<th>Course Code</th>
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<th>At the end of the course, the student will be able to:</th>
<th>POs mapped</th>
<th>Strength of mapping</th>
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<tbody>
<tr>
<td>18HS1NCENG/18HS2NCENG</td>
<td>CO1</td>
<td><strong>Communicate</strong> effectively and creatively in both non-verbal and verbal forms in various multi-disciplinary activities.</td>
<td>10</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>CO2</td>
<td><strong>Upgrade</strong> organizational skills/traits, team spirit/working in liaison and thus boost professional etiquette and ethics.</td>
<td>9, 10</td>
<td>3, 2</td>
</tr>
<tr>
<td></td>
<td>CO3</td>
<td><strong>Write</strong> effective technical reports, dissertation and project documents and make effective oral and written presentations.</td>
<td>9, 10</td>
<td>1, 3</td>
</tr>
<tr>
<td></td>
<td>CO4</td>
<td><strong>Enhance</strong> employability via training in writing correct and effective Applications/Resumes.</td>
<td>10</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>CO5</td>
<td><strong>Perform</strong> well against Domestic and International Industry Standards via group discussions and Power Point Presentations.</td>
<td>9, 10</td>
<td>3, 3</td>
</tr>
<tr>
<td></td>
<td>CO6</td>
<td><strong>Strengthen</strong> basic grammar components/structures and overcome mistakes/wrong pronunciation and thereby, encourage speaking/writing in flawless English.</td>
<td>10</td>
<td>3</td>
</tr>
</tbody>
</table>

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UNIT-I

LAPLACE TRANSFORMS
Definitions, properties, transforms of elementary functions, transforms of derivatives and integrals. Applications: Evaluation of Improper integrals using Laplace transforms, Laplace transform of Periodic functions and Unit step function. [9 hours]

UNIT-II

INVERSE LAPLACE TRANSFORMS
Inverse Laplace Transforms-properties, inverse transforms of standard functions, \( L^{-1}\left[ \frac{F(s)}{s} \right], L^{-1}\left[ e^{-as} F(s) \right], L^{-1}\left[ F^{(n)}(s) \right] \). Applications: Solution of differential Equations, LRC series circuits and system of differential Equations. [10 hours]

UNIT-III

PARTIAL DIFFERENTIAL EQUATIONS

UNIT-IV

VECTOR CALCULUS
Scalar and vector point functions, Gradient, directional derivative, Divergence, Curl, Laplacian of a vector point function, solenoidal, irrotational vectors. Vector identities: div\(\nabla\times\mathbf{A}\), curl\(\nabla\phi\), div\(\phi\nabla\), curl\(\phi\mathbf{A}\), div\(\mathbf{A}\times\mathbf{B}\), curl\(\nabla\times\mathbf{A}\) and problems on vector identities.
Vector integration: Statement and problems on Green’s theorem, Stokes’ theorem and Gauss divergence theorem (without proofs). [10 hours]

UNIT-V

ORTHOGONAL CURVILINEAR COORDINATES (OCC):
Definitions - Orthogonal curvilinear coordinates, scale factors, base vectors, cylindrical and spherical coordinate systems, expressing a given vector in cylindrical and spherical coordinates.
Expressions for gradient, divergence, curl and Laplacian in orthogonal curvilinear coordinates. [9 hours]
Text Books

Reference Books

E- Books and Online Resources
https://ndl.iitkgp.ac.in/ and
https://www.pdfdrive.com/engineering-mathematics-books.html
https://ndl.iitkgp.ac.in/ and
https://www.pdfdrive.com/engineering-mathematics-books.html

NPTEL/SWAYAM/MOOCs:
7) http://nptel.ac.in/courses.php/
8) https://www.class-central.com/subject/math (MOOCS)

Course Outcomes:

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<tr>
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<th>At the end of the course, the student will be able to:</th>
<th>PO’s</th>
<th>CO-PO Mapping (Strength)</th>
</tr>
</thead>
<tbody>
<tr>
<td>18MA2BSEM2</td>
<td>CO 1</td>
<td>Understand the concepts of transforms, partial differential equations and vector calculus.</td>
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</tr>
<tr>
<td></td>
<td>CO 2</td>
<td>Apply the concepts of transforms, partial differential equations and calculus to Engineering problems.</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>CO 3</td>
<td>Demonstrate an understanding of the Laplace transforms of functions using alternate tools.</td>
<td>5</td>
<td>1</td>
</tr>
</tbody>
</table>

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